East Coast Railway

Office of the
Principal Chief Engineer
Bhubaneswar

PCE Circular No. 03/2023

Sub: Setting up of Quality Monitoring Cell in HQ Engineering Deptt.

Several works related to track, RUB, LHS and other civil works are being executed by the Divisions over East Coast Railway. Although, these works are being duly supervised by respective supervisors and divisional officers, a need has been felt to exercise a Super Check on these works to ensure better quality and functional adequacy.

Therefore, it is proposed to set up a Quality Monitoring Cell in HQ. An officer of Open Line/Construction shall be nominated on monthly basis by PCE/CAO(Con) who with his team of supervisors will conduct inspections/super checks in different divisions in order to ensure quality of works. The supervisors shall be drawn from the divisions/other construction units, for the purpose for that much period. The respective Sr. DENs(Co)/DyCE(Con) should relieve the supervisory staff to assist the concerned officer during the inspection.

The important type of works and the items to be checked are mentioned below. However, this list is not exhaustive and can be further elaborated. For all works, the latest provisions of Codes, manuals, extant instructions, terms and conditions of contract agreement, approved drawings and specifications, approved list of manufacturers/suppliers and common prudence shall be the guiding factors for the inspecting officials.

The samples collected for verification of quality test reports should be sent by inspection officials to authorised laboratories i.e. Engineering Geolab in Division/HQ or any other laboratory mentioned in tender documents e.g. NABL accredited laboratories, Govt Engineering. Items that can also be tested in laboratory established at work site by contractual agency as per terms and conditions of the contract e.g. Gradation test for aggregate /sand/soil, field compaction test for earthwork, initial setting time/Final setting time of cement, Liquid limit/plastic limit and classification test for soil, concrete cube crushing test for RCC/PCC work etc may be done at site laboratory duly witnessed by inspecting officials.

Type of Works:

1) Civil Works
   (a) Building works
   (b) Platform extension/raising works
   (c) Platform shelter works
   (d) Facade improvement works
   (e) Improvement to circulating area and road works

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2) RUB/LHS Works
3) Minor Bridge/other bridge works like jacketing/grouting/river training works
4) Foot Over Bridge Works
5) Permanent Way --
   (a) Manual TRR/TSR/CTR/TTR/TFR works
   (b) Manual Deep Screening works
   (c) Formation treatment works
6) Earthwork in formation
7) Concrete work

General Items to be inspected during inspection of any works

(a) Whether all drawings necessary to execute the work i.e. General Arrangement Drawings, Structural Drawings, Drawings for plumbing, Drawings for drainage etc. and methodology for specific works if required, have been issued and approved by competent authority.
(b) Whether works are being executed strictly as per approved drawings and specifications.
(c) Whether all materials used in the work are from approved sources and are of approved quality/make.
(d) Whether the materials used in the work have passed the stipulated quality control tests and all relevant records are being maintained at site duly updated. Samples may be collected and sent to authorised Lab for testing.
(e) Whether concrete mix design report from authorised laboratory is available and whether field trial mix has been done using permitted admixtures to keep water-cement ratio minimum for desired strength and such mix design has been approved by concerned DEN/Sr. DEN. Whether periodic review of mix design is being done on change of source of material.
(f) Whether adequate curing is being done for masonry/plaster/flooring and concreting works as per norms.
(g) Whether cement and other materials have deteriorated due to overage/storage conditions.
(h) Whether the field officials are aware of terms and conditions of the contract and work is being executed strictly as per terms and conditions of contract agreement.
(i) Whether manufacturers' test reports for steel/cement and other materials as stipulated in contract documents/specifications are available and whether periodic tests are being done independently in authorised lab.
(j) Knowledge of field supervisors regarding specifications, methodology/procedure of work.

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Important items to be checked other than general items for various types of works

1) Civil Works

(a) Building works

(i) Levels of flooring and plumb of vertical walls should be checked and there should be no visible undulations in vertical/horizontal plane. The finishing of plasters and flooring should have smooth and pleasing look.

(ii) Plumbing works should be checked for leakage under test pressures. Records for such tests should be scrutinized.

(iii) Whether quality of fixtures/fittings used in works are approved by competent authority and records are being kept and whether they match with intended use of building.

(iv) Whether there is coordination between electrical and plumbing works and structural works of buildings. Whether all plumbing and electrical lines are concealed and not compromising on aesthetics of finished surfaces.

(v) Whether provision for electrical cables passing to various floors through separate duct is available.

(b) Platform raising/extension works

(i) Whether the platform wall/coping line and edges of chequered tiles are in alignment parallel to track.

(ii) Whether the edges/corners of coping/tiles are proper and not broken.

(iii) Whether there is any hollow sound from the tiles already laid.

(iv) Whether levels of coping/flooring are proper as per approved drawing and preferably without any slope towards track i.e., properly levelled or mild slope towards building with covered drain and separate covered trench for cables.

(v) Distance of platform wall from centre of the track and height of platform top with rail level are very crucial, since tolerances are very tight. Whether the above parameters are within stipulated tolerance. Whether the level/alignment of track were attended properly as per approved drawings prior to taking up work of platform raising/extension.

(vi) Whether platform edge alignment is in correct alignment and in parallel to track without any kinks and undulations.

(vii) Whether approved soil has been used in filling. Whether Test reports of soil and compaction achieved are available.

(viii) Whether benches and water pedestals are as per approved drawings and whether they are adequate and spaced uniformly along platform length.

(ix) Whether proper drainage is available for water from taps of water pedestals.

(x) Whether water pressure in taps is excessive/low/reasonable.

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(c) Platform Shelter works

(i) Whether structural steel, sheeting and fittings used in platform shelter is from approved supplier.

(ii) Whether quality of welding is satisfactory and as per specification i.e. butt weld/fillet weld/SAW/MIG plant welding are proper without undercuts or lack of fusion or cracks. Dye penetration test should be conducted if feasible.

(iii) Whether records of welders' competency certificate for given type of welding is available.

(iv) Whether sufficient inspections have been carried out in workshops of contractor.

(v) Whether fittings fixing sheets with purlins of roofing system are adequate and whether they are of approved make/quality.

(vi) Whether valley gutters are suitably jointed with each other and with rainwater pipes further connecting to drains to drain out storm water properly without leakage and spillage.

(vii) Whether technicians fixing sheets have competency certificate and whether work is being executed as per standard specifications/specified by manufacturer of sheeting, if any.

(viii) Whether wind ties are specified in drawing and whether they are provided.

(d) Facade improvement works

(i) Aesthetics are most important with regard to facade improvement works. Inspecting official should give remarks and suggestions, if any.

(ii) Whether architectural drawing& structural drawings are approved by competent authority and work is strictly executed as per approved drawings and specification.

(iii) Whether all lines and levels are strictly as per approved drawings.

(iv) Whether the materials used for works are of approved quality and leads to reasonable improvement in aesthetics of building as per current trend.

(v) Whether adequate drainage is provided using rain water pipe and whether such works are properly concealed so as to prevent spoiling aesthetics of the building facade.

(e) Improvement in circulating area and road works

(i) Whether drawings prepared by Architect and duly approved by competent authority are available and works are being executed strictly as per them.

(ii) Whether the levels of surface and inverts of drain are as per approved drawings.

(iii) Whether materials used in works are of approved quality and match with their intended use and extant practices.

(iv) Whether different layers of pavement have been provided as per specifications.

(v) Whether all test reports of pavement works, manufacturers' test reports and site test reports are available.

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2) ROB/LHS works

(i) Whether GAD and structural drawing including drainage works are available, duly approved by competent authority.
(ii) Whether the joints of pre-cast segments are properly sealed against water leakage.
(iii) Quality of finishing of concrete and flooring should be checked. There should not be any honey comb/shuttering works. If any repair has been carried out whether it is visible to the eye as patch works.
(iv) Quality control test records on cement, sand course aggregates, steel, PCC and RCC should be scrutinised and if required samples may be collected and sent for testing to authorised laboratories for verification.
(v) Whether extra widening has been provided on curves and gradient of road is appropriate.
(vi) Whether height gauges are as per approved drawings and clearance slightly less than clear height of boxes.
(vii) Whether fabrication and welding quality of height gauge are satisfactory.

3) Minor Bridge works and other Bridge works like river training works or jacketing/grouting etc.

(i) Whether approved detailed GAD, structural drawing and methodology duly approved by competent authority is available.
(ii) Whether invert level of bridge, top and bottom level of slab/top level of formation and other dimensions are as per approved drawing.
(iii) Whether methodology for grouting works are being followed strictly as per contract specification/manufacturer's specification.
(iv) Audit check and quality of concrete and grouting materials used should be done by sending the samples to authorised lab.
(v) Whether the water way is clear of obstructions and whether there is stagnation of water.
(vi) Whether the work is neatly finished and all debris properly disposed off.
(vii) Whether correct procedures for fixing of dowels for jacketing etc being followed.
(viii) Whether proper precautions, while excavating near foundation of bridges are being taken to prevent any risk of settlement of foundation of existing bridge.

4) Foot Over Bridge works

(i) Whether approved GAD/Structural drawings/electrical installation plan etc are available.
(ii) Whether the work is being executed strictly as per approved drawings/specifications and terms and conditions of the contract.
(iii) Whether the structural steel, reinforcement steel, cement, admixtures and paints are from approved sources and manufacturers' test reports are available. Whether periodic testing of these materials are being done at authorised lab.
(iv) Whether protection/safety screen as per approved drawings and specifications have been provided as required by Electrical TRD department.

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(v) Quality of finishing of flooring i.e., chequered tiles etc should be paid special attention and whether the joints are spoiling aesthetics and it should be checked whether water accumulates on flooring.

(vi) Whether rise and tread of steps are uniform and as per approved drawings.

(vii) Whether the covering sheets have been provided with adequate number of fixtures as per standard specifications/sheeting manufacturers' specifications (Self tapping and self drilling screws with EPDM gaskets or J hook bolts with bitumen gaskets etc. as stipulated) so as to prevent uprooting of sheets during heavy wind storms.

(viii) Whether wind ties have been prescribed and the same have been provided, if prescribed.

5) Permanent Way

(a) Manual TRR/TSR/CTR/TTR/TFR works

(i) Whether joint foot survey with contractors' supervisor has been done to work out the quantity of release materials.

(ii) Whether pre-work longitudinal levels with cushions are recorded along with proposed longitudinal levels and whether post work longitudinal levels are within tolerance from proposed levels.

(iii) Whether work is being executed under required speed restrictions/traffic block of adequate duration failing which quality of work may get compromised.

(iv) Whether all records of daily progress of works, labour deployed work site wise, traffic block details along with work executed during traffic block and without traffic block, Through packing register mentioning pre and post work track parameters etc are being maintained and kept updated.

(v) Whether adequate numbers of wooden blocks are available.

(vi) Whether railway supervisor is available at site.

(vii) Whether Competency Certificate has been issued by Railway in favour of Contractor's supervisor and such contractor's supervisor is available at site.

(viii) Whether the sleepers are square and their spacing are within prescribed tolerances.

(ix) Whether competency certificate is available for welders/supervisors involved with AT Welding and Flash Welding.

(x) Whether approved QAP is available for Flash Butt welding.

(xi) Whether records for tolerances of weld for alignment and grinding are available and whether weld tolerances for alignment and grinding checked by inspecting official at site match with corresponding weld tolerances recorded.

(xii) Whether post work clean ballast cushion matches with desired clean cushion.

(xiii) Whether finished track appears good with neatly dressed ballast and neatly cut/filled/dressed cess as per desired profile.

(xiv) Whether the released materials are stacked properly and disposed off as per norms duly segregating second hand and scrap.

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(b) Manual Deep Screening works

(i) Whether joint foot survey with contractors' supervisor have been done to work out the quantity of release materials.

(ii) Whether pre-work longitudinal levels with cushions are recorded along with proposed longitudinal levels and whether post work longitudinal levels are within tolerance from proposed levels.

(iii) Whether work is being executed under required speed restrictions/traffic block of adequate duration failing which quality of work may get compromised.

(iv) Whether all records of daily progress of works, labour deployed work site wise, traffic block details along with work executed during traffic block and without traffic block, through packing register mentioning pre and post work track parameters is being maintained and kept updated.

(v) Whether adequate numbers of wooden blocks are available.

(vi) Whether competent railway supervisor is available at site

(vii) Whether Competency Certificate has been issued by authorised Railway official in favour of Contractor's supervisor and such contractor's supervisor is available at site.

(viii) Whether the sleepers are square and their spacing, are within prescribed tolerances.

(ix) Whether post work clean ballast cushion matches with desired clean cushion.

(x) Whether finished track appears good with neatly dressed ballast and neatly cut/filled/dressed cess as per desired profile.

(xi) Whether screened muck is thrown away from the worksite especially in cutting so that they do not come back into the track side drains.

(c) Formation treatment works

(i) Whether approved methodology/drawings/sketches for executing work has been approved by competent authority.

(ii) Whether work is being executed strictly as per approved drawings/specifications and methodology.

(iii) Whether materials used are of approved quality and pass the desired tests. Sample of Materials used should be sent for testing in authorised laboratory for verification.

(iv) Whether thickness of layers of blanketing are within prescribed tolerance from prescribed thickness.

(v) Whether proper compaction keeping the thickness of layers as prescribed with sprinkling water on earth so as to keep moisture content of soil at OMC, has been done.

(vi) Whether records regarding gradation of soil mix and field density achieved are available. Sample of soil may be sent to authorised laboratory for verifying test results.

(vii) Whether all records of daily progress of works, labour deployed work site wise, traffic block details along with work executed during traffic block and without traffic block, through packing register mentioning pre and post work track parameters is being maintained and kept updated.

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(viii) Whether finished track appears good with neatly dressed ballast and neatly finished cess as per desired profile.

6) Earthwork in formation

(i) Whether earthwork being strictly carried out as per stipulated Guide lines for earthwork and blanketing issued by RDSO.

(ii) Whether side slopes of cuttings and banks are strictly as per specifications or as per section approved by competent authority.

(iii) Whether soil samples for earthwork in filling and blanketing have been tested in authorised laboratory before start of work and borrow pit has been identified/approved.

(iv) Whether soil being brought strictly from identified/approved borrow pits or quarries.

(v) Whether soil had been tested in authorised laboratory to work out Optimum Moisture Content and maximum dry density.

(vi) Whether soil compaction is done in layers of stipulated thickness with stipulated number of passes to achieve desired level of compaction.

(vii) Whether adequate numbers of samples are being tested for gradation, field density for earthwork and blanketing.

(viii) Whether test records are being maintained in standard format by field executives and they are within stipulated limits. Sample of soil/blanketing may be sent to authorised laboratory for verifying test results.

7) Concrete works

(i) Whether works are being executed strictly as per approved drawings and specifications.

(ii) Quality of finishing of concrete and flooring should be checked. There should not be any honey comb/shuttering works. If any repair has been carried out whether it is visible to the eye as patch works.

(iii) Quality control test records on cement, sand, course aggregates, steel, PCC and RCC should be scrutinised and if required, samples may be collected and sent for testing to authorised laboratories for verification. Whether the materials used in the work have passed the stipulated quality control tests and all relevant records are being maintained at site duly updated. Samples may be collected and sent to authorised Laboratory for testing.

(iv) Whether concrete mix design report from authorised laboratory is available and whether field trial mix has been done using permitted admixtures to keep water-cement ratio minimum for desired strength and such mix design has been approved by concerned DEN/Sr. DEN/DyCE(Con). Whether periodic review of mix design is being done on change of source of material.

(v) Whether due efforts have been made at Mix Design stage to optimise the cement content.

(vi) Whether adequate curing is being done as per norms.

(vii) Whether cement and admixtures have deteriorated due to overage/poor storage conditions.

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(viii) Whether reinforcement detailing and laying strictly matches with specifications and overlaps are adequate and adequate chairs/recast concrete covers are provided.

(ix) Whether form-work is proper, sturdy and leakage proof. Whether polythene is being used at junction of shuttering plates etc. to arrest leakage and whether proper oiling/lubrication of shuttering is being done to ensure no damage to concrete and ensuring ease of removal of forms after concreting and ensuring good finish of concrete surface.

(x) Whether compaction is ensured strictly using proper needle vibrators and technician's knowledge is adequate to prevent under compaction and/or bleeding.

This PCE Circular supersedes the CE Circular No.19 issued vide No.W4/374/Pt.I/CE Circular dtd 24.05.2005.

This issues with the approval of PCE/ECoR.

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Chief General Engineer

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