4(1)

Government of Andhra Pradesh

Irrigation & Command Area Development Dept.

Report of the Experts Committee on Krishna Delta covering the Districts of Krishna, Guntur and Prakasam to study the problems and suggestions for remedial measures

HYDERABAD
DECEMBER '99

Government of Andhra Pradesh

Irrigation & Command Area Development Dept.

Report of the Experts Committee on Krishna Delta covering the Districts of Krishna, Guntur and Prakasam to study the problems and suggestions for remedial measures

HYDERABAD
DECEMBER '99

LETTER OF TRANSMITTAL

TO

The Principle Secretary to Govt.,
Irrign. & CAD (Dr) Dept.,
Secretariat buildings – J. Block
VII Floor, Hyderabad.

Letter No: CE/DR/OT2/2434/99. Dt: 29.03.99.

Sub: Expert Committee – Constitution of Expert Committee on Drainage problems of Krishna Western Delta-Report submitted—

——— :: ———

Sir,

In G.O.Rt.No.7, I&CAD (Drainage) Dept. dt.2.1.98, Govt. of A.P issued orders constituting an Expert Committee on Krishna delta covering the districts of Krishna, Guntur and Prakasam, along with the under noted officers.

1. Sri Ch. Radha Krishna Murthy,
   Engineer-in-Chief (Irr.& Admn) Retd.
   and Member commissionerate of
   Inquires, G.A.D., A.P. — Chairman

2. Sri M.S.N. Murthy, Chief Engineer (Irr)
   (Retired) — Member

3. Sri K. Koteswara Rao,
   Chief Engineer, (Irr) (Retd) — -do-

4. Administrator cum Chief Engineer,
   CADA: NSRC: Guntur. — -do-

5. Sri V. Lokanadha Rao,
   Suptd. Engineer (Irr) (Rtd) — -do-

6. Sri K. Appa Rao,
   Chief Engineer, Major Irrigation
   and Delta Drainage Schemes, Hyd. — Member-convenor

Sri K. Koteswara Rao, Chief Engineer, (Retired) informed the Government that as he was proceeding to U.S.A. he would not be able to serve the committee and requested his name be deleted.

Government in G.O.Rt.No.567, dt.20.4.98, issued orders appointing Sri M.S.Chalapathi Rao, Chief Engineer (Irr) (Rtd) as member and Sri Chalapathi Rao has been serving on the Committee since then.

The Committee held meetings at the following places and heard the views on various issues raised by M.P.s., local legislators, Presidents of Water user's associations, local officers and other public representatives on the subject. The Committee also received representations from them and other individuals containing their suggestions.

The meetings of the Committee were held on various dates at the places shown below

Sl.No.	Place	Date
1.	Hyderabad	26.02.98
2.	Hyderabad	21.03.98
3.	Vijayawada	10&01.07.98
4.	Hyderabad	08.09.98
5.	Hyderabad	21.10.98
6.	Vijayawada	22.02.98
7.	Vijayawada	28&29.03.99
8.	Hyderabad	05.10.99

The minutes of the Committee's deliberations are appended as Appendix I. The Approach Paper prepared by the Committee in November 1998 is appended as Appendix II.

The Committee benefitted itself by drawing material extensively from various references, (mentioned in chapter II of the Report) the authors of which are acknowledged luminaries in the field.

The committee is grateful to the Govt. of A.P. for entrusting them with the task of preparation of the present report. The Committee also conveys heartfelt appreciation and gratitude for the valuable services rendered by Sri K. Appa Rao Chief Engineer, Major Irr.&DDS, Sri V.Suryanarayana Murthy, S.E., I.C.. Guntur and all the Officers working under them whose zealous, willing and active cooperation made the task of the Committee that much easier in bringing out the report. Special mention is to be made of the untiring

efforts put in by Sri R.Sambasiva Rao, Asst. Executive Engineer of the Drainage Wing, for his valuable services in bringing out this Report, and the Committee is highly thankful to Sri Kakani Venkateswara Rao and Sri V.S.Prakasa Rao Superintending Engineer Irrigation Circle Vijayawada and also Sri K.Purnachandra Rao S.E/N.S.R.C lingamguntla for their active participation and constructive cooperation extended to the Committee.

(sd)Sri Ch.Radha Krishna Murty,
29/3/99
ENGINEER IN-CHIEF(Irr)
MEMBERCAD(Rtd)
CHAIRMAN-EXPERT COMMITTEE

(sd) Sri K.Appa Rao
CHIEF ENGINEER/
MAJ.IRR. & DDS
MEMBER - CONVENOR

(sd) Sri M.S.N.Murthy,
29/3/99
CHIEF ENGINEER/Rtd.
MEMBER

(sd)Sri M.S.Chalapati Rao,
29/3/99
CHIEF ENGINEER/Rtd.

(sd)Sri V.Lokananda Rao,
29/3/99
SUPERINTENDING Rtd./
MEMBER

(sd)Sri M.Radha Krishna,
29/3/99
Adminstratoreum-
Chief Engineer/NSRC: CADA
Guntur
MEMBER

EXPERT COMMITTEE'S REPORT

INDEX

REPORT OF THE EXPERT COMMITTEE ON DRAINAGE PROBLEMS OF KRISHNA WETERN DELTA

CHAPTER-1

INTRODUCTION

1.1 CONSTITUTION OF EXPERT COMMITTEE

The rich coastal areas of Andhra Pradesh in the districts of Guntur and Prakasam are subject to floods every year due to cyclones. The vast stretches of area under Nagarjunasagar ayacut lack any regulated drainage system, resulting in inundation of entire Krishna Western delta. Bapatla and Chirala areas are the worst affected. Due to poor and inadequate maintenance of the existing drains, the problem is further aggravated. During the meeting held by the Hon'ble Minister for Major & Medium Irrigation with the M.L.As of Krishna, Guntur and Prakasam Districts on 27.11.1997, it was resolved to constitute an Expert Committee to study this problem and suggest suitable remedial measures. The Govt. of Andhra Pradesh in G.O.Rt.No.7, I&CAD (Dr) Dept., dated 2.1.1998 constituted the Expert Committee on Krishna Delta covering the districts of Krishna, Guntur and Prakasam duly identifying the terms of reference for making a study.

The committee comprised of the following Officers.

1. Sri Ch.Radhakrishna Murthy, Engineer-in-Chief (Retd). — CHAIRMAN
2. Sri M.S.N.Murthy, Chief Engineer (Retd). — MEMBER
3. Sri K.Koteswara Rao, Chief Engineer (Retd). — MEMBER
4. Sri V.Lokanatha Rao, Superintending Engineer (Retd). — MEMBER
5. Administrator-cum- Chief Engineer, CADA, NSRC., Guntur — MEMBER
6. Chief Engineer, Major Irrigation and D.D.S., A.P., Hyderabad — MEMBER & CONVENOR

1.2.0 Sri K.Koteswara Rao, Chief Engineer (Retd) informed the Government that as he was proceeding to U.S.A., he would not be able to be in the Committee and requested that his name be deleted.

Sri M.S.Chalapathi Rao, Chief Engineer (Retd) was appointed as MEMBER in G.O.Rt.No.567, dated 20.4.1998 and he has been serving on the Committee since then.

1.2 TERMS OF REFERENCE

The terms of reference for the above constituted committee are as follows: —

(i) Disposal of Nagarjunasagar Project drainage without affecting the Krishna Western Delta ayacut.

(ii) Improvements to E.T.B., Nallamada and Romperu Basins to relieve drainage submersion.

(iii)Safety measures to Commamur canal.

(iv)Make recommendations on the action to be taken to improve the drainage system in consultation with public representatives.

CHAPTER-2

2.1 ANDHRA PRADESH STATE WITH SPECIAL REFERENCE TO KRISHNA DELTA

2.1.1 LOCATION

The State of Andhra Pradesh is situated on the Eastern side of the Indian Peninsula between longitudes 76^0-50' E and 84^0–50' E and latitudes 12^0–14' N and 19^0–54' N. The State has an area of 2,75,005 sq.Km and a population of about 66.508 Millions (1991 census). Andhra Pradesh is the fifth largest State in area and the fourth most populous State of India.

2.1.2 TOPOGRAPHY

Geographically the State can be divided into three natural regions.

(a) The Coastal Plains

(b) The Eastern Ghats, and

(c) The Peneplains

2.1.2.1 THE COSTAL PLAINS

Andhra Pradesh State has a long coast line, popularly known as the COROMANDAL COAST, extending from Pulicat lake in the South on the border of Tamil Nadu State upto Rushikulya in the North at the border of Orissa State. The area for a considerable distance inland, comprises chiefly of mangrove swamps and sand dunes rising from 9 metres to 15 metres above sea-level. The two deltas formed by the mighty Krishna and Godavari rivers, both flowing into the Bay of Bengal cutting across Eastern Ghats, lie in between the swamps and the upland areas. The Krishna Delta starts from below Vijayawada, 72Km. inland, where the river Krishna cuts a gap through a gneissic ridge. The land in the Krishna Delta is very fertile with predominently irrigated paddy crop grown over an extent of nearly 5.56 lac hectares. The slope of the country is, however, varying from 1 in 4200 at the head of the delta to 1 in 7500 in its lower part and this flat gradient of land is mainly responsible for its poor drainage characteristics.

2.1.2.2 THE EASTERN GHATS

This is a range of scattered hills running more or less parallel to the coast line at a distance of about 130 Km away from it in the interior. This forms the boundary between the peneplained Deccan Plateau area and coastal plains. Some of the hills in this range

reach an elevation of +910 metres to +1520 metres above M.S.L. A number of medium sized coastal rivers such as Budameru, Thammileru, Yerrakalva, Thandava, Varaha etc. originate from these hills and flowing Eastward join the Bay of Bengal, either through the Kolleru lake of directly. The three major rivers of the State ie., Krishna, Godavari and Pennar make their way into Bay of Bengal cutting wide gaps through this hill range.

The Krishna river rising in the Western Ghats at an altitude of +1337M above MSL after flowing down for a distance of 778 Kms. within both Maharastra and Karnataka States enters Andhra Pradesh. In Andhra Pradesh, the river enters the plains of Coromandal coast at Pulichintala nearly 1200 Km. from its source at an elevation of +36.5M above M.S.L. reaching Vijayawada lower down after a further flow for 104 Kms. At Vijayawada, the river flows through the gap of about 1.2 Km between two hills. Beyond this point stretching away on both sides of the river lies a wide alluvial plain known as Krishna Delta. The delta is irrigated by canals, taking off on either side of the Prakasam Barrage at Vijayawada. After Vijayawada, the river continues in a single channel for about 64 Kms. where it throws to its left a branch known as Puligadda arm forming the Divi Island. Thereafter the main stream continues for another 24 Kms. and thus after a total run of 1392 Kms. it breaks up into 3 branches separated from one another by Islands and joins the Bay of Bengal. The total run of the river in Andhra Pradesh is 573 Kms.

2.1.2.3 THE PENEPLAINS

The Peneplains lie to the west of the Eastern Ghats and comprise a part of the Deccan Plateau with its elevation varying from +710 metres to +122 metres; some parts are, however, more than +710 metres above M.S.L. The landscape presents reddish or brown plains with scattered throny shrubs and the rivers are practically dry for more than six months. Dotted in this region are 9 Nos. of storage tanks with considerable area being irrigated under them.

2.1.2.4 CLIMATE

There are three seasons in Andhra Pradesh, the Hot summer followed by tropical monsoon and pleasant winter. The summer extends from March to June, monsoon from July to November and winter from December to February. The maximum temperature varies from 38^0C to 49^0C, May being the hottest month.

2.1.2.5 STORMS & DEPRESSIONS

The average rainfall of Andhra Pradesh is about 925 mm according to hand book of statistics (92-93). There are two monsoon seasons, ie., South-west monsoon from middle of June upto September and North-East monsoon from beginning of October upto December.

The storms and depressions which develop in the Bay of Bengal during monsoon season, move across the coastal areas of Andhra Pradesh causing heavy to very heavy rains.

Andhra Pradesh has 1030 Kms. of Coastal line. This coast line being the most cyclone prone zone in India was hit by 57 cyclones since 1900 AD. According to one study, tropical stones originating from Bay of Bengal strike the densely populated parts of the Indian east coast causing serious floods resulting in disastrous situations.

STORMS & DEPRESSIONS IN BAY OF BENGAL
DURING THE PAST 80 YEARS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Depressions	5	2	1	8	17	35	71	94	91	56	32	18	430
Storms	3	0	2	11	10	30	31	24	19	34	33	17	214
Severe Storms	1	1	2	7	18	4	7	1	8	19	23	19	110
Total	9	3	5	26	45	69	109	119	118	109	88	54	754

The storms and depressions on the East coast of India are very frequent and severe in nature. They vary in size from 60 Kms. to 240 Kms. in diameter and have different intensities and core wind velocities some times reaching upto 325 Kmph. Their intensity is measured by the deficiency of the central pressure in the core or eye of the storm. They cause very extensive rainfall over large areas unlike West coast storms. High intensities of 300 to 400 mm depth of rainfall per day have resulted over several thousand Sq.Km. of the areas. Nearly 50% of the storms on East coast occur along the Andhra Coast causing

very severe storm tides flooding the rich Krishna and Godavari deltas with catastrophic disasters in their wake. The factors causing high storm tides are:

(i) Steep bend in mid-coast-line

(ii) Flatness of continental shelf, and,

(iii)Acute angle of storm attack.

The shelf slope is about 1 in 70 in Andhra coast and on the Tamil Nadu coast the shelf is relatively flatter at 1 in 90 and the storms are of smaller size.

In the North Coastal Andhra Pradesh most of the cyclonic storms occur in the month of October and November. In October the storms generally originate between latitude 8^0 N to latitude 14^0 N and move initially in a North West direction and a number of them recurve and move Northeast. These cyclonic storms together with high tides can cause overtopping of the protective dykes leading not only to destruction of the standing crops but also turning the soils saline. The devastation caused by the killer cyclone that hit coastal Andhra Pradesh in 1977 is an unforgettable catastrophic event. The accompanying concentrated heavy rainfalls cause acute drainage problems.

2.2 IMPORTANT RIVERS OF ANDHRA PRADESH

40 rivers, big and small, flow through the State. Out the total 40 rivers, 12 rivers are inter-State rivers. The most important of these are Krishna, Godavari and Pennar. Andhra Pradesh is the lowest riparian State and these interstate rivers after flowing through the State empty into Bay of Bengal. The other 28 rivers are not inter-State and flow with in the State boundaries.

2.3 DELTA AREAS

The word, "Delta" is very loosely used. A delta is caused due to settlement of sediments brought in by the river. The process of such deposition goes on for ages, and results in building up of the delta. Krishna and Godavari deltas, though popular as deltas, do not fit into this definition.

The areas commanded by the Commamur canal in Guntur and Prakasam districts and likewise considerable part of the ayacut under Krishna-Eluru canal, Godavari-Eluru canal do not constitute a part of the delta. The areas cover by sand dunes and some areas close to the sea also cannot be defined as delta areas. However, customarily-even from

the days of British Engineers-all the areas have been grouped into one category "Delta" which had come to stay.

2.4 KRISHNA DISTRICT

The Krishna District is situated between NL $13^0 43'$ and NL $17^0 10'$ and EL $81^0 33'$ and EL $80^0 0'$. The Krishna District consists of:

a) Delta comprising Bandar, Divi, Gudiwada, Kaikaluru and portions of Vijayawada and Gannavaram Mandals.

b) Uplands comprising Nandigama, Jaggaiahpeta, Tiruvur, Nuzvid and Upland portion of Vijayawada and Gannavaram Mandals.

2.4.1 KRISHNA DELTA

The Krishna Delta area is broadly divided into:

a) KRISHNA EASTERN DELTA

The irrigated ayacut in Krishna Eastren Delta is about 1.81 lac Ha. A portion of this ayacut drains into Kolleru lake of Upputeru river joining the sea. However, some of the most important drains viz., Lazzabanda, Sivaganga and Gunderu join the Bay of Bengal directly.

b) KRISHNA CENTRAL DELTA

This is between the main river and Puligadda arm of the river. There is no upland drainage and the entire drainage is deltaic. The ayacut in the Krishna central delta is about 1.17 lac. Ha.

Both the Krishna Eastern Delta and Krishna Central delta lie in Krishna District.

c) KRISHNA WESTERN DELTA

The total ayacut of 2.31 lac. Ha. in this part of the delta is spread in Guntur and Prakasam Districts. The ayacut area in Guntur District is about 2.02 lac. Ha. and the balance extent of 0.29 lacs. is in Prakasam District.

CHAPTER-3

IRRIGATED AGRICULTURE

Agriculture occupies a key position in the Indian economy because of its tribution to the over all economic growth through supplies of food-grains, raw- erials etc. Majority of the population has agriculture as their livelihood. Agriculture provides a large market for non-agricultural goods and services. It is a matter of mon observation that the economy fluctuates with the agricultural production in the and our country as well. Sustained agricultural production over a period is effective ontrolling the consumer price index.

1 PRIMICY OF IRRIGATION FOR AGRICULTURAL PRODUCTION

The key input for improved agricultural production is irrigation water. Irrigation ces in the past comprised predominantly of wells, tanks and some small reservoirs, ity canals from diversion works on rivers. In pre-independent India, the policy all g then was to provide protective irrigation. Post independent India witnessed a ntum jump in the development activities including irrigation. The Government as a fare measure took-up developmental activities on a large scale through a series of ns". The preplan irrigation potential was only 22.6 M.Ha. which leaped to 68 M.Ha. ix "plans". A very happy development in the field of food grain production, which ost trebled in the above period, has been directly attributable to increase in irrigated

WATER RESOURCES FOR IRRIGATION

The total annual surface flow in our country is assessed at 178 M.Ha. metres. vever, the topographical limitations, climatic conditions, geographic constraints and y the level of present technology impose some restrictions on the total cultivation.

AREA CULTIVATED

Out of the total geographical area of 329 M.Ha. the cultivable area, net sown area, gross cropped area are 186 M.Ha., 143 M.Ha., and 175 M.Ha., respectively. All the ivable area cannot be brought under irrigation. Though an area of 186 M.Ha. could be le available for cultivation, this could be considered possible only when all out efforts made for reclaiming saline and alkaline lands. This may take a long time. However,

the water resources as available at present for agriculture are limited to irrigate only 113 M.Ha. which could at best be touched by about 2010 AD.

The ultimate irrigation potential of Andhra Pradesh through schemes utilising both surface and ground water was assessed to be 118 M.Ha.

3.4 EXPANSION IN IRRIGATED AREA

Any horizontal expansion in irrigated area is not possible in all the regions. Vertical expansion or multiple crops are the only hope for meeting the requirements of agricultural production in the country. It is, therefore, of inescapable necessity that by the use of modern technology and efficient water management practices, increase in productivity is aimed at from the irrigated lands. Because of improper and inefficient use of irrigation water, sizeable areas are losing productivity on account of water logging and salt related problems. Improvement of drainage in irrigated areas is, therefore, imperative and of paramount importance.

3.5 WATER LOGGING AND DRAINAGE IN IRRIGATED AREAS

A properly designed drainage system is the most efficient answer to water logging. Water logging would not have attained menacing levels of its present status, if due attention was paid earlier to drainage along with irrigation. In advanced countries, drainage is always considered as an integral part of the irrigation. In Germany no irrigation project is taken up without drainage. The behaviour of ground water levels after introduction of irrigation needs study. The observations are to be made twice in a year ie., in June and October. As far back as in 1972, Irrigation Commission also recommended such a measure. Surplus water is as harmful to crops as inadequate water.

During rainfall or application of irrigation water the fields get wet. The water in filtrates the soil and is stored in its pores. When all the pores are filled, the soil is saturated and in such condition water starts accumulating in pools on the surface of the ground as well as going to the drains in the area. After the cessation of rains or stoppage of irrigation supplies, part of the water present in the saturated top soil moves downward called Percolation-the process of which continues even when there is no more water left on the ground surface. Plant roots require aeration as well and most plants cannot withstand extended periods of saturated soils in their route zone.

3.5.1 Water logging could, therefore, be defined as the retention of areas under water for a considerable period causing severe damage or complete loss of crop. National Commission on Agriculture (1976) defined as area water logged when the water table rises to an extent that the soil pores in the root zone of a crop become saturated resulting in restriction of the normal circulation of air, decline in the level of oxygen and increase in the level of carbon dioxide, as organic matter decomposes with the saturation of the soil. The cutting off or depletion of the oxygen supply to plant roots results in witting and ultimately in the death of the plants. Water logging is said to be present when the ground water is within one metre from the ground surface.

3.5.2 When the total quantity of water introduced into soils from different sources exceeds the total quantity disposed off (through natural drainage process and the use by crops to meet their evapotranspirational requirements) the water table will rise.

3.5.3 Thus, a simple and yet a comprehensive definition of adequate drainage could be the removal of excess water and salt from the soil at a rate which will permit normal plant growth. The prime objective should be to design and construct a drainage system keeping the following factors in view.

3.5.3.1 FACTORS INFLUENCING DRAINAGE

(a) TOPOGRAPHIC FACTORS

These are of prime importance in drainage. Where surface slopes are sufficient, any excess precipitation, irrigation water and canal wager will flow away rapidly from the area thus resulting in diminishing percolation.

(b) SOIL FACTORS

Soils are the result of a complicated geological process. Knowledge of the presence of soil barriers or hard pans in the soil profile is an important factor. The hard pans restrict the movement of water thus causing water logging. Generally coarse textured soils drain better than fine textured soils although texture is not necessarily related to permeability. In most irrigated areas, the soils are formed into complex profile patterns; stratified sand, silts and clays are commonly found. Fine textured clay layers are often underlain or overlain by coarse textured sands.

(c) **WATER AND CLIMATIC FACTORS**

The common sources of water logging causing major concern in drainage problem areas are (1) precipitation (2) Irrigation, and (3) Seepage with hydrostatic pressure manifest in various forms. Thus, if excess water is due to precipitation, better surface drainage could be the remedial measure; if due to canal seepage, a seepage or interception drain is indicated and if due to artesian pressure, pumped wells may provide the remedy.

3.6 The tolerance of various crops to submersion engaged the attention of agriculture scientists and their studies seem to have revealed as under.

PADDY : Most tolerant at initial and maturity stages but least tolerant at tillering and grain formation stages.

WHEAT : Analysis of data from Punjab indicates that submergence of wheat crop for 2 days reduces the yield by 10%, for 4 days reduces the yield by 25% and for 5 days reduces the yield by 50%.

MAIZE : Submergence in initial stage is more harmful compared to later stages of growth.

COTTON : Gujarat studies indicate that loss of yield is quite significant if submergence occurs within 50 days after sowing; the first 10 days of submergence could mean total loss of crop.

GROUND NUT : Pod development stage is more sensitive to submergence. Uttar Pradesh studies reveal that the crop can tolerate 3 days of submergence without significant loss of crop.

TREES : Forest trees are more tolerant to water logging than horticulture plants. Pear is, however, reported to be quite tolerant. Apricot, plum and peach die within a few days of submergence (Likry 1938). It is generally understood that damage to fruit trees is maximum when flooding occurs during active growth stage.

EXOTIC EUCALYPTUS	:	Can withstand flooding for longer duration and of greater depth.

(Source – Hand book of drainage of irrigated areas in India – Technical report No.5 – WAPCOS – March, 1988)

CHAPTER-4

4.1 HISTORICAL REVIEW OF THE DRAINAGE PROGRAMMES IN AP

Irrigation through large tanks and open head channels was well developed in AP over a long time. The "Drainage" aspect was not thought of then, as it was not a problem in view of limited extent of agriculture. Only during the later part of the 19th century, when irrigation was taken up by harnessing Krishna & Godavari waters on a large scale, it was realised that "Drainage" is a necessity.

4.1.1 The first known "Drainage scheme" is learnt to have been taken up in Krishna Dist. In 1929, when the "Pedalanka Drain" infalling into Upputeru was diverted to Bay of Bengal through a straight cut. "Repalle main drain" straight cut (KW Delta) to Bay of Bengal and "Nalmada Drain" joining the Bay of Bengal through a straight cut called "Nalmada diversion" followed later.

4.1.2 The "Romperu drainage" scheme in Prakasam Dist. taken up during post second world war period to provide employment for demobilised army personnel proved highly beneficial relieving vast extents of submersion besides bringing thousands of acres of waste lands under cultivation.

4.2 DRAINAGE CESS ACT

Proposals for the levy of a special drainage cess for attending to the drainage problems of the deltas of Krishna and Godavari was first mooted in 1950 and once again in 1955. The A.P. Irrgn. (Levy of Betterment Contribution) Act was enacted in 1955, but does not appear to have been implemented. The situation arising in the wake of the unprecedented and disastrous floods in this region between 27.9.1964 and 1.10.1964 drew the at tension for an immediate solution to the recurring problem.

4.3 CONSTITUTION OF AN EXPERT COMMITTEE

The Government of India, Ministry of Irrigation and power vide resolution No. V.501 (4)/64 dated 9.10.1964 constituted an "Expert Committee" under the chairmanship of Sri A.C.Mitra, Engineer-in-Chief of U.P., to study the flood and Drainage problems in the Krishna and Godavari deltas for suggesting a comprehensive plan for controlling the same. The Expert Committee popularly known as "MITRA COMMITTEE" submitted its

report on 6.1.1996 to Government of India. A number of recommendations were made, out of which a few notable ones implemented are set out in Chapter 8.

4.4 DRAINAGE CESS ACT

The Krishna Godavari Drainage Cess Act was enacted in 1968 to raise necessary funds to implement a comprehensive drainage plan based on the recommendations of the Mitra Committee. The Krishna and Godavari Delta Drainage Board was formed on 6.11.1969 for formulating the programmes and review the progress in execution of works. The State Government accorded administrative approval in G.O.Ms.No.1599 PWD dt.21.11.1969 for Rs. 13.39 crores to implement those schemes that were of immediate importance. The Drainage cess was collected upto 1979 and improvements to the drains that were possible to the extent of availability of funds were carried out.

4.5 DRAINAGE ACTS

For pooling up of resources, the Government of Andhra Pradesh once again enacted the Krishna, Godavari and Pennar Delta Drainage Act, 1985 (Act No.26 of 1985) and A.P. Non-delta Drainage Cess Act, 1986 (Act No.20 of 1986). Each Act was for a duration of five years initially. No substantial work could be taken up as the funds raised were found to be meagre due to some concessions by way of remissions granted by the Government.

4.6 REPORT OF DR. K.SREE RAMAKRISHNAIAH

In the wake of the severe floods in 1986, and in view of the large extent of the devastation caused thereby, Government of Andhra Pradesh appointed Dr. K.Sree Ramakrishnaiah, Officer on Special Duty, Telugu Ganga Project to prepare a "Comprehensive Report of Drainage Schemes of Krishna, Godavari Deltas and Pennar Irrigation System". The report was submitted during 1987 but could be implemented only to the extent of yearly grants permitted to the Drainage Unit. The floods of 1988 and 1989 further damaged the drainage system.

4.7 CYCLONE EMERGENCY RECONSTRUCTION PROJECT

The Irrigation and drainage system received a severe battering due to the cyclone of May, 1990. Colossal damage to the infrastructure in several sectors in all the nine coastal districts of A.P. was caused . The estimated damage to the Drainage and irrigation sectors was of the order of Rs. 172 crores. World Bank Assistance to an extent

of Rs. 211 crores was received in a big way for "Cyclone Emergency Reconstruction Project"(CERP). With the Rs.211 crores earmarked for Drainage and Irrigation under C.E.R.P. improvements in the following areas were proposed.

(a) Improvement to Major & Medium drains

(b) Improvements to Irrigation canals.

(c) Strengthening/Reconstruction of structures.

The district-wise details of drains, Flood and Tidal banks taken up the six coastal districts are as follows.

(Rs. In Millions)

Sl.No.	District	Major drains	Medium drains	Flood banks	Tidal banks	Canals	Structures	Total	Remarks
		Nos	Nos	Nos	Nos	Nos	Nos	Rs.	
1.	Visakhapatnam	-	-	2	-	-	5	99.10	
2.	East Godavari	19	41	-	2	8	40	638.40	
3.	West Godavari	26	59	2	-	2	40	815.30	
4.	Krishna	14	44	2	4	17	42	769.30	
5.	Guntur	21	45	4	1	3	13	493.00	
6.	Prakasam	17	11	-	-	1	1	120.10	
	Total :	97	200	10	7	31	141	2935.20 Millions	

CHAPTER-5

5.1 DRAINAGE : AN OVER VIEW

5.1.1 Drainage congestion in the delta and non-delta areas remains as unsolved problem. Adequate attention was not paid to this important discipline of water management even upto 1970 albeit considerable improvements were carried out since. The completion of the Nagarjunasagar project with its canal network has contributed to the aggravation of the problem in certain parts of delta and non-delta areas alike. The heavy to very heavy rainfall intensities during the years 1983 & 1986 caused substantial harm by way of large scale loss of crop.

5.1.2 Drainage works are being executed, by far, adopting some ad hoc procedures. Proper technology could not be evolved inspite of an abundance of theoretical information, and drainage remained a practical science because the characteristics of the drains, the contributory factors such as topography varied from place to place.

5.1.3 Atleast since 1970, there have been enough scope and time to collect field data on the performance of the drains in our State to aim at evolving a proper technology. Unfortunately, the data has not been collected and what little is collected is not processed. It is pertinent and relevant to note here that as far back as 1965-1966, the Mitra Committee report recommended the need that "discharge observations be made for some years on representative typical drains in the various deltas. These may be correlated with rainfall intensities and quantities. Based upon these results the value of coefficients and constants in the formulae in vogue (the then formulae in vogue) be fixed". It is interesting to note that the above recommendations were made by the Mitra Committee while specifically adverting to the design criteria for drains in deltaic areas.

CATCHMENT DETAILS OF DRAINS IN KRISHNA DELTA

	Western Delta	Central Delta	Eastern Delta
	sq.miles	sq.miles	sq.miles
a) Major drains	3542	106	2320
b) Medium drains	405	149	335

CHAPTER-6

TIDAL EFFECT

6.1 TIDES

6.1.1 Tides are generated in the Bay of Bengal and Arabian Sea by the forces of attraction of Sun and Moon on the rotating Earth. The effect of tide is noticeable in a regular alternation of rise and fall of water level in the sea, the estuarine channels and creeks. The rising of the tide is called the "Flood tide or flow tide"; the falling face of the tide is "Ebb tide" and the difference between the highest water level and the lowest water level is called the "Tidal range".

6.1.2 The tidal phenomenon in Bay of Bengal was subjected to a detailed study and the tidal level on any day are predicted and published by the Calcutta Port Trust. The tidal range at any location fluctuates steadily and gradually in accordance with the movement Moon. The tidal range at the time of Full Moon and New Moon is found to be the maximum. This phase is called the "Spring tide" after the occurrence of the spring tide, the tidal range starts diminishing till the occurrence of "Neap tide".

6.2 H.T.L. & L.T.L.

6.2.1 Most of the drains join the Bay of Bengal directly or through the back waters. Some lengths/reaches of each drain are therefore, subjected to tidal action. The length in which the tidal action is noticed varies from month to month and even from day to day. The current practice is to consider about 12 to 15 Kms as the tidal reach, on an ad hoc basis. The tidal range ie., difference between high tide level and low tide level is known to vary from "Zero" at Kanyakumari upto 6 M. at the Northern most part of the Bay of Bengal where as the current practice in Andhra Pradesh for fixing the maximum flood level in drains is to take HTL of 1.07 M (3.25 feet) in Prakasam and Guntur Districts and 0.92 M. (3.00 feet) in Godavari District. This practice does not seem to be based on any study. When the difference, ie. Tidal range, increases from South to North, what is being adopted now is the reverse of the same. The relevance of these levels is:

a) The high tides determine the standard of the Tidal banks and

b) Low tides to locate the sill and standards of the outfall sluices., and hence, there is a great need to study this aspect in considerable detail, revise the present norms on a rational basis rather than adhocism.

6.2.2 One is not certain when floods occur during the four month period of the monsoons and also whether the occurrence of floods coincides with the full moon/new moon periods. It, therefore, becomes necessary that some compromise may have to be made in deciding what HTL, & LTL, are to be considered for purpose of drain design. One possible course of action in study may be that one has to take the average of the highest HTL and the lowest LTL during the four months monsoon period.

6.2.3 WAPCOS a Government of India undertaking are said to have studied the drainage problems and hence, their study may perhaps be considered to evolve a rational method in consultation with that organisation.

CHAPTER-7

KRISHNA WESTREN DELTA CANAL SYSTEM (KW)

7.1 GENERAL DESCRIPTION

The Krishna Western main canal and its system were originally meant to irrigate an extent of 2.14 lac ha. The present total ayacut in Krishna Western delta is around 2.31 lack ha. The Krishna Western delta is supplied with water through the Krishna Western main canal head sluice at Seethanagaram on the right bank of River Krishna.

7.2 HEAD SLUICES

7.2.1 The old head sluice of Krishna Western delta was built along with the old anicut by Capt. ORR and completed in 1855 AD. This "Old head sluice" is a structure with 15Vents of 6' X 9'-6" with sill level at EL + 39.95 feet. (This is called the "Old Head sluice". This structure was contemporaneous with the old anicut and the K.E.Head sluice which collapsed prior to 1905 AD).

7.2.2 In accordance with the practice in vogue in those days, the head sluices on either side of the anicut were built in proximity to the scouring sluices. The K.E. main canal head sluice (Vijayawada side) was built almost normal to the scouring sluice on the Vijayawada side. The K.W. main canal head sluice (Seethanagaram side) was also built almost normal to the scouring sluice on the right side. In 1895, the head sluice [being referred hereafter as the "Old head sluice"] of the K.W. main canal cause anxiety due to the appearance of cracks and signs of distress. Therefore, another set of a sluices was constructed as ancillary to the "Old head sluice" about 61M down stream of the "Old Head Sluice". The ancillary one would still be available to take over the functions of the old structure in case of its failure. This "new head sluice" ie., the ancillary structure built 61M downstream of the "Old head sluice", was completed in 1898 AD. The "Old head sluice" is still at the site. A pond is thus formed between the "Old head sluice" and the ancillary structure. This pond contributes to the stepping down of the difference in level between front and rear water levels during the maximum flood in Krishna. The particulars of the ancillary structure (which incidentally is now 100 years old) and the Hydraulic particulars of the K.W. main canal are:

Structure	:	In masonry with 16Vents of 8'-0" X 9'-6"
Sill level	:	EL +12.35M (+40.50 ft.)
Present ayacut	:	2.31 lac ha.
Designed discharge	:	188.17 cumecs (6640 cusecs)
Front FSD	:	+17.39M (+57.05 ft.)
Rear FSL	:	+16.31M (+53.50 ft.)
Bed width of canal	:	+69.51M (+228 ft.)
Bed level of canal	:	+12.55M (+40.50 ft.)

7.3 CANAL SYSTEM

7.3.1 On either side of the river below the old anicut were deltaic channels, perhaps the trace of the ancient bed of the river or perhaps drainage channels cut by floods or perhaps artificial channels. By means of these channels water was reportedly drawn from the river and stored for irrigation in small tanks formed on the deltaic slopes. One of these deltaic channels, the Tungabhadra, Commenced close to Sitanagaram and after a tortuous course entered the Bay of Bengal at Nizamapatnam

7.3.2. As soon as the old anicut was built and the Sitanagaram head sluice commissioned, water was let into the Tungabhadra channel, and so was available immediately for irrigation. The Tungabhadra channel for several miles of its course was widened and continued for another 6 miles due south to Duggirala. This total stretch of 13 miles is called the "main canal". At the 12th mile is the head-lock of Commamur canal and at the 13th mile is the new lock of Nizamapatnam canal

7.4: KRISHNA WESTERN MAIN CANAL

7.4.1 As stated above, the 21 KM stretch (13 miles) is called the K.W. main canal. The West main branch high level channel existing today takes off towards its left between the 9th and 10th KM. The K.W. bank canal existing today takes off to the left of the main canal from Revendrapadu between 11th and 12th Km. Though the 21 KM length of the canal is named the K.W. main canal, yet there seem to be some confusion arising from old records terming it as the Nizampatnam canal.

7.4.2 In 1856 AD, it was proposed to take off from the K.W. main canal to its left a channel (Similar to Krishna-Eluru canal) so as to shift the K.W. delta and to cross the drainage from the uplands of Guntur and Narasaraopet Taluqs. This proposed channel was even christened (astoundingly as) "Krishna-Kurnool canal" perhaps with the view that it might meet the Kurnool Cuddapah canal (K.C.canal) at the river Pennar. The take off proposed was about 9.6KM below Seethanagaram.

It was to take off in a Westerly direction around the foot of Mangalagiri hill, pass about 3 miles south of Guntur and meet the East coast canal (Buckingham canal) near about Inkollu. This canal appears to have been excavated upto Namburu and even irrigated some extent of land in Fasli 1267-8. The fall was half inch per mile (about 1 in 30,000) and hence, this canal was not well adopted for Irrigation and hence, this line was completely abandoned in favour of Commamur canal.

SOURCE : Krishna Dist. Gazette by Mackenzie.

7.5 KW BANK CANAL

7.5.1 Before 1853, several tanks in Repalle taluk received supply of water from the river through open cuts. After the flood of 1853 AD flood embankment was raised along the river thus cutting off the supplies from the river.

7.5.2 To provide water supply and restore the lost privilege, all the excavated pits behind the flood embankment were connected and a canal formed. Water was let into this canal by a cut from the K.W. main canal at Revendrapadu at a distance of nearly 11.5Km. from the flood bank at Vallabhapuram. The total length of the K.W. Bank canal is 72.2Km upto the point where it joins Bay of Bengal.

7.6 DRAINAGE : GENERAL DESCRIPTION

The drainage of the western delta can be subdivided into 3 major distinct compartments.

1. Drainage of the area between the K.W. Bank canal and Nizampatnam canal.
2. Drainage of area between the Nizampatnam canal and Commamur canal.
3. All the area south and west of No.2 above

7.6.1 FIRST COMPARTMENT

a) The Repalle main drain starting from above the area adjoining the Vallabhapuram and Pidaparru villages runs for about 52Kms. till it infalls into the tidal creek near Nizampatnam. Many affluents join Repalle main drain on its way to the Bay of Bengal.

b) The Bhattiprolu main drain starts from above Vemuru (V) and after running for about 61 Kms. falls into a tidal creep near Adavula deevi.

7.6.2 SECOND COMPARTMENT

This is served by the Tungabhadra drain. The chief effluents of this major drain are

(a) Tenali drain draining the area between the Nizampatnam canal and the Edlapalli channel.

(b) Kollimerla drain and

(c) Nallamada drain.

7.6.3 THIRD COMPARTMENT

This area is served by Romperu drain. Romperu drain is a broad swamp lying at back of the sea coast sand ridge from near Bapatla to Chinnaganjam tidal creek at a distance of about 41 Km. The upland drainage of Sakikalva, Parchuruvagu, Swarna, Aleru, Apperu, and Emileru are crossing Commamur canal and infalling into Romperu drain

7.7 KRISHNA WESTERN DELTA SYSTEM (K.W.DELTA)

7.7.1 GENERAL DESCRIPTION

The Krishna Western Delta (KW Delta) comprises of the mandals of Repalle, Tenali, Bapatla, Kollipara, Vemuru, Kolluru, Bhattiprolu, Nagaram, Nizamapatnam, Mangalagiri, Duggirala, Peda-kakani, Tsunduru, Amarthalur, Pittalavaripalem, Chebrolu, Ponnur, Karlapalem, Kakumanu, Vatticherukuru, all of which lie in Guntur District and Paruchuru, Chirala, Karamchedu, Chinaganjam, N.G.padu of Prakasam district

7.7.2 The total area in Guntur portion of K.W.delta is averaging around 2.02 lac ha.(4,99,231Acs).The K.W. main canal takes off from the right bank of river Krishna from above the Prakasam barrage near Vijayawada. The three main branch canals serving the total ayacut of 2.31 lac ha. (5.71,351 Acs) are:

a. Bank Canal, branching off from K.W. main canal towards left from Revendrapadu on the left side of K.W. main canal and running in a generally south Easternly direction for about 11.2 km. And later, running parallel to right flood bank of Krishna river, for another 61.0 KM; the total length of the Bank canal is thus 72.2 KM from head to tail.

b. The Nizampatnam canal branching off from the main canal at Commamur lock near Duggirala (v) in Tenali (tq.) runs North to South, through the centre of the delta area, for a further distance of 45 km. and has its tailend lock near Nizamapatnam in Repalle taluq. The lock connected to Bay of Bengal is a tidal lock. This canal runs along the slightly elevated ridge between the Repalle and Tungabhadra drains and has irrigation on both sides by the East and West side channels parallel to Nizampatnam channel.

c. The Commamur canal taking off at km.19.2 of main canal above Duggirala lock is a contour canal along the Western boundary of K.W. delta system and is practically the dividing line between the upland and deltaic areas in Guntur District. The Commamur canal runs as an irrigation-cum-navigation canal for a total length of about 96 Km. from the place of its bifurcation upto Peddaganjam lock in Bapatla taluq. Below Peddaganjam lock, this canal goes by the name of Buckingham canal and runs parallel to the coast line upto Chennai in Tamil Nadu. It serves as a Navigation canal. Before the development of rail and road transport systems, navigation on the Buckingham canal was the most important mode of transport for both men and materials.

7.7.3 All the three canals ie., K.W. Bank canal, Nizampatnam canal and Commamur canal are navigable.

7.8 COMMAMUR CANAL

For about 12.5 km. From its head, and after the crossing Guntur-Nallah, the Commamur canal occupies the course of the old Tungabhadra drain beyond which the Commamur canal water shed. The details of the drainage crossings with salient features are appended as a statement.

The Commamur canal formed one of the links in the chain of canals providing Inland water communication between Chennai and Kakinada. The greater part of Singareni coal which reached Chennai during 1896-97 was carried along the Commamur canal and Buckinghan canal.

CHAPTER-8

DETAILS OF ACTION TAKEN ON THE RECOMMENDATIONS OF MITRA COMMITTEE REPORT

S.No	Referance to Para No.	Subject	RECOMMENDATION OF MITRA COMMITTEE	ACTION TAKEN REPORT
1)	10.1.1	GENERAL RESTRICTING DISCHARGES OF UP LAND DRAINS FOR FLOWING INTO THE DELTA AREAS.	These drains enter the delta after crossing the Commamur Canal. As the delta area is comparatively more costly, being more productive and more densely populated than the upland area, so in order to reduce damage from floods, the discharge coming from uplands into the delta be kept restricted. Other wise, almost all the drains in delta, if these have to cater for full flood discharge, will have to be considerably widened and deepened both for earthen sections as well as for masonry works.	10.1 GENERAL : 10.1.1 Restricting the discharges of upland drains for flowing into the Delta Areas : The discharge coming from the uplands into the delta have not been restricted and the total discharge from the upland drains is entering delta drains as at present.
	10.1.2		Where there is no complaint of serious flooding in upstream of Commamur Canal the existing waterways of under-tunnels need not be increased at present. Further, investigations may be made when the upstream drainage due to Nagarjunasagar Canal has to be dealt with.	The U.Ts across Commamur Canal have been further improved by construction of additional vents or Additional U.Ts to cater to the upland upstream drainage, basing on the formulae adopted for computation of maximum flood discharges of drains. The upstream drainage due to Nagarjuna Sagar canals is at present entering into the delta drains. Further investigations have to be taken up to over come this problem.
	10.1.3		Where there are serious complaints the cross drainage masonary works under the Commamur Canal be improved for a discharge given by 92 M 2/3 except in cases where the existing waterways are more than that indicated by this formulae.	The cross drainage masonary works under Commamur Canal were improved for a discharge given by 180 M.2/3.
	10.1.4		The masonary works should be designed for a Velocity of 16 ft. per sec. at designed discharges.	
	10.1.5		The maximum afflux at the cross-drainage works be limited to 4 ft.	The Maximum afflux at the cross-drainage works is limited as recommended.

S.No	Reference to Para No.	Subject	RECOMMENDATION OF MITRA COMMITTEE	ACTION TAKEN REPORT
	10.1.6		The works and sections in d/s. reaches of such drains whose water ways of undertunnels have been increased be also improved to accommodate the additional discharge.	The downstream reaches of the drains are yet to be improved to accommodate the additional discharge.
	10.1.7		Masonary works of drains in deltaic areas be also designed for Q=92 M. 2/3	The drains are improved now for increased discharges using the formulae Q=180 M. 2/3 and accordingly the masonary works are also to be improved.
	10.1.8		On account of higher rainfall intensity and steeper country slope the discharge coming down from Upland near the Commamur Canal can be of the order of Q=500 M. 2/3. The water ways for Cross-drainage works as recommended above is, however, limited to, Q=92 M. 2/3. So, for holding up the difference of discharge between the suitable sites to provide detention basins be investigated. It is further recommended that such of the areas in the detention basins which are likely to get submerged for more than one foot for more than one week be acquired. This is desirable to avoid encroachment and obstructions being put in by the owners. It is also suggested that such areas should not be concluded from locslisation. These areas should also be excavated from the ayacut of the Nagarjunasagar Canal.	This issue has not been investigated so far. No detention basins are provided to hold the additional drainage coming from upland.
	10.1.9		On account of roads and railway crossings, it will not economical to have a diversion channel 40 miles long running upstream and parallel to Commamur Canal to carry the upland water into the sea without flowing through the delta area. Moreover, such long drain where the slope is very flat will soon get silted up and the maintenance cost would be quite high. So on account of heavy cost of construction and also of maintenance, this drain is not recommended.	No diversion channel running upstream of and parallel to Commamur Canal to carry the upland water into the sea without flowing through the Delta area is excavated as recommended by the Mitra Committee Report.

S.No	Referance to Para No.	Subject	RECOMMENDATION OF MITRA COMMITTEE	ACTION TAKEN REPORT
	10.1.10		For the same reason as given under para No. 10.1.9 above, construction of a drain upstream of Commamur Canal, parallel to the G.N.T. Road for carrying surplus waters of Nagarjunasagar ayacut into the Gundlakamma river is not recommended.	The drain upstream of Commamur Canal, parallel to G.N.T. Road for carrying surplus waters of Nagarjunasagar ayacut into Gundlakamma river is not excavated as recommended by the Mitra Committee report.
	10.2	SPECIFIC		
	10.2.1	TUNGABHADRA DRAIN AND ITS TRIBUTARIES	(a) Some representations suggested provision of additional ventways for the under-tunnel across Commamur Canal near Sangam Jagarlamudi for Guntur Nalla. It is recommended that the waterways be worked out according to the design criteria and necessary improvement be made. In order to avoid flooding lower down, the Tungabhadra drain down stream of this tunnel be also improved, both for masonary works as well as for drain section.	(a) The discharging capacity of the U.T. across Commamur Canal under Sangam-Jagarlamudi for Guntur-Nallah has been examined by C.E.R.P. authorities and one additional U.T. was constructed to suit to the designed discharges. The Tungabhadra drain down streams of U.T. was also improved to C.E.R.P. standards by C.E.R.P. Organisation. The Masonary structures are yet to be improved.
			(b) An inlet sluice be provided with flop shutters at the out fall of the Yazalidrain into the East Tungabhadra drain, so as to prevent flood waters backing up into the former.	(b) An inlet sluice with flat shutters at the out fall of Yazali drain into E.T.B. drain is not provided. This aspect is to be looked into.
			(c) Some representations suggested provision of additional water way for the under-tunnel near Kollimerla across Commamur Canal. This as well as the drain section in the lower reaches be checked up for the design already recommended and improved upon, if found necessary.	(c) The existing vent way of U.T. near Kollimerla across Commamur Canal has to examined with reference to the present standards of drains since they are improved for higher discharges under C.E.R.P.
			(d) The Suggestions made for provision of a separate outlet for Kollimerla drain into the sea do not appear feasible, as it cuts through the existing ayacut area. However, feasibility of diverting it through Marripudi drain be examined.	(d) Kollimerla drain is presently infalling into East Tungabhadra drain at the railway bridge near Machavaram Village. Diversion of Kollimerla drain through Marripudi drain is not feasible.
			(e) The suggestion of diverting Yazali drain into Tenali drain and providing in separate outlet into the sea is not	(e) Yazali drain is infalling into E.T.B. drain. Tungabhadra drain is improved but East Tungabhadra drain is not improved under C.E.R.P.

S.No	Referance to Para No.	Subject	RECOMMENDATION OF MITRA COMMITTEE	ACTION TAKEN REPORT
			recommended in view of Tungabhadra drain being improved. The results of the improvements be watched.	
			(f) The suggestion of providing a separate outlet into the sea for the Tenali drain without joining East Tungabhadra is not recommended for the same reason.	(f) Tenali drain is infalling into East Tungabhadra drain. E.T.B. drainis not improved under C.E.R.P.
			(g) The suggestion for providing an outfall sluice for pedapalli drain at its infall into East Tungabhadra drain is recommended.	(g) Outfall sluice for Pedapalli drain at its infall into E.T.B. drain was constructed as recommended.
			(h) The suggestion for providing drainage facilities for areas served by Tollanagu and Ramaraju channels is a local problem and be looked into by the State Irrigation Department.	(h) The drainage facilities for areas served by Thollavagu and Ramaraju Channels are provided.
	10.2.2	NALLAMDRA DRAIN AND ITS TRIBUTORIES	(a) Eight representations suggested provision of additional waterway for the under-tunnel for Nallamada Vagu across Commamur Canal. This should be examined, according to general designn principles.	(a) The U.T. for Nallmada vagu across Commamur Canal has been improved for a discharging capacity of 20,000 C/S. using the formula 273M.2/3.
			(b) The Suggestion of Constructing a new under-tunnel at Mile 36/2 of Commamur Canal for diverting waters of Nakkavagu lower arm into Nallamada drain through Poondla affluent be investigated by the State P.W.D. The Poondla affluent course will also have to be improved to carry Nakkavagu waters besides its own.	(b) The U.T. at Mile 36/2 of Commamur Canal has been improved to carry the discharge, corresponding to 200M.2/3. The Poondla affluent was also improved as recommended.
	10.2.3	ROMPERU DRAINAGE SYSTEM	(a) The left right arms of Romperu drains below Karamchedu under-tunnel was designed to carry half the maximum flood discharge in each. The Romperu left arm was improved to carry a flood discharge of 2,456 C/S. with M.F.L. of 10.78 at head and 9.52 at the end.	(a) Epurupalem Straight has been excavated taking off from Romperu left arm at M.3/7. However this straight cut is not functioning satisfactorily as expected due to sandy soils and flatter slopes. This requiring frequent maintenance problems every year to keep the straight cut functioning properly.

S.No	Referance to Para No.	Subject	RECOMMENDATION OF MITRA COMMITTEE	ACTION TAKEN REPORT
			In the year 1964, a total discharge of about 14,009 C/S. have flowed into the Romperu through several cross drainage works across Commamur Canal in the reach from Mile 49/1 to 59/1. The maximum flood discharge observed in left arm has been of the order of 9,000 Cs. as against 2,456 Cs. designed. Thus, the distribution has been found to be 1/3 and 2/3 in the right and left arms respectively against 1/2 and 1/2. Consequently there has been an increase in the M.F.L. of Romperu left arm by about 5 ft. above the designed level resulting in submersion of extensive area of paddy fields. Therefore, it would be necessary to reduce the M.F.L. considerably, say by 3 to 4 feet to reduce the flooding and avoid recurring flood damages to the paddy fields. There is suggestion to excavate a straight cut from Romperu left arm to the Bay of Bengal approximately along the Karamchedu-Vadarevu road for diverting flood waters into the sea in a short time(see Plate 4). This proposal has been examined by the State Governament. The total length of the proposed diversion channel is about 6½ Miles. This would reduced the observed M.F.F. of 1964 by 3 ft. relieving the submergence of paddy fields. The suggestion is recommended. The exact alignment be finalised by the State P.W.D. after carrying out detailed surveys and economic studies. The approximate cost of this proposal has been estimated at Rs. 65 Lakhs.	
			(b) The suggestion for providing a separate outlet for Saki affluent into the sea does not appear to be necessary in view of the proposed straight cut from Romperu vide (a) above.	(b) Saki drain is infalling into Romperu left arm, for which Epurupalem Straight Cut is excavated.
			(c) Six representations have asked for providing additional waterway to the under-tunnel of Saki affluent across	(c) The U.T. across Commamur Canal for the crossing of Saki affluent has been improved to 180M.2/3 as well as the drain below. Inspite of this, there is an afflux at U.T. and

S.No	Referance to Para No.	Subject	RECOMMENDATION OF MITRA COMMITTEE	ACTION TAKEN REPORT
			Commamur Canal. This may be decided according to general principles laid down.	heading up of the drain below Commamur Canal, due to the reasons that the parent drain namely Romperu left arm and its continuation namely Perali drain have not been improved by C.E.R.P.
			(d) Suggestions have been received for providing additional waterway for the existing under-tunnel for the Paruchuruvagu and Karamcheduvagu across Commamur Canal. This be examined according to general principles already laid down.	(d) The U.T. for the Parchuru vagu and Karamchedu vagu across Commamur Canal has been improved to suit 180M.2/3. But afflux has been observed on upstream of U.T. because Romperu right arm and Romperu left arm below Commamur Canal have not been improved under C.E.R.P.
	10.2.3	ROMPERU DRAINAGE SYSTEM	(e) The suggestion for improving the water way of the existing under tunnel for Swarna affluent across Commamur Canal be also examined according to the general principles.	(e) The U.T. for Swarna affluent across Commamur Canal is improved to suit to 180 M. 2/3. But the parant drain namely Romperu right arm has not been improved upto Vetapalem Straight cut and hence there is heading up of drains.
			(f) The existing straight cut near Vetapalem may be extended to join the sea to carry discharge over and above the safe carrying capacity of Kunderu drain. In this case, a regulator across Kunderu may become necessary which should allow only that much quantity of water which the Kunderu can carry safely without submersion of marginal area. In this connection, the alternative proposal to have a link channel into Kunderu from above the existing regulator be also considered and decision on the two alternatives be taken after carrying out detailed study. The first alternative is estimated to cost Rs 5 Lakhs excluding the regulator across Konderu.	(f) Swarna and Aleru affluents are infalling into Romperu right arm and no separate outlets to joint the effluents in the sea are constructed as they are not necessary.
			(g) Provision of separate outlet for Swarna and Aleru affluents to join the sea is not recommended in view of the new Straight Cut proposed at (f) above.	(g) The existing Straight Cut near Vetapalem is extended to join the sea as recommended. Kunderu drain at the point of crossing Kunderu Straight Cut has been Syphoned.

S.No	Referance to Para No.	Subject	RECOMMENDATION OF MITRA COMMITTEE	ACTION TAKEN REPORT
			(h) The provision of a separate outlet for the Murukondapadu drain into the sea does not appear necessary as Perali drain is already there.	(h) Murukondapadu North drain infalls into Perali drain Perali drain and hence no separate outlet for Murukondapadu drain into sea is necessary.
	10.2.4	PROPOSALS FOR DISPOSAL OF UPLAND DRAINAGE RECEIVED FROM ALERU, APPERU AND EMILERU STREAMS IN KRISHNA WESTERN DELTA	The upland adjoining the Commamur Canal are often subjected to submersion over prolonged areas due to the stagnation of flood waters brought by the streams like ALERU, APPERU and Emileru Krishna Western Delta. At present, there are inlets and outlets across Commamur Canal for these streams. The carrying capacity of these structures are inadequate to discharges the flood waters of these streams coming from upland. As the sill level of the inlet weirs are either at or above the F.S.L. of Commamur Canal, this results necessarily in submersion of the dry lands adjoining the canal on its right side continuously for long time. This problem can be relieved by either (i) constructing under-tunnels with adequate discharge capacity in place of inlets and outlets or (ii) diverting entire flood waters of Aleru, Apperu and Emileru through a diversion Channel to Gundlakamma river (See plate 4). (i) If the under-tunnels are built to carry the entire maximum flood discharge from these streams into the delta which can be the order of Q=450 M.2/3 Cs. This will necessitate extensives increase in the discharge capacity of the drainage course through the delta down-stream of the under-tunnels. This proposal would involve acquisition of large areas of costly and highly productive land in the delta areas and hence the cost of this proposal would be prohibitive. The discharging capacity of the under tunnels	Separate U.Ts have been constructed for Swarna, Aleru, Apperu and Edumudivagu for the maximum flood discharges corresponding to Q=180M. 2/3 and no separate diversion drain has been excavated, since they infall into Romperu right arm only.

S.No	Referance to Para No.	Subject	RECOMMENDATION OF MITRA COMMITTEE	ACTION TAKEN REPORT
			therefore be limited to discharge equivalent to Q=92 M.2/3. The cost of the proposal on this basis is about Rs. 9 Lakhs. (ii) With regard to the proposal for diverting entire flood waters of Aleru, Apperu and Emileru into Gunlakamma river through a diversion channel (see plate 4) it may be pointed out that the diversion Channel will be about 20 miles and will have to run through the very area for which relier is requested. (iii) Out of these two schemes, the first proposal will cost only Rs. 9.43 Lakhs, where as the second proposal costs about Rs. 1.6 Crores. In view of the prohibitive cost and insufficient relief from floods, the second proposal is not justified. Hence the first proposal be adopted.	
	10.2.5	DRAINAGE OF NAGARJUNASAGAR CANAL AYACUT.	The inhabitants of Krishna Western Delta are much concerned about the introduction of irrigation by Nagarjunasagar Canal in upland areas of Guntur District. It is learnt that about 4 Lakhs areas of Guntur district lying towards north of the Commamur Canal is proposed to be brought under irrigation in block Nos. 10 and 11 from the Nagarjunasagar Canal (see plate 15). This area, at the present moment, is in upland area. During monsoon season, the branch canals to irrigate the above areas will carry 3,700 cusecs. of water for irrigation of this area. It is felt that with the introduction of irrigation the land will be terraced and the rain water will be more detained than at present. There will be, however increase in all weather see page water. But, quantity of this water will be smaller than the carrying capacity of ventways at drainage crossing with the Commamur Canal which are proposed to be improved for a discharge of Q=92 M. 2/3. Moreover, there is a recommendation for providing detention basins and	At present all the drainage waters of N.S.Right Canals including the surplus waters are being let into the drains entering Krishna Western Delta. No detension basins have been constructed, to restrict the flows. The problem of drainage from upland catchment area is still persisting, and the people's reprasentative and the ryots are very much concerned about these additional discharge from upland catchment area entering into Delta drains as these drains are playing great havoc in times of heavy rains and cyclones. Hence detailed study and investigation of this problem is necessary.

S.No	Referance to Para No.	Subject	RECOMMENDATION OF MITRA COMMITTEE	ACTION TAKEN REPORT
			eliminating the same from the ayacut of the Nagarjunasagar Canal for the difference of Q=92 M.2/3 and Q=500 M. 2/3. As such, the condition in delta areas in post Nagarjunasagar Canal would not, in any way, be worse than at present.	
	10.2.6	DRAINAGE PROBLEM IN THE IRRIGATED AREA UNDER APPAPURAM CHANNEL.	The cross drainage works across the Appapuram channel are designed for a maximum discharge capacity adopting Q=270 M.2/3 for catchment area upto 5 Sq.Miles, and Q=450 M.2/3 for catchments exceeding 5 Sq.Miles where as those under the Commamur Canal can discharge much less. The waterways under the Appapuram channel have been found to be adequate as no drainage congestion has been reported for the lands lying above Appapuram channel. But there is serious drainage congestion in the area lying between Appapuram channel and Commamur Canal. During 1963 and 1964, nearly 60% to 70% of the ayacut area was affected due to submersion with consequent damage to crops. The main reason is the cross-drainage works built across Commamur Canal in this reach far below the standards adopted for the corresponding works on Appapuram channel during 1964, the under-tunnel constructed at Nallamada vagu across Commamur Canal has actually discharged at a coefficient of C=70Mn Q=CM.2/3 i.e., outflow from the under-tunnel on the Commamur Canal is roughly 1/6th of the inflow entering Appapuram ayacut lands. It may however, be mentioned that even before the introduction of Appapuram Canal, this area must have been inundated to the same extent, if not more than at present. It is not desirable to increase the waterways of cross drainage works under the Commamur Canal and drainage sections and works lower down to cater for the same standards as adopted under Appapuram channel on account	The U.Ts across Commamur Canal have been improved to cater for discharges, corresponding to Q=180 M.2/3. The drains are also improved namely Nakkavagu, Upper arm, Nakkavagu Lower arm for increased discharges under C.E.R.P.

S.No	Referance to Para No.	Subject	RECOMMENDATION OF MITRA COMMITTEE	ACTION TAKEN REPORT
			if cost and highly productive delta one and that will have to be acquired. However, in order to give relief, to some extent, it is recommended that the under-tunnels in this area, as elsewhere, be improved for Q=92 M.2/3 and the main drains which carry water from upland areas be embanked in delta reaches. This will be in accordance with the general principles laid down for all upland drains going through the delta areas.	
	10.2.7	REPALLE MAIN DRAIN AND ITS TRIBUTARIES	(a) The suggestion of excavation of a straight cut for Repalle main drain between Chakkavaripalli and Chintaparru is not desirable as the proposed alignment cuts across irrigated fields and a major tributary joins R.M. drain in this reach. This, however, is a local problem and be examined after watching the effects of improvements already suggested.	(a) The straight cut mentioned between Chekkavaripalem and Chintarevu is not excavated, as it was not recommended by Mitra Committee.
			(b) The suggestion of providing additional waterway for Dhulipudi equeduct be examined according to general principles.	(b) Additional vents of 4 Nos. of 6.1Mts. span each have been constructed, in addition to the existing 3 vents of 6.1 Metres, span each. The discharging capacity of these 7 vents is above 3500 C/S.
			(c) The suggestion of providing new drains for irrigated areas situated in Amudalapalli and Nizampatnam villages is of local nature and be examined and State Irrigation Department.	(c) Minor drains have been excavated near Avudalapalli as per the necessity.
	10.2.8	BHTTIPROLU DRAIN AND ITS TRIBUTARIES.	(a) The Bhattiprolu drain in its lower reaches runs in a zig-zag course with a number of serpentine bends. Due to this tortuous course, the flood waters of the drain are not drained off quickly into the sea with the result the flood waters backup submerging the l ands on either side. During 1963 and 1964 the M.F.Ls recorded in rear of the Isukapalli undertunnel were +8.25ft.and +7.90ft. respectively as against the designed M.F.L. OF +6.81 FT. As a result of this	Gundamtippa straight cut as suggested by Mitra Committee has been excavated for a length of 3.4 Km. Tidle factor has been considered while calculating M.F.Discharges. But during the improvement taken up under C.E.R.P., it was proposed to have dredging from Km. 10900 to 0.000 and also to extend into the sea for a length of 1.4 Kms. But this work was not executed by the agency fixed by the Department. Due to this untackled portion at sea, the drain

S.No	Referance to Para No.	Subject	RECOMMENDATION OF MITRA COMMITTEE	ACTION TAKEN REPORT
			heading up of flood waters, an area of about 2,800 acres were submerged over a period exceeding 7 days. In order to relieve this submergence, a suggestion has been made to excavate a straight cut from "GUNNAMTHIPPA" near Bhimavaripalemto the sea. With this proposal, the length of the existing course of 7 miles would be reduced to about 21/2 Miles. This would improve the surface fall of the drain and facilitate in draining of the flood water, rapidly. From the preliminary investigation carried out by the State P.W.D. it has been found that the alignment of the proposed cut runs through the plain country in the first four furlongs and through Kottapalem reserve forest area for the next 1 mile 2 furlongs. In the last reach the channel runs for 5 furlongs through salt beds on the coast. So the land which will come under the proposed cut is not very valuable. However, this suggestion of providing a straight cut for Bhattiprolu drain from Gunnamtippa to sea via Haripuram be considered after watching the results of improvements of the drains suggested under general principles (see plate 4). The following points, which are likely to arise with the execution of this proposal be kept in view while finalising this proposal: (i) Tidal limit may extend higher up than at present and create salinity problem during dry weather. (ii)The tidal energy may not be absorbed in the cut reach as its capacity will be less. This is likely to made the channel unstable. (iii) Flooding due to tides willl extent Inland. (iv) Forming embankments to restrict flooding may choke the moga due to in adequate flushing. The cost of providing the straight cut referred to above has been worked out at Rs. 7 Lakhs.	above this point has suffered submergence due to higher M..F.Ls.

CHAPTER-9

MAINTENANCE OF DRAINS

9.1 INTRODUCTION

Many recommendations were made earlier in the Mitra Committee report. Some of them need recommendation in view of (a) Social (b) Technological, and (c) past performance parameters since,

9.1.1 Commamur canal is a contour canal practically running along the divide between the upland and deltaic areas of Guntur Dist. The general slope of the upland ie., west of Commamur canal is about 1:500 while the general slope of the tract east of Commamur canal is about 1:7500. Because of this flat nature of the country, the irrigation and drainage waters find there way to the Bay of Bengal with a lot of difficulty.

9.1.2 Being a contour canal, the Commamur canal in its travel cross a number of upland riverlets, drains for which quite a number of CM/CD works including inlets/outlets were constructed. Naturally such CM/CD works and inlets formed the first obstruction to the natural drainage is this region. The Southern railway embankments & the National Highway No.5 formed through the delta and constructed parallel to the coast formed the second obstruction to the drainage. Last but not the least to be mentioned are the sand dunes that are formed due to the littoral drift of sand Northwards forming the obstruction to the natural drainage.

9.1.3 Even though drainage congestion is experienced through out the delta, it is severe and acute in the Bapatla taluk of because many of the drains causing upland flows find their way through the delta of this taluq.

9.1.4 During the time of the Mitra committee recommendation it was felt that the discharge from upland area be kept restricted as otherwise almost all the drains in the delta, to cater to the full discharge, will have to be considerably depend and widened for the earth section as well as for mansonry works. Such a restriction was felt necessary as the delta area was comparatively costlier, more productive and more densely populated. the above considerations may have to be subjected to a review now after about three decades with the commissioning of the Nagarjunasagar right canal system with its criss-cross net work of canals. The area of Guntur district, bounded by Guntur Branch canal

N.S.Right main canal, Gundlakamma river and lastly Commamur canal, in Narsaraopet and Addanki taluqs can claim to be on an equal footing with the delta. As of now, the parameter of cost of land, productivity and population loss considerable significance except of any historic or sentimental value. It may not be short of any heroic attempt to consider any such difference in the status of the area as either side of Commamur canal in the matter of an option to subject the same to drainage congestion.

9.1.5 As the CM/CD works provided for some of the drains in receipt of the upland flows are not of adequate water way, resulting in submersion of cultivable uplands situated on the western side of the Commamur canal, the ryots of these areas resort to the desperate step of making cuts in the banks of the Commamur canal to avoid prolonged submersion of their lands. Such an action compelled with the already existing drainage congestion problem of the delta as one side and the flat country on the other can aggravate the situation.

9.1.6 Under the CERP, the UT's across the Commamur canal receiving the upland drainage are already designed for a maximum flood discharge calculated at 180M 2/3 (M is catchment area in sq.miles). This formula means a submersion of 3 days upstream of the UT's.

9.2 GENERAL

9.2.1 With the advent of increased use of pesticides for paddy and other crops, the waters entering the drain carry the absorbed part of the fertilisers also in addition to the pesticides finding their way into the drain. Lush growth of weeds is the beneficial result. In view of the compelling necessity to let out industrial wastes into the drains at some locations, and as purification of the industrial effluents at bearable costs is yet to be perfected, the drains are not clean in general and the farming society is the worst sufferer. Also drains are becoming increasingly unsafe for livestock.

9.2.2 Periodical maintenance is a must. The formers, in their over enthusiasm are prone to use chemicals in an unskilled manner. Premier institutions connected with Agriculture development have been continuing their research to promote controlled use of chemicals to avert the menace of luxuriant weed growth. Water hyacinth poses a great threat many times have been written on it and its extinction and eradication will remove the menace

the drains are facing presently. Experts in this field have to be consulted to assure that the removal of water hyacinth may not result in some other type of water weed stepping in. Submerged weed needs to be tackled.

9.2.3 In this connection, the memo issued by the Government that destruction of weeds by chemical spraying is to be done entrusting it to departmental personnel need to be reexamined. The lascars in the departments are reluctant to handle the work of spraying, as according to them., the vapours emanating the spray of the weedicides are harmful to their eyes.

9.2.4 Some scientists have been advocating the profitable utilisation of the water hyacinth as a raw material for bio-gas. Though conservative opinion raises the apprehension that encouragement of such a step may trigger off a chain reaction in a clamour for increased growth of water hyacinth thus proving detrimental to the drains., it is felt that such an apprehension is a retrograde step. In the overall content of development of bio-gas needed for the count, perhaps, such an offer by some enterpreneur for setting of a bio-gas plant with water hyacinth may be quite welcome and needs encouragement.

9.2.5 Stern measures should be taken to prevent erection of fish stakes in drains though there may not be any objection for erection of such fish stakes in tidal reaches of the drains.

9.2.6 Agriculture College Bapatla, is engaged actively in research work. The departmental Engineers should feel free to interact, discuss with the agriculture scientists and evolve more satisfactory and efficient methods of weed eradication.

9.2.7 The Water User's Association may think of compensating suitably, financially any local people who can collect the water Hyacinth pulling out from the drain and depositing at a selected place in the Government Poromboke which once again can be offered for sale to any industrialists. This suggestion prima facie may appear rather unorthodox may be worthy of further consideration on the overall benefit it may much in reduction of drainage congestion.

9.3 LOW INTENSITY OF THE DRAINAGE SYSTEM

(World Bank, remarked in their project working plan for APCER Project).

While citing the causes for the worsening drainage congestion in the delta's down stream direction, World Bank observed in Para III 6(g) of their Project working plan for APCER Project (g). The low intensity of the drainage system, a total of 10,200 km drain for 1.0 M.Ha. an average of 10.2 m per ha. This compares unfavourably with estimated drainage requirements of about 40.0 m per ha. and as a result there is widespread water logging. Both inadequate main and field drainage and system capacities are to blame (field to field drainage is common). According to World Bank "the detrimental lack of drainage in the deltas is very largely man-made. They also observed that CEEP" should be followed by a comprehensive, well conceived and properly phased multi year plan towards improved water management in the Krishna – Godavari – Pennar deltas; a "Delta Plan" as it were "based on" further comprehensive irrigation and drainage planning exercises "after Establishing" a computer aided GIS database.

9.3 SUGGESTIONS FOR UPKEEP OF THE DRAINS

9.4.1 Floods from upland catchments should not be permitted to enter the deltas as far as possible by examining the possibilities of impounding such upland flows in detention Reservoirs or by diverting away from the deltas as far as possible

9.4.2 Over a period of time, some old structures like bridges, aqueducts across the drains have been abandoned due to their non-serviceability for various reasons., such structures should be removed completely.

9.4.3 Formation of low-level causeways or pipe culverts or road dams, though prima facie economical become bottlenecks in the long run. Better not to form till the finances are available for a regular road bridge. The existing ones should be removed so as to ease drainage congestion.

9.4.4 In order to please some sections of the society the officers are zealous in recommending according of permissions (sometimes even without) to some for erection of brick kilns, temporary houses, plantation and a like, in the areas of the drain or its margin or its berm. Strict policy instructions should be issued that neither such proposal should be entertained, nor any permission granted.

9.4.5 Plantation of any kind on the drain bunds or drain porombokes should be authorised only by the Irrigation Department in-charge of drains. This includes even leasing to private parties.

9.4.6 In post monsoon season comparatively silt free water may be flowing in the drain but the flow itself is not much. If it is possible from overall consideration to let out canal water copiously and flush the drains, the comparatively silt free water may pick up some of the accumulated silt from the bed and side of the drain and flow to sea; however, such a proposal resulting in wastage of water is normally resisted by the irrigation engineer. But some times it may be possible.

9.4.7 The Executive Engineer, Deputy Executive Engineer/Assistant Executive Engineer must be instructed that the inspection of the drains in their charge is to be done by them as per the under-mentioned schedule.

AEE/AEs	...	Every fortnight.
DEE	...	Every month.

9.4.8 The Executive Engineer should inspect each major drain once in two months and each medium drain once in three months.

9.4.9 The officers should note their inspections findings in a separate register maintained for each major and minor drain. The registers are to be reviewed by the Superintending Engineer.

9.4.10 An annual report on the history and performance of each drainage basin should be prepared by the Chief Engineer and submitted to the Govt.

9.4.11 The Chief Engineer may be requested to issue working instructions in regard to preparation of estimates and execution. The chief Engineer may consider:

i) Cross sections at 25 mts. Intervals to be taken with detailed levels at 3 mt. Intervals.

ii) The alignment of the drain to be well fixed with reference to a fixed point on the ground.

iii) Levelling to be closed only on a permanent bench mark of known value. Temporary bench marks may be left along the drain at 500 mt. Intervals.

9.4.12 The Deputy Executive Engineer should necessarily check the cross section levels of the drain specially covering all the areas where the elevation are shown to be high. These prelevels have to be necessarily checked by another D.E.E nominated by the Executive Engineer. Between the concerned D.E.E and the nominated D.E.E it should be ensured that atleast 75% of the levels get covered.

9.4.13 The Executive Engineer should not process any estimate not confirming to the above.

9.4.14 The contractor to whom the work is let out must accept the prelevels recorded after which only should commence the work.

9.4.15 All payments shall be made based on levels only for any work. Leaving thandoos in the drains is not recommended and hence, the question of making payment in drain by pit measurement does not arise.

9.4.16 Similarly, the Chief Engineer may be requested to issue instructions in regard to submission of D.D.Rs. by the AEE/AE and submission of weekly bar charts by the D.E.E. to the E.E. for review and record.

9.4.17 Government may consider issuance of instructions that irrespective of the estimate value, piece work contract (K2) form shall not be used except in rare cases and that with specific prior approval of Chief Engineer.

9.4.18 The work shall be done from the lower level of the drain upwards (tail to heads)

9.4.19 As cross sections are contemplated at 25m intervals a unit of reach for payment may be fixed as 25m or less. Even in such case, unless the drain is excavated upto the theoretical bed level, the work done should not be considered for payment. The Chief Engineer may be requested to incorporate a suitable clause in the agreement stipulating that,

(a) The contractor shall complete every reach of 25m (or less in case the work is less than 25m) to ultimate levels and achieve the final section of excavation including sides slopes and berms.

(b) Measurement for the reach of 25m. will be recorded only by levels.

(c) Though the contractor like to complete a reach of 25m to ultimate section qualifying for payment, such payments will not be made if a lower reach also entrusted to him is left unattended or left incomplete and only when it is completed to ultimate section then it becomes eligible for payments.

9.4.20 The canal water entering the drain together with rainfall contribution result in inundation and prolonged periods of submersion. As we do not have any control over rainfall, the only other area that could be controlled is canal supplies. Even partial reduction of canal supplies can reduce the distress significantly. On getting to know in advance about prospective incidence of rainfall, the canal discharges can be reduced. The engineers and agriculture scientists may in between them decide the approximate reduction in canal supplies in every month, taking into account, the cultivation practices, the rainfall distribution geographical location of the area in the State, and connected parameters, duly considering the technical grounds such as the one requiring the maintenance of a certain minimum RFSL considering the safety of the regulators.

9.4.21 A point likely to be advanced to counter such reductions in the canal supplies – vide above para is that the riots taking advantage of long levels in the canal may break the banks to clear drainage congestion in their fields. This contingency cannot be overlooked but has to be met. Construction of some additional regulators across the contour canals may take care of this contingency besides aiding the engineering officers in water regulation.

9.4.22 A mechanism for collection of meteorological data, interpretation, guidelines for canal discharge operations has to be evolved. For this purpose "Irrigation control rooms" should be set up at the head of the

(1) Godavari delta at Dowlaiswaram
(2) Krishna Delta at Vijayawada.
(3) Pennar delta at Nellore.
(4) Nagarjunasagar ayacut at Guntur.
(5) Vamsadhara Project at Narasannapeta.
(6) Sreeramsagar project at Nizamabad (includes Nijamsagar & Kadam)
(7) Srisailam Project at Project head Works.

9.4.23 These control rooms are to be maintained round the clock between 1st June and 1st December, every year, with adequate staff. These control rooms should also get interconnected through the advanced communication system now available with computer facilities, and cell phone facilities for direct communication. All these control rooms should be connected to the control room at the A.P.Secretariat. These control rooms should collect all the available meteorological data from different sources and alert the O&M engineers on probable flood incidence and advice them on canal discharge regulation. Canal telephone link, trunk telephone link, under network, Radio Television link, may have to be provided.

9.4.24 The rooms shall be under the direct charge of the Superintending Engineer, Head works, Forecast of incidence of very heavy rainfall can easily be made about 4 to 5 days in advance with the reporting facilities as on today. A set of precise guidelines and rules will have to be evolved for reduction of canal discharges because a sudden draw down is detrimental to the canal system. The staff managing the control rooms should be trained for the assignment.

TECHNICAL

9.4.2 (1) Big sized drains intended to cater for a rainfall of rarity in occurence are prone to be costly and counterproductive. It is a far fetched and uneconomical proposition to attempt to design the drains for the worst conditions. Occurence of damage at periodical intervals is an inbuilt parameter in the design of any drainage project or drain.

(2) As far back as 1965, Mitra Committee recommended correlation of the rain fall with the empirical run off formulae adopted in the State. This observation is equally valid to day. Improvements were carried out on a vast scale once as per Mitra Committee recommendation and later as per cyclone 1991 World Bank aided works. Unfortunately the field data on the performance of the drains was not kept. Such a data would have enabled the department to determine the proper technology; it is high time the construction engineers and the C.D.O. actively associate in the collection of data and its process at least even from now so that in the years to come one can have an opportunity to give up the adhocism and adopt rational methods for better management.

9.4.3 MAINTENANCE

1. Regular maintenance is necessary for drains to keep them functioning as designed. The frequency and degree of such maintenance depends on the climate, amount of rainfall, the depth at which the ground water table must be kept below the ground surface. Shallow surface drains in stable soils may require spot clearance annually and complete clearing, may be for every 5 to 10 years. Whereas in unstable soils, the banks of the drain fall during the rainy season, and coupled with the human and cattle crossings the drains, at some places require annual clearing to be completed before monsoon to maintain designed bed width and bed slope.

2. All spoils banks should be planted with grass mainly to stabilise the excavated material to keep it from flowing or washing back, into the drain and to provide a suitable roadway for maintenance. The side slopes of open drains, specially the sides above the water surface should also be planted with grass and fertilized every 2 to 3 years.

3. Annual silt clearance of drain is sometimes not done due to shortage of funds and the drain bed starts rising every year. Simultaneously the ground water table also may rise in the command area resulting in decline in crop production specially in saline area. In such cases, a roaster should be prepared to clear each drain once in 3 to 5 years to safeguard against severe damage to irrigated lands apart from safeguarding against water logging and hazard of salinity.

As a rule each drain should be taken up for silt removal from its outfalll and proceeding upstream.

Weeds in the drains make the flow of water sluggish with the result the turbid water deposits in the drain bed. In connecting drains and field drains "para grass" plantation in the bed and side sloped is reported to overpower the weed like TYPHA and IPOMEA CORNEA which are quite common in our country. Paragrass serves as a fodder for cattle and can be cut every 2 to 3 months. It is understood that in Chambal project, Kota, Rajasthan, paragrass has been planted in some drains with advantage. As Govt. introduced that weed removal in drains shall be by chemicals spray only the premier institutes like Agriculture college, Bapatla, may be requested to indicate the quantum and nature of the chemical to be sprayed so as to ensure harmlessness to cattle.

It is also given to understand that "para grass" itself may become a menace if allowed to remain without cutting for a longtime.

CHAPTER-10

SPECIFIC RECOMMENDATIONS

10.1 GUNTUR NALLAH-DRAINAGE CONGESTION CAUSED BY THE PROTECTIVE WORKS CHARRIED OUT BY RAILWAY DEPARTMENT AT BRIDGE N0.25, AT KM 0.925.

10.1.1 Bridge N0.25, across Guntur nallah drain @ KM 0.925 on Guntur – Tenali railway line was constructed in 1914.

10.1.2 The bed level of the drain under the railway bridge is +7.95m as reported by the Divisional Railway Manager through his lr.dt.13.03.94.

10.1.3 Prior to the advent of CERP (1990) the Major and Medium drains were designed for an MFD of Q = 81M and 92M for deltaic and non-deltaic drains respectively. The railway bridges must have been constructed for an MFD using either ryves or Deckens formulae with C value of 1000 or 1200. But no records to what discharge this bridge was built were available. As per the recommendations of Technical Monitoring Committee, Deltaic and upland drains were improved taking C as 115 and 145 respectively under CERP.

10.1.4 Thus the drain under reference was improved and the bed level at the Railway Bridge was arrived as +7.11m. The Divisional Engineer, Railways, Vijayawada was requested by the Executive Engineer, CERP Division, Tenali on 09.03.94 to take up necessary protective works taking the drain bed level as +7.11m. Prior to the proposed improvements to the said drain the scoured level just down stream of the Railway Bridge was +6.44m. This was pointed out by the Superintending Engineer, CERP Circle, Guntur. In view of this the Superintending Engineer during the joint inspection has agreed to allow a hump of 0.80 and requested to complete the protection work to the bridge. Thus the bed level works out to 6.44 +0.80 = +7.24m. The Executive Engineer, CERP Tenali division, during the execution of the work of improvements to this drain, had left off a reach of 50m (25m on u/s and 25m on downstream) at the bridge site un-tacklled.

10.1.5 But the railways authorities while executing the protective works in 1995, (at cost of Rs. 9.00 lakh deposited by the State Government) provided grouted pitching in the bed

to a level of +7.95m (+8.04 to +8.07m as reported by the Dy. Executive Engineer, Drainage Sub-Division, Tenali) against the designed bed level of +7.113 which was intimated to them earlier. This was the root cause of the obstruction.

10.1.6 Number of representations from the ayacutdars unstream of the bridge and from Dr.M.P.Rattaiah, M.L.A., Prattipadu were received for removing the hump stating that their ayacut of about 10,000 acres was being subjected to floods every year. They also required to provide 3 additional vents incase removal of hump is not possible. On 29.02.96, the railway authorities required a deposit of Rs. 45.00 lakh for providing additional vents.

10.1.7 At this point of time, the issue has been posed to the Experts Committee for their opinion.

10.1.8 The experts committee on drainage problems of Krishna Western Delta, constituted by the Govt. vide G.O.Rt.No.7 I&CAD (Dr) Dept.dt.02.01.98 under the chairman shop of Sri Ch.Radha Krishna Murthy, Engineer-in-chief, (Retd) visited the site and taken a final decision during the IV meeting of the Committee held at Hyderabad on 08.09.98 that cutting opening the grouted apron along the drain to +7.11m and provide 3m wide tape zodial channels in the bridge vents to pass the designed discharge and to protect the foundations with front and rear cutoffs and driving sheet piles to safe scour depth a round the openings. Further the Committee felt that the above decision is preferable when compared to the proposal of providing additional vents.

The recommendation of the experts committee was sent to S.C. Railway authorities. After personal interaction, the proposal was agreed to by them through it was rejected in the 1st instance and the Superintending Engineer, Irrigation Circle, Guntur is required to take necessary action in the matter subject to the approval of the report of the Committee by the Govt.

10.2 DR. M. PEDA RATTAIAH'S PROPOSALS

10.2.1 The Committee on the request of Sri M.Peda Rattaiah Hon'ble M.L.A., Pedanandipadu, inspected the causeway across Mekalavagu at KM 14.00 of P.R.Department road. The Hon'ble M.L.A explained the Committee that the said cause way had been causing obstruction to the free flow of drainage water resulting in

sumersion of the agricultural lands and there by heavy damages to the crops upstream of the cause way and requested to provide a vented culvert in its place. It was also requested to close the number breaches on this drain.

10.2.2 Further the Hon'ble M.L.A requested to widen the Roads and building culvert at KM 13.00 of Pedanandipadu – Guntur road which is causing obstruction to the free flow of drainage water in Mekalavagu drain.

10.2.3 The committee on the request of the Hon'ble M.L.A inspected the Ogeruvagu from KM 44.40 to 39.63. The Hon'ble M.L.A requested to take up repairs to the said reach which was not takenup under CERP due to land acquisition and some local problems.

10.2.4 On all the above three aspects after examining the issues in detail the committee recommends

(i) To propose a vented culvert in place of pipe causeway on Mekalavagu at KM 14.00 besides closing the breaches on the drain.

(ii) To request the R & B department to widen the culvert at KM 13.00 of Pedanandipadu–Guntur road for free flow of drainage water of Mekalavagu and

(iii)To repair the reach from KM 44.40 to KM 39.63 of Ogeruvagu.

It is reported by the Superintending Engineer, Irrigation Circle, Guntur that the above 3rd item was takenup in the closure of 1999.

10.3 N.S.R.C.AYACUT

10.3.1 Some of the legislators and public representatives have brought to the notice of the Committee, the difficulties faced by them consequent to the drainage of NSRC ayacut finding its way into delta. They suggested that a carrier drain be excavated parallel to GNT road from Ogeruvagu near about Chilakaluripet to Gundlakamma river (a distance of about 65 KM). It is proposed by the Chief Engineer, NSRC on the right side of Vijayawada – Chennai high way at a rough assessment of Rs.200 crore. The Committee considered this proposal not viable after site inspection on 21.02.99 in view of the following aspects

i. The maintenance problem of the long carrier drain.

ii. Costly land acquisition.

iii. Large Number of CM & CD works involved.

iv. Displacement of habitation.

v. Disturbance of some of the existing industries.

vi. Probability of resistance for the transfer of floods to Gundlakamma from the locals of Gudlakamma basin.

10.3.2 The draft reports was discussed with the legislators of the area on 23.05.99 at Guntur. A copy of the proceedings and minutes of the meeting on 23.05.99 at Guntur is appended to this report. Sri M.Seshagiri Rao M.L.A Bapatla reiterated that a carrier drain to convey the NSP ayacut water to Gudlakamma is very necessary. In the meeting, the research & investigation rendered on this proposal till then was apprised to the M.L.A. He gave one more alternative & desire to be examined.

The NS Project got this alternative also examined and prepare a proforma line estimate costing Rs. 122 crores. In addition to the proposal being costly, the proposal does not appear liable in view of it cutting across developed lands besides huge land acquirion. A copy of the proforma estimate sent by the Chief Engineer/NS Project is appended to the report. It is therefore felt that the contemplated diversion of NSP drinage to Gudlakamma is not a viable proposition at this stage.

(sd) * * * * *
05.10.99
(CH.RADHA KRISHNA MURTHY)
CHAIRMAN

(sd) * * * * *
05.10.99
(KAKANI VENKATESWARA RAO)
MEMBER-CONVENOR
CE, MI & DDS

(sd) * * *
05.10.99
(M.S.CHALAPATHI RAO)
MEMBER

(sd) * * *
05.10.99
(V.LOKANADHA RAO)
MEMBER

(sd) * * *
05.10.99
S.E, NSRC O & M CIRCLE
LINGAMGUNTLA,
For MEMBER, (CE, NSRC Guntur)

10.3.3 In view of the above, the committee recommends an alternative plan of action. After attending to the removal of various obstructions across Nallamada (Below Commamur canal) as recommended Supra, the problem may get easened and if it still persists the following two alternatives could be considered at the appropriate time after a few years.

i. Revising the standards of Nallamada

ii. Diverting part flows into Gundlanamma and the relative economics of the above two alternatives may be workedout to adopt the most favourable solution.

10.4 IMPROVEMENTS IN ROMPERU BASIN

10.4.1 During the inspection of Chirala area of Prakasam Dist. on 12.7.98 by the Experts Committee, Dr. Paleti Rama Rao,.M.L.A., Chirala represented regarding the misery experienced due to Drainage congestion in the Romperu basin. He represented for two straight cuts to the sea one on each arm of Romperu on the following grounds.

10.4.2 ROMPERU LEFT ARM – MAJOR DRAIN

1. The Epurupalem straight cut proposed and executed connecting Romperu left arm by a 10.66KM long cut joining the sea which has been improved under CERP programme got silted up to a considerable extent due to the sandy soils and is not effective in providing the required relief, thus causing congestion in the main Romperu left arm. Saki drain already improved under CERP and infalling into the Romperu left arm is adding to the woes.

2. From KM 12.5, Romperu left arm, called Perali drain, running for about 13.2 KM further, infalls into the sea. Before its infall into the sea, the Nallamada diversion joins Perali drain.

3. Nallamada, by itself a Major drain already improved under CERP brings in large volumes of discharge as it has both the upland and deltaic catchments with the result, the drainage discharge in Perali is subjected to back-up effect and sluggishness.

4. Due to cumulative effect of all the factors noted under 1.1 to 1.3 above, the people in the area bounded by the Romperu left arm, Perali drain, Epurupalem straight cut and the

sea in the east are put to severe hardships due to prolonged submersion, some times lasting ever for about 10 days.

5. Dr.P.Rama Rao, M.L.A. Chirala represented for a small straight cut from Perali drain into the sea taking off from near about Maruproluvaripalem village below the confluence of Lambadi drain. This straight cut of about 2.5 KM length will greatly reduce the drainage congestion by providing quicker relief.

6. RECOMMENDATION

The point stressed by the M.L.A. Chirala Dr.P.Rama Rao is well merited and is worhty of consideration.

a. It is therefore recommended that the proposed straight cut (from below the infalling of the Lambadi drain into Perali) joining the sea be investigated for its hydraulic efficiency and provided as the cost involved is not likely to be much. While designing the standards of this straight cut, the problem of side slope stability in view of the sandy nature of the soils (as experienced in the Epurupalem straight cut) be kept in view and the slopes provided accordingly.

b. While on the subject, it is necessary to subject the ills encountered by Epurupalem straight cut, to examination and improve it with flatter side slopes to the extents necessary to avoid the sand slipping into the drain and choking it.

10.4.3 ROMPERU RIGHT ARM – MAJOR DRAIN

1. The Vetapalem straight cut connecting Romperu right arm to the sea is about 6 KM long. The Vetapalem straight cut takes off from about KM 15.18 of the right arm. From this point, the Romperu right arm continues for another 22 KM and joins the sea near about Pedaganjam.

2. The stretch of the drain beyond the off take of Vetapalem straight cut has been improved under CERP programme in its entire length except for a small distance of 7 KM in the last reach before it infalls into Bay of Bengal.

All the infalling drains in this stretch of Romperu right arm some of which are Swarna affluent, Kappalavagu, Aleru drain below and above Commamur canal, Apperu drain below and above Commamur canal are all improved under CERP to the standards.

3. The Romperu right arm from its start ie, Commamur canal, upto vetapalem off take is not improved under CERP.

4. The partial improvements done to the infalling drains, leaving the parent carrier drain ie, Romperu right arm in the first 15.5 KM length has aggravated the misery of the Chirala town and its surroundings, specially Swarna affluent and Aleru bring in large volumes of water and find their way, as at present, through the Vetapalem straight cut.

5. The area enclosed by Romperu right and left arms, the Epurupalem straight cut, the Vetapalem straight cut and the sea has suffered the worst with water stagnating even for a depth of 7 to 8 feet for days together due to the drainage congestion in the above mentioned drains. Dr. P. Rama Rao represented that the Chirala Municipal area experienced this misery. He represented that another straight cut from the Romperu Right arm near about and in juxta position to Janadrapeta town, crossing Kunderu drain duly negotiating the crossing (similar to Vetapalem straight cut) and joining the sea will afford a great relief to Chirala town and its environs in its municipality. The approximate length of this straight cut may be about 6 KM.

6. RECOMMENDATION

The point stressed by the M.L.A. Chirala Dr.P.Rama Rao is well merited. Even in the public meeting held by the committee at Chirala on 12.07.98 with local legislators this case was pressed by many of the inhabitants of Chirala. Their main bone of contention is that the people of that area, small farmers as they are, and with sandy soils, what little they could grow, it subjected to prolonged inundation is putting them to severe misery. The problem faced by them certainly deserves consideration from humanitarian point of view to afford relief to this unfortunate set of people surrounded as they are by the drains. It is also a matter of civilised thinking that a municipal area should not be subjected to 7 to 8 feet depth of standing water threatening the residents.

It is therefore recommended that the additional straight cut joining the Romperu right arm (in its initial reaches) to the sea be investigated for its hydraulic efficiency and provided. The small expense incurred in providing the straight cut is worth as it affords the much needed relief to the Chirala people, as a social welfare measure.

(sd) * * * *
22.02.99
(CH.RADHA KRISHNA MURTHY)
CHAIRMAN

(sd) * * * * *
22.02.99
(K APPA RAO)
MEMBER-CONVENOR
CE, MI & DDS

(sd) * * *
29.03.99
(M.S.N.MURTHY)
MEMBER

(sd) * * *
28.03.99
(M.S.CHALAPATHI RAO)
MEMBER

(sd) * * *
22.02.99
(V.LOKANADHA RAO)
MEMBER

(sd) * * *
22.02.99
S.E, NSRC O & M CIRCLE
LINGAMGUNTLA,
For MEMBER, (CE, NSRC Guntur)

CHAPTER-11

ACKNOWLEDGEMENTS

1. Proceedings of Development and management "Water logging & Drainage Problems in Coastal area" – sponsored by G.O.I., & U.S. Agency for International Development (1985).

2. Report of the Experts Committee on utilisation of River Waters in A.P.Krishna River basin (1985) – J.Raja Rao Committee.

3. Report of Krishna Water Disputes Tribunal Bachawat Award (1973).

4. Comprehensive report of Drainage scheme of Krishna & Godavari deltas and Pennar Irrgn. System by Dr. K. Sree Rama Krishnaiah, Officer on Spl. Duty, Telugu Ganga Project (1987).

5. Report of the Expert committee on Floods for deltaic areas of Krishna, Godavari and Guntur districts of A.P. – A.C.Mitra Committee report.

6. Ellis Manual.

7. A manual of Krishna Dist - Gordon Mackenzie (1787)

8. Report of Irrigation Commission G.O.I. (1972).

9. Comprehensive and detailed technical History of Prakasam Barrage (1995) G.O.A.P. Irr. & CAD.

CHAPTER 12

ANNEXURE I – (i)

From
Sri K. Appa Rao,
BE (Hons) M.Tech. FIE.
Chief Engineer,
Maj. Irr. & Delta Drainage Schemes
and
Conveyor, Experts Committee on
Drainage Problems.

To

1) Sri Ch. Radhakrishna Murthy,
Engineer-in-Chief, I & CAD. Dept.
(Administration Wing)
Chairman,
Experts Committee on Drainage Problems.

2) Sri M.S.N.Murthy,
Chief Engineer (Retired)
38-4-7, Moutessori School Street,
Punnamma Thota,
Vijayawada – 520010.

3) Sri V. Loknatha Rao,
Superintending Engineer (Retired)
Vijayawada.

4) Sri K. Koteswara Rao,
Chief Engineer (Retired)
Door No.7-7-21, Near Indira Gandhi Statue,
Lawyerpeta,
Ongole

5)
Chief Engineer,
Srisailam Project, (A/c. NSRC),
Gagan Vihar,
Hyderabad.

Lr.No.Chief Engineer/DR/2434/97 Dt. 27-02-1998

Sir,

Sub:- Experts Committee on Drainage Problems Minutes of the 1st Meeting held on 26.02.1998 at Hyderabad – Communicated – Regarding.

Ref:- G.O.Rt.No.7 Dated 02.01.1998.

—— :: ——

The Minutes of the 1st Meeting held by the "Experts Committee on Drainage Problems" on 26.02.1998 at Hyderabad are here with communicated.

Encls:- Minutes of the Meeting.

Yours faithfully,

(sd)For CHIEF ENGINEER,
MAJ.IRR. & DELTA DRAOMAGE
SCHEMES: HYDERABAD

1) Copy submitted to the Principal Secretary to Government, Irrigation & CAD. Department A.P Secretariat Hyderabad for favour of information.

2) Copy to :

The Superintending Engineer, Irrigation circle, Vijayawada. |
The Superintending Engineer, Irrigation circle, Guntur. |
The Executive Engineer, KW.Dn. Tenali | for urgent
The Executive Engineer, Drainage Division, Repalle. | necessary action
The Executive Engineer, Drainage Division, Chirala. |

MINUTES OF THE "EXPERTS COMMITTEE ON DRAINAGE PROBLEMS" MEETING HELD ON 26.02.1998 AT HYDERABAD.

The 1st Meeting of the Committee of experts on Krishna Delta, covering the Districts of Krishna, Guntur and Prakasam to study the Drainage problems and open suggestions for remedial measures was convened on 26.02.1998 at 01.30 AM. in the Chambers of the Chief Engineer, Major Irrigation and Delta Drainage Schemes being the convenor.

The following are present:—

1. Sri Ch. Radhakrishna Murthy	...	Chairman
2. Sri M.S.N. Murthy	...	Member
3. Sri V. Lokanatha Rao,	...	Member
4. Sri K.V. Subba Rao	...	Chief Engineer, NSRC
5. Sri K. Appa Rao	...	Member Convenor Chief Engineer Major Irrigation
6. Sri K. Venkateswara Rao	..	Superintending Engineer Irrigation Circle, Vijayawada.
7. Sri V. Suryanarayana Murthy	..	Superintending Engineer, Irrigation Circle, Guntur.
8. Sri K. Purnachandra Rao	..	Executive Engineer, K.W.Division Tenali.
9. Sri M. Venkateswarlu	..	Executive Engineer Drainage Division Repalle.
10. Sri K. Venkatramaiah,	..	Excutive Engineer, Drainage Division, Chirala.
11. Sri. T.S. Prakash Rao	..	Deputy Chief Engineer, Delta Drainage Schemes.

The Committee discussed the problems the K.W.Delta is facing in disposal of Drainage from the Delta and from Nagarjunasagar Right Canals Ayacut.

The following resolutions were passed by the Committee

1) The discharging capacity of Nallamada drain has to be verified i.e., the originally designed discharge and after the improvements under CERP. Are to be checked up.

Action ...Executive Engineer,
Drainage Division,
Chirala.

2) It is essential to collect the data regarding (i) the detention period of waters at U/S. of U.Ts., crossing Commamur canal for the last 5 to 6 years and the rainfall during the said period in the U/S. catchment area and (ii) the extent to which the U.Ts., are to be improved for quick disposal of drainage congestion.

Action ...Executive Engineer,
Drainage Division,
Chirala.

3) The carrying capacities of the drains at D/S. of U.Ts., are to be assessed to determine whether the bottleneck is below U.T. or above U.T. or with in the U.Ts., and if so, steps to remedy the situation are to be discussed and L.S. of E.T.B., Nallamada, Romperu along with straight cuts and present C.S. of these drains from sea mouth upto Commamur Canal crossing may be taken and supplied to the Members.

Action ...Executive Engineer,
Drainage Division,
Chirala.

4) Studies are to be carried out to study whether the carrying capacities of canals are affected by cross masonry works either by affecting the sill levels or by constricting the water way

Action ...Executive Engineer,
K.W Division,
Tenali.

5) Chief Engineer, Nagarjunasagar Right Canals may examine the proposal of a separate drainage canal parallel to GNT Road to Gundlakamma river and submit a detailed report.

Action ...Chief Engineer,
Engineer,
N.S.R.C.

6) A comprehensive Plan showing (I) the drains improved in view of Recommendations of Mitra Committee, (ii) Improved under CERP, (iii) Proposed in APMM & ECRP and (iv) not covered in any of the programmes in different colours may be prepared and sent immediately to the Members of the Committee

Action ...Superintending Engineer,
Irr. Circle,
Guntur.

The Chairman desired to have field visit to study the various items specifically mentioned by the M.L.As., in their meeting with the Hon'ble Minister on 27.11.1997; after the 2nd meeting.

The next meeting will be held on 21.03.1998 at 11.00 AM. In the Chambers of the Chief Engineer Major Irrigation & Delta Drainage Schemes, Member Convenor of the Committee for further discussions and deliberations in the matter

(sd) * * *
29.01.1998
CHIEF ENGINEER
MAJOR IRRIGATION
& DELTA DRAINAGE
SCHEMES
MEMBER, CONVENOR
EXPERTS COMMITTEE.

CHAPTER-12

ANNEXURE I – (ii)

GOOVERNMENT OF ANDHRA PRADESH
IRRIGN. & CAD (DR) DEPT

From
Sri K. Appa Rao, B.E., FIE.,
Chief Engineer, Maj.Irr. & DDS
Member & Convenor, Exports Committee,
Errum Manzil, Hyderabad-82.

To

Letter.No.C /Dr/2434/97

Dated: 30.03.1998

Sir,

Sub:- Experts Committee on Drainage problems-minutes of the 2nd meeting held on 21.03.98 at Hyderabad –Communicated- Reg.

Ref:- 1. G.O.Rt.No.7, dt.2.1.98.
2. T.O.Lr.No.CE /Sr/2434/97, dt. 27.2.98.

—— :: ——

The minutes of the 2nd meeting held by the "Experts Committee on Drainage Problems of Krishna Western Delta and N.S.R.C.ayacut" held on 21.03.98 at Hyderabad are herewith communicated.

Yours faithfully,
Sd/- K. Appa Rao, Dt.30.03.98
CHIEF ENGINEER: DDS: HYD.
Member & Convenor, Experts Committee.

1. Copy submitted to the Principal Secretary to Govt, Irr. & CAD Dept, A.P.Secratariat, Hyderabad for favour of information.
2. Copy to the following officers with a request to furnish the information called for from them atleast by 15.04.98 so that the same may be gone through thoroughly before the 3rd meeting of the committee.

i. The Superintending Engineer, Irrigation Circle, Vijayawada.
ii. The Superintending Engineer, Irrigation Circle, Guntur.
iii. The Executive Engineer, Krishna Western Division, Tenali.

iv. The Executive Engineer, Drainage Division, Repalle.

v. The Executive Engineer, Drainage Division, Chirala.

Sd/- K.Appa Rao, dt.30.03.98
CHIEF ENGINEER:MAJ. IRR.& DDS
Member & Convenor, Experts Committee
Hyderabad

MINUTES OF THE 2ND MEETING OF THE "EXPERTS COMMITTEE ON DRAINAGE PROBLEMS OF KRISHNA WESTERN DELTA AND N.S.R.C AYACUT" HELD ON 21.3.98 AT HYDERABAD.

—— :: ——

The II Meeting of the Committee of experts on Krishna Delta, covering the districts of Krishna, Guntur and Prakasam to study the Drainage problems and offer suggestions for remedial measures was convened on 21.3.98 at 11.00 AM in the Chambers of the Chief Engineer, Major Irrigation and Delta Drainage Schemes, Hyderabad being the Member convenor.

The following are present.

1.	Sri Ch. Radha Krishna Murthy,	Chairman.
2.	Sri M.S.N.Murthy	Member.
3.	Sri J.L.Murthy	Special Invitee.
4.	Sri V. Lokanandha Rao.	Member.
5.	Sri K.V. Subba Rao	Chief Engineer, N.S.R.C.
6.	Sri K. Appa Rao	CE /Maj.Irr.& DDs. Member convenor.
7.	Sri K. Venkateswara Rao	SE/IC/Vijayawada.
8.	Sri D. Ram Mohan	SE/IC/Nellore(Spl. Invitee).
9.	Sri M. Venkateswarlu	E.E, D.D., Repalle.
10.	Sri. R. Venkatramayya	E.E., D.D., Chirala.
11.	Sri K. Purnachandra Rao	E.E.,KWDn., Tenali.
12.	Sri. A. Radha Krishna Murthy	Dy. Chief Engineer –IV.
13.	Sri. T.S. Prakash Rao	Dy. Chief Engineer , D.D.S.

The Committee has discussed the problems of the Krishna Western Delta and N.S.R.C. ayacut and reviewed the follow-up action taken on the resolutions passed by the Committee in the 1st meeting. The following further resolutions have been passed by the Committee.

1. The discharging capacities of all the drains crossing Commamur canal at both upstream and Downstream of U.Ts are to be furnished and the details of bottlenecks if any being caused by U.Ts may also be furnished

Action: Superintending Engineer,
Irrigation Circle, Vijayawada.

2. Rainfall data from 1977 onwards may be obtained and supplied to facilitate the committee examine whether the design criteria being adopted is adequate or not.

Action: Superintending Engineer,
Irrigation Circle, Guntur.

3. Rattlenecks in the drainage net work from sea to Commamur canal may be identified and reported.

Action: Superintending Engineer,
Irrigation Circle, Guntur.

4. Chief Engineer, Nagarjuna Sagar Right canals may arrange for a quick paper study based on S.I. sheets for a possible diversion of N.S.R.C. SURPLUS TO Gudlakamma river.

Two sites are suggested.

i. Upstream of Nagarjunasagar Right main canal.
ii. Along GNT road.
iii. Whether there is any possibility of locating detention reservoirs may be studied and reported

Action: Chief Engineer, N S R C.

5. The Tungabhadra drain and Kollimerla drain have already been improved under C.E.R.P. The Committee finds that there is no option now than to go ahead with improvements to E.T.B. drain as per approved Hydraulic Particulars in C.E.R.P.

Action: Chief Engineer , Major

6. Improvements to Ogeru vagu from KM 39.63 to KM 44.40 can be taken up by bridging the gaps as the other reaches of the drain were already improved under CERP.

The next meeting of the Committee is proposed to be held on 25.4.98 at 11.00 AM in the Chambers of Chief Engineer, Major Irrigation at Hyderabad.

Sd/-K.Appa Rao, dt.30.3.98
CHIEF ENGINEER:DDS:HYDERABAD

For CHIEF ENGINEER:DDS:HYD

CHAPTER-12

ANNEXURE I-(iii)

GOVERNMENT OF ANDHRA PRADESH
IRRIGATION & CAD DEPARTMENT

From

Sri K. Appa Rao, BE (Hons) M.Tech.FIE.,
Chief Engineer,
Delta Drainage Schemes,
Errum Manzil,
HYDERABAD-500082.

To

Sri Ch. Radhakrishna Murthy, BE., FIE.,
Engineer-in-Chief (Retired)
Chairman, Expert Committee,
A.P. Secretariat,
HYDERABAD.

Sir,

Sub: Expert Committee on Drainage problems in Krishna Western Delta – Minutes of the IV Meeting held on 08.09.98 at Hyderabad – Communication – Regarding.

Ref: This Office Lr.No.CE/Dr/OT2/AEE1/2434/97, dt :3.9.98

In continuation of the letter referred above.

I here with enclose 1) the minutes of the IV meeting held at Hyderabad on 08.09.1998 and 2) Note on the Drainage congestion caused by the protective works carried out by Railways at Bridge No.25, across Guntur Nallah drain. This for your information.

Encls:

1) Munutes of the Meeting
2) Note

Yours faithfully,
(sd) * * *
18.09.98.
For Chief Engineer :DDs:HYD.

Copy to:

All the Members of the Committee and Officers concerned (with enclosures).

MINUTES OF THE IV MEETING OF EXPERTS COMMITTEE ON KRISHNA WESTERN DELTA HELD ON 08.09.1998 AT HYDERABAD.

The Experts Committee met in the Chambers of Chief Engineer, Major Irrigation & Delta Drainage Schemes at 2-00 PM on 08.09.1998 to discuss the issues (i) Railway Bridge No.25 on Guntur Nallah drain at KM 0.925 of the drain and (ii) Pedanandipadu L.I. Scheme for the distressed tailend ayacut of Kakumanu Major of NSRC.

The following Members and Officers have attended the Meeting: —

1. Sri Ch. Radhakrishna Murthy,	Chairman
2. Sri M.S.N Murthy	Member
3. Sri M.S. Chalapathi Rao	Member
4. Sri K.Appa Rao	Member Convenor
5. Sri V. Suryanarayana Murthy	S.E. IC. Guntur
6. Sri M. Venkateshwarlu	State Co-ordinator APHM&ECRP
7. Sri S. Venkata Rao	EE APHM&ECRP DN.Repalle
8. Sri K. Lakshmaiah	EE, APHM & ECRP ON-Chirala
9. Dri. S. Padda Raju	EE/QCI Dn.Narasaraopeta

Members have accepted the minutes of III meeting held on 10.07.1998 at Vijayawada.

RAILWAY BRIDGE NO.25: The issue of Drainage congestion due to the protective works for the bridge carried out by the Railways was discussed quite in detail and a tentative consensus was reached. The matter would be discussed further in the next meeting at Vijayawada when all the Members are expected to be present.

PEDANANDIPADU L.I. SCHEME ON OGERUVAU :-Some technical details were asked to be furnished during the previous site inspection on 11.07.98. The particulars furnished by the Executive Engineer, NS Right Canals, QC&I Dn. Lingamguntla, Narsaraopeta at the meeting did not cover all the aspects. The Executive Engineer promised to place the particulars still required at the next meeting at Vijayawada.

Sd/ K.Appa Rao
Chief Engineer , MI&DDS
Member Convenor Experts Committee.

NOTE ON THE DRAINAGE CONGESTION CAUSED BY THE PROTECTIVE WORKS CARRIED OUT BY RAILWAYS AT BRIDGE NO.25 ACROSS GUNTUR NALLAH DRAIN

Bridge No.25 at KM 7/5-6 of Guntur-Tenali Railway line was constructed in 1914 across Guntur Nallah drain at KM 0.925.

Hydraulic particulars of the drain as approved by the Chief Engineer, Major Irrigation & Delta Drainage Schemes.

CATCHMENT AREA:

(in Sq.Miles)	74.60	(upland catchment)
	54.55	(Deltaic catchment)
TOTAL: —	129.15	Sq.miles
BED FALL	1:5250	
Surface fall	1:8000	
Bed width	66 feet with 15 feet berms on either side	
Bed level	+7.010 M	(23.00')
	+7.185 M	@ KM 0.925(23.57')
O F L	+9.30 M	(30.50')
M F L	+10.36 M	(34.00')
TBL	+11.28 M	(37.00')
M F Discharge	2796 cusecs.	
O F D	1398 cusecs	

Observed flood level in fields at KM 0.925 upstream of the bridge on 22.08.1996 is +10.65 M. At bridge site it is +10.46 M.

Bed level in the vent portion of the Railway bridge: + 7.95 M (as reported by Divisional Railway Manager through his letter dated 13.03.1994).

Prior to advent of CERP 1990, the Major and Medium drains were designed for an MFD of Q = 81M in the case of delta drains. However the Railway bridges must have

been constructed for M F D arrived at by using either Rives of Dickens formulae with a 'C' value of 1000 and 1200. But no data is reportedly available on the records to what discharge this bridge was built originally. However, when improvements to drains were taken up under CERP (1990) they were improved as per the recommendations of T.M.C. to pass a MFD calculated using Ryves Formula, CM 2/3 taking C as 155 for deltaic catchment and 145 for upland catchment.

The Hydraulic particulars approved by Chief Engineer, CERP, for this drain at the Railway crossing are

B L	=	+7.11M
M F L	=	+10.46M
B.W	=	36M
Bed fall	=	1:9000
M.F.D.	=	119.60 cumecs or 4424 cusecs

The Divisional Engineer, Railways, Vijayawada was requested by the Executive Engineer, CERP division, Tenali on 9.3.1994 to take up necessary protective works to the bridge No.25 taking the drain bed level as +7.11M.

A joint inspection of the bridge was made on 20.12.1994 by the Superintending Engineer, CERP, Guntur with the Chief Bridge Engineer, South Central Railways.

The abutments and the piers of the bridge were constructed in R R masonry. Depth of foundations were 1.28m and 1.36m. under the abutments A1 & A2. Depth of foundations under the 3 piers P1, P2 and P3 were 1.11m, 1.27m and 1.30m respectively. The deepest foundation level thus was at an elevation of +5.97m under P2 and the highest at +12.65m. The "New" scour level works out to +4.57m and afflux to 0.15m against the available free board of 1m.

During the joint inspection of the Superintending Engineer CERP was agreable to allow the hump of about 0.80m at the bridge site and wanted the Railways to do the required protecive works. The Chief Bridge Engineer, Railways opined that it will have an advantage in the functioning of the drain if the hump is removed completely (while carrying out the improvements, a stretch of 25m was left off by CERP both on the

Upstream and down stream sides of the bridge). The Superintending Engineer CERP also pointed out that the existing scoured bed level of the drain was +6.44m (before improvements to the drain were taken up by CERP).

The Railway authorities asked CERP on 17.06.1994 for depositing Rs. 9.00 lakhs to carry over protection works such as lowering the bed below of the bridge by removing the hump and also providing cutoff walls upto maximum scour level duly providing bed pitching and side revetment of u/s and d/s of the bridge etc.,

Railways proceeded with the construction of protective works in May, 1995. They provided grouted pitching in the bed of the drain and vents of the bridge to E1.+7.95m(+8.04 to 8.07m as per the rough sketch prepared by Dy. Executive Engineer CERP Sub division No.3 on 21.12.1995) against the designed bed level of +7.113m.

A number of representations against the formation of the hump were submitted to the Chief Minister of Andhra Pradesh by the Villagers/Water Users Associations & Distributory Committees of Prathipadu, Thadikonda, Mangalagiri and Duggirala Constituencies Dr. M.P.Rattayya M.L.A, Prathipadu also represented to the Chief Minister on 24.11.1997. About 10,000 acres, according to the villagers has been subjected to drainage congestion during the past four years. Their opinion was that the hump formed by the Railways with the grouted pitching is preventing the smooth functioning of the drain and requested for providing 3 additional vents to the Railway bridge on 29.02.1996, the Railways required a deposit of Rs. 45 lakhs for this additional work. The situation is apparently lending to two alternatives: -

1) Cutting open the grouted rough stone dry packing (along the drain) thus providing open trapezoidal channels of 3m bed width in the bridge vents with bed level at +7.11m, encasing the piers and abutments with either sheet piles or cut off walls taken down to the maximum scour level and connecting the drain banks by smooth transitions to the grouted RSD packing (about 14.5m long on to both sides of the crossing) on the inner side slopes. The revised afflux upstream of the bridge in the drain is to be calculated and the drain bank revised up to the point where the afflux vanishes. Down stream of the bridge the fall in the bed level is to be negotiated by a launching apron.

2) Provision of additional vents to the bridge. Taking into account the practicability of the proposals alternative (1) above is recommended.

The memorandum placed before the Expert Committee for their consideration.

(sd) * * * *

16.09.98

CHIEF ENGINEER:MAJ.IRR&DDS

CONVENOR – MEMBER

EXPERTS COMMITTEE.

CHAPTER 12

ANNEXURE I-(iv)

GOVERNMENT OF ANDHRA PRADESH
IRRIGN. & CAD DEPT.

From
Sri K. Appa Rao, B.E., FIE.,
Chief Engineer, Maj, Irr & DDS
Errum Manzil, Hyderabad-82

To
Sri Ch.Radha Krishna Murthy, B.E., FIE.,
Engineer –in-Chief, (Retd)
Chairman, Experts Committee of
K.W.Drainage Problems, A.P.
Secretariat, Hyderabad.

Lr.No.CE/Dr/OT2/AEE1/2434/97

Dated:1.12.98

Sir,

Sub: Experts Committee on drainage Problems in Krishna Western Delta – Minutes of the V meeting held on 21-10-98 at Hyderabad – Communication – Reg.

Ref: T.O. Lr.No.CE/Dr/OT2/AEE1/2434/97, dt. 14-10-98.

In continuation of this office letter referred above, I here with enclose the minutes of the meeting along with decisions taken during the V meeting held on 21-10-98 at Hyderabad.

This is for favour of information please.

Encls: Minutes of the meeting held on 21-10-98.

Yours faithfully
Sd/- K.Appa Rao, dt. 1-12-98
CHIEF ENGINEER:DDS: HYD
Member Convenor, Expert Committee.

Dy., Chief Engineer : DDS: HYD.

MINUTES OF THE V MEETING OF EXPERT COMMITTEE ON DRAINAGE PROBLEMS OF KRISHNA WESTERN DELTA HELD ON 21.10.98 AT HYDERABAD.

The expert committee met in the chambers of the Chief Engineer Major Irrigation and Delta Drainage Schemes, Hyderabad at 2.P.M. on 21.10.98.

The following members and officers have attended the meeting.

1. Sri Ch.Radha Krishna Murty.	Chairman.
2. Sri M.S. Chalapathi Rao.	Member.
3. Sri V.Lokanandha Rao.	Member.
4. Sri K.Appa Rao.	Member&Convenor.
5. Sri V.Suryanarayana Murty.	Superintending Engineer, Irrign.Circle, Guntur.
6. Sri K.Purnachandra Rao.	Superintending Engineer, NSRC, Lingamgunta.
7. Sri M.Venkateswarlu	Superintending Engineer, Administrator. APHM & ECRP. Hyderabad.
8. Sri K.Lakshmaiah.	Executive Engineer, Drainage Divn. Chirala.
9. Sri S.Venkata Rao,	Executive Engineer, Drainage Divn. Repalle.
10. Sri S.Padda Raju.	Executive Engineer, QC & I Divn. Narasaraopet;
11. Sri Prabhakar S.Mulajkar,	Dy.Chief Engineer, DDS, Hyderabad.
12. Sri V.Prabhakara Rao,	Dy.Executive Engineer, NSRC Sub-Dn.Pedanandipadu.

The Committee have discussed the Agenda of the meeting and the following decisions were taken.

ITEM-1

Drainage Congestion caused by the protective works carried out by the Railways at Bridge No.25 across Guntur Nallah drain.

The matter was further discussed (in the light of the note communicated to all the members of the Committee vide CE / MI & DDS / Lr. No. CE / Dr / OT2 / AEE1 / 2434 / 97, dt.18.9.98) at the V meeting of the committee hold on 21.10.98 in the Chambers of

the Chief Engineer, Major Irrigation and Delta Drainage Schemes. The "Note" appended to the minutes of the IV meeting was studied by the members. Sri M.S.N.Murthy, Member who could not attend the meeting conveyed over the telephone his acceptance for the alternative No.(1) suggested in the note. All the members have also expressed their acceptance to the proposal contained at alternative (1).

It was also suggested to the Chief Engineer, Major Irrigation and Delta Drainage Schemes (Member-convenor) that the proposal should be discussed with the Railway authorities for taking further action.

ITEM-2

The subject relating to write petition filed in A.P. High Court by the Ryots of L.I. Schemes on Ogeruvagu referred to the Committee by the Government is also discussed in detail.

Four farmer societies each representing on L.I. Schemes Downstream of Pedanandipadu Bridge constructed on Ogeruvagu, filed a write petition No.11134 of 1997 in the A.P. High Court seeking direction to the Government for declaring the action of the NSRC authorities in constructing the groyne as illegal and to order for stoppage of construction. The petitioners apprehended that their interests could be adversely affected as the groyne would obstruct the free flow of water.

In the event, the construction of groyne was of a dry rubble cross bund across Ogeru vagu with its top level at +8.20m (B L of vagu is +8.133m). It is not a groyne in its technical sense.

The Hon'ble A.P. High Court were pleased in their judgement dt .17.9.97 to direct the Government of A.P. to order for an enquiry into the matter and to entrust the same to an Officer, not below the rank of Chief Engineer for taking an appropriate decision. Thus the subject was entrusted to this committee for their report.

The Superintending Engineer, NSRC Lingamgunta and his officers stated that they have conducted actual gaugings and compiled the available flow in the months of December since about 5 years. The flows indicated that the flow available after keeping aside about 200 cusecs as the requirement of Pedanandipadu L I scheme (for about 9000 acres), would be about 180 cusecs at 75% dependability which is stated to be adequate for all the

private L I schemes on both the banks of Ogeruvagu located down stream of Pedanandipadu L I scheme against their requirement of about 130 cusecs.

The committee therefore felt that the writ petitioners need not have any apprehension for getting adequate water for their L I schemes.

In view of the importance of Pedanandipadu L I scheme in catering to irrigate 9000 acres of tail and ayacut of N.S.P. not receiving project water, it is felt by the committee that fool proof arrangements are required to be made for drawal of supplies to P.P.L.I. Scheme. Various alternatives were considered. Construction of a bed Regulator across the drain with its still level at the existing bed level of Ogeruvagu at the place of L I scheme or at downstream bridge with proper bank connections and with falling shutters is recommended. The design aspects need to be examined in detail with the Central Designs Organisation and finalised.

Signed by Sarvasri:

1. Ch.Radhakrishna Murthy,
   Chairman, Expert Committee.
2. M.S.Chalapathi Rao, Member.
3. M.S.N.Murthy, Member.
4. V.Lokanadha Rao, Member.
5. K.Appa Rao, Member-Convenor.

Sd/-21.10.98/1.12
CHIEF ENGINEER (DDS)
Member, Convenor,
Experts Committee.

CHAPTER-12

ANNEXURE 1-(v)

GOVERNMENT OF ANDHRA PRADESH
IRRIGN. & CAD DEPT.

Lr.No.CE/Dr/OT2/AEE1/2434/97, Dated :29.07.99

From

Sri Kakani Venkateshwara Rao,
B.Sc.,B.E.,CE.,MIE.,
Chief Engineer, Maj.Irr.&DDS,
Convenor, Exports Committee,
Errum Manzil, Hyderabad-82

To

Sri Ch. Radha Krishna Murthy,
Engineer-in-Chief (Retd.)
Chairman, Experts Committee,
A.P.Secretariat, Hyderabad-22

Sir,

Sub: Experts Committee on Drainage Problems in Krishna Western Delta – Minutes of the VIII meeting held on 23rd & 24th May 1999 at Guntur and Vijayawada – Communicated – Reg.

Ref: T .O .Lr .No.CE/Dr/OT2/AEE1/2434/97, dt.07.05.99.

In continuation of this office letter referred above, I enclose the minutes of the meeting held with local Legislators in the in the Darbar Hall of Collectorate, Guntur on 23.5.99 and on 24.5.99 at Vijayawada. This is for favour of information please.

Encls: Minutes of the meeting.

Yours faithfully,
Sd/- Kakani Venkateshwara Rao
dt. 29.07.99
Chief Engineer, Maj.Irr.& DDS
Convenor, Exports Committee
Hyderabad.

Copy to:

MEMBERS:

1. Sri Ch.Radha Krishna Murthy, Engineer-in-Chief (Retd) — Chairman
2. Sri V.Lokanandha Rao, Superintending Engineer (Retd) — Member
3. Sri M. Radhakrishna, Administrator-cum-Chief Engineer, NSRC, CADA, Guntur. — Member
4. Sri Kakamni Venkateswara Rao Chief Engineer, Naj. Irrign. &DDS — Member Convenor
5. Sri M.S.N.Murty, Chief Engineer (Retd) — Member
6. Sri M.S.Chalapathi Rao, Chief Engineer (Retd) — Member

OFFICERS:

1. Sri Sashank Goel, I.A.S., Collector, Guntur
2. Sri V.Suryanarayana Murty, Superintending Engineer, Irr. Circle, Guntur.
3. Sri M.Gangadhara Rao, Executive Engineer, K.W.Divn. Tenali.
4. Sri S.Venkat Rao, Executive Engineer, Drainage Divn., Repalle.
5. Sri K.Lakshmayya, Executive ENGINEER, Drainage Divn., Chirala.
6. Sri V.Venkateswarlu, Dy. Superintending Engineer, Irr. Circle, Guntur.

M.L.As. (THROUGH THE SUPERINTENDING ENGINEER, I.C.GUNTUR)

1. Sri M.Seshagiri Rao, M.L.A., Bapatla.
2. Dr. M.Pedarattayya, M.L.A., Prattipadu.
3. Sri N.Rama Mohan Rao, M.L.A., Mangalagiri.
4. Sri D.Nerandra Kumar, M.L.A., Ponnur.

MINUTES OF THE VIII MEETING OF EXPERTS COMMITTEE HELD ON 23&24-05-1999 AT GUNTUR AND VIJAYAWADA.

ATTENDED BY:

MEMBERS:

1. Sri Ch. Radha Krishna Murthy, Engineer-in-Chief (Retd) — Chairman
2. Sri V. Lokanandha Rao, Superintending Engineer (Retd) — Member
3. Sri M. Radhakrishna, Administrator-cum-Chief Engineer, NSRC, CADA, Guntur. — Member
4. Sri K. Appa Rao Chief Engineer, Naj. Irrign. &DDS — Member Convenor

OFFICERS:

1. Sri Sashank Goel, I.A.S., Collector, Guntur
2. Sri V. Suryanarayana Murty, Superintending Engineer, Irr. Circle, Guntur.
3. Sri M. Gangadhara Rao, Executive Engineer, K.W.Divn. Tenali.
4. Sri S. Venkat Rao, Executive Engineer, Drainage Divn., Repalle.
5. Sri K. Lakshmayya, Executive ENGINEER, Drainage Divn., Chirala.
6. Sri V. Venkateswarlu, Dy. Superintending Engineer, Irr. Circle, Guntur.

M.L.As.

1. Sri M. Seshagiri Rao, M.L.A., Bapatla.
2. Dr. M.Pedarattayya, M.L.A., Prattipadu.
3. Sri N.Rama Mohan Rao, M.L.A., Mangalagiri.
4. Sri D.Nerandra Kumar, M.L.A., Ponnur.

A draft copy of the committee's recommendation was prepared earlier. It was felt by Hon'ble Minister, Major Irrigation that a meeting with Local legislators be held to discuss the draft report before finalisation. Accordingly a meeting was convened on 23.05.99 at 3.P.M. in the "Darbar Hall" of Collectorate, Guntur.

The contents of the draft report prepared earlier were apprised to the members and their suggestions were requested. While expressing their satisfaction in general the Hon'ble Legislators suggested inclusion of the following proposals.

Sri M. Peda Rattaiah, M.L.A., Prattipadu

1) To replace the existing pipe-cause way at KM 14.00 of Mekalavagu with a vented causeway.

2) To provide a vented culvert in place of the existing pipe culvert at the crossing of Mekalavagu drain and Mallayapalem major of N.S.R.C.

3) The banks of Ogeruvagu in the village limits of i) Uppalapadu and ii) Palaparru are to be strengthened.

4) The banks of Ogeruvagu near Mettapalem are suffering erosion. Protective measures to be taken to protect the villages of Mettapalem and Jarugulavaripalem.

5) As the Railway authorities are reported to have not favourably reacted to the proposal of the committee in regard to the Railway bridge No. 25 on Guntur Nallah drain it was proposed & agreed that the Chief Engineer. Major should discuss with the Chief Engineer, Railways and explain to him the technical features of the proposal for their concurrence.

1. The Superintending Engineer, Irrigation Circle, Guntur may take suitable action to initiate necessary proposals and seek approval of the competent authority for providing a vented causeway at KM 14.00 of Mekalavagu drain in place of existing pipe causeway.

2. The Administrator-cum-Chief Engineer, NSRC, CADA, Guntur may initiate suitable proposals for solving the drainage problem being caused by the CM/CD works on Mallayapalem Major.

3. This work was already taken up and hence no further action is necessary.

4. The Chief Engineer, Major Irrigation is requested to take necessary action to discuss with the Chief Engineer of the South Central Railway, explaining the technical features of the proposal of the committee, the financial implications involved in the proposal of the Railway authorities and take necessary measures to obtain the concurrence of the Railway authority.

The Concurrence of the S.C Railways for the decision of the Committee was obtained in 11/99 and the Superintending Engineer, Irrigation Circle, Guntur was required to further action in the matter.

Sri D. Narendra Kumar, M.L.A, Ponnur observed:

1. The department has not been maintaining any data about the maintenance of the drains. There is no relief of ayacut form submersion.

2. There is no benefit though drains, were said to have been improved under C.E.R.P. by spending crores of rupees.

3. To examine whether the design criteria being adopted by the Department for improvements of drains is correct or not.

4. There is no drainage system in blocks 1 to 11 of NSRC ayacut. It is to be examined whether the drainage system is necessary or not.

5. The old road bridge across Nallamada drain in between Appikatla and Bapatla on Guntur-Chirala road needs to be demolished as it is an old structure besides obstruction the free flow of drain. A new bridge with adequate water way is to be constructed.

The committee concurred with the Hon'ble M.L.A Sri D. Narendra Kumar that data regarding maintenance of drains, status wise i.e., Major, Medium and Minor should be maintained by the Department. The Committee recommends to the Government to issue necessary instructions in the matter to store the information of deltaic and non-deltaic drains in separate floppies for reference in future.

The design criteria for design of drains followed in CERP was as decided by Technical Monitoring Committee. The committee feel that it is too early to review the formulae adopted by the CERP and hence for the present the same may be continued.

The Administrator cum Chief Engineer NSRC, Guntur is requested to furnish detailed report about the necessity of drainage system in blocks 1 to 11 of NSRC ayacut.

The committee already inspected this bridge site on 10.07.98 and examined the issue in detail. The committee recommends to the Government the construction of a new bridge in place of the old bridge. In order to improve the flow condition of the Nallamada drain, the committee suggests that the Chief Engineer may please takeup examination of i) the bed level of Nallamada drain, ii) the aqueduct across Nallamada for Appapuram channel and the adequacy of the vent way of the railway bridge downstream of the old road bridge discussed above. These two structures are existing just at downstream of the old bridge under discussion. If the aqueduct across Nallamada & the Railway bridge were found to need attention after demolition of the old road bridge then, necessary action to improve the flow condition of Nallamada drain need formulation as a package.

Sri M.SESHAGIRI RAO, M.L.A., Bapatal

1. The Hon'ble M.L.A was certain about the need for diversion of drainage from NSRC ayacut through a new separate drain into Gundlakamma river. The committee explained to the Hon'ble M.L.A that the proposed diversion is a costly proposition and was felt by the committee to that detailed investigation be takenup after Nallamada is improved throughly as suggested in the draft report. The M.L.A. suggested that the diversion is absolutely necessary and may be takenup on first priority. Towards this end the MLA suggested that a couple of alternatives for the alignment of the diversion drain be examined atleast for partial diversion. The possible sites were shown on the drawing by the M.L.A. and the Chief Engineer, NSP present, was requested to do a quick investigation to send a report to the committee.

2. Represented that the sea mouth dredging for E.T.B. drain is to be taken up on priority.

Sea Mouth dredging for ETB drain has been included under APHM &ECRP and an amount of Rs.90.00 lakhs has been provided for the same vide G.O.Ms.NO.274, dt.23.03.99 subject to the vacation of stay orders issued by the Hon'ble High Court of A.P. in regard to the settlement and payment of final bills to the contractors who worked on this drain during CERP programme.

3. Ganapavaram swamp needs immediate repairs for better performance.

Regarding Ganapavaram swamp an estimate for Rs. 11.20 lakh has been submitted to Government for Administrative approval and orders in the matter are awaited.

4. Nakkavagu may be repaired under plan grant.

Regarding Nakkavagu, Administrative approval was obtained from the Government for Rs.90.00 lakhs under plan grant in 6/99 and further action will be taken up in the matter.

Sri M.RAMAMOHAN RAO, M.L.A Mangalagiri represented that Kondaveetivagu need immediate attention.

Kondaveetivagu has been proposed to be taken up under APHM & ECRP. Government accorded administrative approval for this work for Rs. 323.00 lakh vide G.O.Ms.No.274, dt 23.03.99. The State level committee met on 19.06.99 cleared the above work stating that the present repairs may be confined to improvements to the existing structures including restoration of low pockets if any in right arm and legt arm and the reaches below Lam Anicut. These works are proposed to be taken up shortly.

(sd) * * * *

29.07.99

(KAKANI VENKATESWARA RAO)
MEMBER COVENOR
CHIEF ENGINEER : MI & DDS : HYD.

CHAPTER-12

ANNEXURE II

STATEMENT SHOWING THE SALIENT FEATURES OF DRAINS CROSSINGS COMMAMUR CANAL. K.W.DIVISION, TENALI

Mileage of Commamur canal at the crossing of the drain	Name of the drain	'C.A.in Sq.Mts	'M.F.Discharge' in Cumecs	Size of U.T. Nos.	'Designed M.F.L		'Observed M.F.L.		Remarks
					U/S in Mts.	'D/S in Mts.	U/S in Mts.	'D/S in Mts.	
KM 32.325 (M.20/1+330) (Old UT1+UT2) 32.395 (New U.T)	Guntur Nallah	Delta 54.55 Sqm Upland 74.60 Sqm	118.82 Cumecs	2X2.74X1.37 3X2.44X1.37 2X3.05X2.44	10.53 10.53 10.36				
KM. 50.328 KM. 50.428	Kollimerla U.T. New. U.T. Old.	156.44 Sqm 40.06 Sqm	157.32 Cumecs	11X6.9X2.19 Raise of Arch 1.22 Mts. 6X3.05X1.52 With Raise of Arch 1.22 Mts.	5.75			+6.30	
KM. 65.80	Nallamada U.T. I U.T. II U.T. III	612.74 Sqm +48.96 Sqm	77.05 122.70 366.59 566.34 Cumecs	2X4.88X3.05 4X4.88X1.54 with raise of arch 0.91 Mts. 10x4.88x3.05	+6.25 +6.25 +6.25	+5.64 +5.64 +5.64		+7.15 +7.15 +7.15	
K.M. 73.551	Saki U.T.	76.05	73.68	6 Nos.X8'X3' 3 Rise 3 Nos.X12'X6.5'	+5.495	+5.195			
K.M. 82.515	Karamchedu U.T. Parchuru Vagu.	182.62	132.16	3X8'X3.5' 4X12'X5.5' 5X12'X5.5'	+4.75	+4.27	+6.10	+6.10	
K.M. 89.100	Swarna U.T.	21.55	39.47	Old 2 Vents. 8'X3.5', 3' Rise New 2 Vents Arch. 8'X5.5'	+4.08	—	—	—	

	Mileage of Commamur canal at the crossing of the drain	Name of the drain	'C.A.in Sq.Mts	'M.F.Discharge' in Cumecs	Size of U.T. Nos.	'Designed M.F.L		'Observed M.F.L.		Remarks
						U/S in Mts.	'D/S in Mts.	U/S in Mts.	'D/S in Mts.	
7.	K.M. 100.00	Upperu	19.50 Up land 2.7 Delta	27.30	Old 2 Nos. 10'X4.5' New 2 Nos. 10'X4.5'	+3.35	—	—	—	
8.	K.M. 105.350	Maddirala Muppala U.T	87.55 Upland 3.09 Delta	124.54	4 Nos.	+4.83	—	—	—	
		Old U.T. New U.T.			4'X4.5' 4 Nos. X12'X4.5'					
9.	K.M. 107.40	Edumudi U.T.	8.54 Upland 2.78 Delta	42.76						
		Old U.T.			1 Vent 10'X4.5'	+2.84	+1.60	—	—	
		New U.T			1 Vent 10'X4.5'					

(sd) • • •
Executive Engineer,
K.W.Division,
Tenali.

CHAPTER-12

ANNEXURE-III

GOVERNMENT OF ANDHRA PRADESH
IRRIGN. & CAD (P.W.) DEPARTMENT.

From:
Sri K.K.V.Prasada Rao, M.Tech.,
Chief Engineer,
N.S.Right Canals,
C.A.D.A.,
GUNTUR-4

To:
The Chief Engineer,
Major Irrigation & DDS.,
Convenor,
Experts Committee,
Errumanzil,
HYDERABAD.

Lr.No.CE(G)/OT3/AEE1/2416/88/Vol.2, DT.24/8/1999.

Sir,

Sub: - Expert Committee on drainage problems in Krishna Western Delta – Minutes of Meeting held on 23rd and 24th May, 1999 at Guntur and Vijayawada – Communicated – Estimate on the 3rd proposal – Submitted – Reg.

Ref: - 1.CE/Major Irrgn. Lr.No.CE/Dr./OT2/AEE1/2434/97, dt. 24-6-99.
2. CE/Major Irrgn. Lr.No.CE/Dr./OT2/AEE1/2434/97, dt. 29-7-99.

In the reference 1st cited, it was requested to furnished detailed report on the following suggestion, said to have been made by Sri M. Seshagiri Rao, M.L.A., Bapatla constituency:

"Formulate suitable proposal for diverting the drainage from NSRC ayacut direct to sea without allowing the same to pass through the deltaic region of Guntur and Prakasam Districts, by providing a separate drain".

But, as per the "Minutes of the Meeting held on 23-5-99 at Guntur, communicated to this vide reference 2nd cited the third proposal as suggested by Sri. M.Seshagiri Rao, M.L.A., Bapatla is, "diversion of drainage from NSRC ayacut through a new separate drain into Gundlakamma river".

Based on this proposal, the report and estimate were obtained from the Superintending Engineer, NSRC O&M. Circle, Lingamguntla and are here with enclosed

for favour of further necessary action. This is the third alternative proposed by the M.L.A., Bapatla constituency, connecting Ogeruvagu to Gundlakamma. The two proposals were already submitted aide this office Lr.No.CE/NSP/CO/HYD/ARB/164-D, dated. 14-5-98.

The length of the drainage channel, under this third proposal is 30 KM and the estimate amount is Rs.122.00 crores.

This proposal involves the following the problems.

(1) The channel is crossing branch canal, number of majors, minors, vagus and roads etc. in the N/S. Right Command.

(2) Depth of cutting is about 20 Mts. to 30 Mts.

(3) Cost involved is huge.

(4) Land acquisition problem.

The N.S.R.C. infrastructure may be effected by excavation of the above drainage channel, under the above proposal. This is submitted for favour of taking further necessary action.

ENCL: - (1) Report.

(2) Estimate with index map.

Yours faithfully,
Sd/- K.K.V.PRASADA RAO, 24/8/99,
CHIEF ENGINEER,
N.S.R.C., C.A.D.A., Guntur.

REPORT TO ACCOMPANY THE PROPOSAL NO.3 FOR DIVERSION OF 2000Cusecs OF WATER FROM OGERUVAGU TO GUNDLAKAMMA

Est. Rs.122 crores.

The proposed diversion channel takes off from Ogeruvagu on right side near the road crossing of Narasaraopet to Vinukonda in the village limits of Petlurivaripalem. The catchment area of Ogeru Vagu at the point is 97.12 Sq.Miles and the discharge workedout to 4226 Cusecs. out of which 2000 Cusecs. is proposed to be diverted to Gundlakamma river. The entire alignment of 30 KM. is passing through the developed ayacut under Addanki Branch Canal in Block No. 11 of N.S.R.C. The Hydrawlic particulars of the diversion channel are as follows.

(1) Discharge required	=	2000 Cusecs or 56.62 cumecs
(2) Discharge	=	Designed 2060 Cusecs or 58.34 cumecs.
(3) Length of Canal	=	30 KMs.
(4) Section adopted	=	25M X 2.3M
(5) Surface fall	=	1 in 4300
(6) Bed level at start	=	+55.61M
(7) F.S.L. at start	=	+57.91M
(8) Bed level at end	=	+48.61M
(9) F.S.L. at end	=	+50.91M

There are 8 Nos. of Vagu crossings, 6 Nos. of Road crossings and 2 Nos. of cross regulators for which CM & CD works are proposed. The alignment of canal has to cross the major ridge of Addanki Branch Canal where the depth of cutting is coming to 33 Meters.

The land required for this proposal is 500 Acres. An amount of Rs. 5.00 crores is provided in the estimate towards the cost of land acquisition at rate of Rs. 1.00 lakh/acre.

An amount of Rs. 5.00 crores is made in the estimate towards the improvements to be done to Gundlakamma river at the confluence point to sea mouth.

The line estimate is prepared based on S.I. Sheets.

Sd/- K.K.V.PRASADA RAO, 24/8/99,
CHIEF ENGINEER,
N.S.R.C., C.A.D.A., GUNTUR-4

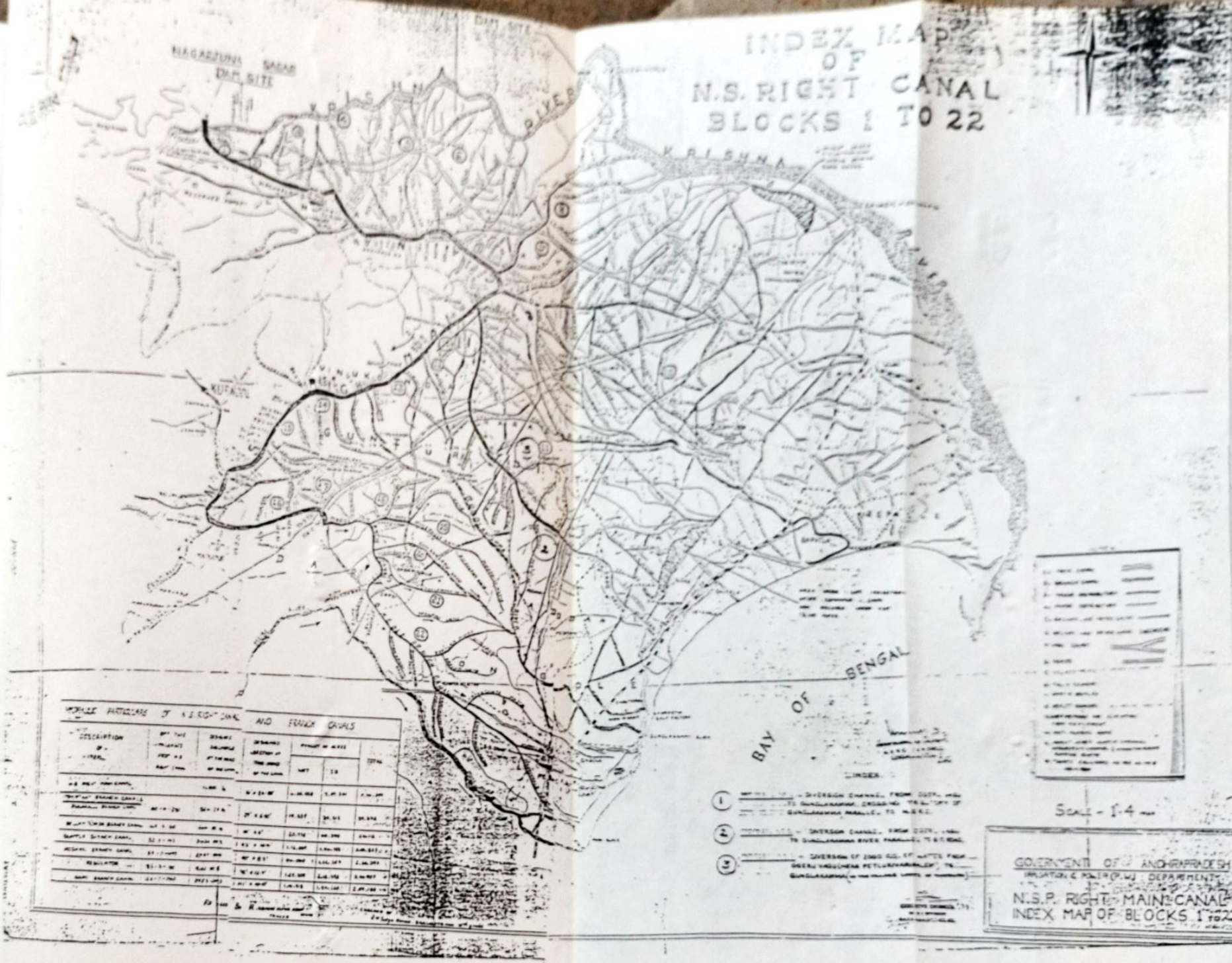
ABSTRACT ESTIMATE

Name of work: - EXCAVATION OF DIVERSION CHANNEL FROM OGERUVAGU TO GUNDLAKAMMA INCLUDING CONSTRUCTION OF CM & CD WORKS.

Quantity	Description of Item	Rate	per	Amount in Lakhs
1.	2.	3.	4.	5.
4301138 Cum	Earth work excavation for Canal cutting in SBC, H.G.& SDR soils (All soils) with all leads and lift etc. complete.	241.00	10 Cum	1036.57
19677864 Cum	Earth work excavation for Canal cutting in Hard disintegrated rock	490.00	10 Cum	9642.15
L.S.	Construction of CM & CD works	L.S.		488.00
L.S.	Cost of land	L.S.		500.00
L.S.	Improvements to the Gundlakamma River upto sea mouth	L.S.		500.00
				12166.72 or, say 122 Crores

(Rupees One hundred and twenty two crores only)

SD/-K.K.V.PRASADA RAO, 24/8/99,
CHIEF ENGINEER,
N.S.R.C., C.A.D.A., GUNTUR-4.


INDEX MAP
OF
N.S. RIGHT CANAL
BLOCKS 1 TO 22
NAGARJUNA SAGAR
DAM SITE
KRISHNA
RIVER
KURNOOL
BAY OF BENGAL
INDEX
Scale - 1·4 mm
GOVERNMENT OF ANDHRA PRADESH
IRRIGATION & POWER (P.W.) DEPARTMENT
N.S.P. RIGHT MAIN CANAL
INDEX MAP OF BLOCKS 1 TO 22