

SECTION-8B

TECHNICAL SPECIFICATIONS

1. General:

- 1.1. The stone ballast (Granite or equivalent acceptable variety) to be supplied by the contractor shall be Machine Crushed, unless otherwise specified in the schedule of items in this contract, and shall strictly conform to the specifications furnished in tender document. Responsibility of ensuring supply conforming to the specifications lies totally with the contractor. Any representation from the contractor for waiver or otherwise in this regard will not be entertained except as provided in the tender conditions.
- 1.2. Tenderer/Contractor is advised to visit the area thoroughly and get himself acquainted with the topography, roads, availability of transport, raw material, climatic conditions etc. All factors affecting in the market rates of labour, materials, laws, rules and regulations of State/Central Governments in respect of mines, minerals, forest and other departments, Specification and special conditions of the contract, and General Conditions Contract and other possibilities / aspects should be considered before quoting the rates and no claim due to any reasons whatsoever will be entertained afterwards. He is also advised to note and confirm himself the availability of stone ballast conforming to railway specification for supply under this tender.

2. TECHNICAL SPECIFICATIONS :

- 2.1 The execution of all works shall conform to the specifications and codes of practice/ manuals mentioned below as amended from time to time .
 - A. **Specifications of Machine Crushed stone ballast at para 2.3 below.**
 - B. Provisions /Instructions & Supplementary instructions of Railways to Indian Railway's Permanent Way manual.
 - C. General and Subsidiary Rules of Railway.
 - D. Standard Schedule of Dimensions.
 - E. Circulars and Engineering Standing orders issued in respect of stone ballast.
- 2.2 KRIDE reserves the right to reject or alter any part of the work executed by the contractor which in the judgment of the KRIDE does not comply with the requirements of the above specifications. The decision of the KRIDE shall be final and conclusive for all purpose and binding on the contractor.
- 2.3 Specifications for Machine Crushed stone ballast for railway track are as under:- (Reference: RDSO's specification for track ballast issued vide report no. IRS-GE- I (2004) with all the correction slips/amendments up to date).
- 2.3.0 SCOPE : These specifications will be applicable for stone ballast to be used for all types of sleepers on normal track, turnouts, tunnels and deck slabs etc., on all routes. These specifications include guidelines for measurement, quality check and reference to other specifications as required. The details given below are not exhaustive and original RDSO specification vide Report

No. IRS-GE-1 with all corrigendum/amendment/ corrections till date of opening of the tender shall apply along with the modifications herein.

2.3.1 DETAILED SPECIFICATIONS:

2.3.1.1 **Basic Quality:** Ballast should be hard durable of and as far as possible angular along edges/corners, free from weathered portions of parent rock, organic impurities and inorganic residues.

2.3.1.2 **Particle Shape :** Ballast should be cubical in shape as far as possible. Individual pieces should not be flaky and should have generally flat faces with not more than two rounded / sub-rounded faces.

2.3.1.3 **Mode of Manufacture :** Ballast shall be machine crushed.

2.3.2 Physical Properties:

2.3.2.1 Ballast should satisfy the following physical properties

| | | |
|--------------------------|-----------------------------|-----------------------|
| Aggregate Abrasion value | *30% Max Value | IS:2386 Pt.IV-1963 |
| Aggregate Impact value | *20% Max Value. | IS:2386 Pt.IV-1963 |
| Water absorption | should not be more than 1%. | IS 2386 Pt III – 1963 |

2.3.3 Size and Gradation :

2.3.3.1 Ballast should satisfy the following size and gradation:

| | | |
|-----|--------------------------------|-------------------|
| (a) | Retained on 65mm sq mesh sieve | 5% Maximum |
| (b) | Retained on 40mm sq mesh sieve | 40% to 60% |
| (c) | Retained on 20mm sq mesh sieve | Not less than 98% |

2.3.3.2 Oversize Ballast:

(i) Retention on 65mm square mesh sieve:

| | |
|-----|---|
| i. | A maximum of 5% ballast retained 65mm sieve in any stack shall be allowed without deduction in payment. |
| ii. | In case ballast retained on 65mm sieve in any isolated stack exceeds 5% but does not exceed 10%, payment at 5% reduction in contracted rate shall be made for the full stack. |
| iii | Stacks having more than 10% retention of ballast on 65mm sieve shall be rejected. |

(ii) In case ballast retained on 40mm square mesh sieve exceeds 60% limit, payment at the following reduced rates shall be apply for the full stack in addition to the reduction worked out at(i) above.

| | |
|----|--|
| i. | 5% reduction in contracted rates if retention on 40mm sq. mesh sieve is between 60% (excluding) and 65% (including). |
|----|--|

| | |
|------|--|
| ii. | 10% reduction in contracted rates if retention on 40mm sq. mesh sieve is between 65% (excluding) and 70% (including). |
| iii. | In case retention on 40mm square mesh sieve exceeds 70% the stack shall be rejected. |

2.3.3.3 Under Size Ballast: Ballast shall be treated as undersize and shall be rejected if :-

| | |
|------|--|
| (i) | Retention on 40mm Sq. Mesh sieve is less than 40%. |
| (ii) | Retention on 20mm square mesh sieve is less than 98% |

2.3.4 Sieve Analysis of Ballast

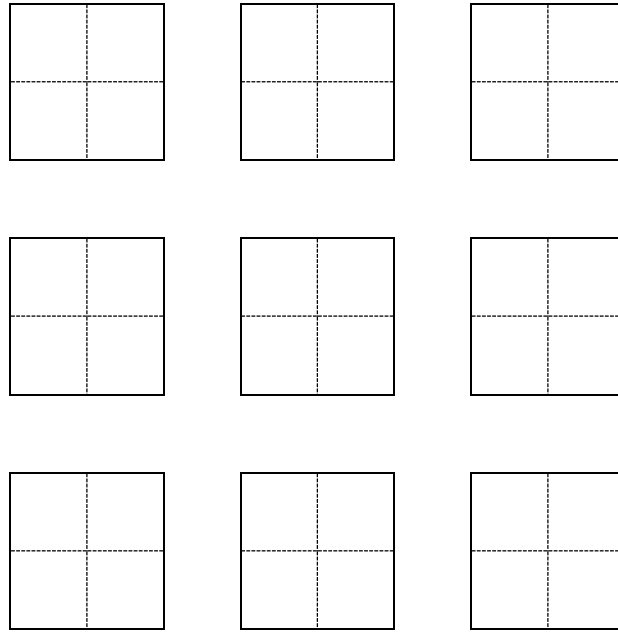
2.3.4.1 The test sieves used for sieve analysis shall conform to the specifications given in Annexure-IV.

Specifications of Test Sieves used for Sieve Analysis of Ballast

- The test sieves shall be perforated plate sieve type with holes/apertures, mounted on a frame. The test sieves are designated by the nominal size of holes/apertures.
- Material of Perforated Plate:** The perforated plate for test sieves shall be manufactured from Brass Sheet or Steel Sheet or Stainless Steel Sheet or Galvanized Steel Sheet or Electroplated Steel Sheet.
- Plate Thickness:** The thickness of plate used for making test sieve and the tolerance permitted for this shall be as following:
 For 65mm Square Mesh Sieve – 3mm (Plus 1.0mm Minus 0.5mm)
 For 40mm Square Mesh Sieve – 2mm (Plus Minus 0.5mm)
 For 20mm Square Mesh Sieve – 2mm (Plus Minus 0.5mm)
- Arrangement of Holes/Apertures:** The square holes/apertures of size “W” in the perforated plate shall be arranged at Pitch “P” as per the sketch given below:

← W → ← P →

↑
P



5. **Sieve Opening Size, Pitch of Openings and tolerances:** The nominal size of individual hole/aperture at mid-section (W), the Pitch of holes/apertures (P) and permissible tolerance for them shall be as under:

| Test Sieve of Square Mesh Size | W | | P | |
|--------------------------------|--------------|-------------|----------|------------------------|
| | Nominal Size | Tolerance | Distance | Tolerance |
| 65mm | 65mm | (+/-)1.5 mm | 80mm | (+)12.0mm (-) 8.0mm |
| 40mm | 40mm | (+/-)1.5mm | 50mm | (+) 7.5mm (-) 5.0mm |
| 20mm | 20mm | (+/-)1.0mm | 25mm | (+)4.0mm (-) 2.5mm |

6. **Sieve Frame:** The frame of test sieves shall be manufactured from Hardwood or Steel Sheet or Brass sheet. The internal size of the frame (i.e. clear size of perforated plate mounted on frame) shall not be less than 100cm in length, 70cm in breadth and 10cm in height on sides.
7. **Marking on test sieves:** A label shall be fixed to the frame of each sieve, legibly marked with following information:
- Nominal Aperture Size,
 - Material of perforated plate,
 - Material of sieve frame,
 - Maker's Name or Trademark, and
 - An Identification Number for the sieve.

- 2.3.4.2** While carrying out sieve analysis, the screen shall not be kept inclined, but held horizontally and shaken vigorously. The pieces of ballast retained on the screen can be turned with hand to see if they pass through but should not be pushed through the sieve.

- 2.3.4.3 The percentage passing through or retained on the sieve shall be determined by weight. The weighing equipment used shall not have least count more than 100 grams.

3.0 SUBMISSION OF TEST REPORT:

- 3.1 "The Tenderer is required to submit test report of ballast for impact value, abrasion value, water absorption value from approved laboratories mentioned in the tender documents as per provisions of "Specification of Track Ballast, IRS-GE-1, June 2004 – issued by RDSO/Lucknow (as amended upto date) failing which the offer is liable to be rejected.

3.1.1 The above Clause No.3.1 of submission of test report of Ballast is not applicable for tenders of mixed works and EPC tenders.

- 3.2 The Tenderer shall also furnish an undertaking that the ballast supply at all times will conform to the laid down Specifications for track ballast as specified by Railway.

4.0 QUARRY PERMITS & OTHER LEGAL MATTERS:

- 4.1 Contractor will at his own expense obtain requisite permits/licenses/parwana for quarrying or for any other purpose as may be necessary to enable him to perform his part of the contract. Railway will not under any circumstances be liable to obtain any permit /licenses/ parwana whatsoever.
- 4.2 Contractor shall be responsible to follow the provisions of Mining Act and other relevant acts and the Railway will not be responsible for infringement of any of their provisions.
- 4.3 The contractor will ensure free access to quarry premises where stone is being quarried and crushed, to the Engineer-in-charge or his representative at all times.

5.0 CRUSHING & BREAKING:

- 5.1 Crushing and breaking of ballast shall be carried out by MECHANICAL CRUSHERS ONLY to be installed and operated by the contractor outside Railway land at his own cost. Railway is not responsible for arranging any licence, permission etc. for quarry or transporting and the contractor is fully responsible for arranging the same in time.

6.0 SERVICE ROADS & VEHICULAR MOVEMENT:

- 6.1 Necessary service roads for collection of ballast shall be made by the contractor at his cost. Any service roads available within railway land can be used free of cost. Width of Railway land may not be uniform and at

some locations, it is interrupted by small streams/road ditches etc., Agency shall make suitable arrangements for plying across such obstructions . The rates quoted shall include costs for such arrangements and the contractor will not be entitled for any additional payment on this account.

- 6.2 In certain situations vehicles for supply of ballast need to be plied through private land also and if so the contractor shall have to make arrangements at his cost . The contractor may have to handle/re-handle the ballast before it reaches the final location of stacking . No additional payment whatsoever shall be admissible on this account.
- 6.3 In no case and under no circumstances, crossing of track by vehicles shall be allowed at unauthorized locations and contractor is solely responsible for all the consequences if he indulges into such unauthorized acts.
- 6.4 For movement of vehicles along the side of track or across, Contractor shall arrange necessary protection including watchman, protective measures and infringement to running trains shall entail heavy penalty on the contractor at the discretion of the Railway.
- 6.5 To ensure safety of Train operations on adjacent tracks, the earthwork contractors are required to provide barricading as per Drawing No. SWR/CN/BNC/SK/165-2018 shall be erected and maintained for the stretch of the work as directed by Engineer-in-Charge during the entire period of execution till completion/extended period of completion of earth work contract.
- 6.6 During execution of earthwork the contractors are required to ensure that the barricading is not disturbed/damaged due to any reasons whatsoever; and in case of any damages the same shall be repaired/replaced immediately and made good.
- 6.7 At the completion of earth work contracts, vertical posts of the barricading shall be retained at site in good condition and the nylon rope may be taken back by the earth work contractors.
- 6.8 Barricading concrete posts available at site along the track are to be used as protective fencing /barricading while carrying out track linking/ ballasting works duly providing nylon rope, repainting the posts and replacing/repairing the damaged post, if any. This barricading shall be maintained in good condition throughout the contract period. No extra payment shall be paid for this.
- 6.9 If barricading is required to be provided in any stretch where no barricading posts were provided earlier for doing the earthwork, payment for providing barricading in such stretches only shall be made as per relevant item (new item if required).
- 6.10 After completion of the work, barricading shall be removed from site and disposed off suitably by the contractor at his own cost.

7.0 HECTOMETER/DEPOT WISE QUANTITY OF COLLECTION:

- 7.1 The quantity of ballast to be collected in each HM post /Depot /Sub Depot should be obtained from the Engineer-in-charge before starting the collection.
- 7.2 In case of cess supply, the collection and stacking of ballast should be completed in all respects in a HM length before measurements are taken, i.e. measurements in a particular HM length shall invariably be taken only once during currency of the contract.
- 7.3 Ballast shall be collected and stacked by the contractor accordingly, in specified quantities on the formation i.e bank / cutting or at the places i.e CESS/Depot/ yards as directed by the Engineer-in-charge in convenient stacks.
- 7.4 The contractor shall prepare a programme for collection in accordance with the above directions/stipulations and submit to railways for scrutiny and approval prior to collection.

8.0 SITE PREPARATION:

- 8.1 Stacking shall be done as far as possible on a neat, plain LEVEL and firm ground with good drainage alongside/near the Railway alignment in Railway land only. Sites/Plots for stacks (comprising cess / depot / semi-depots) shall be located as directed by Engineer- In-charge & shall be selected with a view to convenient dumping into track /loading into rail lorry/ballast train. **All the ballast shall be stacked only on the area identified as above with the written permission for stacking by Engineer -In - Charge on the Ballast Passing register.**
- 8.2 Stacks on sites not so approved will be rejected and the contractor shall restack the ballast at the specified sites as ordered.
- 8.3 Contractor will be required to develop the site for stacking the ballast with his own labour at locations as specified by the Engineer in charge or his supervisors by making approach roads, leveling, dressing of uneven and undulating ground and drainage arrangement ,clean the plots off the rubble/weeds, grass, organic matter, bushes, etc., at his own cost. and the rates quoted shall include costs for such arrangements. The contractor will not be entitled for any claim for earthwork or any other temporary work done by him in connection with development of site. No payment whatsoever shall be admissible on this account.
- 8.4 After expiry of contract, the contractor shall vacate the area and handover the land free of encroachments.
- 8.5 Ballast passing and ground balance registers will be maintained by the Engineer's representative which will be required to be jointly signed by the Railways representative and the contractor or his/their authorized representative

- 8.6 Site shall be developed in such a way that the ballast does not get intermixed with ballast collected by other agencies or already collected by other agencies .
- 8.7 Sketch of DEPOT : Depot ballast shall be collected in the specified yard or Kilometer as indicated in the schedule only. Before starting collection a sketch of depot shall be got approved from General Manager in-charge of the project.
- 8.7.1 For each Depot, a depot sketch shall be drawn clearly showing the sub-depots and plots with specific identification number for each of the plots, incorporating the necessary details , with proper drawing number and approval of General Manager -in-charge of the depot should be obtained.
- 8.7.2 In case of Depot with more than one contract , sub depots sketch shall be drawn in addition to over all Depot sketch. Each sub depot should be distinct and a physical barrier should be erected in between.
- 8.7.3 Each Depot/Sub Depot should be further divided into plots for stacking ballast such that there is only one stack in a plot.
- 8.8 Sketch of Cess/semi depots : In case of cess/semi depots along side for supply at LCs and other areas, cess supply sketch similar to depot sketch shall be drawn and got approved from Addl. General Manager in charge of project.
- 8.9 The contractor shall submit the sketch of depot/cess supply indicating the plots/stacks as per the directions issued by KRIDE as stipulated above. He shall take into account the requirements of the work and feasibility while marking the plots. However, KRIDE will decide the requirements and suitability of the proposal made by the Contractor for approval or make changes as required. The sketch for depot/cess shall clearly show the ballast of other agencies/railways (Open line) in order to avoid remeasurement of the same as supply in this contract. If any such remeasurement is made and comes to the notice of the KRIDE/Railway Administration subsequently, the contractor is fully responsible for any penal action by KRIDE.
- 8.10 After site preparation and leveling the ground and before commencement of ballast collection, the contractor shall arrange for inspection of site by the Engineer – In – Charge of work (test checked by DM/AGM KRIDE) and certification of levelness of ground. However, in spite of issue of such certificate, the responsibility lies on contractor to ensure levelness of ground before actual collection. In case of stacking area found not in one level/plane (before or after the stack is cleared) a minimum penalty of Rs.1000 per/each stack at the discretion of the engineer-in-charge will be imposed in addition to recovery of ballast lost due to such irregular grounds where stacks are made. No claim or representation from the contractor will be entertained and the decision of the railways is final and binding on the contractor.

9.0 NORMS FOR STACKING & SIZE OF STACK:

(Reference: Railway Board's Guide lines vide No. 2006/CE-II/MB/2 dated 25.5.2007 and RDSO's Guidelines IRS-GE-1)

- 9.1 The stacks shall be of uniform cross section conforming to the standard template dimensions.
- 9.2 Each stack shall be so formed that ratio of longer to smaller side does not exceed 2.5 except for areas where there is constraint of land width in which case the ratio upto 3.5 may be permitted.
- 9.3 The height of stack shall not be less than 1.0m except for hilly areas where it may be 0.5m
- 9.4 The height of ballast stack should not be more than 2.0m
- 9.5 The side slopes of stack should not be flatter than 1.5:1 (Horizontal: Vertical) normally.
- 9.6 The cubical content of each stack shall not be less than 30 cum in plain areas and 15 cum in hilly areas.
- 9.7 Top width of stack shall not be less than 1 metre.
- 9.8 Top of stack shall be kept parallel to the ground plane.
- 9.9 Stacks made shall not interfere with movement of Road or Railway traffic.

10.0 REGULATION OF COLLECTION:

(Reference: Railway Board's Guide lines and RDSO's Guidelines)

10.1 DEPOT:

- 10.1.1 For Ballast collection in depot & it's running out, instruction as given in Para 266 of IRPWM and guidelines issued by the Railway shall be adhered to.
- 10.1.2. Collection and Training out of the ballast in the same depot shall not progress simultaneously. In case depot is divided in to sub-depots, simultaneous supply and loading of ballast should only be permitted from separate sub-depots only under written approval by General Manager/KRIDE with a proper regulating system in place.
- 10.1.3 In case the area for stacking is not sufficient to stack all the ballast as per the agreemental quantities in one go in a depot, and if the ballast needs to be collected repeatedly in the available stacking ground in a depot to complete the agreemental quantity, after stacking the ballast once fully in the available stacking area by the contractor, measurement shall be taken. Ballast shall be trained out fully from all plots. Making of fresh stack will be permitted in this depot only after the earlier stacks are completely trained out and conditions for subsequent collection are fulfilled.
- 10.1.4 After the ballast is fully trained out and before authorizing the contractor to commence the second or further round of supply in the same depot, the Engineer – In – Charges shall inspect the site, make sure that all the stacks are fully trained out and record a clear certificate in the ballast passing /ground balance register. The contractor shall obtain written permission from General Manager to commence the next round of collection and stacking in a depot. Even in case a depot is

subdivided as sub-Depots to cater separate contracts, the simultaneous supply and loading of ballast from separate sub-depots shall not be practiced. In exceptional and unavoidable circumstances, General Manager may authorize such simultaneous supply/loading with reasons recorded in writing and ensuring that a proper regulatory system is in place.

10.2 Cess Supply: -

- 10.2.1 For Ballast collection along cess & its running out, instruction as given in Para 267 of IRPWM and guide lines issued by the Railway shall be adhered to.
- 10.2.2 Written permission for stacking after site preparation shall be certified by Deputy Manager on the ballast passing register. Supply, as far as possible, shall be completed in one km continuous stretch at a time, without leaving any gaps in any HM and offered for measurement for ease of measurement and effective monitoring.
- 10.2.3 Subsequent collection at the same location is not permitted. For this purpose, proper planning should be made by the contractor and quantities should be collected with the due approval of the Addl. General Manger/KRIDE.
- 10.3 Other instructions as given elsewhere, in case dumping is in progress, ballast collection shall be regulated so that simultaneous collection and dumping does not take place.

11.0 SUPPLY SCHEDULE/MILE STONE PROGRAMME /PROGRESS:

- 11.1 Ballast shall be supplied as per the accepted programme and a steady supply of ballast to the requirement as per tender schedule shall be maintained and ballast must be collected in the sequence as prescribed by the Engineer-in-charge.
- 11.2 Contractor shall prepare a programme chart giving the activity wise details within seven days from the date of issue of acceptance letter. Programme shall be made carefully so that work can be progressed as planned. The progress shall be reviewed w.r.t this programme chart once in fortnight. The contractor shall update the progress fortnightly and continue to resubmit revised bar charts so that completion of each activity matches with stage targets agreed initially deploying additional resources as required.
- 11.3 Ballast supply shall be programmed and under taken in continuous stretches as MILESTONE TARGETS with an aim to progress uninterrupted supply with out leaving any gaps at bridges/LCs/other special locations . Contractor shall maintain the week/date wise planning in consonance with the above agreed MILESTONE stage targets.
- 11.4 Weekly/Daily progress of the work shall be reported to KRIDE and any suitable corrective measures as directed by the Engineer-in-charge or his representative should be immediately carried out wherever necessary at no extra cost.

- 11.5 During the course of supply of ballast by the contractor, the KRIDE Administration reserves the right to direct the contractor to stop supply or dumping of ballast for regulating the progress of work in the interest of the work.
- 11.6 The contractor is required to restack the disturbed ballast stacks at his own cost to facilitate recording of measurements for drawl of final bill in case of closing down of contract. In the event of failure of the contractor to comply with the above, restacking will be done by the Railway on its own or through any other agency and the actual cost involved with necessary supervision charges etc. will be recovered from contractor's bills, security deposit etc. or from any money payable under this or other contract with the Railways/Central Government.
- 11.7 KRIDE will monitor the supply and will impose penalties / fines as deemed if the progress is not commensurate with the programme as envisaged elsewhere in tender document.

12.0 SAMPLING AND TESTING:

(Reference: RDSO Guidelines RS/F/714/Vol.IV dated 6.6.2016)

12.1. General

- 12.1.1 The samples shall be drawn with due diligence and adequate precaution so that they represent the true nature and condition of the ballast.
- 12.1.2 Being a heterogeneous material, the gradation of ballast loaded in wagons and/or dumped/inserted in the track may not remain same as that initially checked in stacks, due to lifting, loading, transportation, unloading etc. Similarly, in case of direct loading into wagons, the gradation of ballast at destination may not remain same as that at source, due to loading, transportation etc. Therefore, the samples from wagons and track are not representative samples as far as gradation is concerned. Even in the same stack, results of two checks may not be same.
- 12.1.3. The samples from a stack taken after lapse of a long period of stacking are not true representative samples of the ballast initially supplied in the stack, due to settling down of smaller size particles in voids underneath, dirt/dust getting accumulated in the stack, rains etc.

12.2 Sampling Frequency

In order to ensure supply of uniform quality of ballast, the following norms shall be followed in respect of sampling, testing and acceptance.

- 12.2.1 On supply of the first 100 cum, the tests for Size & Gradation, Abrasion Value, Impact Value and Water Absorption (if prescribed) shall be carried out by Railway. Further supply shall be accepted only after this

ballast satisfies the specifications for these tests. Railway reserves the right to terminate the contract as per GCC at this stage itself in case the ballast supply fails to conform with any of these specifications.

12.2.2 Subsequent test shall be carried out as follows:

| Type of Tests | Supply in Stacks | Supply in Wagons |
|---|---|---|
| (a) Size and Gradation Tests | One for each 100 cum or part thereof in any stack | One for each 100cum or part thereof for quantity to be loaded in wagons |
| (b) Abrasion Value, Impact Value and Water Absorption Value (*) | One Test for every 2000 cum | |

(*) These tests shall be done for the purpose of monitoring quality during supply. In case of the test results not being as per the prescribed specifications at any stage, further supplies shall be suspended till suitable corrective action is taken and supplies ensured as per specifications. The above tests can be carried out more frequently, at the discretion of Railway.

12.2.3. All tests for Abrasion Value, Impact Value and Water Absorption should be got done through approved laboratories or Railway's own laboratories (list of laboratories shall be mentioned in the tender document). These tests, subsequent to award of contract, shall be done at Railway's cost.

12.3. Supply of ballast in Stacks

12.3.1 Sampling Procedure

- (i) At the time of formation of stacks, sufficient care should be taken to ensure that there is sufficient space around the stack to facilitate movement of JCB/Power Equipment's. The length and width of each stack shall be kept in such a way that every part of the stack is accessible to the JCB/Power Equipment, to be deployed for drawing "Samples".
- (ii) In case of ballast supply in stacks, three "Samples" each of 0.3 – 0.5 cum volume, one sample each from two sides and one from top after removing outer layer (150-200mm) should be collected from stack for every 100 cum or part thereof, by JCB or other suitable Power Equipment.
- (iii) The location (in plan) and depths of sampling points shall be varied for different "Samples" and different stacks in a lot.
- (iv) "Gross Sample" should be prepared by thoroughly mixing the three "Samples" collected as in (ii) above, using JCB or other suitable Power Equipment, on a clean, flat and hard surface.

Note: In exceptional cases of site-specific constraints, approval of Competent Authority (Engineer-in-charge) shall be taken prior to invitation of tender for using manual means of for collection and mixing of "Samples", and this should be incorporated in the Tender Document.

- (v) A "Test Sample" of volume 0.027 cum shall be drawn from each of the "Gross Sample", by the method described in Para 12.3.1 (iv), for carrying out Size & Gradation tests.
- (vi) Method for drawing "Test Sample": The ballast in "Gross sample" shall be scooped into a cone shaped pile by taking care to drop each scoopful exactly over the same spot. After the cone is formed, it shall be flattened by pressing the top of cone with a smooth surface. Then it is cut into quarters by two lines which intersect at right angles at the centre of the cone. The bulk of sample is reduced by rejecting any two diagonally opposite quarters. The remaining ballast shall be mixed and "test sample" shall be drawn for testing. After drawing "test sample", the left over ballast of "gross Sample" shall be dumped back in the stack.
- (vii) In case clean, flat and hard surface is not available then a tarpaulin or any other suitable sheet may be used on a flat surface for mixing, drawing and sieve analysis of samples.

12.3.2 In case of stacks of volume more than 100 cum, more than one "Test Samples" will be tested for Size & Gradation. In such cases, the sieve analysis results of all the "Test Samples" shall individually conform to following gradation, for acceptance/rejection of the whole stack:

- (i) Retention on 20mm Sq. Mesh Sieve shall not be less than 98% for machine crushed ballast (not less than 95% for hand broken ballast).
- (ii) Retention on 40mm Sq. Mesh Sieve shall be between 40% to 70%.
- (iii) Retention on 65mm Sq. Mesh Sieve shall be more than 10%.

The full payment/reduced payment for the whole stack, as given in Para ---shall be decided based on of the sieve analysis results of all the "Test Samples" for a stack.

12.4 **Supply of ballast in Heaps for loading directly in Wagons**

12.4.1 **Sampling Procedure**

Samples of ballast shall be collected from heaps of ballast proposed to be loaded into wagons. For this, the contractor shall inform ADEN in-charge in writing sufficiently in advance before placement of rake, about the locations of ballast heaps from where it is to be loaded into wagons. ADEN in-charge shall decide the location of heaps from which sampling is to be done, judiciously covering the entire quantity of ballast to be loaded in rake.

12.4.2 Based on the approx. quantity of ballast to be loaded in the rake, methodology for sampling of ballast to be followed shall be the same as in Para 12.3.1 and 12.3.2 above.

12.4.3 **The test viz. determination of Abrasion value, Impact Value and Water Absorption should be got done through approved laboratories or Railway's own laboratories (List of approved laboratories are mentioned below):**

| | | |
|----|---|-----------------|
| 1 | Railway Laboratories of Construction Organization | Bangalore Cantt |
| 2 | Indian Institute of Science, Department of Civil Engg. | Bangalore |
| 3 | University Visvesvaraya College of Engineering, Dept. of Civil Engineering, Bangalore University, Jnanabharati. | Bangalore |
| 4 | National Institute of Engineering | Mysore |
| 5 | Government Engineering College | Hassan |
| 6 | Malnad College of Engineering | Hassan |
| 7 | University B.D,T college of Engineering | Davangere |
| 8 | Government engineering college | Bellary |
| 9 | Government engineering college | Haveri |
| 10 | B.V.B. College of Engineering & Technology, Vidyanagar | Hubli |
| 11 | Government engineering college | Mandya |
| 12 | Government engineering college | Ramanagara |
| 13 | Government engineering college | Raichur |
| 14 | National institute of Technology | Suratkal |
| 15 | Jawaharlal Nehru National College of engineering | Shimoga |
| 16 | Sidda Ganga Institute of Technology | Tumkur |
| 17 | Kalpatharu College of Engineering | Tiptur |
| 18 | Dr. T. Thimmaiah Institute of Technology | Kolar |
| 19 | B. M. S. College of Engineering | Bangalore |
| 20 | R. V. College of Engineering | Bangalore |
| 21 | Bureau Veritas (India) Pvt. Ltd | Bangalore |
| 22 | Any other laboratories/institution approved by Engineer – In – Charge. | |

12.4.4 All costs for sampling/testing through the approved laboratories initially and subsequent to award of contract during the course of supply /at the time of measurement / at the time of billing to ascertain that ballast supply conforms to standards shall be done at Contractor own cost. Contractor reserves the right of getting ballast tested from any of the laboratory from the approved list at their own cost. No extra payment will be made by K-RIDE.

13.0 MEASUREMENT OF BALLAST:

13.1 The contractor shall take representative samples from the stacks in the presence of Engineer- In – Charge seal the samples and arrange TEST reports before commencement of measurement representing that the ballast supplied conforms to prescribed specifications.

13.2 On the day of measurement of fresh stacks, the approved Depot/Sub-depot/Cess Supply sketch shall be augmented and submitted by the contractor for undertaking recording of measurements with the following:

- (i) Stacks measured on date and yet to be paid for
- (ii) Stacks measured earlier but not yet disturbed
- (iii) Stacks measured earlier and already disturbed and
- (iv) Stacks where the supply is in progress.

- 13.3 The diagram shall reflect all the stacks available on the section clearly by different color/ hatching at any time.
- 13.4 Besides signatures by Engineer – In – Charge , the sketch should be got signed by authorized representative of the contractor and DM, duly certifying that position of stacks on the date of measurement has been correctly incorporated. Availability of the aforesaid augmented sketch shall be a pre-requisite for processing of the bill for payment.
- 13.5 Measurement of ballast shall be done when the contractor has brought in sufficient quantity and stacked properly (say 10% of Agreement Quantity or more). No measurement of part stack shall be permitted.
- 13.6 All initial measurements for ballast shall be made and recorded by the in-charge in the Ballast Passing Register. The stacks so recorded shall be checked, remeasured and verified to 100% extent for measurements, quantity and quality by Addl General Manager in the presence of Contractor and he shall make suitable entries in the Ballast Passing Register before recording in the Measurement Books. All recordings/test checks shall normally be made in the presence of contractor. The records made by the Engineer – In – Charge and verified by Addl General Manager shall be binding on the Contractor. In case of any irregularity of dimension of stack/quality, minimum dimensions/parameters shall be taken into consideration for the purpose of payment. In case the Contractor is not accepting such measurements/quality, the Contractor shall replace/restack to proper standards to take measurement afresh.
- 13.7 If he fails to witness the measurements on the appointed date and time, the supply will be measured in his absence which shall be binding upon the contractor, whether or not he has signed the measurement book, provided always that any objection made by him to any measurement shall be checked/investigated and considered in the manner set out in the General Conditions of Contract.
- 13.8.1 **Test check :** Ballast so measured and details entered in Ballast Passing Register and MB, and accepted by Contractor will be test checked by Addl General Manager or higher officials as required in the order of 10% or more of the recorded quantity in each bill, both in respect of measurements and quality before arranging payments and the same shall be binding on the Contractor.
- 13.8.2 Ballast may be counterchecked by any other agency either simultaneously or subsequently and results of the same will have binding on the Contractor under the conditions of General Conditions of Contract.
- 13.9 The volume of stacks based on measurements of ballast will be arrived as under:

$$V=\{(L1 + L3 + L2 + L4)/4 \}X\{(B1 + B3 + B2 + B4)/4\}X\{(H1 + H3 +H2 +H4)/4\}$$

- (i) L1, L3, L2, L4 are length of bottom and top on both sides respectively.

- (ii) B1, B3, B2, B4 are the breadth of bottom and top on both sides respectively.
 - (iii) H1, H3, H2, H4 are the height taken from four different locations chosen at random.
- However, if necessary, additional measurements may be taken if the stacks are irregular.

14.0 NUMBERING AND MARKING:

- 14.1 Soon after the stacks are measured and posted in Ballast Passing register, the stack no. shall be painted on a large sized stone/board as directed by the Engineer in charge. In addition, lime should be sprinkled along all the edges of the stack to indicate that the stack has been measured and posted in the above measures shall be maintained till the stack is cleared.

15.0 SERVICES TO BE RENDERED BY CONTRACTOR:

- 15.1 The Contractor shall supply adequate sets of measurement equipment's like screens of different sizes steel boxes, and weighting machine & weights, ballast forks, etc. . These equipment's must be handed over to the Engineer - In- Charge before the first measurement is made.
- 15.2 At any time required by the Engineer while collection & stacking, contractor shall provide adequate facilities for inspection of material being collected including the quarry and crushing premises.
- 15.3 At the time of measurement, the contractor shall supply labour to facilitate opening of stack upto ground level, if desired by Railways.
- 15.4 Transportation arrangements for the movement of sieves /gauges/inspecting tools etc. to site and adequate labour assistance for sieving, weighing, measurement, sampling, sealing, etc. shall be provided by the contractor.

16.0 SETTING UP OF LABORATORY BY CONTRACTOR:

- 16.1 Deleted.

17.0 REJECTION OF SUPPLIES AND RECTIFICATION/DISPOSAL.

- 17.1 It shall be understood that the accepted rates for ballast are for materials which conform in all respects with the specifications laid down. The contractor is advised to bring only such material at the site which conform to the specifications, as given above. Any material which falls short of the prescribed standards will be rejected and will have to be removed by the contractor at his own expenses. It should be noted that all materials would be passed at the site of stacking only. No passing will be carried out at the sources or anywhere else.
- 17.2 If the Engineer or his representative deputed to measure the ballast supplied is not satisfied that any of above conditions and specifications are not fully complied with, he is at liberty to:

(a) Refuse to measure the ballast supplied after communicating his reasons in writing to the contractor, and

(b) Call upon in writing to bring the ballast up to the specifications by either re-screening the ballast to conform to the specified sizes

(c) Call upon in writing to remove the material and bring new material.

17.3 In case the material offered for supply by the contractor is rejected by the Engineer, the later will specify the date within which rejected material should be removed by the contractor. The contractor will be liable to pay wharfage/demurrage/ground rent and other damages as per general conditions of contract for the period beyond stipulated.

17.4 The Engineer shall mark all rejected ballast in any manner he thinks fit to prevent rejected ballast being mixed with good ballast and the contractor shall remove the rejected ballast to such places as may be directed by the Engineer within a specified period from the date of order of removal.

17.5 In the event of the contractor failing to do so, the Engineer may cause it to be removed and all cost of such removal shall be payable by the contractors to the Railway, without prejudice to the Railway to effect any recovery of the losses as per conditions of GCC.

18.0 ACCOUNTAL OF BALLAST & MAINTGENANCE OF REGISTERS:

18.1 BALLAST PASSING REGISTER

18.1.1 Details of authorization for stacking the ballast in a plot by the Addl General Manager, certification of levelness of ground by Engineer- In – Charge shall be entered. Similarly the details of measured ballast stacks shall be entered in a Ballast passing register/ Stack Measurement Register, at the time of Measurement in the field itself, and the Register should have columns for entering measurements and physical properties checked by DM/AGM/& GM. The register shall be an authentic initial record in the form of Measurement Book with machine numbered pages and instruction for preservation/custody etc. shall be incorporated. Manuscript ruled registers if required should be used only by proper machine numbering the pages. The registers shall be issued by Addl General Manger and each pages shall be pre-signed on top by Engineer – In- Charge.

18.1.2 The Ballast Passing register should bear the following information.

- i. Reference to Agreement No.
- ii. Date of measurement.
- iii. Stack No. and hectometer/TP/Chainage/RHS or LHS.
- iv. Measurement as recorded indicating the different dimensions and volume.
- v. Results of the quantity check and qualitative check as per sieve analysis over size, quantity, dust etc.

18.1.3 There should be no overwriting in the register and if any correction is required, the old entry should be struck off by drawing a line over and a fresh entry made and initiated. No blank line should be left while recording. The recordings done at a time should be properly boxed by drawing a line at the start and close of the measurements. All entries made in Ballast Passing register should be entered in the Measurement Book subsequently, which shall form the basis for the contractors' bill.

18.1.4 The contractor shall sign the Ballast Passing register at the site of measurement and the Measurement Book later in token of acceptance of measurements for arranging payment by Railways.

18.2 GROUND BALANCE REGISTER :

18.2.1 DEPOT: In case of DEPOT supply, the quantity of ballast measured in each Plot should be entered in the Ground Balance Register. After subsequent training out of ballast from a Plot, the successive reducing balances in that Plot should be reflected date-wise. For the quantities loaded in BT/Rail lorry in the Plot, the reference of challan No. should be shown. After the entire quantity in Plot has been trained out, the ground balance should be reduced to zero and the Plot shown as vacant. Further stacking in the plot of DEPOT/ Sub Depot can start only after permission by Addl General Manager/Civil

18.2.2 CESS : Similarly in case of Cess/Semi Depot supply, the Ground Balance Register shall reflect the quantity of ballast measured , the successive reducing balances due to dumping, date-wise and balance available on date STACK WISE should be recorded. As far as possible the full quantity of ballast in a stack shall be dumped at a time in case of cess . Further stacking of ballast in the HM in case of Cess/Semi Depot supply after dumping is not permitted.

18.2.3 Availability of Depot/Cess supply diagram augmented at each time of supply/dumping/training out shall be pre-requisite for processing bill for payment both for supply & dumping..

19.0 **DUMPING/TRAINING OUT:**

19.1 Measured ballast shall not be trained out/dumped when collection is in progress in the Depot/Sub-depot/Yard. Ballast shall also not be dumped/moved when collection is in progress within FIVE Kms. of the dumping area.

19.2 Addl General Manager specific approval for dumping/training out shall be obtained in writing stack wise prior to commencement of dumping/training out from a stack/plot. Ballast training out from Depot/dumping from cess shall be permitted only after elapsing of 7 days of passing of bill and also ensuring that a minimum period of 15 days is elapsed of recording of the initial measurements in Ballast Passing Register by the Engineer – In – Charge

NOTE : 1. In urgent cases, where ballast needs to be dumped /trained out and the 7/15 days mandatory period cannot be adhered to or the required test

check condition by Addl. General Manager for any bill cannot be complied with, a specific approval of General Manager/Civil shall be obtained with the reasons recorded in writing stack wise. In all such cases authorization shall specify the date on which the dumping is permitted.

NOTE : 2. There should be a buffer of at least FIVE Km between the locations of collection and running out/dumping of ballast at any point of time. Deviation from the above shall be permitted in case of urgency, only with the written approval of the General Manager/Civil, with reasons recorded in writing.

- 19.3 Instructions for training out/dumping as prescribed by the Railway from time to time should be complied with meticulously.
- 19.4 Ballast stacks once measured shall not be disturbed on any account except for dumping/training out after the authorization and disturbances otherwise, if any, will be treated as a case of theft and will be liable for prosecution.
- 19.5 No ballast stack shall be laterally or longitudinally moved by any other means other than BT/Rail lorry without written order of the General Manager/Civil at any stage. Movement of ballast longitudinally by road for facilitating loading in Rail lorry if found necessary, shall be done only with specific approval of the General Manager/Civil in writing and only with restacking and re-measurement in Ballast Passing Register at the cost of the Contractor who is dumping the ballast. No payment for such restacking/re-measurement will be made by the Railway. Any shortage if notice after re-measurement, will be at the cost of the contractor and will be recovered from his dues.
- 20.0 **GUARDING OF BALLAST:**
- 20.1 Till such time, the ballast is measured and taken over by the Railway; its custody shall be responsibility of the contractor.
- 20.2 Subsequent to making payment to the contractor, in case the ballast is found to be non-conforming to Specifications or if the Ballast is misappropriated in any form, recovery will be made immediately from contractor's bills/ security deposit etc. or from any money payable under this or other contracts at TWICE the rate paid. In case it is established that the contractor is involved in such fraudulent practices, he is liable to be BANNED from doing business with Railways/Other Central Govt depts.
- 20.3 The contractor shall keep regular watch on all measured stacks till the whole supply is effected and contract is successfully completed.
- 20.4 The contractor shall also keep watch on dumping being undertaken by him / other agencies and ensure that the works are properly done without any misappropriation / mismanagement and any other untoward incidents.
- 21.0 **GENERAL PAYMENT TERMS**
- 21.1 Unless and otherwise specified, the BASE rate quoted by the Contractor at the time of tendering and the agreement rate as concluded in the contract for all the items in the schedule shall include the cost of all labour, transportation,

consumables, tools, plants, equipment's, machinery, all lead, lift, ascent, descent, jungle clearance, making of approach road, handling, re-handling, loading, unloading, transportation, crossing railway lines, crossing of nallahs, roads, any other obstructions and cost of protection, guarding and other any safety precautions required, seignories/royalty, etc. **The quoted rates shall include all taxes and duties as per the various provisions of the Central Goods and Service Tax Act,2017 (CGST)/Integrated Goods and Services Tax Act,2017(IGST)/ Land Mineral Tax/ Union Territory Goods and Services Tax Act 2017 (UTGST)/respective state's State Goods and Services Tax Act (SGST) also, as notified by Central /State Govt & as amended from time to time and applicable taxes. Tenderers will ensure that full benefit of Input Tax Credit (ITC) likely to be availed by them is duly considered while quoting rates.** Nothing extra will be payable on any account unless otherwise specified exclusively in the item of schedule.

- 21.2 **Contractor shall produce Mineral Revenue Clearance Certificate / Seignorage / Royalty payment receipts other statutory clearance as required along with each On Account bill. In case the contractor does not produce such clearance, recovery of seignorage/other charges as ascertained by KRIDE will be made from bills. Refunding of such recoveries shall be done** only with the clearance of the State Govt./Central Government agencies as required for which the Contractor is solely responsible and no claims/representation whatsoever in this regard shall be admissible.
- 21.3 No claims for extra payment will be entertained on account of interruption of work due to rain, floods, or any other cause. Contractor must nevertheless arrange to carry on this work in rainy season. No claim for work done in low lying water-logged area, local pits and depressions containing rain water, wet earth conditions etc., will be entertained by the KRIDE.

Annexure : B-1

**AGGREGATE ABRASION VALUE
(BASED ON IS:2386 IV 1963)**

1.0 Apparatus

1.1 The abrasion test for track ballast shall be carried out using LOS Angeles machine as per fig.1.

1.2 The abrasive charge shall consists of 12 nos. cast iron or steel spheres approx. 48mm dia. and each weighing between 390 and 445 gm ensuring total weight of charge as 5,000 +/- 25gm.

1.3 IS sieves of sizes 50mm, 40mm, 25mm, and 1.70mm.

1.4 Drying Oven.

2.0 Test Sample.

2.1 The test sample of 10,000gm shall consist of clean ballast con-forming to the following grading:

| | |
|--|-------------|
| Passing 50mm and retained on 40mm square mesh sieve. | 5,000gm (@) |
| Passing 40mm and retained on 25mm square mesh sieve | 5,000gm (@) |

(@) Tolerance of +/- 2% permitted.

3.2 The sample shall be dried in oven at 100-110oC to a constant weight and weighed (Weight "A").

3.0 Test Procedure

3.1 The test sample and the abrasive charge shall be placed in the Los-Angles abrasion testing machine and the machine rotated at a speed of 20 to 33 revolutions/minute for 1000 revolutions. At the completion of test, the material shall be discharged and sieved through 1.70mm IS sieve.

4.0 Analysis and Reporting of the Result.

4.1 The material coarser than 1.70mm IS sieve shall be washed dried in oven at 100-110 c to a constant weight and weighed (Weight B).

4.2 The proportion of loss between weight A and weight B of the test sample shall be expressed as a percentage of the original weight of the test sample. This value shall be reported as:

$$\text{Aggregate Abrasion Value} = \frac{A - B}{A} \times 100$$

Annexure: B-2

**AGGRAGATE IMPACT VALUE
(BASED ON IS: 2386 PART IV-1963)**

1.0 Apparatus: The apparatus shall consist of the following:

- 1.1 (a) Impact testing machine conforming to IS:2386 part IV-1963 as per fig 2.
- (b) IS sieves of sizes 12.5 mm, 10mm and 2.36mm.
- (c) A cylindrical metal measure of 75mm dia and 50mm depth.
- (d) A tamping rod 10mm circular cross section and 230mm length, rounded at one end.
- (e) Drying oven

2 Test Sample

- 2.1 The test sample shall be prepared out of track ballast so as to conform to following grading:

| | |
|---------------------------|------|
| - Passing 12.5mm IS sieve | 100% |
| - Retention 10mm IS sieve | 100% |
- 2.2 The sample shall be oven dried for 4 hours at a temperature of 100-110 deg. C and cooled.
- 2.3 The measure shall be filled about one-third full with the prepared aggregate and tamped with 25 strokes of the tamping rod. A further similar quantity of aggregate shall be added and a further tamping of 25 strokes given. The measure shall finally be filled to overflowing, tamped 25 times and the surplus aggregate struck off, using tamping rod as a straight edge. The net weight of the aggregate in the measure shall be determined to the nearest gm. (Weight 'A').

3 Test Procedure

- 3.1 The cup of impact testing machine shall be fixed firmly in the position on the base of the machine and the whole of the test sample placed in it and compacted by 25 strokes of the tamping rod.
- 3.2 The hammer shall be raised 380 mm above the upper surface of the aggregate in the cup and allowed to fall freely on to the aggregate. The test sample shall be subjected to a total of 15 such blows, each being delivered at an interval of not less than one second.

4 Analysis and Reporting of the Result

- 4.1 The sample shall be removed and sieved through 2.36 mm IS sieve. The fraction passing through shall be weighed. (weight 'B'). The fraction retained on the sieve shall also be weighed (Weight 'C') and if the total weight (B+C) is less than the initial weight (weight 'A') by more than one gm., the result shall be discarded and a fresh test made.

- 4.2 The ratio of the weight of the fines formed to the total sample weight shall be expressed as a percentage.

$$\text{Aggregate Impact Value} = \frac{B}{A} \times 100 \quad \text{-----}$$

- 4.3 Two such tests shall be carried out and the mean of the results shall be reported to the nearest whole number as the Aggregate Impact Value of the tested material.

K-RIDE

Annexure: B-3

WATER ABSORPTION
(Based on IS:2386 Part III-1963)

1. **Apparatus:** The apparatus shall consist of the following:
 - a. **Wire Basket** - Perforated, electroplated or plastic coated with wire hangers for suspending it from the balance.
 - b. Water tight container for suspending the basket
 - c. Dry soft Absorbent cloth 75 x 45 cm size 2 Nos
 - d. Shallow Tray of minimum 650 square cm area
 - e. Air tight container of capacity similar to basket.
 - f. Drying Oven.
2. **Test Sample**
A sample of not less than 2000gm shall be used.
3. **Test Procedure**
 - 3.1 The sample shall be thoroughly washed to remove finer particle and dust, drained and then placed in the wire basket and immersed in distilled water at a temperature between 22-32 deg.C.
 - 3.2 After immersion the entrapped air shall be removed by lifting the basket and allowing it to drop 25 times in 25 seconds. The basket and sample shall remain immersed for a period of 24 + 1/2 hours afterwards.
 - 3.3 The basket & aggregate shall then be removed from the water, allowed to drain for few minutes, after which the aggregate shall be gently emptied from the basket on to one of dry clothes and gently surface dried with the cloth, transferring it to second dry cloth when the first will remove no further moisture. The stone aggregate shall be spread on the second cloth and exposed to atmosphere (away from direct sunlight) until it appears to be completely surface dry. The aggregate then shall be weighed (weight 'A')
 - 3.4 The aggregate shall then be placed in an oven at a temperature of 100-110 deg.C for 24 hours. It shall then be removed from oven, cooled and weighed (weight 'B').

4. **Analysis and Reporting of the Result**

$$\text{Water Absorption} = \frac{(A-B)}{B} \times 100$$

4.1 Two such tests shall be made and individual and mean results shall be reported.

ANNEXURE: B-4**FORMAT FOR PRESENTING TEST RESULTS OF BALLAST SAMPLES WHILE TENDERING**

1. Name of Laboratory :
2. Address :
3. Referred by :
4. Quantity / Weight of ballast }
sample offered for testing } Unit
(Cum/Kg.)
.....
5. Source :
6. Date offered for testing :
7. Date Tested :
8. Test Results in Percentage :
 - i. Abrasion Value :
 - ii. Impact Value :
 - iii. Water Absorption :
9. Remarks :
10. Singature and Designation }
of the representative of }
the Laboratory }