# *GUJARAT INDUSTRIES POWER COMPANY LIMITED*
# *(Surat Lignite Power Plant)*

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## *VOLUME – II*

## *GENERAL GUIDELINE FOR; FIELD QUALITY PLAN (FQP) & QUALITY ASSURANCE PLAN (QAP)*

## *"Surat Lignite Power Plant - 4 x 125 MW, Unit 1 to 4: Repair & Resurfacing of various bituminous roads of Power Plant and SLPP Colony (Year: 2026-27).*

## *Bid No.: SLPP/Civil/Repair BT Road /2026/*

## *((n)Procure new Tender Portal E-Tender Id: 367182)*

**This is General Guideline for Field Quality Plan (FQP) & Quality Assurance Plan (QAP).**

**Contractor has to submit Field Quality Plan (FQP) & Quality Assurance Plan (QAP) before commencement of work for GIPCL’s review & approval.**

## DOCUMENT CONTROL

| Particular | Details |
|---|---|
| Employer | Gujarat Industries Power Company Limited (GIPCL) |
| Plant / Location | Surat Lignite Power Plant (SLPP), Nani Naroli, Taluka Mangrol, District Surat, Gujarat |
| Work | Road Repairing, Improvement and Resurfacing Works |
| Document title | Field Quality Plan (FQP) and Quality Assurance Plan (QAP) |
| Document number | GIPCL/SLPP/CIVIL/FQP-QAP/____/2026 |
| Revision / Date | 00 / _____ |
| Prepared by | |
| Reviewed by | _____ |
| Approved by | _____ |

### REVISION HISTORY

| Rev. | Date | Description | Prepared / Reviewed / Approved |
|---|---|---|---|
| 00 | _____ | Initial issue for incorporation in tender | _____ |

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## 1. GENERAL AND SCOPE

1.1 This Field Quality Plan (FQP) and Quality Assurance Plan (QAP) defines the minimum inspection, testing, documentation and acceptance requirements for road repairing, improvement and resurfacing works at GIPCL-SLPP.

1.2 The plan covers the following major activities, as applicable to the BOQ and approved drawings: Wet Mix Macadam (WMM), prime coat, Dense Bituminous Macadam (DBM), tack coat, Bituminous Concrete (BC), Asphalt painting and hot-applied thermoplastic road markings with glass beads.

1.3 The Contractor shall be responsible for the quality of all materials, processes and completed works, irrespective of inspection, witnessing, testing or approval by GIPCL.

1.4 This document shall be read together with the tender, BOQ, approved drawings, approved method statements, applicable MoRTH specifications, relevant IRC publications and Indian Standards. In case of discrepancy, the order of precedence stated in the contract shall apply. Where a technical requirement is more stringent, the more stringent requirement shall govern, subject to written clarification by the Engineer-in-Charge.

1.5 The frequencies stated in this QAP are project-specific minimum control frequencies proposed for this work. They do not replace or dilute any mandatory frequency or acceptance requirement under the applicable MoRTH specification, IS, IRC or contract. The more stringent requirement shall prevail.

1.6 The Engineer-in-Charge (EIC) shall mean the GIPCL officer or authorised representative nominated for administration and inspection of the work.

## 2. APPLICABLE CODES AND SPECIFICATIONS

The latest editions, including amendments and corrigenda applicable on the date specified in the tender, shall be followed. The following references are relevant to the listed work items:

| Work / Subject | Reference |
|---|---|
| WMM | MoRTH Specifications for Road and Bridge Works – Clause 406 and applicable provisions of Section 400 |
| General requirements for bituminous works | MoRTH Clause 501 and applicable provisions of Section 500 |
| Prime coat | MoRTH Clause 502 |
| Tack coat | MoRTH Clause 503 |
| DBM | MoRTH Clause 505 |
| Bituminous Concrete | MoRTH Clause 507 |
| Quality control and acceptance | MoRTH Section 900, particularly applicable provisions of Clauses 901–903 and relevant tables |
| Paving bitumen | IS 73 – Paving Bitumen (VG-30) |
| Soil / density tests | Relevant parts of IS 2720 |
| Aggregate tests | Relevant parts of IS 2386 |
| Bitumen emulsion | IS 8887 and applicable MoRTH requirements, as relevant to the specified emulsion grade |
| Thermoplastic road marking | MoRTH Clause 803; applicable current edition of IS 164 |
| Road marking layout / practice | IRC:35 – Code of Practice for Road Markings |

Note: The Contractor shall verify and comply with all subsequent MoRTH circulars, amendments and corrigenda applicable to the work. Any specific grading, layer thickness, binder content, emulsion grade, application rate or marking thickness shall be as stated in the BOQ, approved drawings and approved mix design; it shall not be inferred solely from this QAP.

## 3. GENERAL QUALITY REQUIREMENTS

- Before commencement, the Contractor shall submit the detailed work methodology, material source details, manufacturer's certificates, proposed laboratory details, calibration certificates, mix designs / JMFs and activity-wise inspection requests for approval.
- Separate Job Mix Formulas shall be submitted and approved for DBM and BC. The JMF shall correspond to the specified grading, layer, aggregate sources and VG-30 binder.
- VG-30 paving bitumen shall conform to IS 73 and the applicable MoRTH requirements. Each supply lot shall be identifiable by manufacturer, batch / lot number, quantity and delivery date.
- Prime coat and tack coat are distinct operations. The Contractor shall use the emulsion / primer grade and application rate specified in the BOQ and applicable MoRTH clauses. One common application rate shall not be assumed for both coats.
- All materials shall be sourced from approved sources. Any change in source, grade, mix composition or material characteristics shall be notified and shall require approval and additional testing as directed by the EIC.
- All equipment used for production, laying, spraying, compaction and testing shall be suitable, maintained and calibrated. Calibration certificates shall be produced when required.
- The Contractor shall give advance notice for Hold Points and Witness Points as specified in Annexure I. Work shall not be covered by a subsequent layer before the preceding layer is inspected and accepted.
- Samples shall be identified with date, location, chainage, material / batch, layer and test reference. Sampling shall be carried out in the presence of the EIC or authorised representative wherever directed.
- Routine quality-control tests, sampling, handling, transportation and testing required under this QAP shall be included in the Contractor's quoted rates unless the BOQ / contract expressly provides otherwise.
- Any work or material failing the specified acceptance criteria shall be treated as non-conforming and shall be rectified, removed or replaced at the Contractor's cost, subject to the contract.
- Test reports shall be submitted promptly and linked to the relevant road stretch, chainage, quantity and running account bill. Test records shall be maintained in an orderly register.
- GIPCL may conduct independent or third-party testing through a NABL accredited laboratory approved by GIPCL. Such testing shall not relieve the Contractor of responsibility for quality.

# ANNEXURE – I

# FIELD QUALITY PLAN (FQP)

## I-A. General inspection and quality-control procedure

| Sr. | Activity / inspection | Inspection requirement | Responsibility | Stage |
|---|---|---|---|---|
| 1 | Material source approval | Submit source details, technical particulars and test certificates | Contractor / GIPCL | Before procurement / use |
| 2 | Aggregate approval | Test reports for grading, abrasion, impact, flakiness / elongation and other specified properties | Contractor / GIPCL | Before use |
| 3 | Bitumen approval | VG-30 grade, IS 73 conformity, manufacturer's certificate and lot details | Contractor / GIPCL | Before use |
| 4 | Emulsion / primer approval | Grade, manufacturer's certificate and conformity to BOQ / specification | Contractor / GIPCL | Before use |
| 5 | Mix design approval | WMM material combination and separate DBM / BC JMFs | Contractor / GIPCL | Before commencement |
| 6 | Plant and equipment inspection | Hot mix plant, paver, rollers, distributor, thermometers and weighing systems | Contractor / GIPCL | Before commencement |
| 7 | Calibration | Calibration / verification of weighing, temperature and measuring equipment | Contractor | Before commencement and periodically |
| 8 | Existing pavement preparation | Removal of defective material, cutting, cleaning and preparation | Contractor / GIPCL | Before next operation |
| 9 | Layer-wise inspection | Inspect and test each completed layer | Contractor / GIPCL | Before subsequent layer |
| 10 | Final inspection | Levels, crossfall, surface finish, drainage and road markings | Contractor / GIPCL | Before final acceptance |
| 11 | Quality records | Maintain test results, inspection requests, batch records and approvals | Contractor | Throughout contract |

## I-B. Stage-wise inspection and approval matrix

| Sr. | Construction stage | Inspection / approval requirement | Class |
|---|---|---|---|
| 1 | Material sources and mix designs | Approval of sources, materials and JMFs | H |
| 2 | Existing road preparation | Inspect cutting, removal of failed pavement and surface preparation | H |
| 3 | WMM laying | Check grading, moisture, layer thickness, levels and compaction | W |
| 4 | WMM completed layer | Verify density, thickness, levels, crossfall and surface condition | H |
| 5 | Prime coat | Check surface preparation, material and application rate | W |
| 6 | DBM production | Check JMF, aggregate grading, binder content and temperatures | W |
| 7 | DBM laying and compaction | Check tack coat where specified, binder content,temperature, thickness and rolling | W |
| 8 | DBM completed layer | Verify density, thickness, levels and surface regularity | H |
| 9 | Tack coat | Check surface cleanliness, emulsion and application rate | W |
| 10 | BC production | Check JMF, aggregate grading, binder content and temperatures | W |
| 11 | BC laying and compaction | Check laying temperature, binder content, thickness, rolling and joints | W |
| 12 | BC completed layer | Verify density, thickness, levels and surface regularity | H |

| Sr. | Construction stage | Inspection / approval requirement | Class |
|---|---|---|---|
| 13 | Asphalt Painting on top surface of road | Manufacturer's test certificate, grade, batch number and relevant test reports. Temperature, Bitumen application rate verification, application workmanship | |
| 14 | Thermoplastic marking | Approve material, layout and trial / application workmanship | W |
| 15 | Final road inspection | Inspect finished surface, drainage, markings and removal of debris | H |

H = Hold Point; W = Witness Point.

Hold Point: The Contractor shall not proceed with the subsequent activity or cover the inspected work without inspection and written clearance of the EIC. Witness Point: The Contractor shall notify the EIC sufficiently in advance. If the EIC does not attend within the period stipulated in the contract after proper notice, the activity may proceed only in accordance with the contract's inspection procedure, with records retained for verification.

### I-C. Construction-specific inspection records

| Activity | Key inspection parameters | Records |
|---|---|---|
| WMM | Aggregate grading, moisture, layer thickness, compaction, levels and crossfall | Aggregate reports, MDD/OMC, moisture and field density reports |
| Prime coat | Surface condition, primer / emulsion grade, application rate, uniformity and curing | Batch certificate, distributor calibration and application-rate record |
| DBM | JMF, VG-30, aggregate grading, binder content, temperatures, density, thickness and joints | JMF, plant production records, temperature log |
| Tack coat | Emulsion grade, surface cleanliness, application rate, uniformity and setting | Batch certificate, distributor calibration and application-rate record |
| BC | JMF, VG-30, aggregate grading, binder content, temperatures, density, thickness and finish | JMF, plant production records, temperature log |
| Asphalt painting | Manufacturer's test certificate, grade, batch number and relevant test reports. Temperature, Bitumen application rate verification, application workmanship | Batch certificate, temperature log and other field inspection records. |
| Thermoplastic marking | Material quality, layout, width, thickness, glass beads, adhesion and retro-reflectivity | Manufacturer's certificate, batch details and field inspection report. |

# ANNEXURE – II

## QUALITY ASSURANCE PLAN (QAP) – MATERIALS AND TESTING

### II-A. Wet Mix Macadam (WMM)

Applicable specification: MoRTH Clause 406 and applicable provisions of Section 400. Aggregate grading shall be as specified in the BOQ / approved drawings and the applicable MoRTH table.

| Sr. | Test / inspection | Acceptance requirement | Minimum project frequency |
|---|---|---|---|
| 1 | Aggregate grading | Conform to specified MoRTH grading and approved source | One test per source and thereafter 1 per 500 m³ |
| 2 | Los Angeles abrasion | Within limit prescribed by Clause 406 for the specified layer | One per source and thereafter 1 per 2,000 m³ |
| 3 | Aggregate impact value | Within limit prescribed by Clause 406 | One per source and thereafter 1 per 2,000 m³ |
| 4 | Combined flakiness and elongation index | Maximum 35%, subject to applicable clause | One per source and thereafter 1 per 2,000 m³ |
| 5 | Water absorption | Within Clause 406 requirement | One per source |
| 6 | Atterberg limits of fraction passing 0.425 mm sieve | Within Clause 406 requirement | One per source / material change |
| 7 | Modified Proctor (MDD and OMC) | Establish approved MDD and OMC for material combination | One for each approved material combination and whenever changed |
| 8 | Moisture content during laying | Within permitted range around approved OMC | At least 1 per 250 m² per layer per shift |

### II-A-1. WMM field inspection and testing

| Sr. | Test / inspection | Acceptance criteria | Minimum frequency |
|---|---|---|---|
| 1 | Compacted layer thickness | As per BOQ / approved drawing and MoRTH | One measurement per 250 m² |
| 2 | Field density | Minimum 98% of MDD, where required by applicable Clause 406 | One test per 250 m² or part thereof |
| 3 | Crossfall / camber | As per approved road profile | At 30 m intervals and at profile changes |
| 4 | Surface regularity | As per applicable MoRTH provisions; no loose pockets, segregation or undue undulations | Continuous visual inspection and straightedge checks |
| 5 | Surface level | As per approved design / existing road profile tie-in | At 30 m intervals and at profile changes |

- WMM shall be produced by mechanical mixing with controlled water addition and shall be laid and compacted in accordance with Clause 406.
- Compacted layer thickness and number of layers shall comply with MoRTH and the approved construction methodology.
- The finished surface shall be free from segregation, loose pockets, rutting, undulations and inadequate drainage.
- No prime coat or subsequent pavement layer shall be applied until the WMM layer has been inspected and accepted.

## II-B. Dense Bituminous Macadam (DBM)

Applicable specification: MoRTH Clauses 501 and 505. Binder: VG-30 paving bitumen conforming to IS 73 and applicable MoRTH requirements. DBM grading and compacted thickness shall be as specified in the BOQ / approved drawings.

### II-B-1. Material quality testing

| Sr. | Test | Acceptance criteria | Minimum frequency |
|---|---|---|---|
| 1 | Coarse aggregate grading | Conform to specified DBM grading and approved source | One per source and thereafter 1 per 500 m³ |
| 2 | Los Angeles abrasion | As per Clause 505 | One per source |
| 3 | Aggregate impact value | As per Clause 505 | One per source |
| 4 | Combined flakiness and elongation index | As per Clause 505 | One per source |
| 5 | Water absorption | As per Clause 505 | One per source |
| 6 | Soundness | As per Clause 505, where applicable | One per source / as specified |
| 7 | VG-30 bitumen properties | Conform to IS 73 and applicable MoRTH requirements | Each supply lot / batch; independent verification as directed by EIC through NABL accredited lab |
| 8 | Mineral filler | Conform to applicable MoRTH requirements | One per source |
| 9 | Stripping / adhesion | Conform to applicable MoRTH requirements | Initial approval and whenever aggregate source changes |

### II-B-2. Job Mix Formula (JMF)

The Contractor shall submit a DBM JMF prepared by a competent NABL accredited laboratory as directed by EIC and based on the actual approved aggregate sources and VG-30 binder. The JMF shall include:

- Source and grading of coarse aggregates, fine aggregates and mineral filler.
- VG-30 bitumen source, grade and test certificate from manufacturer. And third party lab test report.
- Combined aggregate gradation and individual component proportions.
- Optimum bitumen content and the basis of mix design.
- Marshall stability, flow, air voids, VMA and VFB, as applicable to the specified DBM mix.
- Bulk specific gravity and theoretical maximum specific gravity.
- Recommended mixing, transportation, laying and compaction temperature ranges.
- JMF tolerances and the specified DBM grading / layer thickness.

The JMF shall satisfy all requirements of MoRTH Clause 505 for the selected DBM grading. Production shall not commence until the JMF is approved in writing by the EIC.

### II-B-3. Production and field testing

| Sr. | Test / inspection | Acceptance criteria | Minimum project frequency |
|---|---|---|---|
| 1 | Extracted aggregate gradation | Within approved JMF and applicable MoRTH tolerances | 1 per 200 tonnes or part thereof |
| 2 | Bitumen content | Within approved JMF and applicable MoRTH tolerances | 1 per 200 tonnes or part thereof |
| 3 | Marshall stability / flow and volumetric properties | Conform to Clause 505 and approved JMF | One set per 400 tonnes or part thereof |
| 4 | Bulk specific gravity / mix density | Conform to approved JMF and applicable specification | One set per 400 tonnes |
| 5 | Mix temperature at plant | Within approved JMF / VG-30 production temperature range | At least once per 50 tonnes and whenever conditions change |
| 6 | Mix temperature at site / before laying | Within approved laying temperature range | Each truck / load |
| 7 | Binder content | As per technical specification and approved JMF. | Each truck/load with the help of bitumen extraction test at field using appropriate apparatus. |
| 8 | Compaction temperature | Within approved rolling temperature window | At commencement and periodically during rolling |

## II-C. Bituminous Concrete (BC)

Applicable specification: MoRTH Clauses 501 and 507. Binder: VG-30 paving bitumen conforming to IS 73. BC grading and compacted thickness shall be as specified in the BOQ / approved drawings.

### II-C-1. Material testing

| Sr. | Test | Acceptance criteria | Minimum frequency |
|---|---|---|---|
| 1 | Coarse aggregate grading | As per specified BC grading and approved source | One per source |
| 2 | Los Angeles abrasion | As per Clause 507 | One per source |
| 3 | Aggregate impact value | As per Clause 507 | One per source |
| 4 | Combined flakiness and elongation index | As per Clause 507 | One per source |
| 5 | Water absorption | As per Clause 507 | One per source |
| 6 | Fine aggregate grading | As per approved JMF / MoRTH | One per source |
| 7 | Mineral filler | As per applicable MoRTH requirements | One per source |
| 8 | VG-30 bitumen properties | Conform to IS 73 and applicable MoRTH requirements | Each supply lot / batch ,independent verification as directed by EIC through NABL accredited lab |
| 9 | Stripping / adhesion | As per applicable MoRTH requirements | Initial approval and whenever source changes |

### II-C-2. BC Job Mix Formula

A separate BC JMF shall be submitted and approved. It shall include aggregate proportions and gradation, VG-30 binder content, optimum binder content, Marshall properties, volumetric properties, specific gravities, and recommended production / laying / compaction temperature ranges. The JMF shall comply with the selected BC grading and MoRTH Clause 507.

### II-C-3. Production and field testing

| Sr. | Test / inspection | Acceptance criteria | Minimum project frequency |
|---|---|---|---|
| 1 | Extracted aggregate gradation | Within approved JMF and applicable MoRTH tolerances | 1 per 200 tonnes or part thereof |
| 2 | Bitumen content | Within approved JMF and applicable MoRTH tolerances | 1 per 200 tonnes or part thereof |
| 3 | Marshall stability / flow and volumetric properties | Conform to Clause 507 and approved JMF | One set per 400 tonnes or part thereof |
| 4 | Bulk specific gravity / mix density | Conform to approved JMF and applicable specification | One set per 400 tonnes |
| 5 | Mix temperature at plant | Within approved JMF / VG-30 production temperature range | At least once per 50 tonnes and whenever conditions change |
| 6 | Mix temperature at site / before laying | Within approved laying temperature range | Each truck / load |
| 7 | Binder content | As per technical specification and approved JMF. | Each truck/load with the help of bitumen extraction test at field using appropriate apparatus. |
| 8 | Compaction temperature | Within approved rolling temperature window | At commencement and periodically during rolling |

Note: DBM and BC shall have separate JMFs and separate production / test records. BC shall not be accepted solely on the basis of DBM test results.

## II-D. Prime Coat

Applicable specification: MoRTH Clause 502. Material shall be the approved primer / bituminous emulsion specifically specified in the BOQ and permitted by the applicable specification.

| Sr. | Test / inspection | Acceptance criteria | Minimum frequency |
|---|---|---|---|
| 1 | Primer / emulsion grade | As specified in BOQ and Clause 502 | Each supply lot / batch |
| 2 | Manufacturer's test certificate | Conformity to specified material grade | Each batch |
| 3 | Surface preparation | Clean and free from dust, loose material and deleterious matter; condition as required by Clause 502 | Each stretch before application |
| 4 | Application rate | As specified in BOQ / Clause 502 for the receiving surface | One test per 500 m², minimum one per working day |
| 5 | Uniformity of spray | Uniform coverage without streaks, misses or excessive accumulation | Continuous visual inspection |
| 6 | Protection | Protect from traffic / contamination until permitted by EIC | Continuous |

- Apply prime coat using a suitable calibrated mechanical distributor.
- Verify actual application rate by a suitable tray / plate method or another approved quantitative method. Record the area covered and quantity applied.
- Allow the prime coat to penetrate and cure in accordance with Clause 502 and the approved material requirements before placing the next layer.
- Rectify missed areas, streaks or excessive accumulation before proceeding.

## II-E. Tack Coat

Applicable specification: MoRTH Clause 503. Use the bitumen emulsion grade specified in the BOQ and suitable for the receiving surface. The grade may be RS-1 or another specified grade, subject to the applicable MoRTH requirements.

| Sr. | Test / inspection | Acceptance criteria | Minimum frequency |
|---|---|---|---|
| 1 | Emulsion grade | As specified in BOQ and Clause 503 | Each supply lot / batch |
| 2 | Manufacturer's test certificate | Conformity to specified emulsion grade | Each batch |
| 3 | Surface cleanliness | Free from dust, loose material and foreign matter | Each stretch before application |
| 4 | Surface condition | Suitable for tack coat application as per Clause 503 | Before application |
| 5 | Application rate | As specified in BOQ / Clause 503 for the type and condition of receiving surface | One test per 500 m², minimum one per working day |
| 6 | Spray uniformity | Uniform and continuous coverage without streaks or excessive accumulation | Continuous visual inspection |
| 7 | Breaking / setting | As required before laying the subsequent bituminous layer | Each stretch |
| 8 | Protection | Prevent contamination / damage before overlay | Continuous |

- Clean the receiving surface using mechanical means / air compressor as appropriate.
- Apply tack coat uniformly using a calibrated mechanical distributor.
- Verify application rate by tray / plate test or other approved quantitative method and maintain records.
- Allow the emulsion to break / set as required before laying the next layer.
- Do not permit excessive application that may cause bleeding, slippage or other defects.

Prime coat and tack coat shall not be treated as interchangeable. Their material grade, receiving surface, application rate and curing / setting requirements shall be separately specified and recorded.

## II-F. Asphalt Painting

Applicable specification**:** As per the approved BOQ description and method of application approved by the Engineer-in-Charge (EIC). This activity involves application of heated paving bitumen followed by spreading of approved sand/aggregate/dust. It shall be treated separately from the RS-1 emulsion tack coat specified under DBM, BC and bituminous base-course items.

| Sr. | Test / inspection | Acceptance criteria | Minimum frequency |
|---|---|---|---|
| 1 | Bitumen grade | As specified in BOQ, i.e. 60/70 penetration grade / VG-30, subject to confirmation of the approved grade by EIC | Each supply lot / batch |
| 2 | Manufacturer's / supplier's test certificate | Conformity to approved bitumen grade and applicable specification | Each supply lot / batch |
| 3 | Third party NABL accredited lab certificate | Conformity to approved bitumen grade and applicable specification | Each supply lot / batch |
| 4 | Sand / aggregate / dust quality | Approved material, clean, dry and free from clay, organic matter and other harmful impurities | Each supply lot / source |
| 5 | Surface cleanliness | Road surface free from dust, loose material, dirt, debris and foreign matter; cleaning by brush / air compressor | Each stretch before application |
| 6 | Surface condition | Surface shall be dry and suitable for application; no standing water or unsuitable weather conditions | Before application |
| 7 | Heating of bitumen | Uniform heating within the permissible temperature range of the approved bitumen grade / applicable specification; no overheating or burning | Each heating batch / continuous monitoring |
| 8 | Application rate of bitumen | **5.00 kg per 10 m²**, as specified in BOQ | One verification per 500 m², minimum one per working day |
| 9 | Uniformity of bitumen application | Uniform and continuous application without streaks, untreated patches or excessive accumulation | Continuous visual inspection |
| 10 | Quantity of sand / aggregate / dust | **0.03 m³ per 10 m²**, as specified in BOQ | One verification per 500 m², minimum one per working day |
| 11 | Spreading of sand / aggregate / dust | Uniform spreading over the treated surface without excessive accumulation or uncovered bituminous patches | Each application stretch |
| 12 | Finished surface | Uniform appearance, proper coverage and no excessive binder accumulation, loose heaps or untreated patches | Each completed stretch |
| 13 | Protection / opening to traffic | Prevent damage and contamination; remove loose material and allow the treatment to set adequately before opening to traffic, as directed by EIC | Each completed stretch |

**Notes:**

1. The bitumen application rate and sand/aggregate/dust quantity shall be verified by recording actual consumption against the measured treated area.
2. Bitumen shall be applied using a suitable heated bitumen tanker with calibrated mechanical sprayer, as specified in the BOQ.
3. The BOQ mentions both 60/70 penetration grade and VG-30 viscosity grade. Since these are different grading systems, the final approved grade shall be confirmed by GIPCL before commencement.
4. This activity shall not be considered interchangeable with the RS-1 emulsion tack coat under MoRTH Clause 503.

## II-G. Hot-applied thermoplastic road marking

Applicable specification: MoRTH Clause 803, IRC:35 and applicable current edition of IS 164. Material colour, marking pattern, line width, thickness and glass bead requirements shall be as specified in the BOQ / approved road marking layout.

| Sr. | Test / inspection | Acceptance criteria | Minimum frequency |
|---|---|---|---|
| 1 | Manufacturer / make and batch identification | Approved manufacturer; traceable batch / lot | Each supply |
| 2 | Material conformity certificate | Conform to applicable IS / MoRTH requirements | Each batch / lot |
| 3 | Colour | White / yellow or other colour as specified; uniform appearance | Each batch and each stretch |
| 4 | Softening point | As per applicable IS / material specification | Each batch / lot or certificate plus verification as directed |
| 5 | Specific gravity | As per applicable IS / material specification | Each batch / lot or certificate plus verification as directed |
| 6 | Flow resistance / other specified properties | As per applicable IS / material specification | Each batch / lot or certificate plus verification as directed |

| Sr. | Test / inspection | Acceptance criteria | Minimum frequency |
|---|---|---|---|
| 7 | Glass bead conformity | As per Clause 803 / specified material requirements | Each supply lot |
| 8 | Surface preparation | Clean, dry and free from loose dust, oil and contaminants | Each stretch |
| 9 | Marking layout | As per approved drawing / IRC:35 | Before application |
| 10 | Line width / dimensions | As per BOQ and approved layout | One check per 100 m and at changes |
| 11 | Dry film thickness | As specified in BOQ / Clause 803; measure excluding surface-applied beads where applicable | One check per 500 m² or each marking lot, as applicable |
| 12 | Glass bead distribution | Uniform and as specified | Continuous inspection |
| 13 | Adhesion / bonding | No peeling, lifting or premature detachment | Visual inspection of each stretch |
| 14 | Retro-reflectivity | Meet specified requirement, if included in BOQ / contract | Initial verification and random checks |
| 15 | Alignment / finish | Straight, uniform, clean edges and no unacceptable gaps | Continuous inspection |

Where the BOQ specifies 2.5 mm nominal thermoplastic thickness, the measurement shall be interpreted in accordance with the applicable specification and shall exclude surface-applied glass beads where required. The thickness shall not be assumed from this QAP if the BOQ specifies a different value.

The Contractor shall submit the manufacturer's test certificate, batch identification and glass bead details before application. A trial marking / sample area may be required for approval by the EIC.

**Note:** The testing frequencies indicated in this FQP are the minimum indicative requirements for quality control and shall not be construed as exhaustive or restrictive. GIPCL / Engineer-in-Charge shall have the discretion to modify, enhance or prescribe additional tests and inspections, including their frequency, based on the nature and extent of work, site conditions, quality of materials, workmanship, test results, prevailing circumstances and availability of resources, as considered necessary in the interest of quality and project requirements. All testing and acceptance shall, however, comply with the applicable MoRTH specifications, relevant codes and contractual provisions.

# ANNEXURE – III

## QUALITY CONTROL AND INSPECTION RECORD FORMATS

The Contractor shall maintain the following formats or equivalent approved electronic records.

### III-A. Material approval register

| Sr. | Material | Manufacturer / source | Grade / specification | Test certificate no. | Date received | Approval status / remarks |
|---|---|---|---|---|---|---|
| 1 | Coarse aggregate | | | | | |
| 2 | Fine aggregate | | | | | |
| 3 | Mineral filler | | | | | |
| 4 | VG-30 bitumen | | | | | |
| 5 | Prime coat material | | | | | |
| 6 | Tack coat emulsion | | | | | |
| 7 | Thermoplastic material | | | | | |
| 8 | Glass beads | | | | | |

### III-B. Daily bituminous work inspection report

| Particulars | Details |
|---|---|
| Date / shift | |
| Road name / location / chainage from–to | |
| Layer | DBM / BC |
| Approved JMF reference / revision | |
| Binder grade | VG-30 |
| Mix quantity (MT) / truck details | |
| Plant temperature (°C) | |
| Temperature at site / before laying (°C) | |
| Temperature during compaction (°C) | |

| Particulars | Details |
|---|---|
| Weather / surface condition | |
| Paver / roller details and rolling pattern | |
| Layer thickness / width | |
| Core sample IDs / density / thickness results | |
| Test report references | |
| Inspection remarks / corrective action | |
| Acceptance status / EIC remarks | |

## III-C. WMM inspection report

| Particulars | Details |
|---|---|
| Date / road / chainage | |
| Layer / lot identification | |
| Aggregate source / approved grading | |
| Moisture content (%) | |
| OMC (%) / MDD (g/cc) | |
| Field density (g/cc) / percentage compaction | |
| Layer thickness (mm) | |
| Crossfall / level | |
| Surface regularity / visual condition | |
| Test report references | |
| Inspection remarks / acceptance status | |

## III-D. Prime coat / tack coat / Asphalt painting application report

| Particulars | Details |
|---|---|
| Date / road / chainage | |
| Type of coat | Prime / Tack |
| Manufacturer / emulsion grade / batch number | |
| Receiving surface type and condition | |
| Area covered (m²) | |
| Quantity consumed (kg / litre) | |
| Specified application rate | |
| Actual application rate (unit to be stated) | |
| Tray / plate test reference | |
| Distributor calibration reference | |
| Uniformity / setting / curing observations | |
| Inspection remarks / EIC approval | |

## III-E. Thermoplastic road marking inspection report

| Particulars | Details |
|---|---|
| Date / road / chainage | |
| Manufacturer / batch number | |
| Colour / marking type | |
| Approved layout reference | |
| Specified line width / measured line width | |
| Specified thickness / measured thickness | |
| Glass bead type / application record | |
| Retro-reflectivity result (if specified) | |
| Adhesion / visual condition | |
| Inspection remarks / acceptance status | |

### III-F. Non-conformance report (NCR)

| Particulars | Details |
|---|---|
| NCR reference / date | |
| Road / chainage / lot | |
| Work item / layer | |
| Description of non-conformance | |
| Specification / clause reference | |
| Test report / inspection reference | |
| Immediate containment action | |
| Contractor's proposed corrective action | |
| Corrective action completion date | |
| Re-inspection / re-test result | |
| EIC decision / NCR closure approval | |

# ANNEXURE – IV

## LABORATORY ARRANGEMENT AND RESPONSIBILITIES

### IV-A. Contractor's laboratory / testing facilities

The Contractor shall provide or arrange adequate testing facilities at site / approved hot mix plant for the tests required under this QAP. Equipment shall be suitable, maintained and calibrated. The EIC may inspect the facilities before commencement.

| Sr. | Equipment / facility | Purpose |
|---|---|---|
| 1 | Sieve analysis set and weighing balance | Aggregate gradation |
| 2 | Moisture content testing equipment | WMM moisture content |
| 3 | Field density testing equipment / approved method | WMM compaction |
| 4 | Modified Proctor apparatus / access to approved lab | MDD and OMC |
| 5 | Marshall testing apparatus | Bituminous mix properties |
| 6 | Bitumen extraction apparatus / approved alternative | Binder content and extracted aggregate gradation |
| 7 | Calibrated thermometers / temperature probes | Plant, truck, laying and compaction temperature |
| 8 | Survey and measuring equipment | Levels, crossfall, thickness and dimensions |
| 9 | Tray / plate test arrangement | Prime / tack coat/asphalt painting application rate |
| 10 | Thermoplastic thickness measuring equipment | Road marking inspection |

### IV-B. External approved laboratory

Tests requiring specialised facilities or independent verification shall be carried out through an external NABL accredited laboratory approved by GIPCL.The laboratory shall submit signed test reports identifying the sample, test method, result, units and applicable acceptance criteria.

| Sr. | Test / activity | External laboratory arrangement |
|---|---|---|
| 1 | Aggregate abrasion / impact / flakiness and other specified properties | Testing ,Initial source approval and periodic / change-based verification |
| 2 | VG-30 bitumen properties | Testing, Independent verification of supply lots as directed by GIPCL |
| 3 | WMM MDD / OMC | Testing, Initial approval and whenever material combination changes |
| 4 | DBM JMF | Testing, Before commencement and whenever mix / source changes |
| 5 | BC JMF | Testing, Before commencement and whenever mix / source changes |
| 6 | DBM / BC extracted mix testing | Testing ,Random independent verification as directed |
| 7 | Asphalt painting | Testing and approval and batch verification as directed |
| 8 | Thermoplastic material properties / glass beads | Initial approval and batch verification as directed |
| 9 | Retro-reflectivity | Initial and random verification where specified |

## IV-C. Division of responsibilities

| Activity | Contractor | External laboratory | GIPCL |
|---|---|---|---|
| Material source approval | Submit source proposal and samples | Conduct specified tests | Review and approve |
| JMF preparation | Arrange preparation and submit | Prepare / verify JMF | Review and approve |
| Routine testing | Conduct and record | As directed | Witness / verify |
| Independent testing | Provide samples and assistance | Conduct and report | Nominate / review |
| Inspection records | Maintain and submit | Submit reports | Review and accept |
| Non-conformance | Investigate and rectify | Re-test where required | Decide / close NCR |

## IV-D. Tender clause – laboratory and testing

The Contractor shall establish and maintain adequate quality-control testing facilities and shall conduct all routine tests stipulated in the approved QAP. GIPCL shall have the right to obtain independent test results through an external NABL accredited laboratory approved by GIPCL. Such independent testing shall not absolve the Contractor of its responsibility for the quality of materials and workmanship. The cost of routine testing and testing required due to failure of the Contractor's work shall be borne by the Contractor. Cost of testing at external NABL accredited as approved by GIPCL is to be borne by Contractor.

# ANNEXURE – V

## GENERAL QUALITY ASSURANCE CONDITIONS

**V-1. Approval before commencement –** The Contractor shall submit the detailed QAP, material source approvals, JMFs, laboratory details, calibration certificates and construction methodology for approval before commencement of the respective activities.

**V-2. Quality of materials –** All construction materials shall conform to the applicable MoRTH specifications, relevant Indian Standards, approved JMFs and technical requirements of the contract. No material shall be incorporated into the work without approval of the EIC.

**V-3. Testing responsibility –** All routine testing, sampling, transportation of samples, testing equipment and laboratory arrangements required under the approved QAP shall be included in the Contractor's quoted rates unless otherwise expressly provided in the BOQ / contract.

**V-4. Sampling and testing –** Sampling shall be carried out in the presence of the EIC or authorised representative wherever directed. Samples shall be properly identified with date, location, chainage, material source, batch and layer details.

**V-5. Rejection of defective work –** Any material or completed work failing to meet the prescribed acceptance criteria shall be rejected or rectified / removed / replaced by the Contractor at no additional cost to GIPCL, in accordance with the contract.

**V-6. Additional testing –** GIPCL reserves the right to direct additional tests whenever considered necessary. Responsibility for the cost of such testing shall be governed by the contract and the result of the test, where so provided.

**V-7. Calibration –** All testing equipment, weighing equipment, temperature gauges and measuring instruments shall be maintained in calibrated / verified condition. Certificates shall be produced whenever required by GIPCL.

**V-8. Layer-wise approval –** No subsequent pavement layer shall be laid over a layer that has not been inspected and accepted by the EIC. The Contractor shall submit inspection requests sufficiently in advance.

**V-9. Test documentation –** The Contractor shall maintain complete records of material tests, field tests, inspection requests, test reports, batch details and approvals. Records shall be submitted with the relevant running account bills or as directed by GIPCL.

**V-10. Final acceptance –** Final acceptance shall be subject to satisfactory compliance with the approved QAP, specified thickness, density, levels, surface regularity, road marking requirements and workmanship, together with completion of all required records.

**V-11. Contractor's responsibility –** Inspection, witnessing, testing, review or approval by GIPCL shall not relieve the Contractor of its contractual responsibility for quality, performance, safety or compliance.

**V-12. Dispute / retesting –** Where test results are disputed, the EIC may direct sampling and testing at an approved independent laboratory. The procedure and cost allocation shall be as provided in the contract.

## APPROVAL

| Prepared by | Checked by | Approved by |
|---|---|---|
| Name: _____<br>Designation: _____<br>Signature: _____<br>Date: _____ | Name: _____<br>Designation: _____<br>Signature: _____<br>Date: _____ | Name: _____<br>Designation: _____<br>Signature: _____<br>Date: _____ |