CE's Circular No. 109

Sub: Technical/ Quality Audit of Track Renewal, Bridge and other works.

Ensuring proper quality of work at the stage of construction goes a long way in reducing the requirement of maintenance at the later stage. This holds good for all type of works, be it construction of a bridge, a building, laying of new track or renewal of existing track. Similarly, quality of maintenance works, for the aforesaid assets, have their important relevance.

It is the primary responsibility of all supervisors and officers to ensure that the works being supervised by them are done as per the laid down specifications and conform to the requisite quality standards. However, day-to-day routine works of divisional personnel leads to tendency to overlook certain short comings. A quality audit by technical personnel who are otherwise not involved in day to day execution is expected to facilitate further check and provide assistance in identifying and avoiding cases of shortcuts in procedure & non-confirmance of specifications. These inputs can be of great help in improving the quality of works under execution. It has, therefore been decided that a team of 2 Dy.CE's of Hd. Qr. are nominated for each division to act as a Quality Audit Cell of Headquarter, for that division. Each Dy.CE will carry out inspection of at least one work site of track work, bridgework and other works like building etc. every month on the nominated division.

The main aim of the inspection is to see whether at the site of work, extant instructions of planning and specifications are being complied with or not. Special attention may be given to the items enclosed in the checklists at Annexure A, B, C & D for respective type of works. The aspects given in the check lists and related ones shall need to be checked for being achieved appropriately through a proper procedure/ system laid down. The aforesaid being achieved in the course of work through contract and otherwise (without overlap of departmental & contract labour) shall need to be scrutinized in contract documents and their implementation at site. Contract provisions should include supervision level, minimum labour availability and rights of Railways in absence of aforesaid.

The report of the inspections carried out during the month shall be submitted to Principal Chief Engineer through respective THOD of the division by 5th of the following month.

A copy of the report shall also be sent to division for necessary action. The report shall clearly bring out the shortcomings observed as well as the recommendations and action plans for overcoming the shortcomings. The officers with divisions nominated to them are as under-

Ajmer Division - Dy.CE/Track, Dy.CE/TS/II
Bikaner Division - Dy.CE/TMC, Dy.CE/Gen.
Jaipur Division - Dy.CE/Br. Line, Dy.CE/TS/I
Jodhpur Division - Dy.CE/Br./P&D, Dy.CE/Plg.

These instructions are in super session of all earlier instructions in this regards.

DA- As above

(No. 493/1/Quality Audit dated 27.11.2007)

Principal Chief Engineer

CHECK LIST OF QUALITY AUDIT FOR TRACK RENEWAL WORKS (ON GOING TRACK RENEWAL SITES AS WELL AS RECENTLY COMPLETED TRACK RENEWAL SITES).

1. Whether the Project Report for track renewal works as per Para 3069 (a) Of IRPWM (2nd reprint, 2004) has been prepared or not?
2. Whether the following Registers are available, maintained and regularly updated at sites-
    (a) Site Order Register
    (b) Labour Register
    (c) Progress Register
    (d) Tools & Plants and Equipments, details register.
3. Whether aspects of the safety norms planned and achieved. Adequate stop board, speed indicator board etc. are available. Installation of protection board as per norms done. Knowledge of flagman, banner flagman etc. should be checked. Staff overdue for refresher course should be identified.
4. Whether pre-block planning details are available or not ?
5. Whether cess width is adequate ? (It should not be low or high to avoid rolling down of stones and drainage problems respectively).
6. Whether ballast is being provided as per profile. Locations of ballast deficiencies, ballast surplus & clean cushion of ballast should be commented upon.
7. Whether sleepers are laid square, spacing is adequate and broken sleepers are replaced promptly.
8. Whether deep screening has been done with CTR, TSR etc.
9. Whether distressing of LWR is done or not after CTR & TSR.
10. Laying of SEJs, behavior of LWR especially when deep screening has been done during hot weather conditions should also be commented upon.
11. Length and duration of cautions should be examined.
12. Whether adequate durations of welding blocks are taken. Whether grinding of the weld is done as per norms. Whether wooden block is provided underneath new A.T, weld. Whether USFD testing of new weld is being done in stipulated duration. Whether welder's name inlaid or not.
13. Check conditions of fittings- missing, broken, overdriven, under driven etc. Correct combination of fittings be used.
14. Quality of work planned & achieved. Gauge, cross levels, packing and longitudinal level should also be checked to ascertain quality of track laid.
15. Whether there is S.O.D. infringement during and after working at electrified and non-electrified section, at platforms etc.
16. Whether pegs are erected at 20 mtrs. interval to get the requisite longitudinal level ?
17. Proper accountal and disposal of released materials should be checked. Whether released materials correspond to the assessment done prior to commencement of renewal. Break-up of second hand & scrap is as per norms. Stacking and segregation done as per stipulation. Weight of scrap considered is as per actual. No material allowed to remain in block section.

CHECK LIST OF TUBEWELL BORING/DEVELOPMENT SITES, WATER SUPPLY INSTALLATIONS ETC. (WORKS COMPLETED AND ON GOING WORKS).

1.Whether Site Order Book is maintained and instructions given on Site Order Book are complied with, timely and promptly.

2. Whether Log Book for tubewell/development operations is maintained.

3. Following items should be checked-

(a) Quality of pipelines (class of pipes, thickness etc.)

(b) Quality of pea gravel

(c) Quality of water, turbidity, colour, odour etc.

(d) Yield of tubewell

4. Check should be offered to ascertain whether strata diagram is maintained. (Size of the tubewell is kept as 12" x8" and length of easing pipe is kept about 10 mtrs. below working water level.)

5. Whether capacity of pump installed is less than 80% of maximum yield to avoid sanding of tubewell.

6. Whether tubewell is sanding or not. (sedimentary particles are within the permissible limit).

7. Whether site of tubewell is kept at adequate distance from various features like-

(a) from other tubewells (greater than 150 mtrs.)

(b) from buildings (more than 15 mtrs.)

(c) from sewers (more than 30 mtrs.)

(d) from soak pits (more than 30 mtrs.)

8. Check should be offered to find out the duration between boring of tuebwell and its commissioning.

9. Checking of chlorinator materials- bleaching powder, liquid chlorine etc.

10. Chlorine of water should be checked (should be more than 5ppm at every taping point).

11. Tank Cleaning Register should be checked to ascertain whether tank cleaning is being done as per schedule i.e. regular cleaning by 45 days periodicity is being adhered to.

12. Whether the tank covers are being provided with locking arrangements.
13. At stations, it should be checked whether the taps are provided as per minimum essential amenities and no. of taps missing.
14. Tilting of tubewells should be checked. It should be within permissible limit.
15. Whether water supply installations are being checked by AEN once in three months.
16. Whether water supply capacity (tubewell with yields, storage tanks) is available with respect to demand as per laid down norms and whether demand for additional tubewells and storage justified.
17. Whether grid formations for water supply arrangements in colonies and station have been provided to avoid water crisis.
18. Check discharge of coach watering arrangement. Whether it is as per laid down circular.
19. Whether coach watering has been done from either side of platform and whether tank is available on either side.

CHECK LIST OF QUALITY AUDIT OF WORKS SITES.

1. Whether approved drawings (GA Plans, Dismantling Plan, Structural Drawings etc.) are available and works are being undertaken as per Drawings.
2. Whether following documents are available, maintained and instructions given on them are complied with timely and promptly by the designated officials and contractors-
   (a) Site Order Book
   (b) Labour Register
   (c) Brick Passing Register
   (d) Consumption Register
   (e) Cement Testing Register
   (f) Steel Register (reinforcement details etc.)
   (g) Steel Testing Certificates
   (h) Aggregate Register
   (i) Sieve Analysis Report
   (j) Wood work Passing Register
   (k) Detailed schemes of creation of work/ supporting arrangements.
3. Whether mobilization of competent and adequate number of skilled manpower has been done as per provisions in the Contract Agreement.
4. Whether site Engineer has been deployed as per provisions of contract.
5. Whether mobilization of tools & plants, equipments, setting of testing laboratories at site has been done by the contractors as per Contract Agreement. If not, the deficiencies should be enlisted.
6. Actual quality control testing being carried out during execution, its frequency, method of sampling, results of testing, competency of testing officials and maintenance of records.
7. Comments on following aspects of contract management-
   (a) Handing over of sites.
   (b) Progress of works & completion time.
   (c) Correspondence with contactor.
8. Special comments to be given separately about quality control covering following aspects along with remarks on quality being achieved :
   (a) Concrete mix design
   (b) Water/ cement ratio
   (c) Workability and compaction test results
   (d) Reinforcement details
9. Special comments on visual and sound testing of bricks utilized at site.
10. Mortar mix should be checked regarding cement/ sand ratio, water/ cement ratio etc.
11. Checking of steel used in columns, slabs etc. be done with structural drawings and commented upon.
12. Comments on cutting of RCC plaster, CC etc. should be given.
13. Quality checks on cement plaster with respect to plaster mix and thickness should be done and commented upon.
14. Quality of flooring with thickness should be commented upon.
15. Floor tiles, if used, should be checked for their quality visually and dimensionally.
16. Wood work should be checked for quality and workmanship. It should be free from knots and warpages.
17. Checks should be offered on steel section provided as grills, windows, chowkhats etc., preferably by dimensional measurement & weight.

Check list for Bridge Works

CHECK LIST FOR CONCRETE MIX CESIGN

S. No.	Particulars	Y/N	Remarks
1	Whether Concrete mix design is done as per IS: 10262		
2	Whether concrete mix design is approved by railway.		
3	Whether mix design is able to produce the grade of concrete having the require workability and a characteristic strength.		
4	Whether the target mean strength of the concrete mix is equal to the characteristic strength plus 1.65 times the standard deviation.		
5	Whether the total number of test strength of samples required to constitute as acceptable record for calculation of standard deviation is less than 30.		
6	Whether calculation of standard deviation is brought up to date after every change of mix design.		
7	Whether concrete of mix greater than M20 is used after concrete mix design.		
8	Whether minimum cement contents as per the values specified in concrete bridge code for defined type of exposure.		
9	Whether maximum water cement ratio is as per the concrete bridge code for the defined type of exposure.		
10	Whether grade of concrete mix design is as per the approved drawing.		

CHECK LIST FOR PAINTING

S. No.	Particulars	Y/N	Remarks
1	Whether existing primary coat has developed cracks, blistering, peeling or britlenoss.		
2	Whether sand/ grit blasting is employed is case primary coating has cracked.		
3	Whether surface is being washed with luke warm water containing one to two % detergent in case primary coat is intact.		
4	Whether surface is dried & lightly brushed before applying finished coat.		
5	Whether interval between painting & surface preparation is more than 4 hours.		
6	Whether red lead in linseed oil is used for priming coat.		
7	Whether painting has been carelessly applied & final brush marks are seen in wet film.		
8	Whether brushes are cleaned immediately after use with hot, soapy water.		
9	Whether painting is done in rainy season or when relative humidity is more than 80 present.		
10	Whether painting is being done in extremely windy and dusty conditions.		
11	Whether painting is done on areas which are directly exposed to sunlight.		
12	Whether surface preparation/ painting is done when ambient temperature is below 10 degree C or above 50 degree C.		
13	Whether painting is being done in early mornings in winter.		
14	Whether paint being used is as per the approved paint manufactures.		
15	Whether a little quantity of lamp black is added to the paint while doing the first coat with red oxide paint.		
16	Whether a little quantity of blue paint is added while doing the first coat with aluminium paint.		
17	Whether frequent stirring/ mixing is done in container while painting.		
18	Whether maximum time lag primary coat & first finishing coat exceeds 7 days.		
19	Whether maximum time lag 1st finishing coat & second finishing coat exceeds 7 days.		
20	Whether dry film thickness is measured with the help of 'ELCO' meter.		

CHECK LIST FOR JACKETTING

S. No.	Particulars	Y/N	Remarks
1	Whether jacketting is being carried out as per headquarter approved plan.		
2	Whether face of Masonry thoroughly cleaned free of all dirt.		
3	Whether net cement grout of 1:1 applied uniformly over the old masonry before laying new concrete.		
4	Whether old masonry joints racked up to a depth of 50 mm.		
5	Whether 20mm dia MS rods, hooked at the exposed ends are used.		
6	Whether holes are drilled in old masonry up to a minimum depth of 200mm.		
7	Whether drilled hole has been cleaned by flushing it with water & then filled with CM 1:1 slurry.		
8	Whether dowel bar is driven to full length inside the hole.		
9	Whether M20 concrete is being used as jacketting.		
10	Whether minimum thickness of jacketting is less than 50 mm.		
11	Whether minimum cover to reinforcement is less than 50 mm.		
12	Whether maximum size of aggregate used in concrete is more than 40 mm.		
13	Whether distribution reinforcement in the form of 10 mm dia bars, spaced at 200 mm horizontally and vertically, being provided.		
14	Whether cracks in the old masonry grouted before taking up jacketting work.		
15	Whether jacketting is taken right up to the foundation level & integrated with it.		
16	Whether 20 Kmph speed restriction has been imposed during the execution of the work.		
17	Whether a limited width of foundation (1m to 1.5m) is exposed at a time.		
18	Whether jacketting is done all round a pier.		
19	Whether proper curing of recently jacketted portion is being done.		
20	Whether concrete is mechanically vibrated after placement.		