

City Infrastructure Development: Roads and Flyovers

GNCTD undertook construction of 25 roads and bridges for upgradation of city infrastructure and in preparation for CWG 2010. At the time of the Games, 17 of these were fully completed. The remaining 8 were substantially completed and open to traffic with physical completion status varying between 90 per cent and 99.5 per cent. We selected seven of these projects for detailed review.

All the seven projects adopted Contractor's Profit and Overhead Charges (CPOH) of 37.5 per cent for the bridge/flyover components in contrast to CPOH of 15 per cent (raised from 10 per cent in December 2007/ April 2008) stipulated by CPWD. This resulted in increasing the justified cost, worked out by the department after opening of the financial bids, by Rs. 352.47 crore. A higher CPOH leads to a higher cost baseline for potential bidders. The CPOH rate also forms an indirect input into the process of preparation of justified costs, where required, and the associated band of 5/10 per cent for assessing the reasonableness of rates for final award of the contract.

There was irregular award of work in two projects where L-1 was determined by considering separate letters quoting a lump-sum amount, in violation of the manual provisions governing item rate tenders. Use of correction fluid in tender documents, and large number of cuttings/corrections were seen in another bid. These bids, as per rules, were liable for rejection, but were accepted by PWD.

We noticed cases of non-compliance with quality standards, with two cases where batches of steel with variation in weight outside of the permitted tolerance limit were not rejected, and one case where an important test for assessing strength of piles was not carried out.

PWD incorporated, at the level of CE, a new clause for price variation in six projects by deleting existing standard clauses.

We found instances of inaccuracies in the preparation of detailed estimates. In one case, this led to wrong assessment of the lowest bidder, and in the process an expenditure of Rs. 3.55 crore was incurred in excess of requirement. Incorrect estimate of another item, mastic asphalt, led to an additional avoidable payment of Rs. 1.34 crore due to payment for the item at market rates.

Two works costing Rs. 62.63 crore were got executed by PWD through deviations of ongoing works, instead of calling for fresh tenders, on grounds of urgency, but were not completed in time for the games.

PWD awarded work for construction of two arch foot over bridges (FOB) for Rs. 10.35 crore at JLN Stadium using for the first time, a suspension bridge design using imported Macalloy suspension system. One of the FOBs collapsed and the work was subsequently stopped on both the FOBs, which are still lying incomplete, rendering the payment till date of Rs. 8.65 crore infructuous.

We noticed that the PWD is dependent on consultants for all core activities including formulating project proposals, its implementation and third party quality assurance (TPQA). The consultancy agreements, however, did not adequately bring in the consultant's accountability for defects and losses arising from inaccuracy of designs and estimates. Engagement of TPQA consultants is a recent development based on advice of CVC for selected major projects. We, however, found that TPQA consultancy is not sufficiently independent, and is now more a norm rather than an exception, with the consequent increase in the cost of the projects by 1 to 2 per cent.

24.1 Introduction

As a part of upgradation of city infrastructure and in preparation for the Games, GNCTD had taken up 75 projects linked to city infrastructure improvement. Subsequently, 25 projects were stated to be directly linked to CWG for close monitoring.

As identified in our earlier report, three projects were delinked¹ from CWG, and not taken up. In all, GNCTD undertook construction of 25 roads and bridges projects to improve infrastructure of the city during CWG 2010. Of these 25 projects, one project each was started in 2004, 2005 and 2006. Nine projects were started in first half of 2007 and four in the second half. Three projects began in first half of

2008 and four in the second half. Two projects were started as late as in 2009. Of these 25 projects, 17 were fully completed, and the remaining 8 were substantially completed and open to traffic, with physical completion status varying between 90 per cent and 99.5 per cent.

We selected seven of these projects for detailed review - six executed by PWD viz. Raja Ram Kohli Marg Flyover Ghazipur Flyover, Barapulla Elevated Road, UP Link Road, Corridor improvement on Road No. 56 (ISBT-Anand Vihar), and Ring Road Bypass, and one flyover by DDA on NH 24 near the Games Village. These seven projects involved a total sanctioned amount of Rs. 2239.40 crore.

¹ Elevated East West Corridor, BSZ Marg Flyover, and Shastri Park Tunnel Corridor

Table 24.1 — Road and Flyover Projects selected for detailed audit

(Rs. in Crore)

Name of the Project	Contractor	Estimated Cost	Tendered Amount	Date of Award	Stipulated date of completion	Payment made as of Dec 2010
RR Kohli Marg Flyover	Afcons	146.40	214.57	Mar 07	Apr 09	258.26
Ghazipur Flyover	Afcons	173.36	199.79	Apr 08	Apr 10	175.79
Barapulla Elevated Road	DSC	352.40	433.71	Aug 08	Mar 10	382.93
UP Link Road	DSC	177.80	265.04	Sep 08	Apr 10	187.85
Road No. 56-Anand Vihar ISBT	Valecha	97.60	140.53	Nov 08	May 10	120.97
Ring Road Bye pass	Simplex	330.20	409.45	Dec 08 Jan 09	June 10 July 10	157.64 127.49
NH 24 flyover near Games Village (DDA Project)	Gammon	68.79	89.90	Feb 09	Sep 10	78.88

Project Timelines: Most of the projects were awarded in 2008, leaving hardly any margin for delay with the CWG just two years away. The dates by which various important milestones were met for the seven projects examined by us are tabulated below:

Table 24.2 — Important Milestones for selected Road/ Flyover Projects

Name of the Project	Date of Feasibility	Date of AA/ES	Date of approval of DUAC	Date of NIT	Date of Award of Work	Stipulated date of completion	Actual date of completion
RR Kohli Marg Flyover	Sep 05	Jul 06	Oct 06	Feb 07	Mar 07	Apr 09	Apr 10
Ghazipur Flyover	Aug 04	Apr 08	Jul 07	Dec 07	Apr 08	Apr 10	99% completed
Elevated Road over Barapulla Nalla	June 08	Aug 08	--	Jul 08	Aug 08	Mar 10	99% completed
UP Link Road	Mar 07	May 08	Dec 07	Jul 08	Sep 08	Apr 10	93% completed
Road No.56-Anand Vihar ISBT	Sep 04	Jun 08	Jan 08	Aug 08	Nov 08	Mar 10	99% completed
Ring Road Bye pass	--	May 08	Sep 07	Jul 08 Sep 08	Dec 08 Jan 09	Jun 10 Jul 10	99% completed
NH 24 flyover near Games Village (DDA Project)	Jan 08	Nov 09	Jul 08	Oct 08	Feb 09	Sep 10	Aug 10

24.2 Adoption of Contractor's Profit and Overhead Charges of 37.5 per cent for Bridge/ Flyover Projects

All the six projects adopted Contractor's Profit and Overhead Charges (CPOH) of 37.5 per cent² for the bridge/ flyover components (which represented the bulk of the work involved). This is in contrast to CPOH of 15 per cent (raised from 10 per cent in December 2007/ April 2008³) stipulated by CPWD⁴.

The justification adduced by PWD, GNCTD for adopting this percentage of 37.5 per cent (as opposed to 10/ 15 per cent adopted by CPWD) is that this CPOH rate was based on the "Standard Data Book for Analysis of Rates" issued by the Ministry of Road Transport and Highways (MoRTH). The foreword to this data book indicates that it is being adopted by various agencies for projects other than National Highways (which is the primary purpose for this data book). The estimates for these projects were prepared using the data elements indicated in the data book.

We found that the basic approach for the preparation of the MoRTH data book⁵ highlights common elements of overhead charges for both road and bridge works, but specifies different rates for CPOH (varying from 18.8 per cent to 43 per cent) for

different categories of road and bridge works. However, the MoRTH data book and the CPOH rates (indicated in the data book) have not been formally adopted by GNCTD⁶. Despite such non-adoption, PWD, GNCTD have adopted the CPOH rate of 37.5 per cent (as per the MoRTH data book), which is substantially higher than the CPOH rate of 15 per cent stipulated by CPWD. This resulted in increasing the justified cost, worked out by the department after opening of the financial bids, by Rs. 352.47 crore.

While other State PWD Departments are adopting the MoRTH data book for the purposes of estimation of road and bridge works, our scrutiny of selected projects in Orissa, for example, indicated that the data elements indicated in the MoRTH data book were adopted, but the overhead rate adopted⁷ was just 10 per cent.

Further, DMRC which routinely constructs elevated viaducts, similar to flyovers, does not use the MoRTH data book for its cost estimation. For any non-scheduled item of work executed by DMRC, whether following MoRTH specifications or otherwise, they apply a uniform fixed CP&OH of 20 per cent.

It is also not clear to us whether the overhead components for constructing of national highways (generally by NHAI) are applicable as such to the bridge and flyover projects in Delhi. The currently preferred mode for award of national highways is on BOT-toll mode, where Government funding is restricted to Viability Gap Funding (VGF) upto a maximum of 40 per cent of the

² 25 per cent as overhead charges, and 10 per cent profit thereon; this works out to an overall 37.5 per cent

³ The increase was communicated by DG, CPWD in December 2007, but approved by MoUD only in April 2008.

⁴ CPWD's manuals, contract clauses and other terms and conditions/ circulars are generally adopted by PWD, GNCTD.

⁵ Indicated in the data book itself

⁶ It is not clear when PWD, GNCTD commenced using these higher CPOH rates.

⁷ Without any additional margin for contractor's profit

estimated project cost. The amount of VGF itself is the biddable parameter, and hence the accuracy or reliability of estimates is perhaps not as of much concern as in the case of bridge and flyover projects being executed with 100 per cent Government funding.

The critical importance of the CPOH rate is that once adopted for estimation purposes, the detailed estimates thus prepared constitute a baseline for potential bidders. The CPOH rate also forms an indirect input into the process of preparation of justified costs, where required, and the associated band of 5/10 per cent for assessing the reasonableness of rates for final award of the contract.

In our opinion, the de facto use of the CPOH rate of 37.5 per cent for preparation of the estimates for the bridge/ flyover projects is inappropriate. GNCTD needs to carry out an in depth study of the actual elements of overhead involved (including the extent of equipment intensive construction methods actually in use for similar projects) and practices followed in other States for similar projects, before deciding on the appropriate CPOH rate for all such projects.

24.3 Irregularities in tendering procedure

24.3.1 Acceptance of bids quoted on papers other than tender documents

Rules and guidelines on form of the General Conditions of Contract (GCC), which are essentially part of Notice Inviting Tenders

(NIT), stipulate that in case of item rate tenders, tenderers are expected to quote on the tender form. Any tender containing percentage below/above the rates quoted is liable to be rejected⁸. We observed three instances where bids were accepted by PWD despite being quoted on papers other than tender forms:

- PWD called (July 2008) for item rate tenders for work of construction of elevated road on Barapulla Nalla (in two packages) from the empanelled contractors/firms. Six bids were received for each package. The works were awarded to DSC limited at Rs.218.79 crore and Rs.214.92 crore respectively for both the packages. We noticed that DSC became the lowest bidder not on the basis of his bid in the prescribed format of bid documents, but on the basis of separate letters quoting a lump sum amount, stated to be found in envelopes containing financial bid.
- Similarly, in case of UP Link Road project, where PWD invited (July 2008) item rate tenders, two bids were received, and work was awarded in September 2008 to DSC Limited at a cost of Rs. 265.04 crore. Again DSC became the lowest on the basis of separate letter quoting a lump sum amount stated to be found in envelope containing financial bid.

Award of works to DSC was irregular as:

- the letters were not part of the tender documents issued by the department but were stated to be found in envelopes containing financial bids,

⁸ We noted many instances, e.g. Ghazipur flyover, where percentage discount/premium was offered on the tender form, but accepted in violation of this stipulation.

- in the said letters, the firm had quoted the lump sum cost “*after discount on all items...*”. It was PWD which converted the difference between the lump sum amount and amount worked out as per item-wise bid, to a percentage discount to the quoted rate.

Taking cognisance of the letter which did not form part of the prescribed tender documents, and considering the lump sum cost quotation against the item rate tender was not in order and awarding of work to DSC Limited was irregular. Further, audit could not ascertain whether the said letters were submitted along with the bid documents or placed at a later stage.

24.3.2 Acceptance of bid despite over-writings/use of correction fluid

CPWD Manual prohibits the use of correction fluid anywhere in tender documents and, if used, such tender is liable for rejection. We found that the bid documents of Simplex Infrastructure Limited who was awarded the work of Ring Road bypass (Package II) had 12 cuttings/corrections, besides three cases of use of correction fluid for changing the figures, having an impact of increasing the bid amount by Rs.6.23 crore.

Use of correction fluid in the tender document made it liable for rejection. In spite of these obvious shortcomings in the bid document, the department did not reject the bid.

24.3.3 Irregular invitation of percentage rate tender

We found that tenders for RR Kohli Marg Flyover were incorrectly invited as

percentage rate tender, instead of item rate tender, as is required by the CPWD Works Manual.

We also noticed that though the tenders for the work were initially invited on item rate basis, yet it was subsequently changed to percentage rate tender without mentioning any reason despite the fact that scheduled items based on DSR constituted only 2 percent of the work.

Thus, invitation and acceptance of percentage rate tender was irregular.

24.4 Unwarranted inclusion of items in BOQ of agreement

We found that in six projects of PWD and one project of DDA examined by us, agencies had included separate items for providing temporary barricades and pile testing at the tendered cost of Rs. 11.84 crore and Rs.11.27crore respectively, against which, a payment of Rs. 15.35 crore had already been made.

Payment for both the items is inconsistent with MoRTH Specifications⁹ for Road and Bridge Works, against which these projects had been costed and executed, which clearly states that traffic safety arrangements including erection and maintenance of barricades and pile testing would be considered as incidental to the works and would be contractor's responsibility.

⁹ Section 112

24.5 Non compliance with quality standards

24.5.1 Usage of steel not conforming to standards in Barapulla Elevated Road

We noticed that out of 387 batches of steel consignment weighing 9048 MT, samples of 26 batches having the total batch weight of 642.01 MT and costing Rs. 5.79 crore were found by the department to be of weight lower than tolerance limit prescribed in IS 1786. These were, however, not rejected by the department leading to use of non-compliant steel. Out of these 26 batches, samples of only four were sent to third party laboratories, which, on testing, found them to be conforming to standards.

It is not clear why batches of steel which failed in the basic tests had been sent to external labs and were not outrightly rejected and why only selected samples were subjected to third party tests.

24.5.2 Usage of steel not conforming to the standards in Ring Road Bypass

Another instance of non-conformance with standards was seen in the Ring Road bypass project where five batches of steel having total batch weight of 370.78 MT and costing Rs. 2.69 crore were found by the department to be of weight higher than tolerance limit prescribed in IS 1786. These were, however, not rejected by the department, leading to use of non-compliant steel.

24.5.3 Pile tests to confirm quality not carried out

We found that routine tests of piles were not carried out during construction of the

elevated road over Barapulla Nallah, in violation of MoRTH specifications and IS 2911-1985¹⁰.

As per Indian Standard Code IS 2911-1985, routine tests for pile are necessary primarily to determine the safe load on pile, and between one-half per cent to two percent of the piles are required to be tested. This translates to a minimum of seven routine tests to be conducted in case of Barapulla Nallah. As not even a single routine test was carried out, we could not ascertain how the PWD authorities satisfied themselves that piles were executed as per the IS specifications.

PWD, in reply, stated that these tests could not be undertaken due to shortage of time.

24.6 Contract Management

24.6.1 Adoption of revised price variation clause

Price variation in PWD is payable as per standard clauses¹¹ in General Conditions of Contract (GCC). We noticed that PWD incorporated a new clause 10CCA for price variation in all the six projects. The standard price variation clauses of GCC stipulate that for each project, the proportion of key components of steel, cement, labour and material is computed based on the estimated usage of these items in the project, which varies from project to project. In contrast, the new clause introduced by PWD adopted fixed percentages of use for all the components, viz, labour (22per cent), steel (25per cent), cement (15per cent), fuel (5per cent) and

¹⁰ Indian Standard Code of Practice for Design and construction of Pile Foundations

¹¹ 10C, 10CA, 10CC

machinery and machine tools (18per cent). Further, the CPWD manual does not prescribe any price variation payable on machinery and machine tools, though it was prescribed in this new price variation clause.

As the proportion of steel used in these projects was far higher than 25 per cent, and there was a downward trend in prices of steel during the construction period of four of these projects, the amount of recovery was lesser by Rs. 18.01 crore than that which would have become recoverable with the standard price variation clause.

We also noted that no financial or legal advice was taken by the Chief Engineer before incorporation of this new clause, as is required vide GFR and CPWD manual.

PWD stated that the NIT approving authority was fully authorized to make any change in non-statutory clauses contained in the GCC, and price variation clause being a non-statutory clause, amending the same is a matter of administrative discretion.

We are unable to appreciate the Department's stand in this regard. Only a formal, well thought out policy decision at the department level after taking financial and legal advice for amending critical conditions of the GCC can ensure that the interests of the government are protected. This cannot be left to the discretion of individual NIT approving authority on a contract to contract basis.

24.6.2 Incorrect measurement of underweight steel resulting in excess payment of Rs. 0.35 crore

We observed that 5184.26 MT of reinforcement steel bars were found underweight by 48.842 MT in terms of

standard unit weight in the Ring Road Bypass project. However, payment has been made as per standard weight in violation of CPWD specifications¹², resulting in excess payment of Rs. 0.35 crore.

24.6.3 Extra expenditure of Rs. 1.13 crore due to post tender change

PWD replaced an item of work, construction of three pipe culverts, with an extra item for executing the same using a different technology (trenchless digging), in the project of construction of grade separator at ISBT Anand Vihar crossing of Road No. 56. This entailed an additional expenditure of Rs. 1.13 crore. The replacement was done on the plea that it was a busy road and it was difficult to cut open the road without disrupting the traffic. The sanction of the competent authority, Chief Engineer, was also not obtained for the extra item. We are of the view that the item could have been included in the original project definition with the approval of the competent authority, and competitive rates obtained instead of the work being awarded later as an extra item.

24.7 Loss due to incorrect estimations

24.7.1 Loss of Rs. 3.55 crore due to incorrect estimation

We found that estimation for quantities prepared by the consultant¹³ in package-II of work relating to Elevated Road over Barapullah Nallah was not very accurate with large deviations. As a result, based on the actual executed quantities of material

¹² Section 5.3.4

¹³ Tandon Consultants Pvt. Ltd

used, the inter-se ranking of L1¹⁴ and L2¹⁵ bidders changed, with the bid of L2 bidder now lower by Rs. 3.55 crore than L1.

Greater accuracy in estimate preparation would have led to the work being awarded to a different contractor, and a sum of Rs. 3.55 crore could have been saved.

The Department did not invoke the relevant penalty clause against the consultant for his error in estimate preparation.

24.7.2 Avoidable expenditure of Rs. 1.34 crore due to inaccurate estimation

We found that in RR Kohli project, the requirement of mastic asphalt had been grossly underestimated in the detailed estimates prepared by the consultant¹⁶, with the actual executed quantity of mastic asphalt increasing by 815 per cent.

This has resulted in avoidable expenditure of Rs. 1.34 crore for payment for the extra quantity of mastic asphalt at market rates.

24.8 Execution of works without tendering

We noticed that two major works were got executed as deviation to ongoing works, i.e., without call of fresh tenders though as per appendix I (delegation of financial powers) of CPWD Works Manual, only Chief Engineer with the prior approval of CW Board¹⁷ is empowered to award the work without calling of tender.

¹⁴ M/s DSC at tendered cost of Rs. 214.92 crore

¹⁵ M/s Punj Lloyd at tendered cost of Rs. 218.86 crore

¹⁶ Mahendra Raj Consultants

¹⁷ Delhi Works Board, in case of PWD, GNCTD

The two cases are discussed in succeeding paragraphs.

24.8.1 Work costing Rs. 51 crore without tendering

During the construction of Barapulla elevated road, the Delhi Police requested PWD to provide proper connectivity of this road with Lala Lajpat Rai Marg so as to provide uninterrupted dedicated lane for athletes to move from CWG Village to all sports venues during CWG 2010. PWD proposed to GNCTD to provide for this connectivity through the main contractor without calling for tenders so that work could be completed before CWG. The proposal for Rs. 51 crore was approved by GNCTD in July 2009 keeping in view of the fast approaching CWG 2010, but **connectivities were not completed in time for the Games, and the work was ongoing as of December 2010.**

24.8.2 Work costing Rs. 11.63 crore without tendering

GNCTD conveyed the approval for Rs. 11.63 crore for widening of the existing bridge and on Trunk Drain No. 2 at the T Junction of Road No. 56-71 and bridge on Road No. 56-58A, and widening of Road No. 56 from 6 lane to 8 lane in front of ISBT Anand Vihar to provide smooth and signal free traffic on Road No. 56. The Executive Engineer decided to get work executed (without call of open tenders, and without the approval of competent authority), by Valecha, the contractor who was executing the ongoing work for "Corridor Improvement of Road No 56-ISBT Anand Vihar and allied works", so that the work could be completed before the Games. **The work was in progress as on date of audit.**

We are of the view that neither was the widening of bridges necessary for CWG-2010, nor was it a part of work already being executed in that area, and was thus not a deviation in any sense. Hence, award of work to Valecha without call of open tenders is unauthorised.

24.9 Infructuous expenditure of Rs. 8.65 crore on FOBs

The work for construction of two arch foot over bridges (FOBs) was awarded to P&R Infra Projects Limited at a tendered cost of Rs.10.35 crore to facilitate the public to reach JLN Stadium during CWG. The design of the FOB was of a suspension type, and not the ordinary pillar supported structure,

and was being attempted for the first time by PWD Delhi. Given the limited amount of time available for the games, it may have been better for PWD to stick to the tried and tested method of FOB construction. However, PWD decided to use an imported suspension system (Macalloy make) in spite of the fact that a suspension bridge with a similar suspension system had collapsed in Glasgow in 2008. Instead of awarding the design consultancy work to specialized agency having the experience in related field, the work was awarded as extra item to the consultant for the main work (Tandon Consultancy).

The deck of one of the FOBs collapsed during construction, while concrete was being laid.



Collapsed FOB near JLN Stadium

In the absence of FOBs to provide approach to JLN Stadium, PWD arranged for construction of temporary FOB by Indian Army.

The Dogra Committee, set up by GNCTD to enquire into the reasons for the accident, identified improper design as the reason for failure of the joint and collapse of the deck slab. Action taken by GNCTD to fix responsibility for the incident would be reported in future audits.

As drawing and design prepared by the consultant were subject to the approval of the department, failure of the PWD in ensuring correct methodology and design for the FOB and to identify a consultant competent to attend to this work has resulted in infructuous expenditure of Rs. 8.65 crore, which has already been paid to the contractor and consultant.

In response to our observation, PWD stated that the completion of the work had only been postponed and not altogether shelved, and as such, the expenditure could not be termed as infructuous.

24.10 Engagement of Consultants in PWD

For design and implementation of flyover projects, PWD appointed consultants for feasibility study of the projects, preparation of structural designs/ drawings/ estimates/ justified amount statements, proof consultants for checking of the proposed designs & drawings and third party quality assurance (TPQA) of the projects at a total tendered cost of Rs. 14.74 crore. We noted the following:

24.10.1 Inadequate defect liability provisions and lack of accountability in the consultancy agreement

The consultancy agreements provided for performance guarantee and performance security at five per cent of the tendered cost for the performance of the contract. While we note that design consultancy agreements provide a clause to deal with the post contract variations in assessed quantities if any, it did not explicitly state the accountability for lack of accuracy on designs and estimation. We noticed gross variations in quantities of two major items viz. reinforcement work and steel liner for pile ranging between 28 and 100 percent in six projects involving impact on the cost of the projects. Wrong estimation of quantities led to loss of Rs. 3.55 crore to the department in respect of a work mentioned in our report. Since the projects are consultant driven, in our view, the defect liability for the consultant should have been strengthened with specific provision for accountability in view of the fact that timely completion of the project, as per specified designs and also within the estimated cost, is related to the performance of the consultants.

24.10.2 Role of third party quality assurance

The works were awarded to the contractors for execution following the norms prescribed in CPWD Manual and specifications of MORTH and relevant BIS codes. Ensuring quality and specifications for the works was the responsibility of the contractors executing the works and the officers (Engineer in Charge, Project Manager, CE and EIC) supervising it. In

addition, the consultants entrusted with the designs of the projects were also tasked with ensuring execution of the works as per the designs/drawings and specifications.

The department had further engaged third party quality assurance (TPQA) for independent assessment of the quality and specification of the works. Although the TPQA is to be selected from among the short listed panel for such job, the department did not have any specified policy and qualifying criteria for selection of the TPQA.

The practice of engaging TPQA in PWD is stated to be a recent development, arising from a memorandum issued by the Contract Specifications and Quality Assurance (CSQA) unit of CPWD in March 2006. It is based on an advice from CVC for the engagement of external agency for third party quality assurance in certain selected major projects.

We noticed that TPQA consultants were engaged in all the projects examined by us, making TPQA consultancy more a norm rather than exception, adding 1 to 2 per cent to the cost of the project. We also observe that the quality assurance consultants are actually not independent from execution since TPQA were engaged by the Executive Engineers directly in charge of the execution and the test/investigation reports were also submitted to him. To ensure that the third party quality assurance agency is truly independent of both the executing agency, and the contractor, in our view, the TPQA should be engaged and monitored at a level higher than the Executive Engineer, or by an independent unit within PWD. Further, PWD should strengthen and streamline its systems for quality assurance, and come out with clear guidelines on engagement of TPQA providing agencies.