

Tamil Nadu – IAMWARM Project
(Mission: May 31 – June 03, 2011)

Construction Quality Management and Technical Supervision Consultancy under Tamil Nadu- IAMWARM Project.

1. The mission (R.K.Malhotra) visited Tamil-Nadu IAMWARM Project from May 31, 2011 to June 03, 2011. The principal focus was to assess the status of preparedness of WAPCOS LTD, Consultant, Construction Quality Management and Technical Supervision, in handling their assignments agreed with GoTN. The contract for providing consultancy services on quality management and technical supervision on the IAMWARM Project. was awarded to WAPCOS Ltd by GoTN on February 15, 2011. The mission reviewed the actions initiated by the Consultant so far in the process of fulfillment of the requisite Consultancy Objectives. In this context, discussions were held with the Team Leader of the Consultant. In addition, field visits were made to some 12 Phase III works under progress in the Chennai and Madurai regions in addition to one tank of Phase I in Chennai region to assess the performance of the Consultant on the quality checking of works by its quality management engineers and reporting of their findings. The team leader and his team members accompanied the mission during the field visits. (The tanks visited in Chennai and Madurai regions are listed in the enclosed Annex).

2. Establishment of Laboratory System. As per the Agreement for Consultancy Services, WAPCOS Ltd. is required to maintain two ‘ground laboratories’ and two ‘mobile laboratory facilities’. One ground laboratory & one mobile laboratory will serve the Chennai region works, where as, the other ground laboratory & mobile laboratory will serve the Madurai region works. The mission was apprised that the procurement of testing equipment was in advanced stage and, that, it had also been decided to procure 2 new mini trucks for conversion into mobile laboratories. Laboratory system being the most important requirement in the quality management system for testing of inputs / outputs, the mission during discussions with the Team Leader laid great emphasis on the need for establishment of the laboratories the earliest possible.

It has, accordingly, been agreed by the Team Leader, WAPCOS Ltd. that:

- One ‘ground laboratory’ for Chennai region in Villupuram town and ‘one ground laboratory’ for the Maduarai region in Virudhungan town shall be established and made operational latest by July 31, 2011; and, that, each ground laboratory shall be duly equipped with the testing equipment listed in Annexure B I of the Consultancy Agreement.
- The two ‘mobile laboratories’, each housed in a new mini truck and equipped with the testing equipment listed in annexure B II of the Consultancy Agreement, shall also be commissioned latest by July 31, 2011.

As per the team leader’s contention, it shall be only upon the commissioning of the above laboratory system that it would be possible to conduct at least 25 % of the specified quality control tests independently for the respective items of works simultaneously in

each package to fulfill the Consultancy Agreement requirement. However, the mission suggested that, pending, the full scale establishment of the 'ground' & 'mobile' laboratory system by the stipulated date of July 31, 2011, the Consultant should, mean while, promptly arrange procurement of at least the testing equipment needed for conducting routine quality control tests. This suggestion was agreed by the team leader and he assured that the need full would be done within the next 7 to 10 days.

It was also brought out by the mission that, as per the Consultancy Agreement, the Consultant was required to verify at least 10 % of the tests conducted by the contractors to ensure their accuracy and, that, this was not being implemented in the field. The team leader was advised to initiate implementation of this essential requirement through procurement of the minimum needed equipment for the routine quality tests (suggested above) together by using the testing equipment available with the contractors. He assured requisite compliance.

3. Key Personnel. Besides the team leader and the environment, social and I.T. specialists, 2 'quality management engineers' (out of the proposed 4 quality management engineers) and 2 site engineers are in position. In addition, the requisite co-ordination / support staff is also reported to be in position, which comprises: one coordinator, one draftsman, one laboratory assistant, and one computer operator. The induction of remaining 2 quality management engineers and 2 basin quality management engineers is being expedited by the WAPCOS Ltd. Availability of adequate number of laboratory technicians for conducting quality control tests being of paramount importance, the team leader assured the mission that the needed 4 laboratory technicians for conducting the routine tests in the field as well as for conducting the quality tests in the ground and mobile laboratories would be inducted on priority.

4. Familiarization with Manuals, Guidelines, Construction Procedures, Contract Documents, Indian Standard Specifications. This is one of the key task specified in the Consultancy Agreement. Based on my discussions with the team leader and his team of quality management engineers and site engineers as well as my job-specific inter-action with them on work sites during field visits to various works, it was evident that the quality management engineers & site engineers had still to make themselves fully familiar with the above documents. It was emphasized upon them to thoroughly read these documents, particularly, the technical guidelines documented for various key items of IAMWARM Project works, duly illustrated with sketches and construction procedures (available with MDPU and field engineers); selected contract documents and Indian Standard IS 456 : 2000. This familiarization is of paramount importance to make them conversant with the correct construction procedures to be adopted for execution of various types of project works and for the implementation of key quality control requirements duly conforming to the technical specifications. The team leader assured that the specified and suggested familiarization process would be promptly initiated and, that, he would personally ensure its implementation.

5. Monitoring of Physical Works and Reporting of Quality Aspects by Consultant. The mission during field visits to Phase III works in the Chennai and Madurai regions perused the observations recorded by the Consultant's quality management engineers / site

engineers against the various items of works visited by them. Most of the recorded observations were found to be of general nature only and do not reflect the 'quality aspects' of the respective item of works. Some of the recorded observations are listed below:

(i) Stacks of 20 mm metal and sand are seen at site. *It should have been mentioned whether the sand and metal had been properly stock-piled with a space kept between the stock piles as per specifications.* (ii) Cement 53 grade OPC is said to have been used. *The water-cement ratio (W/C) used in the concrete mix should have been mentioned through perusal of test data.* (iii) Small honey-combs noticed in the head wall concrete of sluice. *Method to rectify the honey-comb patches should also have been indicated. Also, the needed rectification should have been got done by him, preferably, in his presence and recorded.* (iv) O.K.Cards are maintained generally. *It should have been mentioned whether the entries against various items had been properly made; whether the quality control engineer and WUA representative had signed the cards; whether reference to quality tests conducted on materials / soils / concrete had been indicated in the O.K.Cards. The word: 'generally' should have been elaborated and any short coming noted should have been indicated.* (v) Centering works are under progress for sluice body wall. *It should also have been indicated whether the quality of centering being used was of good standard and whether the centering surface was observed to be free of any set grout / concrete and had been properly oiled; also, whether the back slope had been cut to 4 (H) : 1 (V) slope and benches cut.* (vi) JCB / Hitachi working for removing jungle. *It should also have been mentioned whether the 'root mass' and 'stumps' were being totally removed and disposed as per specifications.* (vii) Roller working in Bund portion for compaction of earth. *It should have been specifically mentioned whether 'benches' had been cut; whether earth fill was being placed in layers of specified thickness; whether clods / stones of size more than 7,5 cm were being hand-picked from the layer and removed; whether any dead wood / roots present in the layer was being properly removed; whether it was plain power roller or vibratory power roller deployed for compaction; whether moisture content in the earth fill layer was being determined through rapid moisture meter and recorded; whether proper 'sprinkler' was deployed for addition of water in the earth fill layer; whether 'in place density test / tests' had been conducted etc.* (viii) Supply Channel de-silting works completed. *It should also have been mentioned whether the essentially needed work of construction of 'concrete bed bars' in the supply channel had been taken up. If not, when it would be scheduled for commencement.* (ix) Advises to lay concrete without cold joints in body wall and aprons. *It is, of course, better to avoid cold joints in any concrete placement but situations do arise when a cold joint does occur. The method to rectify the cold joint (which had occurred) should have been indicated by the Consultant and such rectification got done by him, preferably, in his presence and recorded.* (x) Vaippar river sand is being used. *It should have been mentioned, through perusal of quality test data maintained by the concerned project quality control engineer, whether the sand was free from impurities and conformed to the acceptable criteria in respect of its grading and fineness modulus as per IS specifications or not. The wording, as it is, does not convey any thing in engineering term.* (xi) Anicut body wall pointing is in progress. *Ratio of cement-sand mortar used for pointing work should have been mentioned; It should also have been indicated whether correct procedure was being followed viz raking of joints to specified*

depth, cleaning of raked joints and moistening of joints prior to application of pointing and availability at site of adequate curing arrangement. (xii) Weir apron concrete work in progress. It should have been mentioned whether design mix concrete was being used; whether proportioning of mix ingredients was being done by weight or volume at site; whether arrangement for addition of 'measured / calibrated' quantity of water to the concrete mix had been made; and what water-cement ratio had been maintained.

6. Field Visits and On-Site Technical Sessions. The mission during field visits to the Phase III tank system rehabilitation works in progress in the Chennai and Madurai regions specifically highlighted to the team leader and his team of engineers of the Consultant (WAPCOS Ltd) the correct procedures to be adopted / being adopted and the basic / key quality control requirements to be implemented / being implemented, as also further improvements needed, wherever so warranted, in respect of the execution of following works & activities:

- Raising & strengthening of tank bunds through cutting of proper benches prior to placement of earth fill in layers. This important feature of 'provision of benches' was actually shown to the Consultant. Also, the earth fill layers containing dead wood / roots being spread in tank bund was also shown and the need for hand picking and removing the same prior to undertaking compaction was also explained as well as the adverse consequences in case this was not done. Methodology of achieving effective compaction of earth fill on slopes was also explained. Importance of proper preparation of 'borrow area' for getting the soil for raising & strengthening of bund was brought out.
- Sequence wise procedure for the reconstruction of irrigation sluices was explained and also shown where this work was being actually done in one of the tanks. Importantly, benches actually cut in the side slopes excavated to 4 (H) : 1 (V) slope and the method of manual compaction adopted for compaction of back fill behind the newly constructed concrete barrel walls(essential quality control requirements) were highlighted and their importance & relevance explained to the Consultant in detail.
- All relevant quality control requirements on placement of plain and reinforced concrete / skin wall construction in weirs covering: proportioning of mix ingredients by weight and their conversion in volumetric proportioning; method of addition of calibrated quantity of water in the mix; strictly maintaining the water-cement ratio; fool-proof method of curing of concrete; casting of concrete / mortar chairs and using these during erection of reinforcement for meticulous maintenance of specified 'cover' (essential durability requirements).were explained to the Consultant for ensuring strict implementation in the field.

The objective of the mission in convening technical sessions at the work sites during field visits and comprehensively illustrating the various activities in actual progress was to make the team leader and his team of engineers of the Consultant (WAPCOS Ltd.) realistically conversant with correct and sound construction procedures to be adopted together with the essential quality control requirements to be implemented on the execution of rehabilitation works in IAMWARM project to enable them to discharge their functions independently with skill, integrity and responsibility. This is expected to

promote construction quality, durability, and long term sustainability of the rehabilitated works.

The mission during detailed interactions with the team leader found him to be open minded and fully receptive to the mission observations and suggestions and assured that all out efforts would be made by him to successfully implement all the key tasks specified in the Consultancy Agreement. The mission feels that in case this is done, the Construction Quality Management and Technical Supervision Consultancy shall prove its usefulness to the IAMWARM project in providing independent inputs for achieving the objective of promoting the construction quality of works.

7. Monitoring of Consultant's Work. The mission had a wrap-up meeting with the Engineer-in-Chief and Chief Engineer, Designs on June 3, 2011. and all the above listed points were explained to them. The mission also specially emphasized that the Superintending Engineer, PWD, Design Circle, WRO, who had signed the Agreement with WAPCOS Ltd should regularly monitor the progress of the Consultant, being key to the successful implementation of Consultancy Agreement.

8. Monitoring of WRD works by MDPU. The mission during field visits to the various Phase III tank rehabilitation works observed that the monitoring of these works being carried out by MDPU through regular / periodical inspections is proving to be result-oriented towards achievement of the objective of quality. This monitoring should be continued.

The mission feels that it was a very timely visit to the IAMWARM project to review the progress made by the Construction Quality Management and Technical Supervision Consultant (WAPCOS) since the signing of Consultancy Agreement on 15 February, 2011 and to also provide the needed orientation to them right at the work sites , particularly, in respect of adoption of sound construction practices and the associated quality control requirements to achieve the objective.

The mission also broadly apprised all the above points to the Project Director and has shared this report with him.

R.K.Malhotra

ANNEX.

List of Tanks visited

Sl. No.	Sub Basin	Name of Tank
I.	Chennai Region	
A	Varahanadhi (Phase-I)	1. Vizhukkam
B	Ongur (Phase-III)	2. Puliur
		3. Kilgudalur
		4. Nolambur
		5. Minnal Siruthambur
C	Araniar (Phase-III)	6. Peruvayal
		7. Gummidipoondi Hissa
		8. Kuruviagaram
		9. Kumanancheri
		10. Killikodi
		11. Sengarai Ayyaneri
II.	Madurai Region	
D	Vaippar Main River (Phase-III)	12. T. Pudupatti
E	Deviar (Phase-III)	13. Thenmalai