4330.1

No. RW/NH-33054/33/89-DO II *Dated the 29th March, 1989*

To

All Chief Engineers of the States/U.T. P.W.D.'s dealing with National Highways.

Subject: Inventory of bridges on National Highways in India.

An up-to-date Inventory of bridges is a basic requirement; not only as a record of assets but also for performance monitoring, inspection and condition assessment. The last inventory of bridges on National Highways was carried out in 1968. Since then, a large number of new bridges have been constructed while some distressed bridges might have been repaired/rehabilitated bringing about changes in their basic features. There is, therefore, an urgent need to carry out a fresh inventory of bridges.

2. A new format for Inventory of bridges on National Highways in India has, therefore, been evolved in the Ministry and is enclosed. To facilitate computerisation of data, Guidelines for coding of informations relating to Inventory of bridges is also enclosed. These may please be distributed to all field officers of PWD in-charge of National Highways so that relevant informations are collected and furnished.

3. In order to achieve the task of inventorisation of all bridges on National Highways, a crash programme should be formulated by the State/U.T. PWDs so as to complete the inventory before the rains i.e. by June, 1889. It is, therefore, requested that a meeting of all field staff of the PWD may be called by the Chief Engineer concerned at the Headquarters positively by 15th April, 89 which will also be attended by the Ministry's R.O/ E.L.O. The form of inventory of bridges and the method of filling the same may please be explained to the officers at this meeting. A programme for completion of inventory may be chalked out and furnished to the R.O./ E.L.O. as well as to the Ministry by 25th April, 89. The data of inventory after being completed will later be cross checked by officers from the Roads Wing.

Enclosure to Ministry's Circular No. RW/NH-33054/33/89-DOII dated 29th March 1989

INVENTORY OF BRIDGES ON NATIONAL HIGHWAYS

(A) IDENTIFICATION

1.	Link No.	□□□□
2.	State	□□
3.	N.H. No.	□□□
4.	Section	□□□□□□□□□□□□□□□□□□□□□□□□□□□□
5.	Location	□□□□□□
6.	Structure No.	□□□□□
7.	Latitude	□□□□□
8.	Longitude	□□□□□
9.	Features Intersected	□□□□□□□□□□□□□□□□□□□□□□□□□□
10.	Facility Carried by Structure	□□□□□□□□□□□□□□□□□□□□□□□□□□
11.	Popular/Official Name	□□□□□□□□□□□□□□□□
12.	Highway Circle & Division	□□□□□□□□□□□□□□□□□□□□□□□□□□□□
13.	Administrative District	□□□□□□□□□□□□□□□□□□□□
14.	Nearest City/Town	□□□□□□□□□□□□□□□□□□□□
15.	Custodian	□
16.	Year of Construction	□□□□
17.	High Level or Submersible	□
18.	Overall Length of Bridge	□□□□
19.	No. of Lanes	□
20.	Load Rating	□□□□

21. Average Daily Traffic (ADT) □□□□□
22. Year of ADT □□□□
23. Detour Length □□
24. Documentation □□
25. Year of Inventory □□□□

(B) STRUCTURE DATA

26. Design Discharge in Cumecs □□□□□
27. Design HFL □□□□
28. Design Scour Level at Pier □□□□
29. Design Scour Level at Abutment □□□□
30. Founding Strata □
31. Whether the Bridge is in Grade □
32. Road Level □□□□
33. Road Width □□□
34. Overall Deck Width □□□□
35. Approach Roadway Width Including Shoulder □□□
36. Height of Approach Embankment □□□□
37. Average Skew □□
38. Whether Navigable □
39. Vertical Clearance □□
40. Horizontal Clearance □□□

(B) (1) MAIN SPANS

41. Total Number of Spans □□□
42. Span Arrangement □□□□□□□□□□□□□□□□□□□□□□□□
43. Superstructure Type □□□□□
44. Pier Type □□
45. Abutment Type □□
46. Pier Foundation Type □□
47. Maximum Depth of Pier Foundation □□
48. Abutment Foundation Type □□
49. Maximum Depth of Abutment Foundation □□
50. Type of Bearings □
51. Wearing Coat Type □
52. Expansion Joints Type □
53. Railing Type □□

(B) (2) APPROACH SPANS

54. Total Number of Spans □□
55. Span Arrangement □□□□□□□□□□□□□□□□□□□□□□□□
56. Superstructure Type □□□□
57. Pier Type □□
58. Abutment Type □□
59. Pier Foundation Type □□
60. Depth of Pier Foundation □□

61. Abutment Foundation Type □□
62. Depth of Abutment Foundation □□
63. Type of Bearings □
64. Wearing Coat Type □
65. Expansion Joints Type □
66. Railing Type □

(B) (3) GENERAL

67. Corrosion Protection Measures □□□□□□□□□
68. Bank Protection & Type □□□□
69. Floor Protection & Type □

(C) HISTORY

70. Suspension of Traffic □□□
71. Erosion of Banks □□□
72. Scour Around Guide Bunds □□□
73. Abnormal Scour Level Around Piers □□□□□□
74. Abnormal Scour Level Around Abutments □□□□□□
75. Abnormal Flood Level □□□□□□
76. Distress and Repair in Foundations □□□
77. Distress and Repair in Guide Bunds □□□
78. Distress and Repair in Substructure Including Bearings □□□
79. Distress and Repair in Superstructure □□□□□□□□□□□□□□□□□□□□□□□□□
80. Any Other Observations □□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□

Guidelines for Coding of Information Relating to The 'Inventory of Bridges'

(A) Identification

Item 1: Link No, (4 digits)

Mention four digit code to indicate the Link No. of the Section of National Highways as standardised by the Ministry.

Item 2: **State (2 digits)**

Mention two digit code for States as under:-

State Name	**NCode**
Andhra Pradesh	AP
Arunachal Pradesh	AR
Assam	AS
Bihar	BR
Goa, Daman and Diu	GO
Gujarat	GJ
Haryana	HR
Himachal Pradesh	HP
Jammu & Kashmir	JK
Karnataka	KN
Kerala	KR
Madhya Pradesh	MP
Maharashtra	MH
Manipur	MN

Meghalaya	MG
Mizoram	MZ
Nagaland	NG
Orissa	OR
Punjab	PN
Rajasthan	RJ
Sikkim	SK
Tamil Nadu	TN
Tripura	TR
Uttar Pradesh	UP
West Bengal	WB
Andaman & Nicobar Islands (U.T.)	AN
Chandigarh (UT.)	CH
Dadra and Nagar Haveli(U.T.)	DH
Delhi (U.T.)	DL
Lakshdweep Islands (U.T.)	DK
Pondicherry (U.T.)	PD

Item 3 NH No. (3 digits):

Use three digit Code to indicate the National Highway number e.g.

NH 15	-	015
NH31A	-	31A
NH No. 7	-	007
NH No. 5A	-	05A

Item 4 Section (30 digits)

Record the name of the section of the highway on which the bridge falls. This item is justified without trailing zeroes. As such the spaces unfilled by the name of Section should be left blank and no zeroes need by put therein e.g.

Item 5 Locations (6 digits)

Location of the centre of the bridge should be given in kms. The last three digits show thousandth of a kilometre e.g.

Location	**Code**
281.380	281380
84.120	084120

Item 6 Structure No. (5 digits)

Structure number may be noted as follows:-

Location of Structure	**Structure No.**	**Code**
2nd Structure after completion of 280 km	281/2	28120
5th structure after completion of 84 kms.	85/5	08550

If any structure is added subsequently between structure number 281/2 and 281/3, the same may be numbered as 281/2A and codified as 2812A.

For multi-lane carriageways, there would be either one combined structure or separate bridge structures. In the case of one combined structures, the structure number shall be noted as mentioned above. However, in case of separate bridge structures, the structure numbers shall be indicated as follows. As the kilometerage of the Section progresses, the left hand side structure will have a suffix 'L' and right hand side structure will have a suffix 'R', e.g.

Location of structures	**Structure No.**	**Code**
2nd structure after completion of 280 km.		
(i) Left side structure	281/2	2812L
(ii) Right side structure	281/2	2812R
5th structure after completion of 84 kms.		
(i) Left side structure	85/5	0855L
(ii) Right side structure	85/5	0855R

Item 7 Latitude (5 digits)

This item should be filled for bridges having overall lengths more than 30 m. First two digits indicate the degrees and last three digits indicate minutes rounded to first decimal place. Indicate the latitude of the centre of the bridge as follows:

Latitude	Code
32°24.5'	32245
23°18.1'	23181

For bridges having lengths less than 30 m, fill all spaces with zeroes.

Item 8 Longitude (5 digits)

Similar as for item 6.

Item 9 Features intersected (25 digits):

The information to be recorded for this item will be the name or names of the features intersected by the structure like a river, road, railway line, canal, nallah, creek etc. If it is an under bridge, the features intersected above the structure should be given. If there are more than one feature intersected by the same bridge the names of all features should be given separated by a semi-colon or a coma. Commonly used and meaningful abbreviations may be used, if necessary. This item is justified without training zeroes.

Item 10 Facility carried by at structure (25 digits):

Indicate the facility being carried by the structure e.g. NH, SH, Railways, Pipeline, water mains, trunk cables. If more than one facilities are carried by the structure, the names of all facilities should be given separated by in semi-colon or a coma. Commonly used and meaningful abbreviation may be used, if necessary. This item is justified without trailing zeroes.

Item 11 Popular/official name (15 digits):

Give the popular or official name of the bridge e.g. MALVIYA BRIDGE NEHRU BRIDGE

The item is justified without trailing zeroes.

Item 12 Highway Circle and Division (30 digits):

Indicate the names of Circle and Division separated by a semi-colon, e.g. NH PATNA; NH PATNA II

The item is justified without trailing zeroes

Item 13 Administrative District (20 digits):

The name of the administrative district should be indicated. The item is justified without trailing zeroes.

Item 14 Nearest City/Town (20 digits):

The name of the nearest city or town should be indicated. If there is no city/town within a distance of 20 kms., all the spaces may be filled with zeroes.

Item 15 Custodian (1 digit)

The agency who actually maintains the bridge should be codified as under:

Agency	Code
State Govt.	1
C.P.W.D.	2
Border Roads	3
Railways	4
Municipalities/Corporations	5

Item 16 Year of Construction (4 digits)

The year of construction should be noted, as precisely as possible, in a four digit code like 1943. If there is no information, then record all zeroes.

Item 17 High level or submersible (1 digit)

Use one digit code to indicate whether the bridge is high level or submersible.

	Code
High Level	1
Submersible	2

Item 18 Overall length of bridge (4 digits)

Record the overall length of bridge in nearest 'metres'. The overall length of a bridge is the length measured along the centre line of the bridge from end to end of the bridge deck, i.e. excluding approach slabs.

Item 19 No. of lanes (1 digit)

Record the number of IRC Class A traffic lanes carried by the bridge as under:

Carriageway width	No. of lanes	Code
Less than 5.5m	1	1
5.5m - 7.5m	2	2
About 11m.	3	3
About 14.5m	4	4

If the bridge does not carry any highway traffic e.g. in the case of Railway overbridge, then put the code as '0'

Item 20 Load Rating (4 digits)

First two digits will give the design load rating and the last two digits will give the load rating at the time of inventory. The code for load rating will be as follows:

	Code
IRC Loading Class 70R	70
IRC loading Class 40 & IRC Class A loading	40
IRC Loading Class 18	18
Not available	00

Example	Code	
Design rating Class 40 Present rating Class 18	40	18
Design rating not available Present rating class 18	00	18

Item 21 Average daily traffic (ADT) (5 digits)

Write average daily traffic in PCU's.

Item 22 Year of ADT (4 digits)

Give the year of traffic survey carried out for item 20.

Item 23 Detour length (2 digits)

This item indicates how much detour will be required in case the bridge is not functional.

If a ground level byepass is possible by the side of the bridge then record code '00'.

In the case of a twin bridge, detour of one of them is possible by another. This may be recorded as 01.

In other cases, give the actual detour length to the nearest kms. All detour lengths more than 99 kms.will be recorded as '99'.

Item 24 Documentation (2 digits)

The first digit, shows whether any documentation of designs is available. The second digit shows the place where the documentation is available. Codes are as follows:

(i) For the first digit available	1
not available	0
(ii) For the second digit	
National Archives	1
MOT	2
State PWD HQ	3
State PWD Division	4

The code will mention the highest office in the above order, where the documentation is available. If no documentation has been made, than the code will be '0'.

Example:	Code
Documentation available at MOST	12

Item 25 Year of Inventory (4 digits)

Give the year in which this inventory has been prepared

(B) Structure Data

Item 26 Design discharge in cumecs (5 digits)

Record the design discharge in cumecs

Item 27 Design HFL (4 digits)

Record the design HFL in metres and tenths of metre.

HFL	Code
211.45	211 4
182.38	182 4
2183.40	183 4

Item 28 and 29 - Design scour level at pier and abutment (4 digits)

Write design scour level in 4 digits code as for item 27.

Item 30 Founding strata (1 digit)

Give the following codes for founding strata.

Founding Strata	Code
Hard Rock	1
Soft Rock	2
Sand	3
Sand + Clay	4

Clay	5
Not available	0

Item 31 Whether the bridge is in grade (1 digit):

If yes, write '1'

If no, write 'O'

Item 32 Road level (4 digits):

Give the level of longitudinal centre line of the road in metres and tenths of metre at the abutments. Record of levels shall be in the same manner as in item 27. In case the bridge is in grade, it will refer to the first abutment as the section proceeds.

Item 32 Road width (3 digits):

Record roadway width between faces of road kerbs normal to the centre line of the bridge, in metres and tenths of metres. If there is divided carriageway, record the sum of the width of the carriageways only.

Width	**Code**
6.43m	064
7.50m	075
11.25m	112

Item 34 Overall deck width (4 digits):

First three digits will indicate the overall deck width, outer to outer of the deck in metres and tenths of metre. The fourth digit will indicate whether footpaths, median strip, or both are provided or not, as given by the following Code:

	Code
None	Z
Footpaths only	F
Median Strip only	M
Both footpaths and median strip	B

e.g.

Deck width	Code
11.4m with footpaths	114 F
8.4 without footpaths	084 Z
21m with footpath and median strip	210 B

Item 35 Approach Roadway width including shoulder (3 digits)

Record the total width of approach roadway including shoulder in the same manner as in item 33.

Item 36 Height of Approach embankment (4 digits):

Height at abutments is to be recorded in full metres (rounded off to nearest metre).

Proceeding from the beginning of the section the height of the first embankment at the abutment above adjoining G.L. is to be recorded in the first two digits. The height of the other embankment is to be recorded in the last two digits.

Example -

Section: Chirkunda - Barhi

Chirkunda side embankment	Barhi side embankment	Code
8.3m	11.6m	0812
12.6m	5.7m	1306

Item 37 Average skew (2 digits)

Indicate average skew angle of the bridge in degrees. If there is no skew, write 00.

Item 38 Whether Navigable (1 digit)

Indicate whether the stream is navigable. If yes, write '1', If no, write '0'.

Item 39 Vertical clearance (2 digits)

Give the vertical clearance of the bridge, in metres, as under:

(a) In case of a channel crossing and superstructure having a flat soffit or soffit with a very flat curve (1 in 100), the minimum vertical clearance shall be from affluxed HFL to the lowest point of the superstructure.

(b) In case of a channel crossing and superstructure having sloped soffit or arches, the clearance shall be measured at ¼th span from the pier/abutment above the affluxed HFL.

(c) In case of Road or Railway overbridges/underbridges the minimum vertical clearance shall be from the top of the crown of road/rail level to the lowest point of the sueperstructure.

Item 40 Horizontal clearance (3 digits)

The horizontal clearance available will be recorded in metres, in a three digit code, as under:-

(a) In case of a channel crossing, it shall refer to the span having maximum horizontal clearance in the channel and shall be measured between inside faces of the foundations/well cap/pile cap in which there is no obstruction to the crossing. It shall be measured normal to the direction of flow.

(b) In case of road or railway overbridge/underbridge, it shall refer to the span having maximum horizontal clearance and shall be measured between inside faces of foundations/well cap/pile cap. It shall be measured normal to the direction of road or railway underneath the bridge.

B(1) Main Spans

The structure data in this heading will relate to the main spans, if there is viaduct or approach spans, and to the whole of the bridge, If there is no viaduct or approach spans.

Item 41 Total number of spans (3 digits)

Give the total number of spans.

Item 42 Span arrangement (5x5 digits)

There will be 5 boxes of 5 digits for this purpose.

The number of spans having the same span length will be coded in one box. The first two digits refer to the number of such spans, while the next three digits refer to the span length, in metres.

The span length shall be measured as centre to centre of piers along the centre line of the bridge. In case of end spans, it shall be measured from the centre of bearings on abutments to the centre of the pier, next to it.

In case there are different span lengths, the same will be indicated in other boxes in similar manner. If there is none, other boxes should be filled in with zeroes.

Example: There are 5 spans of 120 m and 2 spans of 65.2 m each. This will be codified as under:

05120
02065
00000
00000
00000

Item 43 Superstructure type (4 digits):

The superstructure type should refer to the most important main spans, if the type in some of the main spans is different. This will be filled in a four digit code as under:

First digit - Material.

Second digit - Type of design/construction,

Third and Fourth digits - System.

(a)	**Material**	**Code**
	R.C.C.	1
	P.S.C.	2
	Steel	3
	Steel and concrete	4
	Masonry	5
	Timber	6
(b)	**Type of design/construction**	
	Slab	1
	T-Beam and slab	2
	Box-girders - with single cell	3
	Box girder with multiple cell	4
	Arches with backfill	5
	Open spandrel arches	6
	Truss	7
	Plate girders/R.S. Joints with decking	8
	Others	9
(c)	**System**	
	Simply supported	01
	Continuous	02
	Cantilever construction	
	a) Hinged connection	03
	b) Central suspended span	04
	c) Continuous connection	05
	Balanced cantilever	06
	Hammer head with suspended span	07
	Suspension	08
	Cable-stayed	09
	Frame	10
	Others	11

Example R.C.C. slab simply supported - Code '1101' superstructure

Steel Truss simply supported - Code '3701' superstructure

Item 44 Pier type (2 digits)

First digit will indicate the material and second digit will indicate the type of construction.

a) **Material**

	Code
Reinforced Cement Concrete (R.C.C.)	1
Plain Cement Concrete (PCC)	2
Masonry	3
Steel	4
Timber	5

(Codes for materials in superstructure and substructure are different. Please note that code for masonry in superstructure is '5', whereas that in substructure is '3').

b) **Type of construction**

	Code
Solid wall type	1
Cellular Wall type	2
Solid Column/Columns	3
Cellular Column/Columns	4
Pile Bents	5
Frame	6
Others	7

Example- P.C.C. - solid wall type - Code '21'

Item 45 Abutment type (2 digits)

Same codes as for pier type in item 44.

Item 46 Pier foundation type (2 digits)

First digit will indicate the material in foundation while the second digit will indicate the system.

a) **Material**

	Code
Reinforced Cement Concrete (RCC)	1
Plain Cement Concrete (PCC)	2
Masonry	3
Steel	4
Timber	5

b) **System**

	Code
Open	1
Well	2
Pile	3

Example - P.C.C. well foundation - Code '22'.

Item 47 - Maximum depth of pier foundation (2 digits)

Record the maximum depth of pier foundations below G.L. or lowest bed level, in nearest metres.

Example - depth - 28.2m - Code - '28'.

Item 48 - Abutment foundation type (2 digits)

Record the foundation type, in similar manner as for Item 46.

Item 49 - Maximum depth of abutment foundation (2 digits)

Record the maximum depth of abutment foundation in similar manner as in item 47.

Item 50 - Type of bearings (1 digit)

Record the type of bearings as per following code:

Type of bearings	Code
Tar paper	1
Mild steel sliding plate	2
CS/MS Rocker and Roller (single roller)	3
CS/MS Rocker and Roller (multi-roller)	4
Neoprene (Unreinforced)	5
Neoprene (reinforced)	6
PTFE sliding/M.S. or C.S. rocker	7
Pot bearing	8
Others	9

Item 51 - Wearing coat type (1 digit)

Write following codes for wearing coat type:

Wearing coat type	Code
None	0
Plain Cement Concrete	1
R.C.C.	2
Bituminous	3
Mastic Asphalt	4
Integrated wearing coat	5
Others	6

Item 52 - Expansion joint type (1 digit)

Write following codes for expansion joint type:

Expansion joint type	Code
Open joint	1
Open joint with bituminous filler	2
Neoprene/elastomer joint	3
Steel Finger type	4
Others	5

Item 53 - Railing type (2 digits):

First digit for material and second digit for system:

Record First digit as under:-

Material	Code
R.C.C.	1
P.C.C.	2
Masonry	3
Steel	4
Timber	5

Record Second digit as under:-

System	Code
Rail and posts	1
H type	2
Any other design between top and bottom rail	3
Parapet wall	4
Others	5

(B) (2) Approach spans

Details of viaduct or approach spans, if any, will be furnished in items 54 to 66 in similar manner as for items 41 to 53 respectively.

(B) (3) General

Item 67 - Corrosion Protection measures (3x3 digits)

There will be three boxes of 3 digits each. In each box, first digit will indicate the part of structure and the next two digits will indicate the type of corrosion protection measures. The first box will give corrosion protection measures in superstructure (Code '1'). second box those in substructure (Code '2') and the third box those in foundations (Code '3'). The codes for corrosion protection measures are :-

	Corrosion protection measures	Code
a)	None	00
b)	Additional cover only	01
c)	Additional cover + cement grout coated reinforcement	02
d)	Additional cover + epoxy coated reinforcement	03
e)	(b) + epoxy painting	04
f)	(c) + epoxy painting	05
g)	(d) + epoxy painting	06
h)	(b) + anti-corrosive paints	07
i)	(c) + anti-corrosive paints	08
j)	(d) + anti-corrosive paints	
k)	(b) + others	09
l)	(c) + others	10
m)	(d) + others	11
n)	(e) + others	12
o)	(f) + others	13
p)	(g) + others	14
q)	(h) + others	15
r)	(i) + others	16
s)	(j) + others	17

Example - Superstructure - additional cover + anti-corrosive paint

Substructure - additional cover.

Foundation - additional cover.

code 107
201
301

Item 68 - Bank Protection and type (4 digits)

This will be filled up for bridges across channels. In case of overbridges/underbridges all digits will be '0'.

First digit (left u/s), Second digit (left d/s)

Third digit (Right u/s), Fourth digit (Right d/s).

Type of bank protection	Code
None	0
Guidebund	1
Short Guide wall	2
Bank pitching	3
Pitching around abutments	4

Example - Guidebund on left and right sides both u/s and d/s - Code '1111'

Item 69 - Floor protection and type (1 digit)

Following codes may be used for the purpose:

Floor protection type	Code
None	0
P.C.C. flooring with cut off walls	1
Brick flooring with cut off walls	2
Boulder pitching	3
Others	4

(C) HISTORY

Item 70 - Suspension of traffic (3 digits)

The first digit will show the suspension of traffic on the bridge.

	Code
yes	'1'
No.	'0'

The last two digits will show the latest year of suspension of traffic as follows:

Year	
1960	60
1979	79

Example:

Suspension of traffic in 1980	180
No suspension of traffic	000

Item 71 - Erosion of Banks (3 digits)

Similar codes as item 70.

Item 72 - Scour around guidebunds (3 digits)

Similar codes as item 70.

Item 73 - Abnormal scour level around piers (6 digits)

The first four digits will indicate the abnormal scour level (below the maximum design scour level) for piers in the same manner as for item 28.

The last two digits will indicate the year of such abnormal scour as follows:

Year	Code
1969	69
1982	82

Example:

Abnormal scour level of 182.83 in 1969	182869
No abnormal scour	000000

Item 74 - Abnormal scour level around abutments (6 digits)

Similar code as for item 73.

Item 75 - Abnormal flood level (6 digits)

Similar code as for item 73

Item 76 - Distress and repair in foundations (3 digits)

The first digit will indicate whether distress, occurred and whether it was repaired as per following codes.

	Code
No distress	0
Distress observed and repaired	1
Distress observed but not repaired	2

The last two digits will indicate the year in which the distress was repaired or the distress was observed, as the case may be.

Year	Code
1965	65
1988	88

Item 77 - Distress and repair in guidebunds (3 digits)

Similar codes as for item 76

Item 78 - Distress and repair in substructure including bearings (3 digits)

Similar code as for item 76.

Item 79 - Distress and repair in superstructure (3 digits)

Similar code as for item 76.

Item 80 - Any other observation (100 digits)

Write any distress condition in the bridge structure or any important aspect not covered in the inventory as observed during the inventory.