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STANDING COMMITTEE ON RAILWAYS (2019-20)

SEVENTEENTH LOK SABHA

MINISTRY OF RAILWAYS
(RAILWAY BOARD)

[Action taken by the Government on the recommendations / observations contained in the 23rd Report of the Standing Committee on Railways (Sixteenth Lok Sabha) on Maintenance of Bridges in Indian Railways: A Review]

FIRST REPORT

LOK SABHA SECRETARIAT

NEW DELHI

December, 2019/ Agrahayana, 1941 (Saka)

SCR NO.: 225

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Presented to Lok Sabha on : 03.12.2019

Laid in Rajya Sabha on : 03.12.2019

LOK SABHA SECRETARIAT

NEW DELHI

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COMPOSITION OF STANDING COMMITTEE ON RAILWAYS (2019-20)@

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3. Shri T.R. Baalu
4. Smt. Ranjanben Bhatt
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RAJYA SABHA

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25. Shri Joginipally Santosh Kumar
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28. Shri Shri Ashok Siddharth
29. Shri Bashistha Narain Singh
30. Mahant Shambhuprasadji Tundiya
31. Shri Motilal Vora

@ Constituted w.e.f. 13.09.2019 vide Lok Sabha Bulletin Part II No. 550 dated 13.09.2019.

SECRETARIAT

1.	Dr. Kavita Prasad	--	Joint Secretary
2.	Shri Arun K. Kaushik	--	Director
3.	Shri Ram Lal Yadav	--	Additional Director
4.	Smt. Banani Sarker Joshi	--	Committee Officer

INTRODUCTION

I, the Chairperson, Standing Committee on Railways (2019-20), having been authorised by the Committee to submit the Report on their behalf, present this First Report (Seventeenth Report) on Action Taken by Government on the Recommendations/Observations of the Committee contained in their Twenty Third Report (Sixteenth Lok Sabha) on 'Maintenance of Bridges in Indian Railways: A Review'.

2. The Twenty Third Report was presented to Lok Sabha and was laid in Rajya Sabha on 03.01.2019. The Report contained 12 recommendations/observations. The Ministry of Railways furnished their Action Taken Notes on all the recommendations/observations contained in the Report on 28.03.2019.

3. The Committee considered and adopted the Draft Action Taken Report at their sitting held on 28.11.2019. The minutes of the sitting is given in Appendix-I.

4. For facility of reference and convenience, the observation and recommendations of the Committee have been printed in bold letters.

5. An analysis of the Action Taken by Government on the recommendations/observations contained in the Twenty Third Report of the Standing Committee on Railways (Sixteenth Lok Sabha) is given in Appendix-II.

NEW DELHI;
29 November, 2019

8 Agrahayana, 1941 (Saka)

RADHA MOHAN SINGH

Chairperson,
Standing Committee on Railways

CHAPTER I

REPORT

This Report of the Standing Committee on Railways deals with the action taken by the Government on the Recommendations/Observations contained in their Twenty Third Report (16thLok Sabha) on "Maintenance of Bridges in Indian Railways: A Review".

2. The Twenty Third Report was presented to the Lok Sabha and laid in Rajya Sabha on 03.01.2019. It contained 12 Recommendations/Observations.

3. Action Taken Notes in respect of 12 Recommendations/Observations have been received and categorised as follows:

(i) Recommendations/observations which have been accepted by the Government:-

Para Nos. 3,4,5,6,7,8,9,10,11 and 12

Total : 10
Chapter II

(ii) Recommendations/observations which the Committee do not desire to pursue in view of the Government's replies:-

Para No. NIL

Total :NIL
Chapter III

(iii) Recommendations/observations in respect of which replies of the Government have not been accepted by the Committee and which require reiteration:-

Para Nos. 1 and 2

Total : 02
Chapter IV

(iv) Recommendations/observations in respect of which final replies are still awaited:-

Para No. NIL

Total :NIL
Chapter IV

4. The Committee trust that utmost importance will be given to the implementation of the Recommendations accepted by the Government. The Committee desire that final action taken notes to the Recommendations/Observations contained in Chapter-I of this Report should be furnished to them not later than three months of the presentation of this Report.

5. The Committee will now deal with the action taken by the Government on some of their recommendations/observations.

A. CLASSIFICATION OF BRIDGES AND STRUCTURAL SAFETY OF OLD BRIDGES

Recommendation (Para No. 1)

6. The Committee had recommended as under:

"The Committee note that the Indian Railways has a staggering 1,47,523 number of bridges across its immense network. The Committee further note that the Indian Railways have classified bridges under three broad categories which are based on the breadth of their waterway. Bridges with a linear waterway of 300 meters are classified as Important Bridges and those with a linear waterway of 18 meters are classified as Major Bridges. All other bridges are classified as Minor Bridges. This classification effectively relegates 92 percent of the bridges in the Indian Railways to the Minor Bridge category. The Committee feel that such a categorization is too broad and may lead to exclusion of large number of bridges and in view of the fact that there exists different parameters for inspections, maintenance etc. of bridges, such a wide difference would result in unequal weightage/importance being given to only a few bridges as compared to vast majority. The Committee express their reservations on the above mentioned classification and recommend that the Ministry should re-evaluate their classification of bridges in order to bring about some parity. They also recommend that this re-evaluation should take into account the changing dynamics of modern rail transportation which sees the use of heavier and faster trains and higher density of traffic regardless of the measurement of waterways. The Committee strongly feel that such a step would result in augmented safety and security of bridges."

Recommendation (Para No. 2)

7. The Committee had recommended as under:

"The Committee find to their surprise that though 37,689 number of bridges on its network are 100 years or older, yet the Railways do not classify them as a special/separate segment. Rather they are kept at par with the existing newer/modern bridges when it comes to inspections and maintenance. The

Committee express serious doubts over such an action and opine that these bridges have been planned for lesser loads and service conditions that have changed radically over time. Axle loads and traffic density have increased with the advent of faster and heavier trains and safety of these old bridges may be severely compromised which may lead to safety failures. The Committee are of the considered opinion that the (now) obsolete technology and materials used in these old bridges may not be compliant with modern rail paraphernalia and hence there would be a requirement of a different protocol when it comes to their upkeep and sustenance. The Committee also opine that deficiencies related to aging bridges can become a major concern for their structural safety. As such, the Committee do not concur with the contention of the Ministry that the age of a bridge has no direct bearing on its safety and it is only the physical condition of the bridge that is taken into account while classifying a bridge. The Committee wish to remind the Ministry that such a generalization would be detrimental to the health of a bridge since the archaic technology/materials of these older bridges may not be able to withstand the rigours of modern rail transport equipment. It should also be taken into account that these bridges have withstood the stress and rigours of over a century suffering corrosion, distress, wear and tear. The Committee would like to emphasize that with the advent of modern rail transportation, older bridges may be unable to withstand higher load and speed, resulting in accidents or compromise with punctuality. The Committee also take cognizance of the fact that several of these structures have formidable heritage value and are intrinsically linked to the history of the country and overuse or misuse of these structures may erode their historical value. While the Committee are aware of the commercial concerns as well as financial limitations of the Ministry yet they feel that safety is paramount and should not be compromised at anytime. They, therefore, advise the Ministry to devise a protocol of inspection and maintenance to include a greater degree of safety/safeguards for bridges which come under this category while keeping their commercial interests intact."

8. In their Action Taken Replies to both the above recommendations, the Ministry of Railways have stated as under:

"Railway Bridges are classified in the following three types based on their waterway:

Important bridge: Bridges with linear waterway of 300 metres or more or a total waterway of 1000 square metres or more and those Bridges considered as important by the Principal Chief Engineer/Chief Bridge Engineer, depending on considerations such as depth of waterway, extent of river training works and maintenance problems are classified as Important Bridges.

Major bridge: Bridges with total water way of 18 linear metres or more or which have a clear opening of 12 linear metres or more in any one span are classified as Major Bridges.

Minor bridge: Bridges which do not fall in the above classifications are classified as minor Bridges.

However, the classification of the bridges or the age of the bridges does not have a direct relevance on the Inspection/Maintenance protocol of the bridges. There is a well established system of inspection of bridges on Indian Railways. All the bridges are inspected twice a year, one before the onset of monsoon and one detailed inspection after the monsoon. In addition, certain bridges are also inspected more frequently depending upon their condition. Repair / strengthening / rehabilitation / rebuilding of Railway bridges is a continuous process and is undertaken whenever so warranted by their physical condition as ascertained during these inspections and not on the basis of age. If the corrective / remedial measures are expected to take a long duration due to the complexity of the site situation, etc., suitable safety measures like imposing speed restrictions and keeping such bridge under close watch are taken till the bridge is repaired / strengthened / rehabilitated / rebuilt.

There exists a Numerical Rating System for assessment of Bridge health. Every bridge component of Major and Important bridges is assigned with a Conditional Rating Number (CRN). The list of the components is as under:

1. Foundation and Flooring;

2. Masonry/Concrete in Substructure;

3. Training and Protective work;

4. Bed Blocks;

5. Bearing and expansion arrangement;

6. Superstructure; and

7. Track structure.

Lower the CRN, more serious is the deteriorated condition of the component. From the CRNs of different component of the bridge, an Overall Rating Number (ORN) of the bridge as a whole is given. The ORN is the lowest of the 7 CRNs of the bridge. For Minor Bridges only ORN is given based upon its overall condition.

Thus equal weightage is being given to the Major, Important bridges by rating individual component and then arriving at ORN i.e. lowest of CRN.

The present system is working satisfactorily since 64 years for all categories of bridges in the Indian Railways system.

It is agreed that the Axle Load and Traffic density has increased with heavier train proposed to be run for which planning has already been done as under:

1. Dedicated Freight Corridor (Eastern and Western Routes) – there are 776 and 439 bridges respectively which have been identified for strengthening to take the higher axle load. Concerned Zonal Railways (ER, ECR, NCR, NR, NWR, SER, WR, CR) have already initiated the action in advance for strengthening these bridges which are likely to carry higher axle load.

2. 25T routes – there are 1085 nos. of bridges which have been identified which are falling on these routes. Concerned Zonal Railways (ER, ECoR, SER, SECR, SWR, SCR, SR) have already initiated action in advance for strengthening these bridges which are likely to carry higher axle load."

9. The Committee had expressed the need for revaluation of the existing system of classification of railway bridges by the Indian Railways. They had also highlighted the need for taking into consideration the age of a bridge whilst formulating inspection/maintenance protocols. In this context, the Committee strongly recommended that bridges which were more than 100 years old warranted a separate protocol for inspection and maintenance. The Committee are concerned to note that the Ministry have made no effort for addressing their concerns in their action taken replies and have instead stated that their current system of classification of bridges was felt to be adequate. The Ministry have further categorically stated that the classification of the bridges or age of the bridges does not have direct relevance on the inspection/maintenance protocol of bridges. This premise of the Ministry is not acceptable to the Committee. They, therefore, reiterate their earlier recommendation for revising the existing system of bridge classification in order to bring about a fair degree of parity of bridges as well as to strengthen the bridge network across the Indian Railways.

B. TRAINING COURSES/MODULES FOR OFFICIALS CONNECTED WITH BRIDGE INSPECTIONS

Recommendation (Para No. 5)

10. In their original Report, the Committee had recommended as under:

"The Committee find that the Indian Railways depends on a methodical system of inspection where conditional ratings are given based on the physical condition at the time of assessment by the inspecting authority. The Committee also find that the Ministry relies heavily on the visual perception and evaluation of the inspecting official. The Committee feel that such a system puts an undue heavy strain on the wisdom of the inspector and their adherence to prescribed norms/procedures. In such a scenario there is a distinct possibility of subjectivity creeping in as perceptions are often open to interpretations. The Ministry have also themselves admitted that they do not have a standardised guideline for imposing speed restrictions. They, therefore, recommend the Railways to formulate definitive guidelines for bridge inspections including those for speed

restrictions in order to eliminate the need for speculation on the part of the assessing officer. Such guidelines should be comprehensive, unambiguous and include all aspects or possible scenarios of bridge inspections. Further, the Committee recommend that the Railways should design intensive training courses/modules for officials connected with bridge inspections keeping in mind the latest technological expertise in the sphere of bridge management/ maintenance etc. being adopted across the world."

11. In their Action Taken Replies, the Ministry of Railways have stated as under:

"There is an elaborate system of inspection and maintenance of Bridges on Indian Railways. These inspections are carried out at various levels. The bridges are thoroughly inspected by Assistant Divisional Engineers and detailed observations are recorded in Bridge Inspection registers in the prescribed proforma. In addition, detailed technical inspection of certain bridges is carried out by Section Engineer (Bridges) at specified interval. Instructions are, thereafter, given for carrying out repairs of defects noticed during these inspections. Bridge Registers are then sent for scrutiny and directions of Divisional Engineers and further to Chief Engineer/ Chief Bridge Engineer. Based on observations in the registers, Bridges requiring inspection at higher level are again inspected by Divisional Engineers and the Chief Engineer/ Chief Bridge Engineer and the remedial actions are taken as required.

Scrutiny and inspection at various levels is a conscious effort in minimizing subjectivity.

However, in order to further minimize subjectivity, if any, in assessment of condition of bridge and to assess the suitability of existing bridges for higher loading standards and high power locomotives (high longitudinal force), Indian Railways has, therefore, started implementing instrumentation on its bridges.

Modern Techniques for inspection are already commenced as under:

- Continuous water level monitoring system
- Continuous Scour Monitoring of bridge foundation;
- 3D Scanning of river beds;
- Inspection of bridges by Drones;
- Under Water Inspection of bridges by Remote Operated Vehicle (ROV).

Bridge staff are trained for their jobs both through theoretical class room training and practical work at site using the tools, equipment and machinery. Training is a continuing process right from the time of recruitment.

Following training courses at Zonal Railway level, IRICEN level are conducted every year for training of all officials due:

i. Initial courses;

ii. Promotional courses;

iii. Refresher courses;

iv. Special courses.

The recommendation by the Committee for exposure to global practices shall be further carried forward."

12. The Committee are satisfied to note that there is an elaborate system of inspection and maintenance of bridges on Indian Railways. Also, there are modern techniques for inspections, such as continuous water level monitoring system, continuous scour monitoring of bridge foundation and 3D scanning of river beds besides inspection of bridges by drones and under water inspection of bridges by remote operated vehicles.

The Committee note that Railways are continuing to introduce latest technologies for proper upkeep and maintenance of bridges. They further note that bridge staff are trained for their job through theoretical classroom training and practical work at site using tools, equipments and machinery. The Committee hope that as assured by the Railways, latest technology and expertise in the sphere of bridge management/maintenance etc. being adopted across the world, will be adopted by the Indian Railways.

C. USE OF MODERN TECHNOLOGY FOR INSPECTION OF BRIDGES

Recommendation (Para No. 6)

13. The Committee had recommended as under:

"The Committee feel that the Ministry should explore the use of modern technology for inspection of bridges which may be beneficial in early detection of damage and lower maintenance costs. The Committee also desire the Ministry to study the modern methods being used by the Railways of other countries and endeavour to bring/implement such technologies and systems across our own network. The Committee are happy to note that the Ministry is utilizing satellite imagery for detecting faults on its tracks and feel that they should extend this initiative for bridges also which would vastly minimize human error and reduce maintenance costs. The Committee wish to put forward the viewpoint that to improve or inculcate new bridge technology or newer methods of inspection, the Railways must engage with global partners such as Railways of other countries and premier institutions such as the Indian Institutes of Technology (IITs) etc. Such a collaboration may provide stimulus and encourage rail research and lead to innovations in technology in respect of bridges. The Committee feel that in

addition to introduction of new technologies the Ministry should also study their efficacy or impact on the system. The Committee therefore recommend that the Ministry should make a comprehensive survey/study to analyse the benefits as well as effectiveness accrued and whether there has been a marked improvement in rail/bridge safety as a result of the implementation of such technologies."

14. In their Action Taken Replies, the Ministry of Railways have stated as under:

"1) With a view to modernise the inspection system so as to minimise the human intervention and thus subjectivity, Railways has taken effective steps in gradually implementing various modern technologies like:

- Inspection of Bridges by Drones;
- Underwater inspection of Bridges by ROV (Remote Operated Vehicle);
- Continuous Water Level Monitoring System on identified bridges;
- Scour Monitoring System;
- 3D Mapping of river beds;
- Instrumentation of bridges for health monitoring;
- Portable train detection and alarm system.

2) An EOI has been issued by RDSO for Long Life Paint Systems, which is expected to rope in Global firms with proven standards.

3) All these modern technologies are first put in trial stage in few Zonal Railways. RDSO, after study and research on the efficacy of these, recommends for regular adoption like Continuous Water Level Monitoring System on identified bridges (160 no. of bridges).

4) Recently, Health Monitoring Systems have been approved on following Important Bridges which shall be implemented by 3rd party including Global Partners:

Bogibeel Bridge and Bridge No. 44 in Jiribam – Imphal section of NFR.

5) Also, 3rd party audit of Rail Bridges, ROBs etc. has also been started wherein IIT Mumbai and Indore have been roped in for using their expertise. 409 no. of bridges have already been inspected in Central and Western Railway.

6) A presentation on the use of Spherical Bearings by one of the Global firms Hirun was organized on dt. 14.02.19 in Railway Board for dissemination of modern, new technology. This presentation was attended by Sr. Management of Railway Board, Northern Railway and expert team of RDSO (Bridge Directorate).

7) In addition, seminars through IPWE, on the important topics regarding Bridge Maintenance, Construction etc. are organized which are attended by more than 500 delegates across Indian Railways, Global Partners etc."

15. In their recommendation, the Committee had felt that increased use of modern technology for inspection of bridges would reduce human dependence and consequently eliminate the problem of subjectivity entering into evaluation. They had also felt that implementation of modern technology would not only help in early detection of faults/damage, but also come forth as a cost saving measure as well. The Ministry have informed that they are in the process of gradual implementation of several new technologies.

The Committee feel that the initiatives taken by Railways are the steps in the right direction, and if implemented in letter and spirit, will go a long way in strengthening the bridge network and reduce human error as well, which in turn would fortify rail bridges, particularly those which are 100 years or older. The Committee, therefore, recommend the Ministry to examine the efficacy of these initiatives and if found productive, they should be extended to the entire rail network. The Committee would like to be kept apprised of new technologies/innovations being introduced by the Railways.

CHAPTER-II

RECOMMENDATIONS/OBSERVATIONS WHICH HAVE BEEN ACCEPTED BY THE GOVERNMENT

Recommendation (Para No. 3)

The Committee find that the Ministry have laid the groundwork for a bridge management system. This would serve as a long run structural health management system for bridges. The Committee appreciate this endeavour of the Ministry, but at the same time they wish to remind the Ministry that the deadline of completion i.e., March 2019 should be strictly adhered to in order to gain maximum benefit from such an excellent venture. The Committee would like to be kept apprised of any action in this regard.

Reply of the Government

The Bridge Management System (BMS) was sanctioned in 2016-17 at a cost of Rs 10.14 Cr. Few modules including Bridge Master Data were completely developed and BMS launched on 12.7.18 with due interaction with CBE/NR, Railway Board & CRIS organisations. At present following modules exists on the BMS which are being updated:

i. Bridge master with drawing upload

ii. Past bridge inspection upload

iii. Bridge inspection and compliance

iv. Railway Affecting Works/Railway Affecting Tanks (RAW/RAT)

v. Bridge water level report.

The new modules for inspections are being developed simultaneously with other IT applications of the Engineering Department. However, the progress of the development of these modules in NO WAY affects the inspection, monitoring health of the bridges, rehabilitation etc.

Recommendation (Para No. 4)

Taking note of the elaborate system of inspection and maintenance laid down for bridges across the Indian Railways, the Committee are of the firm opinion that bridges being more vulnerable than tracks require a more robust system of inspection. According to the Ministry inspection of bridges are multi-tiered and meticulously inspected under a codified system at fixed intervals of time. The Railways treat the physical condition of the bridge as the primary indicator while deciding on the quantum of maintenance or rehabilitation. The Committee also find that till such time as repair /rehabilitation of a bridge is complete, the Ministry takes a number of steps to ensure safe passage such as speed restrictions. Although very few bridges requiring rehabilitation have speed restrictions, yet the Committee feel that in an already congested rail network any delay is likely to over-burden the system. Since major repairs take a considerable periods, prolonged periods of speed restrictions can be

counter-productive and negatively impact punctuality. Nonetheless it cannot be denied that maintenance negligence and delayed actions invariably lead to heavy costs in future or risk of deterioration of assets. The Committee acknowledge that the introduction of the Indian Railways Projects Sanctions & Management (IRPS&M) system has simplified the process of identification of bridges and getting approval of the competent authorities for their rehabilitation. The Committee, therefore, recommend that the Ministry should pragmatically approach the matter by striking a balance between maintenance and safety of bridges while at the same time adhering to realistic timelines.

Reply of the Government

As stated in Point Nos. 1 & 2 above, priorities are set for repairs/ rehabilitation of bridges based on their URNs. Bridges with Speed Restrictions are also given highest priority in rehabilitation programmes. As already stated in the report, there are NIL bridges in ORN-1, 233 bridges in ORN-2 and 1287 in ORN-3. However, not all of these

require speed restrictions otherwise. 3758 nos. of bridges have already been rehabilitated in last 5 years and 734 nos. in current financial year, till January 2019.

However, Bridge Works require Engineering Time Allowance (ETA) for which efforts are made by Zonal Railways to complete within allotted timeframe. Indian Railways has already implemented web based application called "Indian Railways Project Sanctions and Management" (IRPSM). Details of all the Bridge Works sanctioned at Railway Board level or at Zonal Railway level are available on this portal. Nominated executing agencies or coordinating agencies update the progress of each work every month which is periodically reviewed at Zonal Railways and Railway Board level to complete the works in a time bound manner. A sanctioned work under ORN-2 or higher is programmed for completion in 3 to 4 years, but prioritized bridges are tackled in less period also. However, sometimes the progress of Bridge Works is not as per planning because of various reasons which are not under control of Railways like excessive rainfall, flooding, interruption to supply of materials etc. Nevertheless, timely completion of the works has always been an endeavour of the Railways and various reviews are carried out not only to spend more but also complete the bridge works timely.

Recommendation (Para No. 5)

The Committee find that the Indian Railways depends on a methodical system of inspection where conditional ratings are given based on the physical condition at the time of assessment by the inspecting authority. The Committee also find that the Ministry relies heavily on the visual perception and evaluation of the inspecting official. The Committee feel that such a system puts an undue heavy strain on the wisdom of the inspector and their adherence to prescribed norms/procedures. In such a scenario there is a distinct possibility of subjectivity creeping in as perceptions are often open to interpretations. The Ministry have also themselves admitted that they do not have a standardised guideline for imposing speed restrictions. They, therefore, recommend the Railways to formulate definitive guidelines for bridge inspections including those for speed restrictions in order to eliminate the need for speculation on the part of the assessing officer. Such guidelines should be comprehensive, unambiguous and include

all aspects or possible scenarios of bridge inspections. Further, the Committee recommend that the Railways should design intensive training courses/modules for officials connected with bridge inspections keeping in mind the latest technological expertise in the sphere of bridge management/ maintenance etc. being adopted across the world.

Reply of the Government

There is an elaborate system of inspection and maintenance of Bridges on Indian Railways. These inspections are carried out at various levels. The bridges are thoroughly inspected by Assistant Divisional Engineers and detailed observations are recorded in Bridge Inspection registers in the prescribed proforma. In addition, detailed technical inspection of certain bridges is carried out by Section Engineer (Bridges) at specified interval. Instructions are, thereafter, given for carrying out repairs of defects noticed during these inspections. Bridge Registers are then sent for scrutiny and directions of Divisional Engineers and further to Chief Engineer/ Chief Bridge Engineer. Based on observations in the registers, Bridges requiring inspection at higher level are again inspected by Divisional Engineers and the Chief Engineer/ Chief Bridge Engineer and the remedial actions are taken as required.

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However, in order to further minimize subjectivity, if any, in assessment of condition of bridge and to assess the suitability of existing bridges for higher loading standards and high power locomotives (high longitudinal force), Indian Railways has, therefore, started implementing instrumentation on its bridges.

Modern Techniques for inspection are already commenced as under:

•Continuous water level monitoring system

•Continuous Scour Monitoring of bridge foundation;

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•Under Water Inspection of bridges by Remote Operated Vehicle (ROV).

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Following training courses at Zonal Railway level, IRICEN level are conducted every year for training of all officials due:

i. Initial courses;

ii. Promotional courses;

iii. Refresher courses;

iv. Special courses.

The recommendation by the Committee for exposure to global practices shall be further carried forward.

Comments of the Committee

(Please see recommendation para No. 12 of Chapter-I)

Recommendation (Para No. 6)

The Committee feel that the Ministry should explore the use of modern technology for inspection of bridges which may be beneficial in early detection of damage and lower maintenance costs. The Committee also desire the Ministry to study the modern methods being used by the Railways of other countries and endeavour to bring/implement such technologies and systems across our own network. The Committee are happy to note that the Ministry is utilizing satellite imagery for detecting faults on its tracks and feel that they should extend this initiative for bridges also which would vastly minimize human error and reduce maintenance costs. The Committee wish to put forward the viewpoint that to improve or inculcate new bridge technology or newer methods of inspection, the Railways must engage with global partners such as Railways of other countries and premier institutions such as the Indian Institutes of Technology (IITs) etc. Such a collaboration may provide stimulus and encourage rail research and lead to innovations in technology in respect of bridges. The Committee

feel that in addition to introduction of new technologies the Ministry should also study their efficacy or impact on the system. The Committee therefore recommend that the Ministry should make a comprehensive survey/study to analyse the benefits as well as effectiveness accrued and whether there has been a marked improvement in rail/bridge safety as a result of the implementation of such technologies.

Reply of the Government

1) With a view to modernise the inspection system so as to minimise the human intervention and thus subjectivity, Railways has taken effective steps in gradually implementing various modern technologies like:

- Inspection of Bridges by Drones;
- Underwater inspection of Bridges by ROV (Remote Operated Vehicle);
- Continuous Water Level Monitoring System on identified bridges;
- Scour Monitoring System;
- 3D Mapping of river beds;
- Instrumentation of bridges for health monitoring;
- Portable train detection and alarm system.

2) An EOI has been issued by RDSO for Long Life Paint Systems, which is expected to rope in Global firms with proven standards.

3) All these modern technologies are first put in trial stage in few Zonal Railways. RDSO, after study and research on the efficacy of these, recommends for regular adoption like Continuous Water Level Monitoring System on identified bridges (160 no. of bridges).

4) Recently, Health Monitoring Systems have been approved on following Important Bridges which shall be implemented by 3rd party including Global Partners:

Bogibeel Bridge and Bridge No. 44 in Jiribam – Imphal section of NFR.

5) Also, 3rd party audit of Rail Bridges, ROBs etc. has also been started wherein IIT Mumbai, Indore have been roped in for using their expertise. 409 no. of bridges have already been inspected in Central and Western Railway.

6) A presentation on the use of Spherical Bearings by one of the Global firms Hirun was organized on dt. 14.02.19 in Railway Board for dissemination of modern, new technology.

This presentation was attended by Sr. Management of Railway Board, Northern Railway and expert team of RDSO (Bridge Directorate).

7) In addition, seminars through IPWE, on the important topics regarding Bridge Maintenance, Construction etc. are organized which are attended by more than 500 delegates across Indian Railways, Global Partners etc.

Comments of the Committee

(Please see recommendation para No. 15 of Chapter-I)

Recommendation (Para No. 7)

The Committee find that under water inspection of bridges are carried out only once in every 5 years on bridges which have structures partially submerged underwater permanently. The Committee feel that with the pressure of expansion of rail traffic such an interval is too large. Heavier/faster trains at greater frequency is bound to put greater stress and hasten the wear and tear of the bridge structure. Given such a situation, the Committee would like the Ministry to consider increasing the frequency of underwater inspections of bridges to preserve their worthiness and preventing untoward incidents. The Committee also find that that under water inspections are carried out by outsourced agencies. The Committee do not concur with the Ministry's justification that since underwater inspections are highly specialized they are required to be carried out by specialized agencies. The contention of the Ministry that since only a small percentage of bridges required underwater inspections hence the capability was not developed in-house is not acceptable to the Committee. The Committee have been informed that the Ministry has started a trial of using a remote operated vehicle (ROV) for conducting underwater inspections of bridges. The Committee laud this initiative and recommend that the Ministry should give greater impetus to proliferation of this technology as it would not only be cost effective but also gradually negate the need of physical examination currently being followed. This would consequently reduce the dependence on the outsourced agencies.

Reply of the Government

Committee's recommendation of proliferation of Under Water Inspection using ROV has been noted. With the gradual proliferation of this technology, developing the in-house team for such inspections would not be required in future. Also, these outsourced agencies who bring in special equipments and gadgets are working under direct supervision of experienced, trained Railway Supervisors.

Recommendation (Para No. 8)

The Committee find that the Indian Railways have dedicated category of staff for inspection and maintenance of bridges. However the Committee find to their chagrin that there exists a very high rate of vacancy in this category of staff. As against a sanctioned strength of 7669, the actual strength is only 4517 indicating a vacancy of around 40 percent. Admittedly, the lack of manpower have negatively affected their inspection routine and most acutely in the northeast frontier Railway. The Committee feel that this is a grave lapse on the part of the Ministry in ensuring safety of rail traffic. As earlier observed, the bridges are the most vulnerable link on the Railways and lack of manpower in this segment is bound to create gaps in inspection and maintenance which may compromise Railway safety. The Committee, therefore, direct the Ministry to shake off its inertia and fill up these vacancies in the shortest possible time and in the right earnest. The Committee also recommend that till the time such vacancies are filled the Ministry should set up some temporary measures like filling up these posts through deputation etc. to tide over the shortage. They can approach other government agencies which have bridge features such as defence, highway authorities, road agencies etc. to help fill up these posts temporarily. The Committee would like to be kept apprised of steps taken in this regard.

Reply of the Government

Following steps have been initiated by us to fill up these vacancies:

i. CRB had written recently to all GMs to submit indents for vacancies in Safety Categories vide Board's letter no. E(NG)II/2009/RR-1 dt. 05.02.19 under Direct Quota.

ii. All Zonal Railways (GMs) have been advised (with approval of ME) for expediting the filling up Selection Quota by CPOs (letter no. 2017/36/CE-III/BR/Vacancy dt. 14.02.19)

iii. A note has been moved vide 2017/36/CE-III/BR/Vacancy dt. 20.02.19 to PED/Transformation for filling up the vacancies through engaging Ex-Serviceman in different categories.

iv. A committee of 3 SAG Officers, ED/B&S, CTE/NR, EDF(E) has been constituted on dt. 15.02.19 with the approval of ME, FC to finalize the comments on the recommendations of the 5 member committee for rationalizing the yardstick to work out the requirement of manpower for Inspection and Maintenance of Bridges on Indian Railways.

It is expected that above steps shall mitigate the problem of vacancies.

Recommendation (Para No. 9)

The Committee are of the opinion that natural calamities/hazards like earthquakes, fire, cyclones, floods etc. have a greater devastating impact on the structural stability of bridges as compared to other rail infrastructure. It is seen that even if the bridge is structurally sound yet damage caused by natural calamities are amplified due to their vulnerability. These instances not only cause loss in terms of social, economic and financial terms but they also disrupt rail traffic. Further it is pointed out that in certain remote parts of the country Railway bridges often form the lone lifeline for communications and transportation and any damage to them totally isolates them from the rest of the country. Since there is no prevention or control over natural calamities the Ministry should have a prior planning for prompt rehabilitation and protection from injuries, loss of life, property damage, and destruction of bridges in the eventuality of natural calamities.

Reply of the Government

Bridges on Indian Railways are designed for earthquake/winds forces and floods so that they can withstand natural calamities. Moreover, Railways has a well-documented Disaster Management Plan. Every Zonal Railway keeps a stock of

prescribed material, tools and plants at nominated places to meet with any emergent situation on account of these natural calamities. Emergency controls are set up in respective Zone & Railway Board to monitor the restoration of bridge (if involved), Track as early as possible. Assistance of NDRF is a part of Disaster Management Plans of each Zonal Railway.

Recommendation (Para No. 10)

The Committee find that in the last 3 years the Railways have commissioned 8611 new bridges on account of expansion of rail network. Moreover 4027 existing bridges have been approved for rehabilitation. The Committee also find that in the last 3 years 2347 existing bridges have been rehabilitated. The Committee wish to remind the Ministry that with a total bridge population of over 1.4 lakh bridges these numbers are highly insignificant and in their opinion not proportionate to the number of bridges requiring upgradation. As regards the physical performance of bridge works the Committee was informed that targets are set on a yearly basis. The Committee are happy to note that the Ministry has been achieving the targets and exceeding them in some years. They, however, feel that the targets being set by the Ministry are too modest and unrealistic and recommend that the Ministry make a realistic evaluation of its bridge infrastructure and set targets appropriately. At the same time the Committee wish to caution the Ministry against setting ambitious targets that neither receive allocation nor abide by timelines. However in terms of allocation and utilization the Ministry appears to be falling short. In most years, the allocation was reduced at the RE stage significantly yet the Ministry was unable to fully utilise the resources. In the light of the fact that the Railways have been experiencing severe funds limitations in the last two decades, unspent funds point to lack of proper planning by the Ministry in executing works of such paramount importance. The Committee are unhappy to note that year after year there have been a reduction at the RE stage. The Ministry cannot take recourse to their oft quoted excuse of lack of funds in this regard. The Committee are of the strong opinion that reduction of funds at RE stage points to the inefficacy of the planning process of the Ministry or short sightedness in assigning targets. The Committee therefore urge the Ministry to keep a strong grip on its finances and set realistic targets and goals. The Committee note with concern that with the exception of

financial year 2014-15, the monies have been greatly reduced. They, therefore, recommend that the Ministry take proactive steps in order to fully utilize its allocations keeping with the timelines.

Reply of the Government

(i) After sanction of bridge work, several activities are involved in bridge rehabilitation work such as preparation and finalization of General Arrangement Drawing (GAD), preparation and sanction of detailed estimate, land acquisition in some cases, obtaining CRS sanction, finalization of tenders, execution of work etc.

(ii) Following are statistics for Plan Head: 32 regarding bridge rehabilitation:-

2001-02 to 2010-11 12650 Nos rehabilitated.

Rs. 3419 Crore funds under SRSF fully consumed.

2010-11 to 2017-18 6503 Nos. rehabilitated (106% of Target achieved)

Rs. 3295 Crore consumed (90% of BG allotted)

(iii) Sanctioning of more bridges under PH: 32 every year is a continuous exercise after regular inspection.

ORN-I (NIL) are executed within one year.

ORN-2 (233) as on 01.04.2018 are executed on programmed basis in 3-4 years & also prioritising these on GQ & GD for enhancing the throughput.

(iv) The recommendation of committee for setting up realistic Target for Time lines and also asking for the enhanced Budget Support (RRSK) are noted & shall be followed up in True spirit.

(v) Physical targets for 2018-19 set for 900 nos. shall be achieved.

Recommendation (Para No. 11)

The Committee find that the Ministry had set up High Level Safety Review Committee under the Chairmanship of Dr. Anil Kakodkar in 2012 to review the safety of the Indian Railways and recommend improvements thereto. This Committee had made some recommendations regarding safety and maintenance of bridges. However to their disappointment, the Committee find that even after a gap of 6 years the Ministry has only partially accepted some of these recommendations. The Committee are dissatisfied to note that there have been numerous occasions when the Ministry has disregarded or

overlooked the recommendations of these Committees whose sole purpose is to suggest better methods for rail management. They recommend the Ministry to prescribe a time bound implementation of the recommendations of this Expert Committee and their implementation should be monitored at the highest level. The Committee would like to be kept apprised of any actions taken in this regard.

Reply of the Government

1. The High Level Safety Review Committee recommended:

i. Taking of Photographs and uploaded in MIS for monitoring the condition of bridges;

ii. Fitting of Water Level Gauges and Turbine Flow Meters to measure the flow of river; and

iii. Instrumentation of bridges in terms of deflection, water level and flow velocity.

2. Going by the recommendations of the Committee, a web-based IT application, Bridge Management System (BMS) has been developed and launched in 2018. The bridge records are uploaded and as a result, all bridge related information is available 24x7 for meaningful analysis related to the safety item. Railways has also taken steps in installing and commissioning Water Level Monitoring System on identified bridges (160 nos.). The system has already been installed on 104 numbers of bridges. With a view to instrumentation of vulnerable bridges for measuring bridge girder deflection/camber, a pilot project has also been taken up by Northern Railway.

3. Besides, trials have been conducted at various Zonal Railways on the following:

- Under Water Inspection of Bridges by Remote Operated Vehicle (ROV);
- Inspection of bridges using Drones;
- 3D scanning of river beds;
- Continuous Scour Monitoring;

The implementation of the above technologies is being regularly monitored in Railway Board; and Zonal Railways are accordingly chased for expeditious implementation of the technologies.

Recommendation (Para No. 12)

The Committee find that the Railways have adopted and implemented a number of new technologies in the sphere of bridge construction. At the same time, they are also trying to develop new technologies under the aegis of the 'Make in India' initiative. They also note that the Ministry is considering the use of drones for use in assessing the condition of bridges. The Committee feel that such aerial devices are not only cost effective but they are more efficient and less hazardous for inspecting staff. They can also be used much more frequently than traditional methods of inspections. Moreover 3D mapping of bridges can help authorities with long term repair/maintenance plans. The Committee laud this unique initiative of the Ministry to harness new technologies and advise them to begin its implementation at the earliest.

Reply of the Government

Railways are making all efforts to implement the world proven new technologies in the field of Bridge Inspection & Maintenance. This has already been explained in paras 5, 6 & 11 above.

CHAPTER – III

RECOMMENDATIONS/OBSERVATIONS WHICH THE COMMITTEE DO NOT DESIRE TO PURSUE IN VIEW OF THE GOVERNMENT'S REPLIES

-NIL-

CHAPTER – IV

RECOMMENDATIONS/OBSERVATIONS IN RESPECT OF WHICH REPLIES OF THE GOVERNMENT HAVE NOT BEEN ACCEPTED BY THE COMMITTEE AND WHICH REQUIRE REITERATION

Recommendation (Para No. 1)

The Committee note that the Indian Railways has a staggering 1,47,523 number of bridges across its immense network. The Committee further note that the Indian Railways have classified bridges under three broad categories which are based on the breadth of their waterway. Bridges with a linear waterway of 300 meters are classified as Important Bridges and those with a linear waterway of 18 meters are classified as Major Bridges. All other bridges are classified as Minor Bridges. This classification effectively relegates 92 percent of the bridges in the Indian Railways to the Minor Bridge category. The Committee feel that such a categorization is too broad and may lead to exclusion of large number of bridges and in view of the fact that there exists different parameters for inspections, maintenance etc. of bridges, such a wide difference would result in unequal weightage/importance being given to only a few bridges as compared to vast majority. The Committee express their reservations on the above mentioned classification and recommend that the Ministry should re-evaluate their classification of bridges in order to bring about some parity. They also recommend that this re-evaluation should take into account the changing dynamics of modern rail transportation which sees the use of heavier and faster trains and higher density of traffic regardless of the measurement of waterways. The Committee strongly feel that such a step would result in augmented safety and security of bridges.

AND

Recommendation (Para No. 2)

The Committee find to their surprise that though the 37,689 number of bridges on its network are 100 years or older, yet the Railways do not classify them as a special/separate segment. Rather they are kept at par with the existing newer/modern bridges when it comes to inspections and maintenance. The Committee express serious

doubts over such an action and opine that these bridges have been planned for lesser loads and service conditions that have changed radically over time. Axle loads and traffic density have increased with the advent of faster and heavier trains and safety of these old bridges may be severely compromised which may lead to safety failures. The Committee are of the considered opinion that the (now) obsolete technology and materials used in these old bridges may not be compliant with modern rail paraphernalia and hence there would be a requirement of a different protocol when it comes to their upkeep and sustenance. The Committee also opine that deficiencies related to aging bridges can become a major concern for their structural safety. As such, the Committee do not concur with the contention of the Ministry that the age of a bridge has no direct bearing on its safety and it is only the physical condition of the bridge that is taken into account while classifying a bridge. The Committee wish to remind the Ministry that such a generalization would be detrimental to the health of a bridge since the archaic technology/materials of these older bridges may not be able to withstand the rigors of modern rail transport equipment. It should also be taken into account that these bridges have withstood the stress and rigours of over a century suffering corrosion, distress, wear and tear. The Committee would like to emphasize that with the advent of modern rail transportation, older bridges may be unable to withstand higher load and speed, resulting in accidents or compromise with punctuality. The Committee also take cognizance of the fact that several of these structures have formidable heritage value and are intrinsically linked to the history of the country and overuse or misuse of these structures may erode their historical value. While the Committee are aware of the commercial concerns as well as financial limitations of the Ministry yet they feel that safety is paramount and should not be compromised at anytime. They therefore advise the Ministry to devise a protocol of inspection and maintenance to include a greater degree of safety/safeguards for bridges which come under this category while keeping their commercial interests intact.

Reply of the Government

Railway Bridges are classified in the following three types based on their waterway:

Important bridge: Bridges with linear waterway of 300 metres or more or a total waterway of 1000 square metres or more and those Bridges considered as important by the Principal Chief Engineer/Chief Bridge Engineer, depending on considerations such as depth of waterway, extent of river training works and maintenance problems are classified as Important Bridges.

Major bridge: Bridges with total water way of 18 linear metres or more or which have a clear opening of 12 linear metres or more in any one span are classified as Major Bridges.

Minor bridge: Bridges which do not fall in the above classifications are classified as minor Bridges.

However, the classification of the bridges or the age of the bridges does not have a direct relevance on the Inspection/Maintenance protocol of the bridges. There is a well established system of inspection of bridges on Indian Railways. All the bridges are inspected twice a year, one before the onset of monsoon and one detailed inspection after the monsoon. In addition, certain bridges are also inspected more frequently depending upon their condition. Repair / strengthening / rehabilitation / rebuilding of Railway bridges is a continuous process and is undertaken whenever so warranted by their physical condition as ascertained during these inspections and not on the basis of age. If the corrective / remedial measures are expected to take a long duration due to the complexity of the site situation, etc., suitable safety measures like imposing speed restrictions and keeping such bridge under close watch are taken till the bridge is repaired / strengthened / rehabilitated / rebuilt.

There exists a Numerical Rating System for assessment of Bridge health. Every bridge component of Major and Important bridges is assigned with a Conditional Rating Number (CRN). The list of the components is as under:

1. Foundation and Flooring;

2. Masonry/Concrete in Substructure;

3. Training and Protective work;

4. Bed Blocks;

5. Bearing and expansion arrangement;

6. Superstructure; and

7. Track structure.

Lower the CRN, more serious is the deteriorated condition of the component. From the CRNs of different component of the bridge, an Overall Rating Number (ORN) of the bridge as a whole is given. The ORN is the lowest of the 7 CRNs of the bridge. For Minor Bridges only ORN is given based upon its overall condition.

Thus equal weightage is being given to the Major, Important bridges by rating individual component and then arriving at ORN i.e. lowest of CRN.

The present system is working satisfactorily since 64 years for all categories of bridges in the Indian Railways system.

It is agreed that the Axle Load and Traffic density has increased with heavier train proposed to be run for which planning has already been done as under:

1. Dedicated Freight Corridor (Eastern and Western Routes) – there are 776 and 439 bridges respectively which have been identified for strengthening to take the higher axle load. Concerned Zonal Railways (ER, ECR, NCR, NR, NWR, SER, WR, CR) have already initiated the action in advance for strengthening these bridges which are likely to carry higher axle load.

2. 25T routes – there are 1085 nos. of bridges which have been identified which are falling on these routes. Concerned Zonal Railways (ER, ECoR, SER, SECR, SWR, SCR, SR) have already initiated action in advance for strengthening these bridges which are likely to carry higher axle load.

Comments of the Committee

(Please see recommendation para no. 9 of Chapter I)

CHAPTER – V

RECOMMENDATIONS/OBSERVATIONS IN RESPECT OF WHICH FINAL REPLIES ARE STILL AWAITED

-NIL-

NEW DELHI;

29 November, 2019

8 Agrahayana, 1941 (Saka)

RADHA MOHAN SINGH

Chairperson,

Standing Committee on Railways

APPENDIX I

MINUTES OF THE FOURTH SITTING OF THE STANDING COMMITTEE ON RAILWAYS (2019-20)

The Committee met on Thursday, the 28th November, 2019 from 1430 hrs. to 1500 hrs. in Committee Room '62', Parliament House , New Delhi.

PRESENT

Shri Radha Mohan Singh - Chairperson

MEMBERS

LOK SABHA

2 Shri Pankaj Choudhary
3 Shri Abu Hasem Khan Chowdhury
4 Shri Suresh Kodikunnil
5 Smt. Diya Kumari
6 Smt. JaskaurMeena
7 Shri Sunil Kumar Mondal
8 Smt. Queen Oja
9 Smt. Keshari Devi Patel
10 Shri Mukesh Rajput
11 Shri N. Reddeppa
12 Shri Sumedhanand Saraswati
13 Shri Gopal Jee Thakur

RAJYA SABHA

14 Prof. Manoj Kumar Jha
15 Shri Joginipally Santosh Kumar

SECRETARIAT

1. Dr. Kavita Prasad - Joint Secretary
2. Shri Arun K. Kaushik - Director
3. Shri D.R. Mohanty - Additional Director
4. Shri Ram Lal Yadav - Additional Director
4. Smt. Archana Srivastva - Deputy Secretary

2. At the outset, the Chairperson welcomed the Members to the sitting of the Committee. Thereafter, the Committee took up for consideration the draft Report on Action taken by the Government on the recommendations/ observations of the Committee contained in their 23rd Report on 'Maintenance of Bridges in Indian Railways: A Review'

The Committee adopted the above-mentioned Report without any modification.

3. The Committee also authorized the Chairperson to finalise the Reports and present the same to Parliament.

The Committee then adjourned.

APPENDIX-II

ANALYSIS OF ACTION TAKEN BY THE GOVERNMENT ON THE RECOMMENDATIONS / OBSERVATIONS CONTAINED IN THE 23RD REPORT (16TH LOK SABHA) ON THE SUBJECT "MAINTENANCE OF BRIDGES IN INDIAN RAILWAYS: A REVEW"

	Total number of Recommendations / Observations:	12
(i)	Recommendations/observations which have been accepted by the Government:-	
	Para Nos. 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12	10
	Percentage of Total	83.33%
(ii)	Recommendations/observations which the Committee do not desire to pursue in view of the Government's replies:-	
	Para No. o	0
	Percentage of Total	0
(iii)	Recommendations/observations in respect of which replies of the Government have not been accepted by the Committee and which require reiteration:-	
	Para Nos. 1 and 2	2
	Percentage of Total	16.67%
(iv)	Recommendations/observations in respect of which final replies are still awaited:-	
	Para No. NIL	0
	Percentage of Total	0