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Document Title: Route Data (File) Preparation System (RDPS)			



SPECIFICATION FOR
Route Data (File) Preparation System

Version 3.1

SPECIFICATION NO. TM/SM/325

March-2021

TRACK MACHINE & MONITORING DIRECTORATE

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 1 of 18
Prepared By:	Checked By	Approved By:	

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

TABLE OF CONTENTS

1.0	Scope	3
2.0	General	3
3.0	Functions to be Performed by the System	3
4.0	Hardware	4
5.0	Software	5
6.0	Acceptance Test	5
7.0	Documentation	6
8.0	Spare Parts	6
9.0	Tools	6
10.0	Warranty	6
11.0	Training	7
12.0	Annexure I - XI	8-18

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 2 of 18
Prepared By:	Checked By	Approved By:	

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

1.0 SCOPE

The specifications given below are meant to broadly bring out the technical and performance requirement of the Route Data (File) Preparation System (RDPS).

- 1.1 All the provisions contained in RDSO's ISO procedures laid down in Document No. QO-D-8.1-11 dated 12.09.2018 (titled Vendor – Changes in approved status”), subsequent versions / amendments thereof shall be binding, and applicable on the successful manufacturers/suppliers in the contracts floated by Railways to maintain quality of products supplied to Railways.
- 1.2 Preference to make in India: compliance of the instruction contained in public procurement (preference to make in India) order -2017 “Make in India” shall be ensured or latest instructions issued on subject shall be ensured

2.0 GENERAL

- 2.1 RDPS is trolley-mounted equipment for accurately measuring and recording ground features, location and their details along the railway track to prepare route data file. The recording speed shall be up to 20 km/h.

2.2 SERVICE CONDITIONS :

System should be able to work under following service conditions.

- i. Ambient temperature - 0⁰ C to 55⁰ C
 - ii. Humidity - 5% to 95% non-condensing
 - iii. Rain fall - Fairly heavy
 - iv. Atmospheric condition - Dusty and foggy
- 2.3 On Indian Railways network the electrified traction consists of overhead electric system of either 25000 V AC with residual return current passing through one of the rails in the track. The voltage for track circuits for signaling purpose is up to 12 volts and the corresponding current up to 1 Amp, passes through the other rail. The track feature recording system and its accuracy of measurement shall not be affected in any manner due to the induction effect of the above stated electric traction and signaling systems.
 - 2.4 System shall be portable, light, compact, rugged, reliable and capable of functioning satisfactorily in harsh environment of dust, vibration, shock, water, wind, fog, which is normally encountered on Indian Railways.
 - 2.5 Rechargeable battery shall be used as power source for operation of the system. The battery(s) shall have sufficient capacity for continuous working of at least 8 hrs. If needed additional stand by batteries may be provided. Suitable battery charger shall also be supplied.
 - 2.6 The system shall have a storage capacity to record and store track features of at least 1000 Kilometers.
 - 2.7 System will be installed on a BG or any Gauge push trolley of standard design. All the required accessories for fitting the system on trolley shall be provided and the work of fitting the system on trolley shall also be completed.

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 3 of 18
Prepared By:	Checked By	Approved By:	

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

2.8 In hardware and software design it shall be ensured that no tacho pulse is missed during recording.

3.0 FUNCTIONS TO BE PERFORMED BY THE SYSTEM

3.1 The system shall have the facility to record and store 100 types of track features along with their details, in slow mode. The list of track features and their details are given in Annexure I & II. It should be possible to record remarks also for each feature in Slow Mode.

3.2 The system shall have the facility to record and store 37 track features listed in Annexure III along with their location (kilometer and distance from kilometer post) by operation of a single key/click/touch in Fast Mode. While recording in fast mode the 37 track features shall be stored in ASCII format as given below:

Kilometer, Distance, Track feature code, Latitude, Longitude,

745, 752, 47, 26° 49' 09.50"N, 80° 53' 68.63"E,

745, 1000, 1, 26° 49' 09.50"N, 80° 53' 68.63"E,

The recorded data shall be stored in ASCII format as per Annexure-VIII&IX.

3.3 The system shall have the facility to display few of the last recorded track features on the display unit of the system.

3.4 The system shall have facility to erase the wrongly entered data during recording and subsequently off line also.

3.5 The system and tachometer or optical encoder used shall have the facility to sense the direction of movement of the trolley i.e. if the trolley starts moving in reverse direction the system shall stop the recording and shall resume it at the point from where the trolley had started movement in reverse direction.

3.6 The system shall have the provision for checking and calibration of tachometer. The accuracy of distance measured should be within +/- 0.3% in 01 kilometer.

3.7 The system shall have diagnostic module to pin point the problem area of the system, along with suggested remedial measure.

3.8 The system shall be provided with an option to extract data of desired track features from the recorded data files without longitude and latitude as per Annexure-X for use in Track Recording Car (TRC).

3.9 The system shall have facility to print the stored route feature files along with description of route feature in desired formats detailed in the Annexure-IV, V, VI & VII.

3.10 The system has the facility to change the nomenclature of any track feature without changing the source code both in slow and fast mode.

3.11 System shall have the provision to record and store latitude and longitude at every ground feature and also at distance defined by operator in set up.

4.0 HARDWARE

4.1 Laptop/Net book/Tablet (OTG Compatible) used in RDPS should be as per following specification or better:

Intel 1.66 GHz processor (minimum), 2 GB RAM, 160 GB SATA shock mounted

Hard drive with HDD protection / 160GB shock proof supported Memory, 10.1"

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 4 of 18
Prepared By:	Checked By	Approved By:	

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

1024x600 water resistant screen, Built in 1.3 MP camera, Water resistant key board, 6 cell battery for minimum 8 hrs backup with or without additional battery, Minimum 1xUSB 3.0 Port, 1 SD slot/1 SD Card reader, Micro or normal HDMI port, Wi-Fi enabled, audio jacks, microphone, durable protective cover, with MS Windows OS including Licensed Antivirus software.

- 4.2 Design should be such that results are not affected due to noise, spikes, surges, EMI generated by overhead electric traction lines. Adequate shielding line filters with surge suppressor & EMI protection shall be used.
- 4.3 It is preferable that the system shall be designed by using standard off the shelves available cards.
- 4.4 Battery for Control unit shall be capable of recording for at least 8 hrs. One Battery charger for charging of battery shall also be provided. DeskJet Colour Printer having printing speed of at least 05 PPM shall be provided. Printer shall have the connection with PC through USB port.
- 4.5 A Global Positioning System (GPS) receiver shall be integrated with the hardware design to get the latitude and longitude at every ground feature and at distance defined by operator in set up.
- 4.6 The accuracy of GPS receiver shall be as follows:
Horizontal (CEP) ≤ 3 m
RMS (2σ) ≤ 5 m

5.0 SOFTWARE

- 5.1 Software should be modular, menu driven and user interactive. The software shall have the capability to perform the functions listed in para 3.0.
- 5.2 The software shall also have the facility to perform the following off line functions:
- Utility to select the desired track features in TGMS format out of the recorded 37 features in the ASCII format detailed in para 3.2. The TGMS format is enclosed as Annexure X.
 - Utility to print the report on the printer as per format enclosed as Annexure-IV, V, VI & VII.

6.0 ACCEPTANCE TESTS:

Inspecting authority i.e. purchaser/consignee shall carry out acceptance test on all the equipment/sub units. The following shall comprise the acceptance test:

6.1 Makers test certificate for outsourced items:

- a) Test certificate for Tachometer.
- b) License of Windows Operating System.
- c) License of Antivirus software of reputed supplier with 24 months subscription.
- d) Documents for supporting GPS accuracy
 - The data sheet of used GPS module
 - Letter from the representative of the manufacturer supporting the accuracy claim as per clause 4.6.

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 5 of 18
Prepared By:	Checked By	Approved By:	

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

6.2 Visual inspection:

- i) General workmanship.
- ii) Portability, Compactness, Light weight of the RDPS System.
- iii) Indications and displays.
- iv) Mounting, fitment and clamping of connectors.
- v) Proper housing of cards.
- vi) Painting, labeling and marking.
- vii) Required accessories for fitment of system on trolley (clause 2.7)& other required tools (clause 9).

6.3 System level functionality test:

It shall be carried out as per Annexure – XI.

6.4 Field Trials:

Short stretch of field trials at least for 1km, preferably in electrified section, shall be done for the RDPS under test to assess the working of the system in field conditions as per specification.

7.0 DOCUMENTATION

7.1 Details of GPS Module used shall be provided with the system.

7.2 Calibration, operation, maintenance, trouble shooting and training manuals shall be prepared in sufficient detail to the satisfaction of purchaser and supplied in three copies each.

7.3 Installable version of Software shall be supplied on magnetic media such as CD or zip disk

8.0 SPARES PARTS

One spare tachometer and one spare DIO interface unit shall be supplied with the system so that even during warranty period in case of malfunction of these parts system can be made functional immediately.

9.0 TOOLS

All tools including measuring equipment required for diagnostics / fault finding and normal maintenance/repair should be supplied as a complete kit in one set. The list of such tools and equipment proposed to be supplied with system shall be furnished as part of technical details of offer.

10.0 WARRANTY

10.1 The contractor shall ensure that system supplied including all parts, components, etc. used is free from defects and faults in design, material, workmanship and shall be of the highest quality and in conformity with the contract specifications.

10.2 The warranty shall expire 24 (twenty four) months from the date of acceptance i.e. from the date of issue of commissioning certificate by the purchaser / consignee for

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 6 of 18
Prepared By:	Checked By	Approved By:	

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

the system except in respect of complaints, which are lodged before the expiry of the 24 months.

- 10.3 The supplier shall be required to supply and install free of cost all the equipment, components, PCB cards, ICs, cables, transducers, connectors, spares and consumables which may fail, malfunction, become defective or required for uninterrupted working of system during the currency of Warranty Period except external battery(s) in laptop / tablet and/or system, stationary, ink cartridges, however manufacturer's warranty will be applicable for external batteries. The supplier shall also keep adequate stock of such components, spares, consumables and modules, which are critical and may require repairs/replacement from time to time for ensuring un-interrupted working of the System during the Warranty Period.

11.0 TRAINING

Supplier should provide adequate training to Railway officials for four days in calibration, operation, repair and maintenance of the system on site. It shall include both hardware and software training which is required for the smooth operation and maintenance of the System.

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 7 of 18
Prepared By:	Checked By	Approved By:	

461467/2021/O/o PED/TMM/RDSO

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

LIST OF TRACK FEATURES IN SLOW MODE

Annexure-I

	0 LOACTION MARKER	1 CURVES, GRADIENTS	2 BRIDGES & LXINGS	3 JURISDICTION	4 TRACK STRUCTURES I	5 TRACK STRUCTURES II	6 TRACK FORMATION	7 SPEED RESTRICTIONS & OTHER FEATURES	8 TRACK WORKS/ OTHER FEATURES	9 ROUTINE MAINTENANCE
0	New KM Start	Curve Start KM/T.P. Number-XX	Bridge (Important/ major) Start KM/T.P. Number-xxxx	Railway ZONE TYPE	Point & Crossingx/SJ KM/TP Number-xxxx	Buffer Rails Start KM/TP Number-xx	Cutting Start KM/TP Length	Permanent Speed Restriction Start KM/TPSpeed – XXX	CTR Start KM/TP Rail Section TYPE	Packing Start KM/TP Machine No. xxx
1	K.M. Post Number-xxxx	Curve End KM/T.P. Speed Restriction xxx	Bridge (Important/ major) End KM/T.P. TYPE	Division NAME – XXXX	Diamond Crossing KM/TP No.xx	Buffer Rails End KM/TP Total Gap-xx(mm)	Cutting End KM/TP	Permanent Speed Restriction End KM/TP	CTR End KM/TP Sleeper TYPE Density	Packing End KM/TP Machine TYPE
2.	T.P./OHE Mast Number-xx	Circular Curve StartKM/T.P. S.E. (mm)	Road Over Bridge KM/T.P TYPE	DEN/Hd.Qr. Section from - to	Rail Change KM/TP Section Type	Glued Joint KM/TP Number –xxx	Black Cotton Soil Start KM/TP	Axle Counter (Track Device) KM/TP	TSR Start KM/TP Sleeper TYPE	Ballast Regulation StartKM/TP Machine No.
3.	Station Name xxxx C/L Level (xxx)	Circular Curve End KM/TP Degree- xxx	RUB/LHS KM/TP TYPE	ADEN/Hd. Qr. Section from – to	Sleeper change KM/TP Type	Material Under Trial Start KM/TP TYPE	Black Cotton Soil End KM/TP	Neutral Section KM/TP	TSR End KM/TP Density	Ballast Regulation End KM/TP Machine TYPE
4.	Signal Post TYPE KM/TP	Gradient Start Rise/Fall KM/TP	Bridge (Minor) Start KM/T.P. Number-xxxx	Sr.Section Engr.. Hd.Qr. Section from – to	Fastening Change KM/TP Type	Material Under Trial End KM/TP dd-mm-yy	Formation Treatment Start KM/TP	Emergency Socket (Field Tel) KM/TP	Deep Screening Start KM/TP Ballast Depth-xxx	Casual Renewal of Sleeper Start KM/TP
5.		Gradient End KM/TP Gradient xxxx	Bridge (Minor) End KM/T.P. TYPE	Section Engg. Hd.Qr. Section from – to	Ballast Change KM/TP Depth-xxx(mm)	Vulnerable Area Start KM/TP TYPE	Formation Treatment End KM/TP	MTRC/Microwave Tower KM/TP	Deep Screening End KM/TP Quarry TYPE	Casual Renewal of Sleeper End KM/TP
6.	CabinBuilding KM/TP Interlocking TYPE	Track Circuiting Start KM/TP	Level Crossing KM/TP No. x-xx TYPES	Gang Hd. Qr. Section from – to	Rail welding Change KM/TP Type	Vulnerable Area End KM/TP	Unstable Bank Start KM/TP	Relay Huts (Station Area) KM/TP	SP KM/TP	Rail Renewal Start KM/TP Age-xx (yrs)
7.	F.O.B. KM/TP TYPE Clearance from Track –xx	Track Circuiting End KM/TP		Electrical Crossings (Over Head). KM/TP	Switch Expansion Joint KM/TP	Defective Zone Start KM/TP	Unstable Bank End KM/TP	Transponder KM/TP	SSP KM/TP	Rail Renewal End KM/TP
8.	Platform Start Clearance –xx	Siding/Loop Start KM/TP		Traction Substation KM/TP	Weld KM/TP No. –xx	Defective Zone End KM/TP	Tunnel Start KM/TP	OFC Huts (Station Area) KM/TP	User Key-1	Slack Packing Start KM/TP Length xx (m)
9.	Platform End Height xxx	Siding/Loop End KM/TP		Sub-Station (Electrical) KM/TP	USFD fault KM/TP TYPE	Free Joint KM/TP No.xx	Tunnel End KM/TP	Auto Huts (In ATS Sections) KM/TP	User Key-2	Slack Packing End KM/TP

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 8 of 18
Prepared By:	Checked By	Approved By:	

461467/2021/O/o PED/TMM/RDSO

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

Annexure-II

Sample of Various Types of Features

Feature Signal Post 0: No 1: Distant 2: Inner Distant 3: Home 4: Starter 5: Advance Starter 6: Station Limit	Feature Cabin Building 0: No. 1: Standard I Interlocking 2: Standard II Interlocking 3:Standard III Interlocking 4: Rudimentary 5: Route Relay 6: Panel Working 7: CTC 8: Automatic	Feature Major/Imp Bridge (Steel) 0: No. 1: Girder Trough 2: Girder Underslung 3: Girder Plate	Feature –Bridge (Minor) 0: No. 1: Slab 2: Prestressed 3: Arch 4: Box 5: Pipe	Feature- Lxing (Type of Road) 0: No. 1: National Highway. 2: State Highway. 3: City Road 4: Village Road 5: Kachcha Road	Feature- Railway 0: C.Rly. 1: E.Rly. 2: N.Rly. 3: N.E.Rly. 4: N.F.Rly. 5: S. Rly. 6: S.C. Rly. 7: S.E.C. Rly. 8: S.E. Rly. 9. W. Rly. 10: S.W.Rly. 11: N.Central Rly. 12: N.W. Rly. 13: E.Cost. Rly. 14: E.Central Rly. 15: W.Central Rly. 16: KRCL
Feature- Sleeper Change 0: No 1: PRC 2: ST 3: CST-9 4: Wooden 5: Bridge Sleeper	Feature- Fastening Change 0: No 1: Pandrol 2: Dogspike 3: Key type 4: Screws	Feature- Rail Weld Change 0: No 1: CWR 2: LWR 3: SWR/3 Rail 4: SWR/5 Rail	Feature- Material Under Trial 0: No 1: Rail 2: Sleeper 3: Fastening 4: Rubber Pads 5: Others	Feature- Vulnerable area 0: No 1: Monsoon 2: Hot weather 3: Security	Feature- Rail Section 0: No 1: 60R 2: 75R 3: 90R 4: 52 Kg 5: 60 Kg 6: Others
Deep Screening Quarry Type	Packing Machine Type 0: No 1: 09-3X 2: CSM 3: WST 4: UNI 5: MPT 6: Others	Ballast Regulation – Machine type 0: No 1: BCM 2: SBCM 3: Others	Feature- USFD Fault 0: Left Rail 1: Right Rail		

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 9 of 18
Prepared By:	Checked By	Approved By:	

461467/2021/O/o PED/TMM/RDSO

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

Annexure-III**List of Features for Fast mode of Recording**

1. KM Post
2. TP/OHE Mast
3. Point & Crossing
4. Level Crossing
5. Switch Expansion Joint
6. Buffer Rails
7. Bridge (Important/major) Start
8. Bridge (Important/major) End
9. Bridge (Minor)
10. Road Over Bridge
11. RUB/LHS
12. FOB
13. Gradient Start
14. Gradient End
15. Curve Start
16. Curve End
17. Tunnel Start
18. Tunnel End
19. Cutting Start
20. Cutting End
21. Station
22. Transponder
23. Cabin
24. Signal
25. Emergency Socket
26. Axle counter (Track Device)
27. Relay Huts (Station area),
28. OFC Huts(Station area),
29. Auto Huts (In Automatic Signaling sections)
30. MTRC/ Microwave Towers
31. Neutral Section
32. Electrical Crossings (Over Head)
33. SP
34. SSP
35. Traction Substation (TSS)
36. Sub- station (Electrical)
37. User Key

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 10 of 18
Prepared By:	Checked By	Approved By:	

461467/2021/O/o PED/TMM/RDSO

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

Annexure – IV

-----Route data preparation system-----

Report (RDPS) [KJTNEW4F] Date: 14/06/2006

Railway CENTRAL
 Division BB
 Station From BVS
 TO KJT
 Direction DOWN
 Line DL
 Trolley pra2
 Mode FAST
 KM (from) 94
 KM (to) 99

Latitude	Longitude	KM	Distance (m)	Feature Code	Remarks
18°59'72.83"	73°20'91.75"	94	21.69	21- Major/Imp Bridge(Steel) End	
18°59'72.83"	73°20'91.75"	94	29.13	2- T.P./OHE Mast	
18°59'72.83"	73°20'91.75"	94	61.11	68-Tunnel Start	
18°59'31.48"	73°20'75.70"	94	145.20	69- Tunnel End	
18°59'31.48"	73°20'75.70"	94	166.91	2- T.P./OHE Mast	
18°57'55.41"	73°19'88.86"	94	232.40	2- T.P./OHE Mast	
18°57'44.92"	73°19'90.31"	94	300.84	2- T.P./OHE Mast	
18°57'43.10"	73°19'90.07"	94	332.48	22-Major/ImpBridge(Others) Start	
18°57'42.69"	73°19'89.98"	94	339.50	23-Major/ImpBridge(Others) End	
18°57'41.28"	73°19'90.29"	94	367.78	2- T.P./OHE Mast	
18°57'38.05"	73°19'90.41"	94	427.44	60- Cutting Start	
18°57'36.91"	73°19'90.36"	94	446.99	61- Cutting End	
18°57'35.67"	73°19'90.39"	94	470.34	20- Major/Imp Bridge(Steel) Start	
18°57'35.40"	73°19'90.40"	94	475.54	21- Major/Imp Bridge(Steel) End	
18°57'34.12"	73°19'90.53"	94	499.26	2- T.P./OHE Mast	
18°57'30.45"	73°19'90.63"	94	569.18	10- Curve Start	
18°57'23.02"	73°19'90.79"	94	705.12	40- Point & Crossing/SJ	
18°57'17.02"	73°19'90.62"	94	815.96	60- Cutting Start	
18°57'15.98"	73°19'90.59"	94	835.15	61- Cutting End	
18°57'15.42"	73°19'90.53"	94	845.57	2- T.P./OHE Mast	
18°57'15.08"	73°19'90.50"	94	851.36	22- Major/Imp Bridge(Others) Start	
18°57'14.91"	73°19'90.49"	94	854.93	23- Major/Imp Bridge(Others) End	
18°57'12.30"	73°19'90.33"	94	904.51	2- T.P./OHE Mast	
18°57'11.65"	73°19'90.28"	94	915.88	40- Point & Crossing/SJ	
18°57'08.82"	73°19'90.06"	94	970.87	40- Point & Crossing/SJ	
18°57'07.38"	73°19'89.97"	94	1000.00	1- KM Post	
18°57'07.38"	73°19'89.97"	95	0.00	0-	
18°57'01.04"	73°19'89.15"	95	118.58	22- Major/Imp Bridge(Others) Start	

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 11 of 18
Prepared By:	Checked By	Approved By:	

461467/2021/O/o PED/TMM/RDSO

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

Annexure – V

-----Route data preparation system-----

Railway CENTRAL
 Division BB
 Station From BVS
 TO KJT
 Direction DOWN
 Line DL
 Trolley pra2
 Mode FAST
 KM (from) 94
 KM (to) 99

KM	Distance (m)	Feature Code	Remarks
94	21.69	21- Major/Imp Bridge(Steel) End	
94	29.13	2- T.P./OHE Mast	
94	61.11	68-Tunnel Start	
94	145.20	69- Tunnel End	
94	166.91	2- T.P./OHE Mast	
94	232.40	2- T.P./OHE Mast	
94	300.84	2- T.P./OHE Mast	
94	332.48	22- Major/Imp Bridge(Others) Start	
94	339.50	23- Major/Imp Bridge(Others) End	
94	367.78	2- T.P./OHE Mast	
94	427.44	60- Cutting Start	
94	446.99	61- Cutting End	
94	470.34	20- Major/Imp Bridge(Steel) Start	
94	475.54	21- Major/Imp Bridge(Steel) End	
94	499.26	2- T.P./OHE Mast	
94	569.18	10- Curve Start	
94	705.12	40- Point & Crossing/SJ	
94	815.96	60- Cutting Start	
94	835.15	61- Cutting End	
94	845.57	2- T.P./OHE Mast	
94	851.36	22- Major/Imp Bridge(Others) Start	
94	854.93	23- Major/Imp Bridge(Others) End	
94	904.51	2- T.P./OHE Mast	
94	915.88	40- Point & Crossing/SJ	
94	970.87	40- Point & Crossing/SJ	
94	1000.00	1- KM Post	
95	0.00	0-	
95	118.58	22- Major/Imp Bridge(Others) Start	
95	119.89	23- Major/Imp Bridge(Others) End	
95	249.68	11- Curve End	
95	294.38	29- Level Crossing	
95	329.74	47- Switch Expansion Joint	
95	497.92	68- Tunnel Start	
95	526.28	69- Tunnel End	
95	570.74	2- T.P./OHE Mast	
95	612.90	22- Major/Imp Bridge(Others) Start	
95	617.57	23- Major/Imp Bridge(Others) End	
95	640.84	2- T.P./OHE Mast	
95	706.41	60- Cutting Start	
95	719.68	2- T.P./OHE Mast	

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 12 of 18
Prepared By:	Checked By	Approved By:	

461467/2021/O/o PED/TMM/RDSO

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

Annexure – VI

-----Route data preparation system-----

Railway CENTRAL
Railway CENTRAL
Division BB
Station From BVS
TO KJT
Direction UP
Line DL
Trolley pra2
Mode SLOW
KM (from) 99
KM (to) 94

Latitude	Longitude	KM	Distance (m)	Feature Code	Feature Detail	Remarks
18°55'01.98"	073°19'28.04"	99	0		(GPS) Auto Record	
18°55'01.98"	073°19'28.04"	99	3		(GPS) Auto Record	
18°55'02.11"	073°19'28.08"	99	5		(GPS) Auto Record	
18°55'02.26"	073°19'28.11"	99	9		(GPS) Auto Record	
18°55'02.42"	073°19'28.10"	99	12	2- T.P./OHE Mast	TP: 99/13	
18°55'02.56"	073°19'28.10"	99	15		(GPS) Auto Record	
18°55'02.71"	073°19'28.12"	99	17.63	2- T.P./OHE Mast	TP: 99/14	
18°55'02.71"	073°19'28.12"	99	18		(GPS) Auto Record	
18°55'02.46"	073°19'28.16"	99	21		(GPS) Auto Record	
18°55'03.07"	073°19'28.19"	99	24		(GPS) Auto Record	
18°55'03.27"	073°19'28.20"	99	27		(GPS) Auto Record	
18°55'03.40"	073°19'28.22"	99	30		(GPS) Auto Record	
18°55'03.52"	073°19'28.22"	99	33		(GPS) Auto Record	
18°55'03.74"	073°19'28.27"	99	36		(GPS) Auto Record	
18°55'03.84"	073°19'28.30"	99	39		(GPS) Auto Record	
18°55'03.96"	073°19'28.34"	99	47		(GPS) Auto Record	
18°55'04.22"	073°19'28.44"	99	45		(GPS) Auto Record	
18°55'04.35"	073°19'28.49"	99	48		(GPS) Auto Record	
18°55'04.48"	073°19'28.54"	99	51		(GPS) Auto Record	
18°55'04.50"	073°19'28.58"	99	54		(GPS) Auto Record	
18°55'04.71"	073°19'28.62"	99	57		(GPS) Auto Record	
18°55'04.87"	073°19'28.67"	99	60		(GPS) Auto Record	
18°55'05.02"	073°19'28.72"	99	63		(GPS) Auto Record	
18°55'05.32"	073°19'28.80"	99	66		(GPS) Auto Record	
18°55'05.32"	073°19'28.80"	99	68.97	2- T.P./OHE Mast	TP: 99/15	
18°55'05.47"	073°19'28.85"	99	69		(GPS) Auto Record	
18°55'05.62"	073°19'28.89"	99	72		(GPS) Auto Record	
18°55'05.77"	073°19'28.93"	99	75		(GPS) Auto Record	
18°55'05.94"	073°19'28.99"	99	78		(GPS) Auto Record	
18°55'06.11"	073°19'29.03"	99	82		(GPS) Auto Record	
18°55'06.27"	073°19'29.08"	99	84		(GPS) Auto Record	
18°55'06.40"	073°19'29.12"	99	87		(GPS) Auto Record	
18°55'06.59"	073°19'29.17"	99	90		(GPS) Auto Record	
18°55'06.74"	073°19'29.20"	99	91		(GPS) Auto Record	

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 13 of 18
Prepared By:	Checked By	Approved By:	

461467/2021/O/o PED/TMM/RDSO

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

Annexure – VII

-----Route data preparation system-----

Railway CENTRAL
 Division BB
 Station From BVS
 TO KJT
 Direction UP
 Line DL
 Trolley pra2
 Mode SLOW
 KM (from) 99
 KM (to) 94

KM	Distance (m)	Feature Code	Feature Detail	Remarks
99	0		(GPS) Auto Record	
99	3		(GPS) Auto Record	
99	6		(GPS) Auto Record	
99	9		(GPS) Auto Record	
99	12	2- T.P./OHE Mast	TP: 99/13	
99	15		(GPS) Auto Record	
99	17.63	2- T.P./OHE Mast	TP: 99/14	
99	18		(GPS) Auto Record	
99	21		(GPS) Auto Record	
99	24		(GPS) Auto Record	
99	27		(GPS) Auto Record	
99	30		(GPS) Auto Record	
99	33		(GPS) Auto Record	
99	36		(GPS) Auto Record	
99	39		(GPS) Auto Record	
99	42		(GPS) Auto Record	
99	45		(GPS) Auto Record	
99	48		(GPS) Auto Record	
99	51		(GPS) Auto Record	
99	54		(GPS) Auto Record	
99	57		(GPS) Auto Record	
99	60		(GPS) Auto Record	
99	63		(GPS) Auto Record	
99	66		(GPS) Auto Record	
99	68.97	2- T.P./OHE Mast	TP: 99/15	
99	69		(GPS) Auto Record	
99	72		(GPS) Auto Record	
99	75		(GPS) Auto Record	
99	78		(GPS) Auto Record	
99	81		(GPS) Auto Record	
99	84		(GPS) Auto Record	
99	87		(GPS) Auto Record	
99	90		(GPS) Auto Record	
99	93		(GPS) Auto Record	

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 14 of 18
Prepared By:	Checked By	Approved By:	

461467/2021/O/O PED/TMM/RDSO

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

Annexure-VIII

KJTNEW4F_PWIKJT

6/14/2006

CENTRAL

BB

BVS

KJT

Down

DL

FAST

FD

ARD (m),3

94,0, 18° 54' 50. 30"N, 073° 19'22. 94" E, 0, [GPS] Auto Record
 94,3, 18° 59 '77. 69" N, 073° 20'93. 16"E, 0, [GPS] Auto Record
 94,6, 18° 59 '77. 69" N, 073° 20'93. 16"E, 0, [GPS] Auto Record
 94,9, 18° 59' 77. 69" N, 073° 20'93. 16"E, 0, [GPS] Auto Record
 94,12, 18° 59' 77. 69" N, 073°20'93. 16"E, 0, [GPS] Auto Record
 94,15, 18° 59 '77. 69" N, 073°20'93. 16"E, 0, [GPS] Auto Record
 94,18, 18° 59' 72. 83" N073°20'91. 75" E,,0, [GPS] Auto Record
 94,21, 18° 59 '72. 83" N, 073°20'91. 75"E, 0, [GPS] Auto Record
 94,21.69, 18° 59' 72. 83" N, 073°20'91. 75" E, 21, Bridge (Steel Girder) Out
 94,24, 18° 59 '72. 83" N, 073°20'91. 75 "E, 0, [GPS] Auto Record
 94,27, 18° 59' 72. 83" N, 073°20'91. 75" E, 0, [GPS] Auto Record
 94,29.13, 18° 59' 72. 83" N, 073°20' 91. 75" E, 2, TP/OHE Mast
 94,30, 18° 59 '72. 83" N, 073°20'91. 75"E,0, [GPS] Auto Record
 94,33, 18° 59 '72. 83" N, 073°20'91. 75"E, 0, [GPS] Auto Record
 94,36, 18° 59 '72. 83" N, 073°20'91. 75"E, 0, [GPS] Auto Record
 94,39, 18° 59 '72. 83" N, 073°20'91. 75"E, 0, [GPS] Auto Record
 94,42, 18° 59' 72. 83" N, 073°20'91. 75" E, 0, [GPS] Auto Record
 94,45, 18° 59 '72. 83" N, 073°20'91. 75"E, 0, [GPS] Auto Record
 94,48, 18° 59 '72. 83" N, 073°20'91. 75"E, 0, [GPS] Auto Record
 94,51, 18° 59 '72. 83" N, 073°20'91. 75" E, 0, [GPS] Auto Record
 94,54, 18° 59 '72. 83" N, 073°20'91. 75"E, 0, [GPS] Auto Record
 94,57, 18° 59' 72. 83" N, 073°20'91. 75" E, 0, [GPS] Auto Record
 94,60, 18° 59 '72. 83" N, 073°20'91. 75"E, 0, [GPS] Auto Record
 94,61.11, 18° 59 '72. 83" N, 073°20' 91. 75"E, 68, Tunnel In
 94,63, 18° 59 '72. 83" N, 073°20'91. 75"E, 0, [GPS] Auto Record
 94,66, 18° 59 '72. 83" N, 073°20'91. 75"E, 0, [GPS] Auto Record
 94,69, 18° 59 '72. 83" N, 073°20'91. 75"E, 0, [GPS] Auto Record
 94,72, 18° 59 '72. 83" N, 073°20'91. 75"E, 0, [GPS] Auto Record
 94,75, 18° 59 '72. 83" N, 073°20'91. 75"E, 0, [GPS] Auto Record

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 15 of 18
Prepared By:	Checked By	Approved By:	

461467/2021/O/o PED/TMM/RDSO

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

Annexure –IX**CENTRAL, BB, BVS-KJT, DOWN,DL, Pra2, FAST, 94-99,**

94,0022,21, 18⁰59'72.83"N, 073⁰20'91.75"E,
 94, 0029,2, 18⁰59'72.83"N, 073⁰20'91.75"E,
 94,0061, 68, 18⁰59'72.83"N, 073⁰20'91.75"E,
 94, 0145, 69, 18⁰59'31.48"N, 073⁰20'75.70"E,
 94,0167, 2, 18⁰59'31.48"N, 073⁰20'75.70"E,
 94, 0232, 2, 18⁰57'55.41"N, 073⁰19'88.86"E,
 94, 0301, 2, 18⁰57'44.92"N, 073⁰19'90.31"E,
 94, 0332, 22, 18⁰57'43.10"N, 073⁰19'90.37"E,
 94, 0340, 23, 18⁰57'42.69"N, 073⁰19'89.98"E,
 94, 0368, 2, 18⁰57'41.28"N, 073⁰19'90.29"E,
 94, 0427, 60, 18⁰57'38.05"N, 073⁰19'90.41"E,
 94, 0447, 61, 18⁰57'36.99"N, 073⁰19'90.36"E,
 94, 0470, 20, 18⁰57'35.67"N, 073⁰19'90.39"E,
 94, 0 476, 21, 18⁰57'35.40"N, 073⁰19'90.40"E,
 94, 0499, 2, 18⁰57'34.12"N, 073⁰19'90.53"E,
 94, 0569, 10, 18⁰57'30.45"N, 073⁰19'90.63"E,
 94, 0705, 40, 18⁰57'23.02"N, 073⁰19'90.79"E,
 94, 0816, 60, 18⁰57'17.02"N, 073⁰19'90.62"E,
 94, 0835, 61, 18⁰57'15.98"N, 073⁰19'90.59"E,
 94, 0846, 2, 18⁰57'15.42"N, 073⁰19'90.53"E,
 94, 0851, 22, 18⁰57'15.08"N, 073⁰19'90.50"E,
 94, 0855, 23, 18⁰57'14.91"N, 073⁰19'90.49"E,
 94, 0905, 2, 18⁰57'12.30"N, 073⁰19'90.33"E,
 94, 0916, 40, 18⁰57'11.65"N, 073⁰19'90.28"E,
 94, 0971, 40, 18⁰57'08.82"N, 073⁰19'90.06"E,
 94, 1000,1, 18⁰57'07.38"N, 073⁰19'89.97"E,
 95, 0,0, 18⁰57'07.38"N, 073⁰19'89.97"E,
 95, 0119, 22, 18⁰57'01.04"N, 073⁰19'89.15"E,
 95, 0120, 23, 18⁰57' 00.91"N, 073⁰19'89.12"E,

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 16 of 18
Prepared By:	Checked By	Approved By:	

461467/2021/O/o PED/TMM/RDSO

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

Annexure-X

CENTRAL,BB,BVS-KJT,Down,DL,pra2,FAST,94-99

94,22,21,
 94,29,2,
 94,61,68,
 94,145,69,
 94,167,2,
 94,232,2,
 94,301,2,
 94,332,22,
 94,340,23,
 94,368,2,
 94,427,60,
 94,447,61,
 94,470,20,
 94,476,21,
 94,499,2,
 94,569,10,
 94,705,40,
 94,816,60,
 94,835,61,
 94,846,2,
 94,851,22,
 94,855,23,
 94,905,2,
 94,916,40,
 94,971,40,
 94,1000,1,
 95,0,0,

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 17 of 18
Prepared By:	Checked By	Approved By:	

ISO 9001:2015	Document No: TM/SM/325 March, 2021	Version No:3.1	Date effective: 17/03/2021
Document Title: Route Data (File) Preparation System (RDPS)			

Annexure-XI

System level functionality Test

Clause No.	Test Description	Observation
2.1	Verification of recording speed: This will be tested in lab. By revolving the tacho through a D.C. motor at 20 Kmph speed and entering the 37 features in fast mode. Features will also be entered during this test.	In Lab
2.5	Verification of Battery capacity : The battery will be charged fully and then the system will be switched-on for 8 hours for verification of its capacity. During switch on the system various on line and off line functions will be performed.	In Lab
2.6	Verification of Storage capacity: At least 40 features will be recorded in slow mode and stored for one km distance. The memory used in the one Km recording of data will be noted and multiplied by 1000 to get the memory required for storage of 1000 km recorded data. This will be compared with available hard disk space.	In Lab
2.8	Testing for not missing of Tacho Pulse: Tacho will be fitted to the system; it will be rotated for a definite number of cycles in range of 50 to 100. Pulses will be recorded & matched with the number of pulses per rotation. No pulse signal should be missed.	In Lab
4.1	Verification of Hardware : i) Lap top/Netbook/Tablet will be verified through display of system configuration by Operating System on V.D.U and physical verification. ii) For verification of other hardware data sheet/ literature provided by third party manufacturer will be verified.	In Lab.
3.0 & 5.0	Verification of Online and Offline Software : i) The following facilities & functions of the system mentioned in Para 3 & 5 of Technical Specification will be physically verified during actual operation in field. - Storage of 100 track features in slow mode with details (remarks) - Storage of 37 features in fast mode by a single key operation - Recording of GPS coordinates, distance and key features storage as per Annexure VIII & IX - Display of few last recorded track features. - Facility to erase wrongly entered track feature entry. - Changing nomenclature of any track feature without changing code in slow and fast mode - Tacho calibration & verification of distance measurement accuracy. The accuracy should be within +/- 0.3% in 1 kilometer. - TGMS format output as in Annexure X - Diagnostic module. - Reports as per Annexures IV, V, VI & VII	Lab. / Field
4.5	Facility to record Latitude & Longitude at every ground features at user defined distance.	In Field
8.	Testing of Spare Parts Spare tacho & DIO will be tested by replacing the existing tacho & DIO being used in the system.	Lab.

ARE/TRC-I	DTM-V/ED-TMR	PED/TMM	Page 18 of 18
Prepared By:	Checked By	Approved By:	