Functional Requirement Specification of Formation Rehabilitation Machine

1.0 General:

1.1 Indian Railways is looking for Formation Rehabilitation Machine, capable of replacing formation top layer to the desired depth by approved quality blanketing material comprising of a mixture of new blanket material, recycled crushed ballast and water. The machine should have the capability to crush the existing ballast for making it suitable for use as blanket material and should also be capable of cleaning and re-cycling existing ballast and to insert it with additional new ballast into the track. The machine is to be deployed on existing BG (1676 mm) track and should be capable of allowing the trains to pass at a minimum speed of 40 kmph, just after completion of work and clearance of the block section.

1.2 The machine should comprise of the basic machine and a number of auxiliary units essential for working. The offer should comprise of complete system including the main machine and auxiliary units like material wagons & muck wagons with loading, unloading arrangements, conveying arrangements, material transporting arrangement (as integral part of the entire machine) from material wagons to distributing unit etc. required for 2 shifts (16 hrs.) continuous working.

2.0 Technical Requirements:

i)	Working Site	a) On straight, transition and curved track (up to 10°) on broad gauge (1676mm) of Indian Railways. b) The machine shall be capable of working in long continuous cutting/high bank. The machine working in cuttings should not adversely affect the side drainage. c) The machine shall be capable of working on all types of track structures including rails of 60 kg/52 kg/90R on concrete/metal/ wooden sleepers on tangent track as well as curves. The track lifting mechanism shall have adequate capacity to lift all types of track (as mentioned above) up to 250mm. d) Operation of Machine should not result in excessive stresses in the rails, sleepers and fastenings. e) In case there are any specific requirements to bring the rails to a minimum stress free condition before the start of work (in case of LWR/CWR), the same should be specified by the supplier. f) While excavating, there may be few hidden obstructions encountered by the excavating chains. The excavating mechanism should be equipped with a safety mechanism so as to stop the excavating chains immediately on encountering a

		hidden obstruction so as to avoid any damage to the excavating mechanism or the machine.
ii)	Track Geometry Guidance	The machine shall be equipped with a Track Geometry Guidance system. The Track Geometry Guidance System shall restore the track to original longitudinal and lateral profile after the track skeleton is released back on the compacted blanket and screened ballast.
iii)	Profile of the machine longitudinally and in cross section during movement	a) Within the maximum moving dimensions shown in the Indian Railways Standard BG schedule of Dimensions (metric)-2004 print and is enclosed as Annexure-I b) Keeping in view the length of the loops/sidings on IR, the overall length of formation rehabilitation train, inclusive of locomotive and all material and muck wagons etc. shall not be more than 686 metres. c) Machine shall be capable of working without requiring power block in electrified sections. 25 KVA AC is used for traction through an overhead wire at 5.5 m above rail level. On bridges and tunnels, the height is restricted to 4.8 m.
iv)	Minimum vertical clearance of any part/component.	102 mm from rail level while travelling
v)	Axle load	Lesser than 20.32 t (Axle loads upto 22.82 tonnes and lower axle spacing may be permitted, provided the load combinations do not cause excessive stresses in the tracks & bridges of IR). Stresses in the tracks & bridges shall be calculated by IR/RDSO based on design data submitted by the firm as per (annexure-IVA,B &C), and decision of IR/RDSO shall be final in this regard).
vi)	Minimum axle spacing	1.83m
vii)	Load per metre	Not exceed 7.67 t
viii)	Wheel dia	914 mm. Lesser diameter upto 730 mm (new wheel profile) can also be considered, provided it meets the conditions of condonation of infringements (if any) at the discretion of the purchaser
ix)	Ambient condition	Ambient temperature : 0^{o} - 55°C Altitude : Sea level to 1800 m above mean sea level Humidity : 40% to 100% Maximum rail temp. : 70^{o}C
x)	Minimum Speed (during movement in train formation)	80 kmph
xi)	Output	a) The machine shall be capable of blanketing the entire width of formation which may be upto 8 m. b) Rehabilitation of formation length of minimum 200

		metre in a shift of 8 hrs, including the machine setting up and winding up time, restoration of track for traffic at 40 kmph and travel time for a distance upto 10 Km.

3.0 Brief Functional Requirements:

3.1 The machine shall be capable of doing following works:

i) Removal of the existing ballast and the existing top formation layer (upto 1350mm depth below the sleeper bottom at rail seat) by appropriate excavating mechanism. Arrangement, if any, for replacing the formation up to 3350mm below sleeper bottom may also be elaborated.

ii) Conveying the recyclable ballast after cleaning, screening and crushing to new ballast feed or for blending it with the new blanket material.

iii) Conveying the non- recyclable ballast for disposal to muck wagons.

iv) Conveying the excavated formation soil and the muck released from ballast screening and cleaning for disposal to muck wagons

v) Conveying the blanketing material of approved specifications from the attached material wagons or blending units and lay the same across the entire formation width, compact it in layers so as to achieve the specified minimum dry density across entire width and depth of blanket layer. Since optimum compaction is obtained at particular moisture content for a particular soil, the machine shall have provision for maintaining the moisture content at optimum level by water addition. The water storage on the machine should be adequate for two shift working.

vi) Dress the formation top with desired cross slope (I in 25 to 1 in 40)

vii) The new and recycled ballast shall be deposited on the compacted blanket, before the lifted track is placed back on it.

viii) Release the lifted track on to newly compacted blanket and ballast and doing the necessary tamping so as to allow the trains to pass at a speed of not less than 40 kmph after the clearance of the traffic block/track possession by the machine.

3.2 The machine composition should have arrangement for carrying all required materials i.e., blanketing material, ballast, water etc.

3.3 The machine should be equipped with arrangements to lay Geo-grid and Geo-textile with the required overlaps across the full width below/within the blanket layer.

3.4 The machine should have arrangements for adjusting the edge of cut to avoid obstructions like signal/OHE mast foundations etc.

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Annexure-I

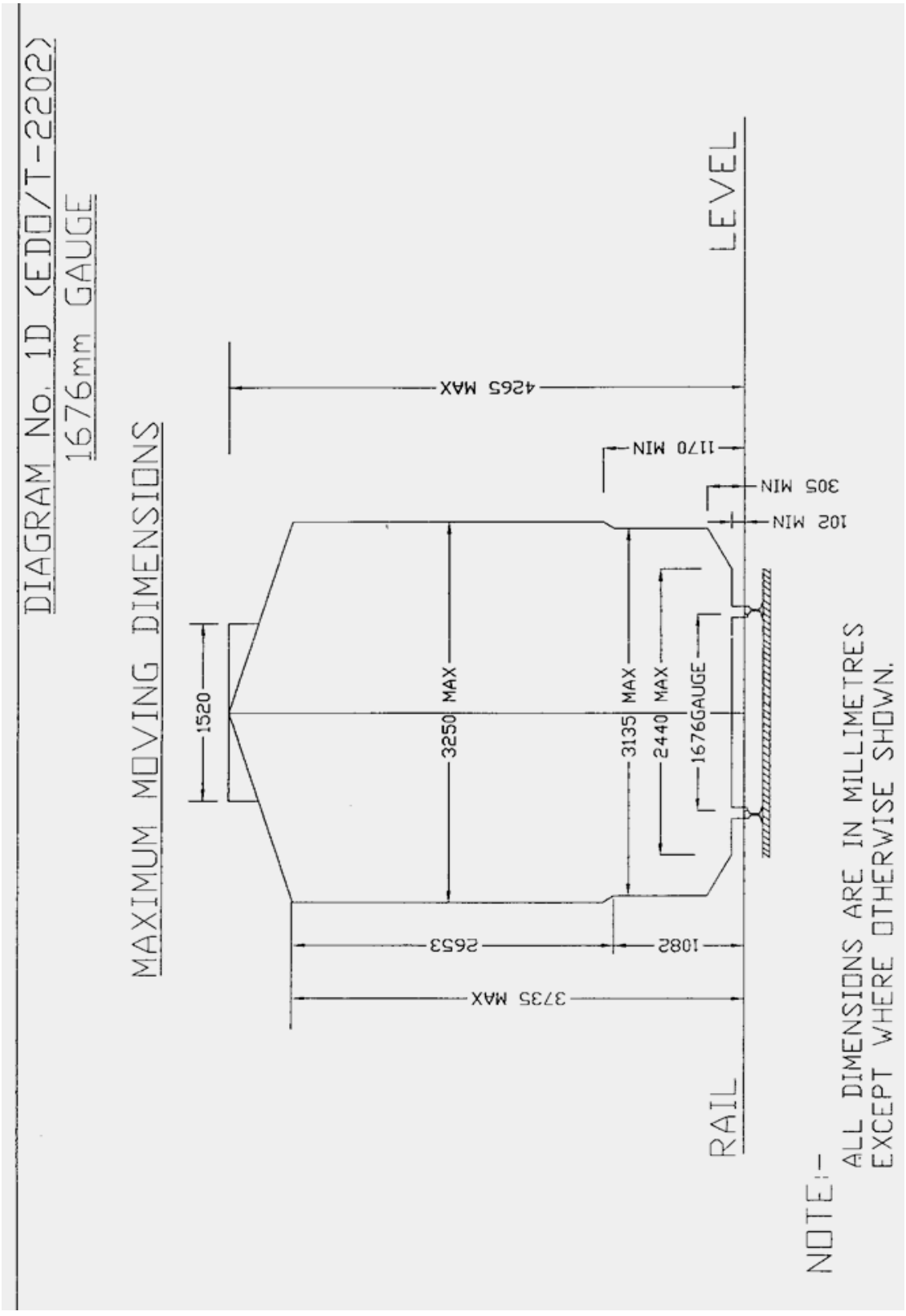
DIAGRAM No. 1D (EDO/T-2202)
1676mm GAUGE
MAXIMUM MOVING DIMENSIONS
LEVEL
RAIL
4265 MAX
1170 MIN
305 MIN
102 MIN
1520
3250 MAX
3135 MAX
2440 MAX
1676GAUGE
2653
1082
3735 MAX
NOTE:-
ALL DIMENSIONS ARE IN MILLIMETRES
EXCEPT WHERE OTHERWISE SHOWN.