

Chapter-10

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Quality control which involves testing and inspection of material and workmanship is extremely important in public works projects in view of their vast and complex network and involvement of huge amount of public funds. Our detailed findings are given in the succeeding paragraphs:

10.1 Quality Control issues

Government issued detailed instructions (August 1996 and July 1997) for ensuring quality control in works executed by PWD. Audit noticed that the government directions have not been adhered to by the divisions, thus compromising the road quality as well as road safety as discussed below:

10.1.1 Mandatory tests not included in the estimates: Important decisions regarding the quality of a road are taken at the design and planning stage itself. The government therefore had directed (August 1996 and July 1997) that in future, type of item-wise tests and their numbers according to Indian Standard/Departmental/ IRC specifications would be mentioned in all estimates. Officers sanctioning estimates would be fully responsible for ensuring that it has been done as per norms. No estimates would be sanctioned unless the above quality requirements have been fully incorporated.

In PWD, estimates for road works are sanctioned by EEs, SEs and CEs depending on the financial value of the work proposed to be executed. Audit observed during the scrutiny of estimates in test-checked districts that the engineering authorities were disregarding the instructions of the Government. Details of quality tests and their numbers in respect of various items of works were not mentioned in any estimate during 2011-16. Thus, the orders of the Government regarding quality control at the stage of preparation and sanction of estimates were ignored.

10.1.2 Submission of test-samples to RI, QPC and district labs: Government instructions required that out of total test-samples, 25 per cent test samples would be sent to Research Development and Quality Promotion Cell (QPC) and Research Institute (RI) Lucknow. 25 per cent would be sent to Regional laboratory, Meerut. In regions where regional laboratories are not available, these 25 per cent test samples would also be sent to QPC and RI. Remaining 50 per cent test samples would be sent to district laboratories for testing.

In addition, SEs/EEs would also send two samples every month from all works being executed in their circles/divisions to QPC/RI.

Scrutiny of records in test-checked districts revealed that divisions were not sending the required 50 per cent (25 per cent for divisions located in Meerut region) test samples to QPC/RI during 2011-16. The number of test-samples sent to QPC/RI was less than even one per cent as discussed in paragraph 10.1.4.

Further, EEs/SEs also did not send test samples from two works being executed in the division/circle during 2011-16.

Scrutiny of records in test-checked districts pertaining to 2011-16 also revealed that divisions failed to follow the orders of the Government and did not send the mandatory 50 per cent test samples from the works being executed by divisions. Though district labs were established in every district of the State, these were not being utilised for testing regularly.

10.1.3 Monthly progress reports of test-samples not sent: Zonal Chief Engineers were required to send division-wise progress reports on test samples to E-in-C for review at E-in-C and Government level.

In contravention of Government order, divisions/circles/zones did not send monthly progress reports during 2011-16 of testing of samples to E-in-C/Government for review. In absence of these reports, it was not possible for the E-in-C and Government to review the position of testing of samples in the State and monitor the quality of road construction.

10.1.4 Quality testing of construction material: Quality testing of construction material is an essential requirement to ensure that the construction work is being executed as per prescribed quality standard/norms. Audit observed that in PWD there are two organisations namely Research Institute (RI) and Research Development and Quality Promotion Cell (QPC) entrusted with the same work and both are working independently.

Audit observed that the number of tests conducted by RI/QPC during 2011-16 was very few as given in the Table 10.1 below:

Table 10.1: Number of tests conducted by RI/QPC for road works

Sl. No.	Year	Number of samples tested	Number of divisions
1	2011-12	484	88
2	2012-13	838	116
3	2013-14	1,390	161
4	2014-15	981	133
5	2015-16	694	108
Total		4,387	606

(Source: Information furnished by Research Institute and Quality Promotion Cell, PWD)

As there are 178 divisions in the State dealing with road works, the information in the table above shows that 17 to 90 divisions had not submitted any sample to RI/QPC during last five years.

Further, the number of samples submitted to RI/QPC was also negligible. On an average, 7 samples were submitted to RI/QPC annually by each division. Audit however, observed that each division was concluding nearly 124 to 147 contracts per year costing ₹ 66 to ₹ 75 crore. For a work costing ₹ 40 lakh, 575 tests were required to be conducted as per IRC norms. Out of these tests, 287 tests were to be conducted by RI/QPC (except Meerut region). Similarly, for a work costing approximately ₹ 20 crore, more than 2675 tests were required to be conducted as per IRC norms. Out of this, 1333 tests were to be conducted by RI/QPC (except Meerut region). This implied that in almost all the road works no quality testing had been carried out.

In reply, Director, RI accepted (August 2016) that there was shortage in the number of samples sent from Zonal Chief Engineers. Further, it was seen that E-in-C was consistently instructing CEs for sending samples to RI/QPC which was not being followed/complied with.

10.1.5 Field laboratories not established by contractors: Every contract bond included the provision that the contractor shall establish field laboratory for carrying out mandatory tests as prescribed in the specification. The field laboratory will have equipment as specified in the Contract.

During test-check of records in selected divisions audit observed that the divisions did not ensure establishment of field laboratories for every work. Audit noticed that the minimum number of equipment and technical staff required for field laboratories was not indicated by the divisions in bid document. Audit also noticed that no test reports were enclosed with bills by the contractors. Test-registers of field laboratories were also not available in divisions except PD, Hapur. This indicated that no field labs were established by the contractors in violation of contract terms.

The divisions also released payments for test-checked 170 works of ₹ 3,031.91 crore to the contractors without insisting on the submission of test reports by the contractors.

10.1.6 Test-reports of field laboratories not sent to SE/CE: For ensuring quality of construction works, the Government instructed (August 2008) that registers of quality test-reports conducted in field laboratories should be preserved in divisions and copies of test-reports should be sent to SEs and CEs. This was also reiterated by Chief Engineers while issuing technical sanction to the detailed estimates.

Audit, however, observed during scrutiny of records of SEs/CEs that in violation of the Government order, divisions in test-checked districts did not send copies of quality tests conducted in field laboratories to SEs and CEs. Thus, SEs/CEs could not ensure that quality tests were conducted as per IRC provisions and that test-reports were satisfactory. Further, SEs and CEs also failed to ensure adherence to the Government order as they did not insist on the submission of such test reports by the divisions.

10.1.7 Payment of bills without test-reports: E-in-C directed (February 2011) that contractors would mandatorily enclose test-reports of samples with bills and until the test-reports are as per norms, payments should not be made.

During scrutiny of records in test-checked districts, audit observed that the divisions paid bills (₹ 3,031.91 crore) of contractors in all 170 test-checked works without quality test reports being submitted by the contractors. Hence, the orders of Engineer-in-Chief were disregarded by EEs which benefited the contractors. Further, use of substandard material and execution of poor quality work could not be ruled out.

10.1.8 Inspection of divisions by SEs: Paragraph 71 of FHB Vol. VI prescribed that Superintending Engineers would carry out inspection of all divisions in their jurisdiction every year to ensure that all required records/registers are being maintained and the divisions are following the instructions of the Government/E-in-C/higher officers, etc.

Scrutiny of records relating to inspection of divisions revealed that during 2011-16, Superintending Engineers did not carry out inspection of divisions under their jurisdiction annually. Out of 33 test-checked divisions, only one division (PD, Hapur) was inspected in November 2014 by SE, Bulandshahr Circle, Bulandshahr during 2011-16 and all other 32 divisions (97 per cent) were not inspected at all during 2011-16.

The only inspection carried out by SE, Bulandshahr (out of 33 test-checked divisions) during 2011-16, brought out significant lapses, malpractices and irregularities in the functioning of the division including failure in submission of quality test reports as discussed in the Case study 10.1 below.

Case study 10.1

SE, Bulandshahr Circle noted in his inspection report of PD, Hapur that (a) Important records like Work register, Works Abstract, Contractors Ledger, Road chart, Court cases register, Incumbency register, Payment register of bills, etc. were not maintained; (b) Register of extra-items, variation and time-extension cases sent for approval was not maintained; (c) Original CRCs, quality certificate of JE/AE/EE, quality test-reports, certificate of compliance of labour laws and Environment were not enclosed with bills for payment; (d) CBR Register was not maintained; (e) Agreement register was not maintained in prescribed format; (f) Condition of use of departmental machines was not included in schedule-C of contract bonds; (g) Supply of construction material was obtained through supply orders and not through contract bonds after tender; and (h) Construction of roads without conducting CBR test of soil after soaking of sub-grade for four days. EE, PD, Hapur agreed to ensure compliance of instructions of SE. However, it was noticed that compliance was not carried out as all the discrepancies pointed out by SE still (August 2016) persists.

The Government stated that provision to take action against the contractor for non-establishment of field lab already exists in the bidding document and further added that instructions are being issued to adhere to such provisions. In respect of non-submission of test samples it did not furnish specific reply and stated that system has been derived to review test reports at HQ level.

Recommendations:

- ***Performance bank guarantee of contractors, who do not establish field labs and submit requisite test reports, should be forfeited; and***
- ***Action should be taken against the divisional officers who failed to submit the test samples especially in large value projects.***

10.2 Functioning of Technical Audit Cell

For introducing an internal, concurrent and continuous administrative and technical audit of the State Public Works Department with a view to securing good quality in works, economy in expenditure and ensuring better technical and financial control of the works in PWD, the Government created (December 1958) the office of Chief Technical Examiner. Technical Audit Cell (TAC) was entrusted *inter-alia* with the responsibilities of inspection of works carried out by contractors, examination of a percentage of contract bonds, audit of a percentage of final bills after payment including quality of works at site etc.

Chief Technical Examiner was to prepare half yearly report showing the total number of bills checked and works inspected and amount of over-payments recovered from contractors and shall point out any serious errors or omissions on the part of executive staff.

Scrutiny of information furnished by TAC revealed following:

- No Annual Technical Audit Plan was prepared during 2011-16.
- No divisions were inspected during 2011-12 and 2012-13 while number of divisions inspected during 2013-14, 2014-15 and 2015-16 was 57, 83 and 81 respectively.
- TAC also did not submit any inspection report to Audit due to which the assessment of the technical examiner with regard to quality of works executed could not be verified.
- No half yearly report showing the total number of bills checked and works inspected and amount of over-payments recovered from contractors was prepared by TAC.
- Against the sanctioned strength of 29, only nine personnel were posted in TAC. Acute shortage of staff affected the performance of TAC adversely.

Thus, TAC failed to fulfill its responsibilities during 2011-16.

Government stated in reply (June 2017) that the observation has been noted for implementation.

Recommendation: Government should strengthen TAC for making it competent in discharging its responsibilities.

10.3 Irrational deployment of Manpower

In Public Works Department, Junior Engineers, Assistant Engineers and Executive Engineers are responsible for ensuring quality in works being executed by contractors under their jurisdiction. Superintending Engineers and Chief Engineers were entrusted responsibility of supervision of construction works being executed in their circles or zones. The engineers are also responsible for carrying out regular traffic census of roads, preparation of preliminary estimates, detailed estimates, finalisation of contract bonds, progress reports, measurement of executed works, preparation of bills, etc.

The position of workload and person-in-position in respect of engineering cadres in test-checked divisions is given in **Appendix 10.1**.

There were significant shortages in the cadre of Assistant Engineers (31 to 32 per cent) during 2013-16. Despite these shortages, audit noticed that there was irrational deployment of manpower in the divisions as discussed below:

- The number of JEs supervised by an AE varied significantly from three to nine in the test-checked divisions (**Appendix 10.1**). For example, against average available three posts of AE, 20 posts of JE were available in CD, Budaun while in CD-1, Basti against the average available four posts of AE, only 11 posts of JE were available. Further, in PD, Sambhal 17 posts of JE were available while number of average available posts of AE was five.

Thus, there was complete lack of systematic deployment of manpower in divisions which is bound to adversely impact the progress as well as quality of execution of work.

Government stated in reply (June 2017) that the observation has been noted for implementation.

Recommendation: Department should utilise the available manpower effectively and efficiently keeping in view the workload of the divisions.

10.4 Management Information System

A comprehensive management information system is essential for an organisation like PWD which deals with large number of small, medium and large projects spread all across the State involving huge amount of public funds. Smooth flow of information/data from divisions to apex level of E-in-C and department and vice versa would lead to speedy implementation of project, efficient utilisation of funds, better monitoring and closer technical supervision of works executed.

Scrutiny of records of EEs, SEs and CEs in test-checked districts and E-in-C office revealed that divisions/circles did not have an efficient MIS and therefore the system of information collection and consolidation was very slow, inefficient and this made it difficult for the department to provide some basic information called for by audit. Following deficiencies were noticed in this regard:

10.4.1 All details of contract bonds not available on website

With a view to make people aware of the amount of funds released for projects, details of specifications, completion schedule, names of contractors and for speedy disposal of complaints regarding execution and quality of construction works, the State Government ordered (November 2006) that important information relating to all construction projects costing more than ₹ one crore like name of project, month/year of sanction, allotment received, date of start and completion of work as per contract bond, name and address of contractor, technical specifications of work, etc., should be exhibited on departmental website 'upwd.up.nic.in'. It was also ordered that website of the department should be widely publicised. Further, EEs were made responsible for putting the required information on departmental website and concerned SEs/CEs were to ensure that these instructions were followed by EEs.

During test-check of records of E-in-C/EEs/SEs/CEs and departmental website, audit observed that the instructions of the Government were not followed by any EE and required information on construction works was not uploaded on departmental website during 2011-16. Further, concerned Superintending Engineers and Zonal Chief Engineers also failed to ensure that the instructions of the Government were followed.

10.5 Electronic database of contracts and contractors not maintained

The government ordered (December 2008) the maintenance of electronic database of all contracts and financial position of contractors at one place so that its verification and cross checking may be done by all departments and tenders executed easily.

Scrutiny of records, however, revealed that no such electronic database of all contracts and financial position of contractors was maintained by the department during 2011-16. Due to this, the divisions could not cross check the status of solvency certificates of contractors enclosed in other contract bonds. This resulted in contractors enclosing same solvency certificate in multiple contract bonds during same period as discussed in paragraph 7.3.1.4. This increased the risk of default by the contractors.

In reply, E-in-C accepted (August 2016) that no such database was available.

10.6 Lack of data on number of PEs

Scrutiny of records revealed that no formats were prescribed by the Government/E-in-C for sending of information relating to number of preliminary estimates sent to SE for onward submission to E-in-C/

Government for approval of road projects relating to construction of new roads, widening & strengthening of existing roads etc. Audit noticed that no documents were maintained at any level (EEs/SEs/CEs) in this regard. Thus, it was not possible to analyse the number of PEs sent to the Government for approval and number of PEs actually approved and rejected. It was also not known what proposals/estimates were sent to Government/higher authorities. Thus, failure to maintain proposals/PEs which were submitted by the divisions for road works and form basis for administrative approval and expenditure sanction by the higher authorities/Government, is fraught with the risk of lack of transparency and corruption.

10.7 Digitalisation of road data

Audit observed that data of division-wise length, width, crust thickness of granular and bituminous layers, PCU, CVPD, etc., of different category of roads was digitised (2015-16) and is available on the departmental website (uppwd.up.nic.in) known as *Srishti*. Divisions can update the data of their division by logging to the *Srishti*. Scrutiny of data uploaded on the website revealed that digitalisation process has not been completed as of June 2017. It was observed that six¹ types of reports were being generated. Out of these six reports, data for five reports was either incomplete or not available.

10.8 Computerisation of system not carried out

During test-check of records (March 2016) in E-in-C office, audit observed that Tata Consultancy Engineers had recommended (2002) the computerisation of the various functions of the department.

It was, however, noticed that the computerisation process was very slow. Out of six modules² being developed by the department, none of the modules were complete (August 2016) and functional. Thus, even after lapse of 14 years after the recommendation by Tata Consultancy Engineers, the work of computerisation was not complete which indicated that it was not given proper priority by the department.

Government stated (June 2017) that computerisation is under way. Budget and monitoring module, Complaint redressal module and Establishment module have already been put on trial and that other modules shall be prepared in due course of time.

Recommendation: Government should ensure early computerisation of all the important functions of the department for making the system transparent, efficient and fast.

¹ Division-wise Inventory report, Division & Km wise Inventory report, Division wise Condition report, Division & Km wise Condition report, Division wise Traffic report and Road & District wise report.

² Division-wise inventory Report Module, Division-wise and Kilometer-wise inventory Module, Division-wise condition Report, Division-wise Kilometer-wise condition Report, Division-wise Traffic Report and Road & District-wise Report.