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76

**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS**

**REPORT
ON
STUDY OF NOISE LEVEL
ON
RAILWAY BRIDGES**

REPORT NO. BS-32

DECEMBER -2000

**RESEARCH DESIGNS AND STANDARDS ORGANISATION
MANAK NAGAR, LUKNOW-226011**

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STUDY OF NOISE LEVEL ON RAILWAY BRIDGES

1.0 INTRODUCTION

Noise has its origin in vibrations. Particles of a vibratory body, such as an engine or rail track, set neighbouring particles in the surrounding medium into motion, transferring physical vibrations to adjoining buildings or to the passengers travelling or to distant observers. Studies conducted by ORE on "Noise abatement on bridges" indicate that noise level depends on various factors such as type of bridge, type of rolling stock, mode of track laying, speed of the train, track structure, condition of rail surface, type of fastening etc.

1.1 Bridge on which track is laid with different type of sleepers normally produces considerable amount of noise on passage of trains, which can disturb the passengers. With the introduction of steel channel sleeper in lieu of wooden sleepers, it was felt that it will lead to considerable increase in noise with laying of these sleepers on bridge. Therefore, it was initially proposed to compare the noise level experienced by the passengers while the train pass over bridges laid with steel channel sleepers with that on wooden sleepers. Hence, limited trials were conducted on bridges laid with these sleepers. The trial was conducted on one bridge laid with steel channel sleepers and four other bridges laid with wooden sleepers in the year 1994. (Annexure -1) . Now with the number of bridges with steel channel sleepers increasing, to make a meaningful study , it was proposed to conduct more trials to measure maximum noise level at higher speed. covering all type of bridges on which track is laid with different type of sleepers and compare these values.

2.0 OBJECTIVE OF STUDY

To measure the maximum noise level experienced by the passengers while train passing over bridges laid with steel channel sleepers and their approaches and compare the same with the maximum noise level on different type of bridges laid with different type of sleepers.

3.0 MEASUREMENT OF SOUND LEVEL

3.1 Sound Level

The sound level is expressed in decibels(dB). It is a measure of acoustic pressure expressed by the logarithm of the ratio of the sound level with reference to a standard sound level.

$$\text{Sound in dB} = 20 \log_{10} \frac{P}{P_0}$$

Where,

P = RMS acoustic pressure of the sound to be measured

P₀ = Standard pressure at 1000 Hz i.e.
2x10⁻⁵ N/m²

3.2 Weighted Sound Level

The value of sound pressure corresponds to a noise level in dB whose audible range lies between 20 and 20000 Hz. The audible range is related with the hearing characteristic of individuals. The apparent loudness that one attributes towards sound varies not only with the sound pressure but also with the frequency of the sound. The way loudness varies with the frequency also depends upon the sound pressure. The measuring equipment normally not take into account psycho-physiological characteristics of human ear and this effect has to be introduced in the scheme of measurement in the form of certain weighting network. Presently four weighting networks referred to as A,B,C & D are in use. Out of these A- weighted sound level has been found useful at all levels of intensities which gives the best approximation of human response to sound. However, "Noise abatement on bridges" by ORE under question D-105, all noise level measurement have been indicated in dB(A) i.e. with weighing network – 'A'. Similar measurements have been taken by ORE on a large number of bridges. All noise level in present field trials are also measured in dB(A) for better appreciation of results.

3.3 Sound Level Meter

Sound level meter type 1551-B as shown in Annexure –5 with in-built sound and vibration analyser of General Radio Co. of USA is used to record noise level. The noise level is recorded by utilising 1/3rd octave filter response characteristics along with 'Fast' response characteristics. The noise level meter was set in the range of 70 dB to 120 dB in maximum mode.

4.0 THRESHOLD OF TOLERABLE NOISE

4.1 T. G. Carpenter in his book " The Environmental Impact of Railway" (Chapter-7 Noise and Vibration) quantifies the following limiting noise level in different conditions.

Conditions	Limiting Noise Level in dB
Utter silence	0
Quite Bed room level	20-40
Communication in office & school	55-60
Factories	90
Threshold of pain	120
Damage of ear	150

4.2 In IS 4954 –1968 , Recommendations for noise abatement in town planning has given, the noise level emitted by rail traffic, experienced at about 15 m distance from the source is 90-110 dB. The train noise levels under different conditions are placed at Annexure –2. However, no Indian specification is available on noise level experienced by the passenger inside the coach of a train.

4.3 The report "Study of noise as an occupational hazard to railway employees" (Report No. 82-82.3 – 1982) issued by Traffic research department (Psycho) of

RDSO quoted that the representative standards for hearing conversation are prescribed by International Standards Organisation (ISO) and Occupational Safety and Health Act (OSHA). The first of these is ISO-E-1999(Europe) "Assessment of Occupational Noise Exposure for Hearing conservation purposes". This standards specified a 'q' value of 3, 'q' being the number of dB(A) to be added to a noise to give the same noise dose if the duration is halved. With this value of 'q', 90 dB(A) for 8 hours will be an equivalent noise dose to 93 dB(A) for 4 hours. The other standard is Occupational Safety and Health Act (USA) which specifies a 'q' value of 5. With this value of 'q', 90 dB(A) for 8 hours will be equivalent Noise dose to 95 dB(A) for 4 hours.

The comparison of the two standards is as follows :-

Permissible daily exposure	Sound level in dB(A) as per	
	OSHA(USA)	ISO-E-1999(Europe)
8 hours	90	90
4 "	95	93
2 "	100	96
1 "	105	99
30 minutes	110	102
15 "	115	105
7.5 "	120	108

4.3 The noise level inside the trains passing over bridges was investigated by ORE vide Report No. C-137 /RP-4 / 1977 and observed values of noise level in dB(A) varies from 66 to 73 for first and 71 for second class passenger coaches respectively when measured at centre of the coach and 69 to 79 for first and 75 to 83 for second class passenger coaches respectively when measured over bogie at 150 /160 kmph speed of the train. (Annexure-3). However, ORE recommended limiting value of noise level as 68 dB(A) and 65 dB(A) inside second and first class passenger coaches respectively at 160 Kmph speed for future Railway vehicles. (Annexure -4).

4.4 Tolerable noise inside the train shall be examined with respect to -

- Maximum noise for short duration above which speech or sleep are seriously interrupted;
- Continuous noise level over longer period.

4.5 The crossing of bridge by any passenger moving in a train normally takes less than a minute, hence exposure time of noise for the passenger is quite low. As such noise of the order of 100 to 105 dB(A) can be considered reasonable permissible limit.

5.0 TYPES OF BRIDGES

Trials were conducted on different types of bridges of span 9.15 m and more. It included open web girders of through, semithrough, underslung type, plate girder bridges, ballasted deck bridges such as PSC girders, PSC box . Steel channel, wooden and PSC sleepers were used on bridges .

6.0 TYPES OF TRAIN, SPEED, COACH ETC.

All normal running passengers / express trains passing over the bridges were selected for the trial. The proposed speed groups for trials were 50, 75 and maximum available speed due to speed restrictions. The non air conditioned coach such as GS, WGSCN and WFC were selected for the trials. Generally 5th /6th coach from the engine was selected for the measurement to avoid the noise from the engine. The recording is done at the quarter point and centre of the coach keeping all windows open. Generally two runs of each speed group were taken.

7.0 OBSERVATIONS

7.1 Noise Level on bridges with steel channel sleepers

a) Plate girder bridges

The observed maximum noise level on steel bridges laid with steel channel sleepers are 86.5, 88.3 and 85.9 dB(A) for 9.15, 12.2 and 24.4 m span respectively. The maximum value on approaches of these bridges are 80.5, 82.3 and 79.3 dB(A) respectively (Table IV/1).

b) Open web girder

The observed maximum noise level on open web girder bridges are 94.7, 94.9 91.5 and 95.3 dB(A) for 30.5 m , 45.7m, 61.0 m and 106.6 m span respectively, while the value on approaches on these bridges are 86.7, 88.0, 85.6 and 82.1 dB(A) respectively. (Table IV/2)

It is observed that Plate girder bridges with steel channel sleepers are having about 7 dB(A) lower value of noise level as compared with open web girder. The value observed on bridges are above 6 to 8 dB more than their approaches except for 106.6 m span which is 13 dB(A) more. (Table V)

7.2 Noise Level on bridges with wooden sleepers

a) Plate girders bridges

The observed maximum noise level in plate girders laid with wooden sleepers are 89.7, 93.6, 92.7 and 87.3 dB(A) for 9.15 , 12.2 , 18.3 and 24.4 m span

respectively , while the values on approaches are 84.3, 90.1, 83.4 and 79.8 dB(A) respectively. (Table IV/3)

b) Open web girders

The observed maximum noise level on open web girders are 101.3, 100, 99, 97.3 dB(A) for 30.5, 45.7, 61.0 and 76.2 m span respectively while the value on approaches are 92.0, 90, 86.9 and 83.3 dB(A) respectively. (Table IV/4)

It is observed that plate girder bridges with wooden sleepers are having about 7 dB lower values of noise level as compared with open web girders. The values of max. noise level on bridges is 3 to 8 and 9 to 14 dB(A) more than as compared to that on their approaches for plate girder and openweb girders respectively. (Table V)

7.3 Noise level on bridges with concrete sleepers

The observed max. noise level as PSC girder/PSC Box girder bridges on ballasted deck bridges are 85.0, 82.5 and 85.0 dB(A) for 12.2, 18.3 and 30.5 m span respectively while the value on approaches of these bridges are 80.3, 78.4 and 80.6 dB(A) respectively. (TableIV/5)

It is observed that noise level is 4 to 6 dB(A) more on bridges as compared to their approaches.

8.0 ANALYSIS OF RESULTS

8.1 Comparison of noise level on different type of sleepers

The absolute max. noise level on steel channel, wooden and PSC sleepers are 95.3, 101.3 and 85.0 on bridges and 88.0, 92.0 and 80.6 dB(A) on their approaches respectively.(Table VI and Fig. 1). However, the mean and standard deviation values of all the maximum noise levels recorded in different speed groups and different span are shown in table VII/1 to VII/3 for steel channel, wooden and PSC sleepers. The mean values of maximum noise level for steel channel, wooden and PSC sleepers are 86.47, 87.51 and 81.43 dB(A) respectively.

8.2 Comparison of noise level on bridges and their approaches

The difference of maximum noise level on bridges and their approaches varies from 6 dB(A) to 14 dB(A) for all types of bridges. These values for the plate girders and PSC girders are in the range of 3 dB(A) to 8 dB(A) irrespective of type of sleepers. While for open web girders the difference of noise level varies from 9 dB(A) to 14 dB(A) (Table-V).

8.3 Noise level and speed of the train

It is observed that noise level generally increases with the increase of the speed of train. The observed maximum noise level on bridges laid with steel channel, wooden and PSC sleepers at different speed is shown in Table III/1 to III/3 and Fig. 2

8.4 Noise level and span of the bridges

The plot between observed noise level v/s span shows that the value of max. noise level generally increases with increase in span of the bridges (Table IV/1 to IV/3 and Fig.3). Graphs drawn for the maximum noise level and span of bridges for speed groups of 50 Kmph or less , 50-80 and 80-110 Kmph shows that noise level generally increases with the increase in the span of the bridges.(Fig. 4 to 6).

8.5 Noise level and different type of open web girder bridges

The graph between noise level with speed of the train (Table III/2 and Fig.7) shows that Open web through girder generates higher values of noise as compared to semithrough Open web girder bridges. Underslung Open web girder bridges generate minimum noise among different types of open- web girders.

9.0 CONCLUSIONS

- i). Absolute maximum noise level on bridges laid with steel channel sleepers is less than wooden sleepers. However , the mean values of maximum noise levels on bridges laid with steel channel and wooden sleepers are comparable. Ballasted deck bridges laid with PSC sleepers are having minimum noise among different types of bridges. (Reference para 8.1 Fig. 1 and 1 a).
- ii). Noise level is more on bridges than their approaches by 6 dB(A) to 14 dB(A). This difference in noise level is more on open web girders as compared to plate girder and PSC bridges (Ref . para 8.2 and Table – V)
- iii). Noise level generally increases with increase in speed of the train. (Ref . para 8.3 and Fig.2)
- iv). Noise level generally increase with increase of the span of the bridges. (Ref . para 8.4 and Fig.3 to 6)
- v). Noise level on open web through girder is more than semithrough girder bridges and lowest for underslung open web girder bridges. (Ref . para 8.5 and Fig. 7).

It is concluded that noise inside the trains ,while trains passing over bridges , is not a serious cause of disturbance for passengers as the maximum noise level observed during trials are well within the permissible limit.(Ref para 4.5).

Details of bridges with steel channel sleepers

S. No	Division / Rly	Section	Bridge No.	Type of Bridge *	Location in Km	Span in m.
1	Lucknow /NR	Kanpur -Lucknow	109	OWG	65/7-8	1x45.7
2	Lucknow /NR	Kanpur -Lucknow	108	OWG	64/8-9	1x45.7
3	Lucknow /NR	Kanpur -Lucknow	184	OWG	518/13 - 519/9	9x45.7
4	Lucknow /NR	Kanpur -Lucknow	183	OWG	510/8-10	8x24.4
5	Jhansi /CR	Agra cantt -Gwalior	1282/1	OWG	1282/12 - 1283/10	12x61.0+ 2x45.7
6	Jodhpur /NR	Jodhpur-Marwar Jn.	85	PG	657/14-18	17x12.4
7	Jodhpur /NR	Jodhpur-Marwar Jn.	92	PG	671/1-2	17x12.4
8	Jodhpur /NR	Jodhpur-Marwar Jn.	99A	PG	704/11-12	2x9.15
9	Lucknow /NE	Varansi-Mugalsarai	11DN	OWG	765-766/66	9x33.91+7x106.6
10	Lucknow /NE	Varansi-Mugalsarai	11UP	OWG	765-766/66	9x33.91+7x106.6
11	Jabalpur/CR	Katni-Bina	1119/2DN	OWG	1119/37-27	4x30.48
12	Ratlam / WR	Kota-Ratlam	317 Up	OWG (US)	694/2-7	10x30.48

* OWG=Openweb girder
PG = Plate girder
US = Underslung

Table I/2

Details of bridges with wooden sleepers

S. No	Division / Rly	Section	Br. No.	Type of Bridge *	Location (Km)	Span in m
1.	Lucknow /NE	Gorakhpur-Lucknow	182	PG	510/2-3	6x24.4
2.	Jhansi /CR	Agra cant.-Gwalior	1331/1UP	OWG	1331/17-19	3x30.5
3.	Jhansi /CR	Agra cant.-Gwalior	1314/1UP	OWG	1314/23-33	4x30.5+ 2x12.2
4.	Jhansi /CR	Agra cant.-Gwalior	1267/2UP	OWG	1267/2-1267/9-10	4x30.5+ 2x12.2
5.	Jhansi /CR	Agra cant.-Gwalior	1258/1UP	OWG	1258/9-15	2x76.2
6.	Jhansi /CR	Agra cant.-Gwalior	1251/1UP	OWG	1251/33-39	2x45.7
7.	Jhansi /CR	Gwalior- Agra cant.-	1251/1DN	OWG	1251/33-39	3x30.48
8.	Jhansi /CR	Gwalior- Agra cant.-	1258/1DN	OWG	1258/34-40	4x30.48
9.	Jhansi /CR	Gwalior- Agra cant.-	1267/1DN	OW(US)	1267/2-1267/9-10	3x30.48+ 2x12.2
10.	Jhansi /CR	Gwalior- Agra cant.-	1282/1DN	OWG	1282/12-1283/10	12x61+2x45.7
11.	Jhansi /CR	Gwalior- Agra cant.-	1314/1DN	OWG	1314/24-32	3x30.48
12.	Jhansi /CR	Gwalior- Agra cant.-	1331/1DN	OWG	1331/1-1331/4-5	3x30.48
13.	JU/NR	JU-MTD	35	PG	556/1-2	3x30.5
14.	JU/NR	JU-MTD	39	PG	557/10-11	1x9.15
15.	Muradabad/NR	Bareille-Moradabad	1038 UP	PG	1312/1-2	4x18.3
16.	Muradabad/NR	Bareille-Moradabad	1075 UP	OWG	1331/2-3	7x30.48
17.	Muradabad/NR	Bareille-Moradabad	1077 UP	OWG	1334/6-8	6x30.48
18.	Muradabad/NR	Bareille-Moradabad	1125 UP	OWG	1375/7-8	10x30.48
19.	Muradabad/NR	Bareille-Moradabad	1137 UP	OWG	1394/14-15	10x61.0
20.	Muradabad/NR	Bareille-Moradabad	1137 DN	OWG	1394/14-15	10x61.0
21.	Muradabad/NR	Bareille-Moradabad	1335 DN	OWG	1389/ 3-4	10x12.2
22.	Muradabad/NR	Bareille-Moradabad	1133DN	OWG	1384/7-8	7x12.2
23.	Muradabad/NR	Bareille-Moradabad	1125 DN	OWG	1375/7-8	10x30.48
24.	Muradabad/NR	Bareille-Moradabad	1038 DN	OWG	1312/1-2	4x18.3

25.	Allahabad-NR	Allahabad-Mugalsarai	30UP	OWG	821/1-22	14X61+2X8.89 +1X9.18
26.	Allahabad-NR	Allahabad-Mugalsarai	30DN	OWG	821/1-22	14X61+2X8.89 +1X9.18
27.	Allahabad-NR	Allahabad-Mugalsarai	5 UP	OWG	792/9-23	7x45.7+ 2X9.75
28.	Allahabad-NR	Allahabad-Mugalsarai	5 DN	OWG	792/9-23	7x45.7+ 2X9.75
29.	Lucknow-NR	Varanasi -Mugalsarai	24 DN	OW(Sem ithrough)	770/13-14	1x30.48
30.	Lucknow-NR	Varanasi -Mugalsarai	24 UP	OW(Sem ithrough)	770/13-14	1x30.48
31.	Jabalpur-CR	Katni -Bina	1234/1DN	PG	1234/26-24	4X18.3+ 1X12.2
32.	Jabalpur-CR	Katni -Bina	1234/1UP	PG	1234/26-24	4X18.3
33.	Jabalpur-CR	Katni -Bina	1222/1DN	PG	1222/27-23	2X12.2+ 2X9.14
34.	Jabalpur-CR	Katni -Bina	1222/1UP	PG	1222/27-23	2X12.2+ 2X4.57
35.	Jabalpur-CR	Katni -Bina	1193/3DN	PG	1193/ 25-21	2X12.2+ 3X4.57
36.	Jabalpur-CR	Katni -Bina	1193/3 UP	PG	1193/ 25-21	2X12.2+ 3X4.57
37.	Jabalpur-CR	Katni -Bina	1185/1 DN	PG	1185/ 17-13	3X12.2+ 2X7.31+ 6X4.57
38.	Jabalpur-CR	Katni -Bina	1185/1 UP	PG+RCC Slab+ Arch	1185/ 17-13	3X12.2+ 2X7.31+ 6X4.57
39.	Jabalpur-CR	Katni -Bina	1175/1DN	OW	1175/ 31-27	5X30.5+ 4X18.3
40.	Jabalpur-CR	Katni -Bina	1175/1 UP	OW	1185/3 1-27	5X30.5+ 5X9.14+ 6X61.0
41.	Jabalpur-CR	Katni -Bina	1151/1 DN	OWG	1151/6-12	11X30.48
42.	Jabalpur-CR	Katni -Bina	1151/1 UP	OWG	1151/6-12	11X30.48
43.	Jabalpur-CR	Katni -Bina	1119/1 UP	OWG	1119/10-11	4X30.48
44.	Jabalpur-CR	Katni -Bina	1105/1 DN	OWG	1105/5-1106/2	8X30.48
45.	Jabalpur-CR	Katni -Bina	1105/1 DN	OWG	1105/5-1106/2	8X30.48
46.	Ratlam-WR	Kota-Ratlam	292UP	PG	658/11-12	1X18.3
47.	Ratlam-WR	Kota-Ratlam	299UP	PG	667/12-13	6X18.3
48.	Ratlam-WR	Kota-Ratlam	302UP	PG	673/7-8	3X12.2
49.	Ratlam-WR	Kota-Ratlam	306UP	PG	680/9-10	3X12.2
50.	Ratlam-WR	Kota-Ratlam	317DN	OWG	694/2-7	10X30.48
51.	Ratlam-WR	Kota-Ratlam	306DN	PG	680/9-10	3X12.2
52.	Ratlam-WR	Kota-Ratlam	302DN	PG	673/7-8	3X12.2
53.	Ratlam-WR	Kota-Ratlam	299DN	PG	667/12-13	6X18.3
54.	Ratlam-WR	Kota-Ratlam	292DN	PG	658/11-12	1X18.3

* OWG = Openweb girder
PG = Plate girder
US = Underslung

Table I/3

Details of bridge with PSC sleepers

S. No	Division / Rly.	Section	Br. No.	Type of Bridge	Location (Km)	Span in m
1	Moradabad/ NR	Bareile-Moradabad	1133 UP	PSC girder	1384/7-8	7x12.2
2	Moradabad/ NR	Bareile-Moradabad	1135 UP	PSC Girder	1389/3-4	10x12.2
3	Moradabad/ NR	Bareile-Moradabad	1077 DN	PSC box girder	1334/6-8	6x30.48
4	Moradabad/ NR	Bareile-Moradabad	1075 DN	PSC box girder	1331/2-3	7x30.48
5	Ratlam/WR	Ratlam-BRC	54 UP	PSC girder	510/4-6	3X18.3+ 2x12.9
6	Ratlam/WR	Ratlam-BRC	26 UP	PSC girder	488/6-9	9X18.3

Table – I/4

Details of Bridges Tested (Type Wise)

S No	Span In Metre	Type of Bridge				
		Plate Girder	PSC Box/ Girder	Triangulated Open Web Girder		
				Through Type	Under Slung	Semi Through
1	9.15	2	-	-	-	-
2	12.2	15	2	-	-	-
3	18.3	8	2	-	-	-
4	24.4	2	-	-	-	-
5	30.5	-	2	20	4	2
6	45.7	-	-	6	-	-
7	61.0	-	-	4	-	-
8	76.2	-	-	1	-	-
9	106.66	-	-	-	-	2
Total		27	6	31	4	4

Table I/5

Details of Bridges Tested (Sleeper Wise)

SNo	Span in Metre	Type of Bridge Sleeper		
		Steel Channel Sleeper	Wooden	Concrete Sleeper
1	9.15	1	1	-
2	12.2	2	13	2
3	18.3	-	8	2
4	24.4	1	1	-
5	30.5	2	22	2
6	45.7	3	3	-
7	61.0	1	5	-
8	76.2	-	1	-
9	106.66	2	-	-
Total		12	54	6

MAX. NOISE LEVEL ON BRIDGES AND THEIR APPROACHES AT DIFFERENT SPEEDS**BRIDGE NO. 109 DN**

Section - Lucknow – Kanpur
 Location - Km 65/7-8
 Span / Type - 1x45.7m / Open Web Girder
 Sleeper - Steel Channel RDSO Design

S.No	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	1.3.2000	6LC	GS	12.30	75	82	91.1	83
2.	-do-	10LC	GS	18.00	76	83	93.1	82.5
3.	2.3.2000	5011	WGSCN	12.30	50	79	85.7	79.5
4.	-do-	10LC	GS	14.30	50	81.1	86.1	78.1
5.	3.3.2000	6LC	GS	12.00	82	85	94.9	86
6.	-do-	10LC	GS	14.15	75	85	91.3	84.6

Table No.II/2

Bridge No. 108 Dn

Section - Lucknow – Kanpur
 Location - Km 64/8-9
 Span / Type of sleeper - 1x45.7m / Open Web Girder
 - Steel Channel RDSO Design

S.No	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	1.3.2000	6LC	GS	12.30	75	83	91.2	79.1
2.	-do-	10LC	GS	18.00	76	82	92.1	81.3
3.	2.3.2000	5011	WGSCN	12.30	50	78.3	84.9	79.3
4.	-do-	10LC	GS	14.30	50	80.1	86.8	79.3
5.	3.3.2000	6LC	GS	12.00	82	88	94.9	84.8
6.	-do-	10LC	GS	14.15	75	84	92.2	84.1

Table no.II/3

Bridge No. 184

Section - Lucknow – Gorakhpur
 Location - Km 518/13 – 519/9
 Span / Type - 9x 45.7m / Open Web Girder
 Sleeper - Steel Channel Railway Design

S No	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	14.3.2000	5063	WGSCN	13.30	15	71	79.8	73
2.	-do-	584	GS	20.00	20	75	86	76
3.	15.3.2000	581	GS	07.10	15	73	80.3	73.6
4.	-do-	4674	WFC	12.50	15	65	78.9	65
5.	15.3.2000	5063	WGSCN	13.30	15	65	80.4	62
6.	-do-	584	GS	19.30	20	82	85.7	86
7.	16.3.2000	5203	WGSCN	07.30	20	63	78.9	62
8.	-do-	1015	WGSCN	09.30	20	67.2	80.2	69
9.	-do-	5007	WGSCN	23.00	30	68.5	79.8	78.2

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Table no II/4

Bridge No. 183

Section - Lucknow – Gorakhpur
 Location - Km 510/8 - 10
 Span / Type - 8x 24.4m / Plate girder
 Sleeper - Steel Channel Railway Design

SN	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	14.3.2000	5063	WGSCN	13.30	60	79.3	85.3	79
2.	-do-	584	GS	20.00	15	76	80	79.1
3.	15.3.2000	581	GS	07.10	40	77	83.2	76
4.	-do-	4674	WFC	12.50	55	72	83.1	70
5.	15.3.2000	5063	WGSCN	13.30	60	70	84.1	70
6.	-do-	584	GS	19.30	15	74	84.6	81.2
7.	16.3.2000	5203	WGSCN	07.30	60	73	85.1	72
8.	-do-	1015	WGSCN	09.30	75	77	85.9	77.9
9.	-do-	5007	WGSCN	23.00	30	70	82.6	69.3

Table no.II/5

Bridge No. 1282/1up-(Chambal)

Section -Agra Cantt - Gwalior
 Location -Km 1282/12 -1283/10
 Span / Type -12x61.0 + 2x45.7m / Open web girder
 Sleeper -Steel Channel RDSO Design

S.No	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	28.3.2000	2138	WGSCN	08.30	45	81.6	89.6	81.4
2.	-do-	2626	WGSCN	14.20	42	85.6	91.5	84.0
3.	29.3.2000	5344	WGSCN	09.15	47	77.4	86.8	78.3
4.	30.3.2000	8238	WGSCN	09.30	50	78.5	84.0	76.5
5.	24.4.2000	8238	WGSCN	08.50	45	77.3	86.7	77.8
6.	25.4.2000	1340	GS	07.00	55	82.8	89.7	79.0
7.	26.4.2000	1340	GS	07.00	46	80.9	87.2	79.4

Table no.II/6

Bridge No. 85

Section -Jodhpur – Marwar Junction
 Location -Km 657/14-18
 Span / Type -17x12.4m / Plate girder
 Sleeper -Steel Channel RDSO Design

SN	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	24.5.2000	Pass	GS	11.00	52	81.4	88.0	82.0
2.	-do-	Pass	WGSCN	14.10	70	75.2	79.4	74.3
3.	25.5.2000	Pass	GS	11.00	57	74.3	85.2	75.2
4.	-do-	Pass	WGSCN	14.10	60	77.1	84.7	78.5
5.	26.5.2000	Pass	GS	11.00	30	77.5	81.4	75.1
6.	-do-	Pass	WGSCN	14.10	35	74.1	77.1	68.1

NOTE:-

A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Table no.II/7

Bridge No. 92

Section -Jodhpur – Marwar Junction
 Location -Km 671/1-2
 Span / Type -17x12.4m / Plate girder
 Sleeper -Steel Channel RDSO Design

SN	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	24.5.2000	Pass	GS	11.00	20	73.1	81.0	74.2
2.	-do-	Pass	WGSCN	14.10	32	72.7	77.6	71.2
3.	25.5.2000	Pass	GS	11.00	25	72.0	75.8	71.3
4.	-do-	Pass	WGSCN	14.10	50	81.2	88.3	82.3
5.	26.5.2000	Pass	GS	11.00	40	77.1	81.5	76.5
6.	-do-	Pass	WGSCN	14.10	40	76.2	80.0	77.4

Table no.II/8

Bridge No. 99a

Section -Jodhpur – Marwar Junction
 Location -Km 704/11-12
 Span / Type -2 X 9.15m / Plate girder
 Sleeper -Steel Channel RDSO Design

SN	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	24.5.2000	Pass	GS	11.00	85	80.5	85	80.5
2.	-do-	Pass	WGSCN	14.10	-	-	-	-
3.	25.5.2000	Pass	GS	11.00	75	73.7	79.6	74.1
4.	-do-	Pass	WGSCN	14.10	-	-	-	-
5.	26.5.2000	Pass	GS	11.00	75	79.7	84.3	80.2
6.	-do-	Pass	WGSCN	14.10	85	76.2	86.5	77.4

Table no.II/9

BRIDGE NO. 11 DN (Malvia)

Section -Varanasi-Mugalsarai
 Location -Km 765/8-766/6
 Span / Type -7 X 106.66+ 9 x 33.91 / Open Web girder
 Sleeper -Steel Channel RDSO Design

SN	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	15.7.2000	2MF	SLR	9.45	30	78	86.5	77
2.	-do-	3484	WGSCN	16.00	20	72.6	83.1	72.3
3.	16.7.2000	2VM	WGSCZ	7.25	50	75.2	89.1	76.8
4.	-do-	2MF	GS	10.00	70	79.1	92.8	78.3
5.	16.7.2000	4VM	GS	18.10	70	82.1	93.4	81.4

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge

Table no.II/10

Bridge No 11 Up(Malvia)

Section -Varanasi-Mugalsarai
 Location -Km 765/8-766/6
 Span / Type -7 X 106.66+ 9 x 33.91 / Open Web girder
 Sleeper -Steel Channel RDSO Design

SN	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	15.7.2000	3483	WGSCN	11.30	50	80	94	82
2.	-do-	2401	WGSCN	18.25	20	77	91.3	78
3.	16.7.2000	1VM	WGSCZ	9.05	50	76.2	95.3	76.9
4.	-do-	3483	WGSCN	11.30	50	74.3	95.2	78.6
5.	16.7.2000	3VM	GS	19.30	50	80.7	94.2	80.1

Table no.II/11

Bridge No1119/2 Dn (Kopra)

Section -Katni-Bina
 Location-Km 1119/37-27
 Span / Type -4x30.5m / Open Web girder
 Sleeper -Steel Channel RDSO Design

SN	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	26.7.2000	8236	WGSCN	6.30	90	83.1	94.7	82.6
2.	27.7.2000	8236	GSCZ	6.30	20	74.1	81.3	73.1
3.	28.7.2000	8236	WSCNLR	6.30	95	82.3	94.3	81.9
4.	29.7.2000	8236	GSCNLR	6.30	85	80.4	92.7	79.2
5.	30.7.2000	8236	WGSCN	6.30	90	82.1	93.1	80.9

Table no.II/12

Bridge No. 317 Up(Chambal)

Section -Kota-Ratlam
 Location -Km 694/2-7
 Span / Type -10x30.48m / Open Web Girder
 Sleeper -Steel Channel RDSO Design

S.No	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	6.8.2000	9020	WFC	13.30	55	85.2	92.9	86.7
2.	6.8.2000	2904	WGSCN	18.00	45	74.8	83.5	73.3
3.	7.8.2000	5046	WGCN	11.17	50	69.3	82.4	70.3
4.	7.8.2000	5063	WGSCN	16.20	45	76.0	84.7	73.9
5.	8.8.2000	9020	WFC	13.30	55	76.5	85.6	75.5

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Bridge No. 182

Section : Gorakhpur-Basti
 Location : Km 510/2-3
 Span / Type : 6x24.4m / Plate Girder
 Sleeper : Wooden Sleepers

SN	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	14.3.2000	5063	WGSCN	13.30	55	79	85	79.8
2.	-do-	584	GS	20.00	35	75	85.1	76.0
3.	15.3.2000	581	GS	07.10	-	-	-	-
4.	-do-	4674	WFC	12.50	65	70	87.3	71.0
5.	15.3.2000	5063	WGSCN	13.30	60	70	85.4	72.0
6.	-do-	584	GS	19.30	35	78	86.7	74.0
7.	16.3.2000	5203	WGSCN	07.30	60	74	86.6	75.4
8.	-do-	1015	WGSCN	09.30	50	76	86.5	77.0
9.	-do-	5007	WGSCN	23.00	20	70	79.5	69.5

Table no.II/14

Bridge No. 1331/1up (Khari)

Section : -Agra-Gwalior
 Location : -Km 1331/17-19
 Span / Type : -3x30.5m + 2x12.2m / Open Web Girder
 Sleeper : -Wooden Sleepers

SN	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	28.3.2000	2138	WGSCN	08.30	85	84.1	90.0	82.4
2.	-do-	2626	WGSCN	14.20	80	86.0	95.6	86.0
3.	29.3.2000	5344	WGSCN	09.15	88	86.1	93.4	82.3
4.	30.3.2000	8238	WGSCN	09.30	70	84.0	90.0	83.0
5.	24.4.2000	8238	WGSCN	08.50	78	82.5	92.6	83.7
6.	25.4.2000	1340	GS	07.00	75	85.6	93.6	85.7
7.	26.4.2000	1340	GS	07.00	40	82.7	90.5	82.5

Table no II/.15

Bridge No. 1314/1 (Banganga)

Section : -Agra-Gwalior
 Location : -Km 1314/23-33
 Span / Type : -4x30.5m + 2x12.2m / Open web girder
 Sleeper : -Wooden Sleepers

SN	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	28.3.2000	2138	WGSCN	08.30	-	-	-	-
2.	-do-	2626	WGSCN	14.20	25	83.8	87.8	84.0
3.	29.3.2000	5344	WGSCN	09.15	27	74.8	81.2	77.6
4.	30.3.2000	8238	WGSCN	09.30	85	83.0	92.8	82.5
5.	24.4.2000	8238	WGSCN	08.50	100	81.2	93.9	82.9
6.	25.4.2000	1340	GS	07.00	40	81.0	87.5	83.0
7.	26.4.2000	1340	GS	07.00	40	82.5	88.8	83.3

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge

Bridge No. 1267/1up (Koari)

Section -Agra Cantt - Gwalior
 Location -Km 1267/2-10
 Span / Type -3x30.5m + 2 x 12.2m / Open web girder
 Sleeper -Wooden Sleepers

SN	Date of test	Train No.	Coach Type	Time	Speed in Kmph	Maximum Noise level in dB(A) at locations		
						A	B	C
1.	28.3.2000	2626	WGSCN	14.20	80	86.0	95.6	86.0
3.	29.3.2000	6344	WGSCN	9.15	88	86.1	93.4	82.3
4.	30.3.2000	8238	WGSCN	9.30	100	84.0	90.2	83.0
5.	24.4.2000	8238	WGSCN	8.50	95	79.9	92.7	79.1
6.	25.4.2000	1340	GS	7.00	90	86.3	91.8	86.1
7	26.4.2000	1340	GS	7.00	50	82.4	89.4	82.6

Table no. II/17

Bridge no. 1258/1 UP (Ason)

Section -Morena – Sank
 Location -KM. 1258/9-15
 Span type - 2x76.2 m , OWG (Through)
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	28.03.2000	2626	WGSCN	14.20	107	82.6	97.3	83.3
2	29.03.2000	6344	WGSCN	09.15	103	82.4	95.8	82.2
3	30.03.2000	8238	WGSCN	09.30	90	82.2	92.5	82.8
4	24.04.2000	8238	WGSCN	08.50	95	79.9	94.4	82.1
5	25.04.2000	1340	GS	07.00	95	85.6	93.0	84.8
6	26.04.2000	1340	GS	07.00	50	80.6	86.5	80.8

Table no. II/18

Bridge no.1251/1 UP (Sank)

Section -Sank - Noorbad
 Location -KM. 1251/33-39
 Span typ e-2x45.7 m OWG (Through)
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	28.03.2000	2626	WGSCN	14.20	45	81.0	90.5	80.0
2	29.03.2000	6344	WGSCN	09.15	50	80.7	88.5	80.9
3	30.03.2000	8238	WGSCN	09.30	50	77.0	88.4	80.0
4	24.04.2000	8238	WGSCN	08.50	95	81.4	93.3	82.1
5	25.04.2000	1340	GS	07.00	80	84.5	91.9	85.4
6	26.04.2000	1340	GS	07.00	45	80.0	87.1	80.8

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Bridge no.1251/1 Dn (Sank)

Section -Sank - Noorbad
 Location -KM. 1251/33-39
 Span type -3x30.48 m /OWG(Through)
 Sleeper -Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
	28.03.2000	2625	WGSCN	11.10	105	84.0	93.4	85.1
2	"	6343	WGSCN	16.10	50	78.2	87.8	78.5
3	29.03.2000	8407	WGSCN	14.15	60	81.0	88.1	79.3
4	30.03.2000	6343	WGSCN	12.50	45	77.0	87.5	76.0
5	24.04.2000	8237	WGSCN	13.35	100	83.2	93.4	83.3
6	25.04.2000	1347	GS	10.30	75	82.2	89.2	82.4
7	26.04.2000	8407	WGSCN	13.30	100	80.4	89.3	80.1

Table no.II/ 20

Bridge no.1258/1 DN (Ason)

Section -Sank - Morena
 Location -KM. 1267/2-1267/9-10
 Span type -4x30.48 m / OWG (Through)
 Sleeper -Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	28.03.2000	2625	WGSCN	11.10	100	81.2	93.2	80.7
2	"	6343	WGSCN	16.10	102	82.0	94.0	82.0
3	29.03.2000	8407	WGSCN	14.15	102	84.1	95.1	83.1
4	30.03.2000	6343	WGSCN	12.50	87	78.0	90.8	80.8
5	24.04.2000	8237	WGSCN	13.35	102	80.2	93.3	80.5
6	25.04.2000	1347	GS	10.30	10	83.4	87.3	83.4
7	26.04.2000	8407	WGSCN	13.30	20	75.3	83.0	74.9

Table no.II/ 21

Bridge no.1267/1 DN (Koari)

Section - Sikredha - Morena
 Location -3 x 30.5 + 2 x12.2 m
 Span type -3x30.48 m /OWG (Under slung)
 Sleeper -Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	28.03.2000	2625	WGSCN	11.10	100	81.6	91.6	83.0
2	"	6343	WGSCN	16.10	100	81.4	92.0	82.0
3	29.03.2000	8407	WGSCN	14.15	92	84.4	92.3	84.2
4	30.03.2000	6343	WGSCN	12.50	90	80.6	90.0	80.1
5	24.04.2000	8237	WGSCN	13.35	15	73.7	79.6	73.2
6	25.04.2000	1347	GS	10.30	70	81.2	88.2	81.4
7	26.04.2000	8407	WGSCN	13.30	100	80.0	89.0	81.8

Table no. II/22

Bridge no.1282/1 DN (Chambal)

Section -Dholpur - Hetampur
 Location - Km - 1282/12-1283/10
 Span type -12x61 + 2x45.7 m
 Sleeper -Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	28.03.2000	2625	WGSCN	11.10	90	84.5	93.8	82.8
2	"	6343	WGSCN	16.10	90	83.3	94.4	84.7
3	29.03.2000	8407	WGSCN	14.15	85	84.6	95.7	84.9
4	30.03.2000	6343	WGSCN	12.50	85	81.3	95.3	83.3
5	24.04.2000	8237	WGSCN	13.35	30	75.5	88.1	76.0
6	25.04.2000	1347	GS	10.30	20	82.0	85.7	81.1
7	26.04.2000	8407	WGSCN	13.30	32	76.5	87.3	74.0

Table no.II/ 23

Bridge no.1314/1 DN (Banganga)

Section -Mamia - Jajau
 Location -KM. 1314/24-32
 Span type -4x30.48 m / OWG (U.S.)
 Sleeper -Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	28.03.2000	2625	WGSCN	11.10	95	92.0	94.3	91.0
2	"	6343	WGSCN	16.10	95	85.7	90.5	83.6
3	29.03.2000	8407	WGSCN	14.15	90	85.9	93.0	86.1
4	30.03.2000	6343	WGSCN	12.50	92	82.9	89.6	83.2
5	24.04.2000	8237	WGSCN	13.35	100	82.5	89.5	83.1
6	25.04.2000	1347	GS	10.30	75	81.3	87.4	82.5
7	26.04.2000	8407	WGSCN	13.30	100	82.0	87.3	83.0

Table no.II/ 24

Bridge no.1331/1 DN (Khari)

Section -Jajau - Bhandai
 Location -KM. 1331/1 - 1331/4-5
 Span type -3x30.5 m / OWG (U. S.)
 Sleeper -Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	28.03.2000	2625	WGSCN	11.10	35	85.0	89.5	87.7
2	"	6343	WGSCN	16.10	30	76.8	85.1	79.0
3	29.03.2000	8407	WGSCN	14.15	27	73.7	84.2	75.0
4	30.03.2000	6343	WGSCN	12.50	20	72.7	80.9	71.7
5	24.04.2000	8237	WGSCN	13.35	20	72.1	79.9	73.0
6	25.04.2000	1347	GS	10.30	20	74.0	78.8	74.2
7	26.04.2000	8407	WGSCN	13.30	20	72.4	76.5	72.7

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Bridge no.35

Section -Jodhpur – Merta Road
 Location -KM. 556/1-2
 Span type -2x12.2 m / P.G.
 Sleeper -Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	27.05.2000	4853	WGSCN	07.10	150	80.2	87.7	79.1
2	27.05.2000	Pass	WGSCN	14.00	66	72.3	80.4	73.1
3	29.05.2000	Pass	WGSCN	10.00	75	74.3	82.6	74.1
4	29.05.2000	Banda Exp.	WGSCN	13.05	70	72.3	77.3	71.4
5	30.05.2000	4853	WGSCN	07.10	105	80.3	90.3	84.8

Table no.II/ 26

Bridge no.39

Section -Jodhpur – Merta Road
 Location -KM. 557/10-11
 Span type -1x9.15 m / P.G.
 Sleeper -Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	27.05.2000	4853	WGSCN	07.10	105	82.2	87.4	80.9
2	27.05.2000	Pass	WGSCN	14.00	70	73.3	80.5	74.3
3	29.05.2000	Pass	WGSCN	10.00	65	74.5	80.1	73.1
4	29.05.2000	Banda Exp.	WGSCN	13.05	75	71.2	78.1	72.1
5	30.05.2000	4853	WGSCN	07.10	105	80.5	89.7	84.3

Table no.II/ 27

Bridge no.1137 DN (Ramganga)

Section -BE-MB
 Location -KM. 1394/14-15
 Span type -10x60.1 m / OWG (Through)
 Sleeper -wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	12.06.2000	3074	WGSCN	10.20	40	82.0	89.5	82.5
2	13.06.2000	3074	WGSCN	10.20	60	83.2	89.7	83.4
3	14.06.2000	3152	WGSCN	11.30	-	-	-	-
4	15.06.2000	3152	WGSCN	11.30	55	79.0	89.0	78.6
5	26.06.2000	2402	WGSCN	16.15	55	76.5	85.7	76.5
6	26.06.2000	3152	WGSCN	11.20	50	77.9	87.7	78.1

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Bridge no.1135 DN

Section -BE-MB
 Location -KM. 1384/3-4
 Span type -10x12.2 m / P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	12.06.2000	3074	WGSCN	10.20	80	77.5	86.1	77.3
2	13.06.2000	3074	WGSCN	10.20	55	73.0	81.7	72.9
3.	14.06.2000	3152	WGSCN	11.30	75	80.0	88.0	78.8
4.	15.06.2000	3152	WGSCN	11.30	85	76.3	85.6	75.1
5.	26.06.2000	2402	WGSCN	16.15	80	78.1	85.3	78.0
6.	26.06.2000	3152	WGSCN	11.20	80	79.4	88.2	76.5

Table no. II/29

Bridge no.1133 DN

Section -BE-MB
 Location-KM. 1384/7-8
 Span type -7x12.2 m /P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	12.06.2000	3074	WGSCN	10.20	70	72.8	82.6	74.4
2	13.06.2000	3074	WGSCN	10.20	75	75.0	83.5	75.3
3.	14.06.2000	3152	WGSCN	11.30	75	76.2	83.2	75.7
4.	15.06.2000	3152	WGSCN	11.30	70	78.6	88.8	76.8
5.	26.06.2000	2402	WGSCN	16.15	80	72.3	84.1	73.2
6.	26.06.2000	3152	WGSCN	11.20	90	77.9	87.0	78.2

Table No.II/ 30

Bridge no.1125 DN(Kosi)

Section -BE -MB
 Location -KM. 1375/7-8
 Span type -10x30.48 m OWG (Through)
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	12.06.2000	3074	WGSCN	10.20	95	81.3	90.6	81.5
2	13.06.2000	3074	WGSCN	10.20	95	83.5	93.5	83.0
3.	14.06.2000	3152	WGSCN	11.30	95	85.3	92.9	82.4
4.	15.06.2000	3152	WGSCN	11.30	70	78.6	88.8	76.8
5.	26.06.2000	2402	WGSCN	16.15	95	86.3	91.4	86.3
6.	26.06.2000	3152	WGSCN	11.20	95	84.9	94.4	84.0

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Bridge no.1077 DN

Section -BE-MB
 Location -KM. 1334/6-8
 Span type -6 x 30.48 m / PSC Box Girder
 Sleeper - PSC

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	12.06.2000	3074	WGSCN	10.20	100	75.6	81.0	75.4
2	13.06.2000	3074	WGSCN	10.20	90	78.6	83.4	78.2
3	14.06.2000	3152	WGSCN	11.30	80	76.0	81.2	75.5
4	15.06.2000	3152	WGSCN	11.30	75	77.3	83.8	76.9
5	26.06.2000	2402	WGSCN	16.15	90	80.6	84.3	79.6
6	26.06.2000	3152	WGSCN	11.20	85	79.3	84.3	76.9

Table no. II/32

Bridge no.1075 DN

Section -BE-MB
 Location -KM. 1331/2-3
 Span type -7 x 30.48 m /PSC box girder
 Sleeper - PSC

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	12.06.2000	3074	WGSCN	10.20	100	73.4	78.0	73.8
2	13.06.2000	3074	WGSCN	10.20	95	78.2	82.1	79.0
3	14.06.2000	3152	WGSCN	11.30	90	77.0	79.9	76.7
4	15.06.2000	3152	WGSCN	11.30	85	77.8	83.0	78.0
5	26.06.2000	2402	WGSCN	16.15	90	80.1	85.0	80.6
6	26.06.2000	3152	WGSCN	11.20	95	78.3	82.9	76.8

Table no. II/33

Bridge no.1038 DN

Section -BE-MB
 Location -KM. 1312/ 1-2
 Span type -4 x 18.3 m /P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	12.06.2000	3074	WGSCN	10.20	15	70.0	71.4	70.0
2	13.06.2000	3074	WGSCN	10.20	20	78.0	83.1	77.0
3	14.06.2000	3152	WGSCN	11.30	40	77.0	86.4	75.1
4	15.06.2000	3152	WGSCN	11.30	40	77.8	85.5	75.9
5	26.06.2000	2402	WGSCN	16.15	55	80.6	87.0	77.6
6	26.06.2000	3152	WGSCN	11.20	50	78.6	88.6	75.6

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Bridge no.1038 UP

Section -BE-MB
 Location -KM. 1312/1-2
 Span type -4 x 18.3 m / P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	12.06.2000	2317	WGSCN	14.15	80	80.2	89.0	80.3
2	13.06.2000	5609	WGSCN	14.40	50	75.4	82.5	75.0
3	14.06.2000	4649	WFC	14.45	55	75.5	83.5	75.3
4	15.06.2000	3151	WGSCN	18.00	70	79.9	87.0	79.8
5	25.06.2000	351	SGSCZ	08.00	80	78.2	86.9	78.2
6	25.06.2000	5609	WGSCN	17.50	65	72.9	82.6	72.5
7	26.06.2000	3151	WGSCN	19.00	75	76.3	87.2	75.3

Table no.II/ 35

Bridge no.1075 UP

Section -BE-MB
 Location -KM. 1331/2-3
 Span type -7 x 30.48 m /OWG
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	12.06.2000	2317	WGSCN	14.15	100	84.9	92.2	86.0
2	13.06.2000	5609	WGSCN	14.40	65	78.6	86.6	78.5
3	14.06.2000	4649	WFC	14.45	80	81.3	89.7	80.3
4	15.06.2000	3151	WGSCN	18.00	75	83.5	90.1	82.5
5	25.06.2000	351	SGSCZ	08.00	65	80.2	86.3	80.4
6	25.06.2000	5609	WGSCN	17.50	90	80.9	88.8	78.7
7	26.06.2000	3151	WGSCN	19.00	45	78.5	85.0	78.4

Table no. II/36

Bridge no.1077 UP

Section -BE-MB
 Location -KM. 1334/6-8
 Span type -6 x 30.48 m /OWG
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	12.06.2000	2317	WGSCN	14.15	100	84.0	96.6	83.3
2	13.06.2000	5609	WGSCN	14.40	80	80.1	93.2	78.7
3	14.06.2000	4649	WFC	14.45	90	79.6	94.6	79.4
4	15.06.2000	3151	WGSCN	18.00	85	81.0	95.8	80.6
5	25.06.2000	351	SGSCL	08.00	65	78.7	90.4	78.2
6	25.06.2000	5609	WGSCN	17.50	90	77.6	92.3	77.2
7	26.06.2000	3151	WGSCN	19.00	60	79.7	91.4	78.6

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Table no.II/ 37

Bridge no.1125 UP(Kosi)

Section -BE-MB
 Location -KM. 1375/7-8
 Span type -10 x 30.48 m/OWG
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	12.06.2000	2317	WGSCN	14.15	95	84.8	91.2	85.0
2	13.06.2000	5609	WGSCN	14.40	65	78.5	84.9	76.5
3	14.06.2000	4649	WFC	14.45	65	78.	87.1	77.4
4	15.06.2000	3151	WGSCN	18.00	70	78.0	88.7	77.0
5	25.06.2000	351	SGSCL	08.00	85	76.2	88.1	78.4
6	25.06.2000	5609	WGSCN	17.50	65	81.4	86.4	78.3
7	26.06.2000	3151	WGSCN	19.00	70	82.3	91.5	81.5

Table no. II/38

Bridge no.1133 UP

Section -BE-MB
 Location -KM. 1384/7-8
 Span type -7x 12.2 m /PSC girder
 Sleeper - PSC

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	12.06.2000	2317	WGSCN	14.15	95	77.5	82.0	77.0
2	13.06.2000	5609	WGSCN	14.40	90	77.1	82.6	77.3
3	14.06.2000	4649	WFC	14.45	85	79.2	83.6	78.8
4	15.06.2000	3151	WGSCN	18.00	100	75.5	81.6	76.0
5	25.06.2000	351	SGSCL	08.00	65	76.5	80.7	76.6
6	25.06.2000	5609	WGSCN	17.50	80	76.5	83.5	77.0
7	26.06.2000	3151	WGSCN	19.00	100	80.2	85.0	77.6

Table no. II/39

Bridge no.1135 UP

Section -BE-MB
 Location -KM. 1389/3-4
 Span type -10x 12.2 m /PSC girder
 Sleeper - PSC

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	12.06.2000	2317	WGSCN	14.15	95	78.0	84.6	77.6
2	13.06.2000	5609	WGSCN	14.40	75	77.6	82.4	76.2
3	14.06.2000	4649	WFC	14.45	85	76.1	81.0	75.2
4	15.06.2000	3151	WGSCN	18.00	90	77.6	81.2	76.2
5	25.06.2000	351	SGSCL	08.00	75	77.8	82.8	77.8
6	25.06.2000	5609	WGSCN	17.50	85	76.3	83.5	76.7
7	26.06.2000	3151	WGSCN	19.00	95	80.3	84.9	79.8

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Table no. II/40

Bridge no.1137 UP(Ramganga)

Section -BE-MB
 Location -Km. 1394/14-15.
 Span/ type - 10 x 60.1 m /OWG
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1.	12.06.2000	2317	WGSCN	14.15	80	82.7	91.2	83.2
2.	13.06.2000	5609	WGSCN	14.40	70	78.7	86.2	79.2
3.	14.06.2000	4649	WFC	14.45	45	79.5	85.0	80.5
4.	14.06.2000	3152*	WFC	11.30	45	78.0	86.5	79.9
5.	15.06.2000	3151	WGSCN	18.00	55	78.7	87.1	79.9
6.	25.06.2000	351	SGSCL	08.00	40	73.0	83.7	72.7
7.	25.06.2000	5609	WGSCN	17.50	55	77.9	85.6	75.6
8.	26.06.2000	3151	WGSCN	19.00	80	82.7	93.2	83.4

* Train passes through up line.

Table no. II/41

Bridge no.30 DN (Yamuna)

Section -ALD-MGS
 Location -KM. 821/1-22
 Span type - 14x61.0+2x14.64+1x9.15 m /OWG (Semithrough girder)
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	08.07.2000	3112	WGSCN	10.25	30	83.6	91.6	83.2
2	09.07.2000	3040	GS	07.10	25	75.5	84.5	74.5
3	09.07.2000	2CA	GS	18.10	20	80.2	88.6	79.1
4	10.07.2000	3040	GS	07.10	20	69.6	82.3	70.2
5	10.07.2000	2AC	GS	18.25	50	83.2	97.1	80.5

Table no. II/42

Bridge no.30 UP (Yamuna)

Section -ALD-MGS
 Location -KM. 821/1-22
 Span type - 14x61.0+2x14.64+1x9.15 m /OWG (semi through)
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	08.07.2000	3111	FC	14.25	70	86.9	99.0	86.5
2	09.07.2000	8101	WGSCN	09.40	75	83.3	96.5	84.3
3	09.07.2000	5015	WFC	21.05	75	85.5	94.3	86.0
4	10.07.2000	1AC	GS	08.30	90	83.5	96.2	81.1
5	10.07.2000	5015	WFC	20.45	55	82.0	94.6	83.1

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Table no. II/43

Bridge no.5 UP(Tonse)

Section -ALD-MGS
 Location -KM. 792/9-23
 Span type - 7x45.7+2x9.15 m OWG (U.S.)
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	08.07.2000	3111	FC	14.25	50	82.9	94.8	86.0
2	09.07.2000	8101	WGSCN	09.40	75	82.0	95.6	82.2
3	09.07.2000	5015	WFC	21.05	50	82.0	92.5	85.0
4	10.07.2000	1AC	GS	08.30	100	81.2	94.2	82.5
5	10.07.2000	5015	WFC	20.45	100	77.6	92.7	79.0

Table no.II/ 44

Bridge no.5 DN(Tonse)

Section -ALD-MGS
 Location -KM. 792/9-23
 Span type - 7x45.7+2x9.15 m /OWG (U.S.)
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	08.07.2000	3112	FC	10.25	100	90.0	100	89.5
2	09.07.2000	3040	WGSCN	07.10	95	84.8	92.5	83.8
3	09.07.2000	2AC	WFC	18.10	100	86.0	91.8	83.9
4	10.07.2000	3040	GS	07.10	95	83.2	91.2	82.6
5	10.07.2000	2AC	WFC	18.25	70	85.2	90.1	84.5

Table no. II/45

Bridge no.24 DN

Section -BSB-MGS
 Location -KM. 770/13-14
 Span type - 1x30.48 m /OWG (semi through)
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	15.07.2000	2MF	SLR	9.45	30	74.5	83.0	73.5
2	15.07.2000	3484	GSCN	16.00	20	71.2	80.3	72.3
3	16.07.2000	2VM	WGSCN	07.25	30	73.5	82.6	74.5
4	16.07.2000	2MF	GS	10.00	70	76.5	88.8	76.2
5	16.07.2000	4VM	GS	18.10	50	80.5	87.1	81.5

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Table no.II/ 46

Bridge no.24 UP

Section -BSB-MGS
 Location -KM. 770/13-14
 Span type - 1x30.48 m /OWG (semi through)
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	15.07.2000	3483	WGSCN	11.30	30	73.2	79.4	72.1
2	15.07.2000	2401	WGSCN	18.25	20	71.3	77.6	71.9
3	16.07.2000	1VM	WGSCN	09.05	20	72.0	77.2	71.1
4	16.07.2000	3483	WGSCN	11.30	20	73.0	78.7	72.4
5	16.07.2000	3VM	GS	19.30	50	76.0	85.4	76.4

Table no. II/47

Bridge no.1234/1 DN(Katani)

Section -Katni -Bina
 Location -KM. 1234/26-24
 Span type - 4x18.3 + 1x12.2 m /P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	26.07.2000	8236	WGSCN	06.30	45	82.3	86.9	79.4
2	27.07.2000	8236	GSCZ	06.30	55	80.1	92.1	77.6
3	28.07.2000	8236	WSCNLR	06.30	80	83.4	92.7	82.1
4	29.07.2000	8236	GSCNLR	06.30	70	74.1	86.9	72.2
5	30.07.2000	8236	WGSCN	06.30	60	78.2	86.5	76.6

Table no. II/48

Bridge no.1234/1 UP(Katani)

Section -Katni-Bina
 Location -KM. 1234/26-24
 Span type - 4x18.3 m /P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	26.07.2000	1505	WGSCN	10.30	25	71.2	79.3	73.3
2	27.07.2000	8235	WGSCZ	17.30	30	75.6	84.0	73.2
3	28.07.2000	1505	GS	10.30	30	73.1	80.0	75.0
4	29.07.2000	1505	SLR	10.30	30	77.2	82.3	78.3
5	30.07.2000	1505	GS	10.30	45	76.3	88.1	77.2

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Table no. II/49

Bridge no.1222/1 DN(Alloni)

Section -Katni-Bina
 Location -km. 1222/27-23
 Span type - 2x12.2+ 2x9.14 /P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	26.07.2000	8236	WGSCNY	06.30	60	81.7	85.5	80.1
2	27.07.2000	8236	GSCZ	06.30	80	85.1	90.9	84.9
3	28.07.2000	8236	WGSCNLR	06.30	90	81.0	85.7	79.5
4	29.07.2000	8236	GSCNLR	06.30	85	77.2	85.2	76.6
5	30.07.2000	8236	WGSCN	06.30	50	77.6	81.6	75.5

Table no. II/50

Bridge no.1222/1 UP(Alloni)

Section -Katni-Bina
 Location -KM. 1222/27-23
 Span type - 2x12.2 + 2X4.57 m / P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	26.07.2000	1505	WGSCN	10.30	85	82.1	92.3	83.4
2	27.07.2000	8235	WGSCZ	17.30	70	77.2	84.4	79.3
3	28.07.2000	1505	GS	10.30	95	82.9	93.2	84.1
4	29.07.2000	1505	SLR	10.30	90	78.8	88.6	79.9
5	30.07.2000	1505	GS	10.30	85	78.1	87.6	80.2

Table no.II/ 51

Bridge no.1193/3 DN(Borina)

Section -Katni-Bina
 Location -KM. 1193/25-21
 Span type - 2x12.2 + 3x4.57/P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	26.07.2000	8236	WGSCNY	06.30	90	84.6	91.7	83.2
2	27.07.2000	8236	GSCZ	06.30	90	90.1	93.6	88.2
3	28.07.2000	8236	WGSCNLR	06.30	90	83.4	89.5	81.7
4	29.07.2000	8236	GSCNLR	06.30	95	80.5	89.6	79.2
5	30.07.2000	8236	WGSCN	06.30	90	83.2	92.7	80.9

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Table no. II/52

Bridge no.1193/3 UP(Borina)

Section - Katni-Bina
 Location - KM. 1193/25-21
 Span type - 2x12.2 + 2X4.57 m /P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	26.07.2000	1505	WGSCN	10.30	85	75.3	84.1	76.1
2	27.07.2000	8235	WGSCZ	17.30	90	81.7	85.6	82.1
3	28.07.2000	1505	GS	10.30	95	81.7	88.6	82.6
4	29.07.2000	1505	SLR	10.30	85	78.2	87.2	79.0
5	30.07.2000	1505	GS	10.30	80	81.2	89.3	83.0

Table no. II/53

Bridge no.1185/1 DN(Patne)

Section - Katni-Bina
 Location - KM. 1185/17-13
 Span type - 3x12.2+ 2x7.31 m /P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	26.07.2000	8236	WGSCNY	06.30	45	68.7	73.1	67.1
2	27.07.2000	8236	GSCZ	06.30	35	76.7	80.0	75.1
3	28.07.2000	8236	WGSCNLR	06.30	60	73.2	77.7	72.4
4	29.07.2000	8236	GSCNLR	06.30	50	74.2	81.6	73.6
5	30.07.2000	8236	WGSCN	06.30	40	74.1	77.2	72.2

Table no. II/54

Bridge no.1185/1 UP(Patne)

Section - Katni-Bina
 Location - KM. 1185/17-13
 Span type - 2x12.2 + 6X4.57 m /P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	26.07.2000	1505	WGSCN	10.30	55	71.8	79.1	72.5
2	27.07.2000	8235	WGSCZ	17.30	50	70.9	78.7	71.7
3	28.07.2000	1505	GS	10.30	60	75.3	85.0	78.7
4	29.07.2000	1505	SLR	10.30	55	76.1	81.5	77.0
5	30.07.2000	1505	GS	10.30	65	74.0	85.9	75.3

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Bridge no.1175/1 DN(Bhoja-Kho via duct)

Section -Katni-Bina
 Location -KM. 1175/31-27
 Span type - 5x30.5 + 4x18.3 m OWG/P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	26.07.2000	8236	WGSCNY	06.30	50	82.5	89.6	81.4
2	27.07.2000	8236	GSCZ	06.30	30	78.1	80.2	77.2
3	28.07.2000	8236	WGSCNLR	06.30	60	79.2	86.6	77.4
4	29.07.2000	8236	GSCNLR	06.30	50	74.4	82.7	73.2
5	30.07.2000	8236	WGSCN	06.30	60	76.5	90.5	74.6

Table no. II/56

Bridge no.1175/UP(Bhoja-Kho via duct)

Section -Katni-Bina
 Location -KM. 1175/31-27
 Span type - 5x30.5 + 4x9.14 + 6x6.10 m /OWG /P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	26.07.2000	1505	WGSCN	10.30	20	74.0	86.1	75.1
2	27.07.2000	8235	WGSCZ	17.30	20	67.2	78.2	70.0
3	28.07.2000	1505	GS	10.30	15	66.4	79.4	67.5
4	29.07.2000	1505	SLR	10.30	15	68.1	77.8	69.8
5	30.07.2000	1505	GS	10.30	15	72.3	84.7	75.1

Table no. II/57

Bridge no.1151/1 DN(Bearmi)

Section -Katni -Bina
 Location -Km. 1151/6-12
 Span type - 11 x 30.48 m /OWG
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	26.07.2000	8236	WGSCNY	06.30	50	82.6	87.9	81.4
2	27.07.2000	8236	GSCZ	06.30	50	79.7	87.1	78.2
3	28.07.2000	8236	WGSCNLR	06.30	50	75.1	87.0	72.9
4	29.07.2000	8236	GSCNLR	06.30	45	78.1	87.2	76.7
5	30.07.2000	8236	WGSCN	06.30	45	83.6	87.2	81.2

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Table no. II/58

Bridge no.1151/1 UP(Bearmi)

Section -Katni-Bina
 Location -KM. 1151/6-12
 Span type - 11x30.48 m /OWG
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	26.07.2000	1505	WGSCN	10.30	30	77.3	85.1	79.3
2	27.07.2000	8235	WGSCZ	17.30	25	71.0	85.9	73.2
3	28.07.2000	1505	GS	10.30	50	77.3	93.2	78.1
4	29.07.2000	1505	SLR	10.30	30	77.2	88.7	79.3
5	30.07.2000	1505	GS	10.30	45	78.2	87.7	79.4

Table no. II/59

Bridge no.1119/2 UP(Kopra)

Section -Katni -Beena
 Location -Km.1119/10-11
 Span type - 4x30.48 m OWG
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed in Kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	26.07.2000	1505	WGSCN	10.30	55	74.3	92.0	75.8
2	27.07.2000	8235	WGSCZ	17.30	70	79.8	94.6	82.3
3	28.07.2000	1505	GS	10.30	80	79.7	101.3	83.2
4	29.07.2000	1505	SLR	10.30	80	76.6	94.5	77.4
5	30.07.2000	1505	GS	10.30	80	81.0	96.4	83.1

Table no.II/ 60

Bridge no.1105/1 DN(Sonar)

Section -Katni - Beena
 Location -Km.1105/5-1106/2
 Span type -8 x 30.48 m OWG
 Sleeper -Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed	Max. noise level in dB(A) at locations		
						A	B	C
1	26.07.2000	8236	WGSCNY	06.30	85	86.7	91.12	84.6
2	27.07.2000	8236	GSCZ	06.30	90	90.4	97.9	89.3
3	28.07.2000	8236	WGSCNLR	06.30	95	85.3	91.6	84.1
4	29.07.2000	8236	GSCNLR	06.30	75	87.2	94.2	86.1
5	30.07.2000	8236	WGSCN	06.30	80	86.7	89.5	85.1

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Table no. II/61

Bridge no.1105/1 UP(Sonar)

Section -Katni - Beena
 Location -Km.1105/5-1106/2
 Span type -8 x 30.48 m OWG
 Sleeper -Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed in kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	26.07.2000	1505	WGSCN	10.30	50	81.0	87.6	82.2
2	27.07.2000	8235	WGSCZ	17.30	80	78.2	93.7	81.0
3	28.07.2000	1505	GS	10.30	90	87.4	95.4	88.6
4	29.07.2000	1505	SLR	10.30	75	79.7	92.5	81.0
5	30.07.2000	1505	GS	10.30	80	84.2	93.4	86.0

Table no.II/ 62

Bridge no.292 UP

Section -Kota -Ratlam
 Location -Km.658/11-12
 Span type -1x18.3 m Plate girder
 Sleeper -Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed in kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	06.08.2000	9020	WFC	13.30	85	75.2	81.5	77.2
2	06.08.2000	2904	WGSCN	18.00	105	81.5	86.7	83.2
3	07.08.2000	5046	WGCZ	11.17	88	74.1	82.5	76.2
4	07.08.2000	5063	WGSCN	16.20	90	79.9	84.7	78.2
5	08.08.2000	9020	WFC	13.30	95	79.2	88.6	81.2

Table no. II/63

Bridge no.299 UP

Section -Kota -Ratlam
 Location -Km.667/12-13
 Span type -6x18.3 m, Plate girder
 Sleeper -Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed	Max. noise level in dB(A) at locations		
						A	B	C
1	06.08.2000	9020	WFC	13.30	85	85.2	93.7	86.3
2	06.08.2000	2904	WGSCN	18.00	105	75.2	87.5	76.1
3	07.08.2000	5046	WGSCZ	11.17	80	75.5	84.4	76.2
4	07.08.2000	5063	WGSCN	16.20	95	80.2	87.1	79.4
5	08.08.2000	9020	WFC	13.30	95	82.5	91.5	83.5

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Table no.II/ 64

Bridge no.302 UP

Section -Kota - Ratlam
 Location -Km.673/7-8
 Span type - 3x12.2m /P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	06.08.2000	9020	WFC	13.30	65	75.1	81.7	70.3
2	06.08.2000	2904	WGSCN	18.00	105	74.3	84.1	75.2
3	07.08.2000	5046	WGSCZ	11.17	90	74.8	81.6	76.3
4	07.08.2000	5063	WGSCN	16.20	90	78.1	83.7	79.6
5	08.08.2000	9020	WFC	13.30	90	77.2	84.9	78.9

Table no. II/65

Bridge no.306 UP

Section -Kota-Ratlam
 Location -KM. 680 /9-10
 Span type - 3x12.2m /P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	06.08.2000	9020	WFC	13.30	70	86.9	96.5	88.7
2	06.08.2000	2904	WGSCN	18.00	95	76.8	83.2	77.8
3	07.08.2000	5046	WGSCZ	11.17	90	74.3	81.4	75.5
4	07.08.2000	5063	WGSCN	16.20	55	75.5	80.2	76.5
5	08.08.2000	9020	WFC	13.30	60	75.2	82.2	76.5

Goods train passing on down line.

Table no.II/ 66

Bridge no.317 DN

Section - Kota-Ratlam
 Location -KM. 694/2-7
 Span type - 10x30.48 m /OWG
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	06.08.2000	5064	WGSCN	10.11	45	75.2	85.6	74.1
2	06.08.2000	129	GS	16.28	15	71.7	80.0	71.0
3	07.08.2000	5064	WGSCN	10.11	30	70.2	80.0	68.8
4	07.08.2000	9017	WGSCN	12.50	45	76.5	84.0	75.8
5	08.08.2000	5064	WGSCN	10.11	30	68.1	81.3	66.5

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Table no.II/ 67

Bridge no.306 DN

Section - Kota-Ratlam
 Location -KM. 680/9-10
 Span type - 3x12.2 m, Plate girder.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	06.08.2000	5064	WGSCN	10.11	30	65.3	72.2	64.9
2	06.08.2000	129	GS	16.28	75	74.1	78.1	73.2
3	07.08.2000	5064	WGSCN	10.11	40	69.1	73.2	68.1
4	07.08.2000	9017	WGSCN	12.50	30	70.4	74.5	70.5
5	08.08.2000	5064	WGSCN	10.11	15	68.8	75.4	68.2

Table no.II/ 68

Bridge no.302DN

Section - Kota-Ratlam
 Location -KM. 673/7-8
 Span type - 3x12.2 m /P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	06.08.2000	5064	WGSCN	10.11	100	81.6	86.4	80.0
2	06.08.2000	129	GS	16.28	60	72.3	78.8	73.1
3	07.08.2000	5064	WGSCN	10.11	65	74.2	80.1	73.4
4	07.08.2000	9017	WGSCN	12.50	72	74.1	80.5	73.4
5	08.08.2000	5064	WGSCN	10.11	90	75.6	84.5	76.1

Table no.II/ 69

Bridge no.299DN

Section - Kota-Ratlam
 Location -KM. 667/12-13
 Span type - 3 x 12.2 m /P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	06.08.2000	5064	WGSCN	10.11	100	84.2	90.4	83.2
2	06.08.2000	129	GS	16.28	80	75.4	82.3	74.2
3	07.08.2000	5064	WGSCN	10.11	20	67.2	79.1	66.4
4	07.08.2000	9017	WGSCN	12.50	15	74.1	79.4	73.4
5	08.08.2000	5064	WGSCN	10.11	90	77.6	86.5	75.0

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Table no.II/ 70

Bridge no.292DN

Section - Kota-Ratlam
 Location -KM. 658/11-12
 Span type - 1 x 18.3 m /P.G.
 Sleeper - Wooden

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	06.08.2000	5064	WGSCN	10.11	70	76.2	83.5	75.1
2	06.08.2000	129	GS	16.28	75	74.3	79.9	73.3
3	07.08.2000	5064	WGSCN	10.11	60	70.7	75.9	69.8
4	07.08.2000	9017	WGSCN	12.50	95	79.1	85.6	78.4
5	08.08.2000	5064	WGSCN	10.11	75	75.4	81.2	76.4

Table no.II/ 71

Bridge no.54UP(Hadap)

Section - Ratlam -Badodra
 Location -KM. 510/4-6
 Span type - 3 x 18.3 + 2 x 12.9m /PSC girder
 Sleeper - PSC

S.No	Date of test	Train No.	Coach type	Time	Speed In kmph	Max. noise level in dB(A) at locations		
						A	B	C
1	09.08.2000	9024	WGSCN	08.42	95	77.8	81.8	78.4
2	09.08.2000	718	GS	16.10	50	75.2	82.5	74.2

Table no.II/ 72

Bridge no.26 UP

Section - Ratlam-Badodra
 Location -KM. 488 /6-9
 Span type - 9 x 18.3 m /PSC girder
 Sleeper - PSC

S.No	Date of test	Train No.	Coach type	Time	Speed	Max. noise level in dB(A) at locations		
						A	B	C
1	09.08.2000	9024	WGSCN	08.42	70	72.4	75.1	72.6
2	09.08.2000	718	GS	16.10	75	71.4	73.2	71.0

NOTE:- A & C : Locations at approaches of the bridge
 B : Location on the bridge.

Maximum noise level on Steel channel sleepers.

S.No.	Span in 'm'	Bridge no.	Type of bridge	Speed group Km/h	Maximum noise level in dB(A)	
					On bridge	On approaches
1.	2x9.15	99A	PG	70-80 80-90	84.3 86.5	80.2 80.5
2.	17x12.2	85	PG	30-40 50-60 60-70	81.4 88.0 79.4	77.5 82.0 75.2
3.	17x12.2	92	PG	20-30 30-40 40-50	81.0 81.5 88.3	74.2 77.4 82.3
4.	8x24.4	183	PG	10-20 20-30 30-40 50-60 70-80	80.0 82.6 83.2 85.3 85.9	97.1 70.0 77.0 79.3 77.9
5.	4X30.5	1119/2 DN	OWG	10-20 80-90 90-100	81.3 94.7 94.3	74.1 83.1 82.3
6.	10X30.5	317UP	OWG/U S	40-50 50-60	84.7 92.9	76.0 86.7
7.	9x45.7	184	OWG	10-20 20-30	86.0 79.8	86.0 78.2
8.	1x45.7	109	OWG	40-50 70-80 80-90	86.1 93.1 94.9	81.1 85.0 86.0
9.	1x45.7	108	OWG	40-50 70-80 80-90	86.8 92.2 94.9	80.1 84.1 88.0
10.	12X61.0+ 2X45.7	1282/1 UP	OWG	40-50 50-60	91.5 89.1	85.6 82.8
11.	7X106.66+ 9X33.91	11 DN	OWG	10-20 20-30 50-50 60-70	83.1 86.5 89.1 93.4	72.6 78.0 76.8 82.1
12.	7X106.66+ 9X33.91	11UP	OWG	10-20 40-50	91.3 95.3	78.0 82.0

Table No. III/2

Maximum noise level on Wooden sleepers.

S No.	Span in 'm'	Bridge no.	Type of bridge	Speed group in Km/h	Maximum noise level in dB(A)	
					On bridge	On approaches
1.	1x9.15	39	PG	60-70 70-80 100-110	80.1 80.5 89.7	74.5 74.3 84.3
2.	2x12.2	35	PG	60-70 70-80 100-110	80.4 82.6 90.3	73.1 74.3 84.8
3.	10x12.2	1135 DN	PG	50-60 70-80 80-90	81.7 88.2 85.6	73.0 80.0 76.3
4.	7x12.2	1133 DN	PG	60-70 70-80 80-90	88.8 84.1 87.0	78.6 76.2 78.2
5.	2x12.2+ 2x9.14	1222/1DN	PG	40-50 50-60 70-80 80-90	81.6 85.5 90.9 85.7	77.6 81.7 85.1 81.0
6.	2x12.2+ 2x4.57	1222/1UP	PG	60-70 80-90 90-100	84.4 92.3 93.2	79.3 83.4 84.1
7.	2x12.2+ 3x4.57	1193/3 DN	PG	80-90 90-100	93.6 89.6	90.1 80.5
8.	2x12.2+ 2x4.57	1193/3UP	PG	70-80 80-90 90-100	89.3 87.2 88.6	83.0 82.1 82.6
9.	3x12.2+ 2x7.31	1185/1DN	PG	30-40 40-50 50-60	80.0 81.6 77.7	76.7 74.2 73.2
10.	3x12.2+ 6x4.57	1185/1 UP	PG	40-50 50-60 60-70	78.7 85.0 85.9	71.7 78.7 75.3
11.	3x12.2	302 UP	PG	60-70 80-90 100-110	81.7 84.9 84.1	75.1 79.6 75.2
12.	3x12.2	302 DN	PG	50-60 60-70 70-80 80-90 90-100	78.8 80.1 80.5 84.5 86.4	73.1 74.2 74.1 76.1 81.6
13.	3x12.2	306 UP	PG	50-60 80-90 90-100	82.2 81.4 83.2	76.5 75.5 77.8

14.	3x12.2	306 DN	PG	10-20 20-30 30-40 70-80	75.4 72.2 74.5 78.1	68.8 65.3 70.5 74.1
15.	4x18.3	1038 UP	PG	40-50 50-60 60-70 70-80	82.5 83.5 87.0 89.0	75.4 75.5 79.9 80.3
16.	4x18.3	1038 DN	PG	10-20 30-40 40-50 50-60	83.1 86.4 88.6 87.0	78.0 77.0 78.6 80.6
17.	4x18.3	1234/1 DN	PG	40-50 50-60 60-70 70-80	86.9 92.1 86.9 92.7	82.3 80.1 74.1 83.4
18.	4x18.3	1234/1 UP	PG	20-30 40-50	84.0 88.1	75.6 77.2
19.	1x18.3	292 UP	PG	80-90 90-100 100-110	84.7 88.6 86.7	79.9 81.2 83.2
20.	1x18.3	292 DN	PG	50-60 60-70 70-80 90-100	75.9 83.5 81.2 85.6	70.7 76.2 76.4 78.4
21.	6x18.3	299 UP	PG	70-80 80-90 90-100 100-110	84.4 93.7 91.5 87.5	76.2 86.3 83.5 76.1
22.	6x18.3	299 DN	PG	10-20 70-80 80-90 90-100	79.4 82.3 86.5 90.4	74.1 75.4 77.6 84.2
23.	5x24.4	182	PG	10-20 30-40 40-50 50-60 60-70	79.5 86.7 86.5 86.6 87.3	70.0 78.0 77.0 79.8 71.0
24.	3x30.5+ 2x12.2	1331/UP	OWG	30-40 60-70 70-80 80-90	90.5 90.0 95.6 90.9	82.7 84.0 86.0 84.1
25.	4x30.5+ 2x12.2	1314/UP	OWG	20-30 30-40 80-90 90-100	87.8 88.8 92.8 93.9	84.0 83.3 83.0 82.9
26.	3x30.5+ 2x12.2	1267/1 UP	OWG	40-50 70-80 80-90 90-100	89.4 95.6 93.4 90.2	82.6 86.0 86.3 84.0
27.	3x30.5	1251/1 DN	OWG	40-50 50-60 70-80 90-100 100-110	87.8 88.1 89.2 93.4 93.4	78.5 81.0 82.4 83.3 85.1

28.	4x30.5	1258/1DN	OWG	0-10 10-20 80-90 90-100 100-110	87.3 83.0 90.8 93.2 95.1	83.4 75.3 80.8 81.2 84.1
29.	7x30.5	1075 UP	OWG	40-50 60-70 70-80 80-90 90-100	85.0 86.6 90.1 88.8 92.2	78.5 80.4 83.5 80.9 86.0
30.	6x30.5	1077 UP	OWG	50-60 60-70 70-80 80-90 90-100	91.4 90.4 93.2 95.8 96.6	79.7 78.7 80.1 81.0 84.0
31.	10x30.5	1125 UP	OWG	60-70 80-90 90-100	91.5 88.1 91.2	82.3 78.4 85.0
32.	10x30.5	1125 DN	OWG	60-70 10-100	88.8 94.4	78.6 86.3
33.	5x30.5+5x 9.14+6x6.1 0	1175/1 UP	OWG	10-20	86.1	75.1
34.	5x30.5+4x 18.3	1175/1DN	OWG	20-30 40-50 50-60	80.2 89.6 90.5	78.1 82.5 72.2
35.	11x30.5	1151/1 UP	OWG	20-30 40-50	88.7 93.2	79.3 79.4
36.	11x30.5	1151/1 DN	OWG	40-50	87.9	83.6
37.	4x30.5	1119/2 UP	OWG	50-60 60-70 70-80	92.0 94.6 101.3	75.8 82.3 83.2
38.	8x30.5	1150/1 UP	OWG	40-50 70-80 80-90	87.6 93.7 95.4	82.2 86.0 87.4
39.	8x30.5	1150/1 UP	OWG	70-80 80-90 90-100	89.5 97.9 91.6	86.7 90.4 85.3
40.	1x30.5	24 UP	OWG- semi through	10-20 20-30 40-50	78.7 79.4 85.4	73.0 73.2 76.4
41.	1x30.5	24 DN	OWG- semi through	10-20 20-30 40-50 60-70	80.3 83.0 87.1 88.8	72.3 74.5 81.5 76.5
42.	3x30.5+ 2x12.2	1267/1 DN	OWG Under slung	10-20 60-70 80-90 90-100	79.6 88.2 90.0 92.3	73.7 81.4 80.6 84.4
43.	4x30.5	1314/1 DN	OWG Under slung	70-80 80-90 90-100	87.4 93.0 94.3	82.4 86.1 92.0
44.	3x30.5	1331/1DN	OWG Under slung	10-20 20-30 30-40	80.9 85.1 89.5	74.2 79.0 87.7
45.	10x30.5	317 DN	OWG Under slung	10-20 20-30 40-50	80.0 81.3 85.6	71.7 70.2 76.5

46.	2x45.7	1251/1 UP	OWG	40-50 70-80 90-100	90.5 91.9 93.3	81.0 85.4 82.1
47.	7x45.7+ 2x9.15	5 UP	OWG Under slung	40-50 70-80 90-100	94.8 95.6 94.2	86.0 82.2 82.5
48.	7x45.7+ 2x9.15	5 UP	OWG Under slung	60-70 90-100	90.1 100.0	85.2 90.0
49.	12x61.0+ 2x45.7	1282/1 DN	OWG	10-20 20-30 30-40 80-90	85.7 88.1 87.3 95.7	82.0 76.0 76.5 84.9
50.	10x61.0	1137 UP	OWG	30-40 40-50 50-60 60-70 70-80	83.7 86.5 87.1 86.2 93.2	73.0 80.5 79.9 79.2 83.4
51.	10x61.0	1137 DN	OWG	30-40 40-50 50-60	89.5 87.7 89.7	82.5 78.1 83.4
52.	14x61.0+ 2x14.64+ 1x9.15	30 UP	OWG Semithro ugh (Rail cum road)	50-60 60-70 70-80 80-90	94.6 99.0 96.5 96.2	83.1 86.9 86.0 83.5
53.	14x61.0+ 2x14.64+ 1x9.15	30 DN	“	10-20 20-30 40-50	88.6 91.6 97.1	80.2 83.6 83.2
54.	2x76.2	1258/1 UP	OWG	40-50 80-90 90-100 100-110	86.5 92.5 94.4 97.3	80.0 82.8 82.1 83.3

Table No. III/3

Maximum noise level on PSC sleepers.

S.No.	Span in 'm'	Bridge no.	Type of bridge	Speed group in Km/h	Maximum noise level in dB(A)	
					On bridge	On approaches
1.	4x12.2	1133 UP	PSC girder	60-70 70-80 80-90 90-100	80.7 83.5 83.6 85.0	76.6 77.0 79.2 80.2
2.	3x12.2	1135 UP	PSC girder	70-80 80-90 90-100	82.8 83.5 84.9	77.8 77.6 80.3
3.	3x18.3+ 2x12.9	54 UP	PSC girder	40-50 90-100	82.5 81.8	75.2 78.4
4.	9x18.3	26 UP	PSC girder	60-70 70-80	75.1 73.2	72.6 71.4
5.	7x30.5	1075 DN	PSC Box girder	80-90 90-100	84.0 82.9	80.6 79.0
6.	6x30.5	1077 DN	“	70-80 80-90 90-100	83.8 84.3 85.0	77.3 80.6 79.6

Table No. IV/1

**Maximum noise level on Steel channel sleepers.
(Plate girder)**

S.No	Span in 'm'	No. of Bridges tested.	Speed group in Km/h	Maximum noise level in dB(A)	
				On bridge	On approaches
1.	9.15	1	50-60 80-110	84.3 86.5	80.2 80.5
2.	12.2	2	Upto 50 50-80	88.3 88.0	82.3 82.0
3.	24.4	1	Upto 50 50-80	83.2 85.9	79.1 79.3

Table No. IV/2

**Maximum noise level in dB(A) on Steel channel sleepers.
(Openweb girder)**

S.No	Span in 'm'	No. of Bridges tested.	Speed in Km/h	Maximum noise level in dB(A)	
				On bridge	On approaches
1.	30.5	2	Upto 50 50-80 80-110	84.7 92.9 94.7	76.0 86.7 83.1
2.	45.7	3	Upto 50 50-80 80-110	86.8 93.1 94.9	86.0 85.0 88.0
3.	61.0	1	Upto 50 50-80	91.5 89.7	85.6 82.8
4.	106.6	2	Upto 50 50-80	95.3 93.4	82.0 82.1

Table No. IV/3

**Maximum noise level on Wooden sleepers.
(Plate girder)**

S.No.	Span in 'm'	No. of Bridges tested.	Speed group in Km/h	Maximum noise level in dB(A)	
				On bridge	On approaches
1.	9.15	1	50-80 80-110	80.5 89.7	74.5 84.3
2.	12.2	9	Upto 50 50-80 80-110	81.6 90.9 93.6	77.6 85.1 90.1
3.	18.3	4	Upto 50 50-80	88.6 92.7	82.3 83.4
4.	24.4	1	Utp 50 50-80	86.7 87.3	78.0 79.8

Table No. IV/4

**Maximum noise level in dB(A) on Wooden sleepers.
(Openweb girder)**

S.No	Span in 'm'	No. of Bridges tested.	Speed group in Kmph	Maximum noise level in dB(A)	
				On bridge	On approaches
1.	30.5	21	Upto 50	93.2	87.7
			50-80	101.3	86.0
			80-110	97.9	92.0
2.	45.7	3	Upto 50	94.8	86.0
			50-80	95.6	85.4
			80-110	100.0	90.0
3.	61.0	5	Upto 50	97.1	83.6
			50-80	99.0	86.9
			80-110	96.2	86.0
4.	76.2	1	Upto 50	86.5	86.0
			50-80	86.5	80.8
			80-110	97.3	83.3

Table No. IV/5

Maximum noise level on PSC sleepers.

S.No	Sp an in 'm'	No. of Bridges tested.	Speed group in Kmph	Maximum noise level in dB(A)	
				On bridge	On approache s
1.	12.2	2	Upto 50	-	-
			50-80	83.5	77.8
			80-110	85.0	80.3
2.	18.3	2	Upto 50	82.5	74.2
			50-80	75.1	72.6
			80-110	81.8	78.4
3.	30.5	2	Upto 50	-	-
			50-80	83.8	77.3
			80-110	85.0	80.6

Table No. V

Maximum noise level for different type of bridges

S. N	Span in 'm'	Type of bridge	Type of sleepers	No. of Bridges tested.	Maximum noise level in dB(A)		Change in Noise level on bridge w.r.t approaches
					On the bridge	On the approaches	
1	9.15	Plate girder	Steel channel	1	86.5	80.5	6.0
2	"	Plate girder	Wooden	1	89.7	84.3	5.4
3	12.2	Plate girder	Steel channel	2	88.3	82.3	6.0
4	"	Plate girder	Wooden	13	93.6	90.1	3.5
5	"	PSC girder	Concrete	2	85.0	80.3	4.7
6	18.3	Plate girder	Wooden	8	93.7	86.3	7.4
7	"	PSC girder	Concrete	2	82.5	78.4	4.1
8	24.4	PSC girder	Steel channel	1	85.9	79.3	6.6
9	"	PSC girder	Wooden	1	87.3	79.8	7.5
10	30.5	OWG	Steel channel	2	94.7	85.0	8.0
11	"	"	Wooden	22	101.3	92.0	9.3
12	"	PSC Box girder	Concrete	2	85.0	80.6	4.4
13	45.7	OWG	Steel channel	3	94.9	88.0	6.9
14	"	OWG	Wooden	3	100.0	90.0	10.0
15	61.0	OWG	Steel channel	1	91.5	85.6	5.9
16	"	OWG	Wooden	5	99.0	86.9	12.1
17	76.2	OWG	Wooden	1	97.3	83.3	14.0
18	106.6	OWG	Steel channel	2	95.3	82.1	13.2

Table No. VI

Absolute Maximum value of noise level for different type of sleepers

S.No	Type of sleepers	Type of bridges	Maximum noise level in dB(A)		Change of noise level on bridges with respect to approaches
			On bridge	On approaches	
1	Steel channel	Plate girder	88.3	82.3	6.0
		Open web girder	95.3	88.0	7.3
2	Wooden	Plate girder	93.7	90.1	3.6
		Openweb girder	101.3	92.0	9.3
3	PSC	PSC girder	85.0	80.6	4.4

Table VII/1

Statistical parameters on Noise Level recorded on different type of bridges

Type of Sleepers: Steel Channel

S. No	Span in m	Statistical parameter	Speed group in kmph						Mean of Mean values
			0-30	31-45	46-60	61-75	76-90	91-105	
1	9.15	Mean SD	-	-	-	81.95 2.35	85.75 0.75	-	83.85
2	12.2	Mean SD	79.4 2.55	79.05 1.78	86.55 1.61	79.4 0	-	-	81.10
3	18.3	Mean SD	-	-	-	-	-	-	-
4	24.4	Mean SD	78.2 6.09	84.75 0.95	-	86.9 0	-	-	83.28
5	30.5	Mean SD	81.3 0	84.10 0.60	86.87 4.39	-	93.5 0.86	94.3 0	88.01
6	45.7	Mean SD	81.11 2.59	-	85.88 0.68	91.45 0.94	93.65 1.06	-	88.02
7	61.0	Mean SD	-	89.27 1.97	86.92 2.02	-	-	-	88.10
8	106.6	Mean SD	91.3	-	94.68 0.58	-	-	-	92.99
Over all mean									86.47

Table VII/2

Statistical parameters on Noise Level recorded on different type of bridges

Type of Sleepers: Wooden

S. No	Span in m	Statistical parameter	Noise level in dB(A) for Speed group in kmph							Mean of mean values
			0-30	31-45	46-60	61-75	76-90	91-105	106-120	
1	9.15	Mean SD	-	-	-	79.67 1.11	88.25 0.25	-	-	83.96
2	12.2	Mean SD	76.12 2.76	76.6 3.40	80.28 3.09	83.59 4.67	86.85 3.28	87.92 3.30	90.3	83.09
3	18.3	Mean SD	80.02 4.19	86.85 0.92	85.16 4.79	84.04 2.79	86.93 4.24	87.83 1.87	-	85.14
4	24.4	Mean SD	79.5 0	85.90 0.80	85.88 0.69	87.3 0	-	0	-	84.65
5	30.5	Mean SD	81.68 3.34	87.31 1.82	68.26 2.48	89.57 2.84	92.90 3.13	92.54 1.71	-	88.71
6	45.7	Mean SD	-	88.8 1.70	91.05 2.72	92.85 2.75	91.9 0	93.67 2.73	-	91.65
7	61.0	Mean SD	86.8 3.02	86.7 2.09	89.56 3.91	94.0 4.30	94.25 1.59	-	-	90.26
8	76.2	Mean SD	-	-	96.3 0	-	92.5 0	94.4 1.14	93.7 0	92.68
Over all mean										87.51

Table VII/3

Statistical parameters on Noise Level recorded on different type of bridges

Type of Sleepers: PSC

S. No	Span in m	Statistical parameter	Speed group in kmph						Mean of mean values
			0-30	31-45	46-60	61-75	76-90	91-105	
1	9.15	Mean SD	-	-	-	-	-	-	-
2	12.2	Mean SD	-	-	-	81.97 0.91	82.56 1.09	82.14 2.63	82.22
3	18.3	Mean SD	-	-	82.5 0	74.15 0.95	-	81.8 0	79.48
4	24.4	Mean SD	-	-	-	-	-	-	-
5	30.5	Mean SD	-	-	-	83.8 0	83.0 1.69	81.0 1.86	82.6
Over all mean									81.43

Noise table

Absolute max. value of noise level in dB(A) on different type of bridges & approaches

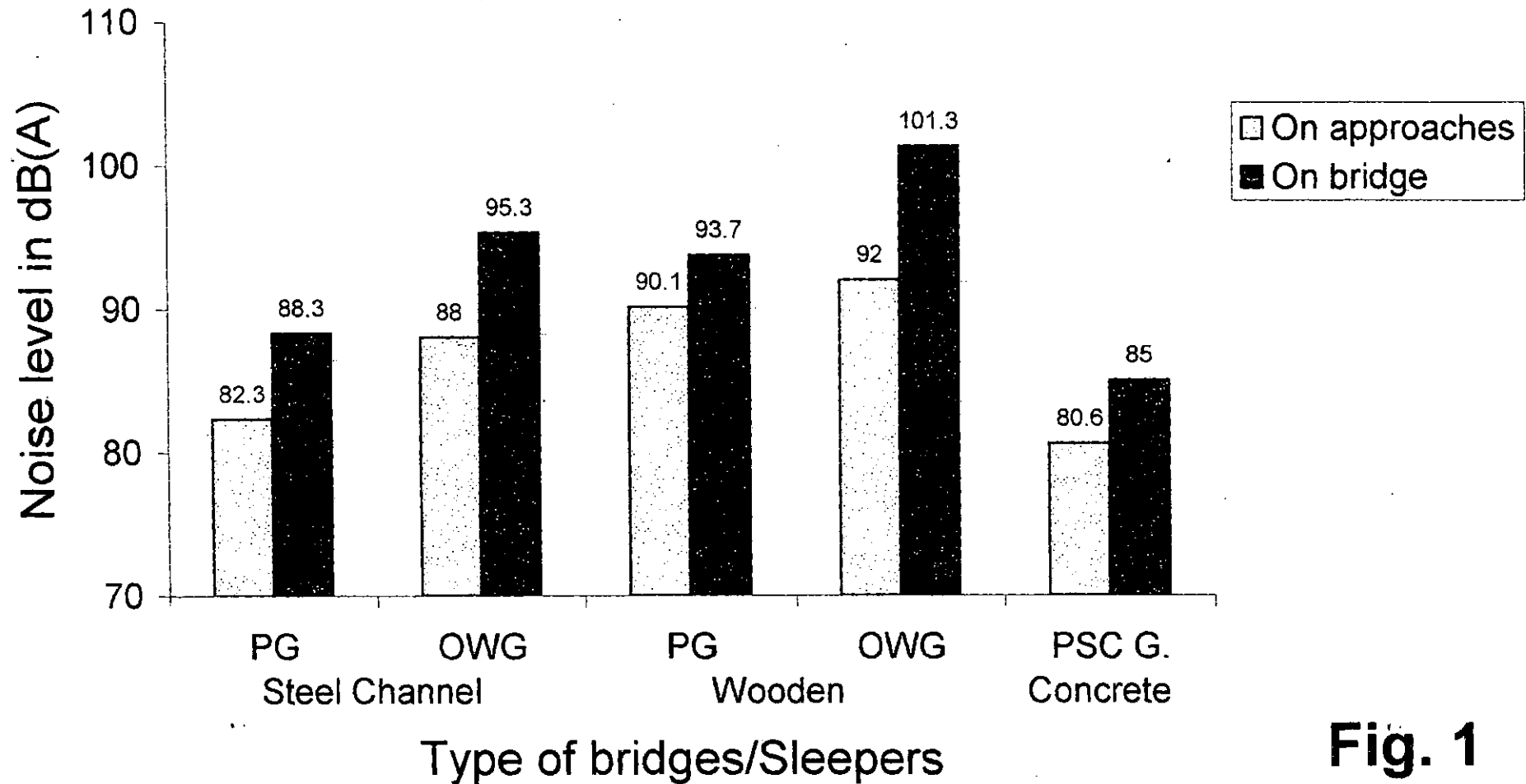


Fig. 1

Mean value of noise level in dB(A) on bridges with different type of sleepers

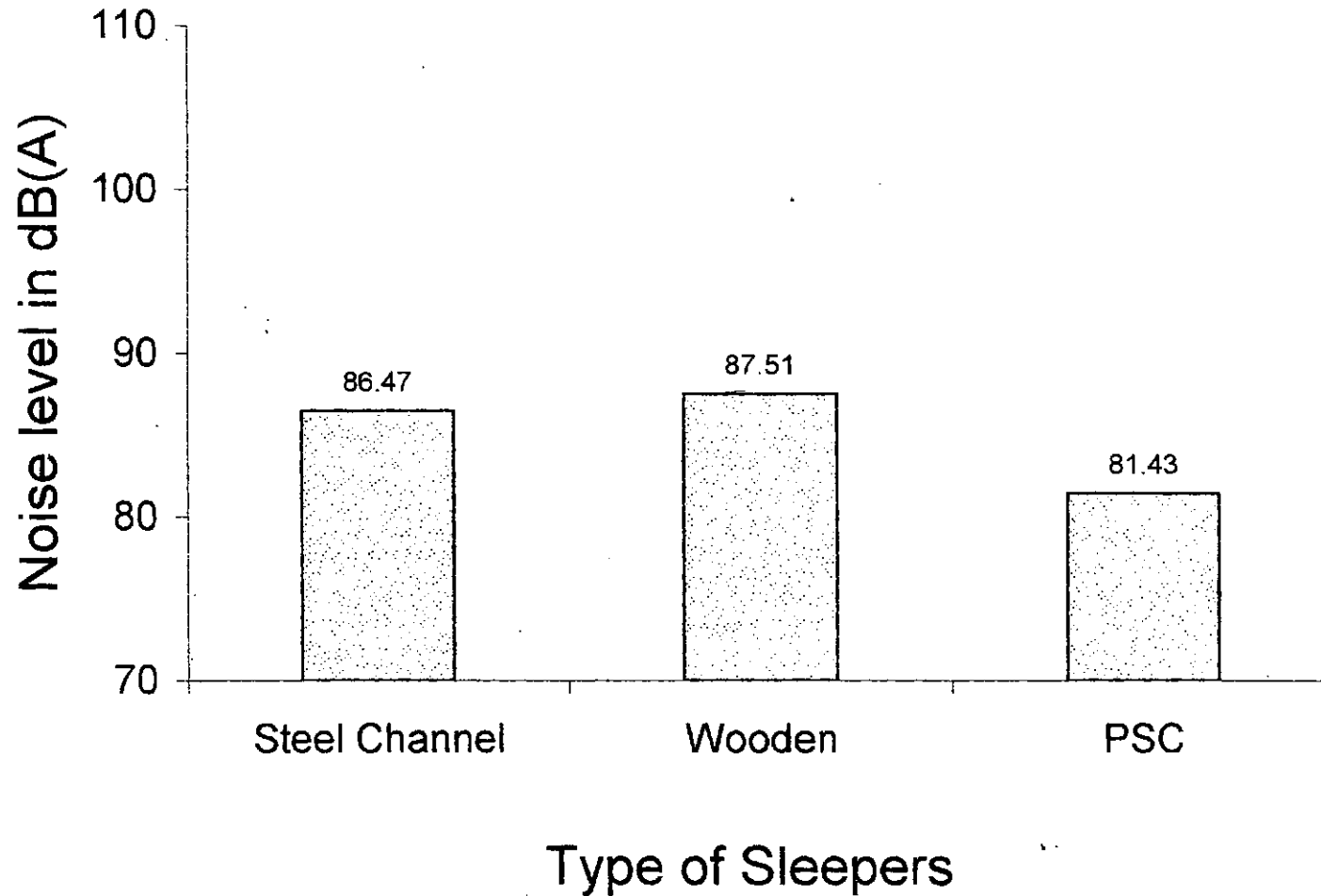


Fig. 1a

Variation of max. noise level with speed of train for different type of sleepers

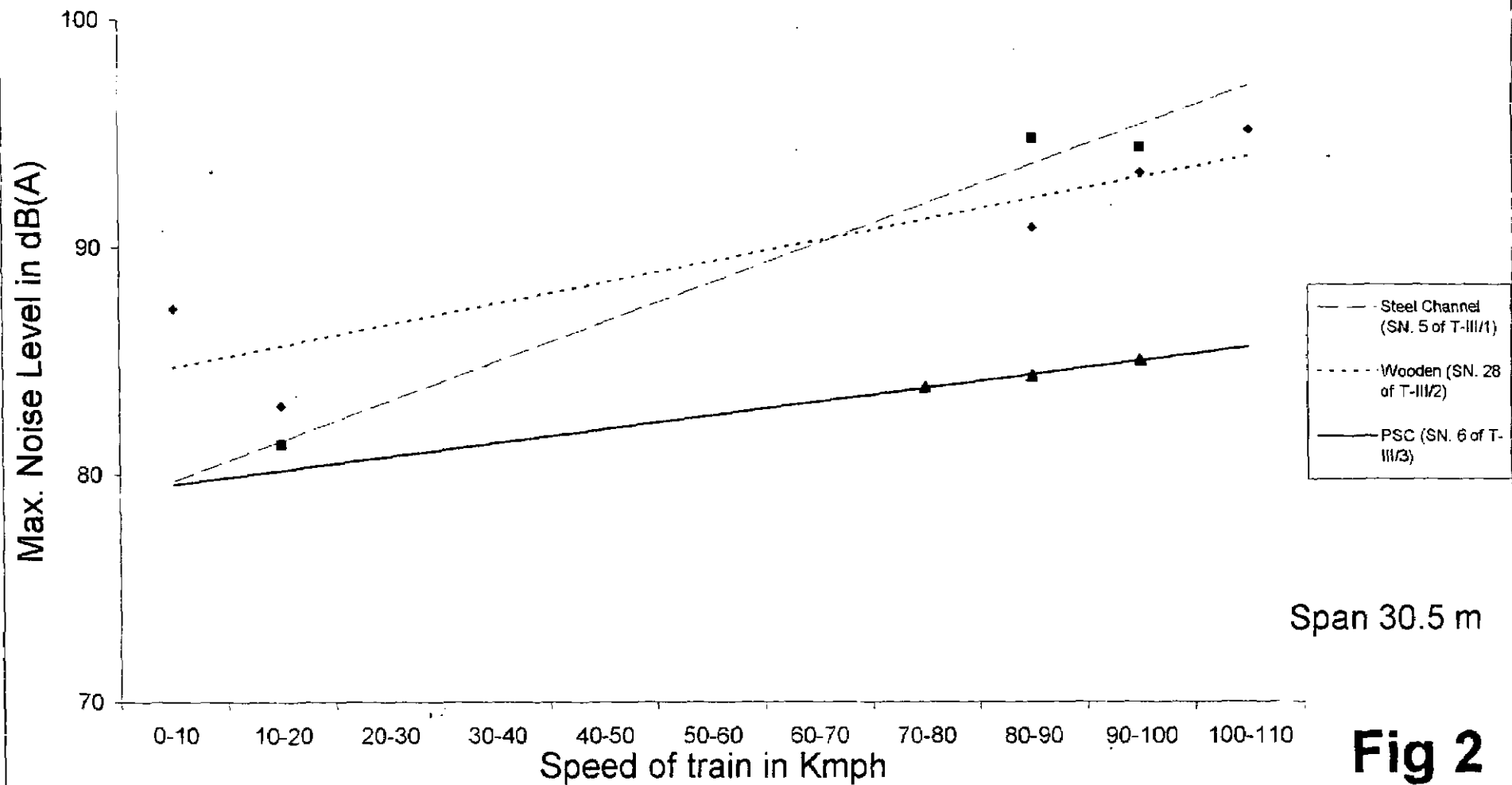


Fig 2

Variation of max. noise level with span of bridges for different type of sleepers

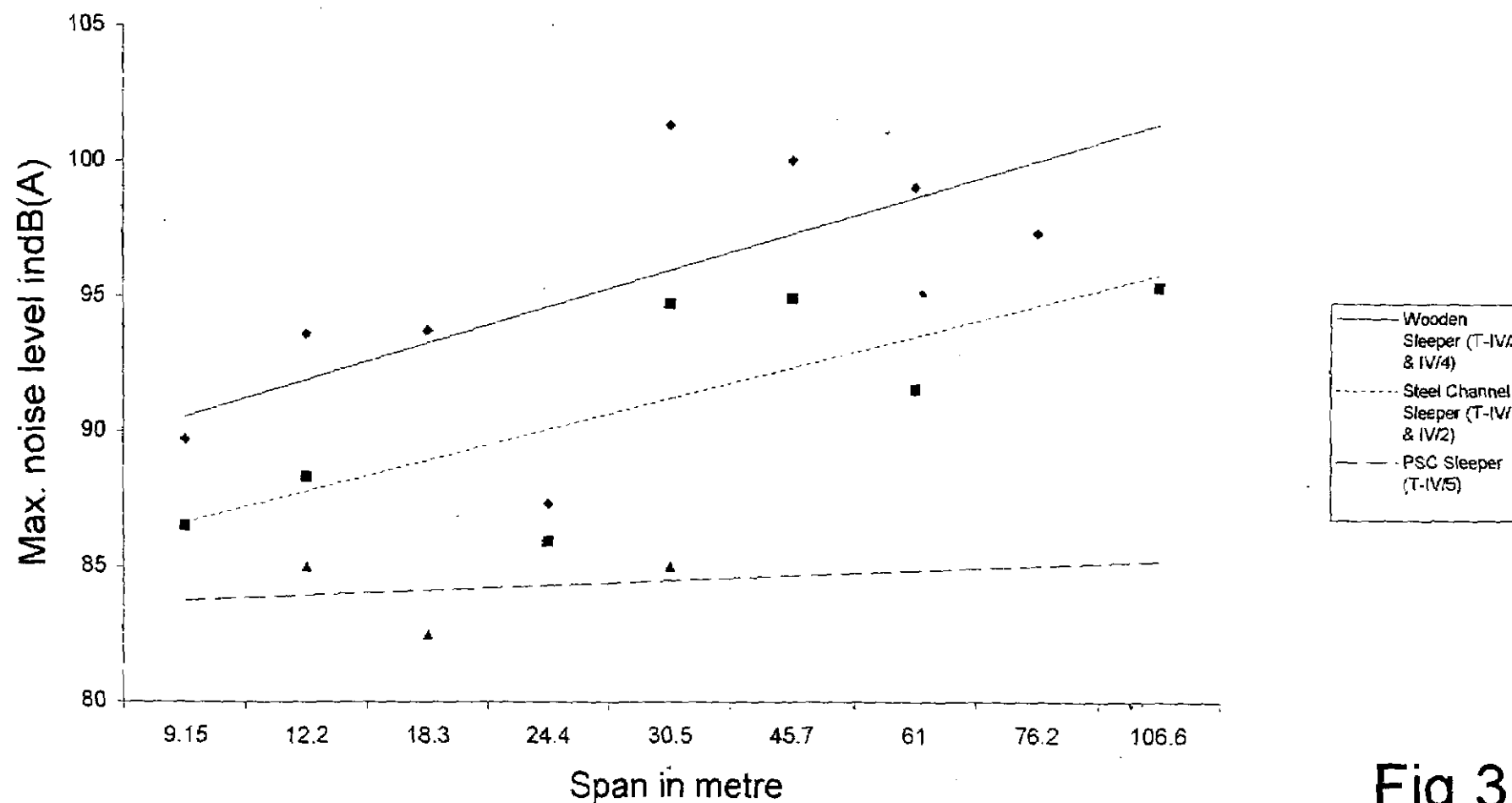


Fig 3

Variation of max. noise level with span of the bridges for steel channels sleepers at different speed groups

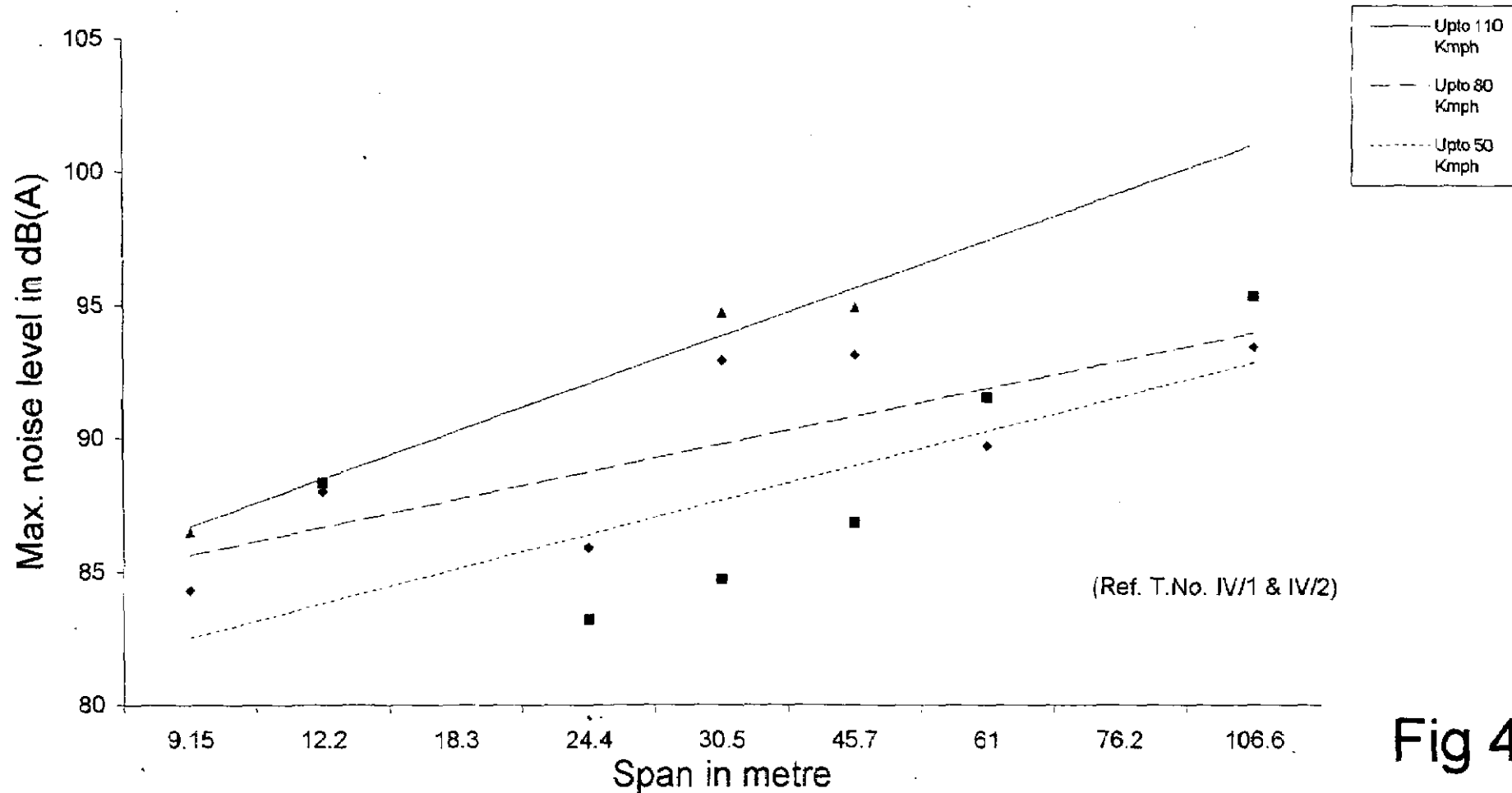


Fig 4

Variation of max. noise level with span of the bridges for wooden sleepers at different speed groups

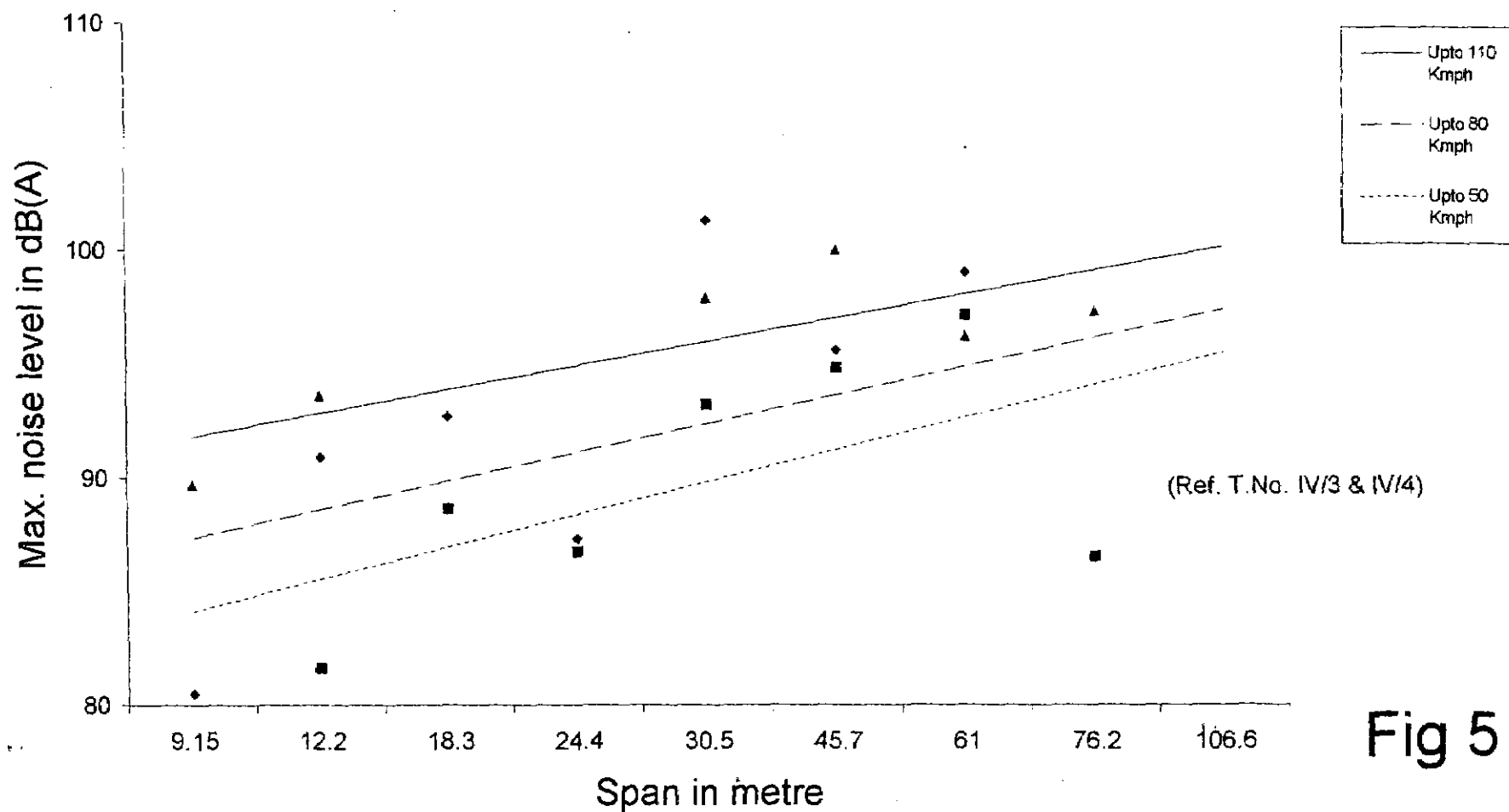


Fig 5

Variation of max. noise level with span of the bridges for PSC sleepers at different speed groups

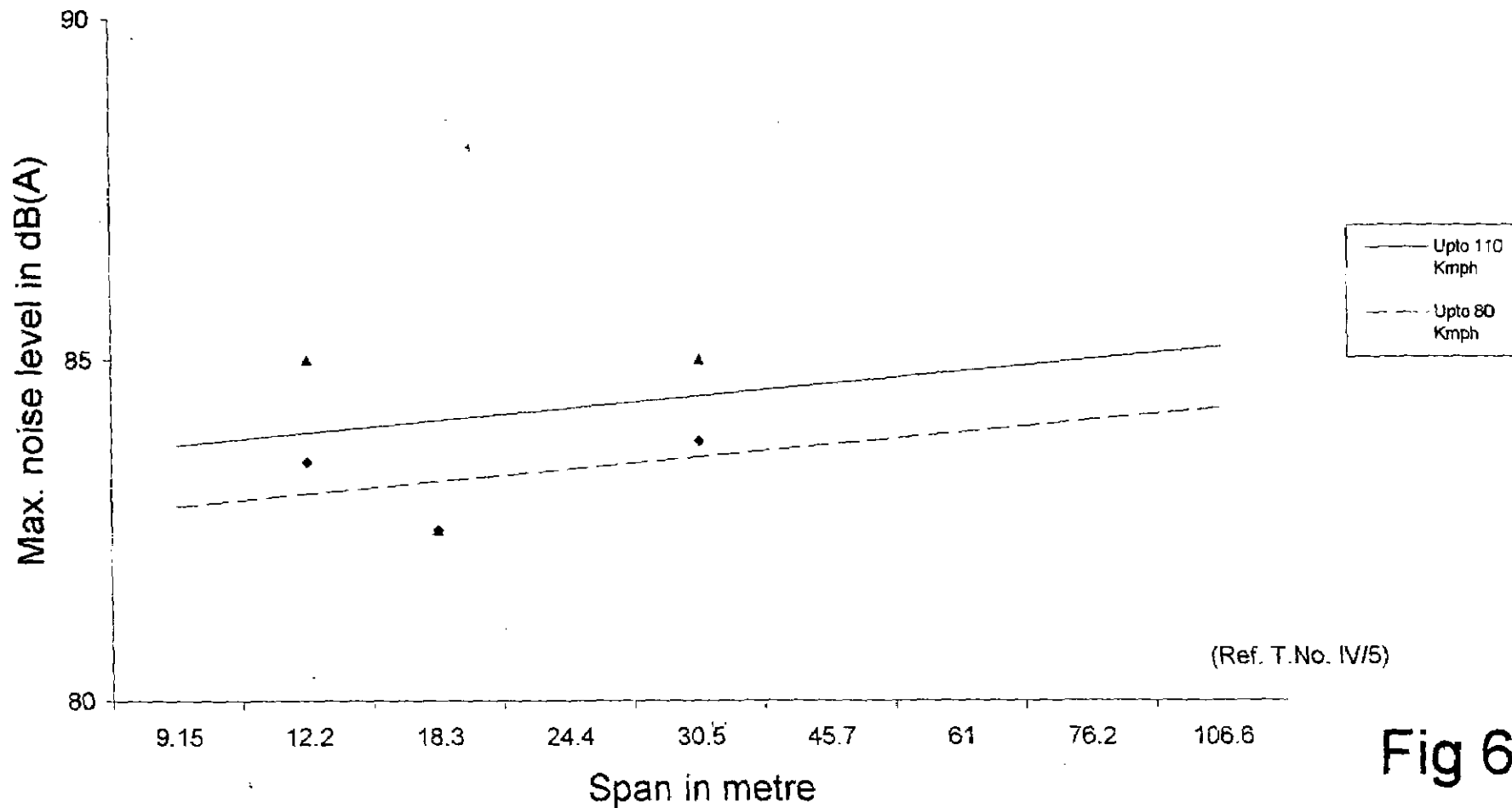


Fig 6

Variation of max. noise level on different type of Open Web Girder bridges with speed

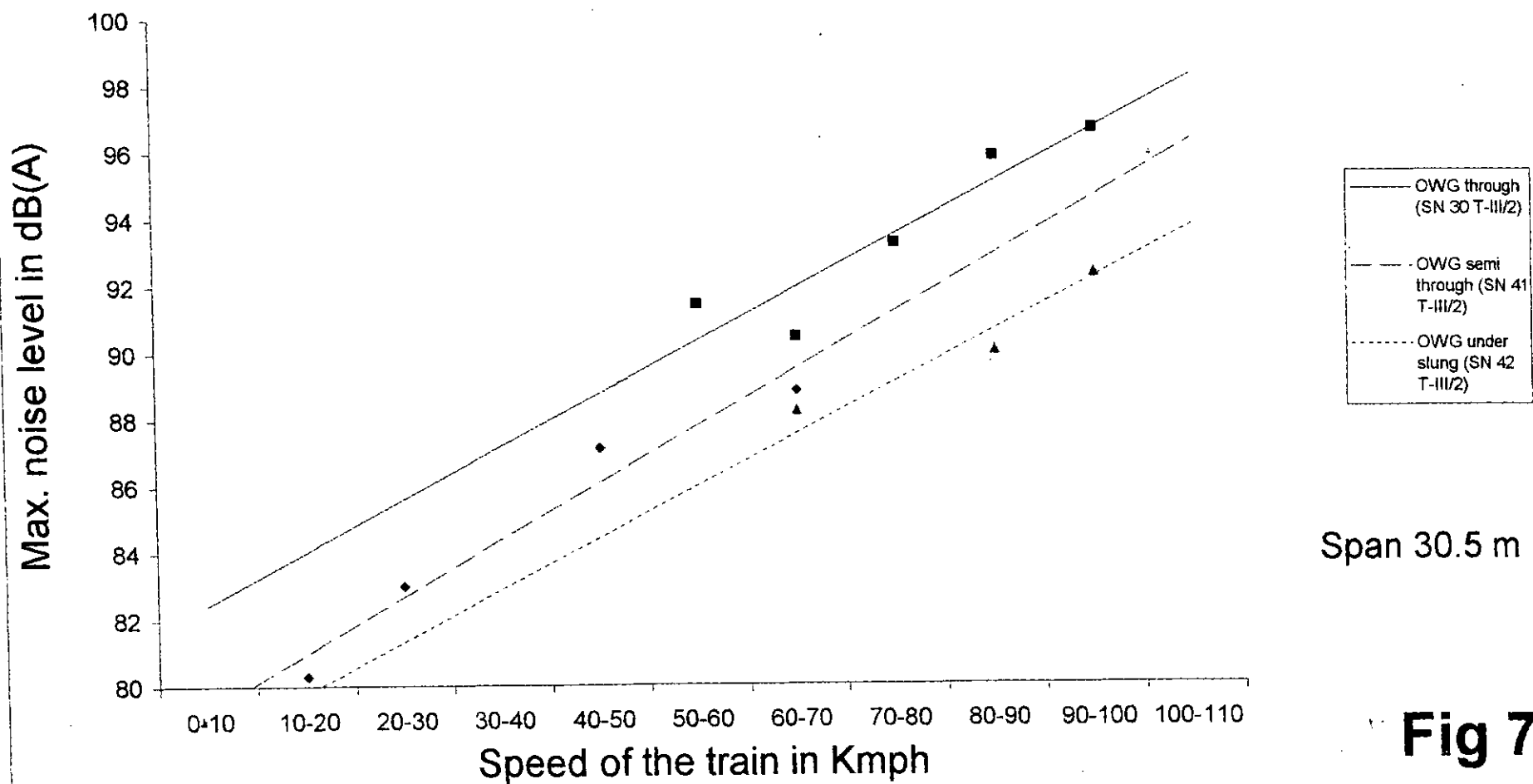


Fig 7

NOISE LEVEL ON BRIDGES WITH TRACK LAID ON STEEL
CHANNEL SLEEPERS:

ME during inaugural address of 68th BSC Meeting held at Puri in March '94 expressed that noise could be a problem on the bridges with track laid on steel channel sleepers. Therefore it was initially proposed to compare the noise level between the bridges with track laid on steel channel sleepers and wooden sleepers. The test results of these measurements will be used to decide further investigations, if necessary,

Studies conducted by ORE on "noise abatement on bridges" indicate that noise level depends on various factors such as type of bridge, type of rolling stock, mode of track laying, speed of the train, track structure, condition of rail surface, type of fastening etc.

The main objective of the present study was to determine the noise level on bridges due to use of steel channel sleepers.

Therefore sound level was measured on two types of bridges only having steel channel sleepers and wooden sleepers. The noise levels were recorded in second class compartment of passenger train hauled by WDM2/WDM2A locomotive as experienced by the passengers. Noise level was also measured on normal track near the bridge to determine the degree of excess of the noise level on the bridge.

MEASURING TECHNIQUES:

Sound level meter type 1551-B with inbuilt sound and vibration analyser of General Radio Co. of USA was used to record noise level. It was calibrated with Acoustic calibrator prior to taking measurements. All the measurements were taken with 'A' weighted net work to facilitate instantaneous recording of the noise level, the sound analyser utilises 1/3rd Octave filter response characteristics along with 'Fast' response characteristics. The sound level meter was set in the range of 70 db to 120 db and in maximum mode. The max. sound level reached on the bridge during the passage of coach was recorded.

OBSERVATION:

The salient feature of bridges and maximum noise level observed on bridge have been shown in the table attached. It is seen from the table that max. noise level on bridge with track laid on steel channel sleepers was observed to be 93.8 db(A) at a speed of 50 kmph. The max. noise level on bridge with track laid on wooden sleeper was observed 88.3 db(A) at a speed of 50 kmph. The maximum noise level on normal track near the bridge was observed 85.8 db(A) at 50 kmph speed. The speed was limited to 50 kmph due to speed restriction on the bridge laid with channel sleepers.

An increase in noise level by 5.5 db(A) has been observed on bridge due to use of steel channel sleepers in comparison of wooden sleepers.

Maximum allowable continuous exposure level is 90 db(A) as per International Standard Organisation and Occupational Safety Health Administration (USA) though the standard for occupational noise exposure limits are not uniform throughout the world. OSHA limits the maximum exposure time per day for a given steady sound level.

Duration per day (Hrs.)	Sound level(db-A)
8	90
6	92
4	95
3	97
2	100
1½	102
1	105
½ or less	115

The noise level above 130 db(A) can cause hearing damage. ORE vide C-137/RP-4 has recommended limiting value of noise level as 68 db(A) in second class passenger coach at speed 160 kmph.

CONCLUSION:

The noise level increased by 5.5 db(A) due to use of steel channel sleepers on bridge over wooden sleepers. The max. noise level 93.8 db(A) observed on bridges with steel channel sleepers is well within the permissible limits since duration of this noise level is very short while OSHA limits the max. exposure time 4 hours at 95 db(A) noise level.

It can be concluded that use of steel channel sleepers will not cause any hearing damage or discomfort to the passengers. The noise level has been measured at 50 kmph speed and can increase at higher speeds. The data is very limited. Therefore it is proposed to measure noise level at higher speeds.

...

MAXIMUM SOUND LEVEL PRESSURE OBSERVED IN SECOND CLASS COACH.

Sl. No.	Sailent feature of bridge.	Section	Type of sleeper	Duration of run	Speed of train in kmph.	Max. Noise level in db(A) on bridge.	Max.Noise level on normal track db(A) near bridge.	Remarks.
1.	Izat Br.No.96 (40x40.72 m) Allahabad-Varanasi Sec.	ALD City-Jhusi.	Steel channel	UP DN	50 50	93.8 92.4	- 85.8	The speed was limited due to speed restriction of 50 kmph.
2.	Ghagra Br.No.10C (18x60.69m) Varanasi-Bhatni Sec.	Belthara-Road-Turtipar	Wooden	UP DN	50 50	85.4 88.3	83.7 83.6	
3.	Varuna Br.No.35 (5x18.29m) Varanasi-Bhatni Sec.	BSB City-Sarnath	-do-	UP DN	55 55	87.7 87.5	83.6 83.4	
4.	Gomti Br. No.21 (13x30.48m) Varanasi-Bhatni Sec.	Aurihar Jn. - Rajwari	-do-	UP DN	20 20	76.9 77.9	74.0 72.5	
5.	Tonse Br.No.1 (6x24.38 m) Varanasi-Bhatni Sec.	Indara Jn. Mau Jn.	-do-	UP DN	20 20	78.8 77.0	74.0 73.0	

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APPENDIX A

(Clauses 2.1.1 and 4.1.6)

A-2. TRAIN NOISE LEVELS

A-2.1 Typical noise levels are shown in Fig. 3.

A-2.1.1 *Track Noise Level* — The following are given:

- | | | |
|--|---|--------------------------------|
| a) Freight trains (900 to 1200 m long)
running at 25 to 40 km/h | } | 90 dB at 6 m
77 dB at 150 m |
| b) Freight trains (900 to 1200 m long)
running at 65 km/h | | 96 dB at 7.5 m |

A-2.2 *Engine Noise Level* — The noise level under all operating conditions will be 97-105 dB at 15 m.

A-2.3 *Whistle Noise Level* — The noise level will be 110 dB at 15 m.

NOTE 1 — It has been noted by the investigators that while track noise increased by 6 dB for every doubling of speed, it decreased by 3 dB for every doubling of the distance.

NOTE 2 — Similarly, engine noise decreased by 3 dB for every doubling of the distance, except within a distance of 15 m where this rate was 6 dB.

NOTE 3 — In the case of whistle noise, the attenuation was 6 dB for every doubling of the distance.

NOTE 4 — Attenuation rate in the case of train and engine noise is attributed to line source of noise, as distinct from point source in the case of whistle noise.

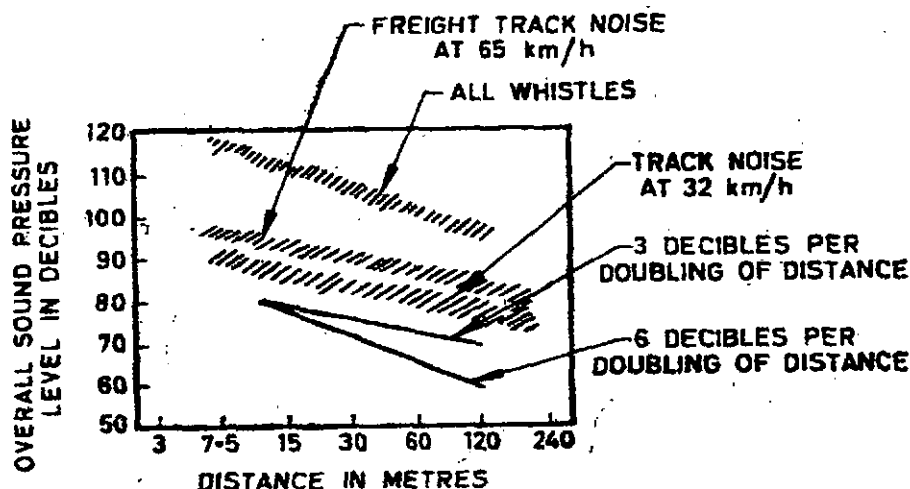
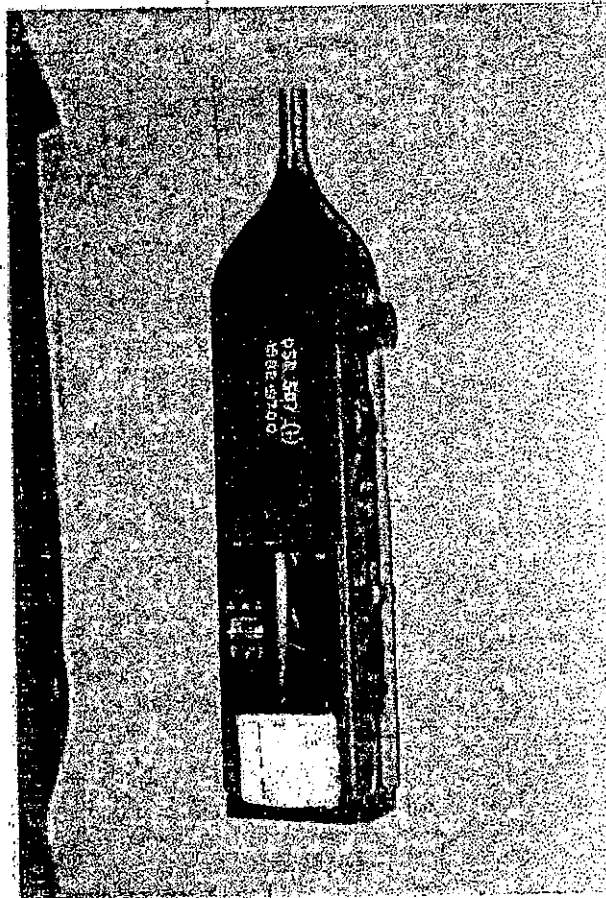


FIG. 3 TRAIN NOISE LEVELS OVERALL SOUND PRESSURE LEVELS AS A FUNCTION OF DISTANCE FROM THE TRACK

Speed km/h		Internal sound level dB(A)				
		Passenger coaches		Sleeping cars		Suburban trains
		1st class	2nd class	Disc brake	Shoe brake	In the open
60	a	-	-	-	-	60 - 66
80	a	57 - 66	59 - 65	-	57 - 60	63 - 81
	b	61 - 73	65 - 75	-	63 - 67	68 - 84
100/110	a	58 - 66	-	-	77 - 79	65 - 84
	b	66 - 73	-	-	-	69 - 84
120/130	a	61 - 69	67 - 70	53	55 - 68	73
	b	65 - 79	70 - 77	67	70 - 72	73
140	a	55 - 73	65 - 73	-	66 - 68	-
	b	60 - 81	73 - 74	-	70 - 76	
150/160	a	66 - 73	71	-	-	-
	b	69 - 79	75 - 83	-	-	
210/200	a	58 - 73	68 - 71	-	-	-
	b	66 - 80	78	-	-	
270		63 - 66	-	-	-	-
Braking	a	-	-	54 ¹⁾	65 ¹⁾	66 ²⁾
	b	-	-	70	82	

- a) In the centre of the coach
 b) Over the bogie
 1) From 120 km/h
 2) From 80 km/h
 3) In tunnels the levels are about 18 dB(A) higher.
 Level increase in comparison with running:
 disc brake +1 or +3, block brake +10 dB(A)

ORE C 137/RP 4			RECOMMENDATIONS FOR NOISE LEVEL REFERENCE FOR FUTURE RAILWAY VEHICLES				A. 5	
	Type of vehicle ¹⁾		Speed km/h.	Internal ⁴⁾		External 25 m distant 3) 4)		
				Drivers' cab	Compartment	In service	Future	
1	Diesel motive power units	Main line locomotive	$V_{\max}$ 120 - 140	75-78	-	92 ²⁾	85 ²⁾	
		Shunting locomotive	$V_{\max}$		-			
		Motor coach	$V_{\max}$ max 120		-			
2	Gas turbine propelled motive power units (motor coaches)		$V_{\max}$ max 160		65	95	90	
			$V_{\max}$ max 250		66			
3	Electric motive power units	Locomotive	$V_{\max}$ max 120		-		85	
		Motor coach	$V_{\max}$ max 120		68			
4	Work trains		max	80-83	-	90	90	
5	UIC passenger coaches	First class	$V_{\max}$ max 160	-	65		85	
		Second class	$V_{\max}$ max 160	-	68			
6	Sleeping cars		$V_{\max}$ max 120	-	60-65			
7	Short distance coaches		$V_{\max}$	-	75			
8	Freight trains		$V_{\max}$	-	-			
1) For motive power units: full output in all cases 2) This corresponds to a noise level of 95 - 105 dB (A) at the exhaust pipe, i.e. at measuring point Q according to ORE Report E 82/RP 4 3) Distance from track centre 4) As measuring tolerance for the level values applies: ± 2 dB(A)								



Photograph of Noise Level Meter