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Compliance Audit Report of the Comptroller and Auditor General of India on Poola Subbaiah Veligonda Project

SUPREME AUDIT INSTITUTION OF INDIA
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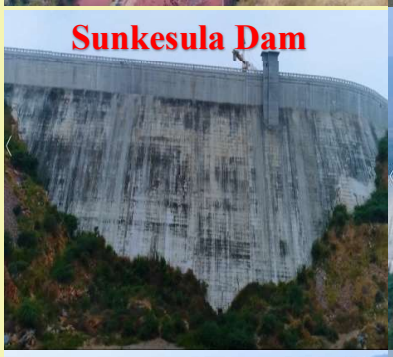

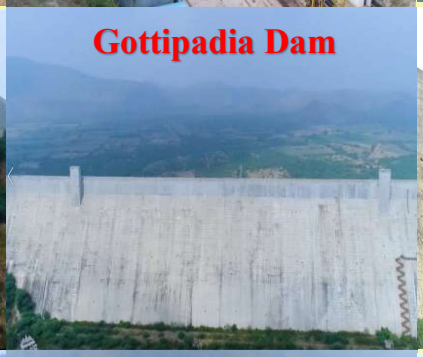

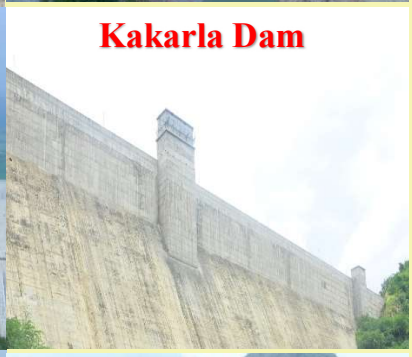

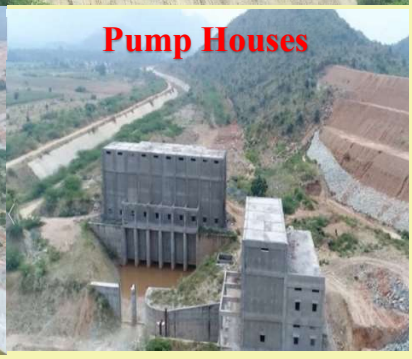

ANDHRA PRADESH
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Government of Andhra Pradesh

Report No. 4 of 2023

Compliance Audit Report of the Comptroller and Auditor General of India on Poola Subbaiah Veligonda Project

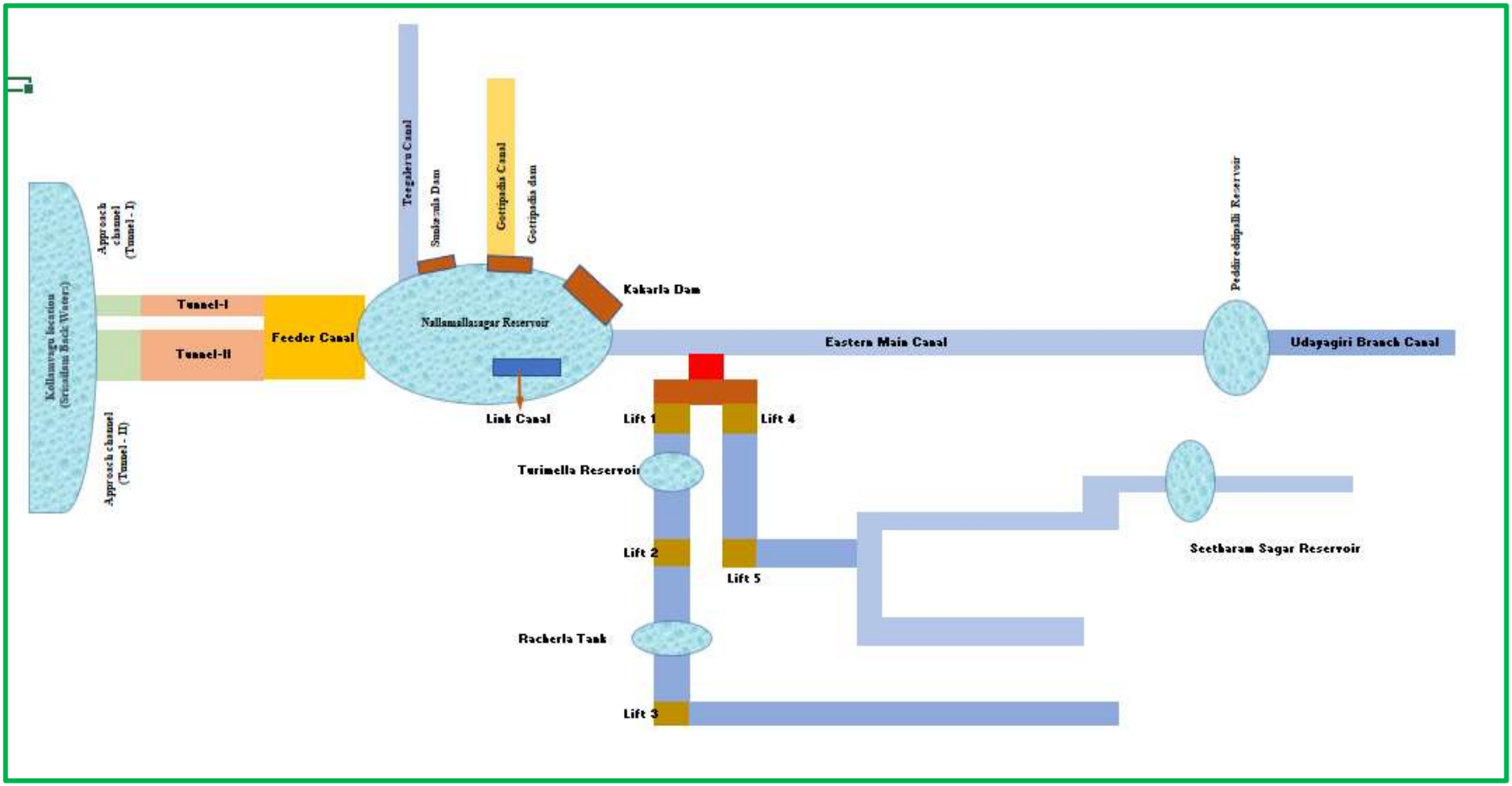
for the year ended March 2021

(Department of Water Resources)

Government of Andhra Pradesh

Report No. 04 of 2023

Poola Subbaiah Veligonda Project Line Diagram



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Preface

This Report of the Comptroller and Auditor General of India has been prepared for submission to the Governor of Andhra Pradesh under Article 151 of the Constitution of India for the year ended 31 March 2021.

This Report contains significant results of the Compliance Audit on 'Poola Subbaiah Veligonda Project' covering the period 2017-18 to 2020-21.

The instances mentioned in this Report are among those which came to notice in the course of test audit.

The audit has been conducted in conformity with the Auditing Standards issued by the Comptroller and Auditor General of India.

Executive Summary

Background of the Project

The uplands of Prakasam, SPSR Nellore and YSR Kadapa districts of Andhra Pradesh form part of a semi-arid zone in the peninsular India with scanty and erratic rainfall. These areas have been identified as drought affected and the frequency of its occurrence during the last 50 years was on the raise.

To mitigate the drought conditions, the Government of Andhra Pradesh (GoAP) conceived the 'Poola Subbaiah Veligonda Project (PSVGP)', to ensure drinking water and one low duty crop (Khariff crop) in the area. In the above context, GoAP ordered (February 1991) to assess the feasibility and to conduct investigation for the project. Investigations were carried out and the first Detailed Project Report (DPR) was prepared in the year 1994. The present project was taken up in 2005 based on the DPR submitted in March 2005.

The PSVGP envisages drawal of flood water of river Krishna from the foreshore (Kollam vagu) of Neelam Sanjeeva Reddy Sagar (Srisailam Reservoir) during monsoon period. The water so drawn would be conveyed through an approach channel, two tunnels, feeder canal and would be impounded in the Nallamalasagar reservoir. The irrigation of the command area and provisioning of drinking water would be covered through three canals connected to the reservoir. The water so drawn would provide irrigation facilities to about 4.38 lakh acres for Irrigating dry crops and drinking water to 15 lakh population in the three districts. The project was proposed to be completed within five years of commencement of construction. However, the project remained incomplete as of date.

In the above background, the detailed Compliance Audit of 'PSVGP' was conducted covering the period since inception of the project with special focus on execution of works during last four years (2017-18 to 2020-21). The audit objective was to assess whether tunnel system, head regulator including approach channel were planned and executed effectively for required water drawal capacity, planning and execution of reservoirs was done with required storage capacity and structural adequacy and canals were designed and executed with adequate structures to create required ayacut. The audit involved scrutiny of records relating to planning and execution of works at the Executive Engineer offices, Superintending Engineer (SE), Chief Engineer (CE) and Principal Secretary, Water Resources Department. The focus was on the aspects relating to planning and execution of the project and their financial impact on the overall project.

Audit findings are organised into chapters namely planning and execution aspects of tunnels, planning and execution of reservoir and planning and execution aspects of canal and distributary networks. The major deficiencies noticed are detailed below:

A) Planning and execution aspects of tunnels

A preliminary analysis or study is vital in assessing the chances of success of a project, which is proposed to be solely dependent on flood water. There was no evidence, in the records made available to audit, regarding conduct of any such study or analysis. In the absence of which, Audit could not ensure whether the targeted flood water can be drawn without affecting other projects dependent upon flood water of Srisailam Reservoir.

Difference in bed level between the Tunnel II exit point and the link canal would cause stagnation of water for a length of 4.11 Km in Tunnel II. The feeder canal was designed with lesser discharge capacity of that of the two tunnels put together. This would make the tunnels to be operated with lesser discharge and thereby restricting the drawal of water and non-achievement of intended ayacut. Despite increase in budget authorization during 2017-21, the expenditure incurred was on decreasing trend. Out of total budget authorization of ₹2,190 crore, only ₹1,270 crore was incurred.

Due to untimely decision to execute balance portion of Tunnel I by manual drill and blast method instead of using Tunnel Boring Machine (TBM), there was wasteful expenditure towards manufacture of segments and procurement of cutters used in operation/functioning of TBM. There was avoidable expenditure towards cost of rehandling of earth material deposited within the boundaries of canals proposed to be widened.

B) Planning and execution of reservoir

Construction of only three Non Over Flow (NOF) dams was identified at the time of preparation of Detailed Project Report, ignoring the fourth gap which prevents maximum level of storage capacity of Nallamallasagar reservoir. This was identified belatedly in August 2019. In respect of link canal, excess payment was made due to erroneous deduction of Stage I earthwork quantity while arriving the quantities for Stage II.

C) Planning and execution aspects of canal and distributary networks

The bids were compared with higher Internal Benchmark (IBM) cost and contracts were awarded for a higher amount than was necessary due to instances of boosting of IBMs. Excess payment towards price variation for steel and fuel was made due to incorrect adoption of rate and formula respectively. Improper planning to procure hydro and electromechanical equipment without assessing the time required to complete the canals, pressure mains, distributaries not only resulted in blockade of funds but also idling of equipment.

The Government ordered that in Engineering Procurement Construction contract system, the contractor shall be bound to execute additional items, contingent to main work and within the scope of work, at no extra cost as the contract price quoted was inclusive of such additional items. However, in four cases though there was no change in the scope of work, the department made payments for the additional quantities executed by the contractors for increase in number of structures/quantities on structures on the canals which resulted in excess payment. Contrary to the above, savings due to

reduction in quantities/length of canals and bunds, while execution of work, were not accrued to the Government.

Schedule of Payments were incorrectly approved, with higher values to certain items of work, without reference to the corresponding agreement rates. This resulted in front payments to contractors and additional financial burden in case of pre-closure/non-continuance of works by contractors.

Though the Gottipadia canal was executed as unlined canal, the payment was made for canal lining as included in the agreement which led to excess payment to the contractor. The Eastern Main Canal (first reach) was proposed with canal lining which includes the lining of structures in the length of the canal. However, in the IBMs separate lining quantities were included in the structures. This resulted in excess sanction and payment to contractor.

Conclusion

- A preliminary analysis for assessing the availability of water, for a project solely dependent on flood water, is vital for the chances of success of the Project. However, no such records were available in conformity of any such analysis.
- Utilization of budget is on a declining trend, which shows that the progress of the project is dampening.
- Execution of feeder canal with lesser discharge capacity than tunnels would result in short creation of contemplated ayacut.
- Delay in approval of designs and frequent change in contracting agencies is hindering the progress of the project.
- Additional quantities over and above IBM quantities were sanctioned in respect of structures, tunnels, etc., though, there was no change in scope of work. On the other hand, whenever and wherever there was reduction in the execution of length of canals, earthen bunds of reservoir and also decrease in quantities executed, when compared to IBM, the contract price was not reduced proportionately.
- The Schedule of Payments were incorrectly approved with higher values to certain items of work without reference to agreement rates. This resulted in front payments to contractors and additional financial burden in case of pre-closure/non-continuance of works by contractors.

Finally, certain crucial components such as tunnels, distributary network and structures on canals are still in progress. Even after completion of 17 years, since commencement of the works, the project remained incomplete thereby depriving the intended benefits of the project to the people of this semi-arid and drought prone area.

Recommendations

- **Government should crystallize the planning parameters and redesign the components of the project wherever necessary and execute the project accordingly.**
- **Government should identify the phase wise priorities and expedite the execution of the project to derive early benefits.**

- **Government should streamline the procedures relating to EPC contracts including the deliverables, scope and specification of work to avoid undue advantage to contractors.**
- **Schedule of payments of all packages should be reviewed to ensure that payments are not frontloaded.**

Chapter 1

Introduction

Chapter I
Introduction

1.1 Background of the project

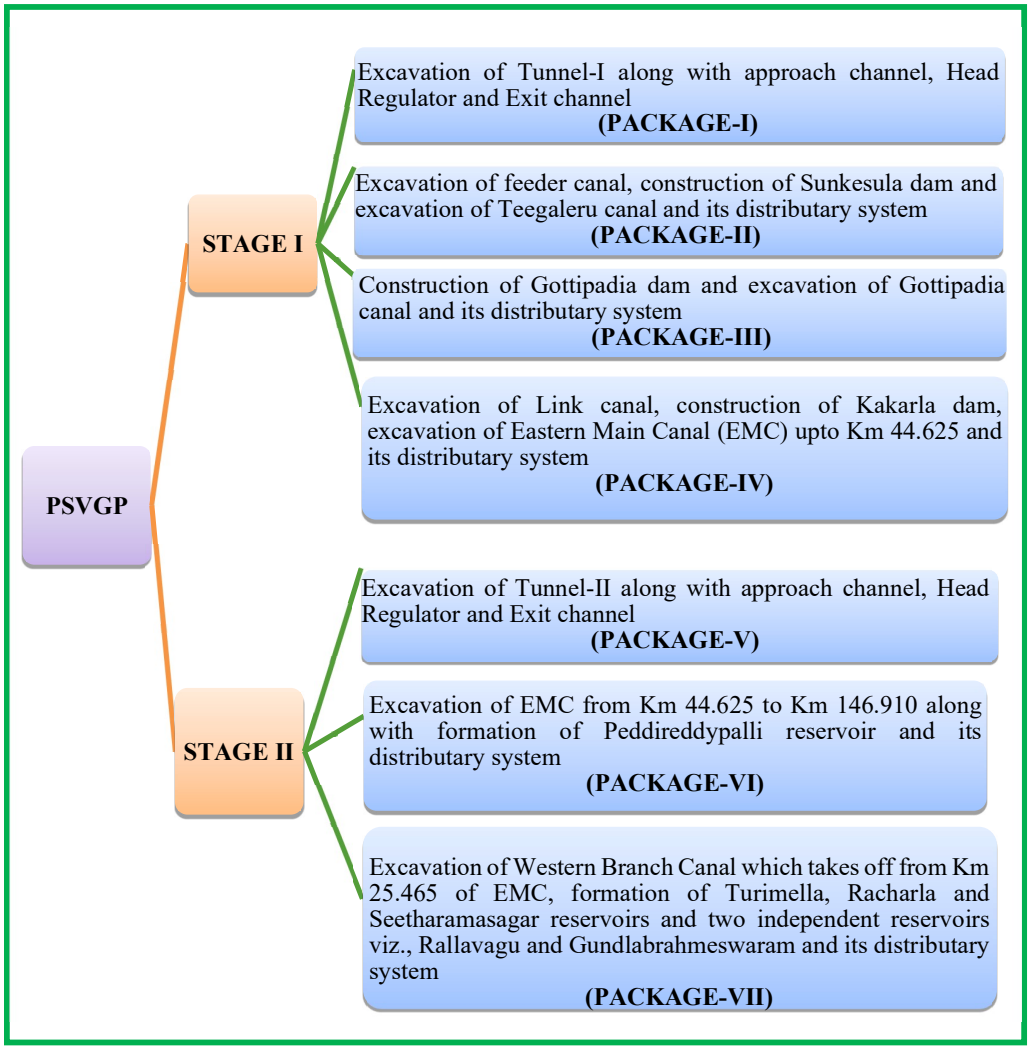
The Poola Subbaiah Veligonda Project (PSVGP) located in Markapur, Prakasam district, Andhra Pradesh was taken up by Government of Andhra Pradesh (GoAP) in 2004. The objective of the project was to create an irrigation potential of 4.38 lakh acres[1] (Irrigation Dry ayacut) and to provide drinking water facilities to 15.00 lakh people in drought prone and fluoride affected areas of 29 mandals across Prakasam, SPSR Nellore and YSR Kadapa districts. The project was envisaged to draw 43.50 TMC (Thousand Million Cubic feet) of Krishna water for a period of 30 days during flood days, by gravity, from back waters of Neelam Sanjeeva Reddy Sagar Project (Srisailam Project) near Kollam vagu in Andhra Pradesh.

GoAP gave administrative sanction[2] (July 2004) for commencement of project and execution of the project was commenced in August 2005. The various components of the project include construction of two tunnels[3] for drawl of water, execution of feeder canal to transfer water to reservoir, execution of link canal and formation of reservoir by constructing NOF dams (at Sunkesula, Gottipadia and Kakarla) to store water with a gross storage capacity[4] of 53.85 TMC, Construction of main canals and distribution network for supply of water to create the required irrigation potential with drinking water facility to the three districts. As of March 2022, for execution of the project, 17,906 acres out of the required land of 28,529 acres was acquired.

In view of the magnitude of work involved, the execution of the project was divided into two stages (Stage I and II) consisting of seven packages as shown in ***Chart 1.1.*** The Stage I works planned to be completed by August 2008 and Stage II by August 2013, are still in progress even after a lapse of more than 13 and eight years respectively from the stipulated period of completion. All the works were initially awarded on *Engineering, Procurement and Construction* (EPC) mode of contract. However, while the works were in progress, due to various reasons contractors were changed and works were awarded on Lumpsum (LS) contract system in certain packages.

[1] Teegaleru canal: 62,000 acres, Gottipadia canal: 9,500 acres and Eastern Main canal: 3,66,500 acres
[2] G.O Ms. No. 120 I & CAD Department dated 09.07.2004
[3] Tunnel-I: 7.0 m dia and Tunnel-II: 9.2 m dia each having length of about 18.800 Km
[4] live storage of 43.50 TMC and Dead Storage of 10.35 TMC

Chart 1.1: Showing division of components of works into different stages and packages



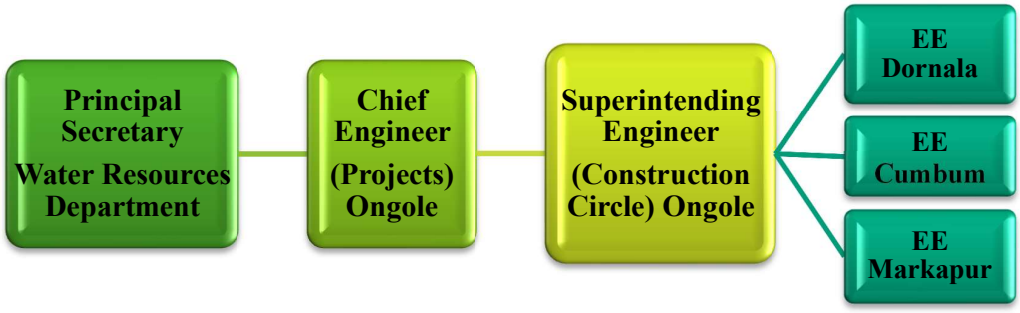
Source: Information furnished by the Department

1.2 Engineering Procurement Construction system of contract

Under Engineering Procurement Construction (EPC) system, the contractors are required to quote a fixed lumpsum price at the time of tendering. For the purpose of cost estimation, the executing department prepares an IBM, to compare with the price bids of the contractors. The selected contractor has the responsibility to survey, investigate and design the components of works, procure all necessary materials, manpower, etc. The Contractor has to execute the components as per designs and drawing approved by the competent authority for various components and deliver it to the employer as per the agreed milestone. The contractor carries the entire risk of the work, as well as budget, in return for a fixed price. The employer would have to define, clearly, (i) scope and specification of the component of work, (ii) quality parameters, (iii) project duration, and (iv) cost.

1.3 Organisational set up

At the Government level, the policies relating to the Water Resources Department are dealt by the Principal Secretary. Project implementation is the responsibility of Engineer-in-Chief, Chief Engineer (Projects), Ongole, Superintending Engineer (Construction Circle, Ongole), Executive Engineers[5] (EE) at the division level and other functionaries down the line.



1.4 Audit Objectives

The detailed compliance audit of the project was taken up with an objective to assess whether:

1. Tunnel system, head regulator including approach channel were planned and executed effectively for required water drawal capacity,
2. Planning and execution of reservoirs was done with required storage capacity and structural adequacy *(without covering Rehabilitation and Resettlement),* and
3. Canals were designed and executed with adequate structures to create required ayacut *(without covering land acquisition).*

1.5 Audit Criteria

The Audit findings were benchmarked against the criteria sourced from the following documents:

- Public works Department Codes and Manuals.
- Government orders, memos and circulars and various clearances issued by Water Resources Department/ Government/other line departments and relevant International Standard (IS) codes.
- Detailed Project Reports, administrative approvals, technical sanctions, IBMs, tender documents, agreements, payment schedules, bill copies and other correspondence files, etc.
- Minutes of the meetings of IBM/State and District Level sanction committees, High Power committee and correspondence files.

[5] Veligonda Project (VGP) division Markapur, Investigation Division Cumbum and VGP division Udayagiri at Pedda Dornala

1.6 Audit Scope and Methodology

Audit of 'PSVGP' was carried out during November 2021 to March 2022 covering the period since inception of the project with special focus on execution of works during last four years (2017-18 to 2020-21). The focus was on aspects relating to planning and execution of the project and their financial impact on the overall project. *Land Acquisition (LA) and Rehabilitation and Resettlement (R&R) were not covered during the present audit*. Further, the issues already covered under previous CAG Report (Report No. 2 of 2012 Jalayagnam Report) were not covered during the present audit. All the apex[6], auditable[7] and implementing units[8] were covered during the field audit.

The Audit methodology involved scrutiny of estimates/IBMs, tendering process, agreements entered into (both EPC and LS contract system) with contractors, measurement books, etc., at the Circle/Division level.

During scrutiny of EPC contracts, where quantities estimated by the bidders were available, the same were considered to assess the excess and short fall in actual execution/additional sanctions. However, there were instances where agreements did not provide quantities estimated by the bidder, in such cases IBM quantities were considered for the same and observations were made accordingly.

The reply of the Government received (January 2023) has been suitably incorporated in the Report. An Exit Conference was held (April 2023) during which the audit findings and recommendations of audit were discussed in detail. The audit findings are detailed in subsequent Chapters.

1.7 Acknowledgement

Audit acknowledges the co-operation extended by the Water Resources Department, the Engineer-in-Chief, Chief Engineer, Superintending Engineer and officials of three Engineering Divisions of Veligonda Project in conduct of this audit.

[6] Principal Secretary, Water Resources Department, Velagapudi
[7] Chief Engineer, Ongole, Superintending Engineer, Construction Circle, Ongole
[8] Executive Engineer offices at Cumbum, Dornala and Markapuram

Chapter II

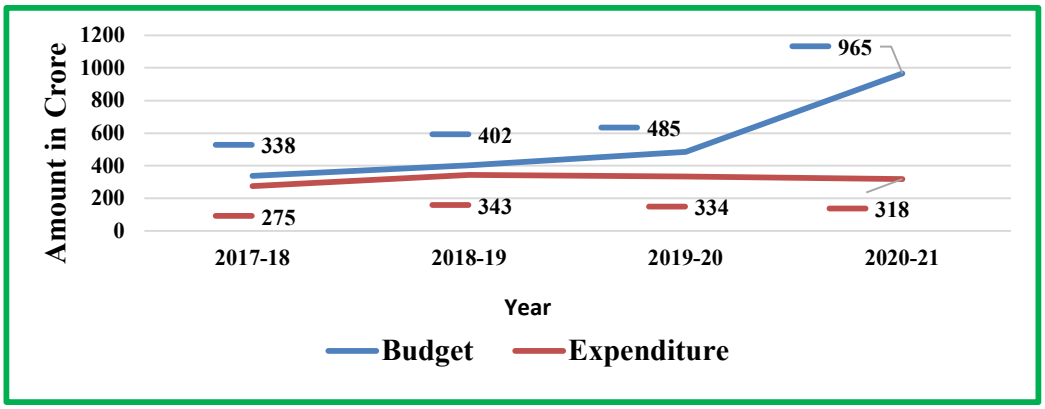
Financial and Environmental Aspect

Chapter II
Financial and Environmental aspect

2.1 Budget allotment and expenditure

The project was taken up by the State Government with a total cost of ₹4,458.86 crore[9] and the same was increased to ₹5,217.73 crore[10] as of November 2021. The budgetary provisions made and expenditure incurred for the project during audit period 2017-18 to 2020-21 was as depicted in ***Chart 2.1***. The expenditure on the project during 2017-21 was ₹1270.90 crore[11].

Chart 2.1: Budget allotted and expenditure incurred for the period 2017-21

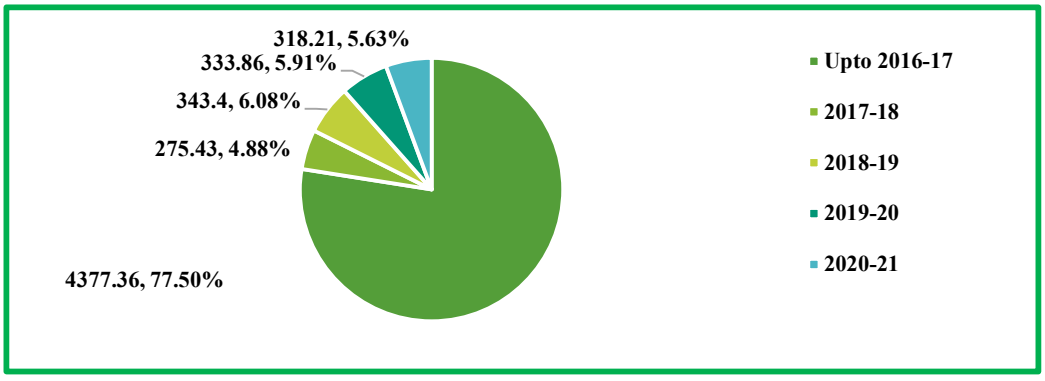


Source: Compiled based on budget booklets and information furnished by the Department
Note : The expenditure incurred as per State Finance Accounts : 2017-18 : ₹NIL, 2018-19 : ₹341.31 crore, 2019-20 : ₹100.74 crore, 2020-21 : ₹114.21 crore

Audit noticed that despite increase in budget authorization during 2017-21, the expenditure incurred showed a decreasing trend. The progress of expenditure (including cost of land acquisition and Resettlement & Rehabilitation) since inception to 2016-17 and year-wise from 2017-18 to 2020-21 was as exhibited in ***Chart 2.2*** below:

Chart 2.2: Year wise expenditure of the Project

(₹ in crore)



Source: As per the information furnished by the Department

[9] based on original agreement value of works
[10] excluding price variation, reimbursements, land acquisition and Rehabilitation and Resettlement
[11] including price variation, reimbursements, land acquisition and Rehabilitation and Resettlement

Scrutiny of bills revealed that there was additional expenditure of ₹630.57 crore over the agreement values towards price variations, reimbursement of Bank Guarantees and insurance charges, etc.

The Department attributed the increase in cost of the project to non-completion of works within stipulated time due to delay in handing over of lands, non-payment of land compensation, non-handing over of forest land, change in scope of work, sanction of additional items and quantities over and above IBM, changes in design parameters, non-availability of sand due to new sand policy etc.

However, the Government did not furnish any reply in this regard.

Thus, the increase in cost of the project was fully attributable to the Department as preliminary clearances were not obtained in time. Due to time overrun there was increase in prices of fuel, cement and steel, etc., which ultimately resulted in increase in project cost.

2.2. Package-wise agreement value and achievement

The total agreement cost of the project over the period of 18 years, was increased from ₹4,458.86 crore to ₹5,217.73 crore due to factors mentioned at Paragraph 2.1. Despite increase in the cost of the project, there was no substantial progress and project as a whole remained incomplete. The details of package-wise agreement value and achievement made thereto is given in ***Table 1.1.***

Table:2.1 Showing package-wise agreement value and achievement

(₹ in crore)

Package Number	Agreement Value (Both Stages I and II[12])	Revised Agreement Value	Total Expenditure	Components Involved	Status of Works
I	624.60	727.66	937.24	Excavation of Tunnel-I, Exit and Link Channel and Head Regulator	All components completed, except lining of Tunnel-I for last one Km (towards Head Regulator)
II	333.31	404.72	338.07	Excavation of feeder canal, construction of Sunkesula dam and excavation of Teegaleru canal and its distributary system.	Construction of Sunkesula dam, excavation of Feeder and Teegaleru canal completed. Structures (CM&CD works) on Feeder and Teegaleru Canal completed 70 *per cent* and 54 *per cent* respectively. Distributary network for 12,266 acres, out of the contemplated 62,000 acres of ayacut was created.
III	417.56	420.89	410.55	Construction/excavation of Gottipadia dam and canal and its distributary system.	All components completed, except excavation of Field Channels under distributary network.
IV	459.19	543.93	495.38	Excavation of Link canal, construction of Kakarla dam, excavation of Eastern Main Canal (EMC) upto	All components completed, except 0.600 Km of excavation of EMC. Only 37.5 *per cent* of the structures were completed. Creation of an ayacut of 47,500 acres is pending.

[12] inclusive of Stage II additional works under Package II: ₹78.81 crore, Package III: ₹37.56 crore and Package IV: ₹252.39 crore

				Km 44.625 and its distributary system	
V	735.21	962.08	610.78	Excavation of Tunnel-II along with approach channel, Head Regulator and Exit channel.	Excavation of 2.624 Km of Tunnel-II and construction of Head Regulator are pending and in progress
VI	1135.85	1250.71	893.56	Excavation of EMC from Km 44.625 to Km 146.910 along with formation of Peddireddypalli reservoir and distributary system	Excavation of 3.000 Km of EMC and 15 *per cent* of Branch Canal are pending and in progress. Structures (CM&CD works) on EMC and Branch Canal are completed 41 *per cent* and 17 *per cent* respectively. Distributary network is pending due to Land acquisition problems.
VII	753.14	817.81	638.14	Excavation of Western Branch Canal (WBC), which takes off from Km 25.465 of EMC, formation of Turimella, Racharla and Seetharamasagar reservoirs and two independent reservoirs viz., Rallavagu and Gundlabrahmeswaram and its distributary system.	Excavation of 39.53 *per cent* of WBC completed. All five pump houses completed and laying of 88.85 *per cent* of pressure mains completed.
IA & VA	0.00	89.93	0	--	--
Total	**4458.86**	**5217.73**	**4323.72**	--	--

Source: Compiled by Audit based on the information furnished by the Department

Audit noticed that:

- There was a total increase in project cost by ₹339.01 crore in Packages II to IV, VI and VII, due to additional sanctions made to contractors.
- In Packages I, V and IA & VA, there was an increase in project cost by ₹419.86 crore due to re-entrustment of works to new contractors.
- Though the Tunnels (except Tunnel-II), Link channel and Feeder canal were completed, water could not be impounded into the Nallamallasagar reservoir as the structures on Feeder canal are pending completion.

Incomplete structure on Feeder canal

- Even if water is impounded into the Nallamallasagar reservoir through Tunnel-I, the water could not be supplied to the ayacut due to non-completion of distributary network.

2.3. Status of land acquisition and environmental aspect

Out of a total land requirement of 28,529 acres for the project, 17,906 acres (62.76 *per cent*) of land was acquired as of March 2022 leaving a balance of 10,623 acres (37.24 *per cent*) yet to be acquired. The project involved a total forest land of about 7,585.75 acres (3,069.91 Hectare), which required clearance from Ministry of Environment and Forest (MoE&F), Government of India (GoI). Government of Andhra Pradesh (GoAP)

submitted (July 2007) the proposal under Forest Conservation Act 1980, for diversion of 3,069.91 Hectare of forest land for construction of the project.

GoI had accorded final approval[13] for diversion of forest land in May 2014. The GoAP, based on approval by Ministry of Environment and Forest, accorded permission[14] (Stage-II) for this project in May 2014 subject to certain conditions[15]. Audit noticed certain deviation to the environmental conditions stipulated during execution of work by the Department.

2.3.1 Dumping of excavated debris within the reserve forest area

As per the conditions stipulated by Forest Department[16], the excavated debris should be dumped away from the Nagarjuna Sagar Srisailam Tiger Reserve and Reserved Forest boundary and should be scientifically stabilised.

Audit noticed that the excavated debris of Head Regulator works was dumped near Kollam vagu location (from where water is to be drawn) in an area of three Hectare (Ha). The Forest Department issued (June 2019) Preliminary Offence Report No. 815 (POR) for violating the conditions of environmental clearance.

Dumping of excavated muck in Reserve Forest area

The Government replied (January 2023) that the subject work is highly critical in nature in respect of accessibility, transportation of materials, communication facilities, working environment, limited working period, etc. Certain minimum submergence area (0.6 Hectare) adjacent to Head Regulators was raised to Full Reservoir Level with excavated muck for creating temporary working space, which is un-avoidable. Government also replied that the Forest Department have been informed that debris temporarily stacked would be rehandled, transported, and dumped away from Reserve Forest Area.

The reply is not acceptable, as mandatory prior permission of Forest Department for dumping of excavated muck within the Reserve area was not obtained.

2.3.2 Non deployment of staff of Forest Department to monitor the project

As per the conditions stipulated (May 2014) by Forest Department, the works are to be got executed under the presence of sufficient Forest Department staff (drafted on deputation basis as decided by Forest Department) at the cost of user agency. However, no records were maintained in this regard by the Water Resources Department (WRD).

The Government replied (January 2023) that the condition to depute the staff of Forest Department was not mandatory and stated that the Forest Department staff are constantly monitoring the entire work of construction of Head Regulator. It was further

[13] MoE&F orders dated 09.05.2014. Stage I permission was accorded by MOE&F on 30.09.2009

[14] GoI, MOEF, file No.8-71/2007-FC dated 09.05.2014 and G.O. Ms. No. 59 Environment, Forests, Science & Technology (For.I) Department dated 31.05.2014

[15] no damage to flora and fauna, no labour camps to be set up in forest area, no tree felling, etc.

[16] para 6 (xvii)(c) of G.O. Ms. No. 59 dated 31.05.2014

stated that the condition warrants only execution of work under the presence of Forest Department staff but not on deputation to the user agency.

The reply is not acceptable. While according environmental permission, the GoAP had mentioned (condition number 6 (xvii) (l)) that the works may be got executed under the presence of sufficient staff of the Forest Department on deputation, as decided by the Forest Department, at the cost of user agency. However, the Forest staff were not deputed; they were not on the payrolls of the Water Resources Department.

2.3.3 Change in methodology of excavation of tunnel without assessing the environmental impact

Government instructed[17] (December 2020) the Chief Engineer (Projects), Ongole to form a Committee[18] to recommend or provide opinion/instruct to take up manual excavation activity in Tunnel II without affecting already executed concrete lining of Tunnel-I. The Committee should also put forth the environmental impact due to change in methodology (i.e. from Tunnel Boring Machine[19] (TBM) to other mode) of excavation in Tunnel-II. Further, the Committee should state whether such an activity would be within the boundaries set by environmental clearance given for the purpose. The recommendations/opinion made by the Committee are to be placed before the State Level Technical Committee (SLTC) for further recommendations to the Government.

Scrutiny of records revealed that the Department concluded a Supplementary agreement[20] (April 2022) with the contractor[21] for ₹277 crore towards excavation of Tunnel II from Km 12.000 to Km 18.787 including excavation of three number of adits from Tunnel I to Tunnel II using heading and benching method[22], instead of TBM. As of July 2022, an amount of ₹79.69 crore was paid (July 2022) to the contractor towards excavation of tunnel.

[17] Memo No. ICD01-MJIR/632.2020-Projects-II-1, dated 31.12.2020
[18] Technical Experts/ team of Senior Geologists from Geological Survey of India (GSI)
[19] a machine used to excavate tunnel with a circular cross section through a variety of soil and rock strata. These are used as an alternative to drilling and blasting methods
[20] No. 01/2022-23 dated 04.04.2022
[21] M/s Megha Engineering & Infrastructures Limited
[22] a tunnelling method in which a top heading is excavated, followed (within one to a few blasts or shoves) by excavation of the lower bench

Excavation of Adit from Tunnel I to II for manual excavation in Tunnel II. Until closure of Adit, release of water through tunnel I is not possible

Excavation of Tunnel II using manual drill and blast method

As there was change in methodology of excavation in Tunnel II and also excavation of adits from Tunnel I to Tunnel II, as per instructions of Government, a Committee should have been constituted to recommend or provide opinion/instruct to take up manual excavation activity and also put forth the environmental impact. However, the Department did not furnish any documentary evidence regarding constitution of Committee, recommendations/opinion made, the assessment of environmental impact due to change in methodology in excavation of Tunnel-II and further recommendations of SLTC. Further, information regarding the assessment carried on the adverse effect to the eco system in Reserve Forest area, by Water Resources Department as well as by Forest Department, was also not furnished.

The department stated (February 2023) that to reap early benefits of the project and to create number of working faces, for tunnel II excavation, three adits[23] were excavated from Tunnel I. Further, it was replied that no mandatory permissions are required as excavation is carried out as per the standard procedures and practices. The Department also stated that the Research Officer, Ministry of Environment, Forest & Climate Change (MoEF & CC), Regional Office, Chennai had visited (September 2019) the tunnel site and did not find any fault with the procedure even from the environment impact angle.

The reply of the Department is not acceptable. If 'no mandatory permissions are required', the Government would not have ordered to assess the environmental impact due to change in excavation methodology in Tunnel II without affecting the concrete lining of Tunnel-I. Further, the Research Officer, MoEF & CC had visited the tunnel site and submitted the report prior to the Government Order (December 2020) and hence had no relevance. Also, it could not be ascertained from the records submitted to Audit, whether the procedure prescribed by Government was adhered to prior to change in the method of excavation from TBM to heading and benching method.

[23] adit 1 at Km 17.800, adit 2 at Km 16.555 and adit 3 at Km 13.500 of Tunnel I

Chapter III

Planning and Execution of Tunnels and Feeder Canal

Chapter III
Planning and execution of tunnels and feeder canal

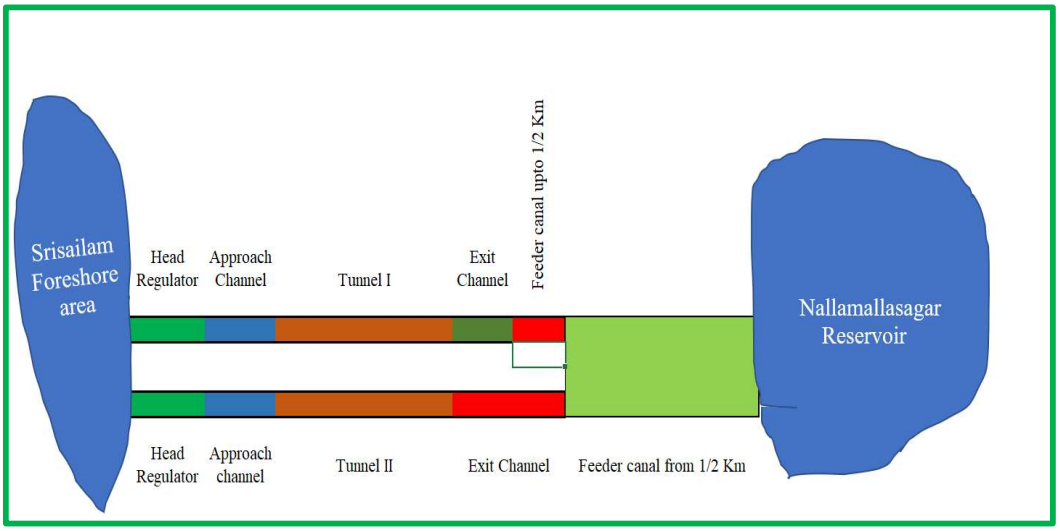
Planning process was not adequate as Project of such a large scale was taken up without scientifically assessing the availability of number of flood days and sufficiency of flood water with required water head level for creation of contemplated ayacut. Different bed levels for connecting link canal and Tunnel II exit point were adopted which leads to stagnation of water in Tunnel II. The feeder canal was under designed with 32 *per cent* less discharge capacity than the maximum discharge capacity of the tunnels thereby restricting the free flow of water into feeder canal. Frequent change of contractors, in execution of Tunnels using the same TBM led to additional financial burden in excavation of the tunnel and subsequently delay in completion of Tunnels. Due to change in Tunnel I excavation methodology from TBM to manual drill and blast method there was wasteful expenditure towards segments manufactured and cutters procured for TBM.

To draw 43.50 TMC of water from the foreshore (near Kollam vagu) of Srisailam reservoir, two tunnels[24] were proposed to be excavated. Excavation of these tunnels was grounded[25] by using latest technology *viz.,* TBMs. Further, to draw water up to tunnel entry point, separate approach channels, Head Regulators[26] and separate exit channels to transfer water to the feeder canal were proposed.

The water drawn from these two tunnels was to be transferred to Nallamallasagar reservoir through an unlined[27] feeder canal with 23.360 Km length and 328 cumecs (cubic meter per second) discharge capacity (Stage II). The components of tunnel system and feeder canal involved in the project are depicted in the following line diagram (***Not to scale***).

[24] stage I: one tunnel with 7.0 m diameter with a length of 18.800 Km and Stage II: another tunnel with 9.2 m diameter with a length of 18.800 Km
[25] tunnel - I in 2005 and tunnel - II in 2007
[26] to regulate the water inflows into tunnel
[27] a canal for which concrete lining was not made

Line Diagram 1 : Components involved in tunnel system and feeder canal



Source: Prepared by audit based on understanding of the project

3.1 Planning for tunnels and feeder canal

To develop 1.19 lakh acres of ayacut in Stage I, 10.70 TMC of water requirement was assessed in 2005. The required water was planned to be drawn in 45 flood days with an average discharge capacity of 85 cumecs through Tunnel I. Subsequently, Government revised[28] (April 2005) the number of flood days to 30 from 45. Accordingly, the Department envisaged maximum discharge (at water head[29] of 19.5 m) capacity of 160.64 cumecs from an average of 85 cumecs, without change in design of tunnel.

In Stage II, to develop an additional ayacut of 3.19 lakh acres, 32.80 TMC (43.50 TMC–10.70 TMC) of water requirement was assessed/planned to be drawn in 45 days with an average discharge capacity of 243 cumecs and in 30 days with a maximum discharge capacity of 322.68 cumecs, through Tunnel II.

Initially, for feeder canal, it was proposed to carry out investigation/survey for both Stage I (85 cumecs) and Stage II (328 cumecs) and excavation of canal for only Stage I. The design and execution of structures (Cross Masonry (CM) and Cross Drainage (CD) works) were proposed for Stage II. The discharge capacity of feeder canal was increased to 328 cumecs in Stage II by widening it to transfer additional water up to 43.50 TMC. Further, it was proposed to execute lining to canal only after serving for two to three kharif crop seasons.

3.1.1 Grounding of project without assessing availability of water

To draw required water from Srisailam Reservoir, a detailed analysis for the availability of water and the number of days for which flood flow is available is to be undertaken without effecting the requirement of water for other projects availing the same facility. The Technical Expert Committee appointed by the State Government stated that number

[28] G.O.Ms.No.170 dated 13.04.2005
[29] maximum water height available at the location from where water was drawn for this project

of flood days and availability of water head of 19.5 m at Srisailam Reservoir has to be arrived scientifically to take up the Veligonda project.

However, there was no evidence in the records made available to audit regarding conduct of any such study or analysis prior to grounding the project. Such an analysis or study is vital in assessing the chances of success of the project, which is proposed to be solely dependent on flood water. In the absence of such studies, the availability of required water at Srisailam for creation of contemplated ayacut could not be ensured.

The Government replied (January 2023) that 800 TMC of water was allocated to Combined Andhra Pradesh State, by Krishna Water Dispute Tribunal (KWDT), considering the 75 *per cent* dependability. The surplus water flowing into sea at Vijayawada, during 1962 to 1982, is assessed as 150 to 2600 TMC. The project was taken up based on above surplus water, which was allowed by KWDT also. Further, the details of surplus flood days of Srisailam Reservoir between 1984 to 2022 was also made available to Audit.

The reply is not acceptable, as it speaks about the total allocation of Krishna water to combined State of Andhra Pradesh and availability of surplus water flowing into sea during the period 1962 to 1982. Out of 800 TMC allocated to combined State of Andhra Pradesh, the actual quantity of water allocated to Veligonda Project considering the requirement of water for other dependable project was not assessed. Further, no report was furnished in support of availability of flood surplus days.

Thus, even after incurring an expenditure of ₹4,323.72 crore towards works component, the availability of required quantity of water was not ensured which may lead to wasteful expenditure in case sufficient water does not flow out of Krishna River.

3.1.2 Stagnation of water due to variation in bed levels of link canal and tunnel II exit point

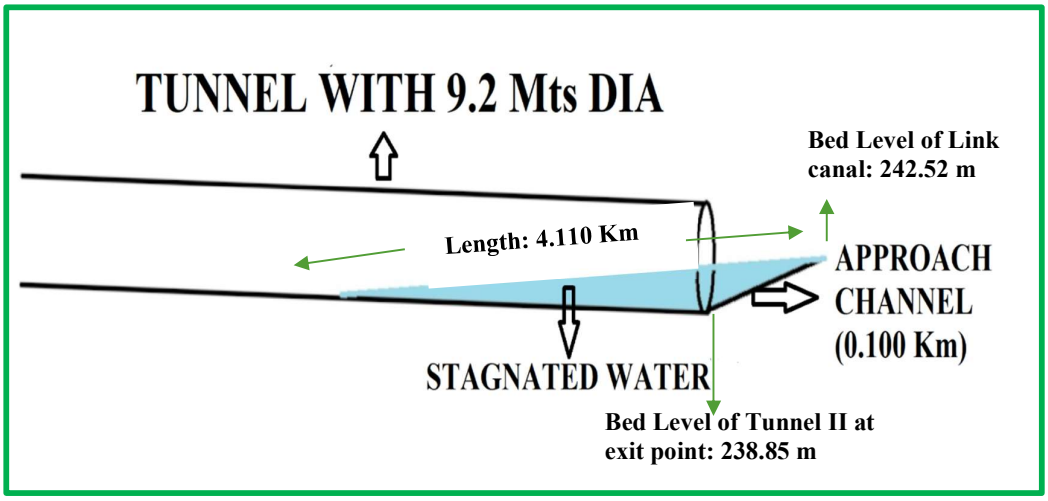
As per International Standard (IS) Code[30], all tunnels should preferably have a positive gradient (free flow) in the direction of flow. Accordingly, in Tunnel II, one meter fall in flow of water for every 1096 m of tunnel length was proposed. The link canal (exit channel) at the end of Tunnel II should be so designed that the water discharged from the tunnel enters link canal without any obstruction or stagnation at the point of contact and subsequently water flows into the feeder canal.

Scrutiny of designs of Tunnel II revealed that there was variation of 3.67 m[31] in height of bed level between the Tunnel II exit point and the exit point of link canal. As calculated by Indian Institute of Technology[32] (IIT) Madras, the difference in bed level would cause stagnation (when inflow of water is stopped) of water for a length of approximately 4.110 Km in Tunnel II. Provision for dewatering of stagnated water was not contemplated by the Department.

A line diagram ***(Not to scale)*** is exhibited below to show stagnation of water.

[30] 4880 (Part III) - 1976 vide Para 2.2.1
[31] link canal bed level : 242.52 m, Tunnel II exit point bed level : 238.85 m
[32] engaged by Audit for technical opinion and guidance

Line Diagram 2: Stagnation of water due to higher elevation of link canal than Tunnel II



The Government replied (January 2023) that the stagnation of water at the exit of tunnel acts as energy dissipation arrangement and safeguards the link channel from scouring. It was also replied that the stagnated water would recede through percolation and evaporation or could be utilised by way of pumping.

The reply is not acceptable, as difference in bed levels would ultimately result in stagnation of water.

3.1.3 Designing of feeder canal with insufficient discharge capacity

As per approved design, the total quantum of water discharged from both the tunnels should flow into feeder canal through the link canals. The tunnels were designed with a maximum total discharge capacity of 483.32 cumecs (Tunnel I - 160.64 cumecs and Tunnel II - 322.68 cumecs) to draw 43.50 TMC of water in 30 days. As such, feeder canal should have been planned for a discharge capacity of 483.32 cumecs for 30 flood days.

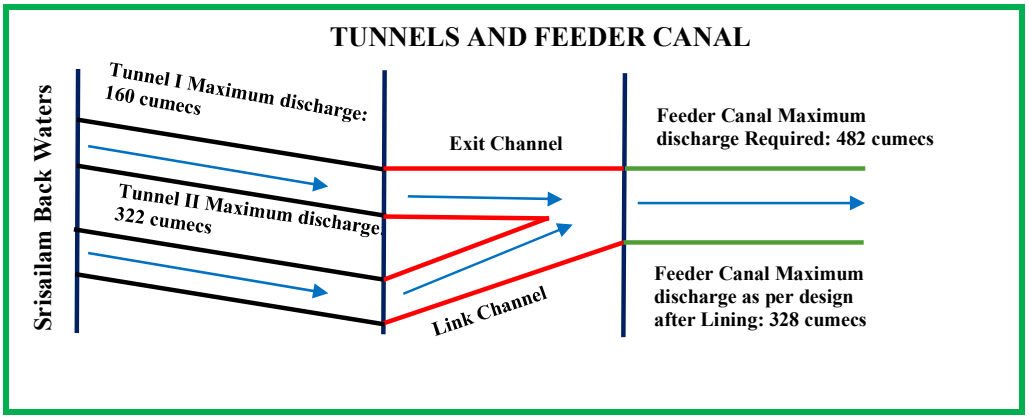
However, as against the discharge requirement of 483.32 cumecs, the feeder canal was designed with a discharge capacity of 328 cumecs (with lining), short by 155.31 cumecs (32.14 *per cent*). Though, the feeder canal was designed as lined canal, the execution was made for unlined canal and it was proposed to take up lining after serving for two to three Kharif crop seasons.

As per calculations made by Audit, without lining, the discharge capacity of feeder canal would be 214.64 cumecs[33] **(a*s detailed in Appendix-I)*** with a shortfall of 268.67 cumecs (55.19 *per cent*) of discharge capacity till completion of lining. This would have an adverse effect on drawal of contemplated water and would result in shortage of contemplated ayacut of 1.41 lakh acres[34] after completion of lining and 2.42 lakh acres[35] without completion of lining. Thus, it is evident that at planning stage, the Department had not designed the capacity of feeder canal in line with the total

[33] by using Manning's equation as per Annexure D of IS Code 7112-2002 below note under Table 3
[34] 4.38 lakh acres x 32.14 *per cent*
[35] 4.38 lakh acres x 55.19 *per cent*

discharge capacities of two tunnels. A line diagram ***(Not to scale)*** is exhibited below to show the difference of discharge capacities.

Line Diagram 3: Showing the discharges of Tunnels and Feeder Canal



The Government replied (January 2023) that the feeder canal was designed to carry a discharge of 328 cumecs, duly considering 45 flood days and subsequently the flood days were reduced to 30 days in July 2005. It was further stated that the feeder canal, if required, would be improved to 483 cumecs. The Government admitted the audit observation and stated that the feeder canal would be improved.

3.2 Execution of tunnels and feeder canal

The excavation of two tunnels along with approach and exit channel and construction of Head Regulators was taken up under Package I and Package V. The works of Packages I and V were awarded under EPC system. As of March 2022, the Head Regulator and approach channel of Tunnel I was completed. However, in respect of Tunnel II, the works were still in progress. The details of entrustment of works to various contractors at different stages under both packages is detailed in ***Appendix-II (A), (B) and (C)***. Scrutiny of records showed the following lapses in execution of tunnels and feeder canal.

3.2.1 Avoidable additional financial burden due to entrustment of balance work to another contractor

(a) The excavation of tunnels under Package I and V were first awarded (August 2005/June 2007) under EPC system to two different agencies[36]. While tunnels excavation was in progress, the Executive Engineer, without approval of Government, deleted certain components[37] worth ₹29.35 crore[38] from the scope of work of Package I (Tunnel I) and V (Tunnel II) stating that the respective contractors did not turn up to mobilise their men and machinery to execute the Head Regulator works. As per the

[36] M/s. Sabir Sew Prasad (JV) in August 2005 for Package I and M/s. HCC-CPPL (JV) in June 2007 for Package V

[37] construction of Head Regulator including approaches along with pickup weir and certain portion of tunnel (Tunnel I: 21.51 m and Tunnel II: 51m) with allied works, O&M of Head Regulator, etc.

[38] package I: ₹14.91 crore plus package V: ₹14.44 crore

instructions of Government, the IBM for deleted works was revised (May 2017) to ₹91.15 crore, based on Standard Schedule of Rates (SoR) 2016-17 by allowing water lead for transportation of men and machinery. The deleted works were awarded (August 2017) to another contractor[39] under EPC contract for an amount of ₹95.44 crore. Subsequently, the Government ratified (October 2018) the above action of the Department.

Audit noticed that despite deletion of works and entrustment of balance works to new contractors, the works could not be completed even after a lapse of five years from the date of awarding of balance works. The deletion of works from scope of first contractor and entrustment of balance work to another contractor had resulted in additional financial burden of ₹66.09 crore (₹95.44 crore – ₹29.35 crore) without achieving the intended purpose.

The Government replied (January 2023) that due to separation of components, both Tunnel I excavation and Head Regulator construction were completed in March 2021 and are ready to impound water into the reservoir during the next monsoon. Timely decisions taken by the Government in separating the works yielded results and any delay in execution increases the project cost due to cost escalations resulting in delay of benefits. Further, Government admitted that the additional cost was due to change in parameters of Head Regulator and provision of extra lead to dump the excavated material away from forest land.

The reply is not convincing, as the objective of impounding water into the reservoir cannot be achieved unless excavation of the Head Regulator and the approach channel of Tunnel II are completed, which are in progress at present. Further, feeder canal, along with its structures such as bridges, aqueduct etc., on feeder canal, and distributary system are still in progress. Thus, decision of the Department to delete the work from scope of original contractors and entrusting the same to another had resulted in additional financial burden without achieving the desired objective.

(b) The TBM excavates the tunnel and executes segment lining simultaneously. The rate of execution of work by TBM depends on the strata of rock to be excavated, periodicity of repairs and maintenance of TBM, etc.

The excavation of Tunnel I with segment lining using TBM was completed for a length of 15.200 Km (out of 18.800 Km) in 3050 days[40] at a cost of ₹754.67 crore. The contractor had completed more than 80 *per cent* of the work and fifth Extension of Time (EoT) was granted up to August 2018 to complete the balance work. Meanwhile, the balance length of tunnel works, and balance components were deleted (March 2018) from the scope of the contractor by the Department stating slow progress of work. The balance work was revised (March 2018) based on Schedule of Rates (SoR) 2017-18. The work was awarded (October 2018) to a new contractor[41] on LS contract with an

[39] M/s. RK Infracorp Private Limited with a tender premium of 4.7119 *per cent*
[40] excluding days lost due to geological accident-492 days, due to deletion of work-61 days
[41] M/s. Mega Engineering and Infrastructure Limited (MEIL)

additional financial commitment of ₹117.97 crore[42] and with a condition to complete the work by October 2019 by using the existing TBM.

Audit noticed that the nature of work entrusted to new contractor was excavation of tunnel by using the existing TBM. As the pace of work depends upon the functioning of TBM and the nature of rock strata to be excavated, the role of the contractor was limited to funding towards operation of TBM and to carrying out repairs. Further, there is no scope to split the work as the tunnel excavation could be done in only one direction, i.e., from tunnel exit to entry. As such, the progress of work cannot be geared up, by using the same TBM, even if there is change in contractor.

The Government replied (January 2023) that the contractor failed to achieve the targets as per milestone programme and failed to restart the works. To derive early benefits, the balance execution was entrusted to new contractors. The increase in cost of the work was due to TBM cost reimbursement, burial cost of TBM, etc. Further, it was also replied that the additional burden was less than the price variation to be payable to the original contractor.

The reply is not tenable, as the new contractor has to complete the balance 3,600 m of tunnel excavation in one year as per the agreement. However, the contractor completed tunnel excavation for a length of 2,547 m in 24 months period (November 2018 to November 2020). The balance 1,053 m tunnel was excavated by using manual drill and blast method, by another contractor. As such, change in contractor with additional financial commitment did not yield any early benefits. Further, as stated in Para 3.2.1(a) above, the benefits could not be derived without completion of other components of the project.

Thus, there was an unnecessary additional financial commitment of ₹117.97 crore.

3.2.2 Wasteful expenditure on manufacture of segments used for tunnel lining and procurement of cutters

Excavation using TBM requires cutters to excavate tunnel. Further, concrete lining (using premanufactured segments) would be done simultaneously along with excavation of tunnel. As such, the contractor has to manufacture segments necessary to execute concrete lining and also to procure cutters in advance for uninterrupted excavation/boring. Accordingly, a quantity of 22,034.20 cum of segments were manufactured at a cost of ₹8,682.12 per cum. Similarly, 1,761 cutters were procured at a cost of ₹37,192.69 per cutter.

Manufactured segments for Tunnel lining

The Government ordered (November, 2020) to change the method of excavation of Tunnel-I (from Km 17.747 to Km 18.800) from TBM to manual drill and blast method. The Department instructed

[42] value of balance work at agreement rates of second contractor (₹234.42 crore) minus value of work as per agreement rates deleted from the scope of first contractor (₹116.45 crore)

(November 2020) to stop excavation of Tunnel by using TBM and to dismantle it. Out of the manufactured segments, 19,194.95 cum was erected leaving a balance of 2,839.25 cum valuing ₹2.47 crore unutilised. Similarly, 1,629 cutters were utilised leaving a balance of 132 cutters valuing ₹0.49 crore unutilised. This resulted in wasteful expenditure of ₹2.96 crore ***(as detailed in Appendix-III)*** towards cost of cutters and segments.

The Government replied (January 2023) that due to cost of maintenance of old TBM, non-availability of spares, stoppage of work owing to repairs to conveyor belt there was change in method of excavation from TBM to manual drill and blast method. Further, it was replied that these unused segments would be utilised in future, whenever repairs occur to the already fixed segments and cutters would be used in Tunnel II with little modifications.

The reply is not acceptable, as the TBMs of both the tunnels were of different make and the suitability to use the leftover cutters of Tunnel I in Tunnel II TBM was not established. Further, the actual requirement of segments at the time of repairs to already fixed segments could not be foreseen.

3.2.3 Variation in component cost between agreement and schedule of payment resulted in excess payment

The components involved in Package V were excavation of Tunnel II, approach channel, Head Regulator and exit channel. As per agreement condition[43], the contract price of the total work is divided into different percentages[44] among components of works. The payments to contractors would be made based on above percentages. As per agreement conditions (Para 13.04.4 and 13.04.6), the bid offer shall be for the whole work. The contractor has to submit the component wise cost details based on and limited to the provision shown in Schedule of Payments (SoP). The SoP has to be approved by the department for the purpose of interim payments.

The total contract price of contractor[45] was ₹735.21 crore. After execution of tunnel for a length of Km 10.703 out of total length of Km 18.800, the balance length was entrusted (September 2018) to another contractor stating slow progress of work. Based on the SoPs, the value of executed components as worked out by the Department was ₹475.83 crore. The balance components worth ₹313.92 crore[46] (at agreement rates) was deleted from the scope of contractor and entrusted to a new contractor.

Audit noticed that the value of executed components as worked out by Department was ₹421.29 crore (based on agreement value) as against the ₹475.83 crore (based on approved SoP). It indicates that the Department had approved the SoP in excess of agreement value for certain components and less than the agreement value for the other components. Meanwhile, an amount of ₹470.78 crore was paid (November 2017) to the contractor. Failure to match the SoP with the agreement rates resulted in excess payment

[43] clause 37.4 of General Conditions of Contract
[44] specified in Annexure-II to 'Schedule of Payments (SoP)'
[45] M/s. HCC -CPPL (JV)
[46] total contract value: ₹735.21 crore– Cost of executed components at agreement rates: ₹421.29 crore

of ₹49.49 crore (₹470.78 crore-₹421.29 crore), besides a committed liability of ₹5.05 crore towards value of works executed but not paid.

The Government replied (January 2023) that the excavation using TBM is a specialised work involving mechanical, electrical, electronics and automation items leading to huge investments prior to commencement of excavation. Hence, IBM estimate components could not be compared with actual items of work in execution. Further, it was replied that the value of deletion was recommended as per the Code for EPC Contracts (G.O. Ms. No. 50 dated 02.03.2009).

The reply is not acceptable, as there was no mention regarding value of deletion in the above said Government Order.

3.2.4 Avoidable expenditure towards rehandling of excavated earth

As per the scope of work of Package II, survey and investigation of feeder canal has to be made for both the stages[47], however initially, the excavation of the canal has to be made for Stage I. While the excavation of canal was in progress, the Government instructed[48] (April 2007) to widen the canal for Stage II. The cost of additional quantities was arrived based on the original agreement rates and component of work was entrusted to the same contractor as additional item.

Scrutiny of records[49] revealed that an amount of ₹2.00 crore[50] was included towards rehandling of earth which was deposited within the boundaries of canal proposed to be widened. Had the excavated earth been dumped outside the boundary of proposed widening, the expenditure of ₹2.00 crore could have been avoided.

The Government replied (January 2023) that as per original agreement the investigation of feeder canal has to be made for Stage I. Accordingly, land acquisition proposals were made. While works were in progress, it was decided to widen the feeder canal for Stage II. Hence, it was inevitable to rehandle the earth.

The reply is not acceptable, as the investigation of feeder canal, as per original agreement, has to be made for both Stages I and II and execution was for Stage I. As such, had the initial deposit of earth was made outside the boundaries considering Stage II parameters, the expenditure on rehandling of earth could have been avoided.

[47] Stage I (85 cumecs discharge) and Stage II (328 cumecs discharge)
[48] G.O. Ms. No. 105 I&CAD Department dated 19.04.2007
[49] 3rd Supplemental agreement No. 1/2010-11 dated 03.04.2010
[50] 8,00,958 cum x ₹25 per cum

Chapter IV

Planning and Execution of Nallamallasagar Reservoir and Link Canal

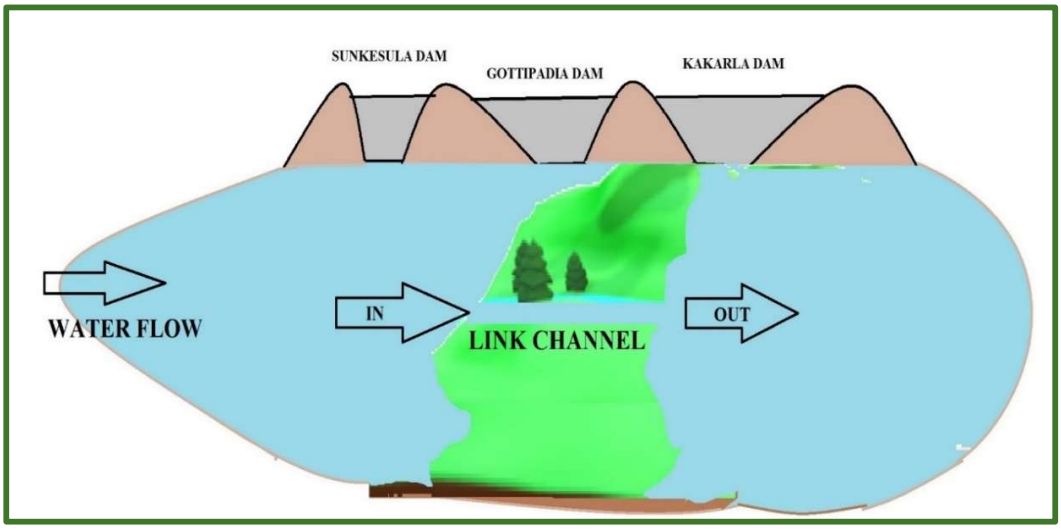
Chapter IV
Planning and execution of Nallamallasagar reservoir and link canal

The department planned the construction of reservoir without ensuring the required dams which would prevent storage of water in the reservoir upto its optimum capacity. Erroneous deduction of Stage I quantity while arriving quantities for Stage II resulted in excess payment to contractor.

As a part of the project, it was proposed to form the Nallamallasagar reservoir with 53.85 TMC[51] storage capacity. For this purpose, it was proposed (November 2004/August 2005) to construct three NOF concrete dams by closing three gaps between the hillocks near the villages Sunkesula, Gottipadia and Kakarla. These dams were initially proposed to be constructed at a height of (+) 230.00 m for Sunkesula, Gottipadia and (+) 220.00 m for Kakarla for Stage I and subsequently, the height was increased[52] upto (+) 248.00 m each for Stage II.

The foreshore area of Nallamallasagar reservoir has two segments. Segment 1 covers Sunkesula, Gottipadia gaps and Segment 2 covers Kakarla gap. These two segments were separated by a land segment with higher ground level. To overcome the bottleneck of higher ground level for transferring water from one segment to the other, a link canal of 9.8 Km length with discharge capacity of 400 cusecs was proposed to be excavated. The excavation of link canal was initially planned for Stage I and subsequently widened to Stage II. The formation of reservoir with three dams and link canal is detailed pictographically in the following diagram (***Not to Scale***).

Line Diagram 4: Formation of Reservoir with three dams and Link canal



[51] Live storage: 43.50 TMC plus Dead Storage: 10.35 TMC
[52] Sunkesula (November 2007) Gottipadia (May 2008) and Kakarla (January 2009)

4.1. Planning for construction of Nallamallasagar reservoir and link canal

4.1.1 Construction of saddle dam not identified at planning stage

The Full Reservoir Level (FRL) of three NOF dams was (+) 244.00 m. As such, all gaps between the hillocks below the FRL have to be closed to prevent water leakage. Scrutiny of records showed that Department identified (August 2019) the fourth gap (+241.665 m). It was proposed to close this gap by constructing a saddle dam. Accordingly, detailed survey for construction of saddle dam was carried out and an estimate for ₹2.45 crore was prepared and submitted (December 2019) to Government for approval. The final approval from Government was still awaited as of November 2021.

Audit noticed that despite the Department being aware (January 2009) of the elevation of the dams for stage II, no provision was made to construct the saddle dam in the revised estimate. The Nallamallasagar reservoir cannot be filled to its maximum storage capacity unless the saddle dam is constructed.

The Government replied (January 2023) that the FRL of Nallamallasagar reservoir was (+) 244.00 m and Top Bund Level (TBL) was (+) 248.00 m. The ground levels at the proposed location of saddle dam were between (+) 242.00 m to (+) 243.00 m. Hence, the necessity of a saddle dam could not be identified. Due to formation of road in this location, the ground level was decreased to (+) 240.665 m. Further, it was replied that the reservoir could be filled upto (+) 240.665 m level immediately and in general practice, the new reservoir would be filled in three or four fillings to maximum storage capacity.

The reply is not acceptable, as the original ground levels, at the proposed location of saddle dam before formation of road, when compared to FRL of Nallamallasagar reservoir were less by 1.00 to 2.00 m. As such, the necessity to construct saddle dam in this location should have been envisaged at the time of grounding the project. However, the same was identified in August 2019 and final approval of the estimate is still pending.

4.2. Execution of Nallamallasagar reservoir and link canal

The construction of three NOF dams was divided into Packages II, III and IV respectively. The scope of work of these dams includes investigation and design for Stages I and II and initial execution was for Stage I[53]. The works were entrusted (between 2005 and 2006) to three different contractors[54] on EPC contract system. Subsequently, the scope of work was revised[55] to Stage II by increasing the height of all dams. Accordingly, the additional quantities required for execution up to Stage II were worked out and IBMs were revised. The works were entrusted to the same contractors at original agreement rates and supplementary agreements were concluded.

The excavation of link canal was necessitated to transfer water from Segment 1 to Segment 2 in the foreshore area of the reservoir. The same was taken up (August 2005)

[53] Sunkesula and Gottipadia dams: + 230.00 m height, Kakarla dam: + 220.00 m height

[54] Package II: M/s. Jaiprakash Gayatri (JV), Package III: M/s. Larsen & Toubro Limited and Package IV: M/s. SCL-BSCPL (JV)

[55] Sunkesula (November 2007) Gottipadia (May 2008) and Kakarla (January 2009)

under Package IV initially for Stage I capacity. In Stage II, widening of link canal was proposed and revised IBM was prepared with additional quantities and entrusted to same contractor at original agreement rates and supplementary agreement was concluded (January 2009).

4.2.1 Erroneous deduction of Stage I quantity while arriving quantities for Stage II resulted in excess payment to contractor

Mention was made in Para No. 4.5 (v) of Report No. 2 of 2012 of Comptroller & Auditor General of India on GoAP (Jalayagnam) regarding erroneous deduction of Stage I quantity while arriving quantities for Stage II which resulted in excess payment to contractor. However, this omission continued as discussed below.

Scrutiny of records of link canal (Package IV) showed that the Stage I IBM was prepared and contract was entrusted on EPC contract system. Subsequently, the scope of work was enhanced (January 2009) to Stage II. The additional earth work involved to execute the link canal up to Stage II was arrived by revising the IBM. The execution of additional quantities was entrusted (January 2009) to the original contractor at the agreement rates of original contract.

Audit observed that the earth work excavation quantities adopted in IBM of Stage I was 32,39,459 cum. The total earthwork quantities required to execute the link canal up to Stage II was assessed in revised IBM as 50,11,837 cum. As such, the additional earth work quantities to be sanctioned was 17,72,378 cum at a cost of ₹13.39 crore. However, the Department sanctioned 23,55,186 cum at a cost of ₹22.34 crore by deducting the Stage I quantity of 26,56,651 cum instead of 32,39,459 cum. Erroneous deduction of Stage I quantity led to excess sanction of ₹8.95 crore. Out of this, an amount of ₹7.82 crore was already paid to the contractor up to Running Account (RA) Bill No.119.

The Government replied (January 2023) that executed earthwork quantities of stage I were less than IBM quantities. Further, the earth work quantities of Stage I as per execution was, all soils (1,32,833 cum), HDR (2,65,665 cum), F&F (5,31,330 cum) and Hard Rock (17,26,823 cum). Despite there being a reduction in quantities, the cost was increased due to increase in quantities of hard rock. Hence, the actual quantities as per execution was deducted to arrive the additional quantities required for Stage II.

The reply is not acceptable, as the earthwork quantity as per stage I execution in respect of Hard Rock classification was considered as 17,26,823 cum as against the total quantity of 1,365 cum, as per investigation for Stages I and II together. Further, no documentary evidence was supplied in support of the reply. As such, there was huge variation in quantities, despite the IBM for Stage II is prepared based on the investigation carried out by the same contractor.

Chapter V

Planning and Execution of Canal and Distribution System

Chapter V
Planning and execution of canal and distribution system

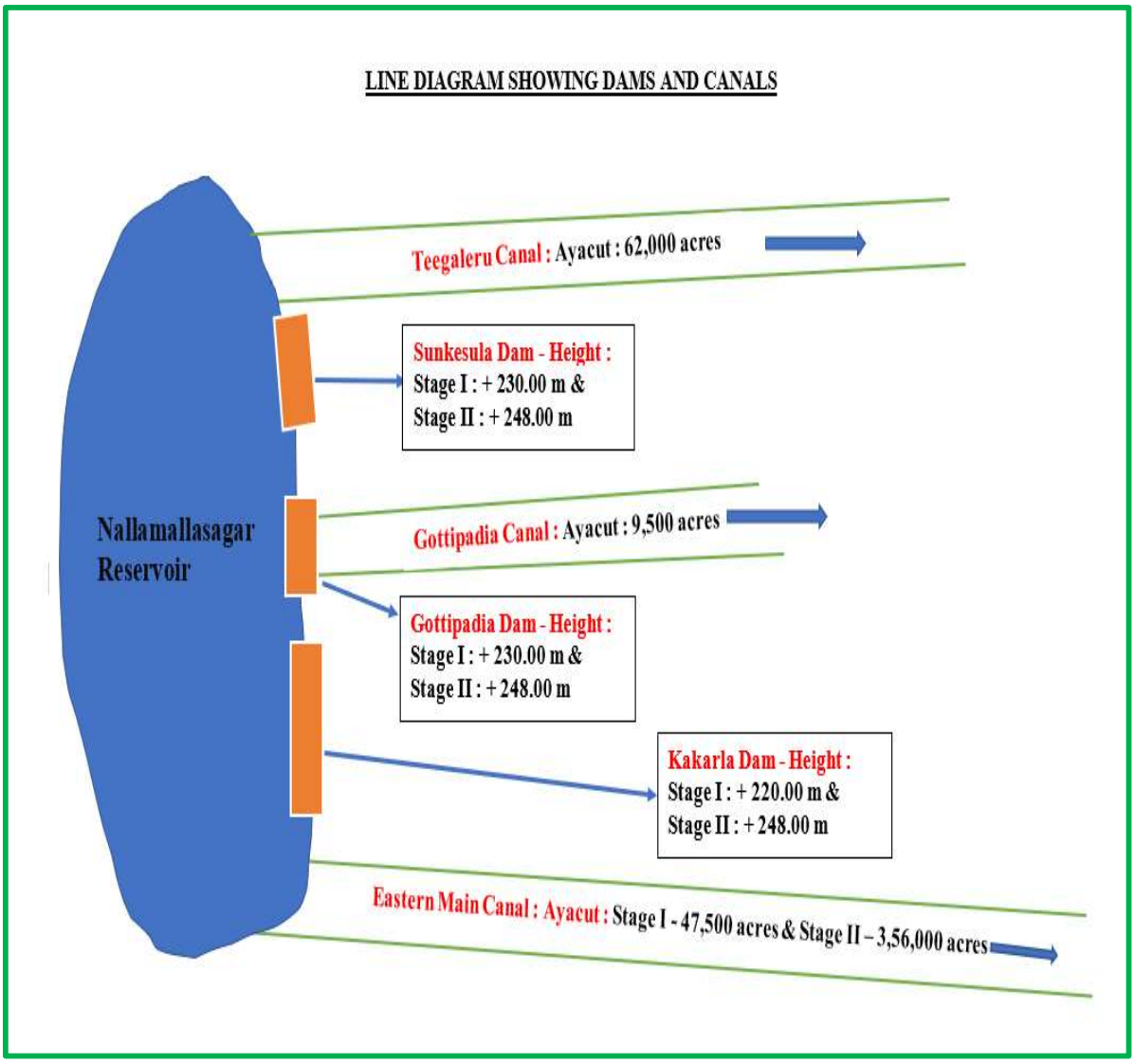
Under Engineering Procurement Construction (EPC) contract system the contractor has to execute the work as per the scope of work without referring to the quantities. However, additional quantities were sanctioned wherever it was advantageous to contractors despite no change in scope of work. The corresponding reduction in contract price was not made, despite there was decrease in quantities / reduction in length of canal / bund of reservoir stating that the works were awarded under EPC contract. Thus, the savings did not accrue to Government, however, additional payments for additional quantities were made to the contractors. As such, it can be construed that the existing provisions of the EPC contract system are more advantageous to the contractors than to the Government. The advance procurement of hydro and electromechanical components led to idling of items and blockade of funds. Incorrect preparation of IBM estimates resulted in boosting of IBM which in turn resulted in comparison of bids for a higher amount than necessary. In respect of Gottipadia canal, there was excess payment to the contractor due to inclusion of cost of canal lining in the bid amount by contractor though the canal was executed as unlined. Despite non-completion of entire project, the department irregularly released Operation & Maintenance charges to the contractor on completion of Gottipadia dam and excavation of Gottipadia canal. The Bank Guarantees (BGs) received towards Earnest Money Deposit from the successful bidder was irregularly released before completion of project and commencement of defect liability period. The Schedule of Payments was incorrectly approved with higher values to certain items of work without reference to agreement rates, resulted in front payment to contractors.

In Stage I, three canals viz, Teegaleru, Gottipadia and first reach of Eastern Main Canal (EMC) were proposed to be excavated to create an ayacut of 1.19 lakh acres in Prakasam District. In Stage II, EMC second reach and Western Branch Canal (takes off as branch canal to EMC) were also taken up to create an additional ayacut of 3.19 lakh acres in the proposed three districts[56]. In addition, 5,000 acres was proposed to be created under two independent reservoirs[57]. The water was proposed to be drawn from Nallamallasagar reservoir by constructing Head Regulators for Teegaleru and EMC and through a pipe in respect of Gottipadia canal.

[56] Prakasam, SPSR Nellore and YSR Kadapa
[57] Rallavagu and Gundlabrahmeswaram

The three canals proposed along with its canal system was depicted in the following line diagram (***Not to scale***)

Line Diagram 5: Showing Reservoir along with dams and canal system



5.1 Planning and execution of Teegaleru canal and distributary system

The Teegaleru canal, was planned as unlined canal with a length of 49.150 Km with takeoff from Nallamallasagar reservoir near Sunkesula dam. The distributary system under this canal would create an ayacut of 62,000 acres in Prakasam District. The excavation of unlined canal and its distributary system were taken as a component under Package II and works were entrusted on EPC contract system.

5.1.1 Irregular adoption of canal parameters in agreement led to sanction of additional quantities on Teegaleru canal

As per para 11.2 and 11.5 of agreement, the bidder shall quote for the entire work on a firm lump sum price and on a single source responsibility basis and the bid offer is for the whole work and not for individual items/part of the work.

The excavation of Teegaleru canal along with structures under Package II were awarded (November 2004) under EPC system. The scope of work (agreement) includes investigation and design of Teegaleru canal including structures along with distributary system to create an ayacut of 62,000 acres.

As per Detailed Project Report (DPR), to create this ayacut, a canal with 28 cumecs ***(as detailed in Appendix-IV(A))*** discharge has to be excavated. However, the same was not mentioned in the scope of work of the agreement. The initial agreement only mentioned the canal parameters viz., bed width, full supply depth, slope, etc. Based on these canal parameters, the maximum discharge capacity, as calculated by department, was assessed as 21 cumecs ***(as detailed in Appendix-IV(B))***. To arrive at the required discharge of 28 cumecs, the Department proposed to widen the Teegaleru canal for which the Department concluded three supplementary agreements[58] (February to August 2008) for ₹34.61 crore.

Audit observed that the additional amount was sanctioned even though the scope of the work did not change i.e., creation of contemplated ayacut of 62,000 acres and further, the Department did not consider the discharge initially proposed in DPR. This resulted in undue financial benefit of ₹34.61 crore to the contractor.

In reply, the Government admitted (January 2023) that in the scope of work of the agreement, the required discharge was not mentioned. However, the basic parameters of the canal were given. Government also stated that as per approved designs, the canal parameters were changed, resulting in increased scope of work. Further, additional sanctions towards variation in quantities in respect of structures were made based on the Government orders[59].

The reply is not acceptable. In EPC system, the work has to be executed as per the scope of work without reference to IBM and its quantities. Further, the design of the canal for creation of contemplated ayacut was the responsibility of the contractor. As such, the difference between canal parameters stated in agreement and as per approved designs could not be treated as increase in scope of work. Further, as per agreement conditions (Para 118.1), the contractor shall deemed to have scrutinised, prior to the base date, the Employer's requirements (including design criteria and calculations, if any) and the contractor shall be responsible for the investigation and design of the work and for the accuracy of such Employer's requirements (including design criteria and calculations).

5.2 Planning and execution of Gottipadia canal and distributary system

The Gottipadia canal was planned as unlined canal with a length of 12.875 Km and would takeoff from Gottipadia dam through a pipe. The distributary system under this canal would create an ayacut of 9,500 acres in Prakasam District. The excavation of

[58] Supplementary Agreement No. 28/2007-08 dated 21.02.2008 : ₹13.77 crore (Change in bed width and height of canal due to increase in discharge capacity; Supplementary Agreement No. 27/2018-19 dated 04.08.2018 : ₹11.42 crore (Additional quantities in structures on Teegaleru canal – in respect of 30 structures); Supplementary Agreement No. 30/2018-19 dated 05.08.2018 : ₹9.42 crore (Additional quantities of structures on Teegaleru canal – in respect of 42 structures)

[59] GO Ms No. 22 dated 23.02.2015 and G.O. Ms. No. 63 dated 12.06.2015

canal along with structures and its distributary system were taken as a component under Package-III. The work "construction of dam, canal, distributary network" was initially entrusted (November 2004) to a contractor[60] on EPC system along with Operation and Maintenance (O&M).

The contractor completed the excavation of Gottipadia dam and main canal including structures (except one syphon[61]). Due to non-handing over of lands, the distributary network along with O&M was deleted from the scope of first contractor and entrusted to second contractor[62] and the balance component (Syphon) was entrusted to third contractor[63] at agreement rates of first contractor.

5.2.1 Non recovery of cost of lining

The Gottipadia canal was to be executed as unlined as per the clarification given in pre bid meeting held with contractor. However, the bid price[64] quoted by the contractor was for lined canal and the agreement was also entered into (November 2004) with the contractor was for lined canal. Instead, the canal was executed as unlined by the contractor.

Audit noticed that though the canal executed was unlined, payment was made for lined canal and the cost of lining was not deducted/recovered from the bills of the contractor. This resulted in excess payment of ₹2.24 crore to the contractor as shown in ***Appendix-V***.

The Government replied (January 2023) that there was no mention about lining of canal in the basic parameters or in the agreement. During the pre-bid meeting, it was clarified that the canal is unlined. Further, it was replied that the contention of Audit that the bid price quoted by the contractor and the agreement entered into was for lined canal is not supported with any documental evidence and hence not admissible. As such, no excess payment was made to contractor.

The reply is not acceptable, as the contractor in "Data Sheet 5", which forms part of the agreement, admitted that the cost working was made based on the assumption that lining thickness would be 100 mm. As such, the bid price quoted was for lined canal with 100 mm thickness though actual execution was unlined canal. Hence, the cost of lining needs to be recovered.

5.2.2 Erroneous calculation of value of work to be deleted resulted in excess payment besides locking up of funds with the contractor

The contractor completed the construction of dam and main canal including structures on main canal (except one syphon) to the end of August 2009. At this juncture, the contractor requested (January 2013) to pre close the contract as required land to

[60] M/s. Larsen & Toubro Limited, ECC Division, Chennai
[61] structure in which the canal is taken below the drainage and the canal water flows under symphonic action and there is no presence of atmospheric pressure in the canal
[62] M/s. KKRC Infrastructures Pvt. Ltd.
[63] M/s. K Sai Mohan Reddy
[64] Data Sheet 5-Construction methodology of different components proposed showed that thickness of lining was taken as 100 mm

construct distributary system was not handed over. Accordingly, the Department deleted (December 2013) the balance works[65] and entrusted the same to two new contractors[66] at agreement rates[67] of first contractor.

Scrutiny of records revealed that:

(i) The total cost for execution of Gottipadia dam, main canal (including structures) and its distributary system (including structures) at agreement rates of first contractor was ₹380.00 crore. The cost of components (dam and main canal) executed by the original contractor at agreement rates was ₹373.35 crore and deleted components (distributary network) was ₹6.65 crore. Based on SoPs, the cost of components executed was ₹374.16 crore and deleted components was ₹5.84 crore. As evident from above, the cost of executed components as per SoPs were more than agreement values by ₹0.81 crore (₹374.16 crore minus ₹373.35 crore). Further, the deleted components were entrusted to new contractor at agreement rates i.e., ₹6.64 crore. Thus, irregular adoption of higher values in SoPs than the agreement rates in respect of components executed resulted in excess payment of ₹0.81 crore to the first contractor.

ii) The IBM for main canal and distributary network was prepared by incorporating lumpsum provisions amounting to ₹0.89 crore (main canal : ₹0.35 crore, distributary network : ₹0.54 crore) for providing guard stones, lab testing materials and samples, insurance, Quality Control (QC) operations, banker charges, etc. While deleting the distributary network from the first contractor, the share of the above provisions pertaining to the distributary network of ₹0.50 crore[68] at agreement rates was not included. This resulted in excess payment to the first contractor.

The excess payment of ₹1.31 crore (₹0.81 crore + ₹0.50 crore) is yet to be recovered from the first contractor.

The Government admitted (January 2023) and promised to adjust the excess payment made at the time of release of withheld amounts.

5.2.3 Irregular release of bank guarantees and operation and maintenance charges

As per agreement conditions[69] of Package III (Gottipadia dam and canal), Earnest Money Deposit (EMD) in the form of Bank Guarantee (BG) furnished by the successful bidder shall be valid for the contract period plus defect liability period. During the defect liability period, the contractor has to carryout Operation and Maintenance (O&M) for two years from the date of completion of entire project or two kharif crops whichever is more. The defect liability period commences only after completion/commissioning of the project.

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[65] Syphon at Km 2.85 and distributary network with structures

[66] Syphon at Km 2.85 to Sri K. Sai Mohan Reddy for ₹16.62 lakh and distributary network to M/s. KKRC Infrastructure Pvt. Ltd., for ₹ 6.64 crore

[67] under clause 60(c) of Preliminary Specifications (PS) to Andhra Pradesh Detailed Standard Specification

[68] ₹0.54 crore minus tender discount of 6.75 *per cent*

[69] Para 13.11 of "Part-C Preparation of bids" and Appendix for O&M vide para 2 (v)

The construction of dam and excavation of main canal (except one syphon on Gottipadia canal) were executed and completed (August 2009) by the contractor[70] However, the balance components entrusted to two different contractors were still in progress and the works under other packages were also in progress.

Scrutiny of records revealed that:

(a) Irregular release of bank guarantees

The Department obtained BGs worth ₹10.44 crore towards EMD from the Package III contractor (Gottipadia dam and canal). Government permitted[71] (April 2015) to release ₹23.67 crore[72] (including the above BGs) to the contractor though the works were still in progress and defect liability period was not commenced/completed. Thus, the release of BGs to the contractor was irregular.

The Government replied (January 2023) that after deletion of balance work from the scope of original contractor, the contractor had completed (January 2012) the total work under their scope and maintained the work during defects liability period (January 2012 to January 2014). As such the bank guarantees were released.

(b) Irregular payment of operation and maintenance charges

While certain components under Package III and other allied packages were still in progress, the Department released (RA Bill No. 59 dated 22.02.2016) O&M charges of ₹3.23 crore[73] to the first contractor as per the said Government orders. The payment of ₹3.23 crore towards O&M charges without completion of whole system is irregular.

The Government replied (January 2023) that as per addendum issued after pre-bid meeting, the maintenance during defect liability period of 24 months was from the date of completion certificate which was issued in January 2012 and as such the defects liability period was completed by January 2014. Hence, release of O&M component was not irregular.

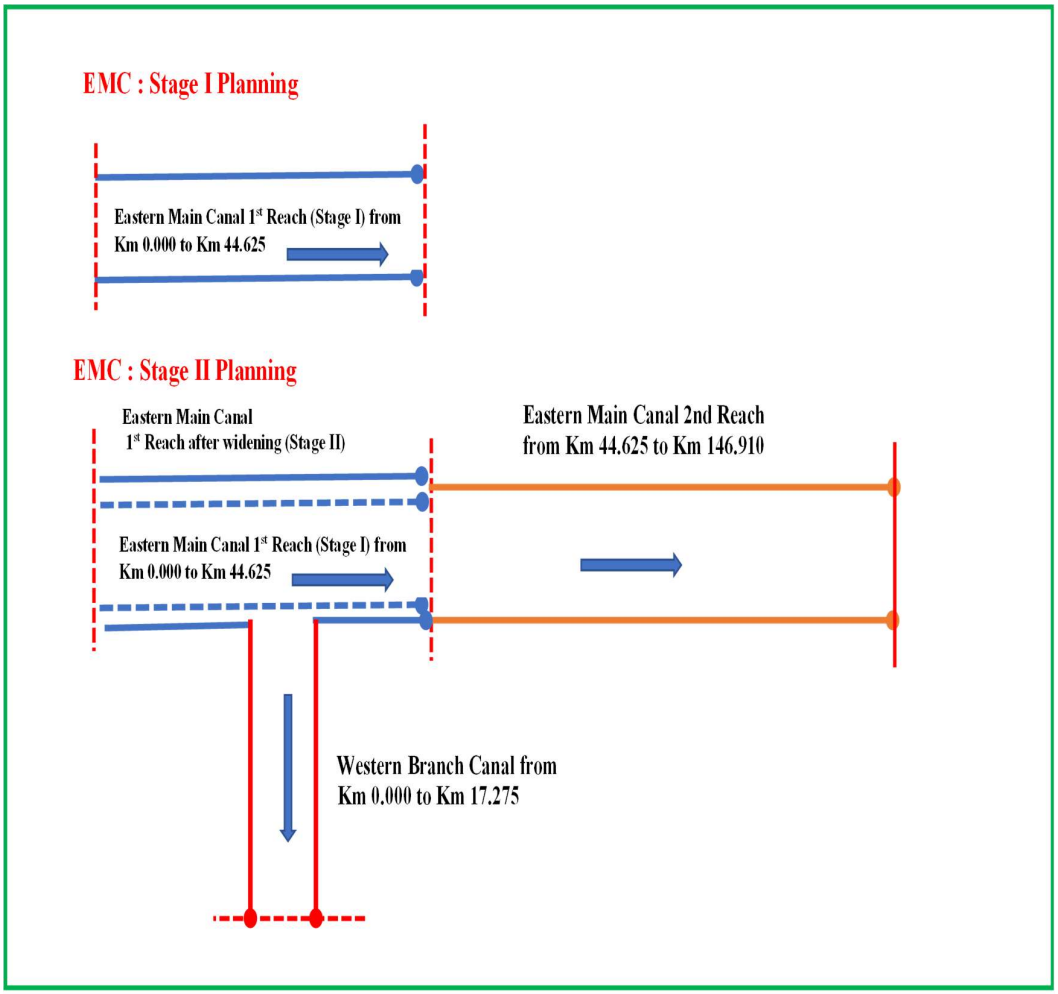
The reply in respect of both the issues is not acceptable, as the defect liability period was for a period of two years from the date of issue of completion certificate as per addendum issued to the bid document. As per agreement condition (Clause 44.1.1), 'the Engineer-in-Charge has to issue a certificate of completion when the whole of the work has been completed'. However, in the instant case, only part of the work was completed (dam and main canal) and the balance components (distributary network and one syphon on main canal) were deleted from the contractor and was shown as completion of whole work. Further, the completion certificate issued was limited to Gottipadia dam leaving main canal despite both were executed by the same contractor.

[70] M/s. Larsen & Toubro Limited, ECC Division, Chennai
[71] G.O. RT. No. 246 Water Resources (Projects-2) Department dated 25.04.2015
[72] Performance Guarantees: ₹10.44 crore, Retention money Bank Guarantees: ₹10.00 crore and O&M component of ₹3.23 crore
[73] Gottipadia dam: ₹3.04 crore + Gottipadia canal: ₹0.19 crore

5.3 Planning and execution of Eastern Main Canal and distributary system

In Stage I, the EMC first reach was planned as a lined canal with a length of 44.625 Km. The distributary system under this canal would create an ayacut of 47,500 acres in Prakasam District. In Stage II, it was proposed to extend the EMC (second reach Km 44.625 to Km 146.910) to create an additional ayacut of 2,50,000 acres. Further, Western Branch Canal (WBC) was also proposed which takes off from Km 25.465 of EMC for creation of additional ayacut of 60,300 acres. In addition, 5,000 acres of ayacut was also proposed to be created under two independent reservoirs[74]. The initial plan of EMC, its widening and second reach of EMC along with WBC is depicted in the following line diagram (***Not to scale***).

Line Diagram 6: Showing Eastern Main Canal and subsequent two canals



[74] Rallavagu and Gundlabrahmeswaram

A. Planning and execution of Eastern Main Canal from Km 0.000 to Km 44.625

The lined EMC would take off from the Nallamallasagar reservoir through a Head Regulator, near Kakarla dam, to draw water with 12.637 cumecs discharge capacity. The distributary system under this canal shall create an ayacut of 47,500 acres in Prakasam District. As per the scope of work, the investigation of main canal is to be carried out for both Stages I and II. Excavation of canal is to be done for Stage I. Further, investigation, design and execution of structures has to be made for Stage II. Under Stage II, for additional ayacut, the discharge capacity of the canal was increased to 123.620 cumecs (from 12.637 cumecs) by widening the canal.

The excavation of EMC upto Km 44.625 including structures, distributary system along with O&M were taken up as a component under Package IV. The work was entrusted (August 2005) to a contractor[75] on EPC system. Further, the widening of canal for Stage II was also entrusted to the same contractor and supplementary agreement was concluded (January 2009).

Subsequently, components viz., "Excavation of approach channel from reservoir to Head Regulator, excavation of tunnel from Head Regulator to EMC and formation of approach road to the top of Kakarla NOF dam" was entrusted (November 2019) to another contractor[76] under LS contract.

5.3.1 Failure to identify the interconnected components between two stages during planning led to additional sanction and excess payment for structures

As per the scope of work (Package IV), the contractor has to execute a branch canal[77] beyond Km 44.625 of EMC. Meanwhile, the Government extended (February 2009) the EMC (Package VI - Km 44.625 to Km 146.910) under Stage II and entrusted (February 2009) the work to another contractor[78].

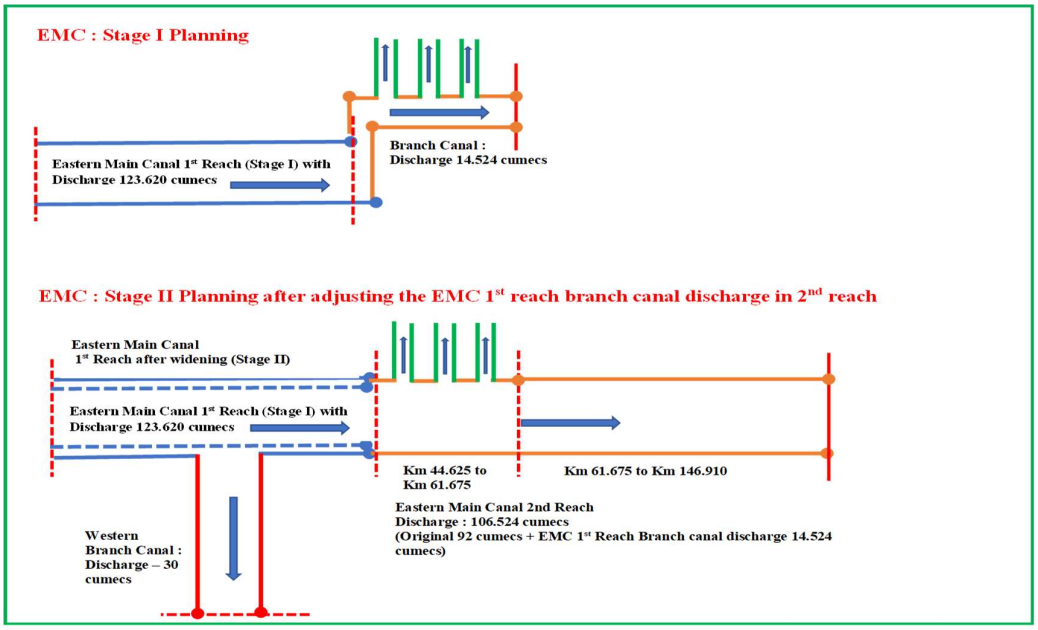
As per designs, the branch canal under Package IV and EMC (second reach) under Package VI are running parallel to each other from Km 44.625 to Km 61.675. To avoid, execution of parallel canals, the Package IV and VI contractors entered into a Memorandum of Understanding (MoU) between themselves. As per this MoU, the Package VI contractor agreed to accommodate 14.524 cumecs[79] discharge of branch canal of Package IV in the Main canal of Package VI. This discharge was accommodated by widening the main canal[80] of Package VI.

Further, the Package IV contractor agreed to pay ₹4.39 crore to Package VI contractor for accommodating the discharge of Package IV branch canal. The Department approved the EMC second reach designs, after accommodating the additional discharge, submitted by the contractor by stating that the land acquisition cost for

[75] Ms/ SCL-BSCPL (JV)
[76] M/s. SCL Infratech Ltd.
[77] serves for an ayacut of 28,000 acres through three Off takes i.e., 12 L Major at Km 51.200, 13 L Major at Km 56.750 and OT of 14 L Major at Km 61.550
[78] Package VI – M/s MRKR – ZVTS (JV))
[79] 106.524 cumecs – 92 cumecs
[80] between Km 44.625 to Km 61.675

branch canal would be avoided. Line diagram showing the above was depicted below (***Not to scale***):

Line Diagram 7: Showing the adjustment of branch canal between two canals



Audit noticed that:

- The Department paid an amount of ₹11.88 crore to the Package IV contractor for the branch canal even though the branch canal was never executed. Since the additional cost involved in widening the EMC second reach was only ₹4.39 crore as per MoU between the two contractors, there was excess payment of ₹7.49 crore (₹11.88 crore - ₹4.39 crore) to the Package IV contractor. Had the Department reviewed the designs while planning for Stage II and deleted the branch canal from Package IV while adding in Package VI, the excess payment could have been avoided.
- For accommodating the additional discharge pertaining to branch canals in the EMC second reach (Package VI), the width of the EMC[81] was increased. Considering the additional width, based on the approved drawings, additional quantities were sanctioned in respect of 16 structures coming in this length. As such, the cost of structures for this additional width (excavated to accommodate the discharge of branch canal) became additional financial burden to the Government.

The Government admitted (January 2023) that the designs of EMC (second reach) was reviewed and were changed to carry out the additional discharge[82] resulting in cost saving of ₹74.63 crore towards land acquisition and additional sanctions. Further, it was replied that the additional financial implication in execution of structures as pointed out by Audit was admitted and the same was calculated as ₹7.85 crore on prorate basis with

[81] between Km 44.625 to Km 61.675
[82] of 12L, 13L and 14L majors

reference to canal discharge. The cost of excavation of tail end branch canal was included in the distributary network provision. Hence, Audit statement that payment of ₹11.88 crore to the Package IV contractor towards branch canal, which was never executed, was only assumption without any basis.

The reply regarding cost saving of ₹74.63 crore towards land acquisition is not acceptable, as there would be no necessity to acquire the lands for excavation of branch canal, had the department initially planned properly for execution of main canal. As such, it could not be treated as saving. The department allowed to transfer an amount of ₹11.88 crore from distributary network to main canal and paid to the contractor instead of reducing the contract value as branch canal was not executed by the Package IV contractor. Further, there was an additional financial burden of ₹7.85 crore, as accepted by the department towards structures.

Hence, responsibility may be fixed, and action is to be initiated against the erring officials.

5.3.2 Incorrect deduction of earthwork quantity from the total quantities for Stage II parameters

Scrutiny of records of EMC (Package IV) revealed that the contractor estimated 64,00,000 cum of earth work and 6,00,000 cum of embankment and the same was incorporated in the Agreement. The Stage I IBM provides for 62,74,331 cum of earth work and 6,19,560 cum of embankment.

During execution of canal for Stage II, the Department while calculating additional quantities, deducted quantities as per original IBM instead of quantities mentioned in the agreement. Accordingly, the additional quantities required for Stage II was assessed and revised agreement was concluded with the same contractor.

Audit observed that the bids were invited on EPC contract wherein the bidder has to quote his price based on his own assessed quantities to be executed. As such, quantities over and above the estimated quantities has to be sanctioned in cases where scope of work increases. However, the Department sanctioned quantities over and above the original IBM quantities. This resulted in excess sanction of ₹0.51 crore. Out of this, an amount of ₹0.45 crore was already paid as of November 2020.

The Government replied (January 2023) that the quantities mentioned in Data Sheet has no relevance in arriving at the additional quantity and comparison of these additional quantities is not correct.

The reply is not acceptable, as the bid price quoted by the contractor was based on bidders' estimated quantities and as such these quantities has to be deducted while sanctioning additional quantities to the contractor.

5.3.3 Entrustment of works within the scope of original work to new contractor as new items

As per clause 23(c) of agreement, the bidder has to take full responsibility for the survey, investigation, design and engineering and execution of entire canal system including commissioning and trial run. The scope of work as per original agreement

concluded (August 2005) under EPC contract include excavation of EMC and distributary system to create an ayacut of 47,500 acres.

The Department prepared separate estimate for ₹23.78 crore towards (i) excavation of approach channel from reservoir to head regulator for ₹2.39 crore (ii) excavation of tunnel from Head regulator to EMC for ₹16.03 crore and (iii) Formation of approach road to top of NOF dam of Kakarla gap and Head Regulator of EMC for ₹5.36 crore. After inviting bids under LS contract system, these items were entrusted to another contractor[83] for ₹23.57 crore.

Audit noticed that the works mentioned at (i) and (ii) in the para above i.e., excavation of approach channel from reservoir to head regulator and excavation of tunnel from head regulator to EMC were integral part of creation of ayacut. The water cannot be drawn for creation of ayacut without executing these items.

Though these items were within scope of original contractor, instead of executing these items with first contractor, the Department, by treating them as new items, entrusted to new contractor at a cost of ₹21.24 crore[84]. Out of this, an amount of ₹2.40 crore was already paid as of November 2020. This resulted in additional financial burden to the Government.

The Government replied (January 2023) that due to change in location of Head Regulator, excavation of approach channel and tunnel was necessitated. These items were not included in the IBM and as such there was change in scope of work. Further, the contractor initially agreed (January 2011) to execute these works as additional items of work and subsequently (April 2016) expressed unwillingness to execute due to increase in prices of labour, POL and materials as the original estimate was prepared with Standard Schedule of Rates (SSR) 2004-05. Hence, the estimate was recasted with SSR 2016-17 and entrusted to new contractor by inviting tenders.

The reply is not acceptable, as the design of the components is the responsibility of contractor in EPC system and change in location of Head Regulator could not be treated as a change in scope of work. Further, as per the agreement conditions, the contractor has the responsibility to design and construct the head regulator to cater an ayacut of 3,57,800 acres. As such, these additional items would fall under the scope of work of original contractor.

5.3.4 Excess payment towards controlled blasting charges

The Government instructed[85] (February 2015), whenever and wherever controlled blasting is needed or has to be resorted to beyond what is permitted in the contract, the same shall be allowed by State Level Standing Committee (SLSC) and High-Power Committee as per actual ground situation and as per recorded evidence. The Government issued orders[86] (June 2015) to consider the claims towards earth work excavation when actual excavation was made by controlled blasting. The Department

[83] M/s. SCL Infratech Ltd., Hyderabad with 0.90 *per cent* less
[84] Estimate value: ₹21.43 crore (-) tender discount at 0.90 *per cent*
[85] Para 4 (v) of G.O.Ms. No.22 Irrigation and CAD (Reforms) Department dated 23.02.2015
[86] Para 3. III of G.O.Ms. No. 63 Water Resources (Reforms) Department dated 12.06.2015

has to submit the proposal to District Level Sanction Committee (DLSC) and based on their recommendations, the same would be referred to SLSC. Further, as per Para VI (ii) of the above orders, 75 *per cent* payments would be made based on the recommendation of DLSC pending final approval from SLSC.

Government approved[87] (July 2016) controlled blasting rate for the year 2004-05 as ₹237.37 per cum in respect of canals with more than 15 cumecs discharge capacity and for average depth of excavation of hard rock with more than three meters. Further, the manual blasting rate of ₹89.48 per cum (Rate as per IBM ₹99.50 per cum minus tender discount at 10.067 *per cent*) has to be deducted from the above approved rate as the same was included in original agreement value.

Scrutiny of records[88] revealed that the DLSC, prior to issue of above orders, approved (December 2015) blasting rate of ₹293.44 per cum after deducting tender discount for a quantity of 8,44,074 cum. Accordingly, an amount of ₹10.63 crore was paid for a quantity of 7,40,489.40 cum as of November 2020.

Audit noticed that the controlled blasting rate sanctioned by DLSC was higher than the rate communicated by Government. The actual payment due for control blasting, as calculated by audit, comes to ₹5.23 crore (7,40,489.40 cum x ₹70.62 per cum[89]). Thus, there was an excess payment of ₹5.40 crore (₹10.63 crore minus ₹5.23 crore).

The Government replied (January 2023) that an amount of ₹8.94 crore was only paid towards control blasting. As per the rate approved by the Government, an amount of ₹9.18 crore has to be paid to the contractor. Proposal was submitted to SLSC and the difference amount of ₹0.24 crore would be paid after obtaining sanction of Government based on the recommendation of SLSC.

The reply is not acceptable. Till the receipt of final recommendations of SLSC, the actual amount to be paid towards controlled blasting was ₹5.23 crore as per Government orders. Further, as per RA bill 119 & part, an amount of ₹10.63 crore was paid to the contractor, but not ₹8.94 crore as replied by Government.

B. Planning and execution of Eastern Main Canal from Km 44.625 to Km 146.910

The components involved in the excavation of EMC from Km 44.625 to Km 146.910 including structures, formation of Peddireddipalli reservoir and distributary system along with O&M were taken up under Package VI. The work was entrusted to a contractor[90] under EPC contract system. After completion of certain portion of work, the balance work costing ₹535.88 crore was transferred/entrusted to new contractor[91] (Lead partner of original contractor).

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87 G.O.Ms. No. 77 Water Resources (Reforms) Department dated 25.07.2016

88 Supp Agt. No. 1007/2015-16 dated 18.12.2015

89 {₹ 237.37 (-) tender discount at 10.067 *per cent*} x 75 *per cent* – {Initial rate : ₹99.50 (-) tender discount at 10.067 *per cent}*

90 M/s. MRKR – ZVTS Consortium

91 M/s. MRKR Constructions and Industries Private Limited being a lead partner in JV

5.3.5 Boosting of Internal Benchmark

(a) Adoption of different ayacut in IBM and agreement resulted in boosting of IBM

As per the scope of work[92] of Package VI (EMC second reach), the contemplated ayacut under this package was 2,50,000 acres. However, provision made in IBM was for 2,64,500 acres[93] at ₹10,500 per acre. This resulted in boosting the value of IBM by ₹15.22 crore (14,500 acres x ₹10,500 per acre).

Similarly, a provision of ₹0.15 crore for sluice gate under Udayagiri branch canal was made in the IBM. As this item falls under distributary network, the cost should be borne from the cost of distributary network, which was provided separately. Incorporation of separate provision resulted in boosting of IBM by ₹0.15 crore. Thus, overall, the IBM was boosted by ₹15.37 crore (₹15.22 crore plus ₹0.15 crore).

(b) Non deduction of tunnel reaches from earthwork resulted in boosting of IBM

The alignment of EMC (second reach) passes through three tunnels[94] enroute. The quantities to be executed under canal and these tunnels were assessed separately.

Audit noticed that the quantities to be executed under two tunnel reaches[95] were assessed under both canal and tunnel portion. Inclusion of same item twice in IBM resulted in boosting of IBM value by ₹3.97 crore.

Due to boosting of IBM, the bids were compared with higher cost and contracts were awarded for a higher amount than is necessary.

The Government admitted (January 2023) that the cost of distributary network for an extent of 14,500 acres and inclusion of quantities under tunnel reaches was erroneously incorporated twice in IBM. However, boosting of IBM would not have any impact on bid price quoted by the contractor. Further, Government replied that the Vigilance and Enforcement (V&E) department had also raised the same issue (September 2014) and recommended to modify the payment schedule and regularise the payment. Government submitted that action would be taken on the recommendations of V&E.

The reply is not acceptable, as no action has been taken, despite lapse of more than eight years since rectification/modification recommended by V&E Department.

5.4 Planning and execution of Western Branch Canal

The excavation of lined Western Branch Canal (WBC) was taken up under Package VII. The various components under the package involves, construction of pump houses, erection of pressure mains including construction of five lifts along with CM & CD

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92 corrigendum No.7/2008-09 "Basic Parameters"

93 EMC – 90,000 acres, E6, E7 and E8 Branch canal – 1,08,000 acres, Udayagiri branch canal – 52,000 acres, E13 block distributary under Udayagiri branch canal 14,500 acres

94 at Chainages Km 67.850 to Km 71.450: 3,600 m, Km 109.50 to Km 111.20: 1,700 m and Km 143.06 to Km 143.51: 450 m

95 Km 109.50 to Km 111.20: 1,700 m and Km 143.06 to Km 143.51: 450 m

works, distributary system, formation of balancing reservoir (Seetharamsagar) and improvements to Racheruvu tank along with O&M of canal. The work was entrusted (February 2009) to a contractor[96] under EPC contract.

The WBC was planned to take off at Km 25.465 on EMC. This necessitated for construction of an off take regulator at Km 25.465 on EMC to distribute water between WBC and downstream of EMC.

5.4.1 Procurement of Hydro and Electromechanical equipment

(a) Advance procurement of hydro and electromechanical equipment led to idling and blockade of funds

Scrutiny of records pertaining to Package VII revealed that the contractor had procured Hydro and Electromechanical equipment at a cost of ₹82.18 crore ***(as detailed in Appendix-VI)*** required for five Lifts useful to lift water from Western Branch Canal and payment was made accordingly.

Audit observed that these items were useful to lift water, which was required only after completion of canals, pressure mains, distributaries, field channels under this package and after impounding of water into Nallamallasagar reservoir. Audit noticed that these items were brought during 2014 and amounts were paid. However, copy of bill in which payments made for these items was not made available to audit.

Though there was no immediate necessity, these items were procured and kept idle since 2014. Improper planning to procure the items without assessing the time required to complete the components as stated above not only resulted in blockade of funds to a tune of ₹82.18 crore but also idling of items. Thus, the actual utility/functioning of equipment (procured in advance) after being kept idle for more than eight years is doubtful.

The Government replied (January 2023) that procurement of hydro mechanical equipment could not be postponed as this component has a fixed schedule as per milestone programme and early completion of one component could not be projected as idling of completed components. It was also replied that six months' time was anticipated for handing over of land, accordingly, this equipment was procured. Due to non-acquisition of land, these items were kept idle. Further, the price escalation would be ₹52.96 crore if procured at a future date.

The reply is not acceptable, as the initial schedule to procure this material has to be planned in such a manner that there should not be any idling of equipment. Further, the price escalation on 'other material' came into force in February 2015 only, whereas the required equipment was procured prior to this date.

[96] M/s. Pioneer Avantika ZVS KBL (JV)

(b) Non revision of percentage for supply of hydro and electromechanical equipment

Scrutiny of original SoP (July 2011) revealed that 18.50 *per cent*[97] was adopted towards hydro and electromechanical items for all five lifts. Subsequently, this was revised (April 2017) to 15.17 *per cent* in the revised SoP (**as detailed in *Appendix-VII (A)).***

Despite the revision was made in the SoP from 18.50 *per cent* to 15.17 *per cent* for the said items, however, the payments were made based on 18.50 *per cent*. Similarly, for item pertaining to Lift 1, the percentage of 2.28 *per cent* was erroneously adopted though the actual to be adopted was 2.16 *per cent* ***(as detailed in Appendix-VII B)***.

Non-revision of percentage from 18.50 to 15.17 for hydro and electromechanical items for Lift 1 to 5 and adoption of higher percentage for Lift 1 resulted in excess payment of ₹15.53 crore (***as detailed in Appendix-VII C***).

The Government replied (January 2023) that the payment made to the contractor was less than the amount earmarked in the payment schedule. Further, the adoption of proportionate rate to each sub-component was not correct when revision in percentage of payment was made.

The reply is not acceptable, as the percentage adopted for different hydromechanical components was subdivided into smaller percentages for each sub-component. As such, these smaller percentages are to be considered for payment to contractor. Further, when the total component percentage was revised, the percentages of the sub-components are also to be revised. However, the same was not done and which resulted in excess payment to contractor.

5.5 Other significant observations

5.5.1 Failure to adhere to EPC contract system

The works were entrusted under EPC contract system wherein the contractors have to execute the works based on scope of work without referring the quantities involved. The payments are to be made based on certain percentages allocated to each component in the SoP.

The Government instructed[98] (February 2015), as and when extra structures needed as well for extra quantities, within the original scope of work, no additional payments would be made. However, in the guidelines to the above order, it was stated that payment of arrears would be made where there was variation between estimated quantities and actual execution due to changes in design owing to unforeseen discovery in site geology or change in basic project parameters, etc. However, there was no mention in the above order regarding reduction in length of canals, reservoir bunds and decrease in quantities as per execution when compared with IBM quantities.

Audit observed that the Department sanctioned additional quantities over and above IBM quantities in respect of structures, tunnels, etc., though, there was no change in scope of work. On the other hand, whenever and wherever there was reduction in the

[97] Lift 1–3.71; Lift 2–1.85; Lift 3–1.85; Lift 4–5.55; Lift 5–5.55 in *per cent*
[98] Para 4 (iii) of G.O.Ms. No.22 Irrigation and CAD (Reforms) Department dated 23.02.2015

execution of length of canals, earthen bunds of reservoir and also decrease in quantities executed when compared to IBM, the contract price was not reduced proportionately as discussed in the subsequent paragraphs.

(a) Sanction of additional quantities despite no change in scope of work

Scrutiny of records of four Packages (II, IV, VI and VII) revealed that the Department sanctioned an additional amount of ₹249.56 crore towards additional quantities, though there was no change in scope of work as detailed below in ***Table 5.1***. The details of individual cases are discussed in ***Appendix-VIII(A)***.

Table 5.1: Showing the additional quantities sanctioned for no change in scope of work

(₹ in crore)

Package Number	Purpose of Sanction	Additional sanction made	Payment made
II (Feeder canal & Teegaleru Canal)	Additional quantities for structures due to change in discharge capacity from 85 to 328 cumecs	37.87	0.00
IV (EMC first Reach)	Additional quantities and increase in number of structures from 30 (as per IBM) to 49 (as per approved designs)	36.40	19.49
VI (EMC second Reach)	Additional quantities for structures and tunnels above the IBM quantities	114.19	22.97
VII (WBC)	Additional quantities for structures, cost of pump houses, increase in number of structures from 21 (as per IBM) to 35 (as per execution) and additional quantities in surplus weir of Turimella Reservoir above the IBM quantities	61.10	28.16
	Total	**249.56**	**70.62**

Source: Compiled as per information furnished by the Department

(b) Non-accrual of savings due to reduction in length of canals

Scrutiny of records of three Packages (III, VI and VII) revealed that the Department did not reduce the proportionate cost of ₹22.58 crore though there was reduction in length of canals/reservoir bunds executed when compared to agreement as detailed below in ***Table 5.2***. The details of individual cases are discussed in ***Appendix-VIII(B)***.

Table 5.2: Showing the non-reduction of proportionate cost for savings in works

(₹ in crore)

Package Number	Description	Total cost	Total length as per agreement (Km)	Total length as per execution (Km)	Reduced length (Km)	Proportionate cost for reduced length

III (Gottipadia canal)	Reduction in length of canal	1.88	12.875	11.440	1.435	0.21
VI (EMC second reach)	Reduction in length of earthen bund	86.70	2.100	1.650	0.450	18.77
VII (WBC)	Reduction in length of canal	10.58	17.275	14.315	2.960	3.60
	Total					**22.58**

Source: Compiled as per information furnished by the Department

(c) Non accrual of savings in quantities as per execution

Scrutiny of records of Package IV revealed that the Department did not reduce the proportionate cost though there was reduction in quantities of earth and concrete works as per execution when compared with the quantities as per IBM. The cost of difference in quantity, as calculated by audit was ₹111.82 crore as detailed in ***Table 5.3***. The details of individual cases are discussed in ***Appendix-VIII(C)***.

Table 5.3: Showing the reduction in finally executed quantities than the quantity arrived in IBM

(₹ in crore)

Package Number	Description	Total cost	Quantity to be executed as per IBM (cum)	Quantity as per actual execution (cum)	Difference (cum)	Cost of difference in quantity
IV	Link canal	50.09	50,11,837	33,05,518	17,06,319	16.90
	EMC (First reach)	120.04	1,99,73,392	1,55,00,000	44,73,392	26.89
	Kakarla dam	170.81	2,68,138	2,27,600	40,538	7.55
VI	EMC (Second reach)	152.76	1,62,55,169	1,01,02,025	61,53,144	60.48
	Total					**111.82**

Source: Compiled as per information furnished by the Department

Audit noticed that whenever there was an increase in quantities / number of structures over and above the provisions as per IBM, the Department compared the quantities with that of the IBM and allowed payment for additional quantities without referring the scope of work. However, suitable reduction in contract price was not made whenever there was savings in quantities / decrease in length of canals and reservoir bund on the pretext that the works were executed based on scope of work and in EPC contract system, the quantities could not be considered.

From the above it is evident that due to unclear definition of 'Scope of Work / Basic Parameters', sanction of excess quantities over and above the IBM are allowed, whereas the savings are not being accrued to the Government.

The Government replied (January 2023) that reduction in executed quantities and reduction in length of canal compared to IBM could not be classified as savings. Further, replied that sanction towards additional quantities was made on account of change in design and due to increase in number of structures, as per approved Hydraulic Particulars over and above IBM based on the Government orders.

The reply is not acceptable. The Government on one hand compared quantities mentioned in IBM for structures / tunnels, etc., whereas for earthwork similar analogy was not adopted. Further, as per Government orders, the basic parameters for canals are canal discharge capacity, full supply level, command area to be covered, location of starting and ending of canal and distributaries. As such, change in design and increase in number of structures does not account for basic parameters. Hence, sanction of additional quantities over and above IBM is incorrect and thus resulted in undue advantage to the contractors.

Thus, Government needs to reassess the EPC contract system by clearly defining the scope and specification of work to safeguard Government interest.

5.5.2 Irregular payment of price variation

The contractor is eligible for escalation of prices in respect of steel/ fuel if variation in price is beyond five *per cent* over the initial rate as mentioned in IBM.

(a) Adoption of lower price of steel in agreement resulted in excess payment towards price variation

The steel rate adopted in IBM has to be taken as initial rate, as the IBM was approved based on the material rates as per SoR. As such, this rate has to be treated as initial rate for assessing the increase/decrease in rate. As per agreement conditions[99], the variation in prices of steel beyond five *per cent* over the initial rate has to be paid based on actual quantity used in the work.

Scrutiny of records of Package II revealed that, in IBM, the steel rate adopted was ₹28,000 per MT as per SoR 2004-05. The Department, in the agreement, adopted the initial rate of steel as ₹27,500 per MT. Further, the Department calculated variation in steel rate, by considering the initial rate of ₹27,500 per MT as adopted in agreement and payments were made accordingly.

Audit noticed that the initial rate of steel adopted in agreement was less than the steel rate as per SoR/IBM. Failure to adopt the rate provided in IBM/SoR in the agreement and considering price variation over and above ₹27,500 per MT instead of ₹28,000 per MT resulted in excess payment of ₹0.12 crore (***as detailed in Appendix-IX)***.

The Government admitted (January 2023) the audit observation and promised to recover the excess payment.

[99] clause No. 46.2 of agreement

(b) Excess payment of price variation charges for fuel

As per agreement condition[100] of Package IV, price variation in respect of fuel has to be calculated based on the formula[101] in cases where variation in cost is beyond five *per cent* over the initial rate. The formula contains four components i.e., 'PF' (Fuel Factor), 'R' (Value of work done after excluding Value Added Tax (VAT) and Seigniorage charges), F_1 (the Cost of petrol per litre on the 15th day of the middle month of the quarter in the nearest petrol bunk) and Fo (the cost of petrol per litre in the nearest petrol bunk on the last date of submission of bids with five *per cent* variation, i.e. 'Initial rate' $\pm$ five *per cent*).

The Department calculated the 'PF'and 'R' values. 'F1' values on the 15th day of every month was obtained. Accordingly, price variation bills were sanctioned and paid periodically as calculated using the formula. Subsequently, the initial sanctions were revised by adopting incorrect 'R' value (by deducting VAT at 2.8 *per cent* instead of prevailing four *per cent*) and "Fo" value in denominator ('initial rate' instead of 'initial rate $\pm$ five *per cent*'). Accordingly, the Department made additional sanctions[102] of ₹4.50 crore (January 2014: ₹3.95 crore & November 2017: ₹0.55 crore) and difference in variation was paid.

Audit noticed that the 'R' value has to be calculated after deducting VAT at four *per cent* instead of 2.8 *per cent*. Further the 'Fo' value in denominator of the formula should be adopted as 'initial rate $\pm$ five per cent' instead of 'initial rate'. This resulted in excess payment of ₹2.91 crore towards price variation as detailed in ***Appendix-X***.

The Government replied (January 2023) that adoption of 'Fo' value was correct in view of orders issued (November 2021) in this regard[103] and admitted the audit objection in respect of adoption of VAT percentage and promised to revise the calculations and to recover the excess paid amount.

The reply in respect of adoption of 'Fo' value was not correct. As in the above said Government Order, it was mentioned (Para No. 7) that instructions given in the order are not applicable to works taken up prior to this order and orders issued earlier would continue to apply for all ongoing works, as per agreement conditions.

5.5.3 Front payments to contractors

As per agreement conditions[104], the contract price shall be the total value of work for the EPC contract including maintenance of total system for two years from the date of issue of completion certificate. The contract price would be divided into various works components/sub-components and their cost specified in percentage terms in the SoPs in the agreement. The interim payments for each sub-component would be regulated out of the percentage cost so assigned. There were different components involved in each package. The execution of these components would be made one after another. As such,

[100] general condition No. 46.3 of agreement
[101] 0.85 x (PF/100) X R x $((F_1 - F_o)/ F_o)$
[102] proceeding No.SE/CC(P)/OGL/DB/TO/JTO-3/P-IV/W-29/4 dated 08.01.2014 & proceeding No. SE/CC(P)OGL/DB/TO/ATO-R/P-IV/W/29/218 dated 21.11.2017
[103] G.O.Ms. No. 62 dated 30.11.2021
[104] clause 37.1 and 37.4 of General conditions of contract

the execution of dams and main canal would be made initially, and distributary network would be made later. Further, the component 'Operation and Maintenance' (O&M) would be made only after completion of entire components under the project.

Audit noticed that the SoPs were incorrectly approved by adopting higher percentage in respect of dams and main canals and reduced percentages in respect of distributary network and O&M. This resulted in front payments to contractors/locking up of funds as discussed in the following paragraphs.

(a) Adoption of lower cost for distributary network in payment schedule resulted in front payment to contractor

To create the contemplated ayacut of 62,000 acres under Package II (Teegaleru canal), the rate adopted in IBM was ₹54.56 crore at ₹8,800 per acre. As per the agreement entered (November 2004) with the contractor this cost would be ₹52.12 crore[105] (after deducting tender discount at 4.48 *per cent)*. The Government enhanced[106] (January 2010 / June 2015) the distributary network rate to ₹10,500 per acre[107]. Subsequently, supplementary agreement[108] for ₹12.98 crore[109] was concluded (November 2018) with the contractor for difference in rate of distributary network. As such, the total agreement cost for distributary network comes to ₹65.10 crore (₹52.12 crore + ₹12.98 crore).

The total cost of Package II, as per agreement/SoP was ₹361.36 crore. Out of this, the distributary network cost was ₹65.10 crore (18.02 *per cent*) and the remaining amount of ₹296.26 crore (81.98 *per cent*) pertains to balance components of work. As such, the same rates should be adopted in the SoP.

However, in SoP, the Department adopted ₹54.82 crore (15.17 *per cent*) for distributary network, and the remaining ₹306.54 crore (84.83 *per cent*) for balance components. The execution of balance components and distributary network were in progress. The Department paid an amount of ₹285.54 crore towards the balance components and ₹3.65 crore towards distributary network as of November 2020.

Audit noticed that the values adopted in respect of balance components (other than distributary network) was higher than the agreement rates by ₹10.28 crore (₹306.54 crore - ₹296.26 crore). The actual payment to be made, at agreement rate, was ₹275.96 crore. (₹285.54 crore x ₹296.26 crore /₹306.54 crore). However, an amount of ₹285.54 crore was paid. As such, there was a front payment of ₹9.58 crore (₹285.54 crore - ₹275.96 crore).

(b) Adoption of lower cost for distributary network, O&M in payment schedule resulted in front payment to contractor

Scrutiny of records[110] of Western Branch Canal revealed that the total contract value was for ₹753.14 crore. This includes the cost of distributary network for ₹69.93 crore (9.28 *per cent*), Operation &Maintenance (O&M) for ₹44.11 crore (5.86 *per cent*) and

[105] 62,000 acres x ₹8,800 per acre as per IBM=₹54.56 crore minus ₹54.56 crore x 4.48 *per cent*
[106] para 2(a) of Memo. No. 34843/Reforms/A1/2006 dated 04.01.2010
[107] ₹9,000 per acre for distributary plus ₹1,500 per acre for field channels
[108] No. 59/2018-19 dated 30.11.2018
[109] 62,000 acres x ₹10,500 minus ₹52.12 crore
[110] original IBM, agreement and schedule of payment

the remaining amount of ₹639.10 crore (84.86 *per cent*) pertains to balance components of work. As such, the same rates should be adopted in the SoP.

However, in SoP, the Department adopted ₹45.90 crore (6.09 *per cent*) for distributary network, ₹25.52 crore (3.39 *per cent*) for O&M and ₹681.72 crore (90.52 *per cent*) for balance components. The execution of these balance components was in progress and an amount of ₹485.51 crore[111] was paid as of November 2020. The components viz., distributary network and O&M was not yet grounded.

Audit noticed that the values adopted in respect of components which were in progress were higher than the agreement rates by ₹42.62 crore (₹681.72 crore - ₹639.10 crore). The actual payment to be made, at agreement rates, was ₹455.16 crore (₹485.51 crore x ₹639.10 crore /₹681.72 crore). However, an amount of ₹485.51 crore was paid. This resulted in front payment of ₹30.35 crore (₹485.51 crore - ₹455.16 crore).

(c) Adoption of lower cost for O&M in payment schedule resulted in front payment to contractor

The Package VI (EMC second reach) was first entrusted (February 2009) to a Joint Venture (JV) firm for an amount of ₹1,135.85 crore. While the execution of components was in progress, the balance works worth ₹535.88 crore was transferred (September 2015) to another contractor, who is a lead partner in the above Joint Venture firm.

Scrutiny of records of EMC second reach revealed that the total contract value was for ₹1,135.85 crore. This includes the cost of O&M of ₹10.72 crore (0.94 *per cent*) and the remaining amount of ₹1,125.13 crore (99.06 *per cent*) pertains to balance components of work. As such, the same rates should be adopted in the SoP. However, in SoP, the Department adopted ₹5.45 crore (0.48 *per cent*) for O&M and ₹1,130.40 crore (99.52 *per cent*) for balance components. The execution of these balance components was in progress and the O&M component would commence after completion of project.

Audit noticed that the values adopted in respect of components which were in progress were higher than the agreement rates by ₹5.27 crore (₹1130.40 crore - ₹1125.13 crore). The actual payment that to be made, at agreement rates, was ₹595.46 crore (₹598.25 crore x ₹1,125.13 crore/₹1,130.40 crore). However, an amount of ₹598.25 crore was paid. This resulted in front payment of ₹1.01 crore to the subsidiary contractor. Further, due to deletion of work from original contractor, an amount of ₹2.77 crore was locked up with the original contractor for more than seven years without recovery as shown in ***Appendix-XI***.

Regarding front payments to contractors, the Government replied (January 2023) that if the agency succeeds in completion of the work as per scope of the agreement, then the issue of front payment does not have any relevance. Further, Government promised to recover the balance value of work as per agreement rates/payment schedule, whichever is higher in case the agency fails to complete the work and opts for pre-closure.

[111] ₹513.67 crore - Cost of Suppl Agt. No. 39/2017-18: ₹24.20 crore - Cost of Supp Agt. No. 40/ 2018-19: ₹3.96 crore

The reply is not acceptable, as adoption of higher cost in the SoP, in respect of components which were executed first resulted in undue financial advantage to the contractor.

5.5.4 Inclusion of canal lining quantities along with structures led to excess sanction

As per agreement condition[112], the canals should be lined for a length of 30 m with cement concrete on upstream and downstream near the structures where canal discharge is 500 cusecs (14.1584 cumecs[113]) and more.

Scrutiny of records of Package IV (EMC first reach) and VI (EMC second reach) revealed that the canals proposed were lined canals and the quantities required to execute lining were estimated and included in the IBM. Further, the Department, at the time of sanction of additional quantities for structures, included canal lining valuing ₹1.54 crore and ₹2.47 crore (***Appendix-XII)*** at agreement rates in Package IV and VI respectively. Out of above, an amount of ₹0.48 crore (₹2.47 crore x 19.54 *per cent*) was already paid in Package VI.

Audit noticed that in IBM (Package VI), the canal lining quantities were incorporated twice i.e., once for the entire length of the canal and then again for the 30 m around the structures. Inclusion of same component under both canal lining and structure quantities resulted in excess sanction of ₹4.01 crore and excess payment of ₹0.48 crore as of November 2020.

The Government admitted (January 2023) the audit observation in respect of Package VI and promised to delete the lining quantities on structures at the time of submission of proposals to the SLSC. In respect of Package IV, it was replied that there was no duplication of quantities of lining.

The reply in respect of Package IV is not acceptable, as lining quantities were not deducted at the time of sanction of additional quantities in structures. As such, there was a duplication, which needs rectification.

5.5.5 Irregular reimbursement of banker's and insurance charges

The Government ordered[114] (July 2003) to make a lumpsum provision towards banker's and insurance charges in the IBM and the bid price quoted by the contractor should be inclusive of above provisions. As such, the contractor has to bear the cost incurred towards payment of insurance premium and charges for obtaining BGs. Further, Government instructed[115] (February 2015) to follow the existing codal provisions for reimbursement of banker's charge on BGs obtained towards Earnest Money Deposit

[112] clause no. 9 of Special conditions of contract
[113] 1 cusec = 0.028316847 cumecs
[114] para (1) (c) of Annexure I to G.O.Ms. No.94 Irrigation and CAD (PW-COD) Department dated 01.07.2003
[115] para No. 4 (vi) of G.O.Ms. No.22 Irrigation and CAD (Reforms) Department dated 23.02.2015 and para 4(j) of guidelines appended to the G.O

(EMD)/ Mobilisation Advance and insurance charges paid by the contractors for works insured.

As per agreement conditions[116], the successful bidder has to furnish EMD at 2.5 *per cent* of bid amount in the form of demand draft or BG, valid till work is completed in all respect. In addition to above, five *per cent* of the bill amount deducted from each bill towards retention amount can be released to contractor against submission of BG in spells of ₹50.00 lakh.

Scrutiny of bills revealed that in four packages (II to IV and VI) the Department reimbursed banker's charges worth ₹4.63 crore submitted towards EMD/Retention amount/ Mobilisation advance and in three packages (Package II, III and IV) insurance charges of ₹3.96 crore was reimbursed.

Audit noticed that, in Package VII, the banker's and insurance charges paid earlier were recovered from the contractor. As such, release of ₹8.59 crore (₹4.63 crore + ₹3.96 crore) towards insurance and BG charges was irregular.

The Government replied (January 2023) that the BG commission and insurance charges were recovered in Package No. VII based on the observations of Regional Vigilance and Enforcement Officer. Further, it was replied that no such instructions were received in respect of other packages and hence no recovery was made.

The reply is not acceptable, as reimbursement of bankers and insurance charges was against the codal provisions and hence needs to be recovered without linking the issue to the Regional Vigilance and Enforcement Officer directives.

5.5.6 Adoption of distributary network rate

(a) Irregular concluding of supplementary agreement towards distributary network resulted in excess sanction

Government ordered (January 2010[117]/June 2015[118]) to enhance distributary network rate as ₹10,500[119] per acre without applying tender discount/premium. The CE clarified[120] (March 2021) that the tender discount/premium shall not to be applied on both initial rate and enhanced rate.

Scrutiny of records revealed that:

(i) For Teegaleru canal (Package II) the contemplated ayacut was 62,000 acres. The cost of distributary network at IBM rates was ₹8,800 per acre and at agreement rate was ₹8,406 per acre (after deducting tender discount of 4.48 *per cent*). The total cost of distributary network, at agreement rates, was ₹52.12 crore (62,000 acres x ₹8,406 per acre). As the rate for distributary network was increased to ₹10,500 per acre, the

[116] package II &III: Para 13.1, 13.6, 13.11 and 13.7 of "Preparation of Bids" and para 47.1 and 47.2 of "Part A–Conditions of contract"; Package IV & VI : Para 15.1, 15.5 and 15.6 of "Preparation of bids" and para 47.1 of "Part A–Conditions of contract"

[117] memo No. 34843/Reforms-A1 dated 04.01.2010

[118] Para IV of G.O.Ms. No. 63 Water Resources (Reforms) Department dated 12.06.2015

[119] distributary–₹9,000 per acre and field channel–₹1,500 per acre

[120] CE&DWRO/PKM DIST/OGL/DEE-1/AEE-3/KORGRP/Vol.15/241 dated 09.03.2021

Department calculated the difference in rate as ₹2,094 per acre (₹10,500 - ₹8,406) and an additional amount of ₹12.98 crore (62,000 acres x ₹2,094 per acre) was sanctioned. Accordingly, supplementary agreement was concluded (November 2018). Further, an amount of ₹3.65 crore[121] (5.6 *per cent*) was paid out of the total distributary network cost of ₹65.10 crore (₹52.12 crore + ₹12.98 crore).

Audit noticed that the Department calculated the difference in cost of distributary rate by applying tender discount on initial rate. Without applying tender discount on initial rate, the difference in unit rate of distributary network, would be ₹1,700 per acre (₹10,500 - ₹8,800). Thus, the Department adopted an excess rate of ₹394 per acre (₹2,094 - ₹1,700) for distributary network. This resulted in excess sanction of ₹2.44 crore[122]. Out of this, an amount of ₹0.14 crore[123] was paid as of November 2020.

(ii) For Gottipadia canal (Package III) the contemplated ayacut was 9,500 acres. The cost of distributary network at IBM rates was ₹7,500 per acre and at agreement rate was ₹6,994 per acre (after deducting tender discount of 6.75 *per cent*). The total cost of distributary network, at agreement rates, was ₹6.64 crore (9,500 acres x ₹6,994 per acre). As the rate for distributary network was increased to ₹10,500 per acre, the Department calculated the difference in rate as ₹3,506 per acre (₹10,500 - ₹6,994) and an additional amount of ₹ 3.33 crore (9,500 acres x ₹3,506 per acre) was sanctioned. Accordingly, supplementary agreement was concluded (September 2015). No payment was made towards distributary network.

Audit noticed that the Department calculated the difference in cost of distributary rate by applying tender discount on initial rate. Without applying tender discount on initial rate, the difference in unit rate of distributary network, would be ₹3,000 per acre (₹10,500 - ₹7,500). Thus, the Department adopted an excess rate of ₹506 per acre (₹3,506 - ₹3,000) for distributary network. This resulted in excess sanction of ₹0.48 crore[124].

Thus, the overall excess sanction in both the packages comes to ₹2.92 crore (₹2.44 crore + ₹0.48 crore) and an amount of ₹0.14 crore was already paid in Package II.

The Government replied (January 2023) that the difference amount was correctly arrived at for the additional sanction by deducting the tender discount on initial cost.

The reply is not acceptable, as it was against the clarification/instructions given in Para 4 (ii) of the Government orders ibid / clarification given by the CE.

(b) Adoption of distributary network rate on lumpsum basis without estimating the actual cost

The cost of distributary network depends on quantity of earthwork to be excavated, embankment required, length and discharge capacity of canals, number and type of structures, etc.

[121] ₹1.98 crore + ₹1.67 crore (up to RA Bill No. 104 and part)
[122] 62,000 acres x ₹394 per acre
[123] ₹2.44 crore x ₹3.65 crore/₹65.10 crore (62,000 acres x ₹10,500 per acre)
[124] 9,500 acres x ₹506 per acre

Scrutiny of IBMs of five Packages (II, III, IV, VI and VII) revealed that, the distributary network rate was adopted based on contemplated ayacut multiplied by rate per acre without considering the above factors. The rate per acre adopted in Package VI and VII was uniform by adopting ₹10,500 per acre. In respect of Package II (₹8,800 per acre) and III (₹7,500 per acre), the rates adopted, initially, were less than ₹10,500 per acre and subsequently increased to ₹10,500 per acre in both Packages II and III. In respect of Package IV, the rate adopted, initially, was ₹12,000 per acre.

Audit noticed that the authority or the detailed calculations made, if any, to adopt cost of distributary network on the basis of 'Rate per acre' in IBMs/subsequent enhancement were not available.

The Government replied (January 2023) that the command area plays a significant role in arriving the cost of distributary network. As such, based on percentage of cultivable command area out of gross command area, the distributary network work rate was adopted initially. Subsequently, the Committee of Engineers studied the distributary cost of Telugu Ganga Project and made certain recommendations. Accordingly, Government ordered (January 2010) to enhance the distributary network rate.

The reply is not acceptable, as at the first instance Government stated that 'the gross command area and cultivable command area play a significant role in arriving the distributary network rate'. Subsequently stated that 'as per studies conducted in other project, the Government ordered to adopt uniform rate'. Thus, no fixed stand was taken in arriving the cost of distributary network.

(INDU AGRAWAL)
Principal Accountant General (Audit)
Andhra Pradesh

Vijayawada
The 12 Sep 2023

Countersigned

(GIRISH CHANDRA MURMU)
Comptroller and Auditor General of India

New Delhi
The 19 Oct 2023

Appendices and Glossary

Appendix-I
(Paragraph No. 3.1.3 & Page No. 14)
Statement showing the discharge capacity of feeder canal without lining

Bed width of the feeder canal (in meters)	23.00
Full Supply Depth (FSD) (in meters)	5.95
Side Slope	1:1
Top width of the canal (Bed width + FSD x 2)	34.90
Area of Cross section {½ (Bed width + Top width) x FSD} (A)	172.25
Wetted Perimeter {Bed width + FSD x Square root of (2) x 2} (P)	39.82
Hydraulic Mean Radius {A/P} (R)	4.32
Section adopted (S)	1 in 6000
Value of 'n' (Rugosity coefficient) to be adopted	0.0275
Velocity $\{1/n \times R^{2/3} \times S^{1/2}\}(V)=\{1/0.0275 \times 4.3247^{2/3} \times (1/6000)^{1/2}\}$	1.24612
Discharge in cumecs {Area x Velocity} Q	214.64
Discharge required (in cumecs)	328

Source: Compiled based on agreement copies furnished by the Department

Appendix-II (A)
(Paragraph No. 3.2 & Page No.15)
Statement showing various contractors involved in execution of Tunnel I

Components of work	Old contractor	New contractor and date of entrustment	Whether SOR revised	Reasons for entrustment	Procedure adopted
Excavation of tunnel from Km 0.000 to Km 18.800 including approach channel, Head Regulator and Exit channel	Not Applicable	M/s. Sabir Sew Prasad (JV) (August 2005)	First entrustment	---	Bids invited under EPC contract system
Excavation of tunnel from Km 0.000 to Km 15.200 was completed along with part work of exit channel					
Excavation of tunnel from Km 15.200 to Km 18.800 and balance exit channel	M/s. Sabir SEW Prasad (JV)	M/s. MEIL (October 2018)	Yes. SOR 2017-18	Slow progress of work	Bids invited under LS contract system
Excavation of tunnel from Km 15.200 to Km 17.747 was completed					

Components of work	Old contractor	New contractor and date of entrustment	Whether SOR revised	Reasons for entrustment	Procedure adopted
Excavation of tunnel from Km 17.747 to Km 18.800	M/s. MEIL	M/s. RR Edifice (July 2021)	No	To derive early benefits	No bids were invited. Excavation using manual drill and blast method

Source: Compiled based on agreement copies furnished by the Department

Appendix-II (B)
(Paragraph No. 3.2 & Page No.15)
Statement showing contractors involved in execution of Tunnel-II

Components of work	Old contractor	New contractor and date of entrustment	Whether SOR revised	Reasons for entrustment	Procedure adopted
Excavation of tunnel II from Km 0.000 to Km 18.800 including approach channel, Head Regulator and Exit channel	Not Applicable	M/s. HCC – CPPL (JV) (June 2017)	First entrustment	---	Bids invited under EPC contract system
Excavation of tunnel from Km 0.000 to Km 10.703 was completed along with part work of exit channel					
Excavation of tunnel from Km 10.703 to 10.750	M/s. HCC – CPPL (JV)	M/s. Rithwik Projects Private Limited (October 2019)			Supplemental agreement was concluded
Excavation of tunnel from Km 10.750 to Km 18.800	M/s. HCC – CPPL (JV)	M/s. Rithwik Projects Private Limited (September 2018)	Yes SoR 2017-18	Slow progress of work	Bids invited under LS contract system
Excavation of tunnel from Km 10.703 to Km 11.212 was completed					
Excavation of tunnel from Km 11.212 to Km 18.800	M/s. Rithwik Projects Private Limited	M/s. MEIL (January 2020)	No	Slow progress of work	Bids were invited for the balance work under Reverse tendering

Source: Compiled based on agreement copies furnished by the Department

Appendix-II (C)
(Paragraph No. 3.2 & Page No.15)
Statement showing contractors involved in execution of head regulator & approach channel

Components of work	Old contractor	New contractor and date of entrustment	Whether SoR revised	Reasons for entrustment	Procedure adopted
Approach channel and Head Regulator work of (Tunnel I)[#]	M/s. Sabir SEW Prasad (JV) (August 2005)	M/s. RK Infracorp Private Limited (May 2017)	Yes. SoR 2016-17	Non grounding of work by first Contractor	Bids invited under EPC contract system
Part work was completed by M/s. RK Infracorp Private Limited					
Approach channel and Head Regulator work of (Tunnel II)	M/s. HCC – CPPL (JV) (June 2017)	M/s. RK Infracorp Private Limited (May 2017)	Yes. SoR 2016-17	Non grounding of work by first contractor	Bids invited under EPC contract system
Approach channel and Head Regulator work (Balance work of Tunnel I and II together)	M/s. RK Infracorp Private Limited	M/s. RR Edifice (October 2019)	No	---	Tender discount of three *per cent* against the tender premium of 4.7119 *per cent* of old contractor

Source: Compiled based on agreement copies furnished by the Department
[#]The balance work along with Tunnel II approach channel, Head Regulator was entrusted to M/s. RR Edifice

Appendix-III
(Paragraph No. 3.2.2 & Page No. 17)
Statement showing wasteful expenditure on segment lining and cutters

Sl. No.	Description	Amount (in ₹)
(a)	Total quantity of segments kept idle at segmentation plant	2,839.25 cum
(b)	Rate per cum as per estimate (in ₹)	8,682.12
(c)	Total number of cutters procured and not utilized	132
(d)	Rate per cutter as per estimate (in ₹)	37,192.69
(e)	Cost of manufacturing segments at estimate rates (in ₹) (2,839.25 x ₹8,682.12)	2,46,50,709.21
(f)	Cost of cutters at estimate rates (in ₹) (132 x ₹37,192.69)	49,09,435.08
(g)	Total wasteful expenditure towards segments and cutters at estimate rates ((e) + (f)) (in ₹)	2,95,60,144.29
(h)	Tender premium at 0.16 *per cent* (in ₹)	47,296.23
(i)	Total wasteful expenditure towards segments and cutters at agreement rates (₹2,95,60,144.29 + ₹47,296.23) (in ₹)	2,96,07,440.52

Source: Compiled as per information furnished by the Department

Appendix-IV (A)
(Paragraph No. 5.1.1 & Page No. 26)
Statement showing required peak discharge for Teegaleru canal

Description	Water requirement/ discharge
Total water required for peak demand (2nd half of the month) for 15 days (in MCFT (Million Cubic Feet))	**1,279.144**
Total water required for one day (1279.144/15) (in MCFT)	85.2762667
Total water required for one day (85.2762667 X 10,00,000) (in CFT(Cubic Feet))	85276266.70
Total water required for one second (85276266.7 / (24 hours x 60 minutes x 60 seconds) (in cusec)	986.99
Discharge in cumecs (986.99x 0.028316847)	27.95
Total discharge required for peak demand as per DPR (in cumecs)	27.95

Source: Compiled as per the information furnished by the Department
1 cusec = 0.028316847 cumecs

Appendix-IV (B)
(Paragraph No. 5.1.1 & Page No. 26)
Statement showing peak discharge with parameters adopted in scope of work of Teegaleru canal

Description	
Bed width (in meters)	6.00
Full Supply Depth (FSD in meters)	3.00
Bed fall (Section- S)	1 in 12000 (i.e. 1/12000)
Slopes	1:1
Rugosity co-efficient value (n)	0.018
Area of Trapezoid section (A) (FSD x {(Bed width) + (FSD)}	27
Perimeter (P) (Bed width + 2 x √2 x FSD) #	14.4853
Hydraulic mean radius (R) (Area/ Perimeter)	1.8640
Velocity (V) (1/n x $R^{2/3}$ x $S^{½}$) $	0.7682
Discharge in cumecs (Q) = (A x V)	20.74

Source: Compiled by audit based on the information furnished by Department
#As 1:1 slope was adopted for canals, height of slope will become the product of squares of other sides and its Square root i.e., √ (1 x 1 + 1 x 1) = √2 (Pythagoras theorem)
$As per Manning equation (IS Code 7112:2002)

Appendix – V
(Paragraph No. 5.2.1 & Page No. 28)
Statement showing cost of lining of Gottipadia canal

(length/thickness in meter)

Sl. No	Canal dimensions				Canal dimensions inclusive of lining thickness					Difference in area i.e., lining area (Sq.m)	Reach length	Difference in quantity i.e., lining quantity (Sq.m)	Lining area for paver (Sq.m)
	Bed width	FSD	Top width	Area of canal without lining thickness (Sqm.)	Lining thickness	Bed width	Depth	Top width	Area of canal with lining thickness (Sq.m)				
A	**B**	**C**	**D=B+ (C x 2)**	**E=½ (C) x (B+D)**	**F**	**G= B+ (2xF)**	**H= C+F**	**I= D+ (2xF)**	**J= ½ (H) x (G+I)**	**K=J-E**	**L**	**M=K x L**	**N =L x {B+2 x (1.414*C)}**
1.	6.9	1.25	9.4	10.1875	0.1	7.1	1.35	9.6	11.2725	1.085	570	618.45	5,948
2.	6.2	1.1	8.4	8.0300	0.1	6.4	1.2	8.6	9.0000	0.970	3172	3,076.84	29,534
3.	4.5	0.9	6.3	4.8600	0.1	4.7	1	6.5	5.6000	0.740	3372	2,495.28	23,756
4.	2.1	0.7	3.5	1.9600	0.1	2.3	0.8	3.7	2.4000	0.440	4326	1,903.44	17,648
Total quantity												**8,094.01**	**76,886**
Rate per cum for concrete lining (in ₹)													2594
Rate per Sqm for paver charges (in ₹)													39
Total cost of concrete lining at IBM rates (8,094 cum x ₹2,594) (in ₹)													2,09,95,836
Total cost for paving at IBM rates (76,886 sqm x ₹39) (in ₹)													29,98,554
Total cost for lining and paving at IBM rates (in ₹)													2,39,94,390
Tender discount at 6.75 *per cent* (in ₹)													16,19,621
Total cost of concrete lining at agreement rates (₹2,39,94,390 – ₹16,19,621) (in ₹)													**2,23,74,769**

Note: In the absence of data for lining in Package III, the rate per cum of ₹2,594 was adopted from the data of Package IV for ultimate stage as both the IBMs were prepared with same SOR

Appendix – VI
(Paragraph No. 5.4.1(a) & Page No. 38)

Statement showing the payments made towards hydro mechanical and electromechanical items for five Lifts

Sl. No.	Lift Number	Description	Amount (₹ in crore)
1.	Lift-1	Supply of Soft starters, DG Sets, EOPD Butterfly Valves, Dual Plate Check valves, Dismantling Joints, Capacitor Banks, HT Switch Board, EOT Crane, LT Switch Board	17.14
2.	Lift-2	Supply of Battery, Battery Charger, EOPD Butterfly Valves, Dual Plate Check valves, Dismantling Joints, Capacitor Banks, Soft starters, HT Switch Board, LT Switch Board	7.45
3.	Lift-3	Supply of Battery, Battery Charger, Soft starters, EOPD Butterfly Valves, Dual Plate Check valves, Dismantling Joints, HT Switch Board, Capacitor Banks	6.75
4.	Lift-4	Supply of Soft starters, Capacitor Banks, DG Sets, Dual Plate Check valves, Dismantling Joints, EOPD Butterfly Valves, HT Switch Board, Battery, Battery Charger, EOT Crane, LT Switch Board	25.42
5.	Lift-5		25.42
		Total	**82.18**

Appendix – VII (A, B & C)
(Paragraph No. 5.4.1 (b) & Page No. 38)

(A) Statement showing percentage as per original payment schedule (18.50 *per cent*) and revised payment schedule (15.17 *per cent*)

Lift No.	Percentage adopted in break-up of payment schedule as per		Excess percentage adopted
	Original payment schedule	Revised payment schedule*	
A	B	C	D = B-C
1.	3.7138	3.0457	0.6681
2.	1.8456	1.5136	0.332
3.	1.8456	1.5136	0.332
4.	5.5475	4.5496	0.9979
5.	5.5475	4.5496	0.9979
Total	**18.5000**	**15.1721**	**3.3279**

* Percentages were calculated based on proportion to total percentage for example 3.7138 x 15.1721/18.5

(B) Statement showing percentage to be adopted as 2.16 *per cent*

Sl. No.	Description of the item	Value (in percentage)
1.	Supply of EOPD Butterfly valves	0.2709
2.	Supply of Duel Plate Check valves	0.2709
3.	Supply of Dismantling Joints	0.1636
4.	Supply of EOT crane	0.0564
5.	Supply of HT Switch Board	0.4576
6.	Supply of LT Switch Board	0.2065
7.	Supply of Soft Starters	0.2895
8.	Supply of Capacitor Banks	0.2822
9.	Supply of DG Set	0.1580
	Total	**2.1556**

(C) Statement showing percentage to be adopted in payment schedule with revised percentage 15.17 *per cent* and at 85 *per cent* payment against supply of material

Sl. No.	Components	Percentage adopted in Payment schedule of Lift 1 with 18.5 *per cent*	Percentage to be adopted in Payment schedule of Lift 1 with 15.1721 *per cent*	Percentage adopted in Payment schedule of Lift 2 with 18.5 *per cent*	Percentage to be adopted in Payment schedule of Lift 2 with 15.1721 *per cent*	Percentage adopted in Payment schedule of Lift 3 with 18.5 *per cent*	Percentage to be adopted in Payment schedule of Lift 3 with 15.1721 *per cent*	Percentage adopted in Payment schedule of Lift 4 with 18.5 *per cent*	Percentage to be adopted in Payment schedule of Lift 4 with 15.1721 *per cent*	Percentage adopted in Payment schedule of Lift 5 with 18.5 *per cent*	Percentage to be adopted in Payment schedule of Lift 5 with 15.1721 *per cent*
I	**Total percentage**	**3.7138**	**3.0457**	**1.8456**	**1.5136**	**1.8456**	**1.5136**	**5.5475**	**4.5496**	**5.5475**	**4.5496**
i	EOPD Butterfly valves	0.2709	0.2222	0.1298	0.1065	0.1298	0.1065	0.4469	0.3665	0.4469	0.3665
ii	Dual Plate check valves	0.2709	0.2222	0.1298	0.1065	0.1298	0.1065	0.4469	0.3665	0.4469	0.3665
iii	Dismantling joints	0.1636	0.1342	0.0959	0.0786	0.0959	0.0786	0.2709	0.2222	0.2709	0.2222
iv	EOT Crane	0.0564	0.0463	Not paid	Not paid	Not paid	Not paid	0.088	0.0722	0.088	0.0722
v	HT Switch board	0.4576	0.3753	0.2082	0.1707	0.2082	0.1707	0.6387	0.5238	0.6387	0.5238
vi	LT Switch Board	0.2065	0.1694	0.0925	0.0759	Not paid	Not paid	0.2882	0.2364	0.2882	0.2364
vii	Soft starters	0.2895	0.2374	0.1704	0.1397	0.1704	0.1397	0.4093	0.3357	0.4093	0.3357
viii	Capacitor Banks	0.2822	0.2314	0.0959	0.0786	0.0959	0.0786	0.395	0.3239	0.395	0.3239
ix	DG Set	0.1580	0.1296	Not paid	Not paid	Not paid	Not paid	0.2213	0.1815	0.2213	0.1815
x	Supply of battery	Not paid	Not paid	0.0271	0.0222	0.0271	0.0222	0.0677	0.0555	0.0677	0.0555
xi	Battery charger	Not paid	Not paid	0.0395	0.0324	0.0395	0.0324	0.1016	0.0833	0.1016	0.0833
II	**Percentage to be adopted (Total of i to xi)**	**2.1556**	**1.768**	**0.9891**	**0.8111**	**0.8966**	**0.7352**	**3.3745**	**2.7675**	**3.3745**	**2.7675**
III	Percentage adopted in RA Bill		2.2764		0.9891		0.8966		3.3745		3.3745
IV	Excess percentage adopted (III – II)		0.5084		0.178		0.1614		0.607		0.607

Note: Variation in total percentage (0.12 *per cent*) for Lift 1 was noticed as 2.28 *per cent* was adopted in RA Bill instead of 2.16 *per cent* as per payment schedule. In respect of balance Lifts 2 to 5 no such variation noticed. Percentage for each component for 15.17 *per cent* was calculated on prorate basis (Eg.: 0.2709 x 15.1721/18.5000)

Total excess percentage adopted (0.5084 + 0.1780 + 0.1614 + 0.6070 + 0.6070) (in ₹)	**2.0618 *per cent***
Total agreement value (in ₹)	753,14,32,133
Excess payment made to contractor (753,14,32,133 x 2.0618*per cent*) (in ₹)	**15,52,83,068**

APPENDIX – VIII (A, B & C)
(Paragraph No. 5.5.1 & Page No. 39 to 41)
Statement showing instances of failure to adhere to provisions of EPC contract system

A.	Sanction of additional quantities
(i)	As per the original scope of work (Package II), design and execution of structures on feeder canal has to be made for Stage II discharge of 328 cumecs (85 cumecs for Stage I). The Teegaleru canal has to be excavated for creation of 62,000 acres of ayacut. The Department sanctioned additional quantities, in respect of structures on feeder canal, by stating that the discharge was increased from 85 to 328 cumecs, and supplementary agreements[125] for ₹17.03 crore were concluded. Similarly, in Teegaleru canal, an amount of ₹20.84 crore was sanctioned towards additional quantities of CM & CD works and two supplementary agreements[126] were concluded. As per provisions of EPC contract, the contractor is not eligible for any additional amounts for additional quantities if there is no change in the scope of work. However, the Government sanctioned an amount of ₹37.87 crore towards additional quantities for the structures on feeder and Teegaleru canal despite there was no change in scope of work. The Department replied (March 2022) that the execution of feeder canal was entrusted with 85 cumecs discharge and subsequently, revised to 328 cumecs. This led to change in basic parameters and hence additional quantities were sanctioned and accordingly supplemental agreements were concluded. These provisions are essentially required to complete the balance work to arrive the intended benefits. The reply is not acceptable. The execution of structures on feeder canal has to be made for 328 cumecs discharge as per the original scope of work. As such, there was no revision in basic parameters. Hence, the recommendation for sanction towards additional quantities is against the laid down provisions of EPC contract system.
(ii)	As per the scope of work of Package IV (EMC first reach), designing and execution of structures on EMC was to be done for Stage II parameters. The State Level Standing Committee (SLSC) recommended (January 2019) an amount of ₹36.40 crore at agreement rates towards additional quantities by stating increase in quantities as per approved designs than provided in the IBM and also due to increase in number of structures from 30 (as per estimate) to 49 (as per approved designs). Government accorded[127] (April 2019) administrative sanction and supplementary agreement[128] was concluded (August 2019) with the contractor.

[125] Supplementary Agt. No. 26/2018-19 dated 04.08.2018 for ₹13.58 crore (10 out of 20 sanctioned structures in G.O. Ms. No. 70 dated 06.07.2018) and Supplementary Agt. No. 30/2018-19 dated 05.08.2018 for ₹3.45 crore (five out of 20 sanctioned structures in G.O. Ms. No. 70 dated 06.07.2018)
[126] Supplementary Agreement No. 27/2018-19 dated 04.08.2018 for ₹11.42 crore (30 out of 73 structures) and Supplementary Agreement No. 30/2018-19 dated 05.08.2018 for ₹9.42 crore
[127] G.O.Ms. No. 44 Water Resources (Projects-II) Department dated 02.04.2019
[128] No. 06/2019-20 dated 01.08.2019

	Audit noticed that the scope of work for structures on EMC was not increased. As such, the contractor is not eligible for any additional sanctions towards increase in number of structures/ additional quantities. This resulted in irregular sanction of ₹36.40 crore at agreement rates. Out of this, an amount of ₹19.49 crore[129] was already paid to the contractor as of November 2020. The Department replied (March 2022), that Government issued orders[130] by superseding earlier orders[131] and accordingly the above sanctions were made. The reply is not acceptable, as the contract was awarded under EPC contract system, wherein the components of work have to be executed as per scope of work without reference to estimate and its quantities. Further, the Government orders issued in February 2015, does not supersede the EPC code, instead reiterated to follow the codal provisions.
(iii)	As per scope of work of Package VI (EMC second reach), the contractor has to execute required structures on canal. As per agreement condition[132], no extra payment should be made to the bidder, if there is any change in type of structure, specifications, variation in quantities as per actual site conditions. Audit noticed that though the scope of work in respect of structures and tunnels under this package was not changed, the Department concluded two supplementary agreements[133] (December 2016 and May 2018) for ₹114.19 crore with the contractor towards additional quantities on structures and tunnels, which is irregular. Out of this, an amount of ₹22.97 crore[134] was already paid to the contractor as of November 2020. The Department replied (March 2022) that as per IBM, the number of structures were 69 and increased to 136 as per approved Hydraulic particulars (HPs). As such, there was increase in quantities and also stated that the quantities in IBM were arrived based on line estimates and there were changes in design parameters. As per Government orders (February 2015), the proposals for additional quantities were placed before DLSC and the same were recommended by DLSC. The reply is not acceptable, as the contract was awarded under EPC contract system wherein the components of work have to be executed as per scope of work without reference to IBM and its quantities.
(iv)	As per scope of work of Package VII (Western Branch Canal), the contractor has to execute required structures, pump houses, etc., for creation of contemplated ayacut. Scrutiny of records revealed that the Department sanctioned (December 2017) an amount of ₹59.00 crore at agreement rates towards additional quantities in respect of

[129] additional quantities on structures (₹16.08 crore) and Tunnel (₹3.40 crore)
[130] G.O.Ms. No. 22 Irrigation and CAD (Reforms) Department dated 23.02.2015
[131] Government superseded the G.O. Ms. No. 50 dated 02.03.2009 and G.O. Ms. No. 13 dated 07.02.2014
[132] condition No. 8 of Special conditions of contract
[133] 35/2016-17 dated 31.12.2016 – ₹78.05 crore (Additional quantities for structures), 03/2018-19 dated 30.5.2018 – ₹36.14 crore (Additional quantities for tunnels on EMC)
[134] additional quantities on structures : ₹15.25 crore + additional quantities for Tunnel I: ₹5.34 crore and additional quantities for Tunnel 2 : ₹2.38 crore up to RA Bill No. 18 and part

	structures, cost of pump houses, etc., by stating increase in number of structures from 21 (as per IBM) to 35 (as per execution). Similarly, an amount of ₹2.10 crore[135], at agreement rates, was also sanctioned (September 2018) towards additional quantities for surplus weir in Turimella reservoir. Audit noticed that the scope of work in respect of structures, cost of pump houses and surplus weir of reservoir under this package was not changed. However, the Department sanctioned ₹61.10 crore towards additional quantities on these items, which is irregular. Out of this, an amount of ₹28.16 crore was already paid to the contractor as of November 2020. The Department replied that the surveys and preparation of HPs and design proposals made by the contractor was approved by competent authority. There is no need to follow the alignment specified in the estimate, only basic parameters shall be followed and the lengths, numbers and quantities may increase/decrease. In the present case, there is an abnormal increase in quantities over and above estimated quantities. Additional sanctions were approved by DLSC based on government instructions. Accordingly, supplementary agreements were concluded, and payments were made. The reply is not acceptable, as the above Government Order does not stipulate sanctioning additional quantities for the items which were within the original scope of work.
B.	**Decrease in length of canals/earthen bund**
(i)	The agreed rate for execution of Gottipadia canal (Package III) for a length of 12.875 km was ₹1.88 crore (₹2.02 crore[136] minus tender discount of 6.75*per cent).* Scrutiny of status report, IBM and approved hydraulic particulars revealed that the length of Gottipadia canal was executed for a length of 11.440 km. Thus, there was a reduction in length of canal by 1.435 Km having a proportionate cost of ₹0.21 crore (₹1.88 crore x 1.435 Km/12.875 Km). The Department admitted (March 2022) that the length of canal is decreased and the reduced length was sufficient to create the contemplated irrigation potential of 9,500 acres. However, the proportionate cost towards reduction in length of canal was not recovered.
(ii)	As per IBM of Package VI (EMC second reach), the length of the earthen bund of the Peddireddipalli reservoir was 2.100 Km. The total cost of earthen bund was ₹86.70 crore (including Cost of Head Sluice : ₹0.66 crore + Cost of Surplus weir : ₹2.28 crore). The earthen bund, as per designs approved by Department, was

[135] ₹5.67 crore minus (₹3.41 crore plus tender premium 4.86 *per cent*)
[136] cost of canal as per IBM : ₹1.88crore + LS Provision Share : ₹0.14 crore

	1.650 Km. As such, there was a reduction by 450 m (2.100 Km – 1.650 Km) with a proportionate cost of ₹18.77 crore[137]. The Department replied that the storage capacity of the reservoir was increased from 1.721 to 2.010 TMC. The position of earth bund was shifted to upper stream of existing alignment with new sections. Due to this change, the cost of head sluice and surplus weir construction was increased and there was a decrease in the cost of land acquisition. The reply is not acceptable, as the cost of head sluice and surplus weir was only 3.39 *per cent* (₹2.94 crore x 100/₹86.70 crore). As such, the increase in cost of these items could not be compared with the remaining components which constitute 96.61 *per cent*.
(iii)	As per IBM of Western Branch Canal (Package VII), the cost of the length of lined canal measuring 17.275 Km in three reaches[138] was ₹20.03 crore (Excavation : ₹10.58 crore + Lining : ₹9.45 crore). However, as per actual execution, the length of canal was 14.315 Km[139] only. As such, there was reduction in length of canal by 2.960 Km with a proportionate cost of ₹3.60 crore[140]. The Department admitted (March 2022) that there was decrease in length of canal and stated that the works were entrusted under EPC contract system wherein contractor has to follow the basic parameters and there may be increase/ decrease in lengths and quantities. The payments are being made as per the approved payment schedule. Further, stated that the contractor is bound to complete all the components of works as per the agreement conditions within the limits of provisions made in the approved payment schedule. However, the proportionate cost towards reduction in length of canal was not recovered.
C.	**Savings in Earthwork quantities**
(i)	As per original agreement (August 2005) of Link canal, EMC (first reach) and Kakarla dam, the contractor[141] has to investigate and design these components for Stage II. The execution was initially limited to Stage I. Subsequently, the Department proposed to execute these items for Stage II. Accordingly, the total quantities was assessed for both Stage I and II for Link canal, EMC first reach and Kakarla dam as 50,11,837 cum, 1,99,73,392 cum and 2,68,138 cum respectively. The execution for Stage II was entrusted (January 2009) to same contractor at original agreement rates. Out of above total quantities, the quantities as per execution, as stated in status reports, work bills etc., towards link canal, EMC 1st reach and Kakarla dam was 33,05,518 cum, 1,55,00,000 cum and 2,27,600 cum respectively.

[137] ₹83.76 crore x 450/2100 + tender premium at 4.588 *per cent*
[138] From Km 2.000 to Km 8.300, Km 11.300 to Km 14.200 and Km 14.800 to Km 22.875
[139] Reach I : Km 3.100 to Km 9.800, Reach II : Km 15.000 to Km 17.500 and Reach III : Km 18.560 to Km 23.675
[140] ₹20.03 crore x 2.960/17.275 + tender premium at 4.86 *per cent*
[141] M/s. SCL-BSCPL (JV)

	Audit noticed that the investigation for total quantities was entrusted initially to the contractor. As such, the Department has to assess the total quantities accurately. However, there was variation between total quantities and quantities as per execution. This indicates that the Department failed to estimate the quantities correctly despite investigation was done. This resulted in undue financial advantage of ₹48.75 crore. Out of this, an amount of ₹47.72 crore was already paid. The Department replied (March 2022) that the quantities executed from the date of initial agreement to December 2012 were not recorded and were not mentioned in the status booklet. It was further replied that the works were executed without any deviation from the basic parameters and scope of work and payment made were within agreement amount only. The reply is not acceptable, as the quantities as per Status Report and RA Bill No. 119 & part were in line. Therefore, the reply furnished by Department stating that non recording the quantities upto December 2012 in the status report was not correct.
(ii)	As per IBM of Package VI (EMC second reach), the contractor has to execute the canal for a length of 102.285 Km. The quantities to be executed, as per IBM, was 1.63 crore cum[142] at a cost of ₹152.76 crore (₹42.87 crore plus ₹109.89 crore). As per execution, the quantities executed were only 1.01 crore cum. As such, there was a reduction in earthwork quantities by 0.62 crore cum with a proportionate cost of ₹60.47 crore[143]. The Department replied (March 2022) that the works were entrusted under EPC turnkey contract system and also the quantities given in Bill of Quantities were meant for general assessment of value of work done and these were subject to alterations, additions and deductions. The basis for payment would be percentage payment at various stages of work which would be assessed on quantities measured by the contractor and approved by Engineer-in-Charge to complete the work as per scope of work. However, the reduction in cost due to reduction in quantities to be executed was not recovered.

[142] 45,62,086 cum plus 1,16,93,083 cum
[143] ₹152.76 x 0.62 crore/1.63 crore + Tender premium of 4.588 *per cent*

Appendix – IX
(Paragraph No. 5.5.2 (a) & Page No. 42)
Statement showing excess payment of price variation on steel in Package II

(in ₹)

Proceeding No.	Month	Quantity (MT)	Initial cost (₹28,000) + five *per cent* to be adopted	Price as per BOC	Difference	Amount	Already paid	Excess payment
A	B	C	D	E	F=E-D	G =C x F	H	I = H-G
Main Contractor								
SE/CC(P)/OGL/DB/ATO-3/ W-30/39 MRK dated 25.11.2008	March 2007	15.545	29,400	29,100	-300	0		
	April 2007	7.385	29,400	29,100	-300	0		
	May 2007	15.077	29,400	29,100	-300	0		
	June 2007	6.054	29,400	30,850	1,450	8,778		
	July 2007	0.879	29,400	30,850	1,450	1,275		
	August 2007	4.432	29,400	30,850	1,450	6,426		
	September 2007	3.174	29,400	31,400	2,000	6,348		
	October 2007	1.560	29,400	31,400	2,000	3,120		
	November 2007	0.304	29,400	31,400	2,000	608		
	December 2007	2.658	29,400	33,000	3,600	9,569		
	February 2008	7.091	29,400	33,000	3,600	25,528		
	March 2008	2.664	29,400	41,490	12,090	32,208		
	May 2008	5.328	29,400	41,500	12,100	64,469		
	June 2008	1.045	29,400	44,500	15,100	15,780		
	July 2008	7.747	29,400	47,000	17,600	1,36,347		
	August 2008	4.623	29,400	50,800	21,400	98,932		
Sub Total						**4,09,387**	**4,42,906**	**33,519**

SE/CC(P)/OGL/DB/ATO-3/ W-30/67 MRK dated 16.04.2010	September 2008	12.644	29,400	45,000	15,600	1,97,246		
	October 2008	7.084	29,400	47,000	17,600	1,24,678		
	November 2008	26.128	29,400	40,600	11,200	2,92,634		
	January 2009	5.288	29,400	31,500	2,100	11,105		
	February 2009	12.489	29,400	31,500	2,100	26,227		
	April 2009	17.796	29,400	33,000	3,600	64,066		
	May 2009	7.933	29,400	33,500	4,100	32,525		
	June 2009	5.552	29,400	31,500	2,100	11,659		
	July 2009	11.709	29,400	31,000	1,600	18,734		
	August 2009	11.478	29,400	30,000	600	6,887		
	September 2009	4.464	29,400	31,000	1,600	7,142		
	October 2009	22.976	29,400	30,000	600	13,786		
Sub Total						**8,06,689**	**8,83,096**	**76,407**
SE/CC(P)/OGL/DB/ATO-3/ W-30/198 MRK dated 05.11.2010	December 2009	10.968	29,400	30,000	600	6,581		
	January 2010	46.835	29,400	34,500	5,100	2,38,859		
	February 2010	16.809	29,400	32,500	3,100	52,108		
	March 2010	12.380	29,400	34,500	5,100	63,138		
	April 2010	1.499	29,400	37,500	8,100	12,142		
Sub Total						**3,72,827**	**4,19,286**	**46,459**
SE/CC(P)/OGL/DB/ATO-1/ W-30/79 MRK dated 18.06.2014	January 2012	7.938	29,400	44,000	14,600	1,15,895		
	March 2012	14.002	29,400	49,500	20,100	2,81,440		
	August 2013	29.470	29,400	41,500	12,100	3,56,587		
	February 2014	1.326	29,400	44,000	14,600	19,360		
	February 2014	0.730	29,400	43,000	13,600	9,928		
Sub Total						**7,83,210**	**8,11,279**	**28,069**

SE/CC(P)/OGL/DB/ATO-3/ W-30/157 MRK dated 21.11.2014	August 2014	3.710	29,400	48,000	18,600	69,006		
	September 2014	14.692	29,400	42,000	12,600	1,85,119		
Sub Total						**2,54,125**	**2,63,786**	**9,661**
SE/CC(P)/OGL/DB/TO-177 MRK dated 19.08.2015	January 2015	17.682	29,400	43,500	14,100	2,49,316		
Sub Total						**2,49,316**	**2,58,599**	**9,283**
SE/CC(P)/OGL/DB/TO-17 MRK dated 23.01.2017	June 2015	2.856	29,400	42,000	12,600	35,986		
	July 2015	8.419	29,400	41,000	11,600	97,660		
	August 2015	2.660	29,400	34,000	4,600	12,236		
	September 2015	26.604	29,400	34,000	4,600	1,22,378		
	October 2015	2.425	29,400	33,000	3,600	8,730		
	November 2015	6.227	29,400	32,000	2,600	16,190		
	June 2016	30.891	29,400	34,500	5,100	1,57,544		
	August 2016	71.878	29,400	34,500	5,100	3,66,578		
	September 2016	119.967	29,400	34,500	5,100	6,11,832		
	October 2016	103.195	29,400	34,500	5,100	5,26,295		
	November 2016	193.691	29,400	34,500	5,100	9,87,824		
		130.419	29,400	34,500	5,100	6,65,137		
	December 2016	44.134	29,400	34,500	5,100	2,25,083		
		69.533	29,400	34,500	5,100	3,54,618		
Sub Total						**41,88,091**	**46,14,864**	**4,26,773**
SE/CC(P)/OGL/DB/TO-143 MRK dated 22.06.2017	January 2017	32.964	29,400	36,000	6,600	2,17,562		
		76.802	29,400	36,000	6,600	5,06,893		
	February 2017	10.880	29,400	36,000	6,600	71,808		
		8.056	29,400	36,000	6,600	53,170		
Sub Total						**8,49,433**	**9,17,002**	**67,569**

SE/CC(P)/OGL/DB/TO/ JTO/W/30/Est./237 MRK dated 28.11.2017	January 2017	0.207	29,400	36,000	6,600	1,366		
		1.988	29,400	36,000	6,600	13,121		
	February 2017	0.217	29,400	36,000	6,600	1,432		
		1.318	29400	36000	6,600	8,699		
	March 2017	15.173	29,400	37,500	8,100	1,22,901		
		74.004	29,400	37,500	8,100	5,99,432		
	April 2017	8.231	29,400	38,500	9,100	74,902		
		15.046	29,400	38,500	9,100	1,36,919		
	May 2017	1.224	29,400	37,500	8,100	9,914		
		34.752	29,400	37,500	8,100	2,81,491		
	June 2017	4.991	29,400	37,500	8,100	40,427		
Sub Total						**12,90,605**	**13,73,115**	**82,510**
SE/CC(P)/OGL/DB/TO/ JTO(V)/W-30/Est./222 MRK dated 29.08.2018	February 2017	0.124	29,400	36,000	6,600	818		
	March 2017	0.248	29,400	37,500	8,100	2,009		
	June 2017	11.014	29,400	37,500	8,100	89,213		
		20.340	29,400	37,500	8,100	1,64,754		
	July 2017	3.230	29,400	38,500	9,100	29,393		
		65.404	29,400	38,500	9,100	5,95,176		
	August 2017	3.074	29,400	38,500	9,100	27,973		
		14.214	29,400	38,500	9,100	1,29,347		
	September 2017	14.648	29,400	32,700	3,300	48,338		
		8.816	29,400	32700	3,300	29,093		
	October 2017	6.351	29,400	32,100	2,700	17,148		
		9.563	29,400	32,100	2,700	25,820		
	November 2017	2.082	29,400	32,000	2,600	5,413		
		29.729	29,400	32,000	2,600	77,295		

	December 2017	26.696	29,400	34,300	4,900	1,30,810		
		4.616	29,400	34,300	4,900	22,618		
	January 2018	10.075	29,400	41,000	11,600	1,16,870		
	February 2018	1.249	29,400	42,500	13,100	16,362		
Sub Total						**15,28,453**	**16,49,978**	**1,21,525**
SE/CC(P)/OGL/DB/TO/ JTO(V)/W-30/Est./308 MRK dated 31.10.2018	March 2018	12.900	29,400	41,300	11,900	1,53,510		
	April 2018	39.226	29,400	42,000	12,600	4,94,248		
	May 2018	12.809	29,400	42,000	12,600	1,61,393		
Sub Total						**8,09,151**	**8,43,242**	**34,091**
SE/CC(P)/OGL/DB/TO/ JTO(V)/W-30/Est./83 MRK dated 15.03.2019	February 2018	2.398	29,400	42,500	13,100	31,414		
	March 2018	0.992	29,400	41,300	11,900	11,805		
	April 2018	0.693	29,400	42,000	12,600	8,732		
	September 2018	14.620	29,400	42,000	12,600	1,84,212		
	October 2018	17.781	29,400	42,000	12,600	2,24,041		
		20.847	29,400	42,000	12,600	2,62,672		
	November 2018	47.543	29,400	43,500	14,100	6,70,356		
Sub Total						**13,93,232**	**1448292**	**55,061**
Total (A)						**1,29,34,520**	**1,39,25,445**	**9,90,925**
60 (C) Contractors								
SE/CC(P)/OGL/DB/TO/JTO (V)/W-30/Es/230 MRK dated 31.08.2018	October 2017	4.040	29,400	32,100	2,700	10,908		
	November 2017	4.630	29,400	32,000	2,600	12,038		
	December 2017	20.660	29,400	34,300	4,900	1,01,234		
	January 2018	2.880	29,400	42,500	13,100	37,728		
Sub Total						**1,61,908**	**1,78,819**	**16,911**
	February 2018	0.451	29,400	42,500	13,100	5,908		
	March 2018	0.301	29,400	41,300	11,900	3,582		

SE/CC(P)/OGL/DB/TO/JTO (V)/W-30/Es/282 MRK dated 08.10.2018	April 2018	0.301	29,400	42,000	12,600	3,793		
	May 2018	12.760	29,400	42,000	12,600	1,60,776		
	June 2018	12.320	29,400	42,000	12,600	1,55,232		
	January 2018	3.671	29,400	41,000	11,600	42,584		
	February 2018	2.807	29,400	42,500	13,100	36,772		
	March 2018	5.005	29,400	41,300	11,900	59,560		
	May 2018	17.740	29,400	42,000	12,600	2,23,524		
	June 2018	32.610	29,400	42,000	12,600	4,10,886		
Sub Total						**35,456**	**36,934**	**1,478**
SE/CC(P)/OGL/DB/TO/JTO -2/W-30/Es/4 MRK dated 04.01.2019	September 2018	3.964	29,400	42,000	12,600	49,946		
	October 2018	32.381	29,400	42,000	12,600	4,08,001		
		29.470	29,400	42,000	12,600	3,71,322		
		32.381	29,400	42,000	12,600	4,08,001		
Sub Total						**12,37,270**	**12,88,823**	**51,553**
SE/CC(P)/OGL/DB/TO/JTO -2/W-30/Es/21 MRK dated 18.01.2019	November 2018	3.813	29,400	43,500	14,100	53,763		
Sub Total						**53,763**	**55,765**	**2,002**
SE/CC(P)/OGL/DB/TO/JTO -2/W-30/Es/22 MRK dated 18.01.2019	October 2018	3.813	29,400	42,000	12,600	48,044		
Sub Total						**48,044**	**50,046**	**2,002**
SE/CC(P)/OGL/DB/TO/JTO (V)/W-30/Es/23 MRK dated 18.01.2019	July 2018	17.647	29,400	42,000	12,600	2,22,352		
	August 2018	19.194	29,400	42,000	12,600	2,41,844		
	October 2018	0.810	29,400	42,000	12,600	10,206		
Sub Total						**4,74,403**	**4,94,169**	**19,766**

SE/CC(P)/OGL/DB/TO/JTO -2/W-30/Es/51 MRK dated 13.02.2019	November 2018	31.438	29,400	43,500	14,100	4,43,276		
		29.744	29,400	43,500	14,100	4,19,390		
	December 2018	30.397	29,400	43,500	14,100	4,28,598		
		23.905	29,400	43,500	14,100	3,37,061		
		23.905	29,400	43,500	14,100	3,37,061		
Sub Total						**19,65,385**	**20,39,296**	**73,911**
SE/CC(P)/OGL/DB/TO/JTO -2/W-30/Es/68 MRK dated 28.02.2019	October 2018	0.284	29,400	42,000	12,600	3,578		
	November 2018	0.046	29,400	43,500	14,100	649		
Sub Total						**4,227**	**4,400**	**173**
SE/CC(P)/OGL/DB/TO/JTO -2/W-30/Es/69 MRK dated 28.02.2019	November 2018	3.280	29,400	43,500	14,100	46,248		
Sub Total						**46,248**	**47,965**	**1,717**
Total (B)						**51,29,319**	**53,45,015**	**2,15,696**
Grand Total (A + B)						**1,80,63,839**	**1,92,70,460**	**12,06,621**

Appendix-X

(Paragraph No. 5.5.2 (b) & Page No. 43)

Statement showing excess payment of fuel escalation due to irregular adoption of 'R' value by deducting Value Added Tax at 2.8 *per cent* and 'Fo' value in denominator

(in ₹)

Sl. No.	Period		Cost of HSD oil as on the date of submission of bid (F_0)	Cost of HSD oil as on the date of submission of bid + five *per cent* hike (F_0)	Cost of HSD oil as on 15th of middle month(F_1)	Variation in Amount	Value of work in the quarter after deducting VAT at four *per cent* (R)	Price Escalation Amount {0.85XPF/100X RX(F_1-F_0)/F_0}
	From	To						
1.	March 2006	May 2006	28.47	29.89	33.75	3.86	15,17,04,254	36,63,538
2.	June 2006	August 2006	28.47	29.89	35.73	5.84	4,11,60,818	15,03,878
3.	September 2006	November 2006	28.47	29.89	35.73	5.84	8,48,49,358	31,00,110
4.	December 2006	February 2007	28.47	29.89	34.63	4.74	11,59,55,071	34,38,617
5.	March 2007	May 2007	28.47	29.89	33.53	3.64	6,19,66,711	14,11,158
6.	June 2007	August 2007	28.47	29.89	33.53	3.64	5,53,28,487	12,59,986
7.	September 2007	November 2007	28.47	29.89	33.53	3.64	6,27,87,940	14,29,859
8.	December 2007	February 2008	28.47	29.89	33.53	3.64	4,45,44,897	10,14,414
9.	March 2008	May2008	28.47	29.89	34.69	4.8	3,09,52,366	9,29,503
10.	June 2008	August 2008	28.47	29.89	37.55	7.66	2,02,22,744	9,69,136
11.	September 2008	November 2008	28.47	29.89	37.75	7.86	2,76,67,974	13,60,553
12.	December 2008	February 2009	28.47	29.89	35.58	5.69	2,94,68,012	10,49,008
13.	March 2009	May 2009	28.47	29.89	33.41	3.52	3,36,65,872	7,41,393
14.	June 2009	August 2009	28.47	29.89	35.59	5.70	14,22,79,227	50,73,785
15.	September 2009	November 2009	28.47	29.89	35.59	5.70	11,57,15,521	41,26,503

16.	December 2009	February 2010	28.47	29.89	35.59	5.70	18,10,04,717	64,54,765
17.	March 2010	May 2010	28.47	29.89	38.37	8.48	23,93,14,662	1,26,96,407
18.	June 2010	August 2010	28.47	29.89	40.63	10.74	21,44,88,849	1,44,12,015
19.	September 2010	November 2010	28.47	29.89	40.63	10.74	33,17,76,454	2,22,92,847
20.	December 2010	February 2011	28.47	29.89	40.67	10.78	17,90,23,015	1,20,73,782
21.	March, 2011	May 2011	28.47	29.89	40.67	10.78	15,30,16,955	1,03,19,865
22.	June, 2011	August 2011	28.47	29.89	44.34	14.45	8,76,60,550	79,24,789
23.	September 2011	November 2011	28.47	29.89	44.34	14.45	7,38,75,490	66,78,577
24.	December 2011	February 2012	28.47	29.89	44.34	14.45	6,77,05,879	61,20,824
25.	March 2012	May 2012	28.47	29.89	44.34	14.45	2,48,93,398	22,50,441
26.	June 2012	August 2012	28.47	29.89	44.34	14.45	3,48,22,866	31,48,097
27.	September 2012	November 2012	28.47	29.89	50.29	20.40	3,03,80,400	38,77,389
28.	December 2012	February,13	28.47	29.89	50.29	20.40	1,63,97,494	20,92,779
29.	March 2013	May 2013	28.47	29.89	53.09	23.2	1,68,76,839	24,49,598
30.	June 2013	August 2013	28.47	29.89	55.56	25.67	1,74,76,007	28,06,621
31.	September 2013	November 2013	28.47	29.89	57.41	27.52	3,24,55,441	55,87,939
32.	December 2013	February 2014	28.47	29.89	59.36	29.47	1,82,45,626	33,63,989
33.	March 2014	May 2014	28.47	29.89	60.61	30.72	3,38,84,735	65,12,399
34.	June 2014		28.47	29.89	62.56	32.67	1,00,50,738	20,54,295
35.	July 2014	September 2014	28.47	29.89	63.81	33.92	3,84,85,039	81,67,017
36.	October 2014	December 2014	28.47	29.89	58.3	28.41	19,29,95,805	3,43,03,212
37.	January 2015	March 2015	28.47	29.89	54.37	24.48	13,66,12,006	2,09,22,615
38.	April 2015	June 2015	28.47	29.89	58.16	28.27	10,68,71,546	1,89,01,819

39.	July 2015	September 2015	28.47	29.89	51.38	21.49	9,82,21,662	1,32,05,638
40.	October 2015	December 2015	28.47	29.89	52.41	22.52	16,61,29,532	2,34,06,200
41.	January 2016	March 2016	28.47	29.89	50.54	20.65	7,81,27,128	1,00,93,403
42.	April 2016	June 2016	28.47	29.89	57.03	27.14	2,59,56,892	44,07,357
43.	July 2016	September 2016	28.47	29.89	59.01	29.12	1,54,27,562	28,10,634
44.	October 2016	December 2016	-	-	-	-	0	0
45.	January 2017	March 2017	28.47	29.89	66.24	36.35	2,36,54,831	53,79,476
46.	April 2017	June 2017	28.47	29.89	66.24	36.35	6,33,631	1,43,877
47.	July 2017	September 2017	28.47	29.89	66.24	36.35	15,48,126	3,52,240
48.	October 2017	December 2017	28.47	29.89	66.24	36.35	2,08,79,736	48,98,810
Total								**31,11,81,160**

Note: 'R' value for the period from September 2011 to March 2017 were calculated by adopting five *per cent* VAT instead of 2.8 *per cent* (Value X 105/102.)
In the absence of detailed calculation of 'R' value actual payment made was adopted, for the period April 2017 to December 2017.

Statement showing excess payment of fuel escalation due to irregular adoption of 'Fo' value in denominator in respect of additional quantities in CM & CD on EMC

Sl. No.	Period		Cost of HSD oil as on the date of submission of bid	(Fo) cost of HSD oil as on the date of submission of bid plus five *per cent* hike (F_0)	Cost of HSD oil as on 15th of middle month(F_1)	Variation in Amount (F_1-F_0)	Value of work in the Quarter (in ₹) (R)	Price Escalation Amount {0.85XPF/100XRX ($F1$-F_0)F_0}
	From	To						
1.	June 2010	August2010	28.47	29.89	40.63	10.74	31,96,360	2,14,771
2.	September 2010	November 2010	28.47	29.89	40.63	10.74	73,35,301	4,92,876
3.	December2010	February 2011	28.47	29.89	40.67	10.78	1,67,02,769	11,26,479
4.	March 2011	May2011	28.47	29.89	40.67	10.78	76,24,177	5,14,194
5.	June 2011	August 2011	28.47	29.89	44.34	14.45	65,48,389	5,91,995
6.	September 2011	November 2011	28.47	29.89	44.34	14.45	68,36,736	6,18,062
7.	December 2011	February 2012	28.47	29.89	44.34	14.45	14,19,877	1,28,361
8.	March 2012	May 2012	28.47	29.89	44.34	14.45	9,71,764	87,851
9.	October 2014	December 2014	28.47	29.89	58.3	28.41	2,90,51,627	51,63,657
10.	January 2015	March 2015	28.47	29.89	54.37	24.48	74,12,606	11,35,267
11.	April 2016	June 2016	28.47	29.89	57.03	27.14	37,00,631	6,28,350
12.	January 2017	March 2017	28.47	29.89	66.24	36.35	14,65,494	3,33,276
Total								**1,10,35,139**

Statement showing total excess payment calculation

(in ₹)

Total escalation to be paid (₹31,11,81,160 + ₹1,10,35,139)		**32,22,16,299**
	Amount paid upto RA Bill 119 and part	35,13,11,416
	Net excess payment	**2,90,95,117**

Appendix-XI
(Paragraph No. 5.5.3 (c) & Page No. 45)
Statement showing front payment due to adoption of lesser percentage to O&M charges

Description	Amount (in ₹)
Total value of work to be done	1135,84,77,000
O&M charges as per IBM	10,24,56,000
Add : Tender premium at 4.588 ***per cent*** on ₹10,24,56,000	47,00,681
O&M charges to be adopted in payment schedule at agreement rates (₹10,24,56,000 + ₹47,00,681)	10,71,56,681
O&M charges adopted in payment schedule	5,45,20,690
Amount of O&M charges adjusted in other components of work (₹ 10,71,56,681 – ₹5,45,20,690)	5,26,35,991
Value of work executed by the contractor and paid upto RA Bill No. 52	598,25,36,383
Premature payment upto RA Bill No. 52 and part (₹5,26,35,991 x ₹598,25,36,383/₹1135,84,77,000)	2,77,23,499
Value of work executed by subsidiary contractor and paid upto RA Bill No. 18	218,64,26,331
Premature payment to subsidiary contractor upto RA Bill No.18 and part (₹5,26,35,991 x ₹218,64,26,331/₹1135,84,77,000)	1,01,32,055
Total front payment (₹2,77,23,499 + ₹1,01,32,055)	**3,78,55,554**

Source: Compiled by Audit as per the information provided by the Department

Appendix – XII
(Paragraph No. 5.5.4 & Page No. 46)
Statement showing quantities of lining not deducted in structure portion

(length/width/thickness in meters)

Reach of structure	Type of structure	Discharge (in cumecs)	Length	Width	Thickness	Bed lining Qty (Cum)	FSD (m)	Height of each slope	No. of slopes	Slopes Lining Quantity (Cum)	Total lining Quantity (Cum)
A	B	C	D	E	F	G=DxExF	H	I=Hx1.8028*	J	K=DxFxIxJ	L=G+K
45.425	UT	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
46.950	SP	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
47.800	SP	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
49.400	SP	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
52.300	SP	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
52.650	OT	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
52.650	DLB	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
53.565	SP	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
54.105	SP	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
54.365	ESCAPE	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
54.690	DLB	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
54.765	SP	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
58.465	UT	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
58.865	SLB	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
59.915	SP	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
64.255	UT	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
65.115	SLB	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
65.115	SP	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
66.715	SP	89.375	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
66.750	OT	39.722	60	11.8	0.1	70.8	4.75	8.563	2	102.76	173.56
72.250	UT	40.74	60	8.7	0.1	52.2	4.15	7.482	2	89.78	141.98
73.300	UT	40.74	60	8.7	0.1	52.2	4.15	7.482	2	89.78	141.98
76.150	SP	40.74	60	8.7	0.1	52.2	4.15	7.482	2	89.78	141.98

79.200	UT	40.74	60	8.7	0.1	52.2	4.15	7.482	2	89.78	141.98
80.050	UT	40.74	60	8.7	0.1	52.2	4.15	7.482	2	89.78	141.98
81.450	UT	40.74	60	8.7	0.1	52.2	4.15	7.482	2	89.78	141.98
84.450	UT	40.74	60	8.7	0.1	52.2	4.15	7.482	2	89.78	141.98
85.540	UT	32.678	60	8.2	0.1	49.2	3.85	6.941	2	83.29	132.49
88.335	SP	32.678	60	8.2	0.1	49.2	3.85	6.941	2	83.29	132.49
91.025	UT	32.678	60	8.2	0.1	49.2	3.85	6.941	2	83.29	132.49
95.545	UT	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
98.145	UT	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
100.660	UT	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
101.990	UT	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
107.590	UT	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
108.290	UT	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
109.030	UT	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
110.351	UT	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
116.915	SP	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
119.140	AQUEDUCT	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
122.710	SP	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
124.388	UT	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
126.641	UT	11.966	20	5.8	0.1	11.6	2.85	5.138	2	20.55	32.15
128.348	UT	11.966	20	5.8	0.1	11.6	2.85	5.138	2	20.55	32.15
130.306	UT	11.966	20	5.8	0.1	11.6	2.85	5.138	2	20.55	32.15
130.470	UT	11.966	20	5.8	0.1	11.6	2.85	5.138	2	20.55	32.15
133.570	UT	11.966	20	5.8	0.1	11.6	2.85	5.138	2	20.55	32.15
134.620	AQUEDUCT	11.966	20	5.8	0.1	11.6	2.85	5.138	2	20.55	32.15
135.145	UT	11.966	20	5.8	0.1	11.6	2.85	5.138	2	20.55	32.15
136.720	UT	11.966	20	5.8	0.1	11.6	2.85	5.138	2	20.55	32.15
137.745	UT	11.966	20	5.8	0.1	11.6	2.85	5.138	2	20.55	32.15
138.775	UT	11.966	20	5.8	0.1	11.6	2.85	5.138	2	20.55	32.15
142.425	UT	6.087	20	4.7	0.1	9.4	2.35	4.237	2	16.95	26.35
143.952	UT	6.087	20	4.7	0.1	9.4	2.35	4.237	2	16.95	26.35
145.795	SP	6.087	20	4.7	0.1	9.4	2.35	4.237	2	16.95	26.35

76.265	SLB	40.741	60	8.7	0.1	52.2	4.15	7.482	2	89.78	141.98
85.365	SLB	40.741	60	8.7	0.1	52.2	4.15	7.482	2	89.78	141.98
93.315	SLB	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
98.140	SLB	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
109.005	SLB	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
123.525	SLB	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
130.485	SLB	11.966	20	5.8	0.1	11.6	2.85	5.138	2	20.55	32.15
134.055	SLB	11.966	20	5.8	0.1	11.6	2.85	5.138	2	20.55	32.15
137.085	SLB	11.966	20	5.8	0.1	11.6	2.85	5.138	2	20.55	32.15
142.610	SLB	11.966	20	4.7	0.1	9.4	2.35	4.237	2	16.95	26.35
119.155	ESCAPE	22.595	60	7.8	0.1	46.8	3.35	6.039	2	72.47	119.27
134.905	ESCAPE	11.966	20	5.8	0.1	11.6	2.85	5.138	2	20.55	32.15
	Total quantity (Cum)										**7,729.62**
	Rate per cum as per IBM including paver charges (in ₹)										3,058.40
	Total amount at IBM rates (7,729.62 cum x ₹3,058.40 per cum) (in ₹)										2,36,40,269.81
	Add: Tender premium at 4.588 *per cent* (₹2.36 crore x 4.588 *per cent*) (in ₹)										10,84,615.57
	Total amount at agreement rates (₹2.36 crore + ₹0.11 crore) (in ₹)										**2,47,24,885.38**

* As 1:1.5 slope was adopted for canals, height of slope would become the product of depth and square root of (1.5 x 1.5 + 1.0 x 1.0) = 1.8028 (Pythagoras theorem)

DLB: Double Lane Bridge; OT: Off-Take sluice; SLB: Single Lane Bridge; SP: Super Passage; UT: Under Tunnel

Glossary

APPWDC	Andhra Pradesh Public Works Department Code
BG	Bank Guarantee
CDO	Central Designs Organisation
CE	Chief Engineer
CM&CD	Cross Masonry and Cross Drainage
DLSC	District Level Sanction Committee
DPR	Detailed Project Report
EE	Executive Engineer
EMC	Eastern Main Canal
EMD	Earnest Money Deposit
ENC	Engineer-in-Chief
EoT	Extension of Time
EPC	Engineering Procurement and Construction
FRL	Full Reservoir Level
GoAP	Government of Andhra Pradesh
GoI	Government of India
HSD	High Speed Diesel
IBM	Internal Benchmark
IS Code	International Standard Code
KWDT	Krishna Water Dispute Tribunal
LA	Land Acquisition
LS	Lumpsum
MoE&F	Ministry of Environment and Forest
NOF	Non Over Flow
O&M	Operation and Maintenance
PSVGP	Poola Subbaiah Veligonda Project
R&R	Rehabilitation and Resettlement
RA Bill	Running Account Bill
SE	Superintending Engineer
SoP	Schedule of Payments
SoR	Schedule of Rates
SSR	Standard Schedule of Rates
SLSC	State Level Standing Committee
TBM	Tunnel Boring Machine
TMC	Thousand Million Cubic feet
V&E	Vigilance and Enforcement
WBC	Western Branch Canal
WRD	Water Resources Department

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