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भारत सरकार - **Government of India**

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SER, ECoR एवं SECR की सहभागिता में ट्रैक संरचना पर 25 टन एक्सल लोड के प्रभाव पर केस स्टडी

CASE STUDY ON EFFECT OF 25 TONNE AXLE LOAD ON TRACK STRUCTURE IN COLLABORATION WITH SER, ECoR & SECR

केमटेक/2018/सि/25 टन एक्सेल लोड/1.0

CAMTECH/2018/C/25 T AXLE LOAD/1.0

दिसम्बर - 2018

December – 2018

अअभासंRDS रेल अग्रदूत Transforming Railways www.rdso.gov.in

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महाराजपुर, ग्वालियर - 474005

Maharajpur, Gwalior – 474005

✆ : 0751 - 2470869 & Fax : 0751 - 2470841

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प्राक्कथन

भारतीय रेलवे देश का सबसे बड़ा परिवहन संगठन है। ट्रेलिंग लोड और ऑपरेटिंग गति हमारे प्रमुख दक्षता संकेतक हैं। एकीकृत रेलवे आधुनिकीकरण योजना को बढ़ाने के उद्देश्य हेतु हाई एक्सल लोड लाना आवश्यक है जिससे बढ़े हुए यातायात को तीव्र गति से चालू किया जा सके।

यह स्पष्ट है कि बढ़ाये गए एक्सल लोड का ट्रैक मापदंडों पर अधिक प्रतिकूल प्रभाव पड़ेगा। वर्तमान केस स्टडी SECR, ECoR एवं SER के सेक्शन पर चल रहे 25 टन एक्सल लोड के प्रभाव के बारे में जानकारी प्रदान करती है। ट्रैक पर देखे गए 25 टन के प्रभाव और संभावित समाधान जैसा कि प्रस्तावित हैं, को हैंडबुक में शामिल किया गया है।

यह उम्मीद की जाती है कि CAMTECH द्वारा की गई केस स्टडी पर यह पुस्तिका, भारतीय रेलवे के इंजीनियरिंग कर्मियों के लिए इस विषय पर अपने अनुभव और ज्ञान को CAMTECH एवं RDSO के साथ साझा करने में काफी सहायक होगी।

केमटेक, ग्वालियर *(डी. के. गुप्ता)*

28 दिसम्बर, 2018 *संयुक्त निदेशक / सिविल*

FOREWORD

Indian Railways is the largest transport organisation in the country. Trailing loads and operating speeds are our principal efficiency indicators. Integrated Railway Modernisation plan needs to be formulated with an objective to introduce Higher Axle Load to carry heavy traffic with enhanced speed.

It is apparent that enhanced axle load will have more adverse effect on track parameters. The present case study provides information about the effect of 25 T axle load running on sections of SECR, ECoR and SER. The effect of 25 T noticed on track and probable solutions as proposed are incorporated in the handbook.

It is expected that this handbook on case study carried out by CAMTECH will be quite helpful to the engineering personnel of Indian Railways to share their experience and knowledge on this subject with CAMTECH & RDSO.

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CAMTECH/Gwalior ***(D.K. Gupta)***
December 28, 2018 ***Joint Director/Civil***

भूमिका

भारतीय रेलवे ने 25 टन या उससे अधिक के भारी एक्सल लोड हेतु आगे बढ़ने की योजना बनाई है। भारी एक्सल लोड के तहत ट्रैक संरचना को गहन तनाव, रगड़ और विरूपण के अधीनकृत किया जाएगा। स्वाभाविक रूप से तनाव में वृद्धि से ट्रैक ज्यामिति का तेजी से ह्रास होता है और ट्रैक रखरखाव में आनुपातिक वृद्धि होती है। इसलिए इससे पहले कि एक भारी एक्सल लोड को चलाने की अनुमति दी जाए, यह जरूरी होगा कि इंफ्रास्ट्रक्चर की सुरक्षा सुनिश्चित की जाए क्योंकि यह यात्री यातायात को भी वहन करता है।

इस केस स्टडी में, SECR, ECoR और SER द्वारा उपलब्ध कराया गया डेटा, उन सेक्शन का है जिनमें 25 टन एक्सल लोड का ट्रैक पैरामीटर पर प्रभाव का अध्ययन किया गया है तथा जहां लौह अयस्क से भरे हुए रेक BOBSNM1, BOY, BOXNHL, BOBS और N-BOX को निर्दिष्ट गति पर चलाने की अनुमति है। इसके अलावा RDSO की टिप्पणियों / निष्कर्षों / दिशानिर्देशों में और IPWE सेमिनार में रेलवे अधिकारियों द्वारा प्रस्तुत पत्रों में सुझाए गए समाधान (उद्धृत संदर्भ के लिए उचित श्रेय के साथ) को शामिल किया गया है।

“ट्रैक संरचना पर 25 टन एक्सल लोड के प्रभाव का अध्ययन” विषय पर इस हैंडबुक को, ट्रैक के निर्माण और रखरखाव गतिविधियों में लगे भारतीय रेलवे के SSEs / JEs और अधिकारियों के मध्य विषय संबन्धित ज्ञान को प्रसारित करने के उद्देश्य से तैयार किया गया है, ताकि वे आगे के अध्ययन के लिए अपने क्षेत्र के अनुभवों और ज्ञान का योगदान दे सकें।

इस हैंडबुक के और सुधार के लिए हम अपने पाठकों के किसी भी सुझाव का स्वागत करते हैं।

केमटेक, ग्वालियर *(के.सी. शाक्य)*

26 दिसम्बर, 2018 *वरिष्ठ अनुभाग अभियंता/सिविल*

PREFACE

Indian Railways has planned to go for higher axle loads of 25 T or even more. Track structure under the higher axle load will be subjected to intense stresses, wear and deformation. Obviously, increase in stresses lead to faster deterioration of track geometry and proportional increase in track maintenance. Hence before a heavier axle load is permitted to run, it will be necessary that the safety of infrastructures must be ensured as it has to carry passenger traffic also.

In this case study, the data provided by SECR, ECoR and SER are included to study the effect of 25 T Axle Load on Track Parameters in the sections, where BOBSNM1, BOY, BOXNHL, BOBS and N-BOX loaded with iron ore are permitted to run at specified speed. The solutions as suggested in RDSO observations/findings/guidelines and in the papers presented by railway officials in IPWE seminars (with due credit to references cited) have been incorporated.

This handbook on 'case study on effect of 25 T axle load on track structure' is prepared with the objective to disseminate the knowledge incorporated from various sources mentioned above among SSEs/JEs & Officers of Indian Railways engaged in construction and maintenance activities of track, so that they may also contribute their experiences and knowledge to enhance the data for further studies.

We welcome any suggestions from our readers for further improvement of this handbook.

CAMTECH/Gwalior ***(K.C. Shakya)***
December 26, 2018 ***Sr. Section Engineer/Civil***

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संशोधन पर्चियों का प्रकाशन
ISSUE OF CORRECTION SLIPS

इस हस्तपुस्तिका के लिए भविष्य में प्रकाशित होने वाली संशोधन पर्चियों को निम्नानुसार संख्यांकित किया जाएगा :

The correction slips to be issued in future for this handbook will be numbered as follows:

केमटेक/2018/सि/25 टन एक्सेल लोड/1.0/सीएस# XX दिनांक_____

CAMTECH/2018/C/25T AXLE LOAD/1.0/CS # XX date_____

जहाँ xx संबन्धित संशोधन पर्ची की क्रम संख्या है (01 से प्रारम्भ होकर आगे की ओर)

Where "XX" is the serial number of the concerned correction slip (starting from 01 onwards).

प्रकाशित संशोधन पर्चियाँ
CORRECTION SLIPS ISSUED

क्र.सं./ Sr. No.	प्रकाशन दिनांक/ Date of issue	संशोधित पृष्ठ संख्या तथा मद संख्या/ Page no. and Item No. modified	टिप्पणी/ Remarks

1.0 परिचय / Introduction

Indian Railways as a lifeline of the nation traverses length and breadth of the country providing the required connectivity and integration for balanced regional development. It is known that most of the existing track has been designed before independence and specifications which better suited to the then standard has been adopted. Though over the decades, constant improvement has been done to track system like PSC sleepers, CMS crossing, LWR, mechanized track maintenance, better fasteners etc., to keep pace with increasing axle load and speed.

At present and in future Indian Railways have planned construction of new railway lines for heavy axle loads at a very fast pace with a view to maintain the quality of construction. The combination of heavy freight traffic and semi-high speed passenger traffic poses challenges in the design, construction and maintenance of track, because of the conflicting requirements. Both the traffic (freight as well as passenger) impose impact loads due to irregularities in the track and in the wheels, but the combination of axle load and train speed makes the differences in load magnitude and track damage extremely complex. The loads from high axle load freight trains are higher in magnitude and longer in duration than loads from high speed trains.

Indian Railways adopted the strategy of running heavier axle loads on the existing tracks. Vide letter no. 2004/CE-II/TK/1/Policy/Pt. dated 19.07.2006 (Track Policy circular 2 of 2006), Railway Board has directed to adopt the Minimum Track Structure for running of 25t axle load train as under:

Rail section	60 kg, 90UTS
Sleepers and density	PSC, 1660 nos. per Km
Ballast cushion	300 mm
Points and crossing	Fan-shaped layout with 60 kg curved switches

It was further stated in the letter that "Existing track structure, consisting of 52 Kg 90UTS rails on PSC sleepers with 1540 nos. per km and 250mm ballast cushion, is suitable for running of 25T axle load trains at a restricted speed of 60kmph only, for BOXN and similar type of wagons." On 52 Kg 90 UTS rails, which have not carried traffic more than 50% of stipulated GMT of 525 GMT, limited operation of 25t axle load can be permitted at speed not exceeding 45 kmph, actual speed to be decided by Railways based on age/ condition of rails.

Based on the very limited operation of 25 t at restricted speed of 50 kmph on selected routes in ECoR, SCR, SECR, the track related issues are summarized as under:

- Excessive wear in switches and crossings.
- Crossing zone requires frequent packing.
- CMS crossings required frequent replacement/ repair due to wear and cracking of crossing.
- Excessive wear of outer rails of curve and flattening of inner rails.
- Battering of glued joints frequently.
- Increased cases of glued joint failure and fish plate fracture.
- Stretches on weak formation/ black cotton soil causing frequent ballast puncture resulting into abrupt cross level vibration.
- Fish plate of stock rail joints getting battered, leading to failure of fish plates.

- Following specific problem of iron ore routes due to iron ore falling on the rail and ballast from BOBs wagons –
  - Pitting of rail top
  - Frequent requirement of deep screening due to fouling of ballast
  - Difficulty in tamping and poor quality of tamping due to fouling of ballast

Therefore, there is a need to upgrade & standardize the existing track structure for 25 t axle load on IR. Use of wider & heavier PSC sleeper and suitable elastic fastening system for 25 t axle load is considered advantageous on numerous accounts for semi-high speed and heavy axle load both.

2.0 ट्रैक इंजीनियर्स के सामने चुनौतियाँ / Challenges Before The Track Engineers

The main concern of the track engineers in the field is that the track deterioration caused predominantly by freight trains becomes impediment to passenger trains. Most of the track deterioration is strongly associated to the development of dynamic loads resulting from the wheel-rail contact. These dynamic loads are influenced by many factors. Some important factors are:

- Axle load
- Speed of operation and dynamic augment of rolling stock
- Characteristics of rolling stock affecting dynamic behavior i.e. wheel diameter, suspension system, unsprung mass, etc.
- Maintenance standards of rolling stock – permissible size of wheel flat, wheel deformations
- Track structure, its geometry

It is pertinent to note that

- The increasing speed would lead to increase the dynamic effect which at higher speeds might cause the dynamic load equal to twice the static load. Adding to it, if the static load in itself is increased in case of high axle load, the dynamic effect at high speeds would be very high.
- Heavier axle loads will enable carrying more payloads in one train, which in turn improve throughput substantially. Hence before a heavier axle load is permitted to run, the safety of infrastructures has to be ensured as it carries passenger traffic also.

The increase in speed and axle load increases the static as well as dynamic component of forces coming on the track due to operations. This increase is proportional for static component but the dynamic augment increases at a much faster rate with speed. The increased loading on track leads to faster rate of deterioration of track geometry and also decreased fatigue life of rail, weld and other components thus causing increase in number of rail/weld failure.

3.0 डायनेमिक ऑगमेंट / Dynamic Augment

Dynamic Augment is an out of balance force that refers to a vertical force, which alternately adds to and subtracts from the locomotive's weight on a wheel. It is transferred to the track by the driving wheel. The high speed means higher dynamic augment, which will result into higher

B.M. & higher stress in rail, higher rail seat on sleeper & higher vertical stress on ballast bed & formation.

3.1 As per Indian Railway Works practice (RDSO Guidelines) the Dynamic Augment is governed by C-100 report. The dynamic augment reported for various rolling stock at their maximum permitted speed, based on RDSO trials in June-2005 is as under:

Rolling Stock	Speed (kmph)	Dynamic Augment using WILD (%age)
Box N	75	55% approx.
Box NHS	75	50% approx.
WDM2	110	95% approx.
BCN	75	50% approx.

The RDSO report No. C-100 indicates that a wheel flat of dimensions of 18x25x3 mm in ICF coach produced a dynamic augment (DA) as high as 257% at speed of 96 kmph against the normal DA of 57.4%.

- Therefore, it can be inferred that even of flat of size 10-15 mm or little deformation in wheel, which is very likely for a large number of wheels, will produce an instantaneous wheel load of such order that rail stress crosses its permissible limit in 60 kg rail.
- Continuous operation at near limiting magnitude of rail stress could be severe for the track. The aspect assumes greater importance considering the fact that the flat size up to 60 mm is permitted in the wagons on IR.

3.2 The option of higher UTS rail giving higher service stresses is open, however, with the prevailing underutilization of available rail grinding machines, it looks unlikely that the mandatory regime of rail grinding needed for use of higher UTS can be implemented effectively.

- In that case, the use of higher UTS shall be more of a liability than asset as they are prone to higher incidences of sudden failures, wheel scabs/burns leading to rather increased incidences of rail failures.

4.0 ट्रैक पैरामीटर्स पर नजर रखी जाना / Track Parameters Being Monitored

During the study of data provided by SEC Railway, Eco Railway and SE Railway, the effect of 25t axle load dedicated rakes consisting of BOBSNM1, BOY, BOXNHL, BOBS, N-BOX and others loaded with iron ore is being monitored for the following track parameters.

(i) Rails (ii) Fastenings (iii) Sleepers (iv) Ballast (v) Formation & Bridges

5.0 सेक्शन में चलने वाले 25 टन एक्सल लोड के समर्पित रेक – विवरण / 25 T Axle Load Dedicated Rake Running In Section – Details Thereof

The following details are made available by SEC Railway, Eco Railway and SE Railway.

In Maroda-Dallirajhara non-electrified section of SEC Railway – Vide Report No. SECR/ENGG/BIA-II/PW/1/Pt-V/258, dated 01.02.2018 of ADEN/II/BIA/SECR, the 25 t axle

load dedicated rake consisting of BOBSNM1 loaded with iron ore is running at a maximum speed 50kmph in Maroda-Dallirajhara non-electrified section of SEC Railway.

This is a single line section having annual GMT of 23.21, and on average daily 6 loaded trains with 25 t axle load are running. Since the frequency of loaded trains is very less, so this section may not be considered true representative of 25t axle load route.

In Kottavalsa-kirandul electrified section of ECo Railway – Vide Report No. E/2/KRPU/2018, dated 23.02.2018 of ADEN/KRPU/ECoR, 25 t axle load dedicated rake consisting of BOY, BOXNHL loaded with iron ore is running at a maximum speed 65kmph in Kottavalsa-kirandul electrified section of ECo Railway.

This is a single line section having annual GMT of 27.70, and on average daily 12 loaded trains with 25 t axle load are running. The frequency of loaded trains is very high and the trains stop at intermediate stations frequently.

In Bandamunda – Bimalgarh, Bimalgarh – Barsuan and Bimalgarh – Kiriburu electrified section of SE Railway – Vide Report No. TC/CC+10/2018, dated 03.05.2018 of ADEN/BNDM/SER, 25 t axle load dedicated rake consisting of BOBS, N-BOX and others loaded with iron ore is running at a maximum specified speed in a) Bandamunda – Bimalgarh b) Bimalgarh – Barsuan and c) in Bimalgarh – Kiriburu electrified section of SE Railway.

(a) **Bandamunda – Bimalgarh, Bimalgarh – Barsuan –** A single line section classified as Group-D spl route covering passenger trains and heavy axle load wagons (CC+8+2/100T) with an annual traffic density of BNDM-BUF (33.89) & BUF-BXF (9.56) GMT and axle load of 22.58 MT.

(b) **Bimalgarh – Kiriburu -** A single line section classified as Group-E route covering heavy axle load wagons (CC+10+2) with an annual traffic density of BUF-KRBU (20.69) GMT and axle load of 25 MT.

6.0 ट्रैक पैरामीटर पर देखे गए प्रभाव / Effects Noticed On Track Parameters

The track deterioration in the sections mentioned above in Para 5 is due to dropping of iron ore particles on rail surface during run of 25 t axle load dedicated rake. The following effects noticed on track parameters are listed as below –

6.1 रेल पर देखे गए प्रभाव / Effect Noticed On Rail

- In Maroda-Dallirajhara non-electrified section of SEC Railway –

  The top surface of rails 60 kg (90UTS) laid in year 2006-07 is pitted due to drop of iron ore particles in the entire section. Due to iron ore particles falling on Rail top from BOBs wagon & after passage of wagon, pitting is observed at rail top which may further reduce the service life of rail. No cases of scabbing of rails/wheel burns on rails are observed during Oct-16 to Dec-16 and during Oct-17 to Dec-17.

S. No.	Year	Rail/Weld failure details maintained separately for 52 kg/60 kg rail section				Nos. of USFD Defects detected					
		RF		WF		IMR		IMRW		DFWR	
		60 kg	52 kg	60 kg	52 kg	60 Kg	52 Kg	60 Kg	52 Kg	60 Kg	52 Kg
1	2013-14	0	0	0	0	0	0	01	0	0	0
2	2014-15	0	0	01	0	0	0	0	0	0	0
3	2015-16	0	0	0	0	0	0	0	0	0	0
4	2016-17	0	0	10	0	02	0	0	0	0	0
5	2017-18	0	0	08	01	01	0	01	0	0	0
	Total	0	0	19	01	03	0	01	0	0	0

- The following Rail/Weld failures on single line of route DUG-DRZ are reported during period October-2017 to December-2017 (Period under review)

  a) October-16 to December-16: Rail fracture – Nil & Weld fracture – Nil
  b) October-17 to December-17: Rail fracture – Nil & Weld fracture – 01 No.

- <u>In Kottavalsa-kirandul electrified section of ECo Railway</u> –

The gauge face of the 90UTS rail which are laid even in 2013-14 and 110 UTS laid on 1992-96 became pitted particularly gauge face of outer rail on curve more than 5 deg. and top surface in entire section.

- The following Rail/Weld failures on single line of route KTV-KRDL are reported during period April-2016 to February-2018 (Period under review)

  a) April -16 to March-17: Rail fracture – 01 No. & Weld fracture – 04 Nos.
  b) April-17 to February-18: Rail fracture – 02 Nos. & Weld fracture – 16 Nos.

S. No.	Year	Rail/Weld failure details maintained separately for 52 kg/60 kg rail section				Nos. of USFD Defects detected					
		RF		WF		IMR		IMRW		DFWR	
		60 kg	52 kg	60 kg	52 kg	60 Kg	52 Kg	60 Kg	52 Kg	60 Kg	52 Kg
1	2013-14	01	0	15	0	01	0	01	0	0	0
2	2014-15	01	0	21	0	03	0	0	0	12	0
3	2015-16	01	0	05	0	03	0	02	0	01	0
4	2016-17	02	0	04	0	11	0	04	0	20	0
5	2017-18	02	0	16	0	59	0	04	0	163	0
	Total	07	0	61	0	77	0	11	0	196	0

- In a) Bandamunda – Bimalgarh b) Bimalgarh – Barsuan Sections of SE Railway –

  At some of the locations Rail Top surface pitted due to dropping of Iron-ore particles.

  Rail/Weld failure details

Rail/Weld failure details maintained separately for 52 kg/60 kg rail section	S. No.	Year	RF		WF	
			60 kg	52 kg	60 kg	52 kg
	1	2013-14	01	02	0	01
	2	2014-15	0	01	01	01
	3	2015-16	01	0	01	01
	4	2016-17	0	0	0	0
	5	2017-18	0	0	01	0
		Total	02	03	03	03

- In Bimalgarh – Kiriburu Section of SE Railway –

  At some of the locations Rail Top surface pitted due to dropping of Iron-ore particles.

  Rail/Weld failure details

Rail/Weld failure details maintained separately for 52 kg/60 kg rail section	S. No.	Year	RF 60 kg	WF 60 kg
	1	2013-14	01	01
	2	2014-15	0	01
	3	2015-16	01	01
	4	2016-17	0	0
	5	2017-18	0	01
		Total	02	04

6.2 फास्टनिंग्स पर देखे गए प्रभाव / Effect Noticed On Fastenings

i) In Maroda-Dallirajhara non-electrified section of SEC Railway – The GR Pad crushed and toe load of ERC reduced.

ii) In Kottavalsa-kirandul electrified section of ECo Railway – The crushing of GR Pad is very high particularly on curve more than 6 deg. The GR Pad crushed and toe load of ERC reduced. Renewal of GR Pads is being done once in 6 months which means the life of GR Pad is reduced due to heavy load.

iii) In a) Bandamunda – Bimalgarh b) Bimalgarh – Barsuan Sections of SE Railway – Rubber Pads crushed and toe load of ERC reduced.

iv) In Bimalgarh – Kiriburu Section of SE Railway – Rubber Pads crushed and toe load of ERC reduced.

6.3 स्लीपर्स पर देखे गए प्रभाव / Effect Noticed On Sleepers

i) In Maroda-Dallirajhara non-electrified section of SEC Railway – Large nos. of sleepers cracked premature.

ii) In Kottavalsa-kirandul electrified section of ECo Railway – Grooving of Sleeper is very high particularly in curves having curvature more than 5 deg. The Sleepers which were laid in 2008-09 are being renewed from 2015 till date. On locations with curvature less than 5 deg. curve which were renewed during 2004 are being renewed again and large nos. of sleepers cracked prior to completion of 1/3rd life. The sleeper should be more stronger particularly under rail seat.

- On bridge, channel sleepers are being cracked frequently. On bridge no. 652 the channel sleepers were renewed during 2013-14 in which 15% sleepers developed cracks out of which 4 have been renewed due to badly damaged condition under rail seat during November 2017.

iii) In a) Bandamunda – Bimalgarh b) Bimalgarh – Barsuan Sections of SE Railway – At some of the locations, sleepers were laid in the year 1997-98 & 2008 and most of the sleepers were in cracked condition.

iv) In Bimalgarh – Kiriburu Section of SE Railway – At some of the locations, sleepers were laid in the year 2002-03 and most of the sleepers were in cracked condition.

6.4 गिट्टी पर देखे गए प्रभाव / Effect Noticed On Ballast

i) In Maroda-Dallirajhara non-electrified section of SEC Railway –

On average clean ballast cushion is 180-220 mm except at yard locations. In yards, ballast cushion is 100 mm and less. Ballast cushion reduced frequently due to dropping of iron ore particle on the track resulting in tamping could not be done fully. Deep screening required in less interval of time (4-5 years) due to dropping of iron ore in the track.

1. Temping Machines are unable to tamp fully as iron ore particles are continuously falling in the tamping zone.
2. To overcome the issue of iron ore falling in the section, manual overhauling (as FRM does not screen in tamping zone) should be carried out once a year in about 100 track KM.

ii) In Kottavalsa-kirandul electrified section of ECo Railway –

On average the ballast cushion is 150-250 mm except yards and curves of curvature more than 5 deg. In yards and curves, cushion is less than 100 mm. Ballast cushion reduces frequently due to dropping of iron ore particle on the track. Resulting tamping could not be done up to full depth. Deep screening is required in 4-5 year interval.

1. Temping Machines are unable to tamp fully as iron ore particles are continuously falling in the tamping zone leading to early cracking of ballast.

2. To overcome the issue of iron ore falling in the section, manual overhauling (as FRM does not screen in tamping zone) should be carried out once a year and BCM should be provided once in 5 years.

iii) In a) Bandamunda – Bimalgarh b) Bimalgarh – Barsuan Sections of SE Railway –

Last Deep screening done in the year 2006. BCM work is going in the section.

iv) In Bimalgarh – Kiriburu Section of SE Railway –

Last deep screening done in the year 2004. Sanctioned TSR(P) with deep screening for 13.349 Track Km work under progress and deep screening by BCM for 20.784 Track Km sanctioned.

6.5 नींव और पुलों पर देखे गए प्रभाव / Effects Noticed On Formation and On Bridges

i) In Maroda-Dallirajhara non-electrified section of SEC Railway –

There was problem of wing wall failure observed in two major bridges [Br. No. 80 (1x12.2mG) and Br. No. 90 (4x12.2mG)]. Wing walls were failing due to excessive separation from abutment. Rehabilitation work done in both bridges in the year 2015-16.

- Major deficiencies as noticed in
  (a) Bearings : Nil
  (b) Superstructure : Nil
  (c) Substructure : Nil
  (d) Any other : Plinth protection of bridge pier foundation and flooring repair required for Br. No. 58, 148 and 146.
- Status of Instrumentation of Bridges: Nil

ii) In Kottavalsa-kirandul electrified section of ECo Railway –

No effects on formation & bridges are reported in the report.

iii) In a) Bandamunda – Bimalgarh b) Bimalgarh – Barsuan Sections of SE Railway –

There are 249 nos. of Bridges and out of 249 Bridges, 07 Nos. of Major & 242 Nos. of Minor Bridges. At present at Br. No. 47 (Major), channel sleepers are to be changed as per GM Inspection Note No. 05/2016/Annual Para No. 20 (ii) of PCE/GRC. On BUF end, a curve (Curve No. 18 of 5.5^0 LH) starts from this bridge covering a length of 30.00 m in transition, to be made straight. For these 41 Nos., new steel channel sleepers are required to make the portion straight.

iv) In Bimalgarh – Kiriburu Section of SE Railway –

There are 160 Nos. of Bridges, and out of 160 bridges, 04 nos. of Major & 156 nos. of Minor bridges. There are 78 nos. curves, out of them 13 nos. curve – 8^0, 01 no. curve – 7.5^0, 01 no. curve – 7^0, 30 nos. curve – 6.5^0, and rest of curves are 2^0 to 5^0.

7.0 रेक विवरण / Rake Details (CC+8+2 BOXNHL/Other 22.9 T Axle Load)

The primary requirement for heavier axle load stocks to operate at 100 kmph and coaching stocks at semi-high speeds in mixed traffic regime is a track friendly design which imparts such low/moderate forces on track as adopted in the design of track structure. It implies that stress coming on rail and other components shall not exceed the permissible limits during service.

i) In Maroda-Dallirajhara non-electrified section of SEC Railway –

BOBSNM1 loaded with 25 t axle load (on average daily 6 load and 6 empty trains).

ii) In Kottavalsa-kirandul electrified section of ECo Railway –

BOY, BOXNHL loaded with 25 t axle load on an average 15-19 and 11-13 empty with including 3-4 empty jumbo rakes and 3 express UP and DN trains and 1 passenger train also run on this section.

iii) In a) Bandamunda – Bimalgarh b) Bimalgarh – Barsuan Sections of SE Railway –

(CC+8+2) BOBS, N-BOX and others: Annual traffic density on this route is 33.32 for 25 T axle load. On average 24 Nos. of Goods Train & 01 Nos. of Passenger Train runs in this section.

iv) In Bimalgarh – Kiriburu Section of SE Railway –

(CC+8+2) BOBS, N-BOX and others: Annual traffic density on this route is 20.69 for 25 T axle load. On average 24 Nos. of Goods Train & 01 Nos. of Staff Shuttle Train runs in this section.

8.0 सेक्शन में जीएमटी का सारांश / Summary of GMT in Sections

Year	GMT on				
	SEC Railway	Eco Railway	SE Railway		
	Maroda-Dallirajhara non-electrified Section	Kottavalsa – Kirandul electrified section	Bandamunda – Bimalgarh electrified section	Bimalgarh – Barsuan electrified section	Bimalgarh – Kiriburu electrified section
2013-14	19.50	35.11	32.53	13.09	18.27
2014-15	20.50	27.26	33.32	13.29	18.66
2015-16	21.77	21.03	33.89	9.56	20.69
2016-17	23.21	27.70	33.89	9.56	20.69
2017-18	-	-	33.89	9.56	20.69

9.0 समाधान प्रस्तावित / Solutions Proposed

In view of the effects noticed above, the solutions based on the papers presented by railway officials in IPWE seminars and RDSO observations/findings/guidelines are being proposed in context of the reports provided by SEC Railway, Eco Railway and SE Railway.

9.1 रेल / Rails

- **Use of a heavier section rail of 60 Kg, 90 UTS:** An increase in axle load will result in decrease in the fatigue life of rail, measured in terms of cumulative GMT and reduction occurs for both heavier as well as lighter sections, therefore in the interest of long term economy and from fatigue considerations, it is decided to use a heavier section rail of 60 Kg, 90 UTS.
  - In case of static stresses due to vertical bending, the heavier axle load means higher wheel load, which will result into higher bending moment and higher stress in rail, higher static rail seat load on sleeper and higher vertical stress on ballast bed and formation.

- **Rail profile required to be re-designed:** In case of stresses due to lateral load, the generation of lateral/flange force will depend upon speed, axle load & conicity of wheel & play. Under semi high speed & heavier axle load the lateral flange force will increase. The play needs to be controlled & conicity of wheel can be 1 in 40 in place of 1 in 20, accordingly rail profile will require to be re-designed.

- **As suggested in Report No. E/2/KRPU/2018, dated 23.02.2018 of ADEN/KRPU/ECoR:** In comparison to 60 kg (90UTS) rail, 60kg (110UTS) rail is more suitable for the Kottavalsa-kirandul electrified section of ECo Railway because wear of 110 UTS rail is 5 times lesser than 90 UTS rail.

- **Rail grinding required to be undertaken:** It is to prevent Rolling Contact Fatigue (RCF) and to increase rail life, which is obtainable under present axle load itself in range of GMT i.e. below the prescribed life of 800 GMT for 90 UTS rails. Till rail grinding is implemented, there is a need to safe guard against rail fractures due to RCF by extensive and effective USFD.

9.2 फास्टनिंग्स / Fastenings

The rail fasteners are normally elastic and its stiffness is much less than the rubber pad. Due to heavy axle load, there is possibility of heavy wear & tear on fitting & fastening. Fastening get loose very fast and thereby effecting track geometry.

- Therefore, use of less stiff rubber pad and more elastic resilient fastenings will ensure more stable track behaviour for semi-high speed track.

With the introduction of wider sleeper, indigenous elastic fastening system having better features with enhanced service life has been conceived in order to further strengthen the fastening system for wider sleeper. For this purpose, following improvements in the three fastening components have been considered.

9.2.1 Elastic Rail Clip

- ERC MK-V: This is the existing rail clip having 23 mm dia. (Grade 55 Si7 silico-manganese spring steel rounds). With a view to enable its use on existing PSC sleeper, its leg was machined and diameter was reduced to suit the existing insert. The reduction in diameter was achieved through precise profiling, which requires special care during manufacturing. Insulating liners and rail pads of same raw material were suitably modified to suit the wider sleeper.

- ERC MK III/V: This is a new elastic rail clip of uniform 23 mm dia. (Grade 55 Si7 silico-manganese spring steel rounds) developed to avoid extra machining, and to provide ease in manufacturing and full utilization of material.

Note: ERC MK III/ ERC MK V to Drg. No. RDSO/T-3701/ RDSO/T-5919 shall be used with GFN 66 insulating liner to Drg. No. RDSO/T- 6937 with 136RE (68 kg/m) rail section. It is important that elastic clips function within elastic range during their service in track even after undergoing manufacturing tolerances of different assembly components. The above RDSO design has been found to have enough elastic margins to function in elastic limits.

9.2.2 High Viscous Liners

The material high viscous nylon has been proposed in place of glass filled nylon for its better elongation and hence better impact properties.

9.2.3 High Performance Rail Pad

Rubber pads get damaged early. The stiffness of rubber pad plays an important role. If the rubber pad is less stiff, then under the given wheel load, there will be comparatively larger deflection in rail. Stiffer rubber pad, on other hand, will cause lesser deflection in rail.

- Thick (10 mm), ultraviolet stabilized and less stiff Rubber pad (stiffness = 40-100 Kg/mm), Elastic resilient Pandrol fast clips (suitable for high speed as well as heavy haul freight tracks) and heavier track sleepers (223 Kg, 2 m long) were used to ensure better dynamic track stability under high speeding trains and lesser rate of track deterioration.
- As per experience of IR and that of other railways also, the existing 6 mm thick rubber pad shall not be able to sustain heavy axle loads. 10 mm thick Composite Grooved Rubber Sole Plate (CGRSP) to Drg. No. RT-8528 has been designed for use with wider PSC Sleeper to Drg. No. RDSO/T-8527 for 25t axle load.

9.3 एक साथ जोड़ा गया विद्युत-रोधित जोड़ / Glued Insulated Joint

Glued Insulated Joint starts failing because of either insulation gets broken or failure of glue which bonds the joints.

- In high axle loaded LWR track, glued joint can be considered to be weaker than the surrounding track. They have a stipulated life of 200 GMT which means in an average 80 GMT every 3 years, there is possibility of changing the glued joint.

- In increasingly heavy axle loads and high speed, there is always a possibility of it getting ruptured early. So there is a need to review the existing design of glued joint.

9.4 स्लीपर्स / Sleepers

As per suggestion mentioned in Report No. E/2/KRPU/2018, dated 23.02.2018 of ADEN/KRPU/ ECoR, the sleeper should be more stronger particularly under rail seat.

9.4.1 The existing PSC sleeper was designed for 20.32t axle loads and was allowed for 22.9t axle load operations up to 75 kmph. On the review by officers of RDSO and Zonal Railways, it is concluded that these sleepers will not be fit for regular 25t operations at speed of 75 kmph and above.

In year 2008, RDSO had designed a 25t sleeper (Drg. RDSO/T-7008) keeping dimensional profile same as that of BG line sleeper (Drg, RDSO/T-2496). As per Railway Board instructions vide letter No. 2013/TK-II/22/2/2, dated 18.06.2013 and RDSO observations on this issue, design of wider & heavier sleeper was contemplated for achieving the following main advantages, viz.

- Increased width and weight providing higher frame resistance against buckling, chances of reducing de-stressing temperature with likely reduction in rail/weld failures.
- Increased rail seat area resulting in higher rubber pad life.
- Reduced ballast pressure leading to reduction in ballast pulverization, deep screening cycle & enhanced drainage.

A new wider PSC sleeper design (RDSO/T-8527) has been developed using 16 nos., 3ply x 3 mm HTS strands with design rail seat load taken as 17.2 t. The wider sleeper for 25t axle load has been designed keeping provision to accommodate extra foot width for 68 kg rails as required through change of liners. The rail seat assembly for wider sleeper has been designed to provide flexibility to adopt UIC 60 kg rail section or 136 RE (68 kg/m) rail section.

The Railway Board vide letter dated 06.10.2016 has approved the field trial of this wider & heavier PSC sleeper (RT-8527) along with its fastening components in 5 Zonal Railways e.g. ECoR, SECR, SER, WCR, NCR. The Railway Board has instructed to conduct trial in a stretch of 15 km length and the trial stretch should be suitably indentified by CTE's and should generally be on busy routes identified for 25 t operation and should also cover curves & gradient to the extent possible.

This new wider PSC sleeper can be finalized for regular adoption for 25 t axle load on IR and DFCCIL tracks. This can be further upgraded to even higher axle load up to 35 t without changing sleeper profile and by increasing number of strands. The weight of this sleeper is 332 kg against 267 kg in existing design, which is almost 24% higher and 40% wider rail seat. Rubber pad area also increased by 48% which will reduce stresses on rubber pad substantially and increase its life. This sleeper will be more suitable for tracks with mixed routes of semi-high speed and heavy axle loads.

A comparison of salient features of the wider sleeper design vis-à-vis that of existing sleepers are as follows:

S. No.	Parameter	BG Line Sleeper (22.5t)	25 t Existing Sleeper	25 t Wider Sleeper
1	RDSO Drawing No.	RT-2495 & 2496	RT-7008	RT-8527
2	Grade of Concrete	M-55	M-60	M-60
3	HTS Strands (3mm dia. x 3 ply)	18 Nos.	20 Nos.	16 Nos.
4	Initial Prestress	70%	75%	75%
5	Prestress Loss	30%	30%	30%
6	Axle Load	22.5 t	25 t	25 t
7	Weight	267 kg	267 kg	332 kg
8	Dimension - Length - Depth at Rail Seat - Depth at Centre - Width at Rail Seat Top - Width at Rail Seat Bottom	 2750 mm 210 mm 180 mm 150 mm 250 mm	 2750 mm 210 mm 180 mm 150 mm 250 mm	 2750 mm 230 mm 200 mm 210 mm 280 mm

A comparison of the sectional dimensions of existing sleeper and wider sleeper are as follows:

S. No.	Type of Sleeper (India)	Gauge (mm)	Length (mm)	Sectional Dimensions						Max Static Axle Load (KN)
				Rail Seat (mm)			Mid Span (mm)			
				Depth	Bottom Width	Top Width	Depth	Bottom Width	Top Width	
1	Existing BG (RDSO/T-2496) & 25 T Sleeper **(RDSO/T-7008)**	1673	2750	210	250	150	180	220	150	221 & 245
2	**Wider Sleeper (RDSO/ T-8527)**	**1673**	**2750**	**230**	**280**	**210**	**200**	**230**	**180**	**245**

It can be observed from the table above that

- Existing sleepers offer less track frame resistance, which is an important requirement for mixed traffic routes with operation of semi-high speed and heavy axle load and LWR on curves.
- Existing sleepers are less fit for higher impact load caused by flat wheels which result sometime to pre-mature failures of sleepers.
- Further, the design of sleeper has reached to saturation stage as it has already 20 numbers of HTS stands in RT-7008. Nos. of strands can not be increased further and this sleeper is difficult to upgrade for higher axle load beyond 25 t.

9.4.2 SGCI INSERT (based on new design of ERC): A new type of insert to accommodate this new clip has been developed. Drawing of the insert has been prepared and its prototype also has been casted for manufacturing based on the new design of ERC.

9.5 गिट्टी / Ballast

Railway ballast is uniformly-graded coarse aggregate produced from crushing (Machine or hand crushed) locally available rocks such as granite, basalt, limestone, slag or gravel. IR uses the ballast having the specifications given in IRS-GE-1 code issued by RDSO in June 2004 with the latest correction slip issued in 2014.

The ballast becomes all the more important in light of the data of Rail-Weld fractures that 50% of the fractures occurred in A route only because the deep screening was due for more than 5 years. Thus this period needs to be further increased by choosing some better quality of ballast which can withstand such high axle loads.

- Good ballast provides resilience and drainage to the track therefore to maintain the desired gradation and strength.
- Ballast replacement is done after certain time interval or after the passage of certain volume of traffic.
- Having clean and well packed ballast is a necessity for longer retentivity of track parameters.
- The drainage of the track gets hampered if the voids between the ballast get clogged due to ingress of dust and pulverization of ballast with the passage of traffic.
- BCM machines are used for deep screening of track and the frequency of deep screening prescribed on IR track is once in 10 years as per para 238(1)(b)(5) of IRPWM-2004.
- Railway Board has stipulated that BCM should be granted 4 hrs block every day.

Recently there has issue of correction slips in IRPWM where it is suggested to reduce the frequency of deep screening from 10 years to 500 GMT. It implies that due to increasing axle load, there has been deterioration in the ballast very rapidly. In order to overcome this, it is suggested that bituminous sub-ballast can be used in the construction of traffic with high axle load and high speed tracks.

Advantages of using bituminous sub-ballast

- **Bearing capacity –** Application of a monolithic layer (0.1-0.2 m) of bituminous ballast as a sub-ballast layer will increase the stiffness of the total structure.
- **Geotechnical stability –** The relatively high stiffness of the bituminous sub-ballast layer will make a positive contribution to the compaction of the layers on top of the bituminous ballast layer. This improves the total stability and keeps the railroad geometry unaltered.
- **Resistance to vertical deformation –** The relatively high stiffness of the bituminous ballast layer compared to granular material will lead to less permanent vertical deformation by railroads. The vertical loading conditions and the relatively short loading time are relatively small, so there will be no permanent deformation in the bituminous ballast layer.

- **Noise and vibrations –** Mechanical properties of the bituminous layer will lead to a reduction in the vibrations and noise produced by passing trains.
- **Durability –** The bituminous ballast as sub-ballast layer increases the foundation modulus, providing a more rigid foundation, with the effect that there is a reduction of tension and shearing stress inside the ballast material, with consequently less fatigue and less degradation and wear of the individual aggregate particles. Even if limited deformation of the sub-soil does take place, this will not affect the bituminous ballast layer because it is capable of withstanding the deformation without loosing its integrity because of the visco-elastic properties of bitumen.

9.6 पुल / Bridges

At the time of taking decision regarding enhancing the axle loads on existing routes, the bridge management regime was characterized by the following:

a. Primarily visual inspections.
b. Paper based records of inspection.
c. Very limited use of non destructive testing (NDT) methods for investigation of bridge problems.
d. Scarce use of instrumentation and measurements of parameters under dynamic condition.

Against this backdrop, when IR decided to raise the axle loads of wagons from 20.82 t to 22.82 t, it was decided to monitor the effects of the higher axle loads on the same through instrumentation.

The vibration of bridges caused by the passing of vehicles has been a subject of research after introducing the high speed trains. Dynamic response of Railway Bridge under moving railway vehicles has been observed to be depending on dynamic characteristics of the vehicle such as axle load, sprung and unsprung masses, stiffness of primary and secondary suspension system, damping, vehicle speed, type of wagons, wagon dimension, load combination and interaction between them.

9.7 नींव / Foundation

In Indian Railways, about 600 km of track was under permanent speed restriction on account of formation problems. It is obvious that wheel defects coupled with overloading cause generation of excessive stresses in track and formation leading to faster deterioration of track.

The increased axle loads have increased the stresses on track structure and formation. The increase in stresses lead to faster deterioration of track geometry and proportional increase in track maintenance. The challenges that would be faced in case of high axle load would be degradation of track foundation due to excess stresses in subgrade, puncturing of ballast into subgrade, uneven settlement of subgrade on curves, etc. and in case of semi-high speed is cant.

On existing tracks, as the formation stresses are likely to exceed the safe bearing capacity of soil, blanketing or any other ground improvement technology is to be implemented which will consequently hike the maintenance expenditure. Provision of blanketing in accordance with

guidelines issued by RDSO of Indian Railways in June 2003, vide Guideline NO.GE: G-I may be a solution.

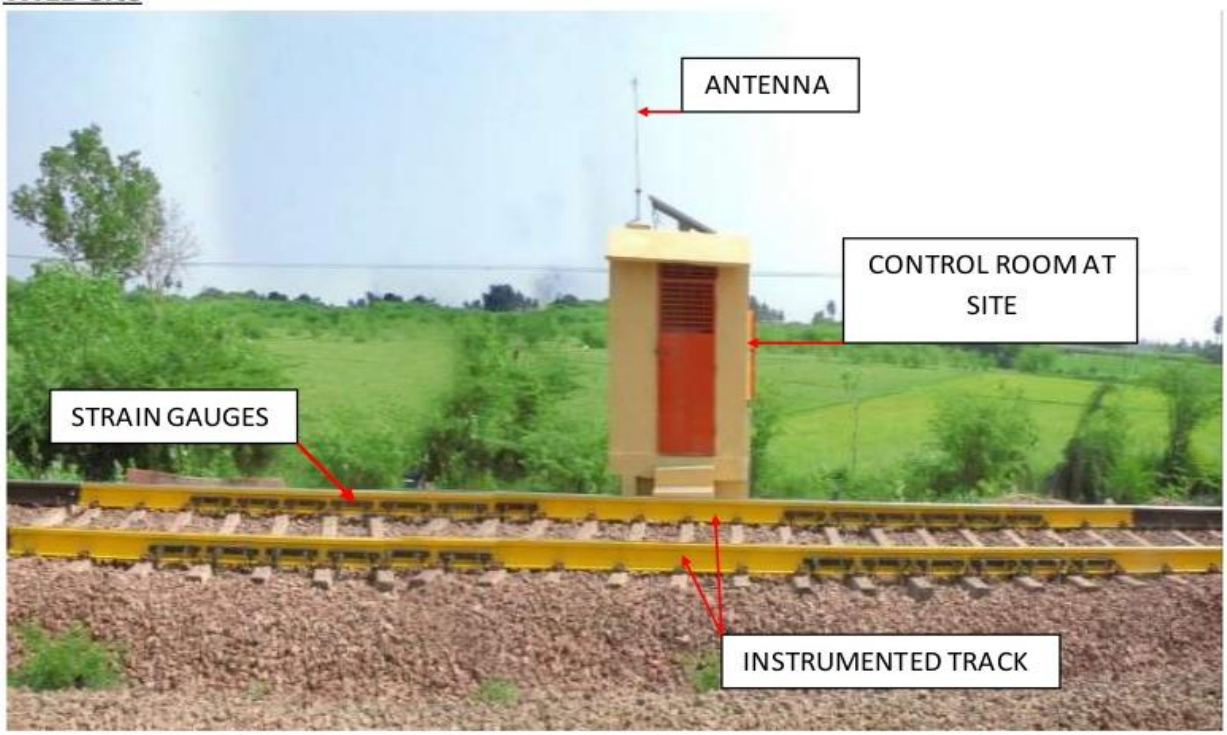
Blanket is a layer of specified coarse, granular material of designed thickness provided over full width of formation between subgrade and ballast to improve the bearing capacity of formation soils.

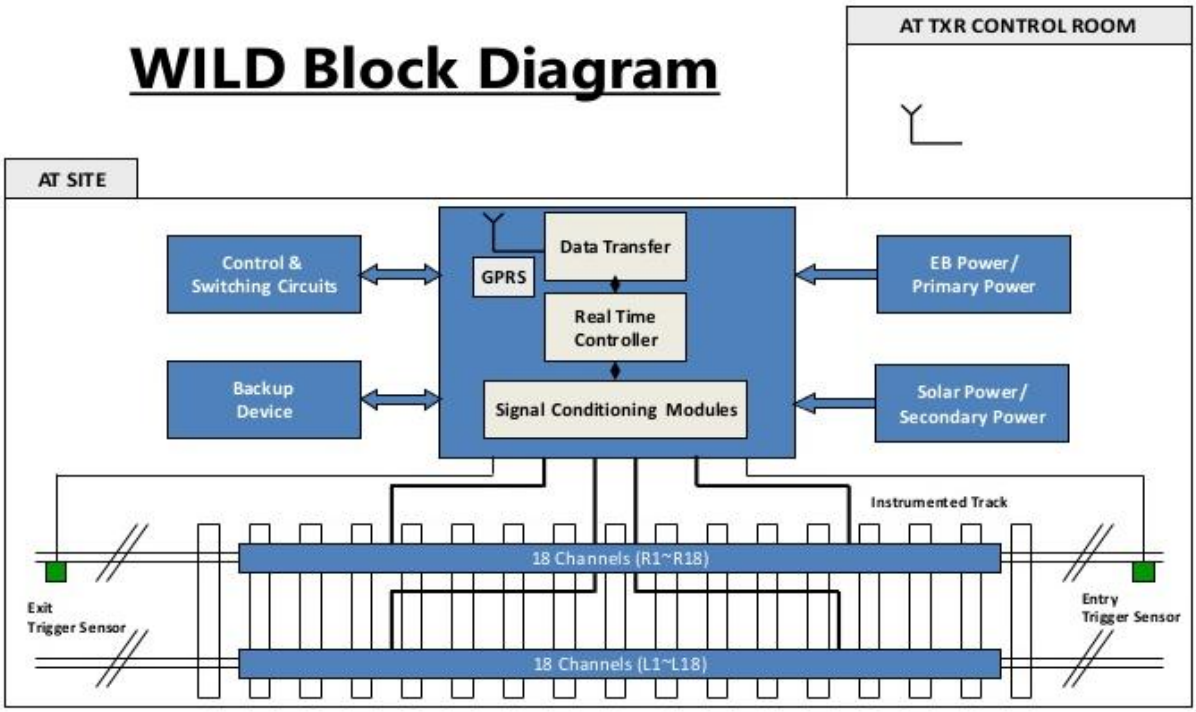
Note: Railway embankment is foundation of railway lines, and to construct a formation that gives trouble free service under the most adverse conditions it is necessary that the embankment has very good shear as well as compressive strength and well compacted to the desired density. Further to assure the quality of the compacted soil, it becomes very important to maintain the density of the compacted soil as achieved in the laboratory.

10.0 WILD का उपयोग / Use of WILD

The Wheel Impact Load Detector (WILD) is a set of instrumented rails (strain gauged) through which data acquisition (impact of load) for wheels of trains under moving conditions at all speeds is done and processed for further report generation. Defective rolling stock produces high impact loads that over a prolonged period of time, leads to Rail/Wagon failure, wheel bearing failure etc.

WILD Site





The WILD is needed in Railways due to following points as listed below:

- WILD measures impact load independent of the cause.
- WILD system assists railway engineers to attend to the defective rolling stock immediately.
- WILD reduces Service Failures and Unplanned Maintenance Cost of Rolling Stocks & Tracks.
- WILD is used to catch the defects in the early stage and thereby protecting Rail Infrastructure & avoids Catastrophic Failures.

It is observed that the basic requisites and operational regime stipulated while introduction of heavy axle load 22.9 t have not been implemented meticulously and lack of implementation of these instructions coupled with inadequate rolling stock design not being in line with international norms for mixed traffic regime has been causing very high incidences of asset failures.

The major issues in the operation are indicated below:

- There is very little monitoring of impact loading on track.
- The second issue is high impact loading permitted during operations.
- It is seen from the WILD data that zonal railways are not taking action on WILD alarms as stipulated.
- Instantaneous wheel load up to 59t (DA – 400%) have been recorded by WILD

- Monitoring of overloading and corrective action thereon is also not being ensured by zonal railways.
- Inadequate powering is another important area of concern, particularly in gradient sections, leading to stalling and damage to rails.
- Heavy loading on track requires enhanced level of maintenance thus increasing the requirement of maintenance blocks and other resources.
- Another significant area of concern is the corrosion of rails and fastenings due to human excreta from coaches which leads to severe reduction in sectional area at critical locations as foot in very short span of time and leads to sudden breakage of rails/welds.
  - The Bio-toilets are provided in passenger trains to keep the track away from the human excreta, thereby reducing considerably the corrosion and minimizing the rail/weld failures.

RAILWAYS TEAM FOR WILD INSTALLATION

S. No.	Department	Responsibility
1	Mechanical C& W	• Owner for the system from date of receipt of material. • Has to coordinate with other department during installation and post installation requirements.
2	Engineering	• To confirm all the site conditions. • Instrumented rail with Glued joint rail installations. • Changing of sleepers with new ones. • Periodic checking of pandrol clips in instrumented area. • Confirmation for civil works like construction of building, Trenching work for strain gauge wires, Trenching work for power line, earth pits and similar works etc.
3	Operations/Traffic	• Blocks required during rail fixing, Proving out test and routine Calibration
4	S&T/TRD	• To ensure track continuity is there after installation of glued joint Rail
5	Security	• Security for the materials and people who install the system.

A) In Maroda-Dallirajhara non-electrified section of SEC Railway -

Detail Report of WILD in BIA-MXA from Jan-2017 to Nov-2017

Month	Total Trains Passed	Total Trains Analysed	Total Wheels Analysed	Total critical alarms				Remark		
				Impact Load> 35t	ILF> 4.5	Both	Total Critical Alarm cases	Detached	Defects found cases	Defects found within permissible limit
JAN-2017	518	516	146588	-	-	-	-	-	-	-
FEB-2017	466	464	136520	-	-	-	-	-	-	-
MAR-2017	557	548	164420	-	-	-	-	-	-	-
APR-2017	372	371	103756	-	-	-	-	-	-	-
MAY-2017	402	395	109876	2	2	2	2	-	-	2
JUN-2017	375	374	105332	-	-	-	-	-	-	-

JUL-2017	383	373	113400	4	-	-	-	-	-	4
AUG-2017	436	344	122415	-	-	-	-	-	-	-
SEP-2017	398	397	114644	-	-	-	-	-	-	-
OCT-2017	300	298	94476	-	-	-	-	-	-	-
NOV-2017	410	406	127172	-	-	-	-	-	-	-

Analysis of Maintenance Alarms in Month of Sep-2017

Date	Vehicle No.	Wheel Left/Right	ILF (Left)/(Right)	Impact Load (Left)/(Right)	Defect Found	Action Taken	Train No./BPC No.
02.09.17	Loco No. 12863	Left	3.06	34.929 (left)	Found OK	All wagons are checked by C & W staff and allowed for run.	DBC/105 C-1 BPC No. 4120, dt. 02.09.17
18.09.17	SE 75071610021	Right	-	20.29 (right)	-		DBC/191 G3 BPC No. 4142, dt. 15.09.17
19.09.17	SE 75079117003	Left	-	20.478 (left)	Slight skidded		DBC/198 J13 BPC No. 4121, dt. 12.09.17
21.09.17	SEC 75141611156	Left	-	20.153 (left)	Dent mark		DBC/206 D3 BPC No. 4126, dt. 18.08.17
	SEC 75100648599	Left	-	20.413 (left)			
21.09.17	ECR 75100648599	Right	2.274 (right)	-	-		BDC/212 B7 BPC No. 4223, dt. 13.09.17
23.09.17	CR 75019360018	Left	2.08 (left)	-	Found OK		BDC/220 E4 BPC No. 4127, dt. 19.09.17
25.09.17	SC 75099714039	Left	2.028 (left)	-	Slight skidded		DBC/230 D6 BPC No. 4126, dt. 19.09.17
29.09.17	NR 75038985758	Left	2.025 (left)	-	Dent mark		BDC/252 J BPC No. 4128, dt. 23.09.17
	SE 81678	Left	2.025 (left)	-	Found OK		
30.09.17	Engine No. 4126	Right	-	20.179 (right)	-		BDC/258 D10 BPC No. 4126, dt. 18.09.17
		Right	-	20.033 (right)	-		

Analysis of Maintenance Alarms in Month of Oct-2017

Date	Vehicle No.	Wheel Left/Right	ILF (Left)/(Right)	Impact Load (Left)/(Right)	Defect Found	Action Taken	Train No./BPC No.
12.10.17	SEC 75141610807 BOBS	Left	2.042 (left)	-	Found OK	Wagons allowed for run since defect is negligible.	DBC/160 A9 4137, dt. 12.10.17
	SEC 75141610807 BOBS	Left	2.52 (left)	-			
21.10.17	SEC 54527 BOXNHL	Left	2.042 (left)	-	Slight skidded		NBOX HL 165216, DT.

	EC 70413 BOXNHL	Left	2.521 (LEFT)	-	Found OK		21.10.17
26.10.17	SWR 75151610781 BOBS	Left	-	20.991 (left)	Dent mark		DBC/225 J9 4138, dt. 13.10.17
	SE 75079215846	Left	-	20.245 (left)	Found OK		

Analysis of Maintenance Alarms in Month of Nov-2017

Date	Vehicle No.	Wheel Left/Right	ILF (Left)/(Right)	Impact Load (Left)/(Right)	Defect Found	Action Taken	Train No./BPC No.
02.11.17	SWR 75151610729	Left	2.009 (left)	-	Slight skidded	Wagons allowed for run since defect is negligible.	DBC/104 J14 4138, dt. 13.10.17
	SC 75099013279	Left	-	20.078 (left)	Dent mark		BDC/108 B8 4150, dt 12.11.17
03.11.17	SCR 75091355872	-	2.696 (right)	-	Found OK		BDC/114 G6 4144, dt. 26.10.17
26.10.17	SEC 75141610616	-	-	-	Found OK		BDC/138 A7 4149, dt. 09.11.17

B) In Kottavalsa-kirandul electrified section of ECo Railway – As reported, no WILD data is available due to non-installation of WILD apparatus.

C) In a) Bandamunda – Bimalgarh b) Bimalgarh – Barsuan and c) in Bimalgarh – Kiriburu electrified section of SE Railway –

As reported, no WILD data is available due to non-installation of WILD apparatus.

In Bimalgarh – Kiriburu Section of SE Railway –

As reported, no WILD data is available due to non-installation of WILD apparatus.

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टिप्पणी / NOTES

गुणवत्ता नीति

रेलों में यात्री और माल यातायात की बढ़ती माँग को पूरा करने के लिए गुणवत्ता प्रबंध प्रणाली में अनुसंधान, डिज़ाइनों और मानकों में उत्कृष्टता तथा सतत सुधारों के माध्यम से सांविधिक और नियामक अपेक्षाओं को पूरा करते हुए सुरक्षित, आधुनिक और किफ़ायती रेल प्रौद्योगिकी का विकास करना।

QUALITY POLICY

To develop safe, modern and cost effective Railway technology complying with Statutory and Regulatory requirements, through excellence in Research, Designs & Standards and Continual improvements in Quality Management System to cater to growing demand of passenger and freight traffic on the Railways.

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संपर्क सूत्र	:	संयुक्त निदेशक (सिविल)
पत्राचार का पता	:	भारतीय रेल उच्च अनुरक्षण प्रौद्योगिकी केन्द्र महाराजपुर, ग्वालियर (म. प्र.) पिनकोड - 474005
टेलीफोन	:	0751-2470869
फैक्स	:	0751-2470841
ई-मेल	:	dircivilcamtech@gmail.com

Our Objective

To upgrade Maintenance Technologies and Methodologies and achieve improvement in productivity and performance of all Railway assets and manpower which inter-alia would cover Reliability, Availability, and Utilisation.

***If you have any suggestion & comments, please write to us*:**

Contact person	:	**Joint Director (Civil),**
Postal Address	:	**Indian Railway Centre for Advanced Maintenance Technology, Maharajpur, Gwalior (M.P.) Pin code – 474 005**
Phone	:	**(0751) - 2470869**
Fax	:	**(0751) – 2470841**
Email	:	**dircivilcamtech@gmail.com**