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INDIAN RAILWAY

SPECIFICATIONS FOR POINTS & CROSSINGS CHANGING MACHINE FOR BROAD GAUGE (1676 mm)

(Specification No. TM/HM/PCCM/370 rev. 01 of 2016)

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SPECIFICATIONS FOR POINTS & CROSSINGS CHANGING MACHINE FOR BROAD GAUGE (1676 mm) (Specification No. TM/HM/PCCM/370 rev. 01 of 2016)

1.0 GENERAL

1.1 These specifications have been framed for a robust and sturdy machines, which shall take out the old turnouts and replace them by newly assembled turnouts expeditiously and with desirable degree of accuracy. It shall also perform other related functions as detailed in the following clauses.

1.2 The technical specifications have been drafted to reflect the performance and quality requirement of the machine in a neutral manner without bias to any specific manufacturer. Bidders are requested to study the specifications carefully and assure that their machine fully comply therewith. If a bidder feels that his machine can substantially meet the performance and quality requirements of the specifications, but does not fully satisfy a particular specification, he should mention the same in the statement of deviation from the specifications, giving the details how the functional requirements are going to be met with.

1.3 The bidder shall specify the make/model offered and furnish a detailed technical description of the machine. The machine may consist of more than one units and the complete set of units required for performing the functions desired in the specifications shall be treated as one machine. Systems/subsystems of the working mechanism of the machine, as per Para 3 in particular and all items of the specifications in general, shall be described in detail in the “Technical Description” along with sketches to show the manner in which the requirements of the specifications are accomplished by the machine (model) offered.

1.4 Photographs of the type of machine offered in working mode shall be enclosed with the offer. This shall also show close-ups of various working assemblies/systems and the full machine. The tenderer shall also furnish a compact disc (computer enabled) or DVD or USB showing the working of machine in real time under field conditions. Tenderer shall also submit the names of countries & Railways where the offered machines are working and where their working at site can be visited by Indian Railway officials.

2.0 DIMENSIONAL AND OPERATING REQUIREMENTS

2.1 The machine shall be diesel powered which shall be robust, reliable and suitable for working on straight, transition and curved tracks (upto 10 degree) on broad gauge (1676 mm) of Indian Railways. The design and dimensions of the machine and its components shall be to metric standards and shall comply with provision of Indian Railways Schedule of Dimensions-1676mm gauge(BG), revised, 2004 with latest corrigendum and upto date correction slips issued. Quality assurance during manufacturing of the machine shall be according to ISO-9001.The welding standard followed for manufacturing of machine should conform to ISO: 3834, EN: 15085 or any other equivalent standard for welding railway vehicle and components. The manufacturer should specify the standard followed and certify that it meets the welding standard mentioned above.

2.2 The profile of the machine (including its units) longitudinally and in cross-section shall be within the provision of Indian Railways Schedule of Dimensions–1676 mm gauge (BG) revised, 2004 with latest corrigendum and up to date correction slips issued during transfer as self-propelled vehicle on track or loaded on railway wagons. The minimum

and maximum moving dimensions are enclosed at ANNEXUREI/I. Floor height of standard railway wagon of BWT/B, in empty condition may be taken 1070 mm from Rail level (Annexure-I/V) to determine the profile of machine as loaded on Indian Railway BWT/B type wagon. Floor height may be reduced beyond 1070 mm in loaded condition.

2.3 Adequate clearance shall be allowed so that no component of any unit of machine shall infringe the minimum clearance of 102 mm from rail level while travelling on track up to condemnation limit.

2.4 Wherever applicable, Axle load of machine units shall be lesser than 20.32T with minimum axle spacing of 1.5 m while moving on track with or without Turnout. Load per meter shall not exceed 7.67 T.

2.5 It shall be desirable to have rail wheel diameter of 915 mm, however, lesser diameter can also be considered.

2.6 Machine units shall be capable of negotiating curves up to 10^0 curvature (175 m radius), super elevation up to 185mm and gradients up to 3% in travel mode.

2.7 It shall be capable of continuous operation during the varying atmospheric and climatic conditions occurring throughout the year in India. The range of climatic conditions is as follows:

Ambient Temperature	:	-5^0 C to 55^0 C
Altitude – Sea Level	:	1750 m above mean sea level.
Humidity	:	Upto 100%
Max. rail temperature	:	70^0 C.

All the system components on the machine, which are vulnerable to moisture ingress and adversely affected during rains, should be covered by roof or suitable arrangement so that the machine is able to work continuously even during rains.

2.8 During transfer from one station to another, the machine units should be equipped with suitable arrangements to fasten & secure it properly on the Railway wagon, so as to permit the movement of loaded Railways wagon at a speed of 75 kmph.

2.9 It shall be capable of working and travelling without requiring power block in electrified sections.2x25KV AC power supply is used for traction through an overhead wire at 5500 mm above rail level on Indian Railways. The height is restricted to 4800 mm on bridges and tunnels.

3.0 **WORKING MECHANISM**

3.1 The machine shall be required to handle 1 in 8 ½ or 1 in 12 or 1 in 16 or 1 in 20 turnouts with Straight or curved switches or thick web switches and built up/cast manganese steel / welded crossing on concrete sleepers. The details regarding length and weights of 1 in 8 ½, 1 in 12 and 1 in 16 turnout on concrete sleepers is at Annexure I/II. Total weight of 60 kg 1 in 12 fan shaped concrete turnout is 54.936 tonnes and that of 1 in 16 is about 67.40 tonnes as mentioned at Annexure I/II. Out of this, while lifting the assembled turnout more weight comes on the machine due to lifting the crossing side. Total weight of assembly may increase even further with introduction of thick web switches and wider sleepers for 25 t axle load. Considering these factors, lifting capacity of the machine

shall not be less than 72 metric tonnes while lifting and transporting the assembled turnout. If two or more than two units are used for the job, individual capacity of each unit shall be equal and total capacity of these units acting as machine shall not be less than 72 metric tonnes. The machine should also be capable of handling Diamond turnout on Concrete sleepers and Trap switches on concrete sleepers. Dimensional detail of Diamond and Trap switch is enclosed at Annexure I/II.

3.2 Total number of lifting points (Left rail and Right rail lifting together at one location is one point) in machine (all units involved in lifting at a time put together) should not be less than 6 to avoid excess sag in assembled turnout on concrete sleepers when lifted by machine. The load carrying capacity of each hook/chain/Jaw should be sufficient to lift the complete assembled turnouts according to number of lifting points.

3.3 It shall be possible to change the entire turnout as one piece. However, if required by the Purchaser, it shall also be possible to change the turnout in segments. The machine shall however be so designed that it could be modified and /or augmented to handle longer turnouts of 1 in 16 and 1 in 20 which shall be 55 m and 65 m long respectively.

3.4 The machine shall be capable of completing the following operations in a single traffic block(refer sketch at Annexure -I/III)

a) Machine approaching the old turnout (G) from the side position near (A) or longitudinally from position near (D) or from some parking position in the yard by Lateral shifting and by moving on track.

b) Picking up of the complete assembly of old turnout (G) and its transportation and deposition at Position near (A) or (B) depending on site conditions. It may be noted that position near (A) may not necessarily be right opposite the old turnout and therefore the old turnout may be required to be moved both longitudinally and laterally or else it may have to be steered to Position near (A) or (B) at an angle other than right angle to the track.

c) Transfer of machines to the new turnout assembled at position near (A) or (B) and its lifting and transportation to the site of laying.

d) Laying of new turnout in place of old turnout.

e) Clearing of the site by the machines to position near (A) or (B) or some other position in the yard after laying of Points and crossing.

3.5 The machine (with its units) should have following capability (Refer sketch at Annexure-1/III) to perform the above function.

a) The machine and its units can be unloaded from Railway wagon in suitable siding line in Railway Yard and can be self-propelled to position C and D with trolley without requiring any assistance of another power/Locomotive. This movement of machine should preferably be on Rail wheel on track so as not to infringe train movement on adjacent track and negotiating from one track to another over turnout which may be required for reaching position C and D is also comfortable.

b) It should be capable of shifting itself with all necessary units from track (C) & (D) to the position on ground at say position (A) and (B) which may be required for clearing occupied track or to shift itself on the fabricated panel placed at position A and B. The shifting facility and procedure should be simple and each set of unit being shifted should be stable by itself not requiring additional assistance of any auxiliary unit.

c) It should be capable of laterally shifting fabricated assembly from position on ground at say A or B to the nearby location for either directly laying the prefabricated panel or to load it over trolley placed on track there for shifting on track to some other position of laying .

d) It should be able to carry prefabricated turnout assembly over trolleys.

e) It should have arrangement for carrying the fabricated assembly longitudinally on crawler on prepared bed for final laying and adjustment.

f) The machine should have the capability to self-load and unload itself with its units from the Indian Railways wagon as per para 3.17.

The manufacturer should clearly state how the above capability has to be provided.

3.6 The supplier shall quote as part of the machine the following as applicable to his system.

a) Prime mover for longitudinal transfer of the old or new turnout assembly on track and on ground.

b) Facilities for lifting, loading and unloading on and from trolley & laying of old or new turnout assembly during the process of renewal.

c) Facilities of loading and unloading of machine and its unit on Indian Railway wagon for transit from one station to other (Ref. clause 3.17) .The BWT/B wagons used on IR are detailed in Annexure I/V, and total requirements of such wagons should not be more than two.

d) Any other unit required for performing the operations mentioned in clause 3.4 and for having capability mentioned at Clause 3.5.

3.7 As mentioned in para 3.5 above, the facilities for transfer of old or new turnout shall be provided in the shape of trolleys. There should be minimum four numbers of trolleys to avoid sag in assembled turnout. The powering arrangement for movement of trolleys should be clearly stated. The trolleys should be motorized so that they are capable of lifting the assembled turnout by at least 30 cm and at same time they should also be capable of slewing the lifted turnout by at least 30 cm in either direction (left or right).

3.8 Various types of units comprising the system shall be quoted and described individually and the total number of each type of units in the system shall be clearly stated. The machine shall permit unrestricted movement of trains on the adjoining up tracks while replacing a turnout, in situations mentioned at clause 3.4.

3.9 The machine shall also have the capability to change turnout on a Platform line (low and rail level).

3.10 The workers at site shall not be required to work under a lifted turnout at any stage of the turnout changing operation.

3.11 Portal type unit of machine shall have preferably four legs or a Crawler with rail wheel arrangement for movement on track for ensuring stability and safety. Crawlers shall move on continuous steel chains provided in machine units for movement on ground. Crawler chains should be covered with rubberized shoe plates to avoid any damage to the rails, sleepers and other track fittings. It is desirable that the rubber soles are made / fitted in such a manner that the replacement / recoupment are possible during the service life of machine. Further during the service life of machine, replacements of rubber soles should be treated as a spare part for which the supplier has to ensure availability of rubber sole and its fitment on the steel chains (read with para12, as well).

3.12 Machine may require to pass an OHE mast, a signal post or a wagon standing on another line, etc. during longitudinal transfer of the turnout on track. The cycle of by-passing such an obstacle by laterally shifting the turnout by 1 m, then moving 50 m in forward direction and again reverting back to the original position by lateral shift shall not take more than 6 minutes.

3.13 While working on platform lines, if the platform is to be used for machine working, the maximum pressure applied on platform surface by machine and its units supporting the prefabricated panel shall not exceed 3 kg /cm^2.

3.14 The operations of travelling, lifting / lowering or lateral shifting shall not be sudden or jerky to avoid distortion of the turnout. During transport of the linked turnout, rails, sleepers and other track components are subjected to handling stresses so it is desirable that the mechanism of picking up and handling is smooth.

3.15 Operations of gripping / releasing of turnouts and lifting /lowering, travelling & braking shall preferably be done from one operating panel for the purpose of better synchronization and reduced stresses on the turnout. In any case, if more than two operators and corresponding number of units have to perform travelling/ braking/ lifting / lowering / shifting operations, simultaneously, the machine shall have in-built system of synchronization of the motion of all units. Provision should exist for either synchronized working or the independent working of the machines by operation of switch inside the working cabins wherever applicable.

3.16 There shall be adequate safety arrangement to ensure proper locking of the lifted turnout to avoid any chance of falling of the same. It is desirable to maintain the lifted turnout in one horizontal plane. Suitable arrangement and control systems may be provided on the machines for this purpose.

3.17 The machine units which are not self-propelled for transfer from one station to another and are required to be loaded on Railway wagons for transfer, the same shall be self-loading / unloading type or else a crane or suitable equipment or arrangement required for loading/unloading of the machine units shall form the part of the machine and be quoted by the tenderer accordingly. The loading/unloading equipment or arrangement of self-loading / unloading on Railway wagons shall be transported along with the machines. The wagon floor height may be taken same as in Clause 2.2. Also, the loaded profile should not infringe the minimum and maximum moving dimensions enclosed at ANNEXURE I/I.

3.18 Sag in the turnout in lifted position during transit or during laying shall not be more than 20cm at any point for 52 / 60 kg rails turnouts on concrete sleepers. Calculation may be submitted in support. The lifting location and number of transportation trolleys may be increased if required to achieve the sag within the specified limits.

3.19 There shall be provision for longitudinal and lateral adjustments of the lifted turnout assembly for at least 20 cm in the assembly lifting unit of machine for accurate positioning at the time of final laying for proper butting of Stock Rail Joint and Back Leg of Crossing.

3.20 In the case of machines provided with sliding beams and tubes, there should be provision of lubrication/rollers on the metallic surfaces in contact with each other. The beam should be made to slide inside the tube with wear plates surrounding the beam in such a manner that, the beam's surfaces do not rub directly on the tubes insides. This will ensure that neither the tube nor the beam is damaged in case of wear due to metallic friction and wear is borne by the especially designed wear plates. The wear plates should be fixed on the beam in such a manner that they can be replaced with ease.

3.21 The complete break-up of the cycle time inlaying of one prefabricated assembly of 1 in 12 turnout and clearing the site by machine for train operation over newly laid turnout in the situations given in Annexure 1/VI shall be given by the tenderer in his description of the working of the machine. This will include steps involved in shifting of machine to position of fabricated panel, positioning itself for clamping, lifting, laterally shifting, longitudinal shifting, transportation, lowering, butting of Stock Rail Joint and releasing of the turnout and clearing the relayed point. The maximum lateral and longitudinal stroke assumed for the purpose shall also be specified.

3.22 Speed of longitudinal transfer of the machine while carrying a 1 in 12 concrete sleeper turnout shall be furnished.

3.23 The supplier should get acquainted himself with normal Indian Railway yard layouts and the types of terrain available in the Indian Railway yards. The machine should be able to work successfully in all the yards and the timings mentioned in para 3.21& 3.22 above should take into account the realistic yard conditions.

3.24 The offer shall also be submitted separately including a complete scheme of operations with timings to cover all the operations like machine approaching the old turnout, removing the old turnout, shifting the same to the location specified, placing it on ground, machine approaching the new turnout, picking it up, bringing of the new turnout to the site of laying, laying of new turnout and clearing of the site by the machines.

3.25 The holding and lifting (which is normally by clamping on rail) of turnout assembly by machine during lateral shifting, longitudinal shifting, transportation & final laying should be rigid enough so as not to normally take reaction from sleeper at any time which may disturb the original position of sleeper on assembled turnout. All units involved in the process should also be synchronized.

3.26 The machine should be equipped with GPS, GSM/GPRS based remote monitoring capabilities for monitoring the location of machine on real time basis. The data transfer unit of this equipment should be compatible with the Track Management System (TMS) of IR.

4.0 DIESEL ENGINE

4.1 The machine and its unit shall be powered by diesel engine preferably indigenous, with proven record of service in tropical countries; robust construction and low maintenance cost are of particular importance. Adequate allowance shall be made for de-rating of diesel engine under the most adverse climatic conditions mentioned in this specification elsewhere.

4.2 The supplier shall furnish the details of diesel engine and its controls to assess its conformity with the engines already operating on track machines on Indian Railways. The engine should be one of such designs/brand which is being manufactured indigenously and/or such designs, whose after sales servicing facilities are available in India.

4.3 High-speed diesel oil to Indian Standard Specification shall be normally used. Minimum fuel tank capacity sufficient for continuous operation of each unit of machine for 8 hrs will be desirable.

4.4 Sight glass type fuel measuring gauge preferably of full height shall be provided on the fuel tank.

4.5 For starting the engine, storage batteries of well-known make shall be provided for starting the engine. The engine shall normally be push/pull button start type or key type.

4.6 Since the engine has to work outdoor under extreme dusty conditions, the air intake system shall be designed suitably so as not to allow dust through air intake system.

4.7 There is a likelihood of dust deposition over the engine body and surrounding area over the lubricants spill over. These should be easy to access for daily cleaning and routine maintenance. In case, air cooled engines are proposed by the supplier, maintenance equipment for cleaning and maintenance of the air cooling fins shall be provided by the supplier along with the machine.

4.8 The engine parameter monitoring gauges like temperature, rpm, and lubricant Oil pressure shall be direct reading type mounted on the engine backed up by electrical/mechanical gauges in the operator's cabin showing the absolute readings along with safe limits suitably coloured. There shall be audio visual warning (safety mechanism) to the operators in case of any of the parameters exceeding the safe limit, engine shut down automatically.

4.9 Suitable and rugged mechanism should be provided to start the prime mover at no load/minimum load and gradual loading after the start of the prime mover.

4.10 The engine power take off shall be coupled to the main gear box through a flexible coupling. The engine shall be mounted on suitable Anti Vibration Mountings.

4.11 The tenderer should furnish the information regarding make and model of the engine proposed to be used and details of agency which will provide after sales service support and availability of spares in India, details of diesel engine and its controls to assess its conformity with the engines already operating on track machines on Indian railways. If the machine design incorporates an engine, not already operating with the purchaser, the model of the engine is liable for change as per the technical requirements and the maintenance logistics with the purchaser after technical negotiations with the supplier. Nothing extra shall be payable on this account.

4.12 In order to adhere to pollution control norms, the diesel engine should be electronically controlled emmissionized engine with minimum compliance of tier 2 stage.

4.13 The engine should be enclosed in a weather protective, sound and dust resistant enclosure to minimise engine noise and to prevent oozing out of oil spills etc. from engine area to the adjacent machine components, hoses, electrical cables fittings as a protection against fire. All doors on the enclosure shall be strategically located in areas as to allow ease of maintenance of the engine and allow good access to and visibility of instruments, controls, engine gauges, etc. Sufficient louvers shall be provided to allow the total engine cooling air requirements used in this application.

5.0 COOLING SYSTEM

5.1 The cooling system shall be efficient and designed for a maximum ambient temperature of 55°C. Supplier may note that the machine shall be working under extreme dusty conditions and the cooling mechanism should be maintainable under these conditions. Adequate heat transfer arrangement shall be provided so that under extreme heat conditions as mentioned in Para 2.7 above, the system oil temperature does not go beyond specified range of the engine.

6.0 BRAKES

6.1 Hydraulic/pneumatic brakes shall be provided. The brakes provided for the different operations shall be protected from ingress of water, grease, oil or other substances which may have an adverse effect on the brake. The brake lining shall be suitable for high ambient temperature of 55^0C. The force required for operating the brakes shall not exceed 10 kg at the handle while applying by hand and 20 kg on the pedal when applied by foot.

7.0 HORN, HOOTER AND SAFETY SWITCHES

7.1 The machine units capable of independent movement shall be provided with electric/pneumatic horns at suitable location. The horns shall be distinctly audible from a distance of at-least 200 m from the machine unit. The horns shall be operated by means of push buttons provided in the operating panel and also outside the machine body at appropriate locations. Wherever feasible adequate numbers of safety stop switches should be provided in the body of machine unit so that in case of any danger to worker during working, the working can be stopped immediately.

7.2 Machine shall be provided with emergency backup system to wind up the machine in the event of failure of prime mover or power transmission system of the machine.

7.3 One Pneumatically/electrically operated hooter capable of producing intensity of sound between 105-110 db at a distance of 5 meter (when measured in still air in a closed room) and with variation in intensity of sound not be more than 5 dB shall be provided as a unit with the machine. The hooter shall be fixed in one of the main unit facing outwards at suitable locations, operated by means of push buttons provided in the operating panel to warn the staff working on/around the machine about approaching train on adjoining track. Additional switches for such hooter shall be provided outside on the main machine unit frame so that it can be operated by staff present at work site near the machine unit. The hooter shall also be operatable from remote point at a distance of at least 300 m from the hooter.

8.0 ELECTRIC EQUIPMENT AND LIGHTING

8.1 The electrical equipment to be provided shall conform to relevant standard specifications and shall be suitable for Indian climatic conditions. The machine units capable of independent movement shall be equipped with head light at each end and with two front and rear parking lights, which can be switched on to red or white according to the direction of the travel. Powerful swivelling floodlights shall also be provided in main working units to illuminate the working area sufficiently bright for efficient working during night.

9.0 STRUCTURAL FRAME

9.1 The body framework shall be of standard welded steel sections and of steel sheets, so as to permit transportation of the machine properly secured on a wagon.

10.0 CABINS

10.1 Wherever operators' panel are provided in cabins, the cabin of that machine unit shall be fully enclosed with safety glass windows. In view of the high ambient temperature prevailing in India, special attention should be paid to free circulation of air and ventilation in the cabin. It shall be possible to have a clear view of the track ahead while driving/working the machine.

10.2 The gauges, instruments and controls shall be suitably located in the operator's panel so that they can be observed without undue fatigue to the operator. One screen wiper shall be provided preferably operated by compressed air/Electrically on the front window of cabin where ever applicable.

10.3 Suitable no. of fire extinguisher shall be provided in the cabin. The chemicals used for extinguishing fire by such fire extinguishers shall not chemically react with electronic equipments/components, PCBs, cables etc.

10.4 The machine shall be provided with adequate space for keeping the tools and spares required for on-site repair of the machine to attend the breakdowns and other working requirements.

11.0 TOOLS & INSTRUCTION MANUALS

11.1 Each machine shall be supplied with a complete kit of tools required by the operator in emergency and for normal working of the machine. The list of tools to be provided shall include all tools necessary for maintenance and repair of the entire machine including specialized equipment. All special tools shall be listed and catalogued illustrating the method of application. The tenderer shall along with his offer submit the list of tools to be supplied along with each machine. The list can be modified to suit the purchaser's requirement, while examining the offer.

11.2 Detailed operating manual, maintenance and service manual, service and repair instructions shall be specially prepared in English language and four hard copies & soft copies of each of the same shall be supplied with each machine.

11.3 The manufacturer shall also supply circuit diagrams of electrical, hydraulic, pneumatic and electronic circuits used on the machine and its unit. Trouble shooting diagram/table shall also be supplied. In addition, the tenderer shall provide dimension and drawings

with material description of items like rubber seals, washers, springs, bushes, metallic pins, etc. Main features such as type, rpm & discharge etc. of items like hydraulic pumps, motors and such other bought out components/assemblies shall be furnished by the tenderer. These shall be specially prepared in English language and four copies of these shall be provided with each machine.

11.4 While offering the machine for first inspection, the supplier shall submit one copy of complete technical literature in English language including operation, service and maintenance manual/instructions and complete electrical, electronic hydraulic & pneumatic circuit diagrams, troubleshooting charts, component drawings/description and other relevant technical details as reference document for the inspecting officer.

11.5 A draft copy of all documents to be supplied with the machine should be sent 3 months in advance of inspection of the first machine to RDSO for their review regarding adequacy and manner of detailing. Necessary modifications and further detailing as per RDSO's comments should be carried out and compliance should be reported to RDSO as well as the Inspecting officer of the first machine.

11.6 One set of all the manuals and diagrams should also be sent to the Principal/IRTMTC, Allahabad, one set to ED/TMM, RDSO, Lucknow, one set to DTK (MC)/Railway Board and one set to Director/IRICEN/Pune along with supply of first machine of similar group. In case, there is any subsequent amendment in above documents based on field performance, the amendment/amended documents should also be sent to above mentioned authorities.

11.7 One portable diesel operated D.C. welding plant (with the provision of auxiliary output of minimum 2.5 KW, 230 V AC for lighting) of reputed make (preferably made in India) with a minimum 5 KVA capacity capable of welding upto 5 mm electrode (dia) at 60% duty cycle shall be supplied. Sufficient cable or lead shall be provided with the welding plant for day to day repairing of machine and its wearing parts. The diesel tank capacity shall be not less than 10 liters.

12.0 SPARE PARTS

12.1 The tenderer should quote, apart from main equipment, separately for the mandatory spares as well as for recommended spares required for two years of operation along with description, part number, quantity, cost, whether imported or indigenous. The expected life of the components/spare parts should be advised along with their condemning limits. The manufacturer shall be responsible for the subsequent availability of spare parts to ensure trouble free service for the life of the machine (20 years). For indigenous parts, and bought out components and assemblies the source (original equipment manufacturers reference and part number) and other technical details shall be supplied while offering the first machine for inspection.

13.0 MAKER'S TEST CERTIFICATE

13.1 Copies of Maker's certificate, guaranteeing the performance of the machines shall be supplied in duplicate along with the delivery of each machine.

14.0 **OPERATORS**

14.1 The number of operators and allied staff for working of the machines under normal condition shall be indicated, specifying their duties and minimum qualifications.

15.0 **OPTIONAL EQUIPMENT**

15.1 Tenderer is expected to quote for optional equipment separately for each item giving the advantages/functions of such optional equipment. Tenderer shall also indicate whether such equipments are already in use on machines elsewhere indicating the user Railway system.

16.0 **WARRANTY**

16.1 In addition to the special conditions of contract dealing with warranty, the following will apply.
The machine shall be warranted for 1200 effective working hours or 18 months from date of commissioning and proving test of equipment or 24 months from date of delivery at ultimate destination in India whichever shall be earlier. Effective working hours for this purpose will be traffic block time during which machine is deployed for work. If any design modification is to be made in any part of the equipment offered, the warranty period of 18 months would commence from the commissioning and proving test of equipment for the purpose of that part and those parts which may get damaged due to defects in the new replaced part. The cost of such modification should be borne by the supplier.

17.0 **INSPECTION OF THE MACHINE**

17.1 While inspecting the machine before dispatch from the supplier's premises, the inspecting officer shall verify the conformity of the machine with respect to individual specification as above. The machine's conformity/non-conformity with respect to each item shall be jointly recorded before issue of the inspection certificate and approval for dispatch of the machine as per Annexure-IV enclosed.

17.2 Following arrangements shall be made by the supplier/Manufacturer at the inspection premises for carrying out inspection of the machine by inspecting officials:

- Machine units are to be stabled on straight & level BG track. The length of the track should be at least 10 m more than buffer to buffer length of machine.
- In order to check Maximum Moving dimensions in cross section, a Sturdy frame of IR Max Moving Dimensions shall be provided by the manufacturer and passed over the machine units (loaded on wagon or raised to the floor height of wagon) holding it perpendicular to track, centre aligned with track centre. Adequate arrangements shall be made to the satisfaction of inspecting official

17.3 The following documents shall be provided to the Inspecting Officer at least 4 weeks in advance of the date of inspection.

i) One copy of complete technical literature mentioned in clause 11, in English language, including operation, service and field maintenance manuals/instructions and complete electrical, hydraulic and pneumatic circuit diagrams, trouble shooting charts, component drawings/ description and other relevant technical details as a reference documents for the inspecting officer.

ii) Cross section of the machine units (both on track and loaded on wagon) super imposed on IR maximum moving dimensions envelope shall be provided to IO in advance.

iii) Clause by clause comments of the manufacturer to be sent to Inspecting Officer (IO) in advance for his review. Comments should state manufacturer's conformity of compliance of each of the requirement stated in each clause, elaborating where necessary the details/manner in which the requirement has been complied. The proforma for the clause-wise comments is given below:

Clause	Clause no.	Comments of Supplier/manufacturer	Comments of Inspecting Officer

iv) Manufacturer's Internal Quality Inspection Report of the machine.

v) Manufacturer's quality certificate and/or test reports for bought out assemblies/sub-assemblies to be provided to IO, containing serial number wherever applicable.

vi) Draft Inspection Report to be prepared by the manufacturer, containing all annexure mentioned at para 17.4

vii) Details of arrangements made for checking Maximum Moving Dimensions for his approval.

Supplier will incorporate amendments/further clarification in the above documents to the satisfaction of the Inspecting Officer keeping in view the Inspecting Officer's comments, if any.

List of documents to be annexed in the draft Inspection Report should include:

i. Maker's Test Certificate.
ii. Manufacturer's Internal Quality Inspection Report
iii. Quality Certificates of Bought out assemblies/sub-assemblies.
iv. Cross section of the machine units when on track and when loaded on wagon super imposed on the IRMMD.
v. List of spare parts to be dispatched along with the machine.
vi. List of tools to be dispatched along with the machine.
vii. List of Manuals, Drawings, Spare Parts Catalogues, etc. to be dispatched along with the machine, duly indicating the number of sets of each.

These above documents shall be part of final inspection report.

18.0 **ACCEPTANCE TESTS**

In addition to verification of the various items of specifications covered earlier, the following tests shall be carried out in India at the Purchaser's premises by the Purchaser's nominee at the time of commissioning of the machine.

18.1 Dimensional check of loading gauge i.e. maximum moving dimensions, clearance with machine units on track and on wagons wherever applicable etc.

18.2 Testing for negotiability of machine units capable of moving on track of 10^0 curve and on1 in 8 ½ turnout where ever applicable, on the first machine.

18.3 Stability test of machine loaded on Indian Railway wagon being pulled by power. Any arrangement to be made on first wagon for fixing the machine properly is to be done by the supplier. The details of wagon shall be as per para 2.2.

18.4 Construction and engineering of the machine and its ability to perform all the functions as laid down in the specifications above.

18.5 Actual output and performance quality test

These tests shall consist of the use of machine under field conditions in India. The machine shall be operated by the trained personnel of the purchaser or the operators provided by the supplier. The following operations will be conducted. (Refer sketch at Annexure 1/III).

a) The time taken in laying pre-assembled assembly from position (A) by lateral shifting to position (G) with proper alignment and butting of stock rail joint and back leg of crossing, taking initial position when machine units are in complete readiness with fabricated assembly should not be more than one and half hour. The laying is to be done primarily by lateral shifting without using transportation trolley to beforehand prepared bed at G. The above requires lateral shifting of minimum 6m and longitudinal shifting minimum 2 m. The time of one and half hour to include clearing of laid assembly by machine units for permitting movement of train over the laid assembly.

b) The time taken in laying pre-fabricated assembly (B) by shifting the assembly on trolley to Position (G) with proper alignment and butting of stock rail joint and Back leg of crossing taking initial position when machine units are in complete readiness with fabricated assembly for loading on trolley placed in the siding line should not be more than one and half hour. The laying would primarily be by longitudinally shifting the assembly to the beforehand prepared bed at (G). The above requires longitudinal movement up to 700 m. The time of one and half hour to include clearing laid assembly by machine units for permitting movement of train over the laid assembly.

c) Test of machine capability as per Item 3.5.

d) Self-loading/unloading of machine on wagons or loading by other equipment in accordance with Para 3.17 including self-loading of the equipment itself.

19.0 Should any modifications found necessary as a result of the tests, these shall be carried out by the supplier at his own expenses.

20.0 TRAINING AND SERVICE ENGINEERS

20.1 The supplier shall provide at his own expense the services of competent engineers during the warrantee period for warrantee related issues. The service engineers shall be available for the commissioning of the machine for regular service. E-Learning courses module should be arranged for imparting training to railway operators. In addition the service engineer shall provide hands on training to railway staff in calibration, operation, repairing and maintenance of the machine in field to make them fully conversant with the machine. The engineers shall also advise the Railways on appropriate maintenance, testing, operating, repair and staff training facilities that are necessary for the efficient performance of the machines.

21.0 MARKING & COLOUR OF MACHINE

21.1 The machine body shall be painted in golden yellow colour of Indian Standard Colour code of 356 as per IS:5. The exterior painting shall be polyurethane binder based conforming to RDSO Specification No. M&C/PCN/100/2013 (Specification for Epoxy cum Polyurethane Painting System–Two packs for the Exterior Painting of Railway Coaches, Diesel and Electric Locomotives and other Industrial Applications) or ISO 12944.

21.2 Following should be written in black on the machine at appropriate location in English & Hindi as per direction of Indian Railway official

i. Indian Railways logo of suitable height in different machine units at prominent locations.

ii. “INDIAN RAILWAYS” is to be written in Bold and in Black colour of appropriate size for clear visibility at prominent location on different units of machine.

iii. Manufacturers Name and Machine model and manufacturing Year should be written in black colour and in letter of size less than the size in which Indian Railways is written and at suitable locations.

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Annexure-I/I

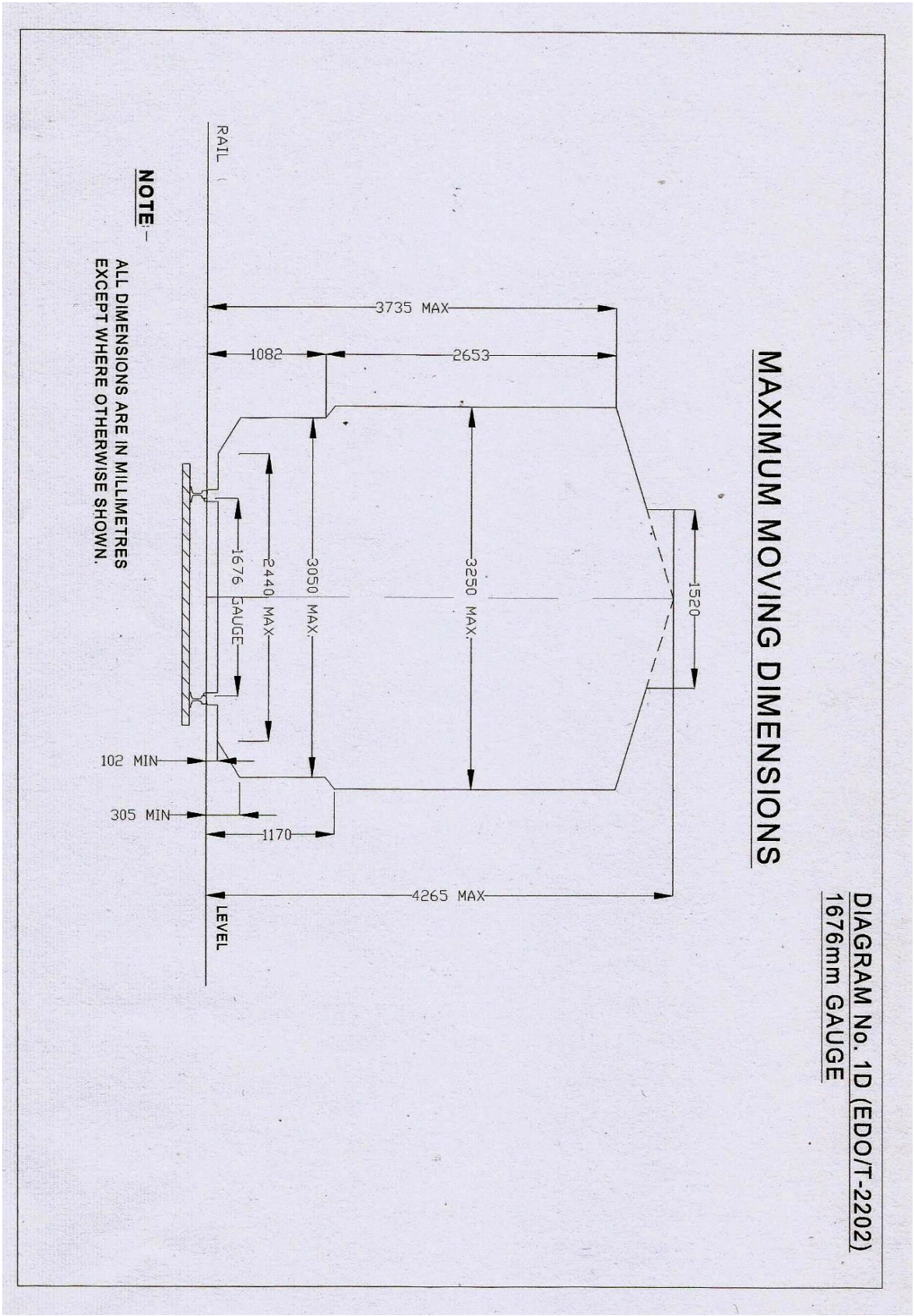
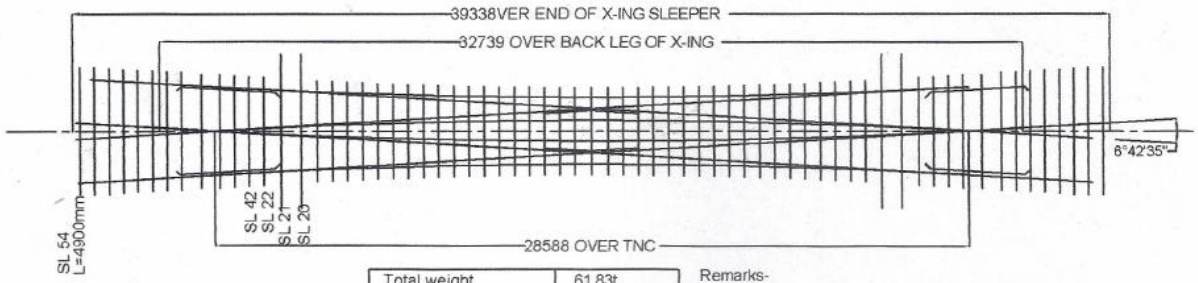


DIAGRAM No. 1D (EDO/T-2202)
1676mm GAUGE
MAXIMUM MOVING DIMENSIONS
NOTE:-
ALL DIMENSIONS ARE IN MILLIMETRES
EXCEPT WHERE OTHERWISE SHOWN.
RAIL
3735 MAX
1082
2653
1676 GAUGE
2440 MAX
3050 MAX
3250 MAX
1520
102 MIN
305 MIN
1170
4265 MAX
LEVEL

ANNEXURE-1/II

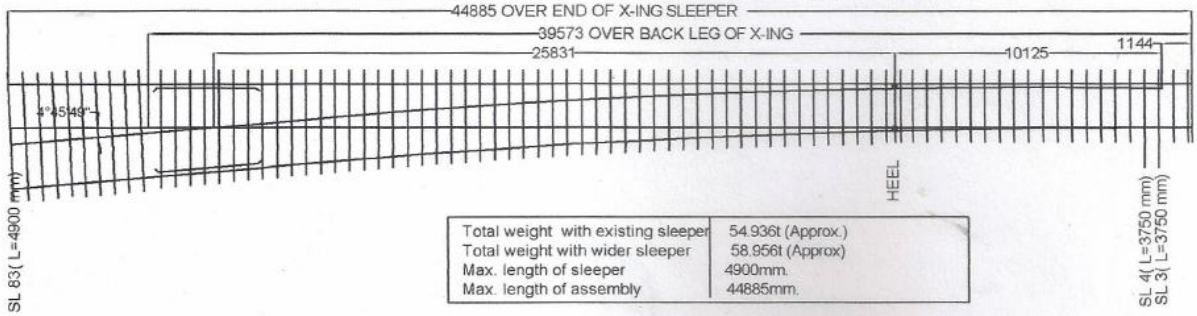
DIAMOND X-ING WITH DOUBLE SLIP ON 60 KG RAIL & PSC SLEEPER



Total weight	61.83t
Max length of Sleeper	4900 mm
Max length of assembly	39339 mm

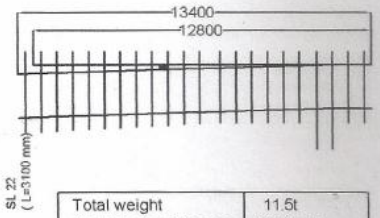
Remarks-
Sl.no 20 & 21 which are 5900 mm long can be laid separately.

1: 12 T/O WITH 10125 mm O/R , C/S & CMS X-ING 1673 mm for 60 KG ON PSC SLEEPERS



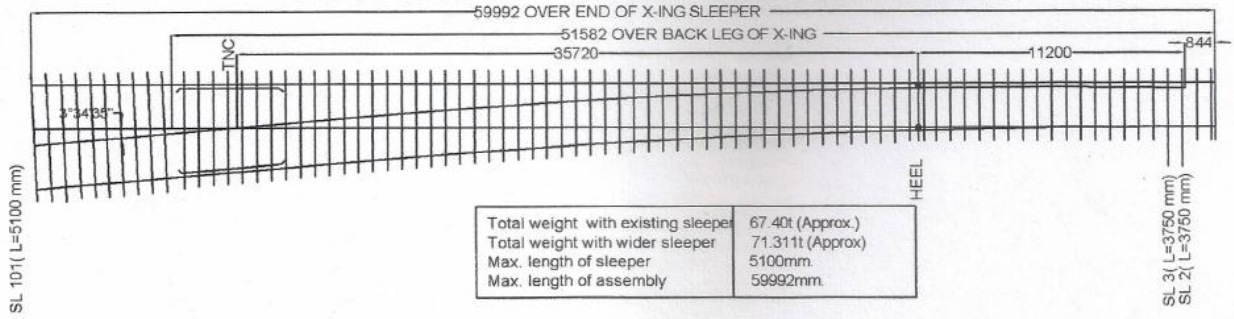
Total weight with existing sleeper	54.936t (Approx.)
Total weight with wider sleeper	58.956t (Approx)
Max. length of sleeper	4900mm.
Max. length of assembly	44885mm.

1: 8.5 D/S WITH 6400 mm O/R , C/S for 60 KG ON PSC SLEEPERS FOR BG



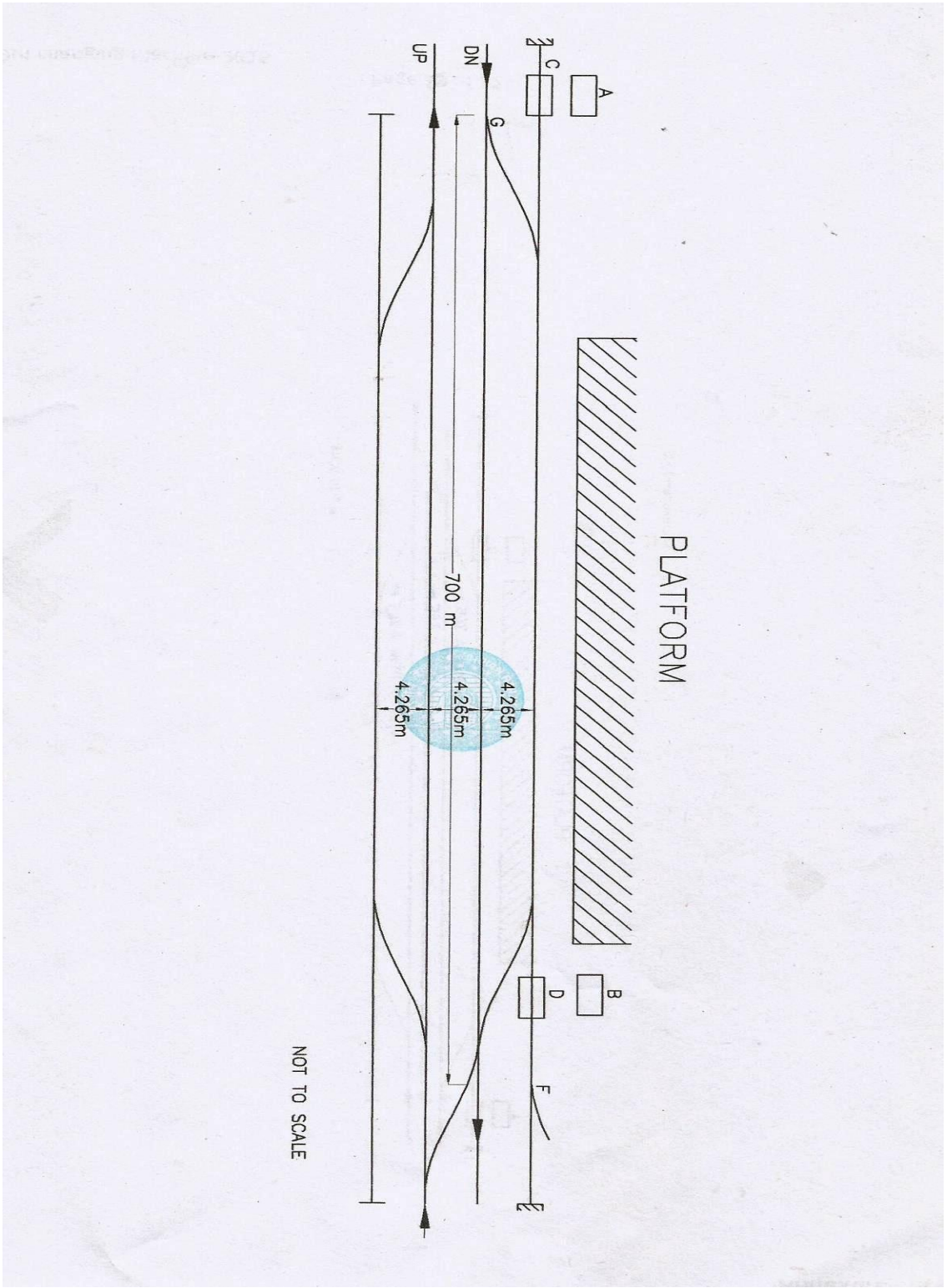
Total weight	11.5t
Max length of Sleeper	3750 mm
Max length of assembly	13400 mm

1: 16 T/O WITH 11200 mm O/R , C/S & CMS X-ING 1673 mm for 60 KG ON PSC SLEEPERS



Total weight with existing sleeper	67.40t (Approx.)
Total weight with wider sleeper	71.311t (Approx)
Max. length of sleeper	5100mm.
Max. length of assembly	59992mm.

Annexure-I/III



Annexure-I/IV

INSPECTION CERTIFICATE

CERTIFICATE OF INSPECTION OF TRACK MACHINE ( ) BY INSPECTING OFFICIAL AND APPROVAL FOR DISPATCH OF MACHINES. (STRIKE OUT WHICHEVER NOT APPLICABLE)

This is to certify that I have inspected the machine type)_____bearing Sl.No._____ from(date) _____to _____at (Place) _____ for its conformity/non-conformity with respect to the laid down Technical Specifications in contract Agreement No._____dated_____between President of India through Director Track Machines and M/s. (Name of Supplier) _____
_____.

The detailed Inspection note regarding its conformity/non-conformity to the laid specifications is to be enclosed along with this certificate. It is observed that (strike out whichever is not applicable):-
The Machine conforms to all the laid down specifications. The machine conforms to all the laid down specifications except those at Sl.No._____. The above deviations are minor/major affecting/not affecting the performance of the equipment in substantial way. The following T and P/manuals/drawings are to be supplied along with the machine:

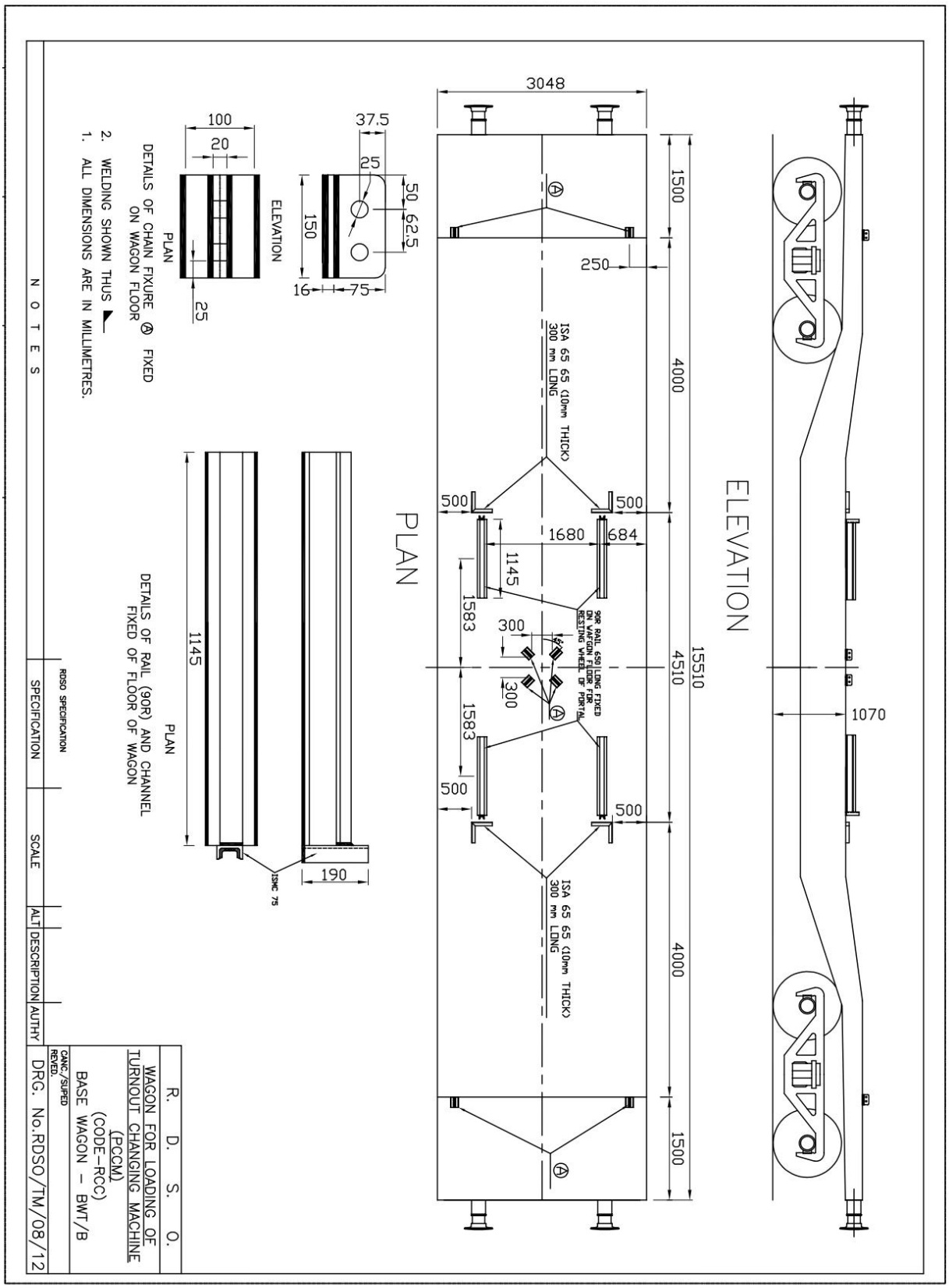
_____
_____
_____

Based on the above, the Machine is certified/not certified to be conforming to the specifications:
The machine is approved/not approved for dispatch to _____(Consignee) Indian Railways.

SIGNATURE AND DATE
INSPECTING OFFICIAL
(NAME AND DESIGNATION)
For and behalf of President of India

For M/s._____
_____

Annexure-I/V


ELEVATION
PLAN
3048
15510
1500
4000
4510
250
500
1680
684
1145
1583
300
1070
ISA 65 65 (10mm THICK)
300 mm LONG
90R RAIL 650 LONG FIXED ON WAGON FLOOR FOR RESTING WHEEL OF PORTAL
DETAILS OF CHAIN FIXTURE Ⓐ FIXED ON WAGON FLOOR
ELEVATION
PLAN
100
20
25
37.5
50
62.5
150
16
75
DETAILS OF RAIL (90R) AND CHANNEL FIXED OF FLOOR OF WAGON
190
ISMC 75
NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. WELDING SHOWN THUS
RDSO SPECIFICATION
SPECIFICATION
SCALE
ALT
DESCRIPTION
AUTHY
R. D. S. O.
WAGON FOR LOADING OF TURNOUT CHANGING MACHINE (PCCM)
(CODE-RCC)
BASE WAGON – BWT/B
CANC./SUPED
REVED.
DRG. No.RDSO/TM/08/12

Annexure-I/VI

TIME TAKEN IN LAYING 1 in 12 POINTS AND CROSSING

The complete break-up of the cycle time in laying of one prefabricated assembly of 1 in 12 Turn out and clearing the site by machine for train operation over newly laid T/O in the below two situation is to be given (reference Annexure 1/III) :

Case –I: Machine (including all units) is at C and newly prefabricated T/O assembly is at A. Existing laid assembly G is to be shifted to cess close to A and then new assembly at A is to be laid in its place. The prefabricated panel is at a distance of around 6m or more from the siding line on which machine is positioned initially. Also the new assembly at A is not in the complete lateral alignment of existing T/O G and is required to be shifted by not less than 2 m towards Stock Rail Joint for laying at required position.

The breakup of time is to be given activity wise as given below which may be further split into sub activities involved wherever felt necessary.

- Shifting of machine from C to the existing T/O assembly at G and removal of T/O assemble to cess.
- Further shifting of machine to new fabricated T/O at A.
- Shifting and Laying of the new T/O assembly at the position G by lateral shifting without use of trolley including longitudinal adjustment of minimum 2 m required.
- Clearing of site by machine back to position C by lateral shifting or by movement on track as comfortable taking minimum time.

Brief on how these activities will be performed should also be given

Case-II: Machine (including all units) is at Don siding line and prefabricated T/O assembly is at B close to the siding line. Laying is to be done at G where existing points and crossing is dismantled and bed is prepared beforehand. The net longitudinal movement is 700 m.

The breakup of time is to be given activity wise as given below which may be further split into sub activities involved wherever felt necessary.

- Shifting of machine from C to over assembled T/O at B and shifting the assembly on trolley on siding line.
- Time in transit of the assembled T/O on trolley to the site of laying.
- Time in activities involved in actual laying and correct placement of new T/o.
- Time in clearing the site by machine to position C by lateral shifting or by movement on track as comfortable taking minimum time.