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2023/48/CE-III/BR/Mission3000MT

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भारत सरकार GOVERNMENT OF INDIA
रेल मंत्रालय MINISTRY OF RAILWAYS
(रेलवे बोर्ड RAILWAY BOARD)

No.2023/48/CE-III/BR/3000 MT (E-3448988)

New Delhi, dated 13.06.2024

Principal Chief Engineer,
All Zonal Railways.

Sub: - Residual Fatigue assessment of steel bridges for running of Heavier Axle loads.

Ref: - Board letter No. 2023/48/CE-III/BR/3000 MT dated 04.06.2024.

Kindly refer to the Board's letter under reference above at ref. (i) on the captioned subject in which Residual Fatigue assessment of steel bridges for running of Heavier Axle loads is to be done in following conditions:

- All the bridges, more than 50 years old, need to be assessed for their residual fatigue life. The estimation of residual fatigue life of a bridge depends on the accuracy of past traffic data and future projections.
- Bridges on High GMT routes (say > 40 GMT) shall be assessed on priority to ensure availability of sufficient residual fatigue life of bridge components. Appropriate instrumentation and health monitoring may be planned in consultation with RDSO as per the requirement based on the outcome of the assessment.

As per BMS, the total no. of steel bridges, more than 50 years old is 2752 nos and a google sheet is prepared & circulated for monitoring. It is requested that the Residual Fatigue assessment of steel bridges for running of Heavier Axle loads shall be completed within 45 days and intimated to the Board's office on priority basis through e-mail at bmccllr@b@gmail.com.

<https://docs.google.com/spreadsheets/d/1Cr3E4XWhYXh7vS2oSjb9sr4ONGE7v8Cm/edit?usp=sharing&ouid=101130874854381509262&rtpof=true&sd=true>

DA: As Above

Signed by Niraj Kumar

Date: 14-06-2024 18:36:51

Reason: Approved (Niraj Kumar)

Executive Director Civil Engg./B&S

Phone No. 011-47845474

Copy to:- CBEs/All Zonal Railways for information & necessary action please.

Assessment of Residual Fatigue life of Steel Bridges

Railway Board letter No. 2023/48/CE-III/BR/3000 MT (E-3448988) dated 04.06.2024

SN	Railway	Scope of Steel Bridges for Fatigue Assessment (more than 50 year old Bridge)		No. of Bridges Fatigue Assessment done	No. of Bridges Fail in Residual Fatigue	No of Bridges Balance for Fatigue Assessment	TDC (Assess the Residual Fatigue as per Scope)
		As per BMS	As per Zonal Railway				
1	CR	146					
2	ER	211					
3	ECR	247					
4	ECoR	140					
5	NR	177					
6	NCR	13					
7	NER	89					
8	NFR	450					
9	NWR	24					
10	SR	196					
11	SCR	188					
12	SER	213					
13	SECR	130					
14	SWR	74					
15	WR	220					
16	WCR	234					
Total		2752	0	0	0	0	0

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

No. 2023/48/CE-III/BR/3000 MT (E-3448988)

New Delhi dated 04.06.2024

Principal Chief Engineer,
All Zonal Railways.

Sub: Residual Fatigue assessment of steel bridges for running of Heavier Axle loads.

- Ref:**
1. RDSO letter No. CBS/25t Axle Load dated 15.03.2023 – Suitability of bridges for running 25t loading – 2008 at 100 kmph on DFC feeder routes and 25t identified routes.
 2. RDSO letter No. CBS/25t Axle Load dated 20.04.2009 – Guidelines for checking the suitability of existing drawings of BGML/RBG/MBG/HM loading for 25t loading – 2008.
 3. RDSO report on Assessment of Residual Fatigue Life of Br. No.-586 near Koraput, East Coast Railway (BS-107).
 4. RDSO Guidelines for Assessment of Residual Fatigue Life of steel girder bridges (BS-91).
 5. RDSO Guidelines BS 106 R2 -Guidelines for Instrumentation of Bridges. (Rev- 2)

Steel Girder Bridges are subjected to heavy fluctuating stresses causing fatigue in steel. This may lead to the failure of member or connection at the stress level much below the maximum stress for which the member/connection has been designed under static loads. The phenomenon of fatigue was not correctly understood earlier and most of the old bridges have been designed without adequate safeguards against fatigue. IRS Steel Bridge Code-1962 contained provisions for fatigue which were based on stress ratio concept and have been rendered obsolete as new fatigue provisions based on concepts of stress range, GMT factor, configuration of truss, loading & design life etc. have been introduced in 2012. With increase in axle loads & speeds, the bridge is subjected to **cycles of higher stress ranges** and fatigue life of individual members/ components gets consumed early, affecting overall residual fatigue life of the bridge. Heavier axle loads such as 25 t loading, CC+6+2 and CC+8+2 have already been permitted on some of the routes. Few cases of failure of bridge components in recent past have been reported on such routes in one of the railway where annual GMT has suddenly increased.

2. Therefore, all the bridges, more than 50 years old, need to be assessed for their residual fatigue life. The estimation of residual fatigue life of a bridge depends on the

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accuracy of past traffic data and future projections. The initial assessment can be made with simplified approach as given Annexure -G (for Fatigue) in IRS Steel Bridge Code (Reprint -2017). Guidelines / instructions for making **residual fatigue life assessment** are already given by RDSO vide Ref. (1), (2) & (3) above.

3. **Bridges on High GMT routes (say > 40 GMT)** shall be assessed on priority to ensure availability of sufficient residual fatigue life of bridge components. Appropriate instrumentation and health monitoring may be planned in consultation with RDSO as per the requirement based on the outcome of the assessment.

4. Further action shall be planned for re-girdering/ rebuilding based on the outcome of the above assessment.

26/04/2024

(Ravindra Kumar Goel)

Principal Executive Director/Bridge

Ph. No. 011-478-45452

Copy to:-

1. DG, IRICEN for information please.
2. PED/Infra-II and ED/B&S RDSO for guiding the railways in assessment of residual fatigue and compiling the results for taking further necessary action.
3. CBEs/All Zonal Railways for information and necessary action please.

Room No.-109-C, Rail Bhawan, New Delhi-110001.