付録-2

橋梁の非破壊試験結果

非破壊検査状況

General Information of the Bridge

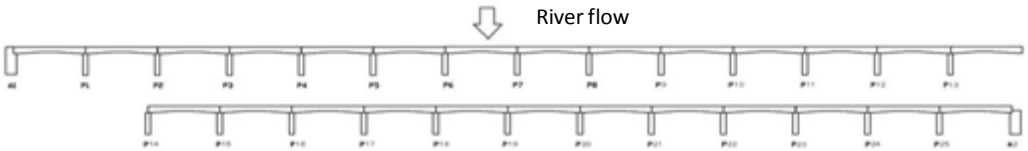
Date : 27 Nov 2013

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A
Station	-	**Road Category**	National Highway
GPS Data	N 26 ° 36 ' 43.0 "	**Management Authority**	State PWD
	E 092 ° 51 ' 12.5 "	**Year of Construction**	1987

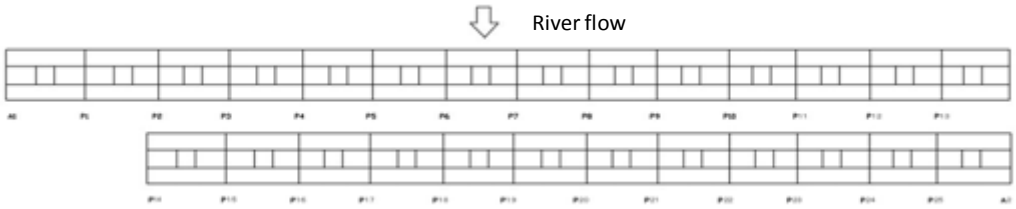
Bridge Length	3,105m	**Span Arrangement**	26 spans
Bridge Width			
- Carriageway Width	7.5m	**Approach Road Width**	Same as bridge
- Medium Width	Nil		
- Footway Width	1.5m (both side)	**Existing of Detour**	None (approx. 327Km)
Type of Superstructure	PC BOX Girber (Gerber Girder)	**Type of Substructure**	RC
Type of Foundation	Well		

Sketch of the Bridge

Side View



Plan View



Photoes of 2nd Field Survey (1/4)

Date : 27 Nov 2013

Bridge No.	2	Location (State)	Assam
Bridge Name	Kaliabhomora Bridge	Road Name	NH37A

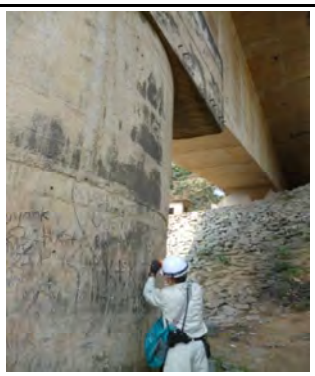
Photoes（Hammer Test）

Photoes of 2nd Field Survey (2/4)

Date : 27 Nov 2013

Bridge No.	2	Location (State)	Assam
Bridge Name	Kaliabhomora Bridge	Road Name	NH37A

Photoes（Rebound Hanmmer Test）



Photoes of 2nd Field Survey (3/4)

Date : 27 Nov 2013

Bridge No.	2	Location (State)	Assam
Bridge Name	Kaliabhomora Bridge	Road Name	NH37A

Photoes（RC redar Inspection）

Photoes of 2nd Field Survey (4/4)

Date : 27 Nov 2013

Bridge No.	2	Location (State)	Assam
Bridge Name	Kaliabhomora Bridge	Road Name	NH37A

Photoes（Electromagnetic Inspection）

General Description of Damages

Date : 27 Nov 2013

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A
Station	-	**Road Category**	National Highway
GPS Data	N 26 °36 ' 43.0 "	**Management Authority**	State PWD
	E 092 °51 ' 12.5 "	**Year of Construction**	1987

General Description of Damages

Member	**Kind of the Damage** **Ex. Concrete : Cracking, Spalling, etc. Steel : Cracking, Rusting, Fracture, etc.**
1. Superstructure	
(1) Concrete Member	
- Girder	Unequal level in deck slab of Gerber Girder in some spans
- Cross Beam	Nil
- Slab	Nil
(2) Steel Member	
- Girder	N/A
- Virtical Girder (stringer)	N/A
- Cross Beam	N/A
- Sway Bracing	N/A
(3) Bearing Shoe	Nil
(4) EXP Joint	Nil
(5) Handrail	Nil
(6) Kerb	Nil
(7) Drainage Pipe	Nil
(8) Others	Nil
2. Substructure	
- Pier	Nil
- Abutment	Nil
- Wing Wall	Nil
3. Miscellaneous	
- Approach Road Condition	Nil
- Obstruction	Nil
- Scouring	At some piers, but not serious

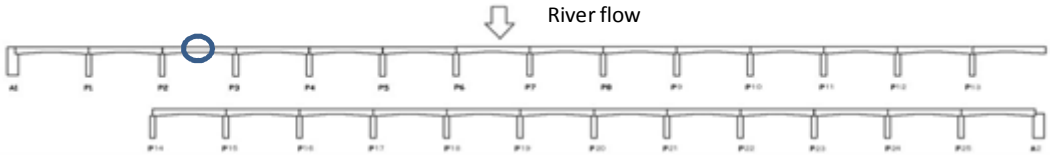
Damage Photoes (1/3)

Date : 27 Nov 2013

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A
Station	-	**Road Category**	National Highway
GPS Data	N 26 °36 ' 43.0 "	**Management Authority**	State PWD
	E 092 °51 ' 12.5 "	**Year of Construction**	1987

Detailed Description of Damages

Object Member	Gerber Girder (at some spans)
Kind of Damage	Level difference at Gerber Girder (P1–P2, P2–P3, P3–P4, P4–P5, P5–P6, P6–P7, P7–P8, P24–P25)
Sketch or Photo	



Damage Photoes (2/3)

Date : 27 Nov 2013

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A
Station	-	**Road Category**	National Highway
GPS Data	N 26 °36 ' 43.0 "	**Management Authority**	State PWD
	E 092 °51 ' 12.5 "	**Year of Construction**	1987

Detailed Description of Damages

Object Member	Gerber Girder (at some spans)
Kind of Damage	Level difference at Gerber Girder (P1-P2, P2-P3, P3-P4, P4-P5, P5-P6, P6-P7, P7-P8, P24-P25)
Sketch or Photo	

Damage Photoes (3/3)

Date : 27 Nov 2013

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A
Station	-	**Road Category**	National Highway
GPS Data	N 26 °36 ' 43.0 "	**Management Authority**	State PWD
	E 092 °51 ' 12.5 "	**Year of Construction**	1987

Detailed Description of Damages

Object Member	Gerber Girder (at some spans)
Kind of Damage	Level difference at Gerber Girder (P1-P2, P2-P3, P3-P4, P4-P5, P5-P6, P6-P7, P7-P8, P24-P25)
Sketch or Photo	

General Information of the Bridge

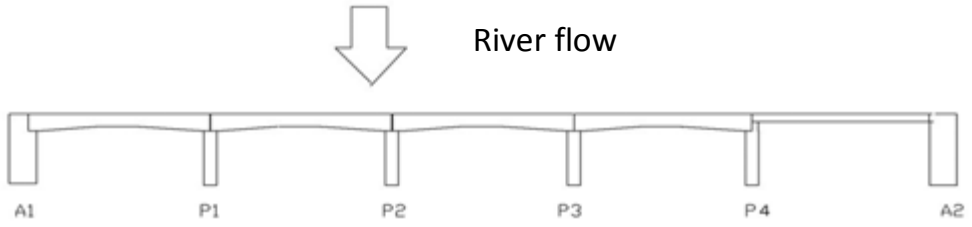
Date : 27 Jan 2014

Bridge No.	4	**Location (State)**	Assam
Bridge Name	Badarpurghat Bridge	**Road Name**	NH 6 (old NH 44)
Station	Km201	**Road Category**	National Highway
GPS Data	N 24 ° 52 ' 34.5 "	**Management Authority**	State PWD
	E 092 ° 35 ' 00.8 "	**Year of Construction**	1974

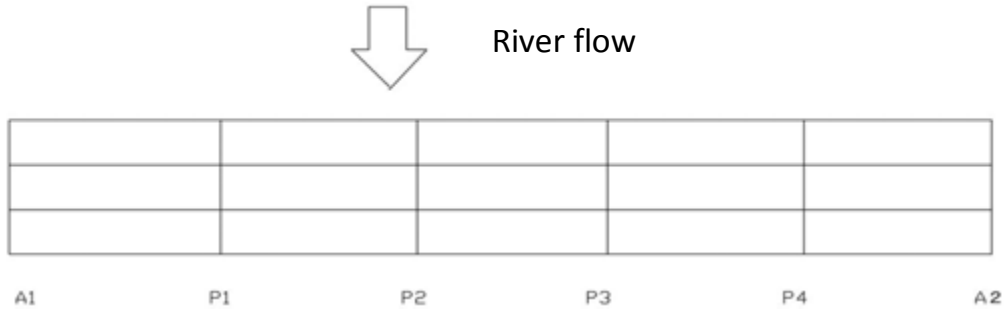
Bridge Length	359.44 m	**Span Arrangement**	5 spans
Bridge Width			
- Carriageway Width	7.0m	**Approach Road Width**	Same as bridge
- Medium Width	Nil		
- Footway Width	1.5m (both side)	**Existing of Detour**	Approx. 64Km
Type of Superstructure	PC BOX Girber (Centre Hinge)	**Type of Substructure**	RC
Type of Foundation	Well		

Sketch of the Bridge

Side View



Plan View



Photoes of 2nd Field Survey (1/4)

Date : 27 Jan 2014

Bridge No.	4	Location (State)	Assam
Bridge Name	Badarpurghat Bridge	Road Name	NH 6 (old NH 44)

Photoes（Hammer Test）

Photoes of 2nd Field Survey (2/4)

Date : 27 Jan 2014

Bridge No.	4	Location (State)	Assam
Bridge Name	Badarpurghat Bridge	Road Name	NH 6 (old NH 44)

Photoes（Rebound Hanmmer Test）

Photoes of 2nd Field Survey (3/4)

Date : 27 Jan 2014

Bridge No.	4	Location (State)	Assam
Bridge Name	Badarpurghat Bridge	Road Name	NH 6 (old NH 44)

Photoes（Concrete cover survey：RC redar）

Photoes of 2nd Field Survey (4/4)

Date : 27 Jan 2014

Bridge No.	4	Location (State)	Assam
Bridge Name	Badarpurghat Bridge	Road Name	NH 6 (old NH 44)

Photoes（Concrete cover survey：Electro magnetic redar）

General Description of Damages

Date : 27 Jan 2014

Bridge No.	4	**Location (State)**	Assam
Bridge Name	Badarpurghat Bridge	**Road Name**	NH 6 (old NH 44)
Station	Km201	**Road Category**	National Highway
GPS Data	N 24 °52 ' 34.5 "	**Management Authority**	State PWD
	E 092 °35 ' 00.8 "	**Year of Construction**	1974

General Description of Damages

Member	Kind of the Damage Ex. Concrete : Cracking, Spalling, etc. Steel : Cracking, Rusting, Fracture, etc.
1. Superstructure	
(1) Concrete Member	
- Girder	Abnormal deflection and level differences at center hinge portions.
- Cross Beam	Nil
- Slab	Nil
(2) Steel Member	
- Girder	N/A
- Virtical Girder (stringer)	N/A
- Cross Beam	N/A
- Sway Bracing	N/A
(3) Bearing Shoe	Not approachable in first survey
(4) EXP Joint	Nil
(5) Handrail	Nil
(6) Kerb	CC peeling
(7) Drainage Pipe	Nil
(8) Others	Nil
2. Substructure	
- Pier	Nil
- Abutment	Nil
- Wing Wall	Nil
3. Miscellaneous	
- Approach Road Condition	Nil
- Obstruction	Nil
- Scouring	Unknown

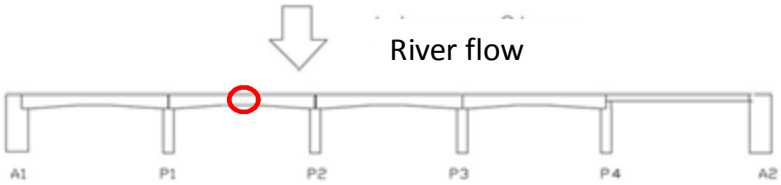
Damage Photoes (1/4)

Date : 27 Jan 2014

Bridge No.	4	**Location (State)**	Assam
Bridge Name	Badarpurghat Bridge	**Road Name**	NH 6 (old NH 44)
Station	Km201	**Road Category**	National Highway
GPS Data	N 24 °52 ' 34.5 "	**Management Authority**	State PWD
	E 092 °35 ' 00.8 "	**Year of Construction**	1974

Detailed Description of Damages

Object Member	**Gap Slab (P1-P2)**
Kind of Damage	**End point of girders damaged. Abnormal deflection, and 10m span steel bridge are provided over thegap slab.**
Sketch or Photo	



Damage Photoes (2/4)

Date : 27 Jan 2014

Bridge No.	4	**Location (State)**	Assam
Bridge Name	Badarpurghat Bridge	**Road Name**	NH 6 (old NH 44)
Station	Km201	**Road Category**	National Highway
GPS Data	N 24 °52 ' 34.5 "	**Management Authority**	State PWD
	E 092 °35 ' 00.8 "	**Year of Construction**	1974

Detailed Description of Damages

Object Member	**Gap Slab (P1-P2)**
Kind of Damage	**End point of girders damaged. Abnormal deflection, and 10m span steel bridge are provided over thegap slab.**
Sketch or Photo	

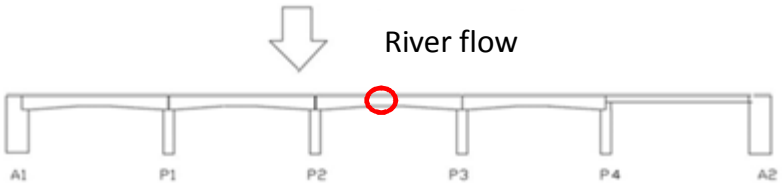
Damage Photoes (3/4)

Date : 27 Jan 2014

Bridge No.	4	**Location (State)**	Assam
Bridge Name	Badarpurghat Bridge	**Road Name**	NH 6 (old NH 44)
Station	Km201	**Road Category**	National Highway
GPS Data	N 24 °52 ' 34.5 "	**Management Authority**	State PWD
	E 092 °35 ' 00.8 "	**Year of Construction**	1974

Detailed Description of Damages

Object Member	Gerber Girder (P2-P3)
Kind of Damage	Level difference
Sketch or Photo	



Damage Photoes (4/4)

Date : 27 Jan 2014

Bridge No.	4	**Location (State)**	Assam
Bridge Name	Badarpurghat Bridge	**Road Name**	NH 6 (old NH 44)
Station	Km201	**Road Category**	National Highway
GPS Data	N 24 °52 ' 34.5 "	**Management Authority**	State PWD
	E 092 °35 ' 00.8 "	**Year of Construction**	1974

Detailed Description of Damages

Object Member	Gerber Girder (P2-P3)
Kind of Damage	Level difference
Sketch or Photo	

General Information of the Bridge

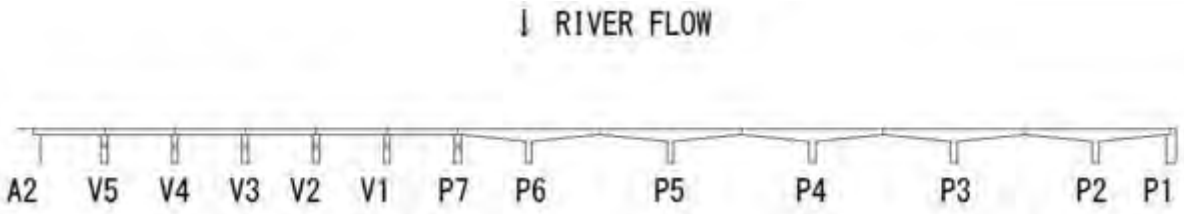
Date : 14 Jan 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17
Station	Panaji Km14/800	**Road Category**	National Highway
GPS Data	N 15 ° 24' 41.49 "	**Management Authority**	MORTH/PWD
	E 73 ° 54' 24.59"	**Year of Construction**	1982

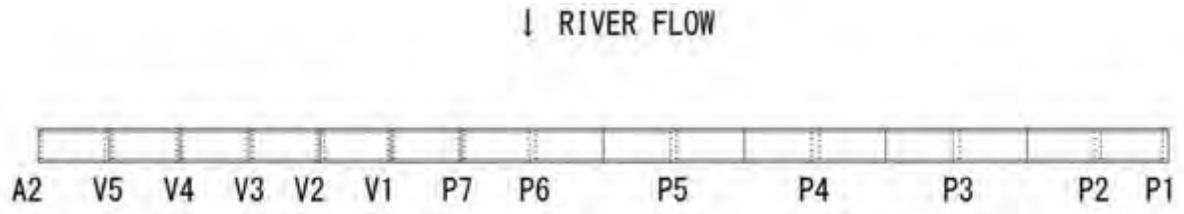
Bridge Length	809m	**Span Arrangement**	11 Spans
Bridge Width			
- Carriageway Width	7.50m (2 Lane)	**Approach Road Width**	8.5m (Both side)
- Medium Width	Nil		
- Footway Width	1.50m	**Existing of Detour**	Approx. 54km
Type of Superstructure	PC Box Girder	**Type of Substructure**	RC
Type of Foundation	RC Well		

Sketch of the Bridge

Side View



Plan View



Photoes of 2nd Field Survey (1/4)

Date : 14 Jan 2014

Bridge No.	5	Location (State)	Goa
Bridge Name	Zuari Bridge	Road Name	NH17
Photoes（Hammer Test）			

Photoes of 2nd Field Survey (2/4)

Date : 14 Jan 2014

Bridge No.	5	Location (State)	Goa
Bridge Name	Zuari Bridge	Road Name	NH17

Photoes（Rebound Hanmmer Test）

Photo R10

Photoes of 2nd Field Survey (3/4)

Date : 14 Jan 2014

Bridge No.	5	Location (State)	Goa
Bridge Name	Zuari Bridge	Road Name	NH17
Photoes（Concrete cover survey：RC redar）			

Photoes of 2nd Field Survey (4/4)

Date : 14 Jan 2014

Bridge No.	5	Location (State)	Goa
Bridge Name	Zuari Bridge	Road Name	NH17

Photoes（Concrete cover survey：Electro magnetic redar）

General Description of Damages

Date : 14 Jan 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17
Station	Panaji Km14/800	**Road Category**	National Highway
GPS Data	N 15 ° 24' 41.49 "	**Management Authority**	MORTH/PWD
	E 73 ° 54' 24.59"	**Year of Construction**	1982

General Description of Damages

Member	**Kind of the Damage** **Ex. Concrete : Cracking, Spalling, etc. Steel : Cracking, Rusting, Fracture, etc.**
1. Superstructure	
(1) Concrete Member	
- Girder	Level difference (P2-P3, P4-P5, V5) Gap (V4)
- Cross Beam	Nil
- Slab	Corrosion (P5P6)
(2) Steel Member	
- Girder	N/A
- Virtical Girder (stringer)	N/A
- Cross Beam	N/A
- Sway Bracing	N/A
(3) Bearing Shoe	Nil
(4) EXP Joint	Corossion (P4P5, P5P6) Broken (P7)
(5) Handrail	Nil
(6) Kerb	Nil
(7) Drainage Pipe	Nil
(8) Others	
2. Substructure	
- Pier	Nil
- Abutment	Nil
- Wing Wall	Nil
3. Miscellaneous	
- Approach Road Condition	Nil
- Obstruction	Nil
- Scouring	Nil

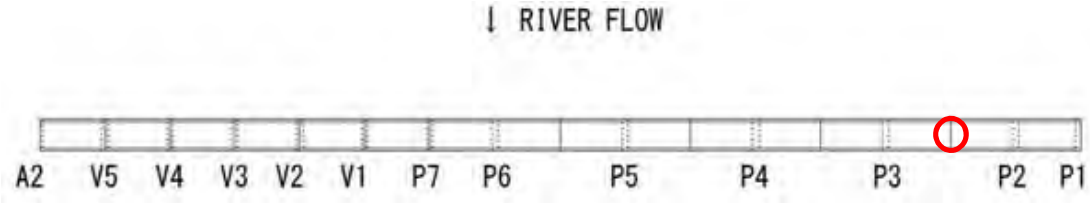
Damage Photoes (1/4)

Date : 14 Jan 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17
Station	Panaji Km14/800	**Road Category**	National Highway
GPS Data	N 15 ° 24' 41.49 "	**Management Authority**	MORTH/PWD
	E 73 ° 54' 24.59"	**Year of Construction**	1982

Detailed Description of Damages

Object Member	Centre hinge P2-P3
Kind of Damage	**Level difference**
Photo	



Damage Photoes (2/4)

Date : 14 Jan 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17
Station	Panaji Km14/800	**Road Category**	National Highway
GPS Data	N 15 ° 24' 41.49 "	**Management Authority**	MORTH/PWD
	E 73 ° 54' 24.59"	**Year of Construction**	1982

Detailed Description of Damages

Object Member	Centre hinge P2-P3
Kind of Damage	**Level difference**
Photo	

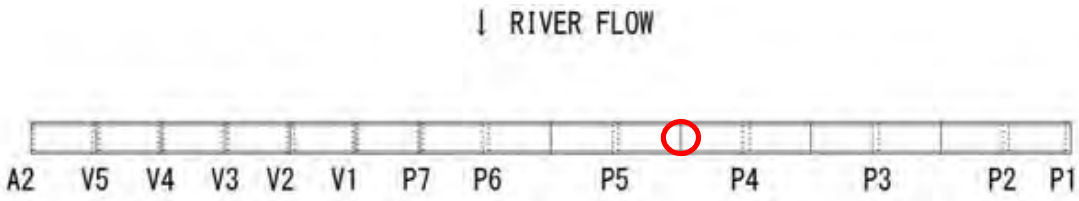
Damage Photoes (3/4)

Date : 14 Jan 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17
Station	Panaji Km14/800	**Road Category**	National Highway
GPS Data	N 15 ° 24' 41.49 "	**Management Authority**	MORTH/PWD
	E 73 ° 54' 24.59"	**Year of Construction**	1982

Detailed Description of Damages

Object Member	Centre hinge P4-P5
Kind of Damage	**Broken by Level difference**
Photo	



Damage Photoes (4/4)

Date : 14 Jan 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17
Station	Panaji Km14/800	**Road Category**	National Highway
GPS Data	N 15 ° 24' 41.49 "	**Management Authority**	MORTH/PWD
	E 73 ° 54' 24.59"	**Year of Construction**	1982

Detailed Description of Damages

Object Member	Centre hinge P4-P5
Kind of Damage	**Level difference**
Photo	

General Information of the Bridge

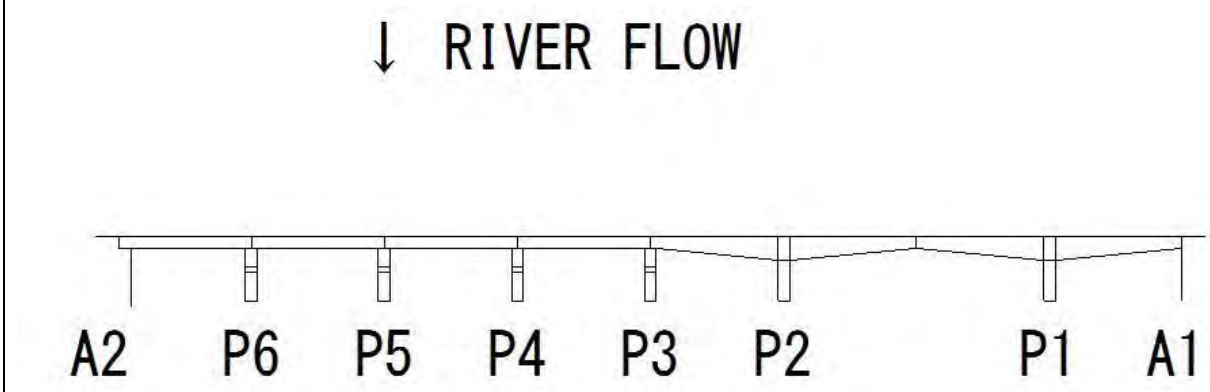
Date : 15 Jan 2014

Bridge No.	8	**Location (State)**	Goa
Bridge Name	Borim Bridge	**Road Name**	NH17B
Station	Ponda Km9/00	**Road Category**	National Highway
GPS Data	N 15° 20' 58.61"	**Management Authority**	MORTH
	E 74° 00' 10.43"	**Year of Construction**	1983

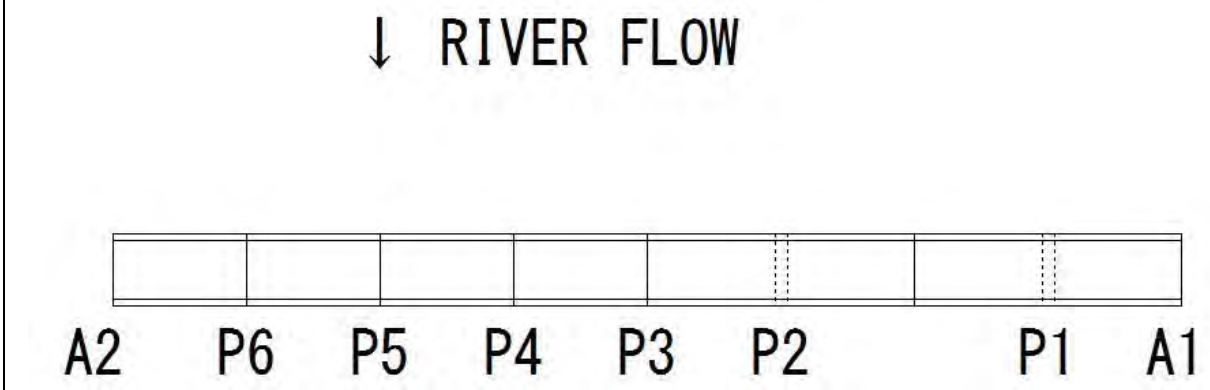
Bridge Length	411 m	**Span Arrangement**	7 Spans
Bridge Width			
- Carriageway Width	7.50 m (2 Lane)	**Approach Road Width**	11m (Both side)
- Medium Width	Nil		
- Footway Width	1.50 m	**Existing of Detour**	Approx. 48km
Type of Superstructure	PC Box Girder	**Type of Substructure**	Hollow RC
Type of Foundation	Well		

Sketch of the Bridge

Side View



Plan View



Photoes of 2nd Field Survey (1/4)

Date : 15 Jan 2014

Bridge No.	8	Location (State)	Goa
Bridge Name	Borim Bridge	Road Name	NH17B
Photoes（Hammer Test）			

Photoes of 2nd Field Survey (2/4)

Date : 15 Jan 2014

Bridge No.	8	Location (State)	Goa
Bridge Name	Borim Bridge	Road Name	NH17B

Photoes（Rebound Hanmmer Test）

Photoes of 2nd Field Survey (3/4)

Date : 15 Jan 2014

Bridge No.	8	Location (State)	Goa
Bridge Name	Borim Bridge	Road Name	NH17B
Photoes（Concrete cover survey：RC redar）			

Photoes of 2nd Field Survey (4/4)

Date : 15 Jan 2014

Bridge No.	8	Location (State)	Goa
Bridge Name	Borim Bridge	Road Name	NH17B

Photoes（Concrete cover survey：Electro magnetic redar）

General Description of Damages

Date : 15 Jan 2014

Bridge No.	8	**Location (State)**	Goa
Bridge Name	Borim Bridge	**Road Name**	NH17B
Station	Ponda Km9/00	**Road Category**	National Highway
GPS Data	N 15° 20' 58.61"	**Management Authority**	MORTH
	E 74° 00' 10.43"	**Year of Construction**	1983

General Description of Damages

Member	**Kind of the Damage**
	Ex. Concrete : Cracking, Spalling, etc. Steel : Cracking, Rusting, Fracture, etc.
1. Superstructure	
(1) Concrete Member	
- Girder	There is some level difference at centre hinge
- Cross Beam	N/A
- Slab	Nil
(2) Steel Member	
- Girder	N/A
- Virtical Girder (stringer)	N/A
- Cross Beam	N/A
- Sway Bracing	N/A
(3) Bearing Shoe	Nil
(4) EXP Joint	Corrosion & Gap (P1P2)
(5) Handrail	Nil
(6) Kerb	Nil
(7) Drainage Pipe	Nil
(8) Others	Nil
2. Substructure	
- Pier	Nil
- Abutment	Nil
- Wing Wall	Nil
3. Miscellaneous	
- Approach Road Condition	Nil
- Obstruction	Nil
- Scouring	Nil

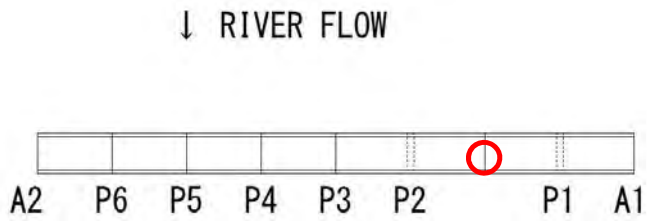
Damage Photoes (1/2)

Date : 15 Jan 2014

Bridge No.	8	**Location (State)**	Goa
Bridge Name	Borim Bridge	**Road Name**	NH17B
Station	Ponda Km9/00	**Road Category**	National Highway
GPS Data	N 15° 20' 58.61"	**Management Authority**	MORTH
	E 74° 00' 10.43"	**Year of Construction**	1983

Detailed Description of Damages

Object Member	Centre hinge P1-P2
Kind of Damage	**Level Difference**
Photo	



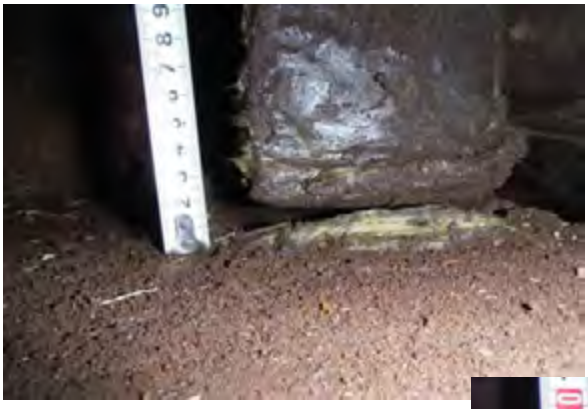
Damage Photoes (2/2)

Date : 15 Jan 2014

Bridge No.	8	**Location (State)**	Goa
Bridge Name	Borim Bridge	**Road Name**	NH17B
Station	Ponda Km9/00	**Road Category**	National Highway
GPS Data	N 15° 20' 58.61"	**Management Authority**	MORTH
	E 74° 00' 10.43"	**Year of Construction**	1983

Detailed Description of Damages

Object Member	centre hinge P1-P2
Kind of Damage	**Level Difference**
Photo	



General Information of the Bridge

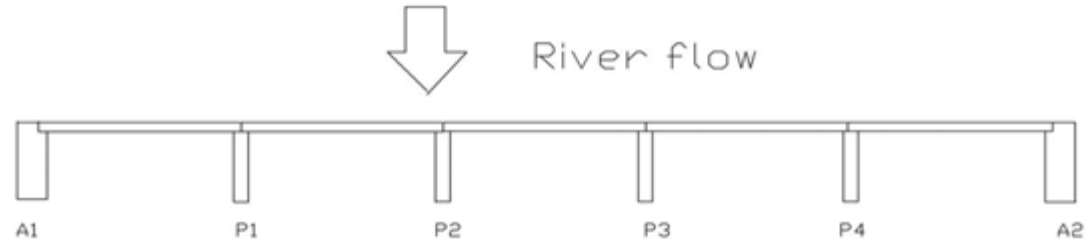
Date : 17 Jan 2014

Bridge No.	10	**Location (State)**	Kerala
Bridge Name	Mahe Bridge	**Road Name**	NH17
Station	184/600	**Road Category**	National Highway
GPS Data	N 11 ° 42 ' 24.3 "	**Management Authority**	Kerala PWD
	E 075 ° 31 ' 59.4 "	**Year of Construction**	1930

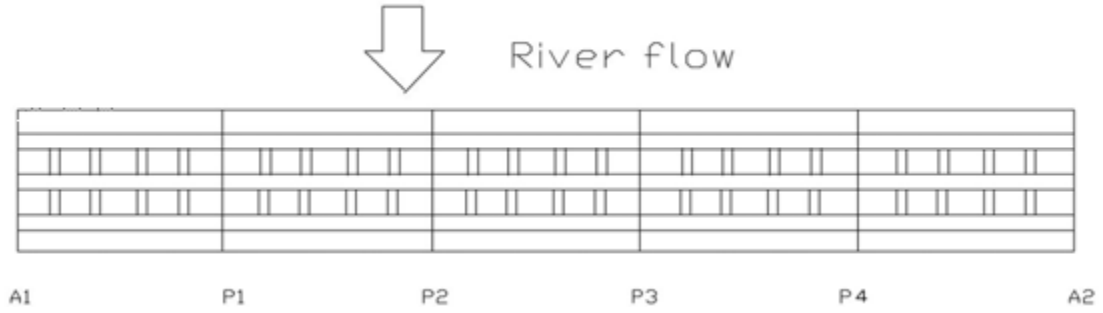
Bridge Length	117 m	**Span Arrangement**	5 x 23.40m
Bridge Width			
- Carriageway Width	6.7m	**Approach Road Width**	Same as bridge
- Median Width	Nil		
- Footway Width	0.96m (both side)	**Existing of Detour**	Approx. 16Km
Type of Superstructure	RC T Girder	**Type of Substructure**	Stone masonry
Type of Foundation	Well		

Sketch of the Bridge

Side View



Plan View



Photoes of 2nd Field Survey (1/4)

Date : 17 Jan 2014

Bridge No.	10	Location (State)	Kerala
Bridge Name	Mahe Bridge	Road Name	NH17

Photoes（Hammer Test）

Photoes of 2nd Field Survey (2/4)

Date : 17 Jan 2014

Bridge No.	10	Location (State)	Kerala
Bridge Name	Mahe Bridge	Road Name	NH17

Photoes（Rebound Hanmmer Test）

N/A
Impossible to inspect caouse of that :
- Substructure is stone masonry
- Superstructure is covered by guniting work

Photoes of 2nd Field Survey (3/4)

Date : 17 Jan 2014

Bridge No.	10	Location (State)	Kerala
Bridge Name	Mahe Bridge	Road Name	NH17

Photoes（Concrete cover survey：RC redar）

Photoes of 2nd Field Survey (4/4)

Date : 17 Jan 2014

Bridge No.	10	Location (State)	Kerala
Bridge Name	Mahe Bridge	Road Name	NH17

Photoes（Concrete cover survey：Electro magnetic redar）

N/A
Impossible to inspect caouse of that :
- Substructure is stone masonry
- Superstructure is covered by guniting work

General Description of Damages

Date : 17 Jan 2014

Bridge No.	10	**Location (State)**	Kerala
Bridge Name	Mahe Bridge	**Road Name**	NH17
Station	184/600	**Road Category**	National Highway
GPS Data	N 11 °42 ' 24.3 "	**Management Authority**	Kerala PWD
	E 075 °31 ' 59.4 "	**Year of Construction**	1930

General Description of Damages

Member	**Kind of the Damage** **Ex. Concrete : Cracking, Spalling, etc. Steel : Cracking, Rusting, Fracture, etc.**
1. Superstructure	
(1) Concrete Member	
- Girder	There are some cracks on lower flange and web.
- Cross Beam	Unidentifiable due to guniting work in 2000
- Slab	There aore some crack on lower slab
(2) Steel Member	
- Girder	N/A
- Virtical Girder (stringer)	N/A
- Cross Beam	N/A
- Sway Bracing	N/A
(3) Bearing Shoe	Some bearing shoe are broken
(4) EXP Joint	All EXP Joints are plugged with asphalt or bituminous material
(5) Handrail	CC peeling and corroded re-bar exposed
(6) Kerb	Kerb height is not available or broken
(7) Drainage Pipe	Nil
(8) Others	It is assumed that there are mamy dameges on superstructure although cracks were covered by guniting work and it is difficult to observe them.
2. Substructure	
- Pier	Nil
- Abutment	Nil
- Wing Wall	Nil
3. Miscellaneous	
- Approach Road Condition	Nil
- Obstruction	Nil
- Scouring	Unknown

Damage Photoes (1/4)

Date : 17 Jan 2014

Bridge No.	10	**Location (State)**	Kerala
Bridge Name	Mahe Bridge	**Road Name**	NH17
Station	184/600	**Road Category**	National Highway
GPS Data	N 11 °42 ' 24.3 "	**Management Authority**	Kerala PWD
	E 075 °31 ' 59.4 "	**Year of Construction**	1930

Detailed Description of Damages

Object Member	Girder (A1-P1)
Kind of Damage	Cracks on web
Photo	

Damage Photoes(2/4)

Date : 17 Jan 2014

Bridge No.	10	**Location (State)**	Kerala
Bridge Name	Mahe Bridge	**Road Name**	NH17
Station	184/600	**Road Category**	National Highway
GPS Data	N 11 °42 ' 24.3 "	**Management Authority**	Kerala PWD
	E 075 °31 ' 59.4 "	**Year of Construction**	1930

Detailed Description of Damages

Object Member	Girder (A1-P1)
Kind of Damage	Cracks on lower flange (P4-A2)
Photo	

Damage Photoes (3/4)

Date : 17 Jan 2014

Bridge No.	10	**Location (State)**	Kerala
Bridge Name	Mahe Bridge	**Road Name**	NH17
Station	184/600	**Road Category**	National Highway
GPS Data	N 11 °42 ' 24.3 "	**Management Authority**	Kerala PWD
	E 075 °31 ' 59.4 "	**Year of Construction**	1930

Detailed Description of Damages

Object Member	Girder (P1-P2)
Kind of Damage	EXP joints are plugged with asphalt or bituminous material
Photo	

Damage Photoes (4/4)

Date : 17 Jan 2014

Bridge No.	10	**Location (State)**	Kerala
Bridge Name	Mahe Bridge	**Road Name**	NH17
Station	184/600	**Road Category**	National Highway
GPS Data	N 11 °42 ' 24.3 "	**Management Authority**	Kerala PWD
	E 075 °31 ' 59.4 "	**Year of Construction**	1930

Detailed Description of Damages

Object Member	**Deck slab (P4-A2)**
Kind of Damage	**EXP joints are plugged with asphalt or bituminous material**
Photo	

General Information of the Bridge

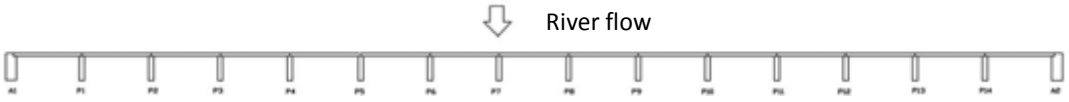
Date : 17 Jan 2014

Bridge No.	11	**Location (State)**	Kerala
Bridge Name	Valapattanam Bridge	**Road Name**	NH17
Station	Km147/250	**Road Category**	National Highway
GPS Data	N 11 ° 55 ' 49.8 "	**Management Authority**	Kerala PWD
	E 075 ° 21 ' 11.0 "	**Year of Construction**	1980

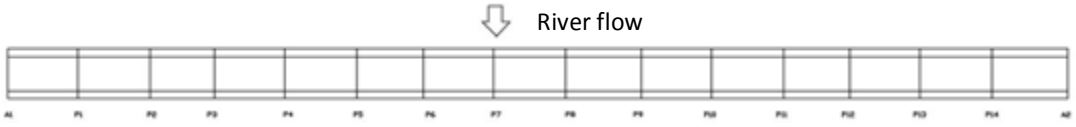
Bridge Length	420.77 m	**Span Arrangement**	15 spans
Bridge Width			
- Carriageway Width	7.50m	**Approach Road Width**	Same as bridge
- Median Width	Nil		
- Footway Width	1.35m (both side)	**Existing of Detour**	Approx. 26Km
Type of Superstructure	RC Box Girder	**Type of Substructure**	RC
Type of Foundation	RC Piles		

Sketch of the Bridge

Side View



Plan View

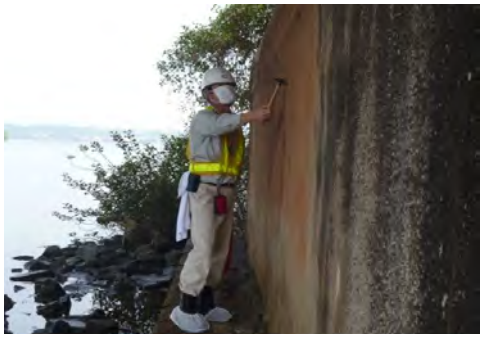


Photoes of 2nd Field Survey (1/4)

Date : 17 Jan 2014

Bridge No.	11	Location (State)	Kerala
Bridge Name	Valapattanam Bridge	Road Name	NH17

Photoes（Hammer Test）



Photoes of 2nd Field Survey (2/4)

Date : 17 Jan 2014

Bridge No.	11	Location (State)	Kerala
Bridge Name	Valapattanam Bridge	Road Name	NH17

Photoes（Rebound Hanmmer Test）

Photoes of 2nd Field Survey (3/4)

Date : 17 Jan 2014

Bridge No.	11	Location (State)	Kerala
Bridge Name	Valapattanam Bridge	Road Name	NH17

Photoes（Concrete cover survey：RC redar）

Photoes of 2nd Field Survey (4/4)

Date : 17 Jan 2014

Bridge No.	11	Location (State)	Kerala
Bridge Name	Valapattanam Bridge	Road Name	NH17

Photoes（Concrete cover survey：Electro magnetic redar）

General Description of Damages

Date : 17 Jan 2014

Bridge No.	11	**Location (State)**	Kerala
Bridge Name	Valapattanam Bridge	**Road Name**	NH17
Station	Km147/250	**Road Category**	National Highway
GPS Data	N 11 °55 ' 49.8 "	**Management Authority**	Kerala PWD
	E 075 °21 ' 11.0 "	**Year of Construction**	1980

General Description of Damages

Member	**Kind of the Damage** **Ex. Concrete : Cracking, Spalling, etc. Steel : Cracking, Rusting, Fracture, etc.**
1. Superstructure	
(1) Concrete Member	
- Girder	Tehre are many spalling
- Cross Beam	Nil
- Slab	There are some crack and honeycomb on lower slab
(2) Steel Member	
- Girder	N/A
- Virtical Girder (stringer)	N/A
- Cross Beam	N/A
- Sway Bracing	N/A
(3) Bearing Shoe	Inclination
(4) EXP Joint	All covered by asphalt and not functioning properly
(5) Handrail	Nil
(6) Kerb	Nil
(7) Drainage Pipe	Nil
(8) Others	There are some potholes on pavement
2. Substructure	
- Pier	There are some cracks and swelling
- Abutment	Nil
- Wing Wall	Nil
3. Miscellaneous	
- Approach Road Condition	Nil
- Obstruction	Nil
- Scouring	Unknown

Damage Photoes (1/5)

Date : 17 Jan 2014

Bridge No.	11	**Location (State)**	Kerala
Bridge Name	Valapattanam Bridge	**Road Name**	NH17
Station	Km147/250	**Road Category**	National Highway
GPS Data	N 11 °55 ' 49.8 "	**Management Authority**	Kerala PWD
	E 075 °21 ' 11.0 "	**Year of Construction**	1980

Detailed Description of Damages

Object Member	**P4-P13**
Kind of Damage	**Spalling**
Photo	

Damage Photoes (2/5)

Date : 17 Jan 2014

Bridge No.	11	**Location (State)**	Kerala
Bridge Name	Valapattanam Bridge	**Road Name**	NH17
Station	Km147/250	**Road Category**	National Highway
GPS Data	N 11 °55 ' 49.8 "	**Management Authority**	Kerala PWD
	E 075 °21 ' 11.0 "	**Year of Construction**	1980

Detailed Description of Damages

Object Member	**P4-P13**
Kind of Damage	**Spalling**
Photo	

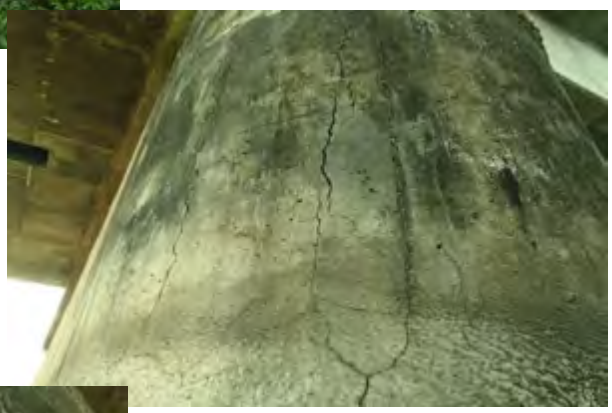
Damage Photoes (3/5)

Date : 17 Jan 2014

Bridge No.	11	**Location (State)**	Kerala
Bridge Name	Valapattanam Bridge	**Road Name**	NH17
Station	Km147/250	**Road Category**	National Highway
GPS Data	N 11 °55 ' 49.8 "	**Management Authority**	Kerala PWD
	E 075 °21 ' 11.0 "	**Year of Construction**	1980

Detailed Description of Damages

Object Member	**P2・P6・P7・P8・P10・P13**
Kind of Damage	**Crack and swelling**
Photo	



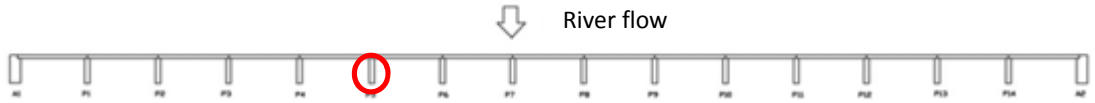
Damage Photoes (4/5)

Date : 17 Jan 2014

Bridge No.	11	**Location (State)**	Kerala
Bridge Name	Valapattanam Bridge	**Road Name**	NH17
Station	Km147/250	**Road Category**	National Highway
GPS Data	N 11 °55 ' 49.8 "	**Management Authority**	Kerala PWD
	E 075 °21 ' 11.0 "	**Year of Construction**	1980

Detailed Description of Damages

Object Member	**P5**
Kind of Damage	**Swelling**
Photo	



Damage Photoes (5/5)

Date : 17 Jan 2014

Bridge No.	11	**Location (State)**	Kerala
Bridge Name	Valapattanam Bridge	**Road Name**	NH17
Station	Km147/250	**Road Category**	National Highway
GPS Data	N 11 °55 ' 49.8 "	**Management Authority**	Kerala PWD
	E 075 °21 ' 11.0 "	**Year of Construction**	1980

Detailed Description of Damages

Object Member	**P4**
Kind of Damage	**Crack**
Photo	

General Information of the Bridge

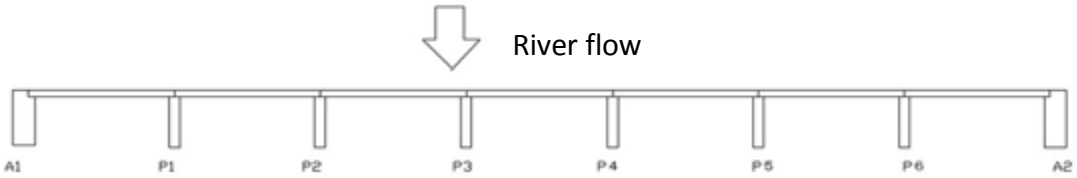
Date : 16 Jan 2014

Bridge No.	12	**Location (State)**	Kerala
Bridge Name	Perumba Bridge	**Road Name**	NH17
Station	Km115/400	**Road Category**	National Highway
GPS Data	N 12 ° 06 ' 30.0 "	**Management Authority**	Kerala PWD
	E 075 ° 13 ' 18.7 "	**Year of Construction**	1952

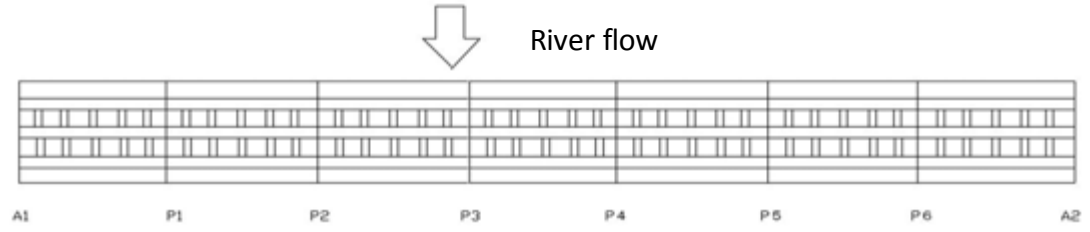
Bridge Length	146.8 m	**Span Arrangement**	7 spans
Bridge Width			
- Carriageway Width	6.7m	**Approach Road Width**	Same as Bridge
- Median Width	Nil		
- Footway Width	Nil	**Existing of Detour**	Approx. 23Km
Type of Superstructure	RC T Girder	**Type of Substructure**	Stone Masonry
Type of Foundation	Well		

Sketch of the Bridge

Side View



Plan View

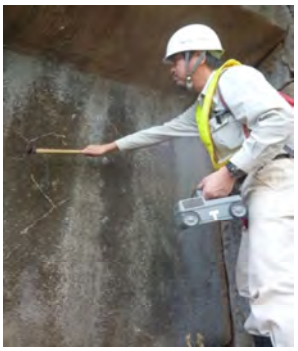


Photoes of 2nd Field Survey (1/4)

Date : 16 Jan 2014

Bridge No.	12	Location (State)	Kerala
Bridge Name	Perumba Bridge	Road Name	NH17

Photoes（Hammer Test）



Photoes of 2nd Field Survey (2/4)

Date : 16 Jan 2014

Bridge No.	12	Location (State)	Kerala
Bridge Name	Perumba Bridge	Road Name	NH17

Photoes（Rebound Hanmmer Test）

N/A
Impossible to inspect caouse of that :
- Substructure is stone masonry
- Superstructure is covered by guniting work

Photoes of 2nd Field Survey (3/4)

Date : 16 Jan 2014

Bridge No.	12	Location (State)	Kerala
Bridge Name	Perumba Bridge	Road Name	NH17

Photoes（Concrete cover survey：RC redar）

Photoes of 2nd Field Survey (4/4)

Date : 16 Jan 2014

Bridge No.	12	Location (State)	Kerala
Bridge Name	Perumba Bridge	Road Name	NH17

Photoes（Concrete cover survey：Electro magnetic redar）

N/A
Impossible to inspect caouse of that :
- Substructure is stone masonry
- Superstructure is covered by guniting work

General Description of Damages

Date : 16 Jan 2014

Bridge No.	12	**Location (State)**	Kerala
Bridge Name	Perumba Bridge	**Road Name**	NH17
Station	Km115/400	**Road Category**	National Highway
GPS Data	N 12 °06 ' 30.0 "	**Management Authority**	Kerala PWD
	E 075 °13 ' 18.7 "	**Year of Construction**	1952

General Description of Damages

Member	**Kind of the Damage** **Ex. Concrete : Cracking, Spalling, etc. Steel : Cracking, Rusting, Fracture, etc.**
1. Superstructure	
(1) Concrete Member	
- Girder	There are some cracks and efflorecence on web.
- Cross Beam	Unidentifiable due to guniting work in 2000
- Slab	There are some cracks and efflorecence on bottom slab.
(2) Steel Member	
- Girder	N/A
- Virtical Girder (stringer)	N/A
- Cross Beam	N/A
- Sway Bracing	N/A
(3) Bearing Shoe	Collapsion of bearing shoe at A2 Void in bearing block of P6
(4) EXP Joint	All covered by asphalt and not functioning properly. Some cracks.
(5) Handrail	CC peeling and corroded re-bar exposed
(6) Kerb	Nil
(7) Drainage Pipe	Nil
(8) Others	It is assumed that there are mamy dameges on superstructure although cracks were covered by guniting work and it is difficult to observe them.
2. Substructure	
- Pier	Nil
- Abutment	Nil
- Wing Wall	Nil
3. Miscellaneous	
- Approach Road Condition	Nil
- Obstruction	Nil
- Scouring	Unknown

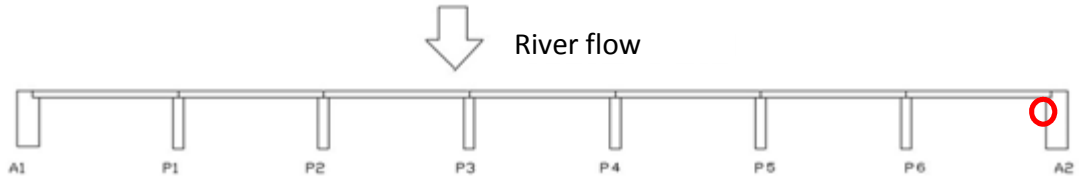
Damage Photoes (1/2)

Date : 16 Jan 2014

Bridge No.	12	**Location (State)**	Kerala
Bridge Name	Perumba Bridge	**Road Name**	NH17
Station	Km115/400	**Road Category**	National Highway
GPS Data	N 12 °06 ' 30.0 "	**Management Authority**	Kerala PWD
	E 075 °13 ' 18.7 "	**Year of Construction**	1952

Detailed Description of Damages

Object Member	**Bearing Block (A2)**
Kind of Damage	**Collapsion of bearing shoe**
Photo	



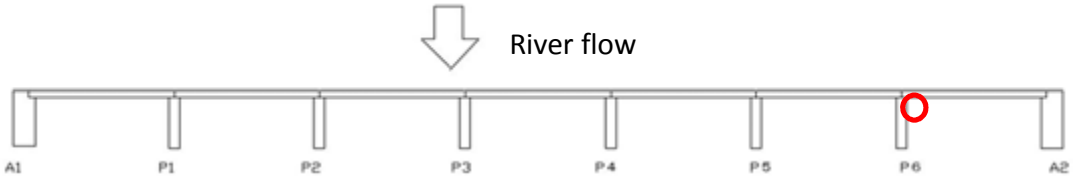
Damage Photoes (2/2)

Date : 16 Jan 2014

Bridge No.	12	**Location (State)**	Kerala
Bridge Name	Perumba Bridge	**Road Name**	NH17
Station	Km115/400	**Road Category**	National Highway
GPS Data	N 12 °06 ' 30.0 "	**Management Authority**	Kerala PWD
	E 075 °13 ' 18.7 "	**Year of Construction**	1952

Detailed Description of Damages

Object Member	**Bearing Block (P6)**
Kind of Damage	**Void in bearing block**
Photo	



General Information of the Bridge

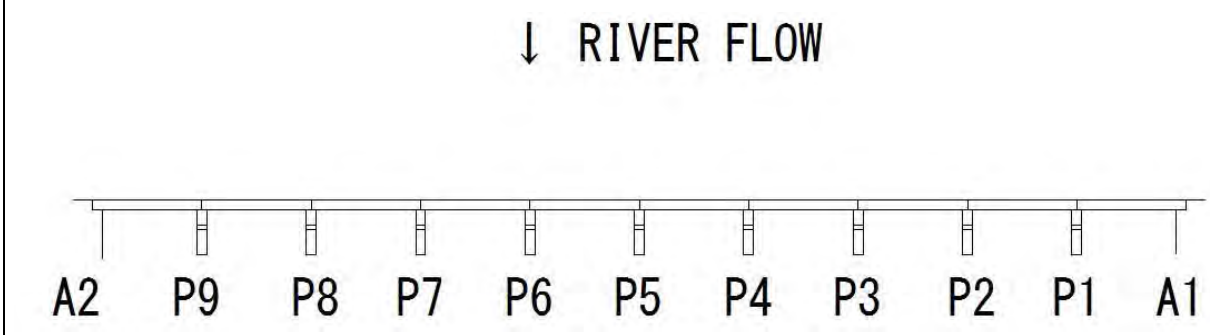
Date : 13 Jan 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E
Station	Budhel Km10/0	**Road Category**	National Higway
GPS Data	N 21° 22' 09.77"	**Management Authority**	MORTH
	E 77° 02' 25.69"	**Year of Construction**	1985

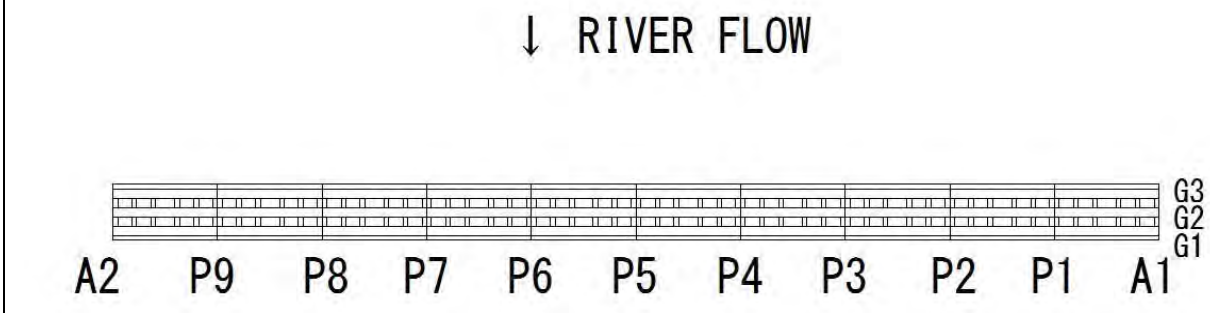
Bridge Length	240m	**Span Arrangement**	10 Spans
Bridge Width			
- Carriageway Width	7.50m (2 Lane)	**Approach Road Width**	7.50m (Both side)
- Medium Width	Nil		
- Footway Width	5.50m	**Existing of Detour**	Approx. 7km
Type of Superstructure	RC T Girder	**Type of Substructure**	RC mass concrete
Type of Foundation	Pile		

Sketch of the Bridge

Side View



Plan View



Photoes of 2nd Field Survey (1/4)

Date : 13 Jan 2014

Bridge No.	14	Location (State)	Gujarat
Bridge Name	Shetrunji Bridge	Road Name	NH8E

Photoes（Hammer Test）

Photoes of 2nd Field Survey (2/4)

Date : 13 Jan 2014

Bridge No.	14	Location (State)	Gujarat
Bridge Name	Shetrunji Bridge	Road Name	NH8E

Photoes（Rebound Hanmmer Test）

Photoes of 2nd Field Survey (3/4)

Date : 13 Jan 2014

Bridge No.	14	Location (State)	Gujarat
Bridge Name	Shetrunji Bridge	Road Name	NH8E

Photoes（Concrete cover survey：RC redar）

Photoes of 2nd Field Survey (4/4)

Date : 13 Jan 2014

Bridge No.	14	Location (State)	Gujarat
Bridge Name	Shetrunji Bridge	Road Name	NH8E

Photoes（Concrete cover survey：Electro magnetic redar）

General Description of Damages

Date : 13 Jan 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E
Station	Budhel Km10/0	**Road Category**	National Higway
GPS Data	N 21°22' 09.77"	**Management Authority**	MORTH
	E 77°02' 25.69"	**Year of Construction**	1985

General Description of Damages

Member	**Kind of the Damage** **Ex. Concrete : Cracking, Spalling, etc. Steel : Cracking, Rusting, Fracture, etc.**
1. Superstructure	
(1) Concrete Member	
- Girder	There are many spalling
- Cross Beam	Nil
- Slab	Nil
(2) Steel Member	
- Girder	N/A
- Virtical Girder (stringer)	N/A
- Cross Beam	N/A
- Sway Bracing	N/A
(3) Bearing Shoe	Nil
(4) EXP Joint	Nil
(5) Handrail	Nil
(6) Kerb	N/A
(7) Drainage Pipe	Nil
(8) Others	
2. Substructure	
- Pier	Apalling and Swelling (P1)
- Abutment	Nil
- Wing Wall	There are many spalling
3. Miscellaneous	
- Approach Road Condition	Nil
- Obstruction	Nil
- Scouring	Nil

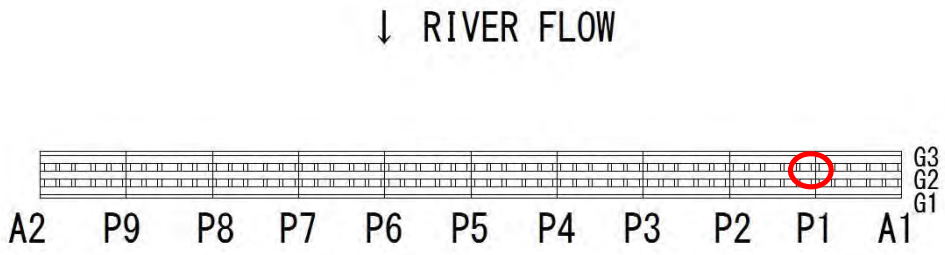
Damage Photoes (1/2)

Date : 13 Jan 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E
Station	Budhel Km10/0	**Road Category**	National Higway
GPS Data	N 21°22' 09.77"	**Management Authority**	MORTH
	E 77°02' 25.69"	**Year of Construction**	1985

Detailed Description of Damages

Object Member	**P1**
Kind of Damage	**Spalling**
Photo	



Damage Photoes (2/2)

Date : 13 Jan 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E
Station	Budhel Km10/0	**Road Category**	National Higway
GPS Data	N 21°22' 09.77"	**Management Authority**	MORTH
	E 77°02' 25.69"	**Year of Construction**	1985

Detailed Description of Damages

Object Member	**P1**
Kind of Damage	**Swelling**
Photo	

シュミットハンマー試験

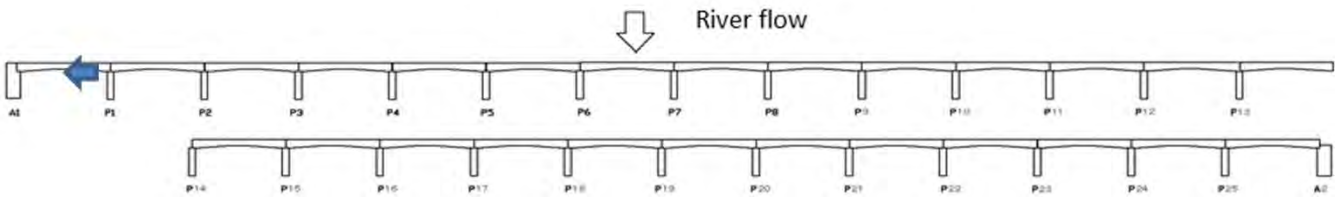
Record of Rebound Hammer Test (1/6)

Inspector : Koji KAWAMATA Date : 23 Jan 2014

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A

Sketch of the Bridge

Side View



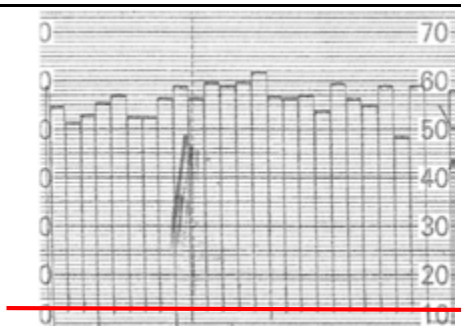
Test Hammer Direction: **Horizontal**

Concrete Condition: **Dry**

Correction of Direction **R1**: **0**

Corerection of Condition **R2**: **0**

Test Data **R**:



53	52	51	52	51	Average **Av**:	**51.3**
50	48	55	51	50	Av.−20%	**41.0**
46	48	54	52	54	Av.+20%	**61.6**
48	51	55	49	43		
50	54	57	54	54		

53	52	51	52	51	**R:**	**51.3**
50	48	55	51	50		
46	48	54	52	54		
48	51	55	49	43		
50	54	57	54	54		

R0=	**R**	+	**R1**	+	**R2**
	51.3		0		0
=		**51.3**			

$F(N/mm2) = (-18.0 + 1.27 \times RO) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **47.2** N/mm2

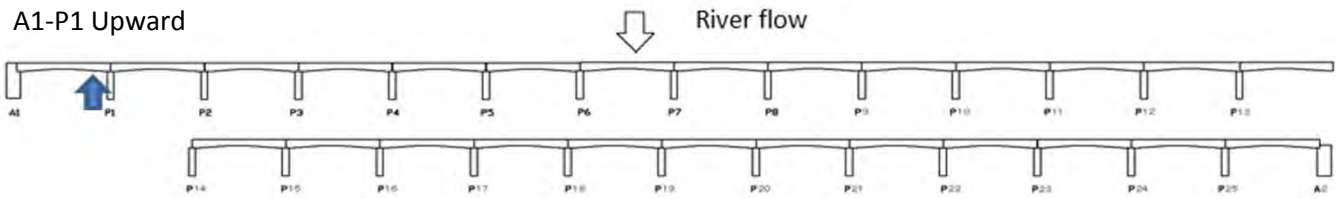
Record of Rebound Hammer Test (2/6)

Inspector : Koji KAWAMATA Date : 23 Jan 2014

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A

Sketch of the Bridge

Side View



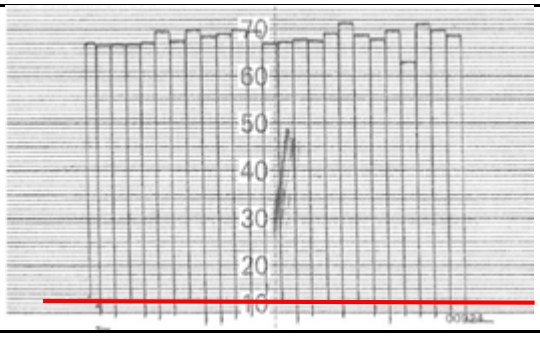
Test Hammer Direction: **Vertical**

Concrete Condition: **Dry**

Correction of Direction **R1**: **−0.6**

Corerection of Condition **R2**: **0**

Test Data **R**:



62	65	65	62	65	Average **Av**:	**62.9**
62	63	64	64	58	Av.−20%	**50.3**
62	65	62	66	56	Av.+20%	**75.5**
62	63	62	64	65		
62	64	63	63	64		

62	65	65	62	65	**R:**	**62.9**
62	63	64	64	58		
62	65	62	66	56		
62	63	62	64	65		
62	64	63	63	64		

R0=	**R**	+	**R1**	+	**R2**
	62.9		−0.6		0
=		**62.3**			

$F(N/mm2) = (-18.0 + 1.27 \times RO) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **61.1** N/mm2

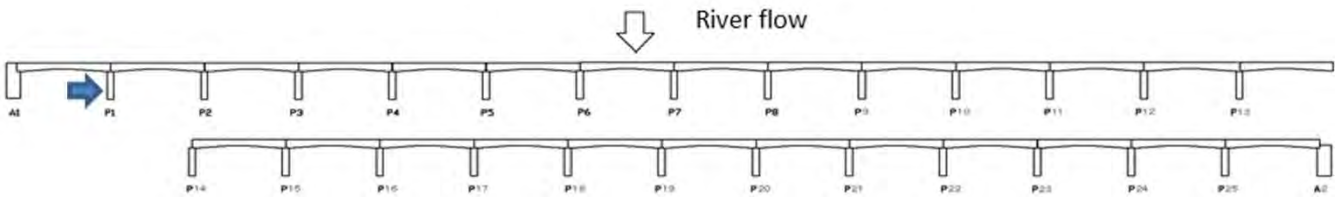
Record of Rebound Hammer Test (3/6)

Inspector : Koji KAWAMATA Date : 23 Jan 2014

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A

Sketch of the Bridge

Side View



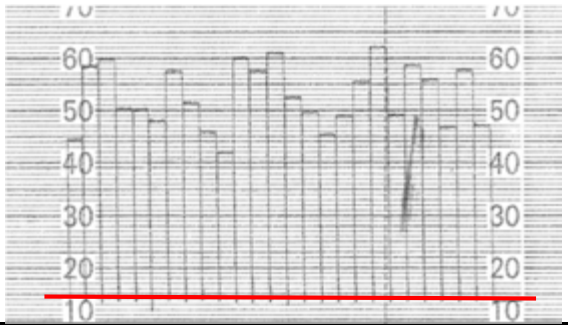
Test Hammer Direction: **Horizontal**

Concrete Condition: **Dry**

Correction of Direction **R1**: **0**

Corerection of Condition **R2**: **0**

Test Data **R**:



37	40	52	38	50	Average **Av**:	**44.7**
50	49	50	41	48	Av.−20%	**35.8**
52	43	53	48	39	Av.+20%	**53.6**
42	38	45	54	50		
42	34	42	41	39		

37	40	52	38	50	**R:**	**45.1**
50	49	50	41	48		
52	43	53	48	39		
42	38	45	54	50		
42		42	41	39		

R0=	**R**	+	**R1**	+	**R2**
	45.1		0		0
=		**45.1**			

$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **39.3** N/mm2

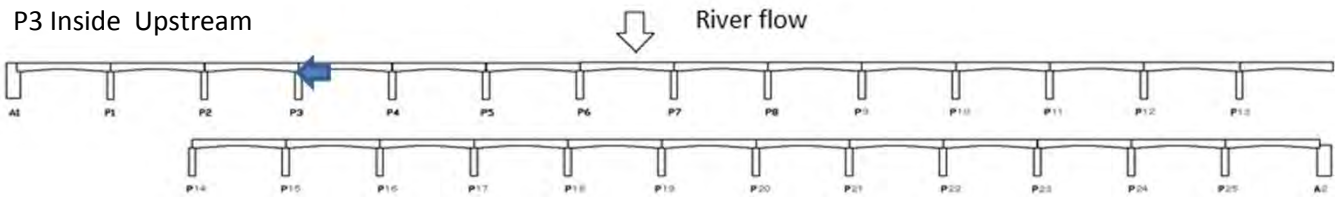
Rebound Hammer Test (4/6)

Inspector : Koji KAWAMATA Date : 23 Jan 2014

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A

Sketch of the Bridge

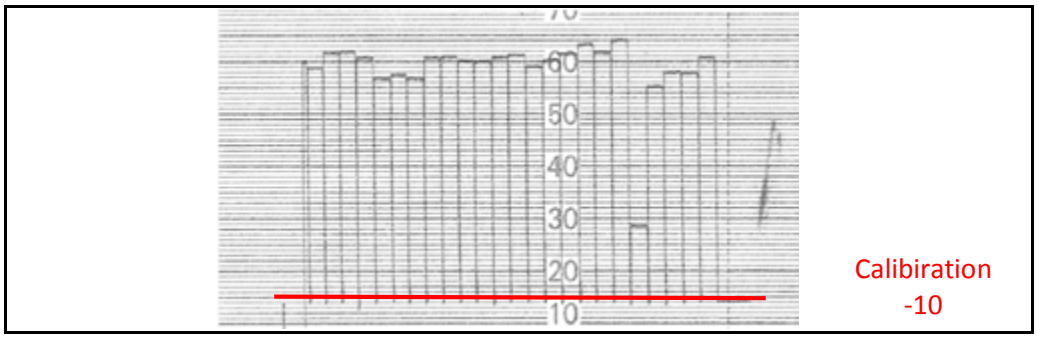
Side View



Test Hammer Direction: **Horizontal** Correction of Direction **R1**: **0**

Concrete Condition: **Dry** Corerection of Condition **R2**: **0**

Test Data **R**:



50	47	50	50	19	Average **Av**:	**48.9**
49	48	50	52	45	Av.−20%	**39.1**
52	47	51	54	48	Av.+20%	**58.7**
52	51	51	52	48		
51	51	49	54	51		

50	47	50	50		**R:**	**50.1**
49	48	50	52	45		
52	47	51	54	48		
52	51	51	52	48		
51	51	49	54	51		

R0=	**R**	+	**R1**	+	**R2**
	50.1		0		0
=		**50.1**			

$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **45.6** N/mm2

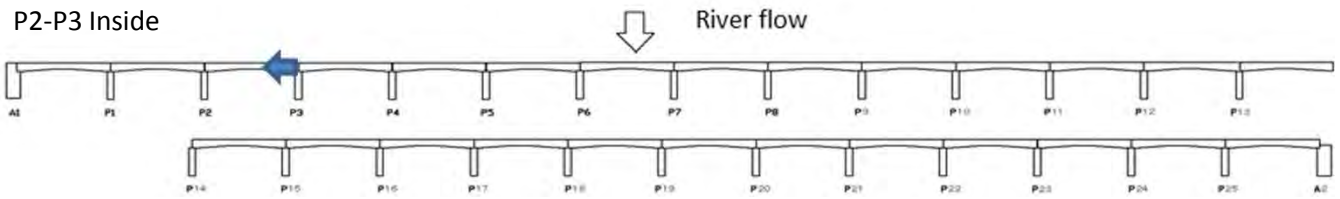
Record of Rebound Hammer Test (5/6)

Inspector : Koji KAWAMATA Date : 23 Jan 2014

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A

Sketch of the Bridge

Side View



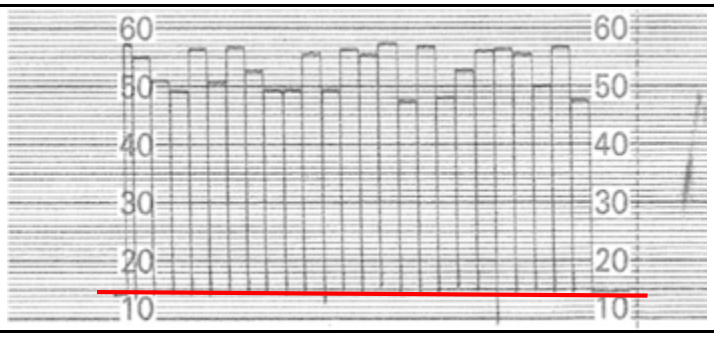
Test Hammer Direction: **Horizontal**

Concrete Condition: **Dry**

Correction of Direction **R1**: **0**

Corerection of Condition **R2**: **0**

Test Data **R**:



47	41	46	38	46	Average **Av**:	**43.1**
45	47	39	47	45	Av.−20%	**34.5**
41	43	46	38	40	Av.+20%	**51.7**
39	39	45	43	47		
47	39	47	46	37		

47	41	46	38	46	**R:**	**43.1**
45	47	39	47	45		
41	43	46	38	40		
39	39	45	43	47		
47	39	47	46	37		

R0=	**R**	+	**R1**	+	**R2**
	43.1		0		0
=		**43.1**			

$F(N/mm2) = (-18.0 + 1.27 \times RO) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **36.7** N/mm2

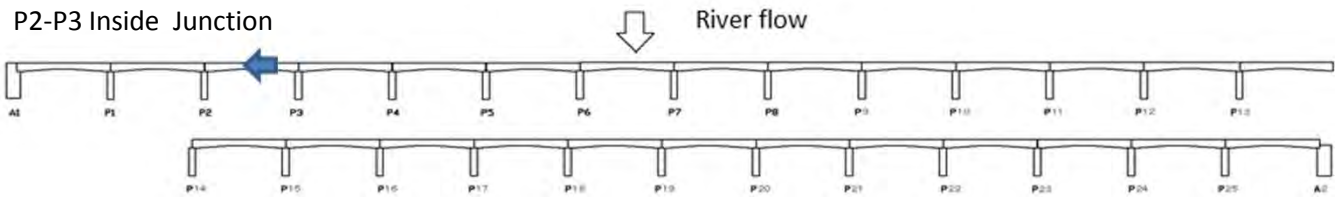
Record of Rebound Hammer Test (6/6)

Inspector : Koji KAWAMATA Date : 23 Jan 2014

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A

Sketch of the Bridge

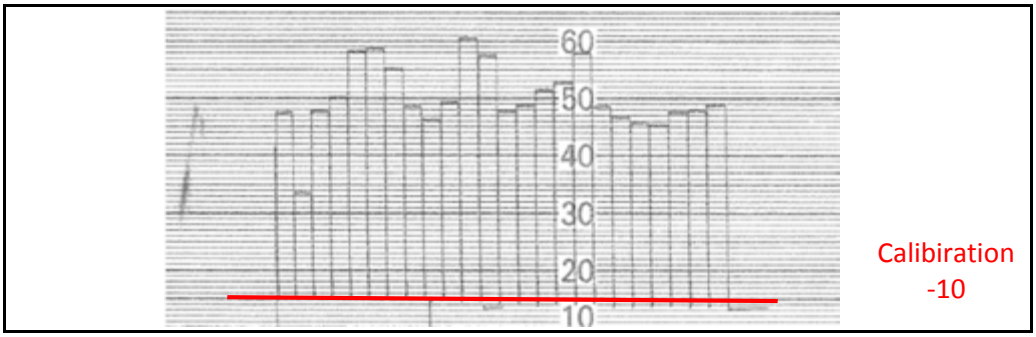
Side View



Test Hammer Direction: **Horizontal** Correction of Direction **R1**: **0**

Concrete Condition: **Dry** Corerection of Condition **R2**: **0**

Test Data **R**:



32	48	39	41	36	Average **Av**:	**39.9**
38	49	51	43	35	Av.−20%	**31.9**
24	45	48	48	38	Av.+20%	**47.9**
38	39	38	38	38		
40	36	39	37	39		

32	48	39	41	36	**R:**	**40.1**
38	49		43	35		
	45	48	48	38		
38	39	38	38	38		
40	36	39	37	39		

R0=	**R**	+	**R1**	+	**R2**
	40.1		0		0
=		**40.1**			

$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **32.9** N/mm2

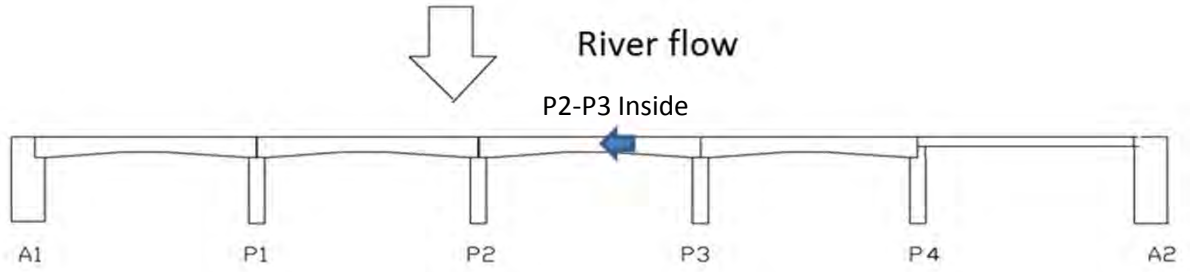
Record of Rebound Hammer Test (1/4)

Inspector : Koji KAWAMATA Date : 27 Jan 2014

Bridge No.	4	**Location (State)**	Assam
Bridge Name	Badarpurghat Bridge	**Road Name**	NH 6 (old NH 44)

Sketch of the Bridge

Side View



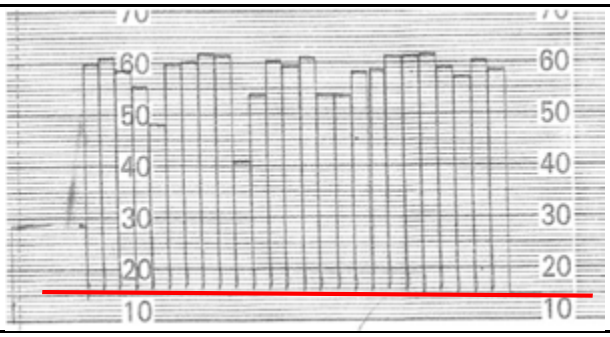
Test Hammer Direction: **Horizontal**

Concrete Condition: **Dry**

Correction of Direction **R1**: **0**

Corerection of Condition **R2**: **0**

Test Data **R**:



50	50	44	44	51	Average **Av**:	**47.4**
51	50	51	48	49	Av.−20%	**37.9**
48	52	49	49	37	Av.+20%	**56.9**
46	51	51	51	51		
38	31	44	51	48		

50	50	44	44	51	**R:**	**48.6**
51	50	51	48	49		
48	52	49	49			
46	51	51	51	51		
38		44	51	48		

R0=	**R**	+	**R1**	+	**R2**
	48.6		0		0
=		**48.6**			

$$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$$

α : 1 (Age of concrete over 28 days)

$$= \boxed{43.7} \text{ N/mm2}$$

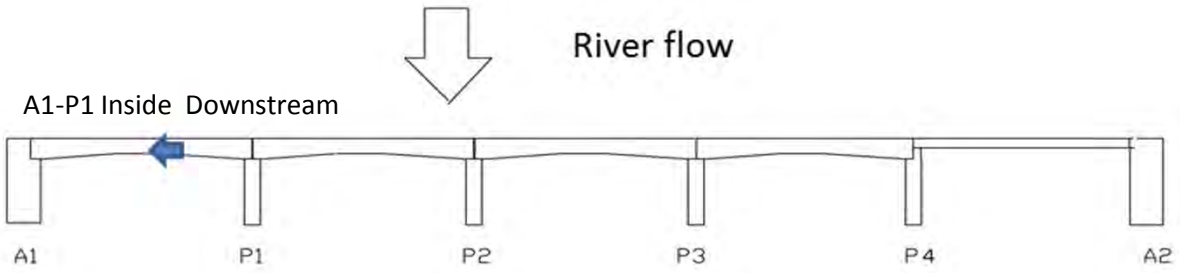
Record of Rebound Hammer Test (2/4)

Inspector : Koji KAWAMATA Date : 27 Jan 2014

Bridge No.	4	**Location (State)**	Assam
Bridge Name	Badarpurghat Bridge	**Road Name**	NH 6 (old NH 44)

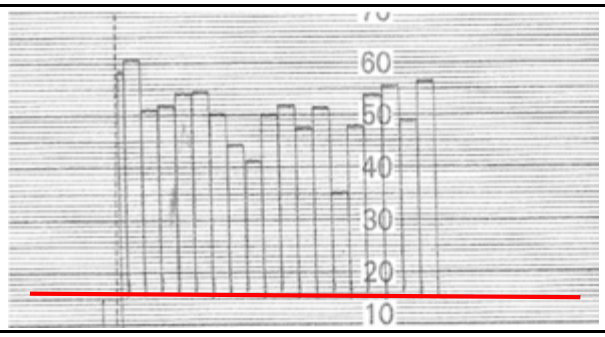
Sketch of the Bridge

Side View



Test Hammer Direction: **Horizontal**
Concrete Condition: **Dry**
Correction of Direction **R1**: **0**
Corerection of Condition **R2**: **0**

Test Data **R**:



48	45	42	44	Average **Av**:	**40.8**
51	40	37	46	Av.−20%	**32.6**
41	34	41	39	Av.+20%	**49.0**
42	31	25	47		
45	40	38			

48	45	42	44	**R:** **41.8**
	40	37	46	
41	34	41	39	
42			47	
45	40	38		

R0=	**R**	+	**R1**	+	**R2**
	41.8		0		0
=		**41.8**			

$$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$$

α : 1 (Age of concrete over 28 days)

$$= 35.1 \text{ N/mm2}$$

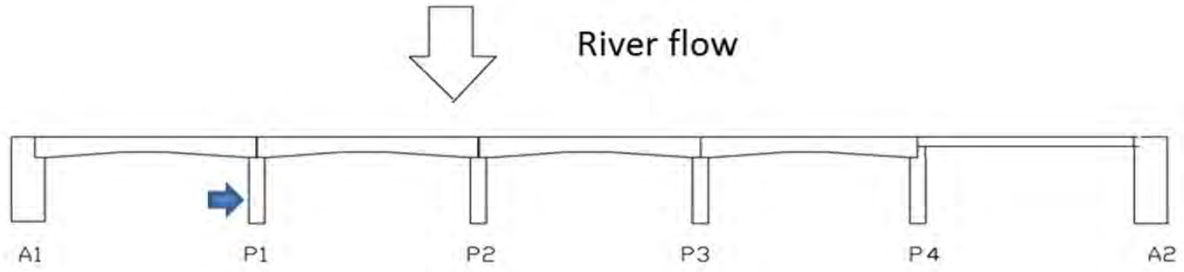
Record of Rebound Hammer Test (3/4)

Inspector : Koji KAWAMATA Date : 27 Jan 2014

Bridge No.	4	**Location (State)**	Assam
Bridge Name	Badarpurghat Bridge	**Road Name**	NH 6 (old NH 44)

Sketch of the Bridge

Side View



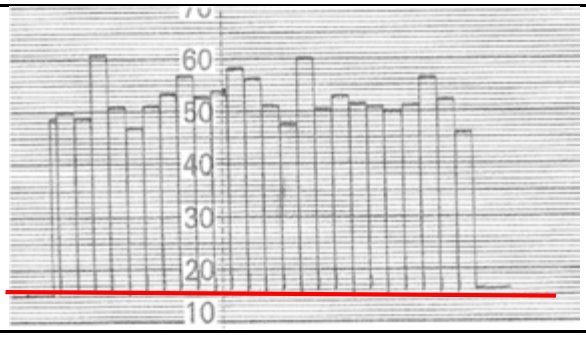
Test Hammer Direction: **Horizontal**

Concrete Condition: **Dry**

Correction of Direction **R1**: **0**

Corerection of Condition **R2**: **0**

Test Data **R**:



Calibration
-10

39	37	43	50	40	Average **Av**:	**42.4**
40	41	48	41	41	Av.−20%	**33.9**
39	43	46	43	47	Av.+20%	**50.9**
51	47	41	42	43		
41	42	38	41	36		

39	37	43	50	40	**R:**	**42.0**
40	41	48	41	41		
39	43	46	43	47		
	47	41	42	43		
41	42	38	41	36		

R0=	**R**	+	**R1**	+	**R2**
	42		0		0
=		**42**			

$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **35.3** N/mm2

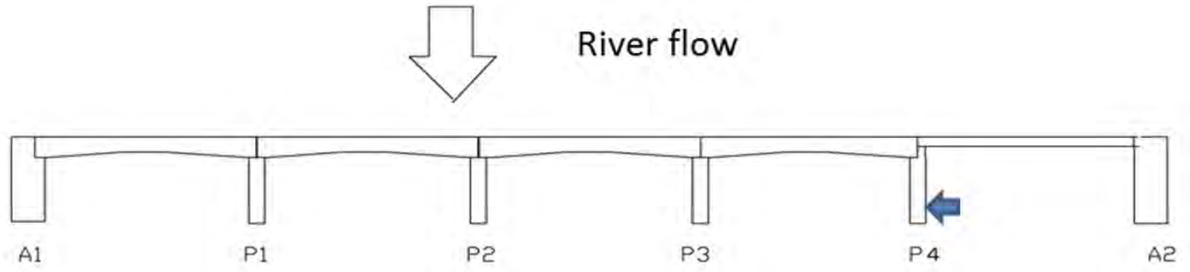
Record of Rebound Hammer Test (4/4)

Inspector : Koji KAWAMATA Date : 27 Jan 2014

Bridge No.	4	**Location (State)**	Assam
Bridge Name	Badarpurghat Bridge	**Road Name**	NH 6 (old NH 44)

Sketch of the Bridge

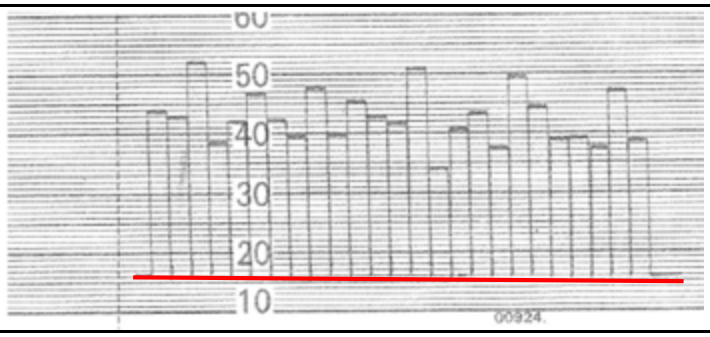
Side View



Test Hammer Direction: **Horizontal** Correction of Direction **R1**: **0**

Concrete Condition: **Dry** Corerection of Condition **R2**: **0**

Test Data **R**:



34	37	36	31	29	Average **Av**:	**32.8**
33	32	33	34	29	Av.−20%	**26.2**
42	30	32	28	27	Av.+20%	**39.4**
28	38	41	40	37		
32	30	24	35	29		

34	37	36	31	29	**R:**	**32.1**
33	32	33	34	29		
	30	32	28	27		
28	38			37		
32	30		35	29		

R0=	**R**	+	**R1**	+	**R2**
	32.1		0		0
=		**32.1**			

$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **22.8** N/mm2

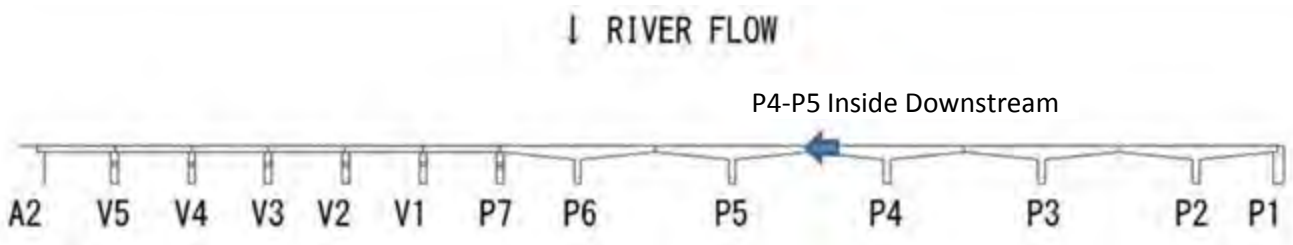
Record of Rebound Hammer Test (1/4)

Inspector : Koji KAWAMATA Date : 14 Nov 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17

Sketch of the Bridge

Side View



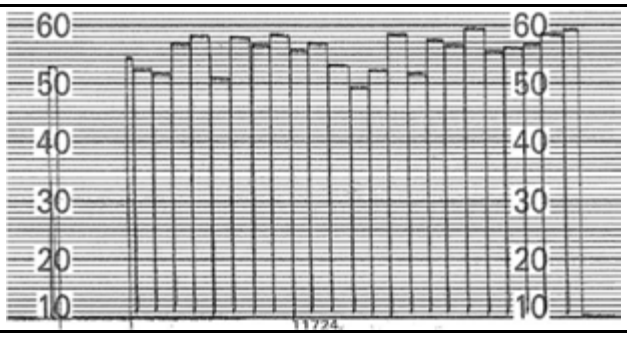
Test Hammer Direction: **Horizontal**

Concrete Condition: **Dry**

Correction of Direction **R1**: **0**

Corerection of Condition **R2**: **0**

Test Data **R**:



55	51	57	52	56	Average **Av**:	**55.7**
53	58	53	57	57	Av.−20%	**44.6**
52	57	49	56	58	Av.+20%	**66.8**
57	58	53	60	59		
58	56	59	55			

55	51	57	52	56	**R:**	**55.7**
53	58	53	57	57		
52	57	49	56	58		
57	58	53	60	59		
58	56	59	55			

R0=	**R**	+	**R1**	+	**R2**
	55.7		0		0
=		**55.7**			

$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$ α : 1 (Age of concrete over 28 days)

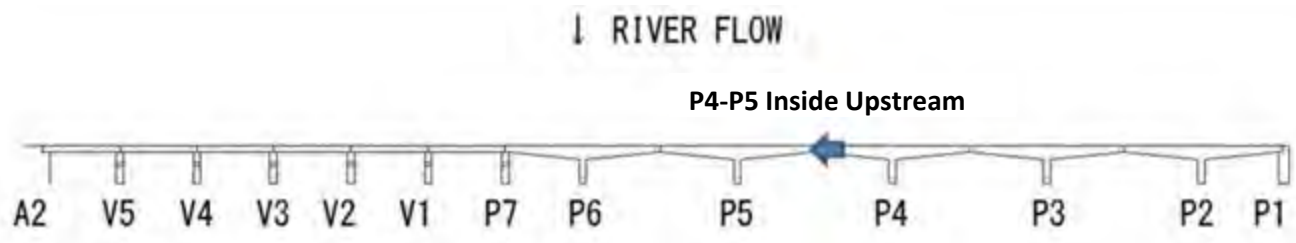
= **52.7** N/mm2

Record of Rebound Hammer Test (2/4)

Inspector : Koji KAWAMATA Date : 14 Nov 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17

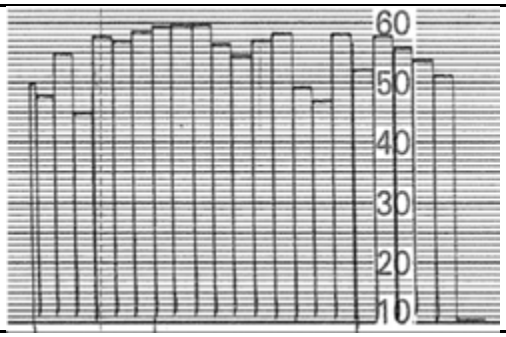
Sketch of the Bridge — Side View



Test Hammer Direction: **Horizontal** Correction of Direction **R1**: **0**

Concrete Condition: **Dry** Corerection of Condition **R2**: **0**

Test Data **R**:



50	57	56	47	56	Average **Av**:	**53.5**
48	59	45	58	54	Av.−20%	**42.8**
55	60	47	57	51	Av.+20%	**64.2**
45	60	48	52			
58	60	49	58			

50	57	56	47	56	**R:**	**53.5**
48	59	45	58	54		
55	60	47	57	51		
45	60	48	52			
58	60	49	58			

R0=	**R**	+	**R1**	+	**R2**
	53.5		0		0
=		**53.5**			

$F(N/mm2) = (-18.0 + 1.27 \times RO) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **49.9** N/mm2

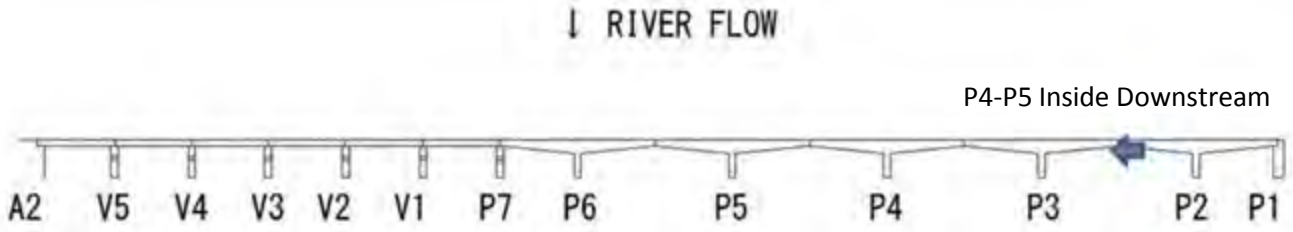
Record of Rebound Hammer Test (3/4)

Inspector : Koji KAWAMATA Date : 14 Nov 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17

Sketch of the Bridge

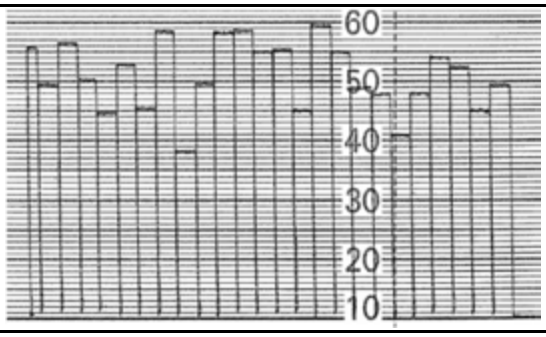
Side View



Test Hammer Direction: **Horizontal** Correction of Direction **R1**: **0**

Concrete Condition: **Dry** Corerection of Condition **R2**: **0**

Test Data **R**:



56	53	58	60	48	Average **Av**:	**51.0**
50	45	59	55	54	Av.−20%	**40.8**
56	59	55	48	52	Av.+20%	**61.2**
50	38	56	47	45		
45	50	45	41	49		

56	53	58	60	48	**R:**	**51.0**
50	45	59	55	54		
56	59	55	48	52		
50	38	56	47	45		
45	50	45	41	49		

R0=	**R**	+	**R1**	+	**R2**
	51		0		0
=		**51**			

$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **46.8** N/mm2

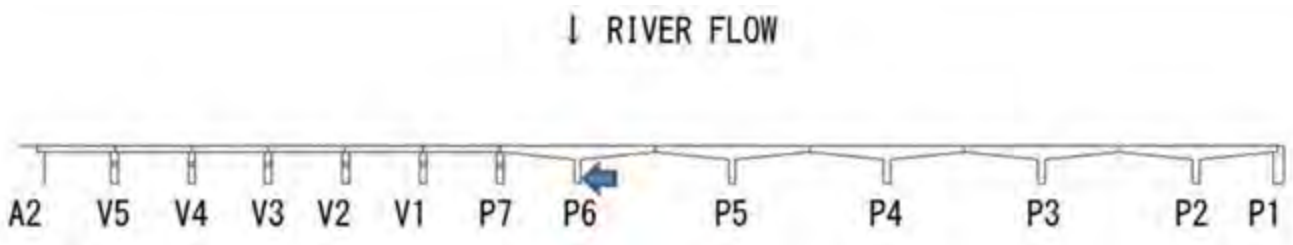
Record of Rebound Hammer Test (4/4)

Inspector : Koji KAWAMATA Date : 14 Nov 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17

Sketch of the Bridge

Side View



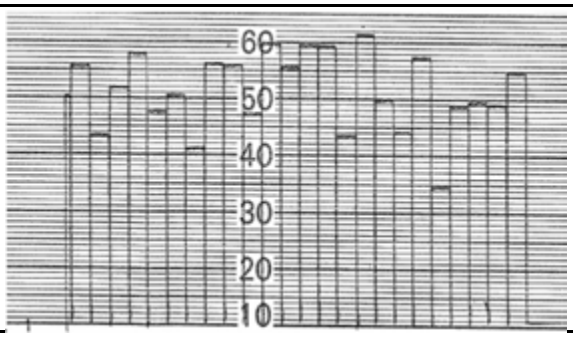
Test Hammer Direction: **Horizontal**

Concrete Condition: **Dry**

Correction of Direction **R1**: **0**

Corerection of Condition **R2**: **0**

Test Data **R**:



50	47	47	44	35	Average **Av**:	**51.5**
56	51	60	61	49	Av.−20%	**41.2**
43	41	56	50	50	Av.+20%	**61.8**
52	56	60	44	49		
58	56	59	58	55		

50	47	47	44	35	**R:**	**51.9**
56	51	60	61	49		
43		56	50	50		
52	56	60	44	49		
58	56	59	58	55		

R0=	**R**	+	**R1**	+	**R2**
	51.9		0		0
=		**51.9**			

$$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$$

α : 1 (Age of concrete over 28 days)

$$= \mathbf{47.9}\ N/mm2$$

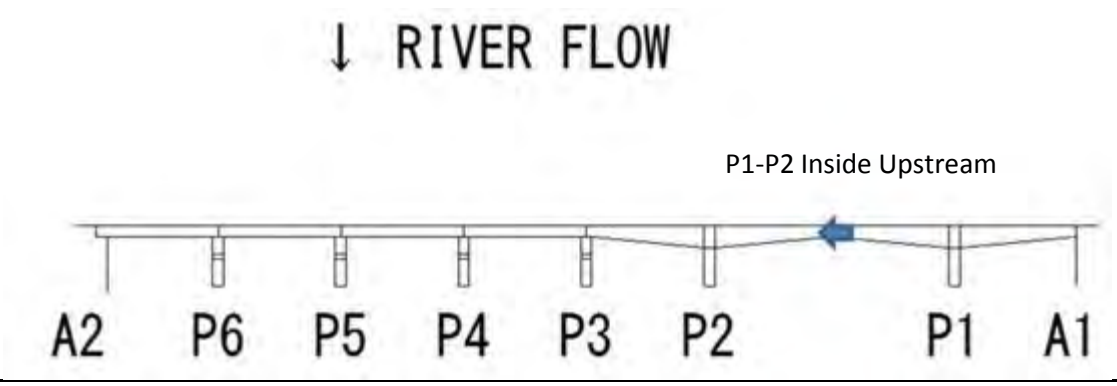
Record of Rebound Hammer Test (1/2)

Inspector : Koji KAWAMATA Date : 15 Jan 2014

Bridge No.	8	**Location (State)**	Goa
Bridge Name	Borim Bridge	**Road Name**	NH17B

Sketch of the Bridge

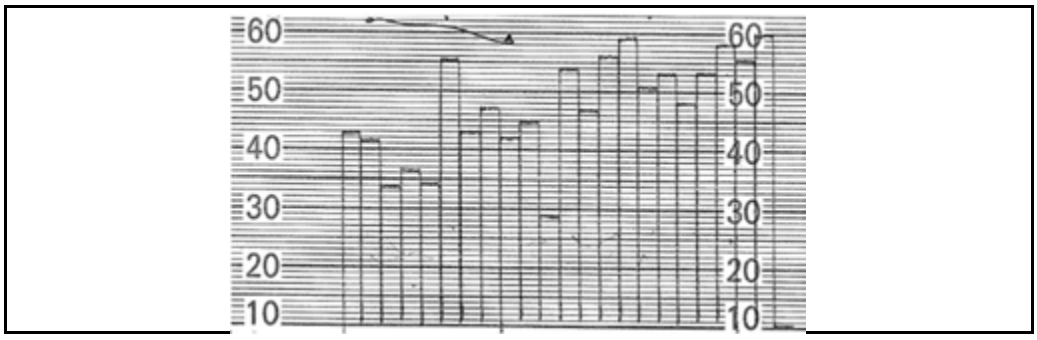
Side View



Test Hammer Direction: **Horizontal** Correction of Direction **R1**: **0**

Concrete Condition: **Dry** Corerection of Condition **R2**: **0**

Test Data **R**:



43	55	29	51	56	Average **Av**:	**47.5**
42	43	54	53	60	Av.−20%	**38.0**
34	47	47	48		Av.+20%	**57.0**
36	42	56	54			
34	45	59	58			

43	55		51	56	**R:**	**49.1**
42	43	54	53			
	47	47	48			
	42	56	54			
	45					

R0=	**R**	+	**R1**	+	**R2**
	49.1		0		0
=		**49.1**			

$F(N/mm2) = (-18.0 + 1.27 \times RO) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **44.4** N/mm2

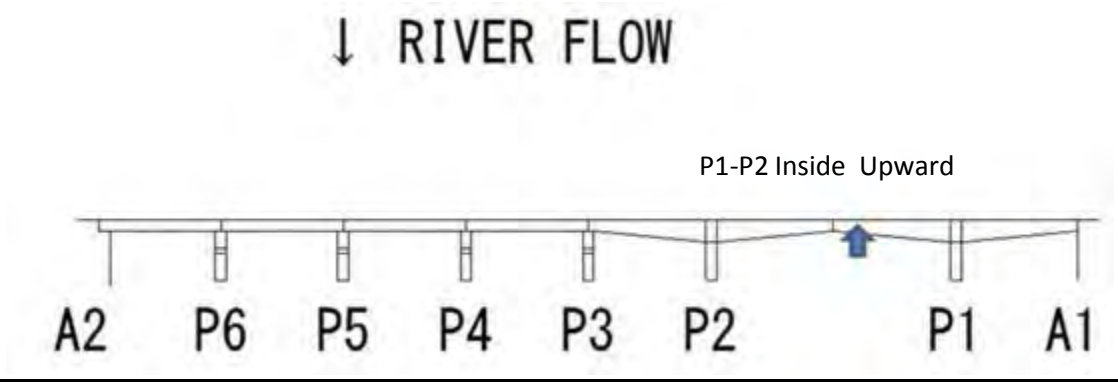
Record of Rebound Hammer Test (2/2)

Inspector : Koji KAWAMATA Date : 15 Jan 2014

Bridge No.	8	**Location (State)**	Goa
Bridge Name	Borim Bridge	**Road Name**	NH17B

Sketch of the Bridge

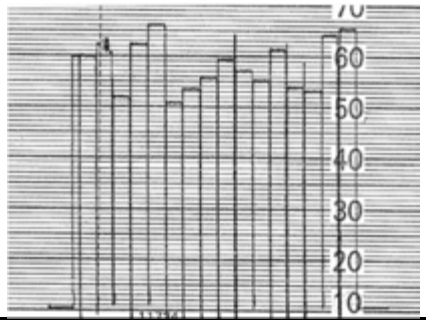
Side View



Test Hammer Direction: **Vertical** Correction of Direction **R1**: **−2.50**

Concrete Condition: **Dry** Corerection of Condition **R2**: **0**

Test Data **R**:



60	66	64	54	Average **Av**:	**58.9**
60	51	57	59	Av.−20%	**47.1**
63	54	55	53	Av.+20%	**70.7**
52	56	61	64		
62	59	62	66		

60	66	64	54	**R:**	**58.9**
60	51	57	59		
63	54	55	53		
52	56	61	64		
62	59	62	66		

R0=	**R**	+	**R1**	+	**R2**
	58.9		−2.5		0
=		**56.4**			

$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **53.6** N/mm2

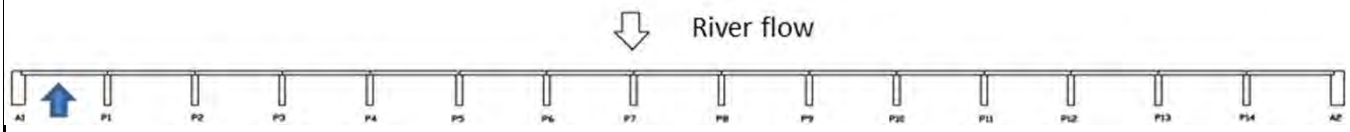
Record of Rebound Hammer Test (1/3)

Inspector : Koji KAWAMATA Date : 17 Jan 2014

Bridge No.	11	**Location (State)**	Kerala
Bridge Name	Valapattanam Bridge	**Road Name**	NH17

Sketch of the Bridge

Side View

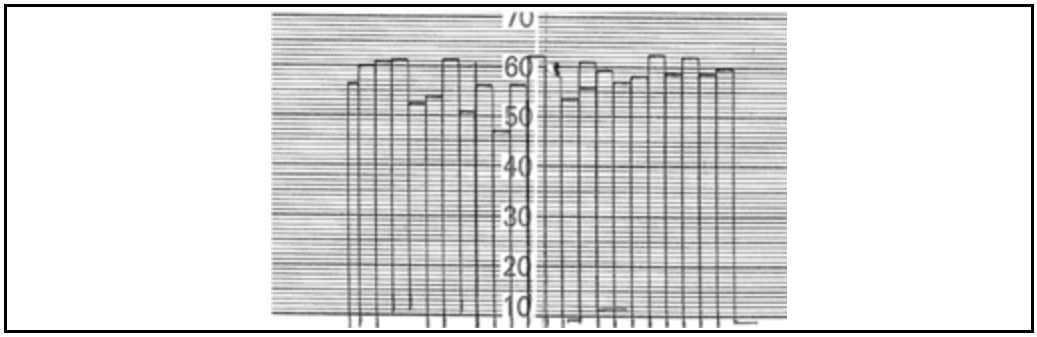


P14-A2 Upward

Test Hammer Direction: **Vertical** Correction of Direction **R1**: **−3.0**

Concrete Condition: **Dry** Corerection of Condition **R2**: **0**

Test Data **R**:



56	54	47	61	62	Average **Av**:	**57.8**
60	61	56	56	59	Av.−20%	**46.2**
61	51	62	59	62	Av.+20%	**69.4**
61	61	60	57	59		
52	56	53	58	60		

56	54	47	61	62	**R:**	**57.8**
60	61	56	56	59		
61	51	62	59	62		
61	61	60	57	59		
52	56	53	58	60		

R0=	**R**	+	**R1**	+	**R2**
	57.8		−3.0		0
=		**54.8**			

$F(N/mm2) = (-18.0 + 1.27 \times RO) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **51.6** N/mm2

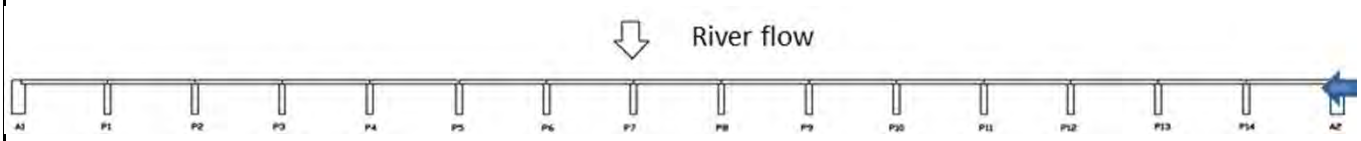
Record of Rebound Hammer Test (2/3)

Inspector : Koji KAWAMATA Date : 17 Jan 2014

Bridge No.	11	**Location (State)**	Kerala
Bridge Name	Valapattanam Bridge	**Road Name**	NH17

Sketch of the Bridge

Side View



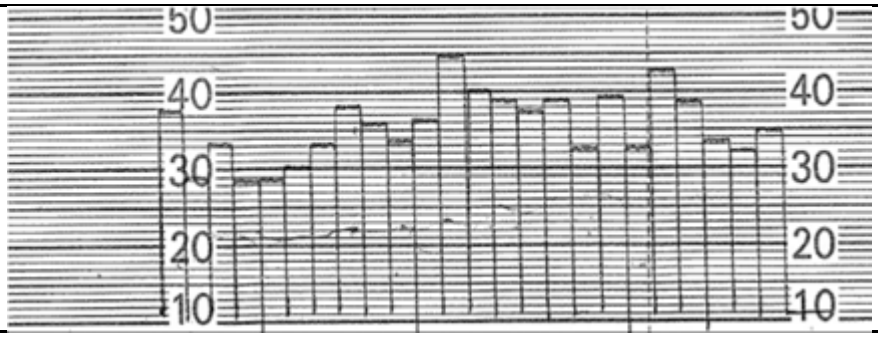
Test Hammer Direction: **Horizontal**

Concrete Condition: **Dry**

Correction of Direction **R1**: **0**

Corerection of Condition **R2**: **0**

Test Data **R**:



38	30	36	39	39	Average **Av**:	**35.7**
30	33	45	33	34	Av.−20%	**28.6**
34	37	40	40	32	Av.+20%	**42.8**
29	36	39	33	35		
29	34	38	43			

38	30	36	39	39	**R:**	**34.9**
30	33		33	34		
34	37	40	40	32		
29	36	39	33	35		
29	34	38				

R0=	**R**	+	**R1**	+	**R2**
	34.9		0		0
=		**34.9**			

$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **26.3** N/mm2

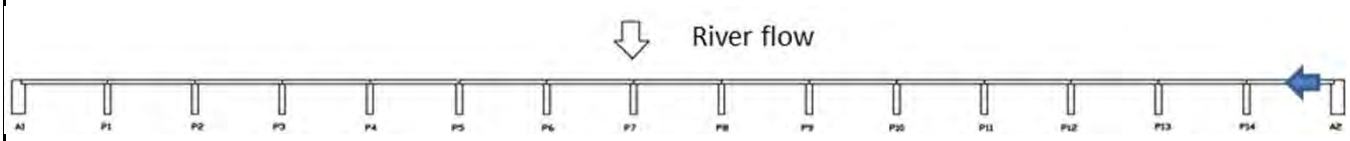
Record of Rebound Hammer Test (3/3)

Inspector : Koji KAWAMATA Date : 17 Jan 2014

Bridge No.	11	**Location (State)**	Kerala
Bridge Name	Valapattanam Bridge	**Road Name**	NH17

Sketch of the Bridge

Side View

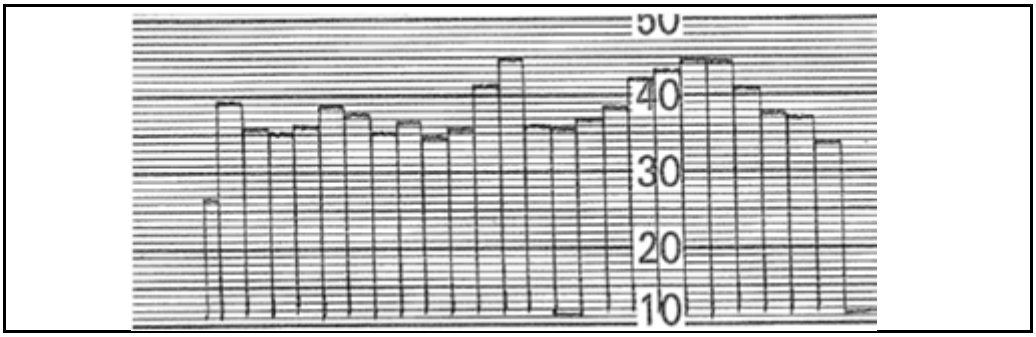


A1-P1 Inside Downstrem

Test Hammer Direction: **Horizontal** Correction of Direction **R1**: **0**

Concrete Condition: **Dry** Corerection of Condition **R2**: **0**

Test Data **R**:



26	39	36	37	45	Average **Av**:	**38.0**
39	38	41	38	41	Av.−20%	**30.4**
36	35	45	42	38	Av.+20%	**45.6**
35	37	36	43	37		
36	35	36	45	33		

	39	36	37	45	**R:**	**38.5**
39	38	41	38	41		
36	35	45	42	38		
35	37	36	43	37		
36	35	36	45	33		

R0=	**R**	+	**R1**	+	**R2**
	38.5		0		0
=		**38.5**			

$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **30.9** N/mm2

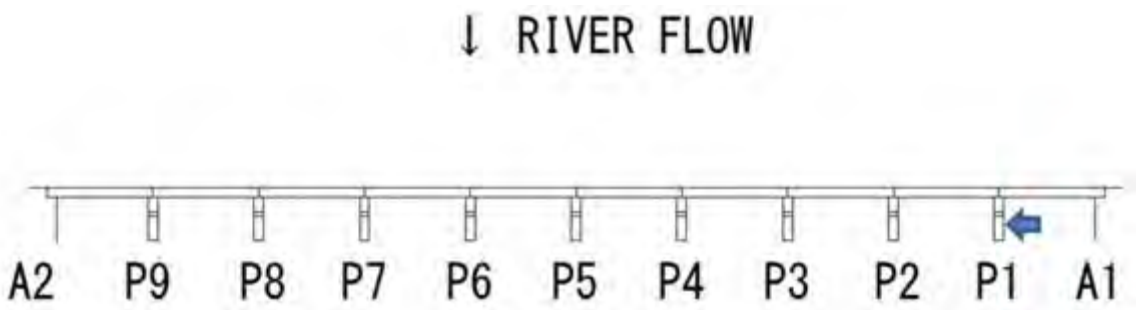
Record of Rebound Hammer Test (1/7)

Inspector : Koji KAWAMATA Date : 13 Jan 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E

Sketch of the Bridge

Side View



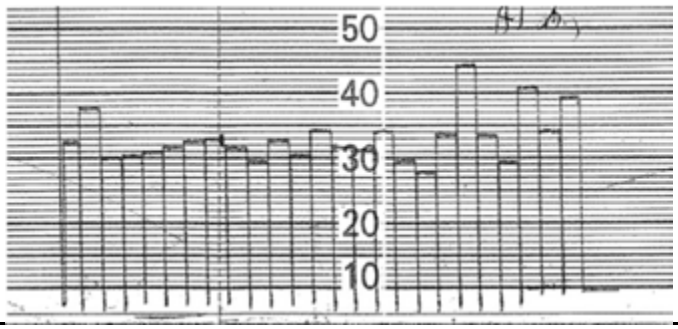
Test Hammer Direction: **Horizontal**

Concrete Condition: **Dry**

Correction of Direction **R1**: **0**

Corerection of Condition **R2**: **0**

Test Data **R**:



33	32	33	34	34	Average **Av**:	**33.6**
47	33	31	30	29	Av.−20%	**26.9**
30	33	34	28	41	Av.+20%	**40.3**
30	32	32	34	33		
31	30	32	44	39		

33	32	33	34	34	**R:**	**32.5**
	33	31	30	29		
30	33	34	28	41		
30	32	32	34	33		
31	30	32		39		

R0=	**R**	+	**R1**	+	**R2**
	32.5		0		0
=		**32.5**			

$$F(N/mm2) = (-18.0 + 1.27 \times RO) \times \alpha$$

α : 1 (Age of concrete over 28 days)

$$= \boxed{23.3} \text{ N/mm2}$$

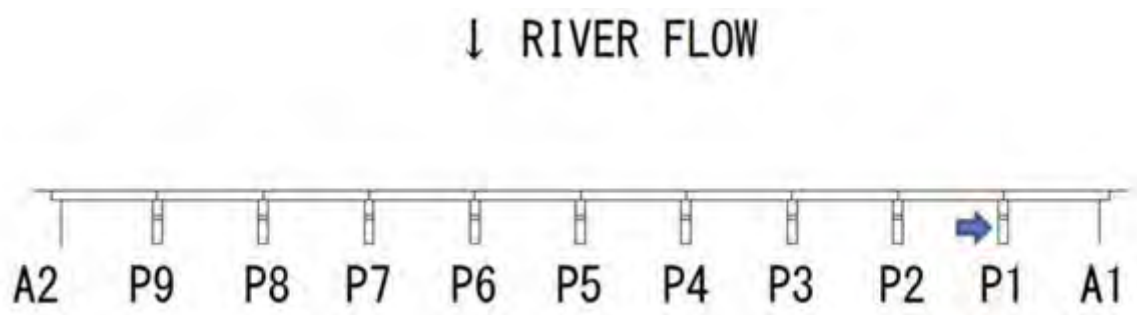
Record of Rebound Hammer Test (2/7)

Inspector : Koji KAWAMATA Date : 13 Jan 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E

Sketch of the Bridge

Side View



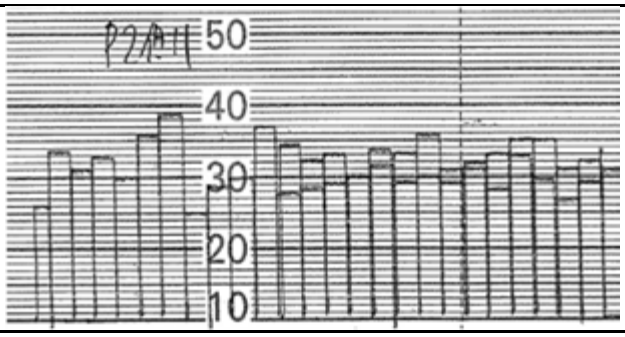
Test Hammer Direction: **Horizontal**

Concrete Condition: **Dry**

Correction of Direction **R1**: **0**

Corerection of Condition **R2**: **0**

Test Data **R**:



26	36	37	34	33	Average **Av**:	**32.4**
33	39	35	33	35	Av.−20%	**25.9**
31	25	33	36	35	Av.+20%	**38.9**
33	28	33	31	31		
30	30	30	32	32		

26	36	37	34	33	**R:**	**32.8**
33	39	35	33	35		
31		33	36	35		
33	28	33	31	31		
30	30	30	32	32		

R0=	**R**	+	**R1**	+	**R2**
	32.8		0		0
=		**32.8**			

$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **23.7** N/mm2

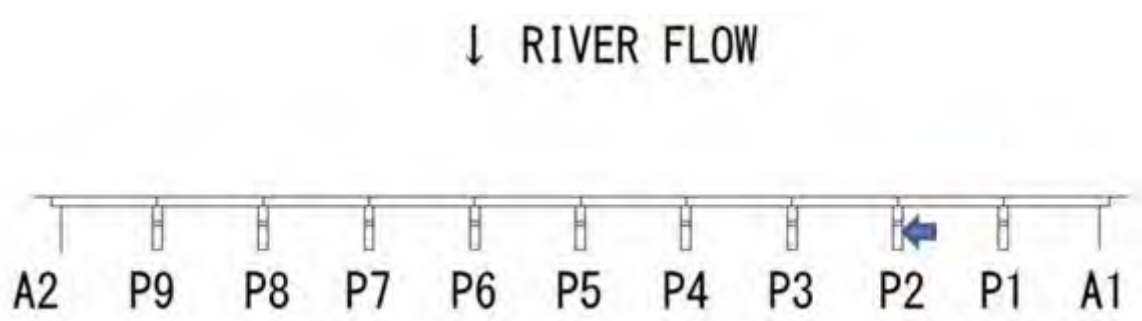
Record of Rebound Hammer Test (3/7)

Inspector : Koji KAWAMATA Date : 13 Jan 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E

Sketch of the Bridge

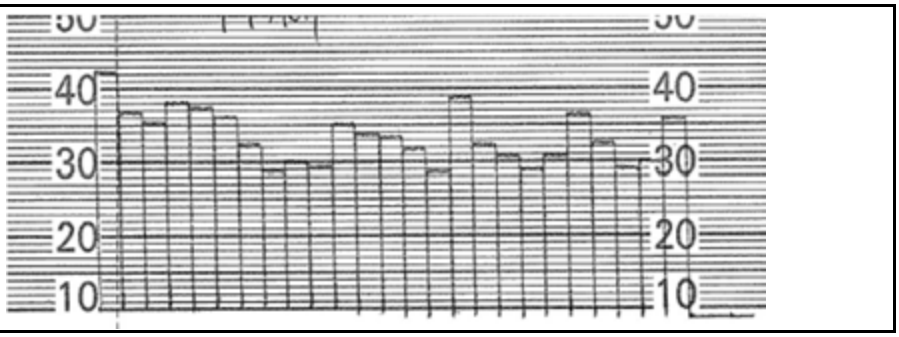
Side View



Test Hammer Direction: **Horizontal** Correction of Direction **R1**: **0**

Concrete Condition: **Dry** Corerection of Condition **R2**: **0**

Test Data **R**:



42	36	35	39	36	Average **Av**:	**33.8**
37	33	34	32	33	Av.−20%	**27.0**
34	29	33	41	29	Av.+20%	**40.6**
38	30	32	29	30		
37	29	29	31	36		

	36	35	39	36	**R:**	**33.1**
37	33	34	32	33		
34	29	33		29		
38	30	32	29	30		
37	29	29	31	36		

R0=	**R**	+	**R1**	+	**R2**
	33.1		0		0
=		**33.1**			

$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **24.0** N/mm2

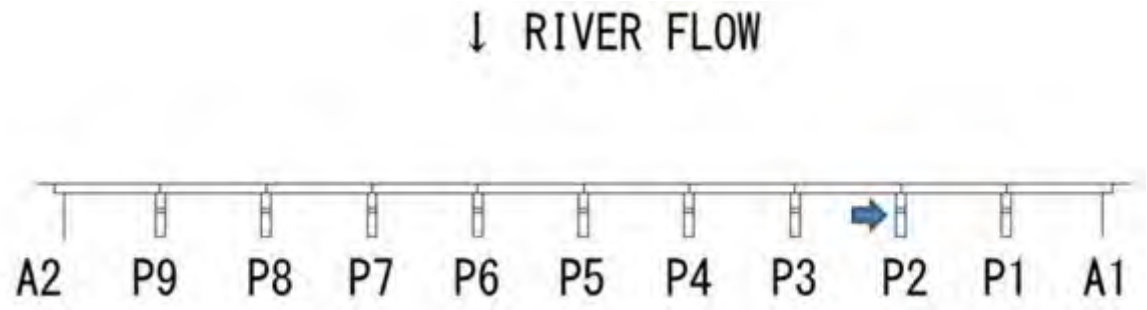
Record of Rebound Hammer Test (4/7)

Inspector : Koji KAWAMATA Date : 13 Jan 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E

Sketch of the Bridge

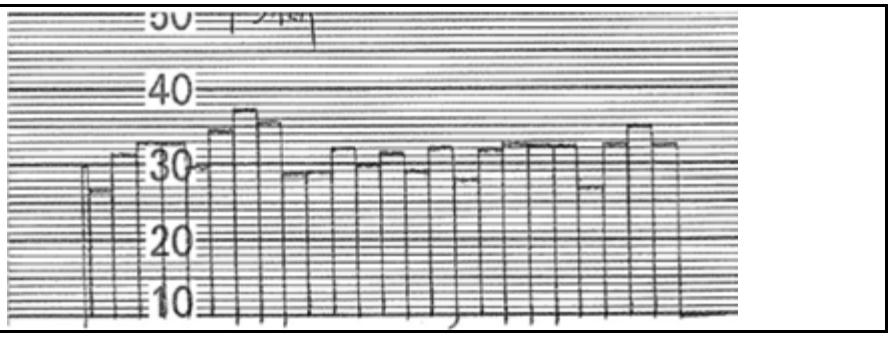
Side View



Test Hammer Direction: **Horizontal** Correction of Direction **R1**: **0**

Concrete Condition: **Dry** Corerection of Condition **R2**: **0**

Test Data **R**:



30	35	32	28	32	Average **Av**:	**31.6**
27	37	30	32	27	Av.−20%	**25.3**
31	36	31	33	32	Av.+20%	**37.9**
33	29	29	32	35		
33	29	32	32	33		

30	35	32	28	32	**R:**	**31.6**
27	37	30	32	27		
31	36	31	33	32		
33	29	29	32	35		
33	29	32	32	33		

R0=	**R**	+	**R1**	+	**R2**
	31.6		0		0
=		**31.6**			

$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **22.1** N/mm2

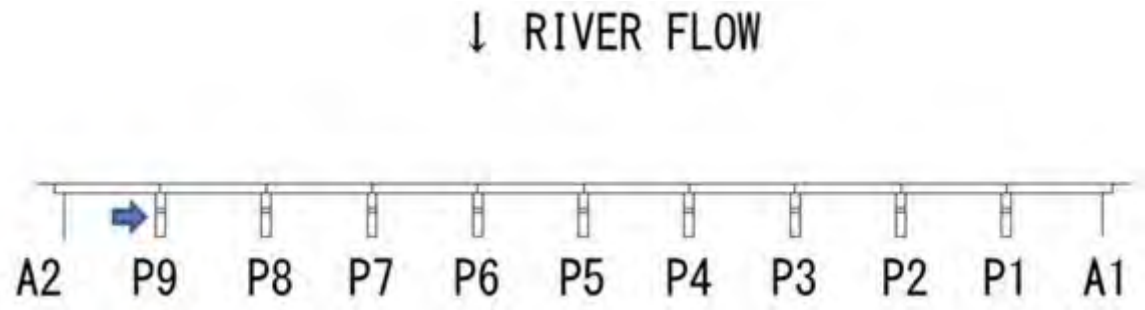
Record of Rebound Hammer Test (5/7)

Inspector : Koji KAWAMATA Date : 13 Jan 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E

Sketch of the Bridge

Side View



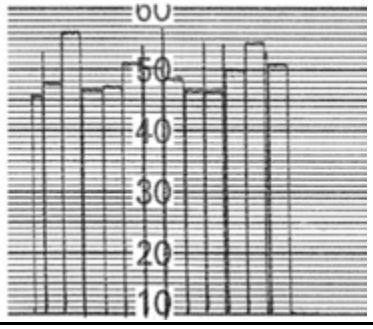
Test Hammer Direction: **Horizontal**

Concrete Condition: **Dry**

Correction of Direction **R1**: **0**

Corerection of Condition **R2**: **0**

Test Data **R**:



46	47	48	50
53	51	46	54
48	54	54	53
56	50	46	51
47	57	54	

Average **Av**: **50.8**

Av.−20% **40.6**

Av.+20% **61**

46	47	48	50
53	51	46	54
48	54	54	53
56	50	46	51
47	57	54	

R: **50.8**

R0=	**R**	+	**R1**	+	**R2**
	50.8		0		0
=		**50.8**			

$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **46.5** N/mm2

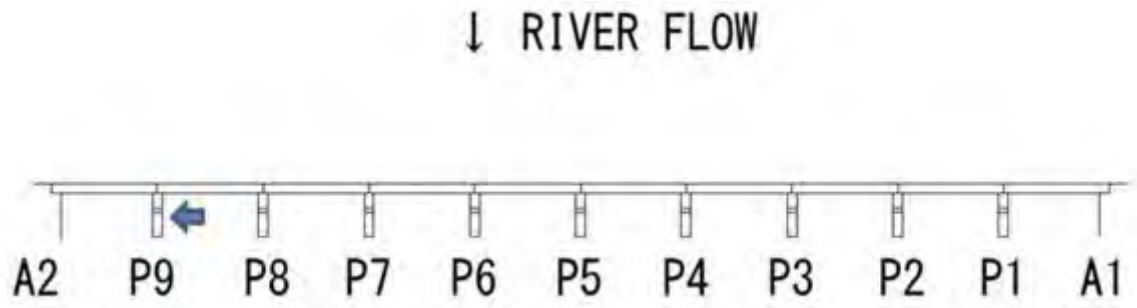
Record of Rebound Hammer Test (6/7)

Inspector : Koji KAWAMATA Date : 13 Jan 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E

Sketch of the Bridge

Side View



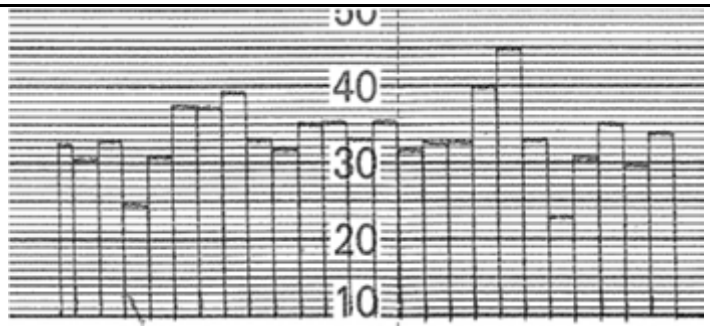
Test Hammer Direction: **Horizontal**

Concrete Condition: **Dry**

Correction of Direction **R1**: **0**

Corerection of Condition **R2**: **0**

Test Data **R**:



32	38	35	33	23	Average **Av**:	**33.6**
31	37	35	33	31	Av.−20%	**26.9**
33	39	33	40	35	Av.+20%	**40.3**
25	33	36	45	30		
31	32	32	33	34		

32	38	35	33		**R:**	**34**
31	37	35		31		
33	39	33	40	35		
25	33	36	45	30		
31	32	32	33	34		

R0=	**R**	+	**R1**	+	**R2**
	34		0		0
=		**34**			

$F(N/mm2) = (-18.0 + 1.27 \times R0) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **25.2** N/mm2

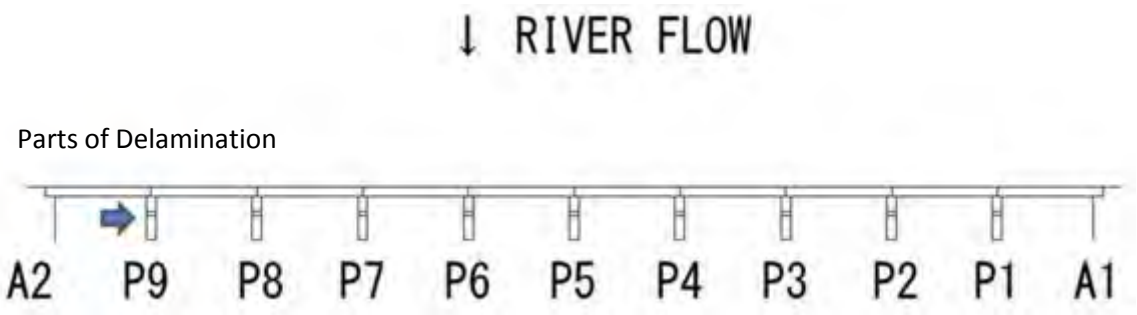
Record of Rebound Hammer Test (7/7)

Inspector : Koji KAWAMATA Date : 13 Jan 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E

Sketch of the Bridge

Side View



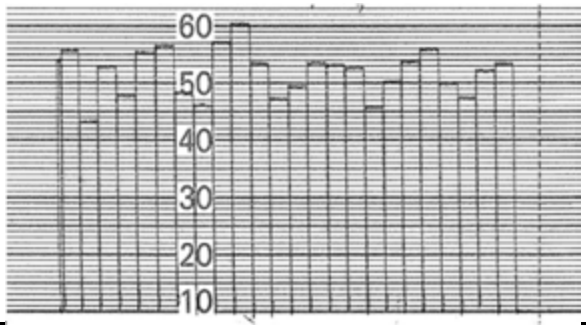
Test Hammer Direction: **Horizontal**

Concrete Condition: **Dry**

Correction of Direction **R1**: **0**

Corerection of Condition **R2**: **0**

Test Data **R**:



54	55	60	54	56	Average **Av**:	**51.5**
46	56	54	53	50	Av.−20%	**41.2**
44	48	47	46	48	Av.+20%	**61.8**
53	46	50	50	52		
48	57	54	54	53		

54	55	60	54	56	**R:**	**51.5**
46	56	54	53	50		
44	48	47	46	48		
53	46	50	50	52		
48	57	54	54	53		

R0=	**R**	+	**R1**	+	**R2**
	51.5		0		0
=		**51.5**			

$F(N/mm2) = (-18.0 + 1.27 \times RO) \times \alpha$ α : 1 (Age of concrete over 28 days)

= **47.4** N/mm2

鉄筋探査（電磁波法）

Record of RC Rader Inspection (1/6)

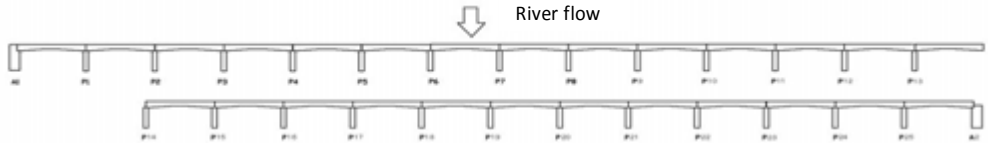
Inspector : Toshinao YAMAGUCHI Date : 23 Jan 2014

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A
Station	-	**Road Category**	National Highway
GPS Data	N 26 ° 36 ' 43.0 "	**Management Authority**	State PWD
	E 092 ° 51 ' 12.5 "	**Year of Construction**	1987

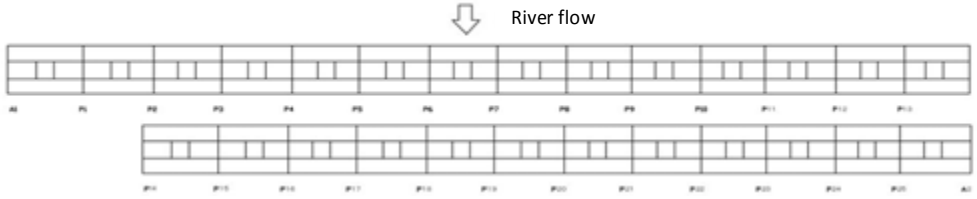
Bridge Length	3,105m	**Span Arrangement**	26 spans
Bridge Width			
- Carriageway Width	7.5m	**Approach Road Width**	Same as bridge
- Medium Width	Nil		
- Footway Width	1.5m (both side)	**Existing of Detour**	None (approx. 327Km)
Type of Superstructure	PC BOX Girber (Gerber Girder)	**Type of Substructure**	RC
Type of Foundation	Well		

Sketch of the Bridge

Side View



Plan View

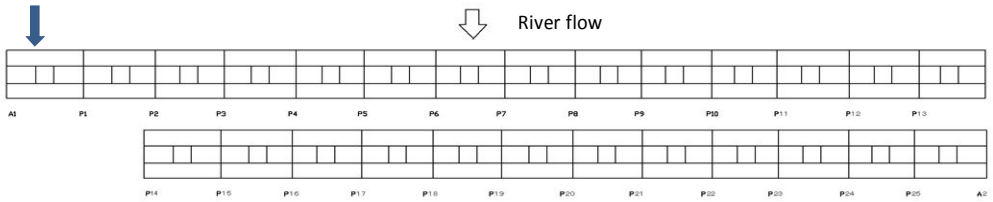


Record of RC Rader Inspection (2/6)

Inspector : Toshinao YAMAGUCHI Date : 23 Jan 2014

Bridge No.	2	Location (State)	Assam
Bridge Name	Kaliabhomora Bridge	Road Name	NH37A

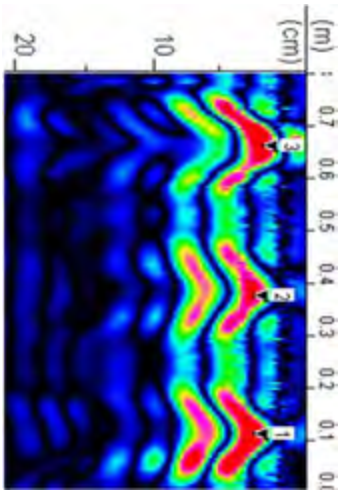
Location	Girder web (A1-P1)



arrangement of bar

Main Revar

Image



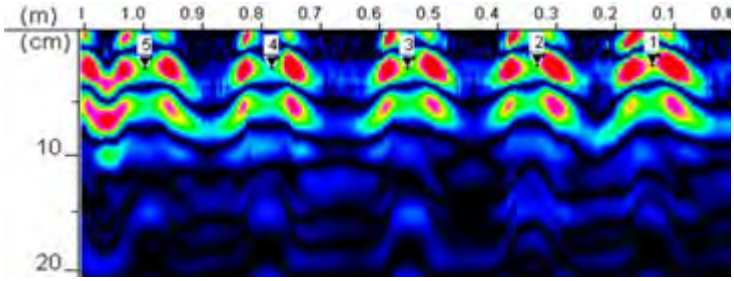
Data

(mm)

No.	Cover	Space
1	21	-
2	21	265
3	12	285
Ave	18.0	275.0

Distributing Bar

Image



Data

(mm)

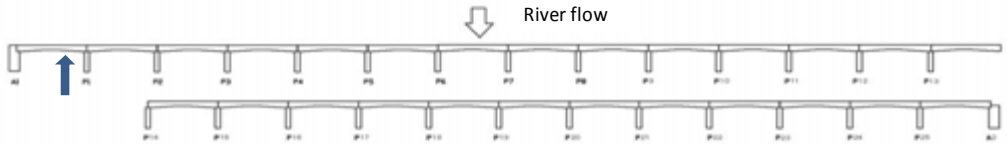
No.	Cover	Space
1	12	-
2	12	195
3	15	220
4	15	230
5	15	215
Ave	13.8	215.0

Record of RC Rader Inspection (3/6)

Inspector : Toshinao YAMAGUCHI Date : 23 Jan 2014

Bridge No.	2	Location (State)	Assam
Bridge Name	Kaliabhomora Bridge	Road Name	NH37A

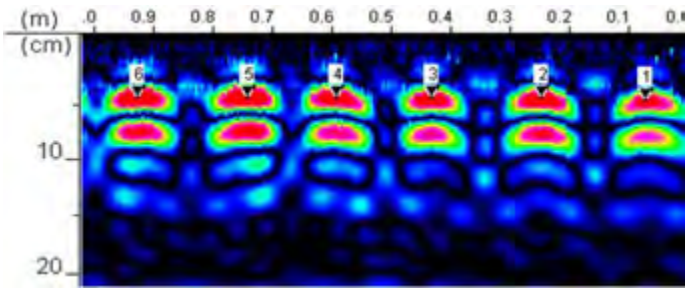
Location	Bottom of Box Girder (A1-P1)



arrangement of bar

Main Revar

Image



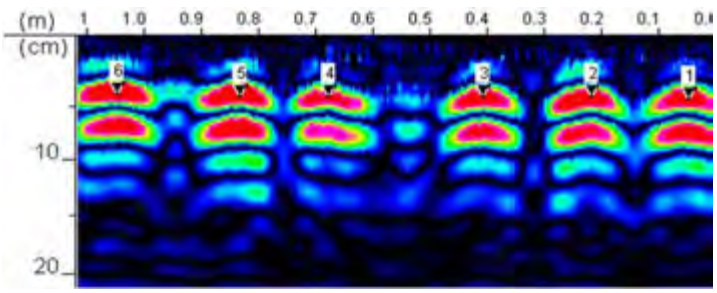
Data

(mm)

No.	Cover	Space
1	47	-
2	44	175
3	44	185
4	44	160
5	44	150
6	44	185
Ave	44.5	171.0

Distributing Bar

Image



Data

(mm)

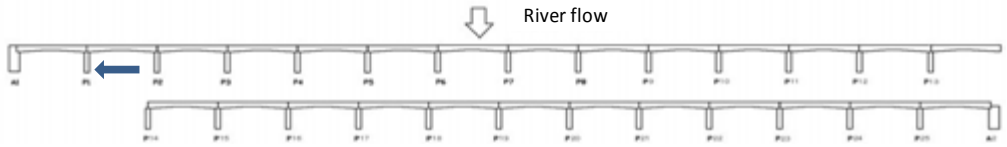
No.	Cover	Space
1	44	-
2	41	170
3	41	190
4	41	270
5	41	155
6	39	215
Ave	41.2	200.0

Record of RC Rader Inspection (4/6)

Inspector : Toshinao YAMAGUCHI Date : 23 Jan 2014

Bridge No.	2	Location (State)	Assam
Bridge Name	Kaliabhomora Bridge	Road Name	NH37A

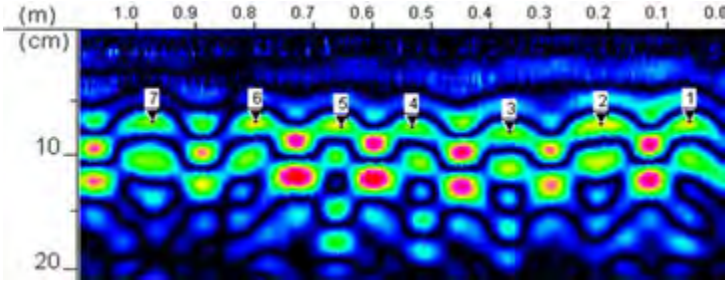
Location	P1



arrangement of bar

Main Revar

Image



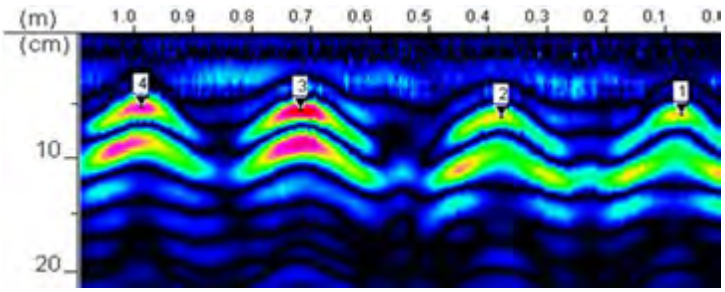
Data

(mm)

No.	Cover	Space
1	72	-
2	74	150
3	82	155
4	77	165
5	77	120
6	72	145
7	72	175
Ave	75.1	151.7

Distributing Bar

Image



Data

(mm)

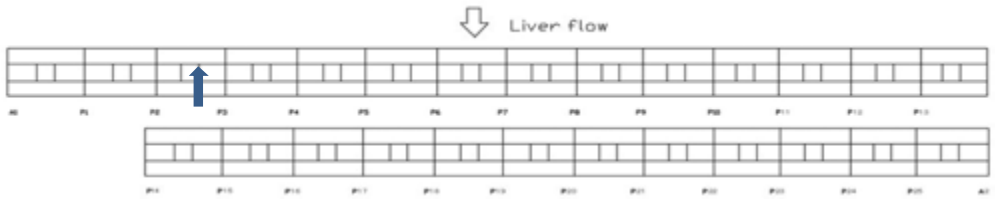
No.	Cover	Space
1	62	-
2	65	305
3	57	340
4	55	270
Ave	59.8	305.0

Record of RC Rader Inspection (5/6)

Inspector : Toshinao YAMAGUCHI Date : 23 Jan 2014

Bridge No.	2	Location (State)	Assam
Bridge Name	Kaliabhomora Bridge	Road Name	NH37A

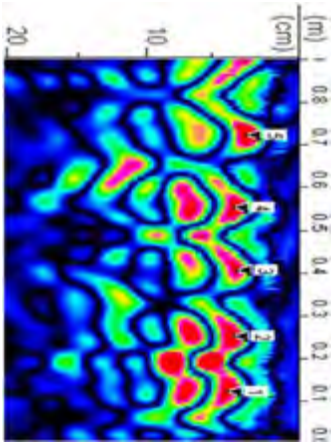
Location	Inside Web of Box Girder (P2-P3)



arrangement of bar

Main Revar

Image



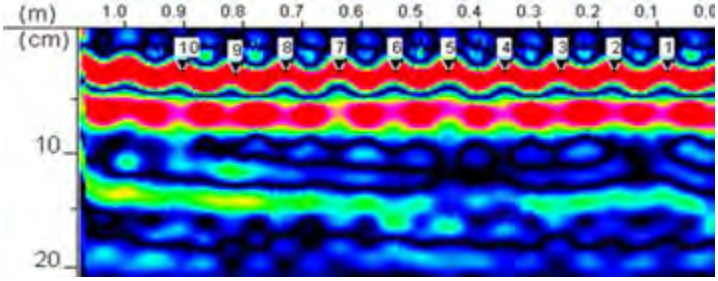
Data

(mm)

No.	Cover	Space
1	39	-
2	33	130
3	30	155
4	33	145
5	21	170
Ave	31.2	150.0

Distributing Bar

Image



Data

(mm)

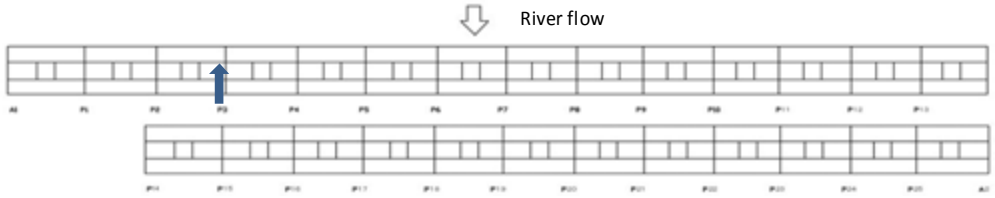
No.	Cover	Space
1	21	-
2	21	90
3	21	90
4	21	95
5	21	95
6	21	90
7	21	95
8	21	90
9	21	85
10	21	90
Ave	21.0	91.1

Record of RC Rader Inspection (6/6)

Inspector : Toshinao YAMAGUCHI Date : 23 Jan 2014

Bridge No.	2	Location (State)	Assam
Bridge Name	Kaliabhomora Bridge	Road Name	NH37A

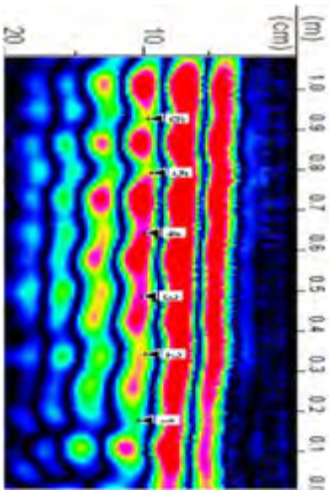
Location	Inside Web of Box Girder (P3)



arrangement of bar

Main Revar

Image



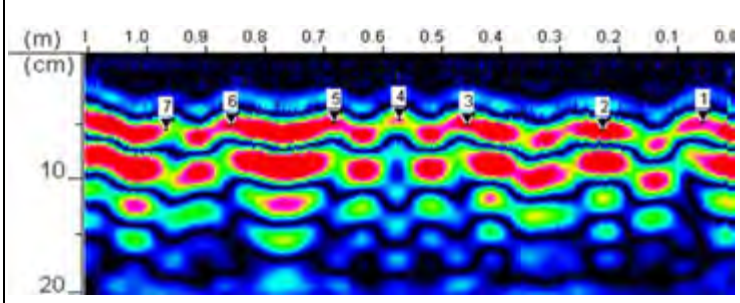
Data

(mm)

No.	Cover	Space
1	105	-
2	100	165
3	103	145
4	100	155
5	96	150
6	98	135
Ave	100.3	150.0

Distributing Bar

Image



Data

(mm)

No.	Cover	Space
1	49	-
2	57	170
3	52	230
4	47	115
5	49	110
6	52	175
7	57	110
Ave	51.9	151.7

Record of RC Rader Inspection (1/6)

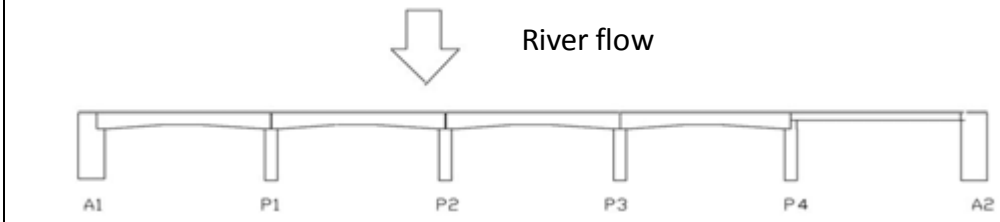
Inspector : Toshinao YAMAGUCHI Date : 23 Jan 2014

Bridge No.	4	**Location (State)**	Assam
Bridge Name	Badarpurghat Bridge	**Road Name**	NH 6 (old NH 44)
Station	Km201	**Road Category**	National Highway
GPS Data	N 24 ° 52 ' 34.5 "	**Management Authority**	State PWD
	E 092 ° 35 ' 00.8 "	**Year of Construction**	1974

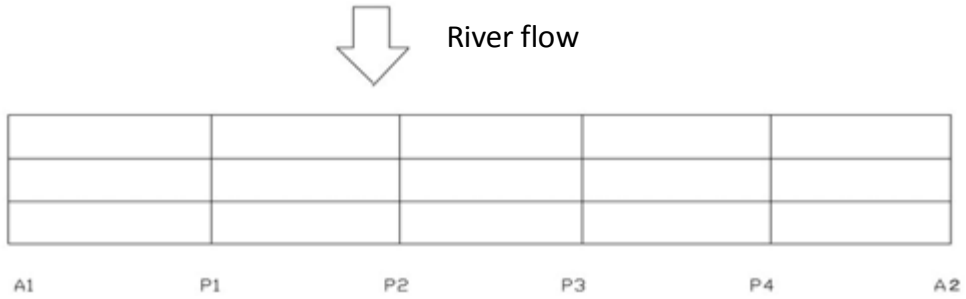
Bridge Length	359.44 m	**Span Arrangement**	5 spans
Bridge Width			
- Carriageway Width	7.0m	**Approach Road Width**	Same as bridge
- Medium Width	Nil		
- Footway Width	1.5m (both side)	**Existing of Detour**	Approx. 64Km
Type of Superstructure	PC BOX Girber (Centre Hinge)	**Type of Substructure**	RC
Type of Foundation	Well		

Sketch of the Bridge

Side View



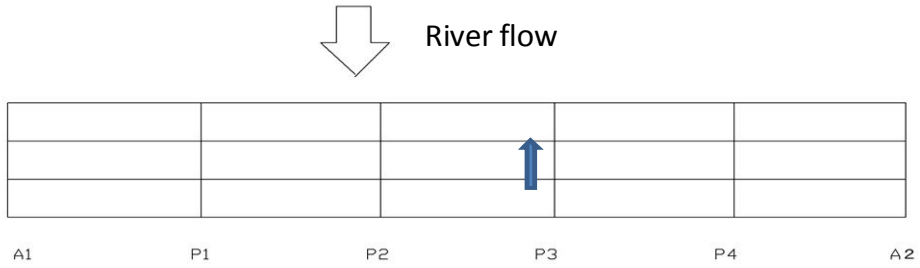
Plan View



Record of RC Rader Inspection (2/6)

Inspector : Toshinao YAMAGUCHI Date : 23 Jan 2014

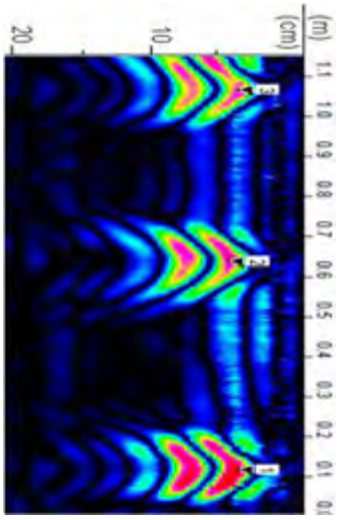
Bridge No.	4	Location (State)	Assam
Bridge Name	Badarpurghat Bridge	Road Name	NH 6 (old NH 44)
Location	Inside Web of Box Girder (P3)		



arrangement of bar

Main Revar

Image	Data

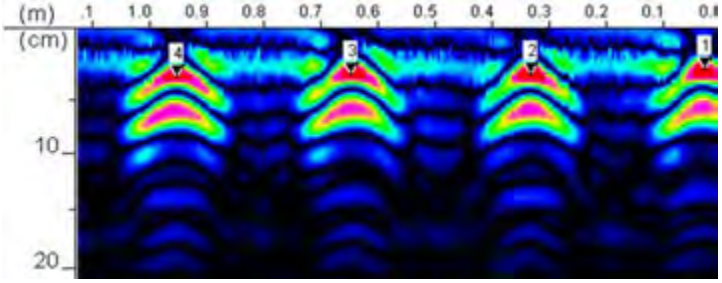


(mm)

No.	Cover	Space
1	33	-
2	41	520
3	33	430
Ave	35.7	475.0

Distributing Bar

Image	Data



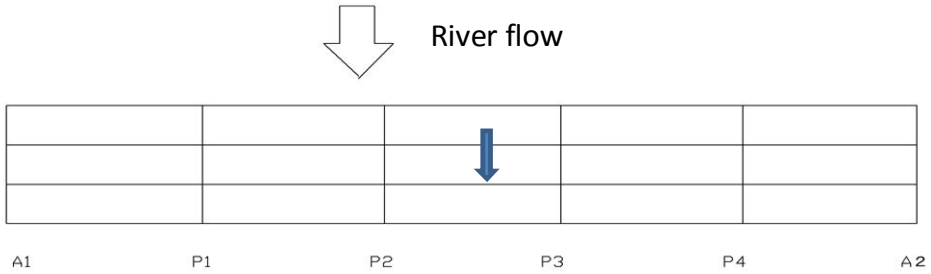
(mm)

No.	Cover	Space
1	18	-
2	24	305
3	24	315
4	27	305
Ave	23.3	308.3

Record of RC Rader Inspection (3/6)

Inspector : Toshinao YAMAGUCHI Date : 23 Jan 2014

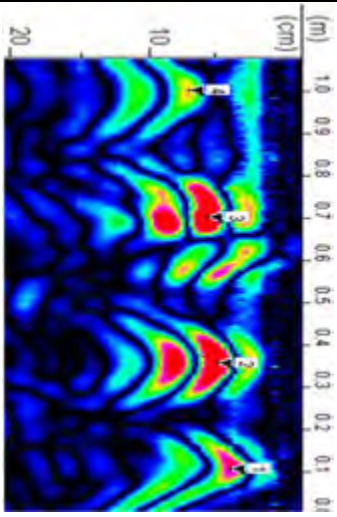
Bridge No.	4	Location (State)	Assam
Bridge Name	Badarpurghat Bridge	Road Name	NH 6 (old NH 44)
Location	Inside Web of Box Girder (P2-P3)		



arrangement of bar

Main Revar

Image



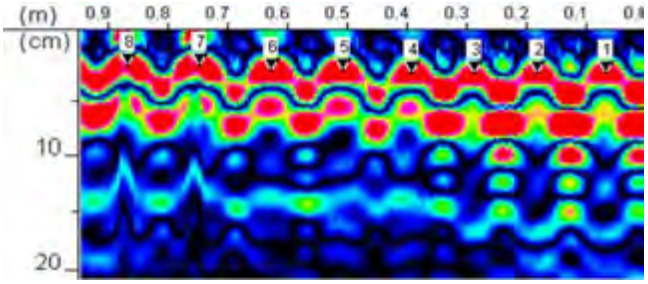
Data

(mm)

No.	Cover	Space
1	39	-
2	49	250
3	57	345
4	72	300
Ave	54.3	298.3

Distributing Bar

Image



Data

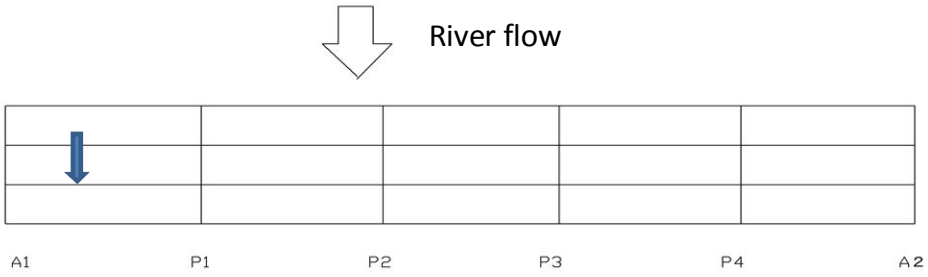
(mm)

No.	Cover	Space
1	21	-
2	21	115
3	21	105
4	21	105
5	18	115
6	18	120
7	12	120
8	12	120
Ave	18.0	114.3

Record of RC Rader Inspection (4/6)

Inspector : Toshinao YAMAGUCHI Date : 23 Jan 2014

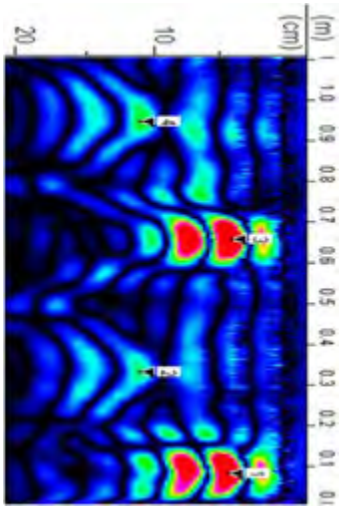
Bridge No.	4	Location (State)	Assam
Bridge Name	Badarpurghat Bridge	Road Name	NH 6 (old NH 44)
Location	Inside Web of Box Girder (A1-P1)		



arrangement of bar

Main Revar

Image



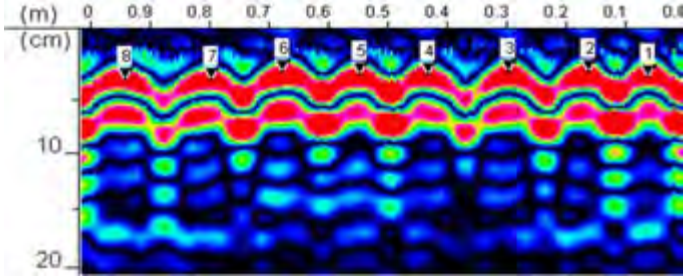
Data

(mm)

No.	Cover	Space
1	44	-
2	112	250
3	41	325
4	112	290
Ave	77.3	288.3

Distributing Bar

Image



Data

(mm)

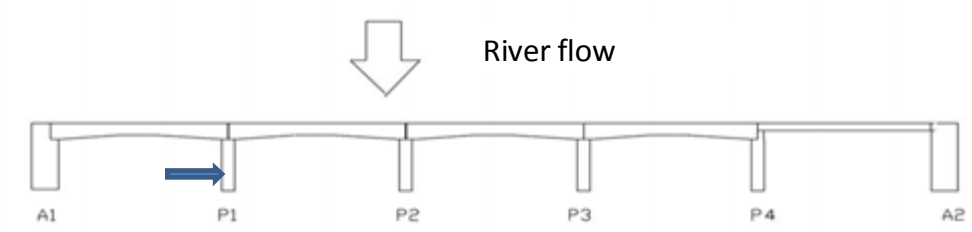
No.	Cover	Space
1	27	-
2	21	100
3	21	135
4	24	135
5	24	115
6	21	130
7	30	120
8	30	145
Ave	24.8	125.7

Record of RC Rader Inspection (5/6)

Inspector : Toshinao YAMAGUCHI Date : 23 Jan 2014

Bridge No.	4	Location (State)	Assam
Bridge Name	Badarpurghat Bridge	Road Name	NH 6 (old NH 44)

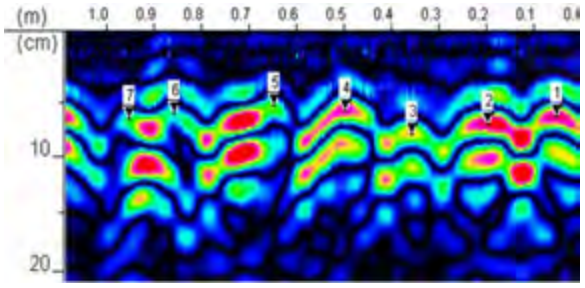
Location	P1



arrangement of bar

Main Revar

Image



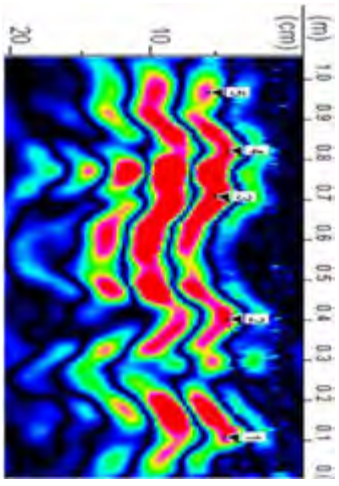
Data

(mm)

No.	Cover	Space
1	65	-
2	72	145
3	82	160
4	60	140
5	55	150
6	62	210
7	67	95
Ave	66.1	150.0

Distributing Bar

Image



Data

(mm)

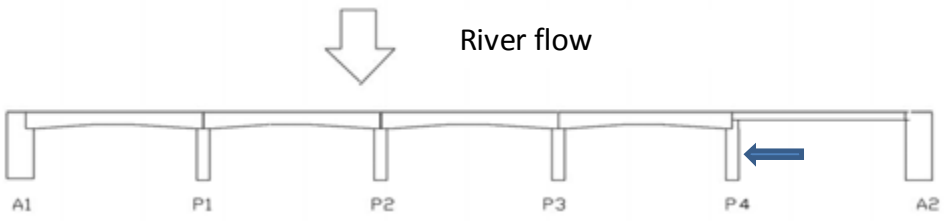
No.	Cover	Space
1	44	-
2	41	295
3	52	305
4	41	115
5	57	145
Ave	47.0	215.0

Record of RC Rader Inspection (6/6)

Inspector : Toshinao YAMAGUCHI Date : 23 Jan 2014

Bridge No.	4	Location (State)	Assam
Bridge Name	Badarpurghat Bridge	Road Name	NH 6 (old NH 44)

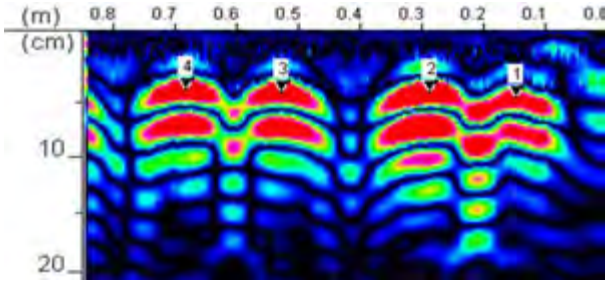
Location	P4(A2')



arrangement of bar

Main Revar

Image



Data

(mm)

No.	Cover	Space
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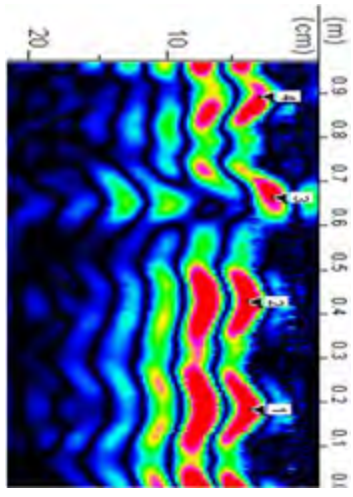
3	41	240
4	39	155
Ave	42.0	178.3

Distributing Bar

Image



Data

(mm)

No.	Cover	Space
1	36	-
2	39	245
3	15	235
4	27	230
Ave	29.3	236.7

Record of RC Rader Inspection (1/7)

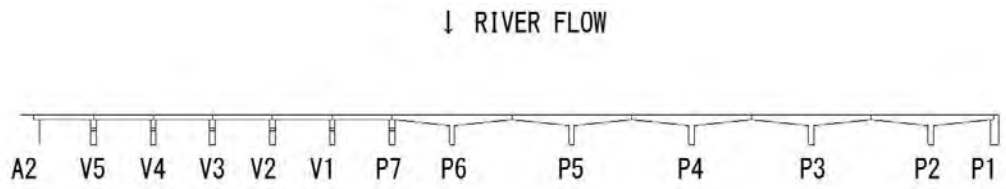
Inspector : Toshinao YAMAGUCHI Date : 14 Jan 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17
Station	Panaji Km14/800	**Road Category**	National Highway
GPS Data	N 15 ° 24' 41.49 "	**Management Authority**	MORTH/PWD
	E 73 ° 54' 24.59"	**Year of Construction**	1982

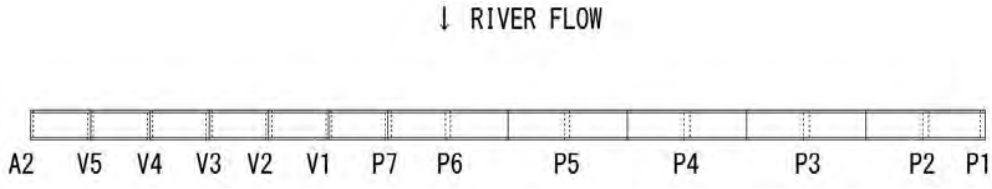
Bridge Length	809m	**Span Arrangement**	11 Spans
Bridge Width			
- Carriageway Width	7.50m (2 Lane)	**Approach Road Width**	8.5m (Both side)
- Medium Width	Nil		
- Footway Width	1.50m	**Existing of Detour**	Approx. 54km
Type of Superstructure	PC Box Girder	**Type of Substructure**	RC
Type of Foundation	RC Well		

Sketch of the Bridge

Side View



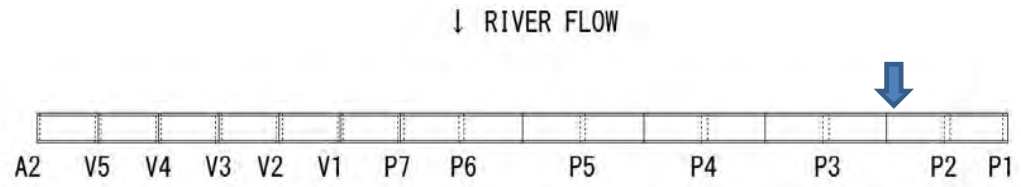
Plan View



Record of RC Rader Inspection (2/7)

Inspector : Toshinao YAMAGUCHI Date : 14 Jan 2014

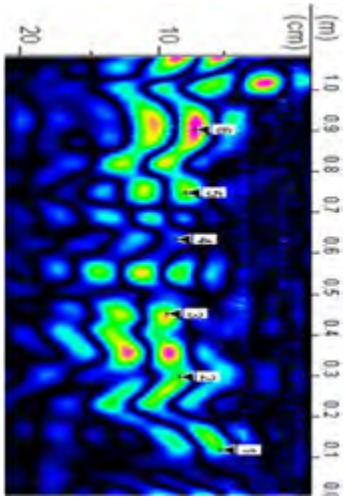
Bridge No.	5	Location (State)	Goa
Bridge Name	Zuari Bridge	Road Name	NH17
Location	centre hinge P2 (inside girder web)		



arrangement of bar

Main Revar

Image



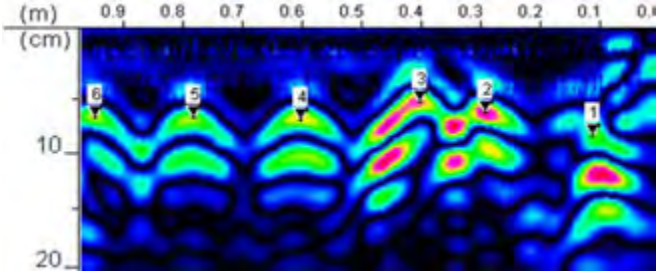
Data

(mm)

No.	Cover	Space
1	55	-
2	86	180
3	96	155
4	89	180
5	82	115
6	74	155
Ave	80.3	157.0

Distributing Bar

Image



Data

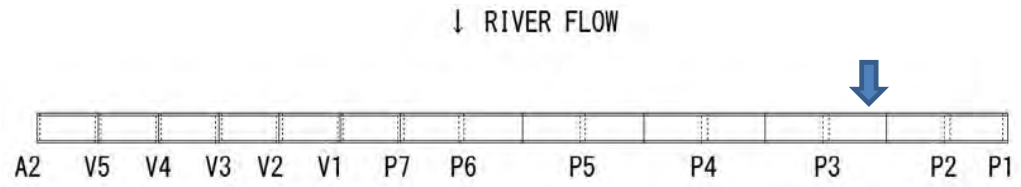
(mm)

No.	Cover	Space
1	86	-
2	65	180
3	55	110
4	72	200
5	69	180
6	69	165
Ave	69.3	167.0

Record of RC Rader Inspection (3/7)

Inspector : Toshinao YAMAGUCHI Date : 14 Jan 2014

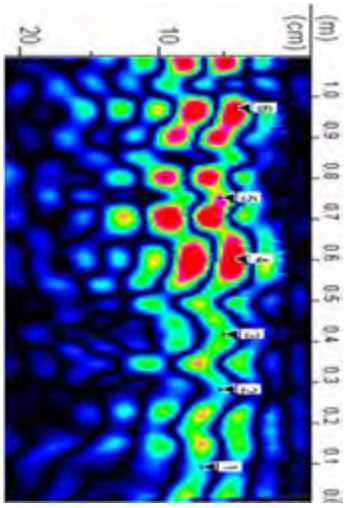
Bridge No.	5	Location (State)	Goa
Bridge Name	Zuari Bridge	Road Name	NH17
Location	centre hinge P3 (inside girder web)		



arrangement of bar

Main Revar

Image



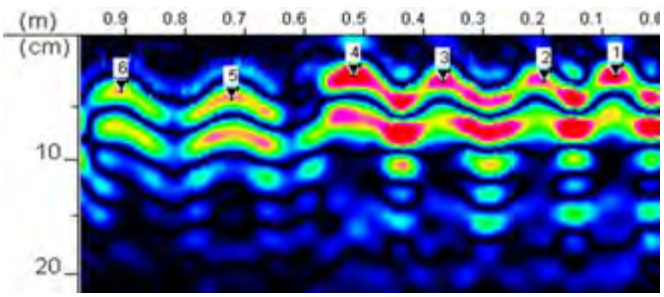
Data

(mm)

No.	Cover	Space
1	69	-
2	55	190
3	52	135
4	44	185
5	55	150
6	41	220
Ave	52.7	176.0

Distributing Bar

Image



Data

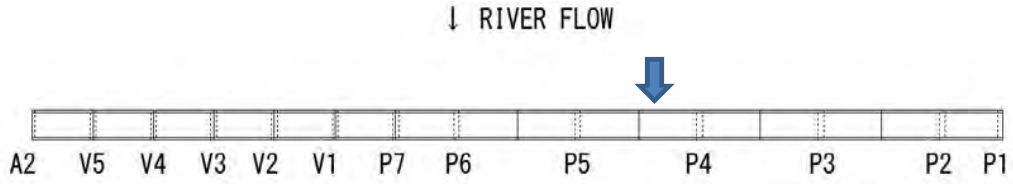
(mm)

No.	Cover	Space
1	18	-
2	24	120
3	24	170
4	18	150
5	44	205
6	36	185
Ave	27.3	166.0

Record of RC Rader Inspection (4/7)

Inspector : Toshinao YAMAGUCHI Date : 14 Jan 2014

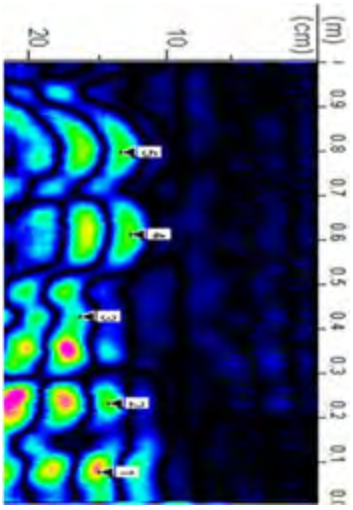
Bridge No.	5	Location (State)	Goa
Bridge Name	Zuari Bridge	Road Name	NH17
Location	centre hinge P4 (inside girder web)		



arrangement of bar

Main Revar

Image



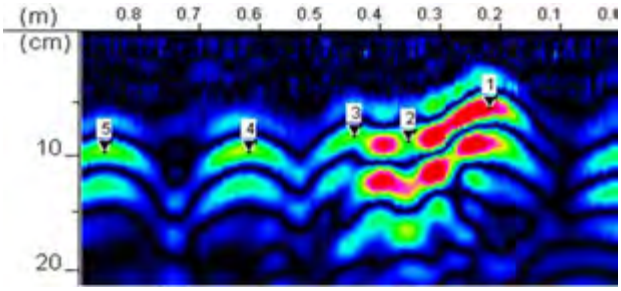
Data

(mm)

No.	Cover	Space
1	155	-
2	144	155
3	165	195
4	128	185
5	135	185
Ave	145.4	180.0

Distributing Bar

Image



Data

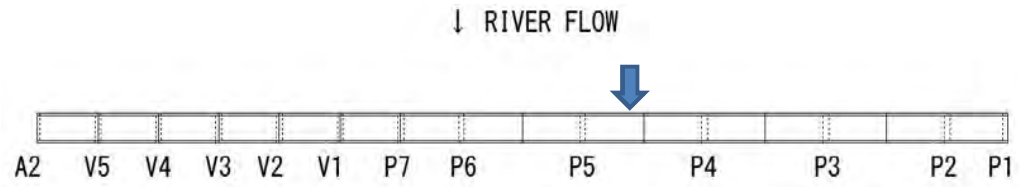
(mm)

No.	Cover	Space
1	57	-
2	89	135
3	84	90
4	98	175
5	98	240
Ave	85.2	160.0

Record of RC Rader Inspection (5/7)

Inspector : Toshinao YAMAGUCHI Date : 14 Jan 2014

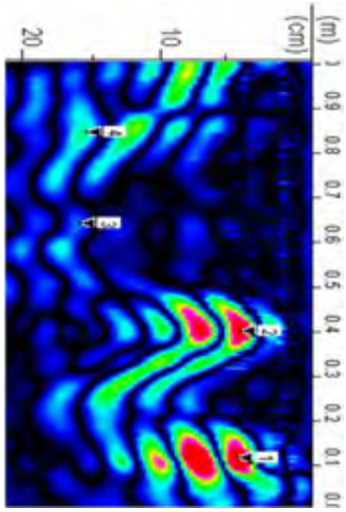
Bridge No.	5	Location (State)	Goa
Bridge Name	Zuari Bridge	Road Name	NH17
Location	centre hinge P5 (inside girder web)		



arrangement of bar

Main Revar

Image



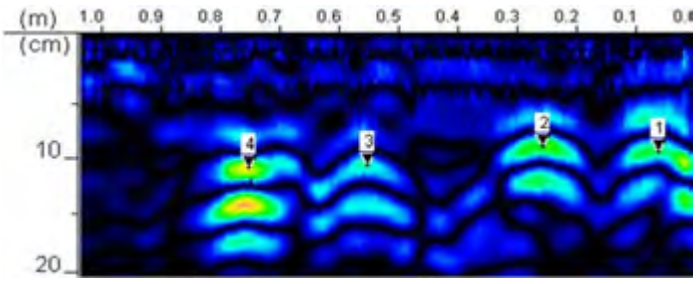
Data

(mm)

No.	Cover	Space
1	41	-
2	39	285
3	160	205
4	156	125
Ave	99.0	205.0

Distributing Bar

Image



Data

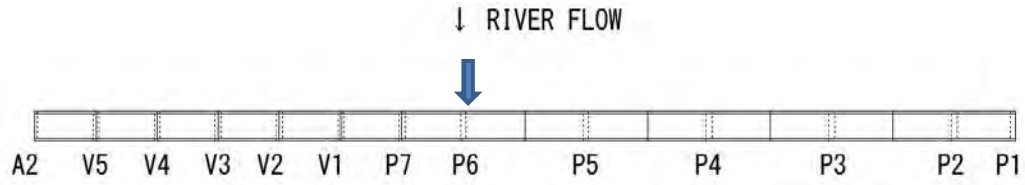
(mm)

No.	Cover	Space
1	96	-
2	91	195
3	107	295
4	110	200
Ave	101.0	230.0

Record of RC Rader Inspection (6/7)

Inspector : Toshinao YAMAGUCHI Date : 14 Jan 2014

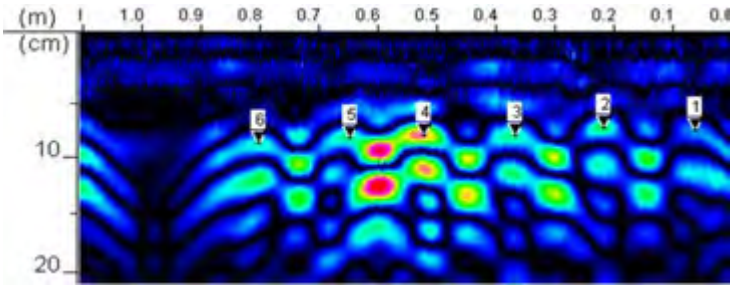
Bridge No.	5	Location (State)	Goa
Bridge Name	Zuari Bridge	Road Name	NH17
Location	P6 pier (upstream side)		



arrangement of bar

Main Revar

Image



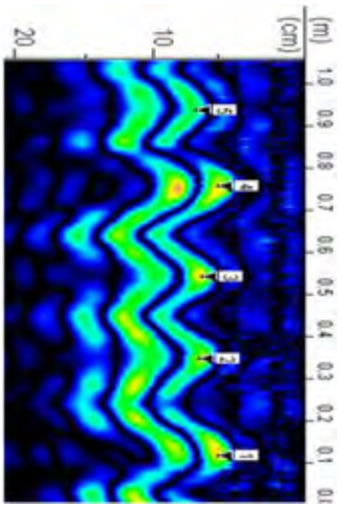
Data

(mm)

No.	Cover	Space
1	77	-
2	74	155
3	82	150
4	82	155
5	84	125
6	89	155
Ave	81.3	148.0

Distributing Bar

Image



Data

(mm)

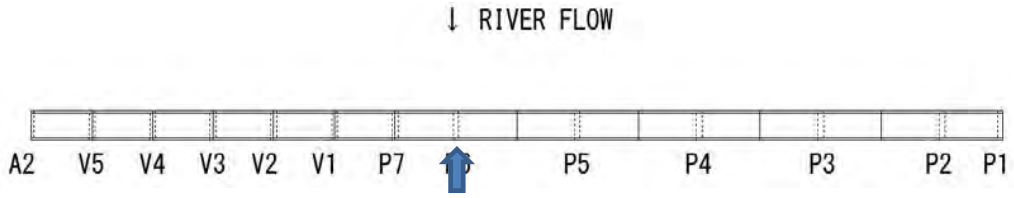
No.	Cover	Space
1	52	-
2	67	230
3	65	195
4	52	215
5	69	180
Ave	61.0	205.0

Record of RC Rader Inspection (7/7)

Inspector : Toshinao YAMAGUCHI Date : 14 Jan 2014

Bridge No.	5	Location (State)	Goa
Bridge Name	Zuari Bridge	Road Name	NH17

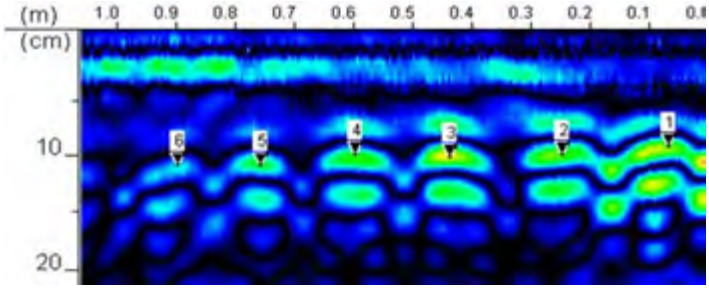
Location	P6 (downstream side)



arrangement of bar

Main Revar

Image



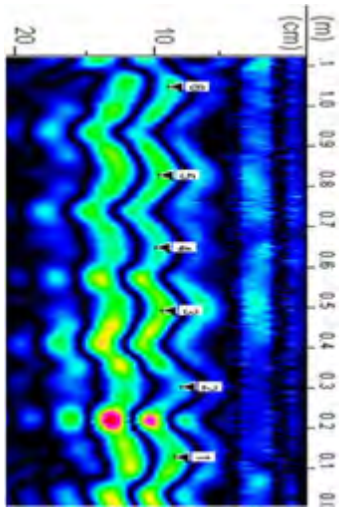
Data

(mm)

No.	Cover	Space
1	93	-
2	100	180
3	103	190
4	100	160
5	110	160
6	110	140
Ave	102.7	166.0

Distributing Bar

Image



Data

(mm)

No.	Cover	Space
1	86	-
2	82	175
3	96	190
4	100	155
5	98	180
6	91	220
Ave	92.2	184.0

Record of RC Rader Inspection (1/5)

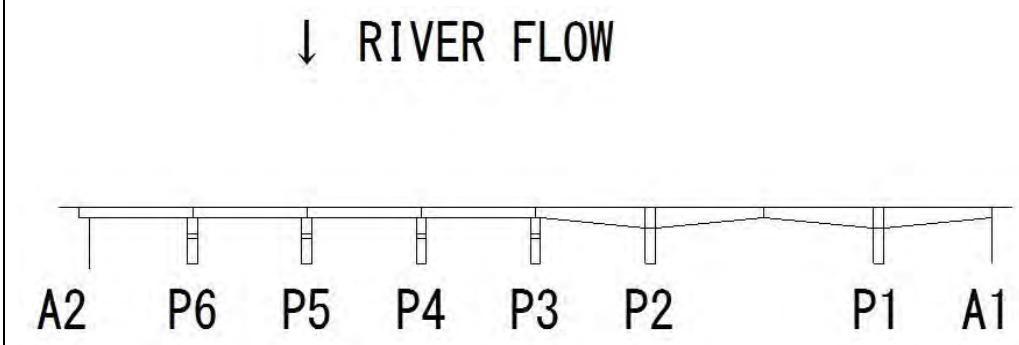
Inspector : Toshinao YAMAGUCHI Date : 15 Jan 2014

Bridge No.	8	**Location (State)**	Goa
Bridge Name	Borim Bridge	**Road Name**	NH17B
Station	Ponda Km9/00	**Road Category**	National Highway
GPS Data	N 15° 20' 58.61"	**Management Authority**	MORTH
	E 74° 00' 10.43"	**Year of Construction**	1983

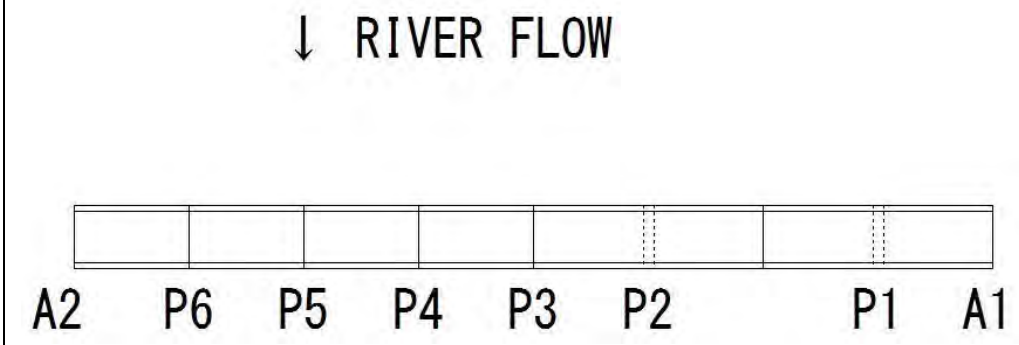
Bridge Length	411 m	**Span Arrangement**	7 Spans
Bridge Width			
- Carriageway Width	7.50 m (2 Lane)	**Approach Road Width**	11m (Both side)
- Medium Width	Nil		
- Footway Width	1.50 m	**Existing of Detour**	Approx. 48km
Type of Superstructure	PC Box Girder	**Type of Substructure**	Hollow RC
Type of Foundation	Well		

Sketch of the Bridge

Side View



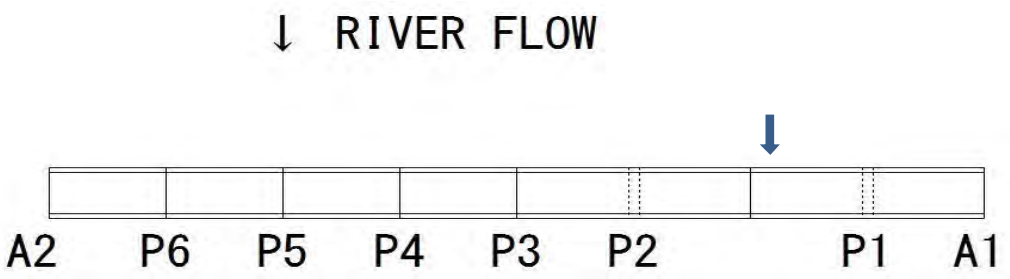
Plan View



Record of RC Rader Inspection (2/5)

Inspector : Toshinao YAMAGUCHI Date : 15 Jan 2014

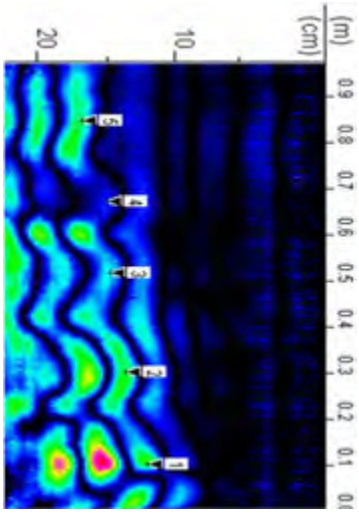
Bridge No.	8	Location (State)	Goa
Bridge Name	Borim Bridge	Road Name	NH17B
Location	centre hinge P1(inside girder web)		



arrangement of bar

Main Revar

Image



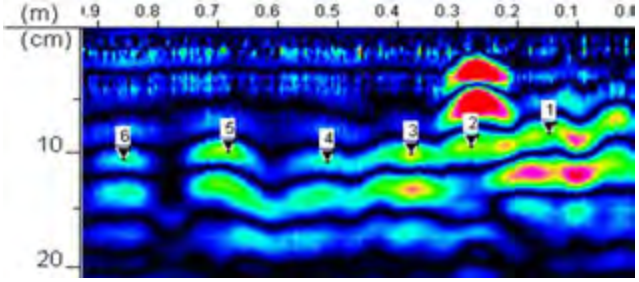
Data

(mm)

No.	Cover	Space
1	121	-
2	137	200
3	149	215
4	151	155
5	169	175
Ave	145.4	186.3

Distributing Bar

Image



Data

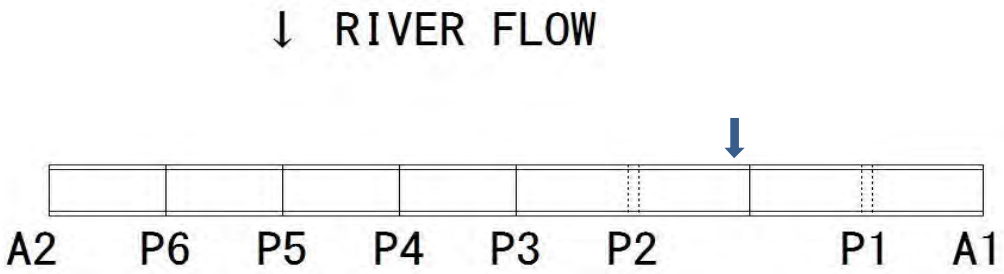
(mm)

No.	Cover	Space
1	84	-
2	96	130
3	103	100
4	110	140
5	100	165
6	107	175
Ave	100.0	142.0

Record of RC Rader Inspection (3/5)

Inspector : Toshinao YAMAGUCHI Date : 15 Jan 2014

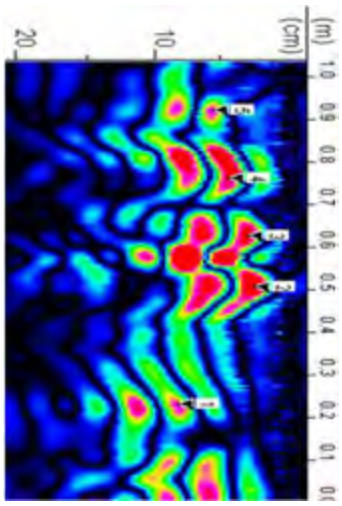
Bridge No.	8	Location (State)	Goa
Bridge Name	Borim Bridge	Road Name	NH17B
Location	centre hinge P2 (inside girder web)		



arrangement of bar

Main Revar

Image



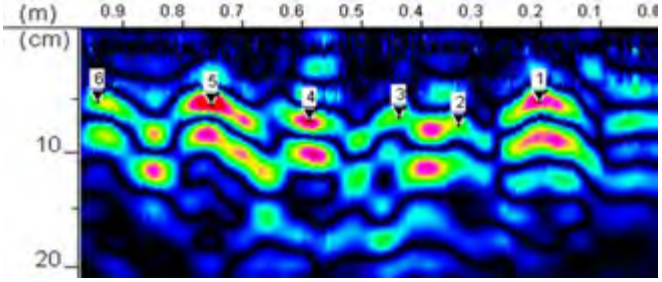
Data

(mm)

No.	Cover	Space
1	84	-
2	21	275
3	27	120
4	44	135
5	57	160
Ave	46.6	172.5

Distributing Bar

Image



Data

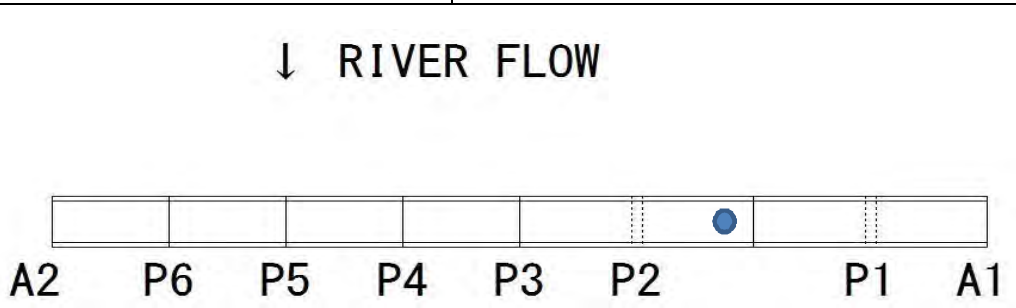
(mm)

No.	Cover	Space
1	55	-
2	77	135
3	69	100
4	72	150
5	57	165
6	55	190
Ave	64.2	148.0

Record of RC Rader Inspection (4/5)

Inspector : Toshinao YAMAGUCHI Date : 15 Jan 2014

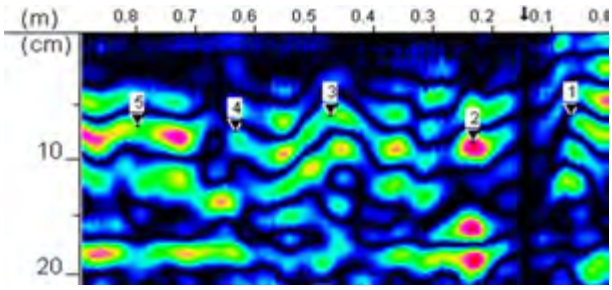
Bridge No.	8	Location (State)	Goa
Bridge Name	Borim Bridge	Road Name	NH17B
Location	Bottom of deck slab (P1–P2)		



arrangement of bar

Main Revar

Image



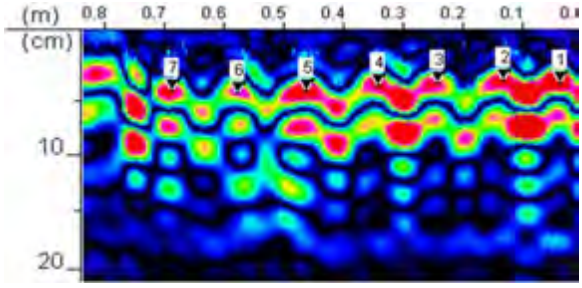
Data

(mm)

No.	Cover	Space
1	62	-
2	86	165
3	62	240
4	77	160
5	72	165
Ave	71.8	182.5

Distributing Bar

Image



Data

(mm)

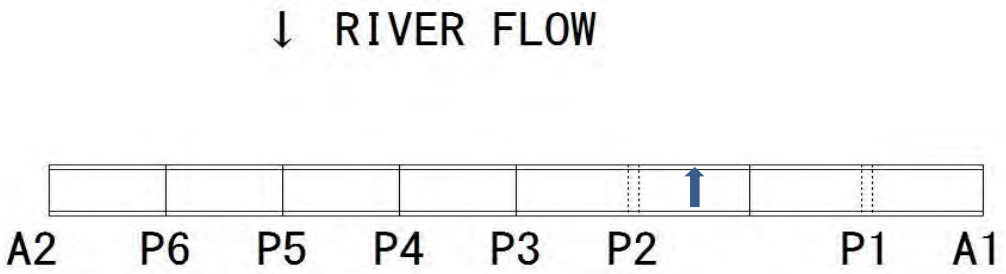
No.	Cover	Space
1	33	-
2	30	95
3	33	110
4	36	100
5	41	120
6	44	115
7	41	110
Ave	36.9	108.3

Record of RC Rader Inspection (5/5)

Inspector : Toshinao YAMAGUCHI Date : 15 Jan 2014

Bridge No.	8	Location (State)	Goa
Bridge Name	Borim Bridge	Road Name	NH17B

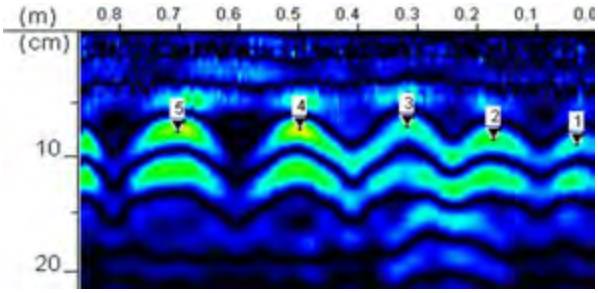
Location	Girder (P1-P2) (girder web)



arrangement of bar

Main Revar

Image



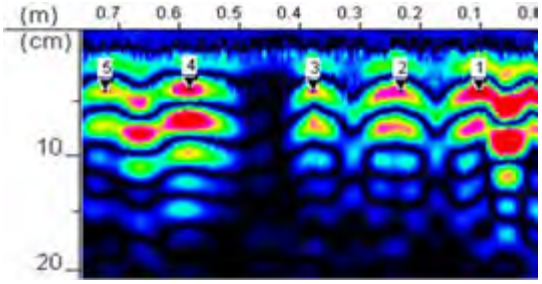
Data

(mm)

No.	Cover	Space
1	91	-
2	86	140
3	74	145
4	77	180
5	79	205
Ave	81.4	167.5

Distributing Bar

Image



Data

(mm)

No.	Cover	Space
1	41	-
2	41	130
3	41	145
4	39	205
5	41	140
Ave	40.6	155.0

Record of RC Rader Inspection (1/3)

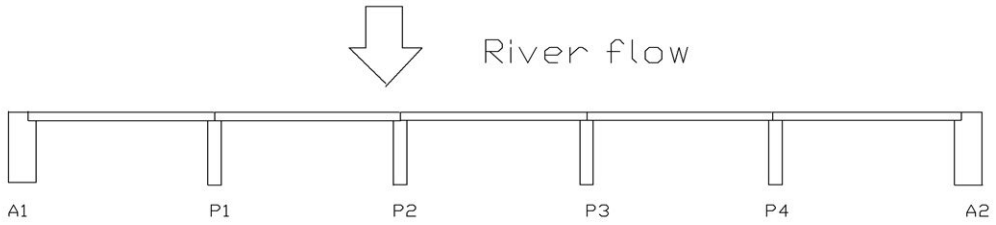
Inspector : Toshinao YAMAGUCHI Date : 17 Jan 2014

Bridge No.	10	**Location (State)**	Kerala
Bridge Name	Mahe Bridge	**Road Name**	NH17
Station	184/600	**Road Category**	National Highway
GPS Data	N 11 ° 42 ' 24.3 "	**Management Authority**	Kerala PWD
	E 075 ° 31 ' 59.4 "	**Year of Construction**	1930

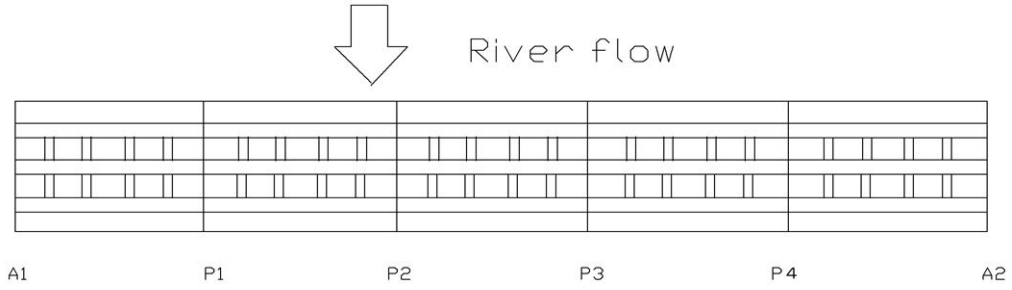
Bridge Length	117 m	**Span Arrangement**	5 x 23.40m
Bridge Width			
- Carriageway Width	6.7m	**Approach Road Width**	Same as bridge
- Median Width	Nil		
- Footway Width	0.96m (both side)	**Existing of Detour**	Approx. 16Km
Type of Superstructure	RC T Girder	**Type of Substructure**	Stone masonry
Type of Foundation	Well		

Sketch of the Bridge

Side View



Plan View

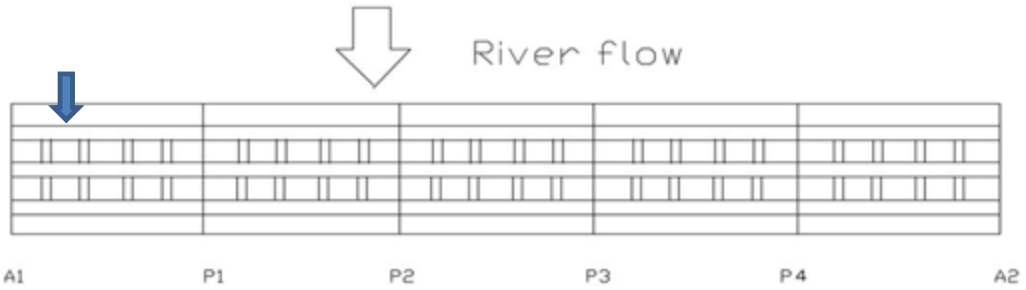


Record of RC Rader Inspection (2/3)

Inspector : Toshinao YAMAGUCHI Date : 17 Jan 2014

Bridge No.	10	Location (State)	Kerala
Bridge Name	Mahe Bridge	Road Name	NH17

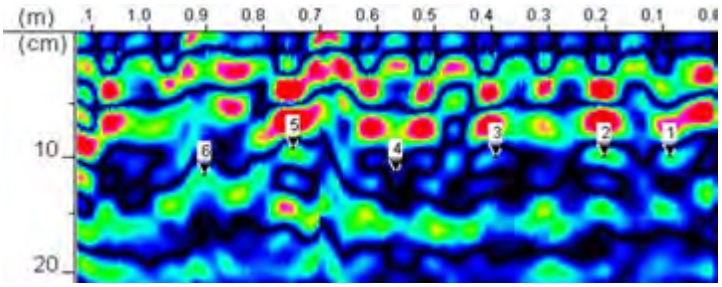
Location	girder web (A1-P1)



arrangement of bar

Main Revar

Image



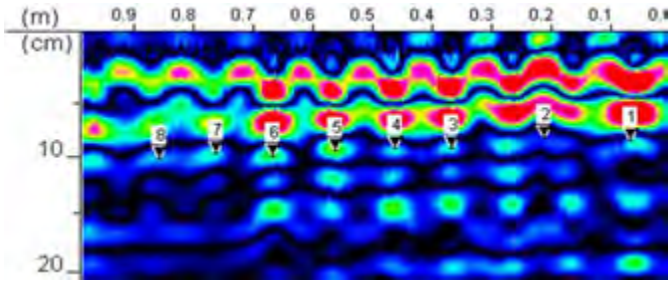
Data

(mm)

No.	Cover	Space
1	100	-
2	100	115
3	100	190
4	114	175
5	93	180
6	117	155
Ave	104.0	163.0

Distributing Bar

Image



Data

(mm)

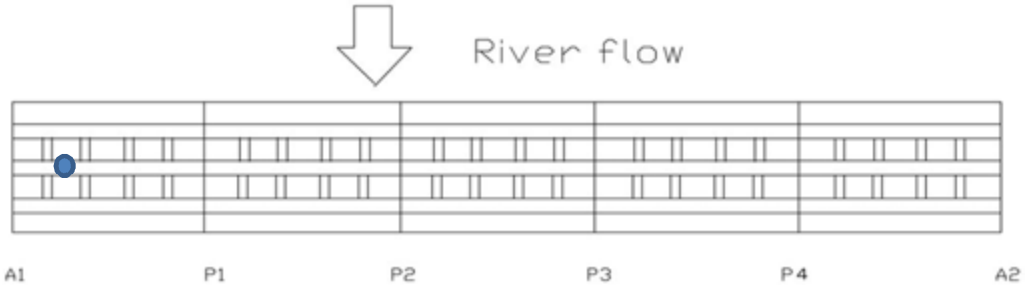
No.	Cover	Space
1	86	-
2	84	145
3	93	155
4	93	95
5	96	100
6	100	105
7	98	95
8	103	95
Ave	94.1	112.9

Record of RC Rader Inspection (3/3)

Inspector : Toshinao YAMAGUCHI Date : 17 Jan 2014

Bridge No.	10	Location (State)	Kerala
Bridge Name	Mahe Bridge	Road Name	NH17

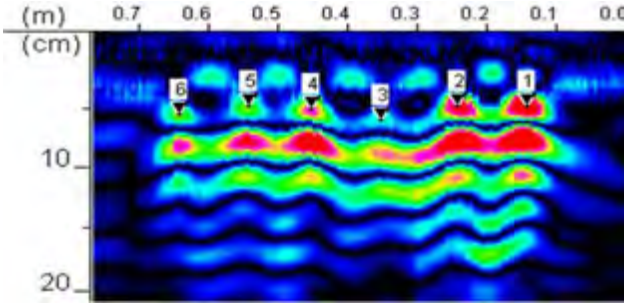
Location	girder bottom plate（A1−P1）



arrangement of bar

Main Revar

Image



Data

（mm）

No.	Cover	Space
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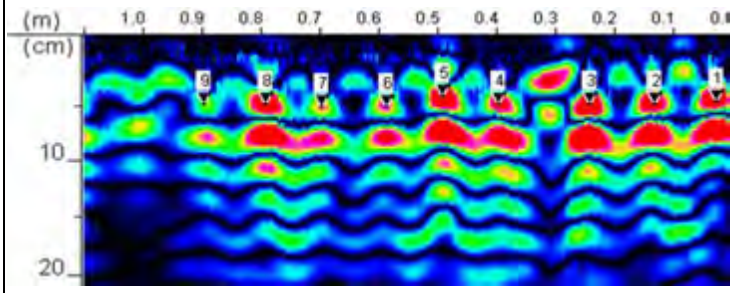
2	49	100
3	62	110
4	52	100
5	49	90
6	57	100
Ave	53.0	100.0

Distributing Bar

Image



Data

（mm）

No.	Cover	Space
1	47	-
2	49	90
3	49	100
4	49	100
5	41	100
6	52	105
7	52	90
8	49	105
9	49	100
Ave	48.6	98.8

Record of RC Rader Inspection (1/5)

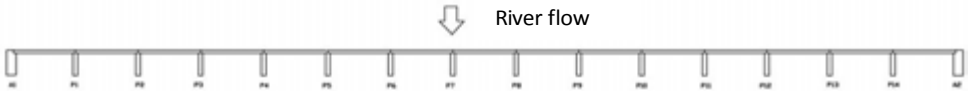
Inspector : Toshinao YAMAGUCHI Date : 17 Jan 2014

Bridge No.	11	**Location (State)**	Kerala
Bridge Name	Valapattanam Bridge	**Road Name**	NH17
Station	Km147/250	**Road Category**	National Highway
GPS Data	N 11 ° 55 ' 49.8 "	**Management Authority**	Kerala PWD
	E 075 ° 21 ' 11.0 "	**Year of Construction**	1980

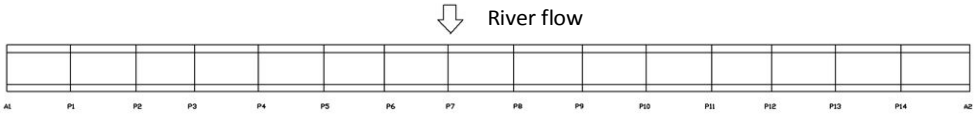
Bridge Length	420.77 m	**Span Arrangement**	15 spans
Bridge Width			
- Carriageway Width	7.50m	**Approach Road Width**	Same as bridge
- Medium Width	Nil		
- Footway Width	1.35m (both side)	**Existing of Detour**	Approx. 26Km
Type of Superstructure	RC Box Girder	**Type of Substructure**	RC
Type of Foundation	RC Piles		

Sketch of the Bridge

Side View



Plan View

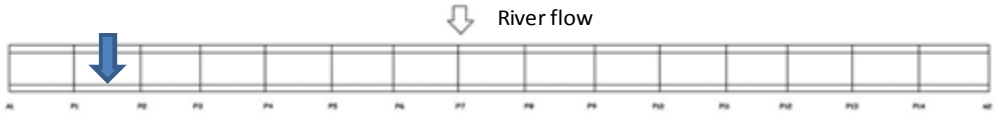


Record of RC Rader Inspection (2/5)

Inspector : Toshinao YAMAGUCHI Date : 17 Jan 2014

Bridge No.	11	Location (State)	Kerala
Bridge Name	Valapattanam Bridge	Road Name	NH17

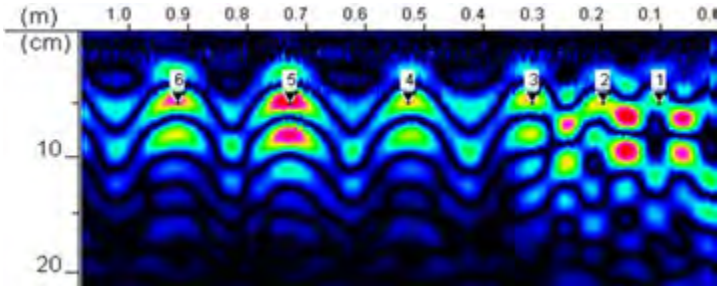
Location	girder web (P1-P2)



arrangement of bar

Main Revar

Image



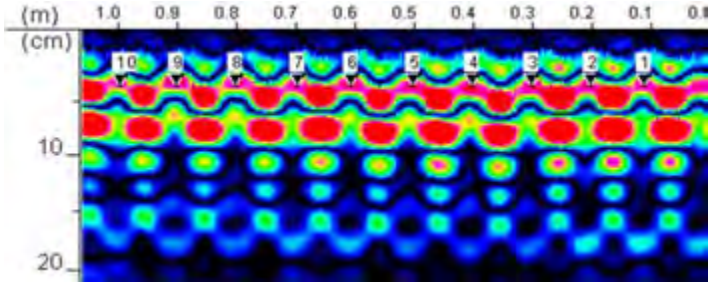
Data

(mm)

No.	Cover	Space
1	52	-
2	52	95
3	52	120
4	52	210
5	52	200
6	52	190
Ave	52.0	163.0

Distributing Bar

Image



Data

(mm)

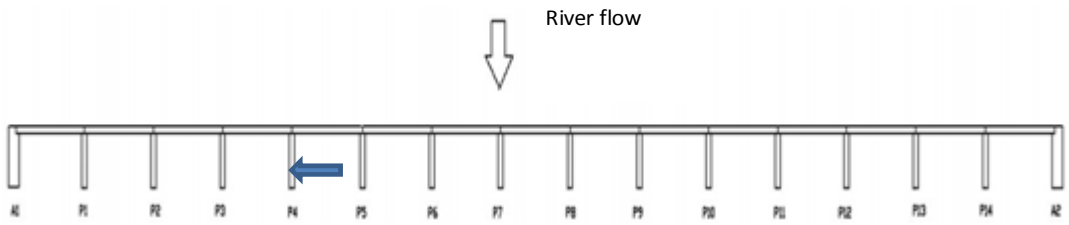
No.	Cover	Space
1	36	-
2	36	90
3	36	100
4	36	100
5	36	100
6	36	105
7	36	90
8	36	105
9	36	100
10	36	95
Ave	36.0	98.3

Record of RC Rader Inspection (3/5)

Inspector : Toshinao YAMAGUCHI Date : 17 Jan 2014

Bridge No.	11	Location (State)	Kerala
Bridge Name	Valapattanam Bridge	Road Name	NH17

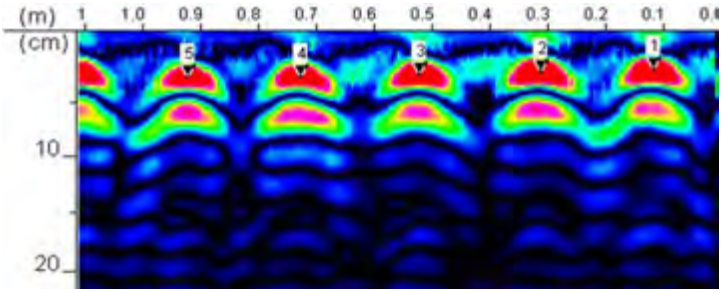
Location	P4 pier



arrangement of bar

Main Revar

Image



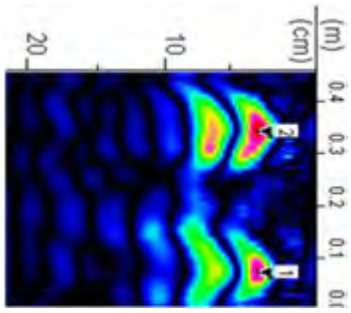
Data

(mm)

No.	Cover	Space
1	15	-
2	18	195
3	21	210
4	24	205
5	24	195
Ave	20.4	201.3

Distributing Bar

Image



Data

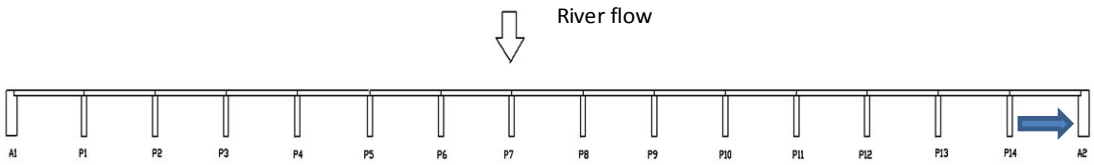
(mm)

No.	Cover	Space
1	27	-
2	27	270
Ave	27.0	270.0

Record of RC Rader Inspection (4/5)

Inspector : Toshinao YAMAGUCHI Date : 17 Jan 2014

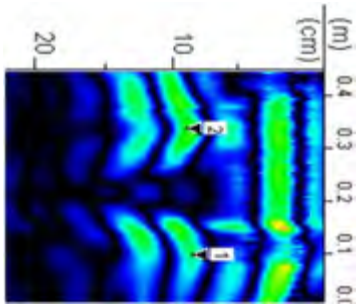
Bridge No.	11	Location (State)	Kerala
Bridge Name	Valapattanam Bridge	Road Name	NH17
Location	A2 abutment wall		



arrangement of bar

Main Revar

Image



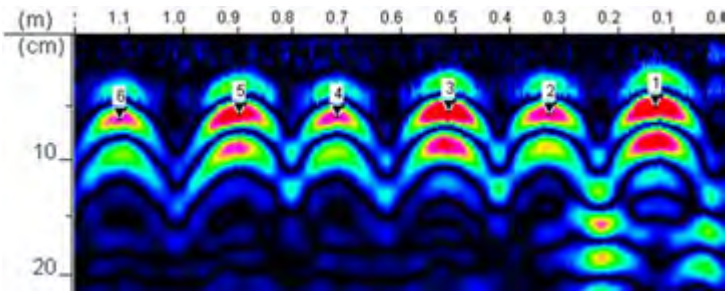
Data

(mm)

No.	Cover	Space
1	86	-
2	91	240
Ave	88.5	240.0

Distributing Bar

Image



Data

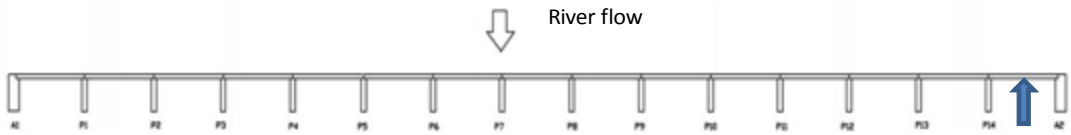
(mm)

No.	Cover	Space
1	52	-
2	60	195
3	57	185
4	62	205
5	60	180
6	65	220
Ave	59.3	197.0

Record of RC Rader Inspection (5/5)

Inspector : Toshinao YAMAGUCHI Date : 17 Jan 2014

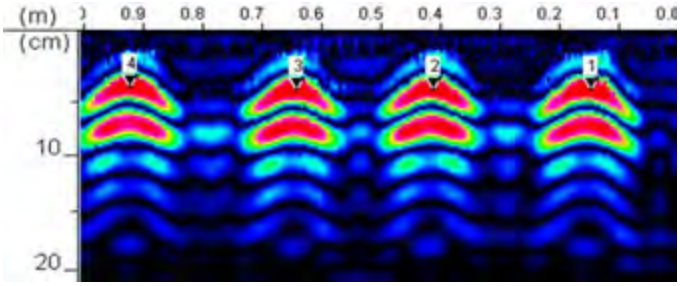
Bridge No.	11	Location (State)	Kerala
Bridge Name	Valapattanam Bridge	Road Name	NH17
Location	Bottom of deck Slab (P14-A2)		



arrangement of bar

Main Revar

Image



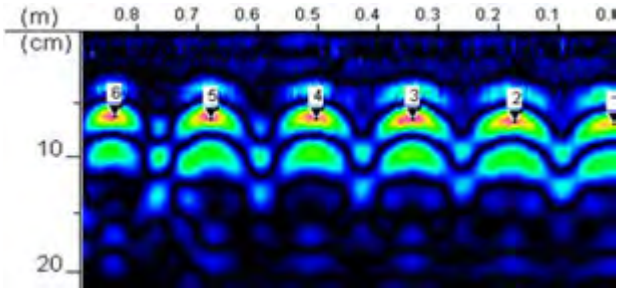
Data

(mm)

No.	Cover	Space
1	39	-
2	39	265
3	39	230
4	36	280
Ave	38.3	258.3

Distributing Bar

Image



Data

(mm)

No.	Cover	Space
1	72	-
2	69	165
3	67	170
4	67	160
5	67	175
6	65	160
Ave	67.8	166.0

Record of RC Rader Inspection (1/2)

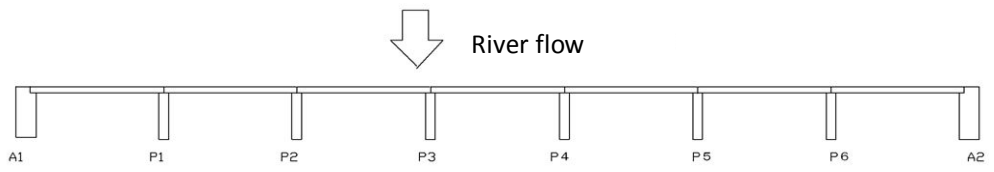
Inspector : Toshinao YAMAGUCHI Date : 16 Jan 2014

Bridge No.	12	**Location (State)**	Kerala
Bridge Name	Perumba Bridge	**Road Name**	NH17
Station	115/400	**Road Category**	National Highway
GPS Data	N 12 ° 06 ' 30.0 "	**Management Authority**	Kerala PWD
	E 075 ° 13 ' 18.7 "	**Year of Construction**	1952

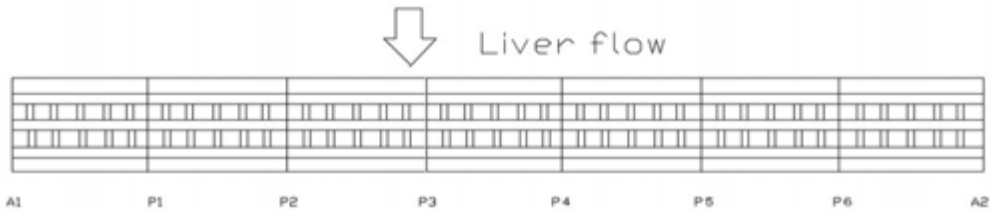
Bridge Length	146.8 m	**Span Arrangement**	7 spans
Bridge Width			
- Carriageway Width	6.7m	**Approach Road Width**	Same as Bridge
- Median Width	Nil		
- Footway Width	Nil	**Existing of Detour**	23Km
Type of Superstructure	RC T Girder	**Type of Substructure**	Stone Masonry
Type of Foundation	Well		

Sketch of the Bridge

Side View



Plan View

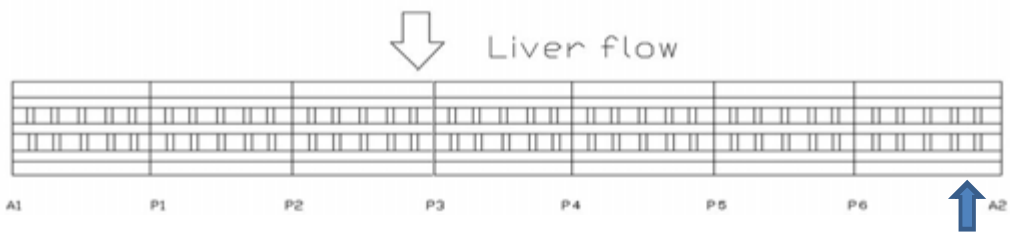


Record of RC Rader Inspection (2/2)

Inspector : Toshinao YAMAGUCHI Date : 16 Jan 2014

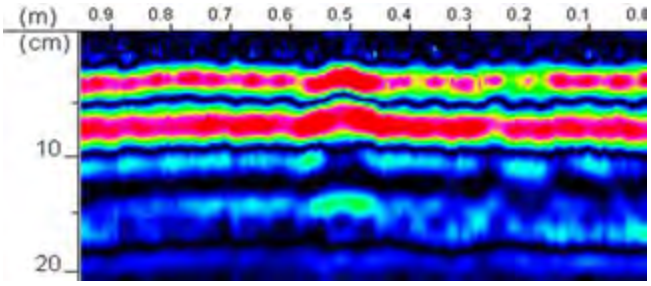
Bridge No.	12	Location (State)	Kerala
Bridge Name	Perumba Bridge	Road Name	NH17

Location	girder web (P6-A2)

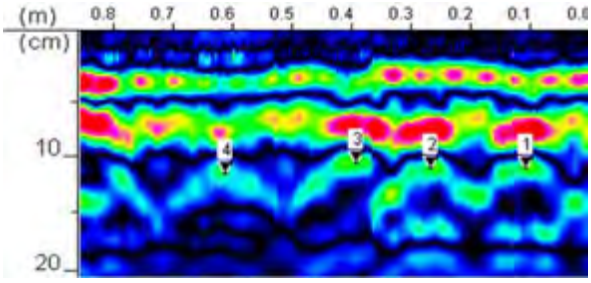


arrangement of bar

Main Revar

Image	Data
	not confirm

Distributing Bar

Image	Data
	(mm)

No.	Cover	Space
1	112	-
2	112	160
3	107	125
4	117	200
Ave	112.0	161.7

Record of RC Rader Inspection (1/7)

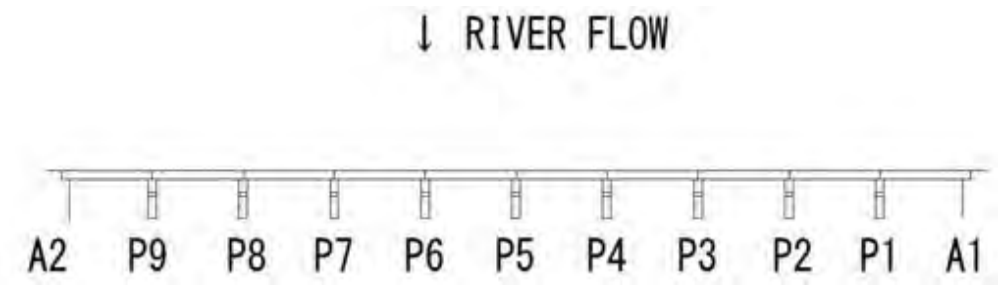
Inspector : Toshinao YAMAGUCHI Date : 13 Jan 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E
Station	Budhel Km10/0	**Road Category**	National Higway
GPS Data	N 21° 22' 09.77"	**Management Authority**	MORTH
	E 77° 02' 25.69"	**Year of Construction**	1985

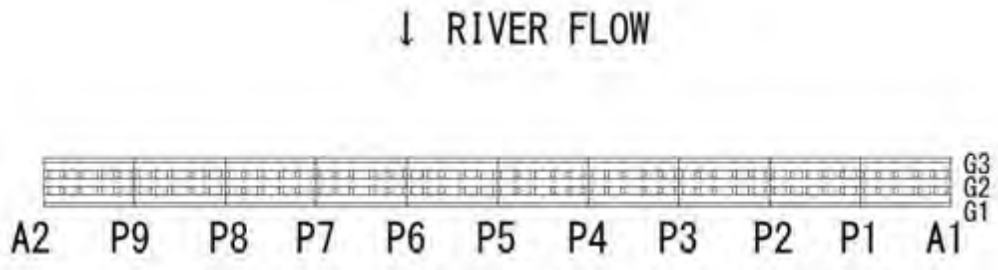
Bridge Length	240m	**Span Arrangement**	10 Spans
Bridge Width			
- Carriageway Width	7.50m (2 Lane)	**Approach Road Width**	7.50m (Both side)
- Medium Width	Nil		
- Footway Width	5.50m	**Existing of Detour**	Approx. 7km
Type of Superstructure	RC T Girder	**Type of Substructure**	RC mass concrete
Type of Foundation	Pile		

Sketch of the Bridge

Side View



Plan View

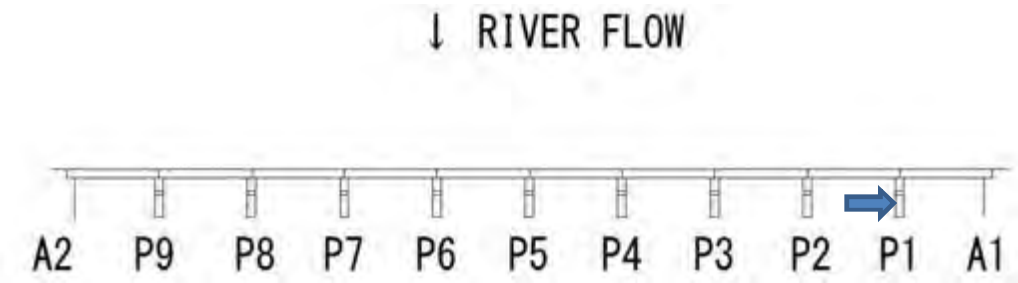


Record of RC Rader Inspection (2/7)

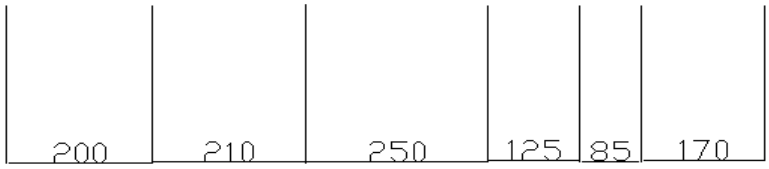
Inspector : Toshinao YAMAGUCHI Date : 13 Jan 2014

Bridge No.	14	Location (State)	Gujarat
Bridge Name	Shetrunji Bridge	Road Name	NH8E

Location	P1

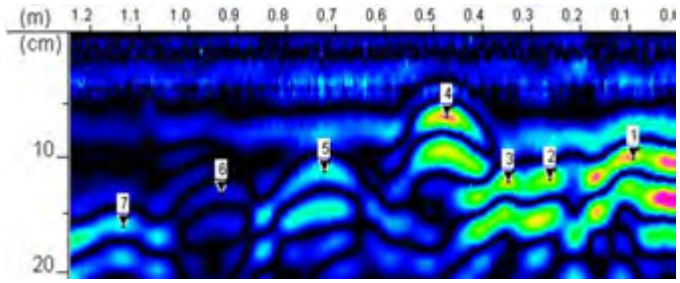


arrangement of bar



Main Revar

Image	Data

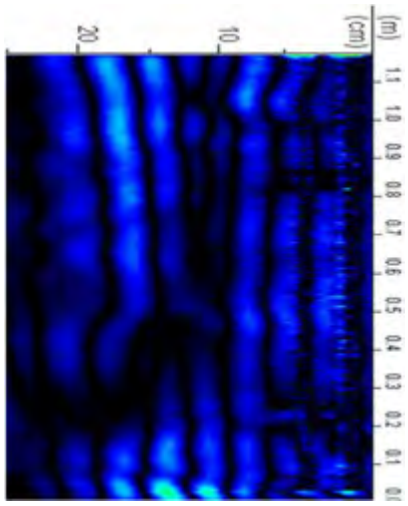


(mm)

No.	Cover	Space
1	103	-
2	121	170
3	124	85
4	65	125
5	114	250
6	133	210
7	162	200
Ave	117.4	173.3

Distributing Bar

Image	Data



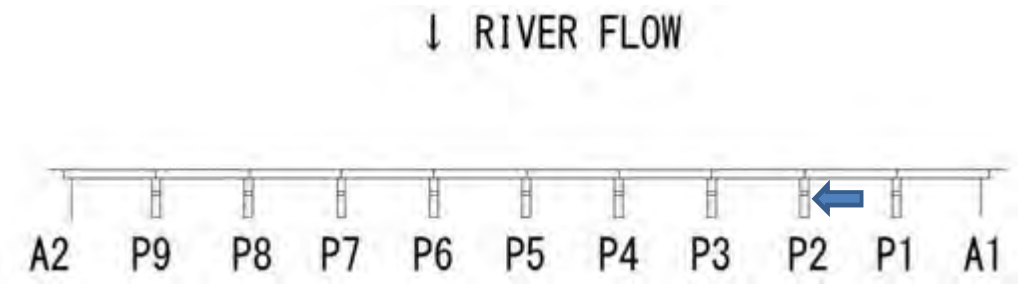
not confirm

Record of RC Rader Inspection (3/7)

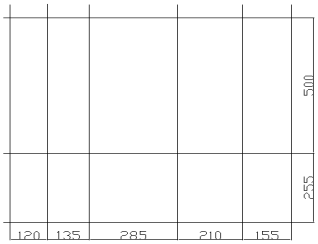
Inspector : Toshinao YAMAGUCHI Date : 13 Jan 2014

Bridge No.	14	Location (State)	Gujarat
Bridge Name	Shetrunji Bridge	Road Name	NH8E

Location	P2

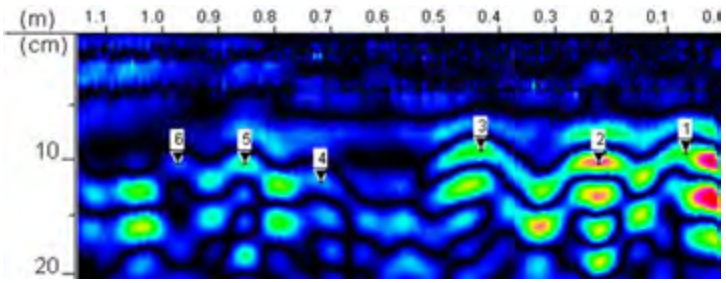


arrangement of bar



Main Revar

Image	Data

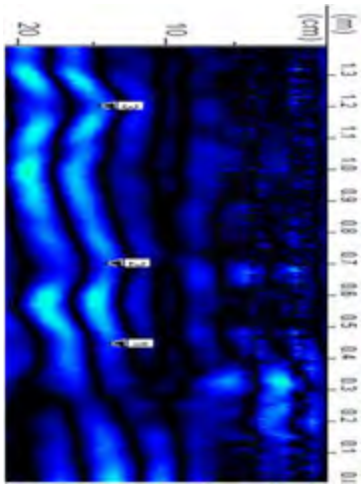


(mm)

No.	Cover	Space
1	96	-
2	115	155
3	93	210
4	121	285
5	105	135
6	105	120
Ave	105.8	181.0

Distributing Bar

Image	Data



(mm)

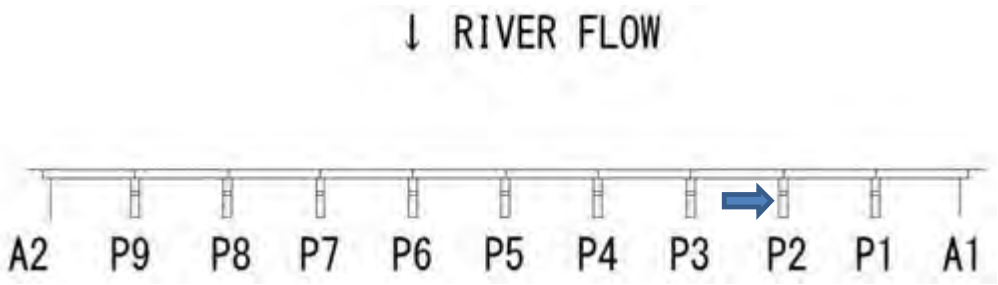
No.	Cover	Space
1	140	-
2	142	255
3	147	500
Ave	143.0	377.5

Record of RC Rader Inspection (4/7)

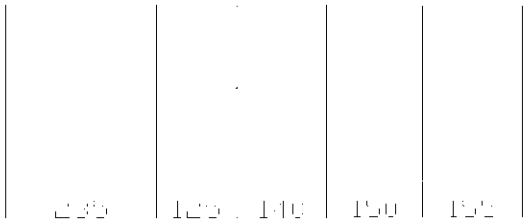
Inspector : Toshinao YAMAGUCHI Date : 13 Jan 2014

Bridge No.	14	Location (State)	Gujarat
Bridge Name	Shetrunji Bridge	Road Name	NH8E

Location	P2

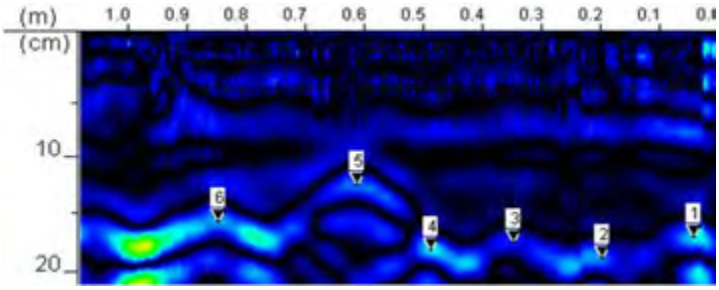


arrangement of bar



Main Revar

Image



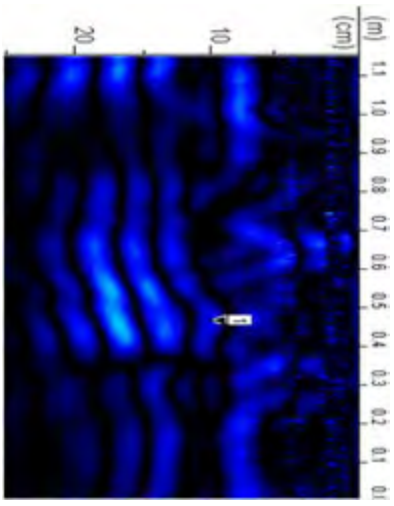
Data

(mm)

No.	Cover	Space
1	172	-
2	190	155
3	176	150
4	183	140
5	126	125
6	158	235
Ave	167.5	161.0

Distributing Bar

Image



Data

(mm)

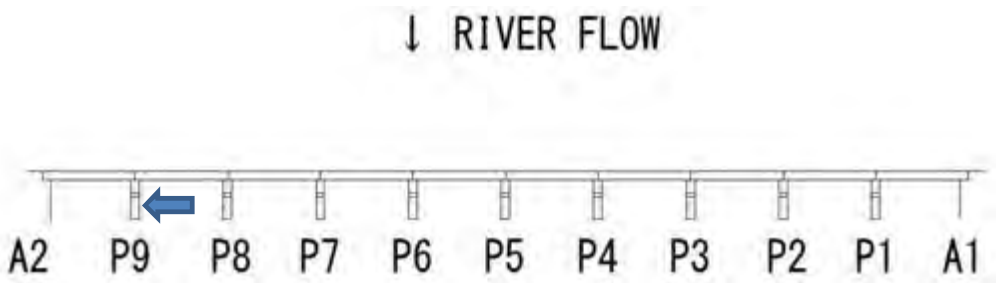
No.	Cover	Space
1	100	-
Ave	100.0	-

Record of RC Rader Inspection (5/7)

Inspector : Toshinao YAMAGUCHI Date : 13 Jan 2014

Bridge No.	14	Location (State)	Gujarat
Bridge Name	Shetrunji Bridge	Road Name	NH8E

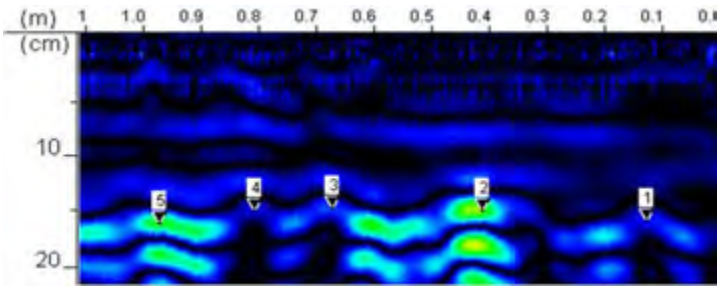
Location	P9



arrangement of bar

Main Revar

Image



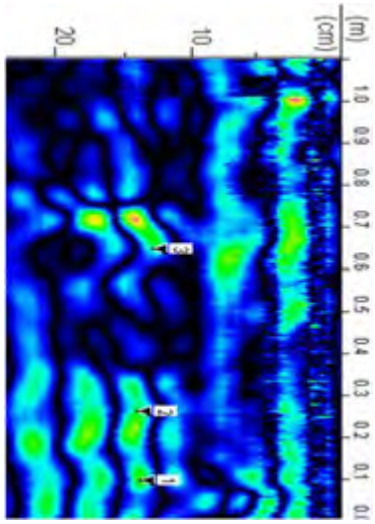
Data

(mm)

No.	Cover	Space
1	160	-
2	151	285
3	149	260
4	151	135
5	162	165
Ave	154.6	211.3

Distributing Bar

Image



Data

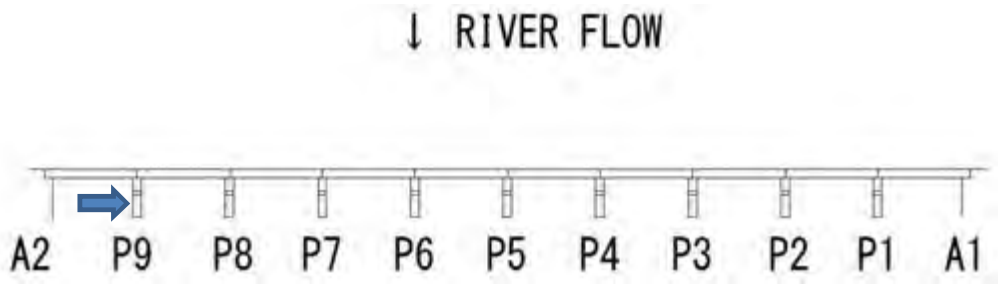
(mm)

No.	Cover	Space
1	140	-
2	142	255
3	131	165
Ave	137.7	385.0

Record of RC Rader Inspection (6/7)

Inspector : Toshinao YAMAGUCHI Date : 13 Jan 2014

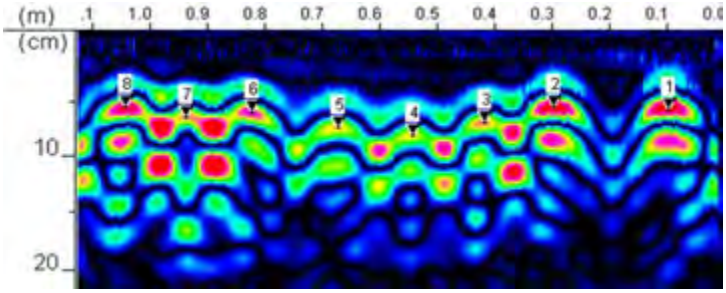
Bridge No.	14	Location (State)	Gujarat
Bridge Name	Shetrunji Bridge	Road Name	NH8E
Location	P9left (upstream side)		



arrangement of bar

Main Revar

Image



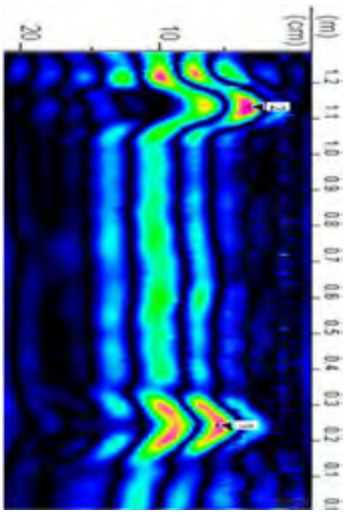
Data

(mm)

No.	Cover	Space
1	60	-
2	57	200
3	72	120
4	84	125
5	77	130
6	62	150
7	67	115
8	57	105
Ave	67.0	135.0

Distributing Bar

Image



Data

(mm)

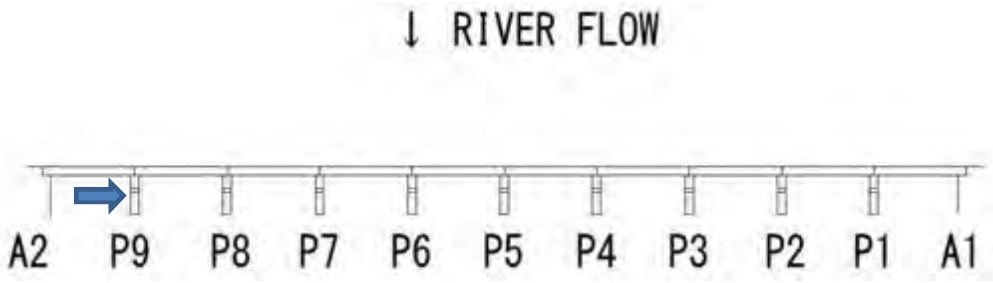
No.	Cover	Space
1	57	-
2	30	890
Ave	43.5	890.0

Record of RC Rader Inspection (7/7)

Inspector : Toshinao YAMAGUCHI Date : 13 Jan 2014

Bridge No.	14	Location (State)	Gujarat
Bridge Name	Shetrunji Bridge	Road Name	NH8E

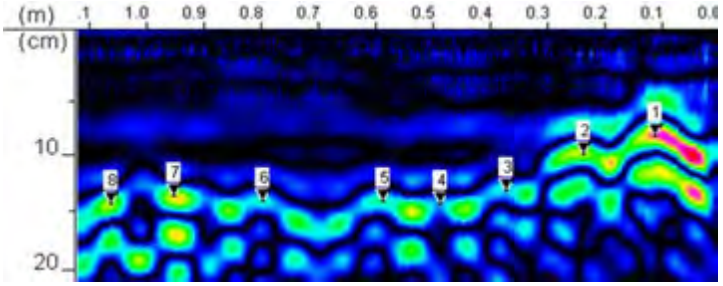
Location	P9 right (downstream side)



arrangement of bar

Main Revar

Image



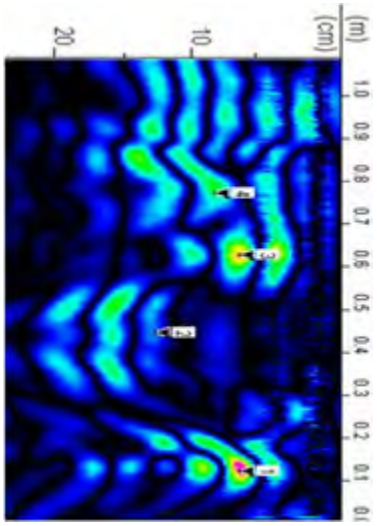
Data

(mm)

No.	Cover	Space
1	84	-
2	100	125
3	133	135
4	144	115
5	142	100
6	142	210
7	137	155
8	144	110
Ave	128.3	135.7

Distributing Bar

Image



Data

(mm)

No.	Cover	Space
1	65	-
2	128	325
3	65	180
4	84	145
Ave	74.5	145.0

鉄筋探査（電磁誘導法）

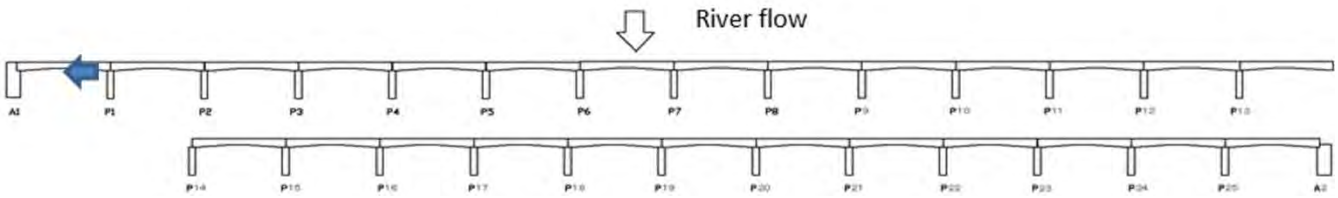
Record of Electromagnetic Inspection (1/5)

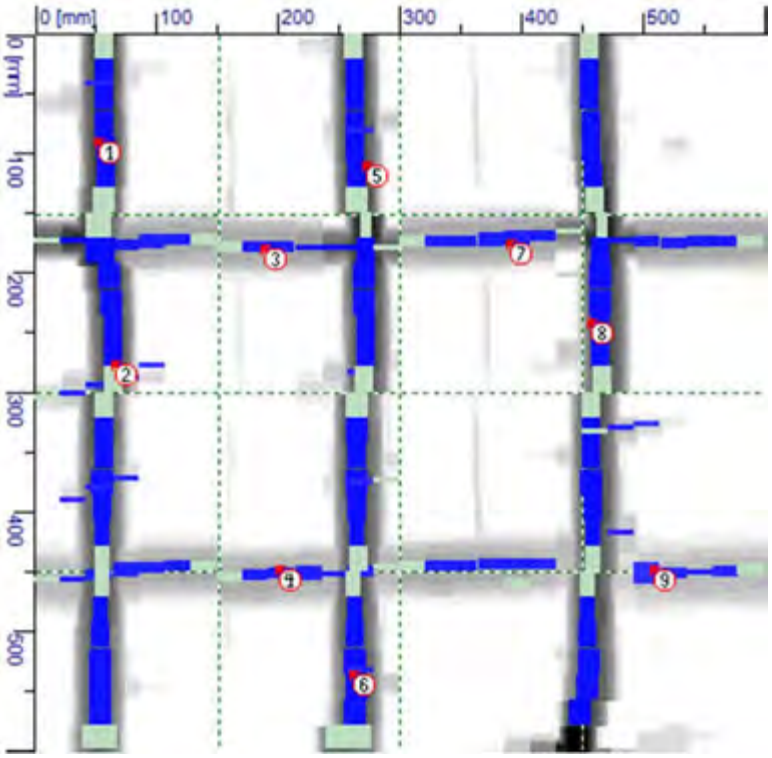
Inspector : Koji KAWAMATA Date : 23 Jan 2014

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Vertical	13	D16
②	Vertical	14	D16
③	Horizontal	30	D10
④	Horizontal	34	D13
⑤	Vertical	13	D16
⑥	Vertical	16	D19
⑦	Horizontal	29	D10
⑧	Vertical	15	D19
⑨	Horizontal	48	D19

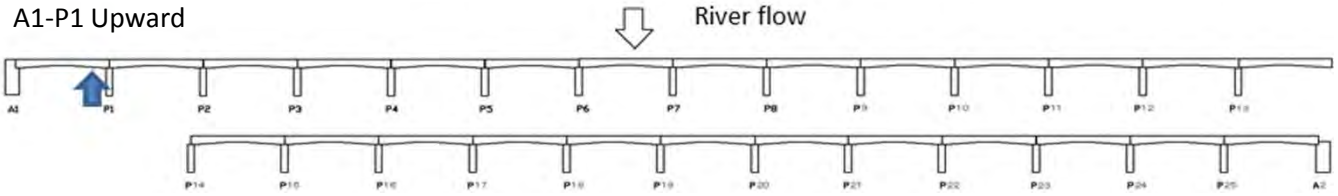
Record of Electromagnetic Inspection (2/5)

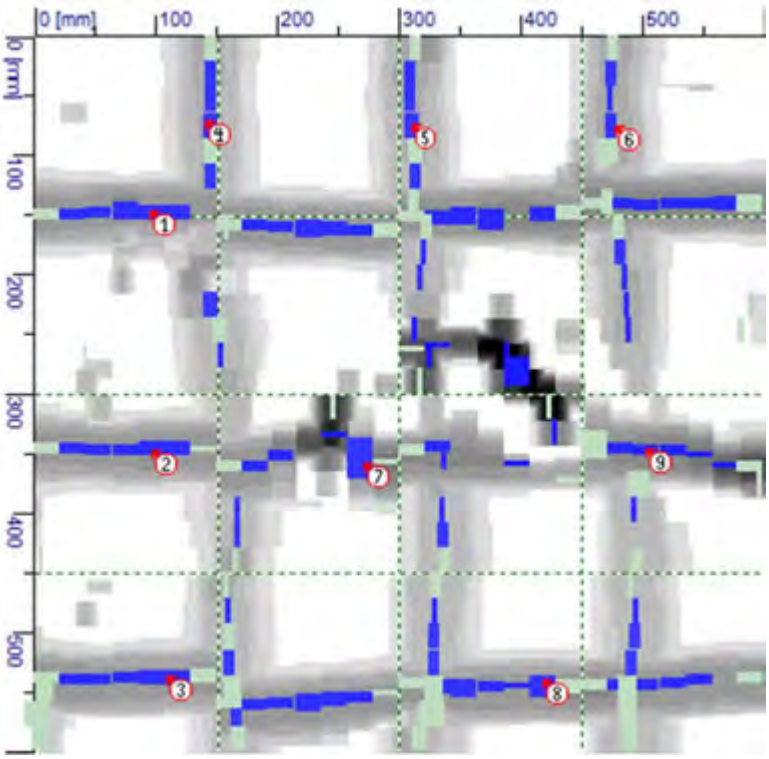
Inspector : Koji KAWAMATA Date : 23 Jan 2014

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Horizontal	49	D16
②	Horizontal	46	D10
③	Horizontal	49	D13
④	Vertical	57	D10
⑤	Vertical	55	D10
⑥	Vertical	53	D10
⑦	Horizontal	55	D35
⑧	Horizontal	52	D19
⑨	Horizontal	39	D10

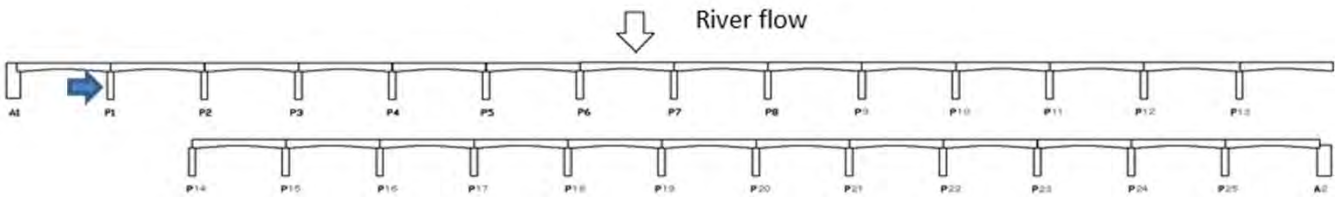
Record of Electromagnetic Inspection (3/5)

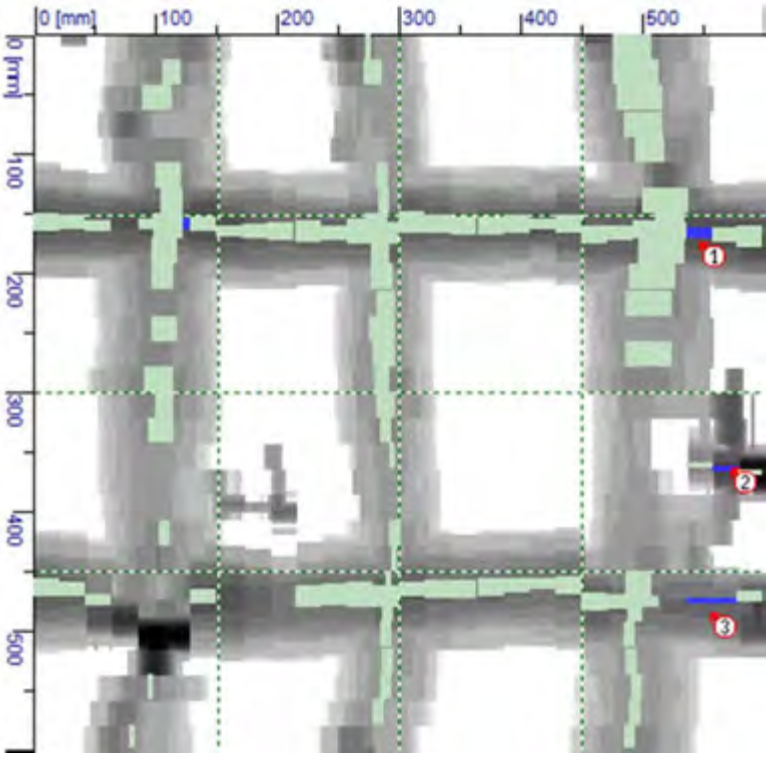
Inspector : Koji KAWAMATA Date : 23 Jan 2014

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Horizontal	59	D10
②	Horizontal	50	–
③	Horizontal	55	–
④			
⑤			
⑥			
⑦			
⑧			
⑨			

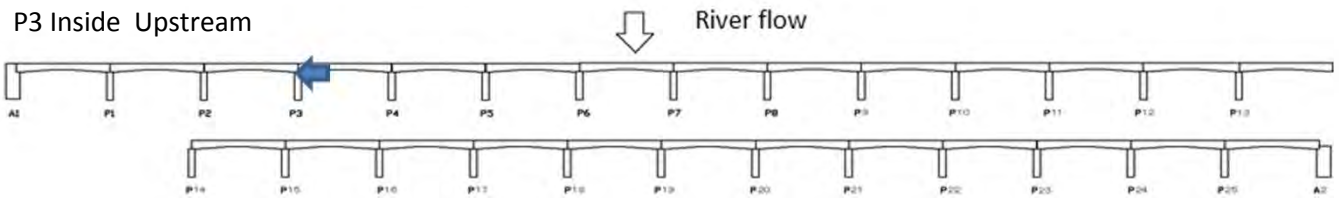
Record of Electromagnetic Inspection (4/5)

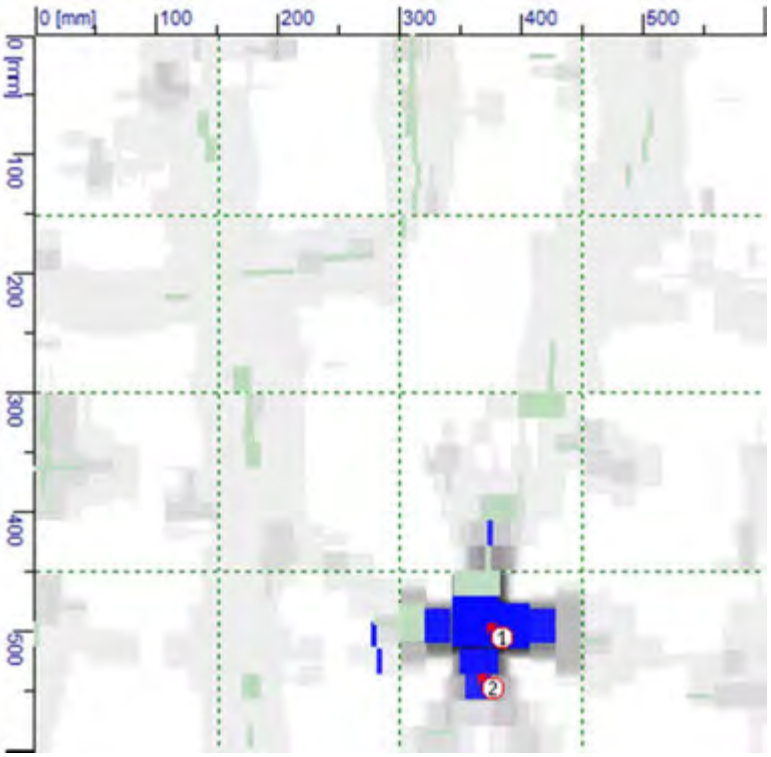
Inspector : Koji KAWAMATA Date : 23 Jan 2014

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Horizontal	13	D38
②	Vertical	20	D32
③			
④			
⑤			
⑥			
⑦			
⑧			
⑨			

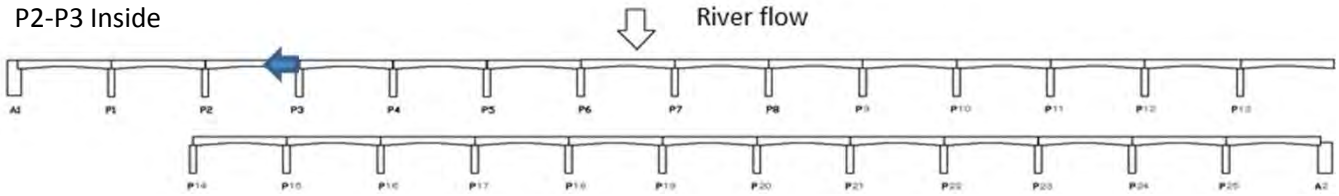
Record of Electromagnetic Inspection (5/5)

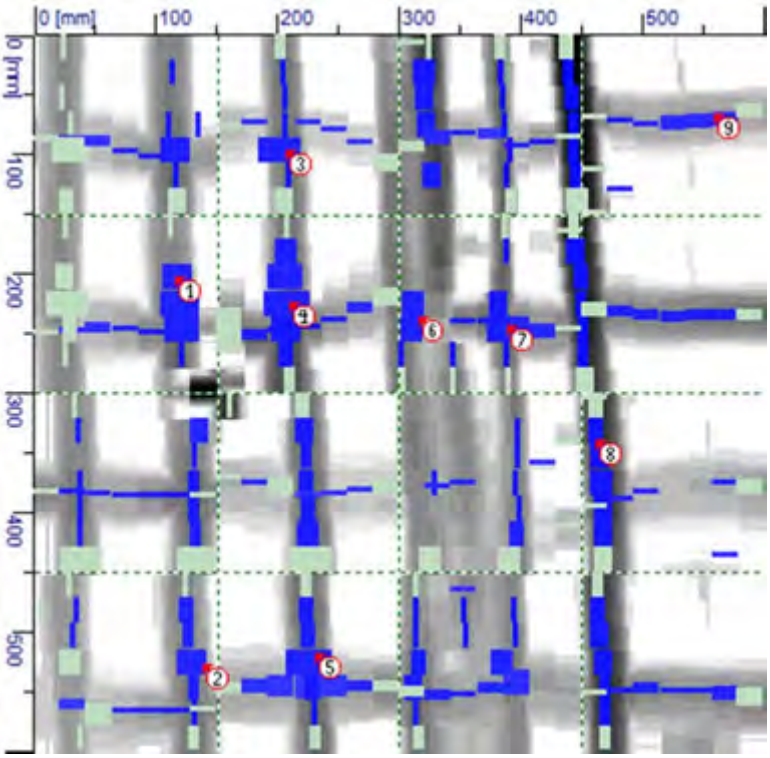
Inspector : Koji KAWAMATA Date : 23 Jan 2014

Bridge No.	2	**Location (State)**	Assam
Bridge Name	Kaliabhomora Bridge	**Road Name**	NH37A

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Vertical	34	D32
②	Vertical	38	D25
③	Vertical	36	D35
④	Vertical	33	D38
⑤	Vertical	36	D38
⑥	Vertical	32	D19
⑦	Vertical	28	D19
⑧	Vertical	23	D19
⑨	Horizontal	43	D13

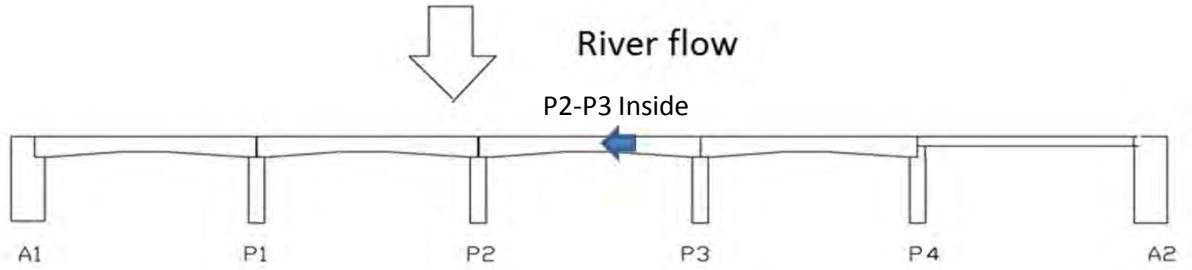
Record of Electromagnetic Inspection (1/4)

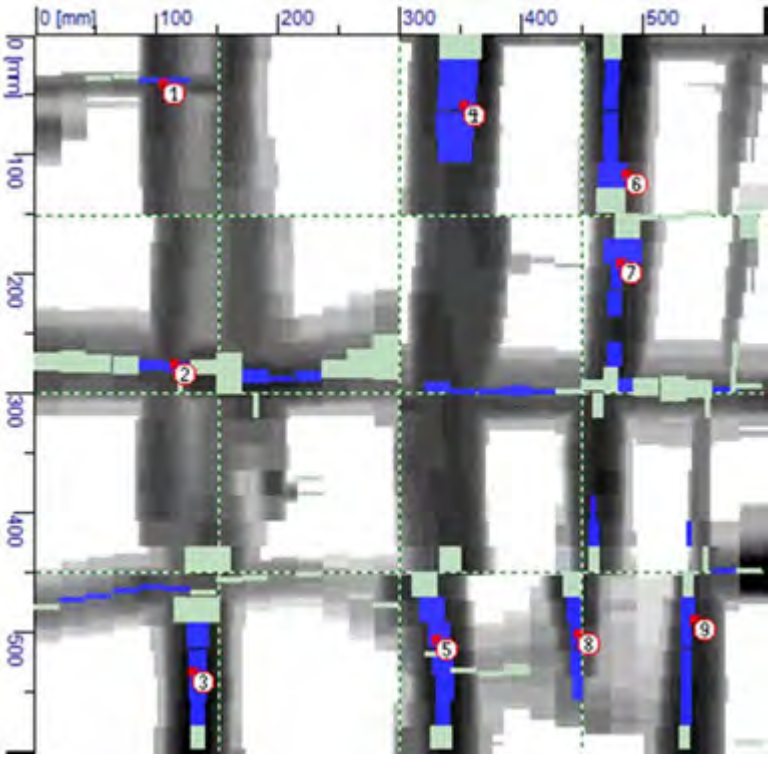
Inspector : Koji KAWAMATA Date : 27 Jan 2014

Bridge No.	4	**Location (State)**	Assam
Bridge Name	Badarpurghat Bridge	**Road Name**	NH 6 (old NH 44)

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Horizontal	54	–
②	Horizontal	56	D10
③	Vertical	47	D16
④	Vertical	54	D32
⑤	Vertical	54	D22
⑥	Vertical	54	D25
⑦	Vertical	59	D32
⑧	Vertical	46	D13
⑨	Vertical	47	D13

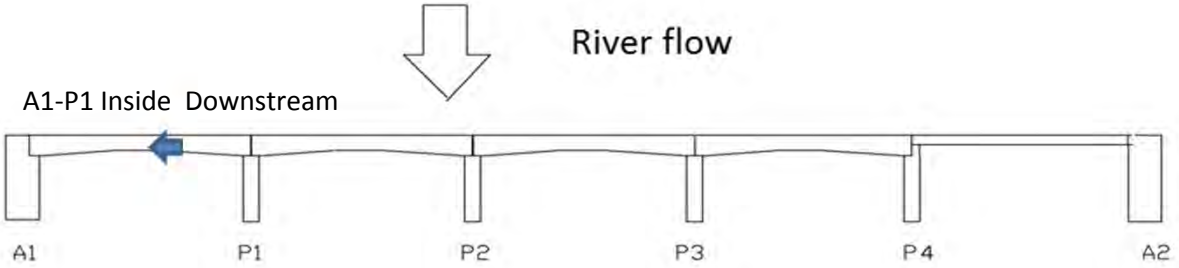
Record of Electromagnetic Inspection (2/4)

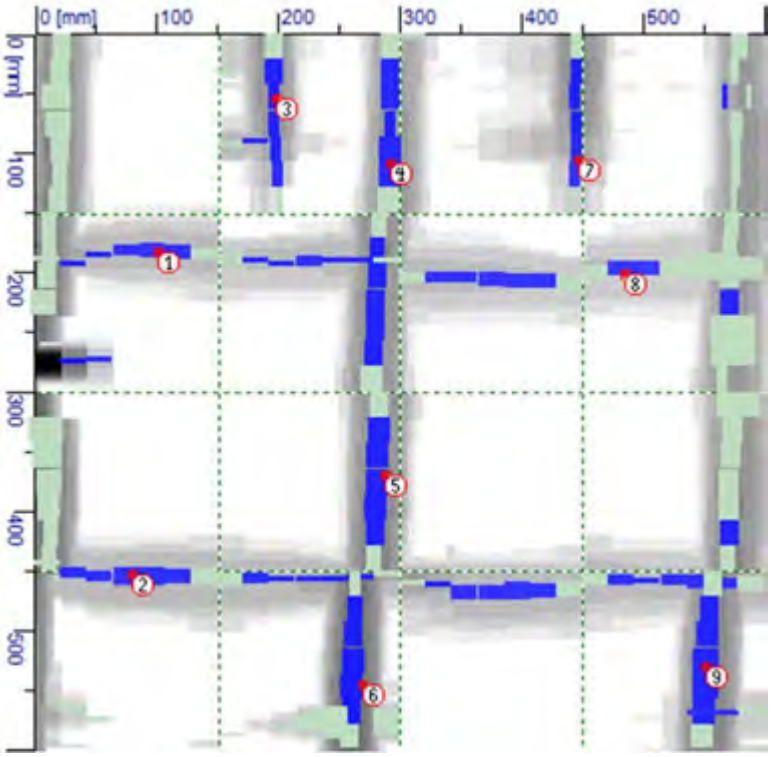
Inspector : Koji KAWAMATA Date : 27 Jan 2014

Bridge No.	4	**Location (State)**	Assam
Bridge Name	Badarpurghat Bridge	**Road Name**	NH 6 (old NH 44)

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Horizontal	53	D13
②	Horizontal	51	D16
③	Vertical	37	D16
④	Vertical	41	D19
⑤	Vertical	37	D19
⑥	Vertical	30	D19
⑦	Vertical	33	D10
⑧	Vertical	58	D13
⑨	Vertical	37	D22

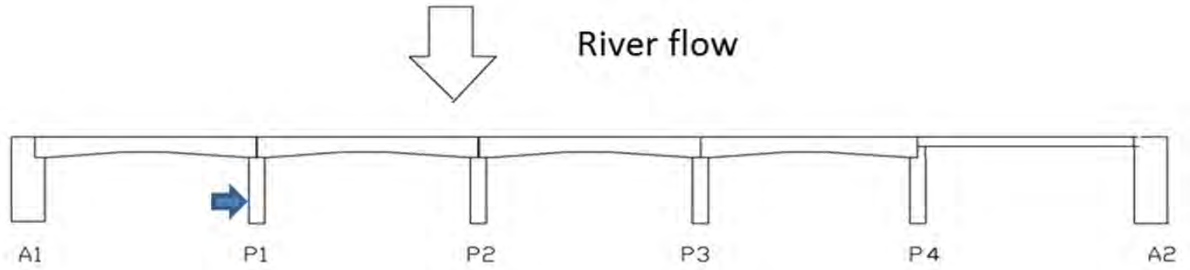
Record of Electromagnetic Inspection (3/4)

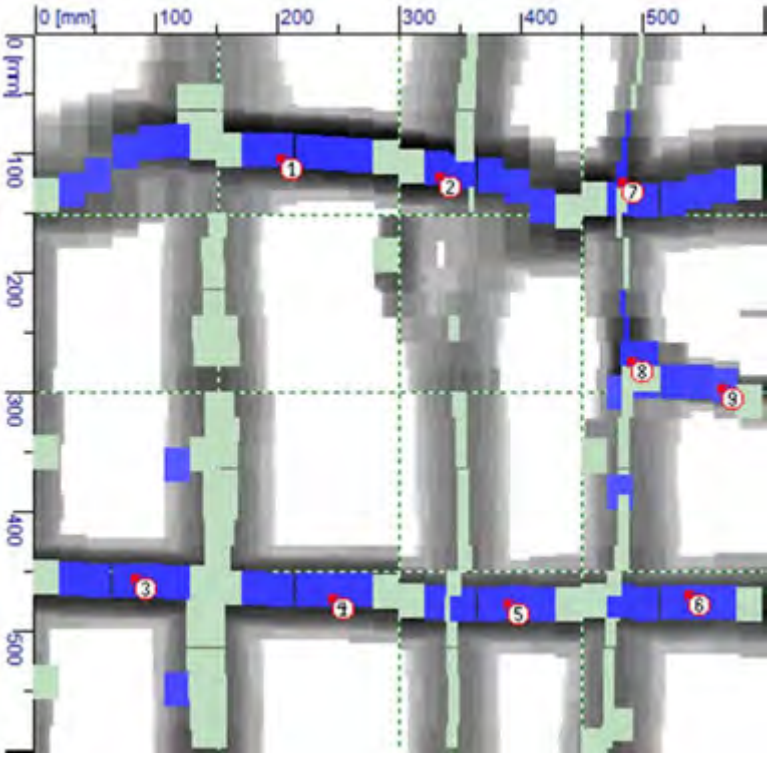
Inspector : Koji KAWAMATA Date : 27 Jan 2014

Bridge No.	4	**Location (State)**	Assam
Bridge Name	Badarpurghat Bridge	**Road Name**	NH 6 (old NH 44)

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Horizontal	54	D29
②	Horizontal	56	D29
③	Horizontal	59	D29
④	Horizontal	59	D29
⑤	Horizontal	57	D22
⑥	Horizontal	61	D29
⑦	Vertical	50	D10
⑧	Vertical	60	D32
⑨	Vertical	69	D29

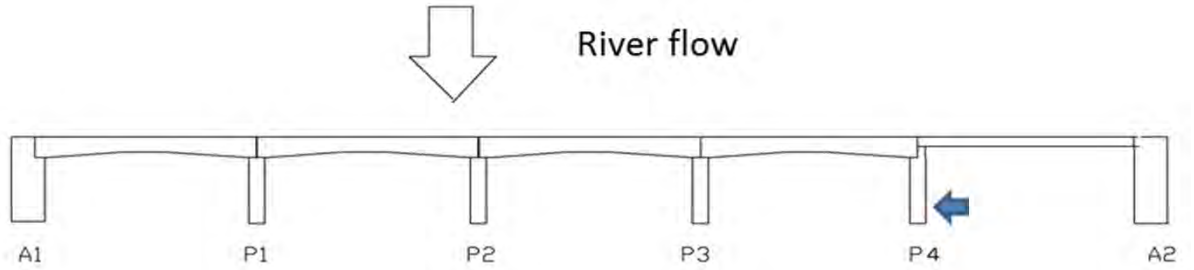
Record of Electromagnetic Inspection (4/4)

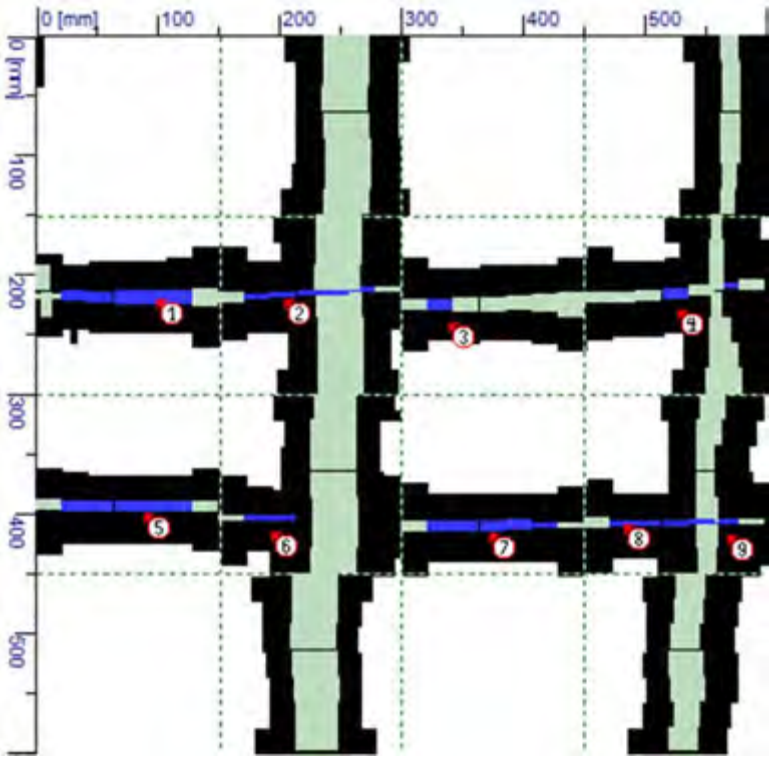
Inspector : Koji KAWAMATA Date : 27 Jan 2014

Bridge No.	4	**Location (State)**	Assam
Bridge Name	Badarpurghat Bridge	**Road Name**	NH 6 (old NH 44)

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Horizontal	56	D13
②	Horizontal	48	–
③	Horizontal	57	D10
④	Horizontal	60	D10
⑤	Horizontal	58	D10
⑥	Horizontal	47	–
⑦	Horizontal	55	D10
⑧	Horizontal	49	–
⑨	Horizontal	49	–

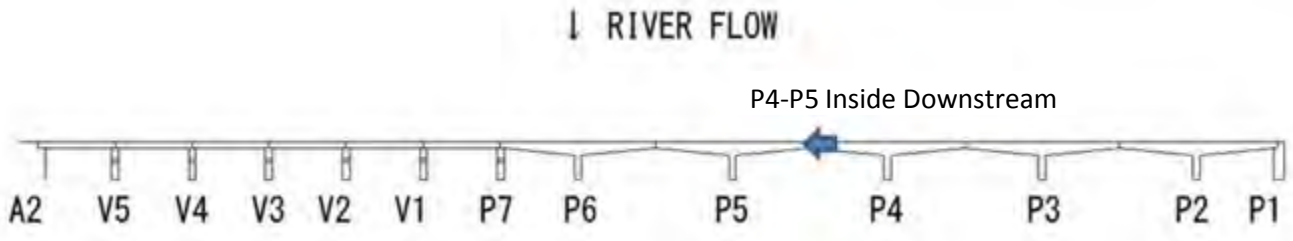
Record of Electromagnetic Inspection (1/5)

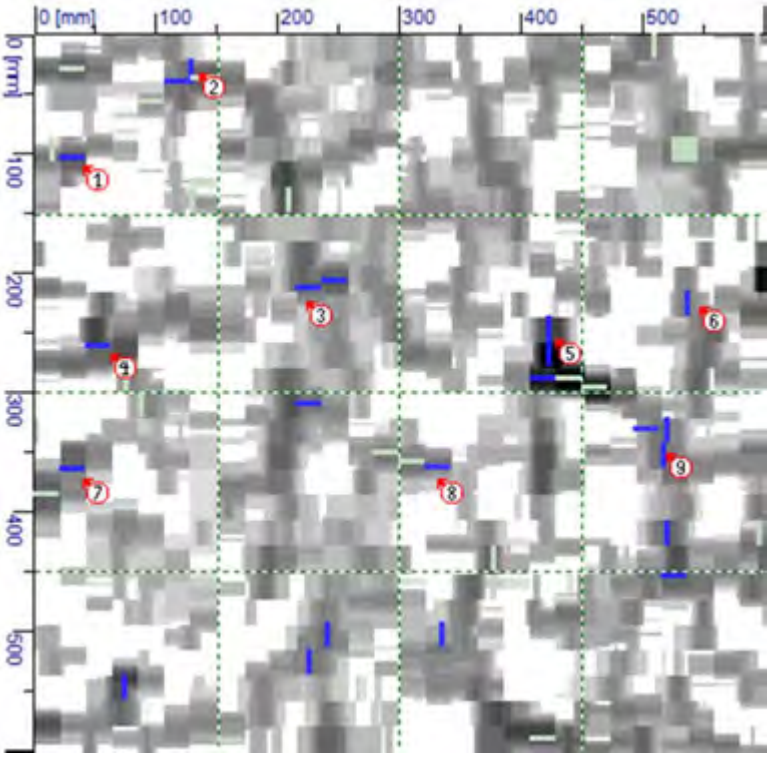
Inspector : Koji KAWAMATA Date : 14 Nov 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Horizontal	40	–
②	Vertical	52	–
③	Horizontal	45	–
④	Horizontal	46	–
⑤	Vertical	39	–
⑥	Vertical	55	–
⑦	Horizontal	43	–
⑧	Horizontal	54	–
⑨	Vertical	49	–

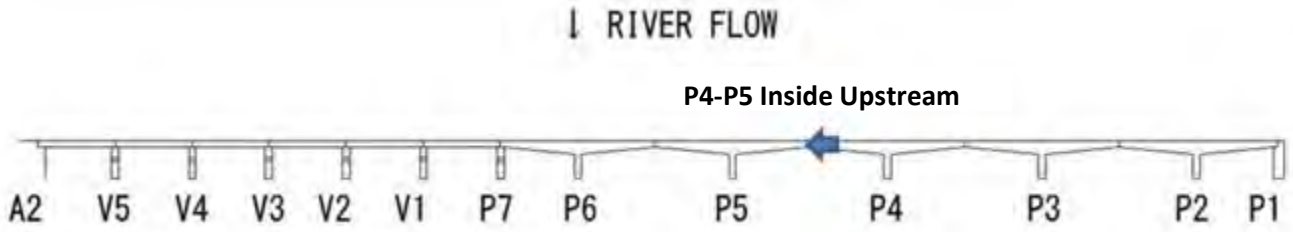
Record of Electromagnetic Inspection (2/5)

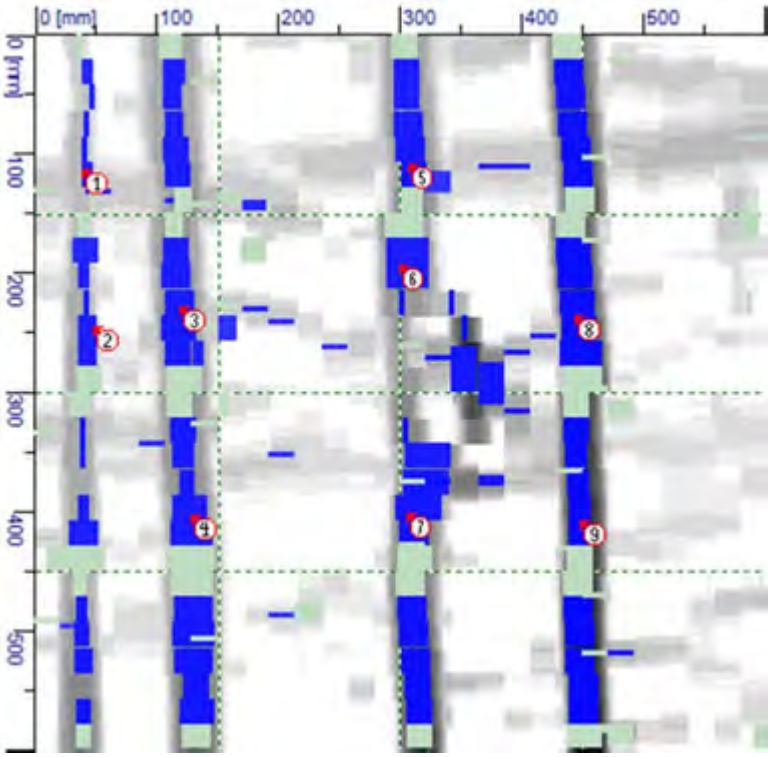
Inspector : Koji KAWAMATA Date : 14 Nov 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Vertical	29	–
②	Vertical	30	D16
③	Vertical	27	D29
④	Vertical	28	D29
⑤	Vertical	29	D25
⑥	Vertical	29	D35
⑦	Vertical	23	D38
⑧	Vertical	16	D29
⑨	Vertical	11	D19

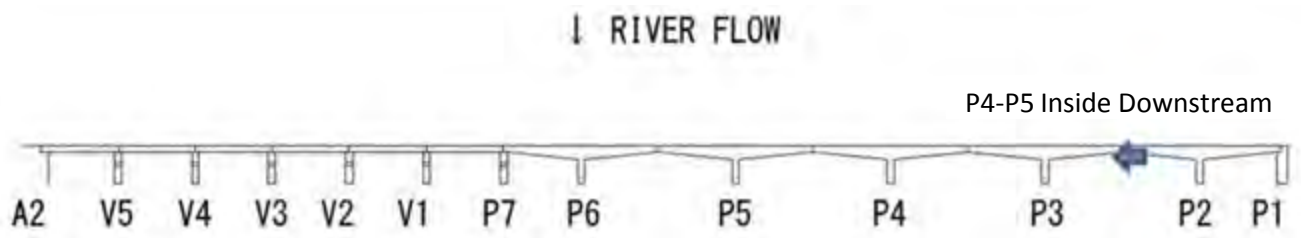
Record of Electromagnetic Inspection (3/5)

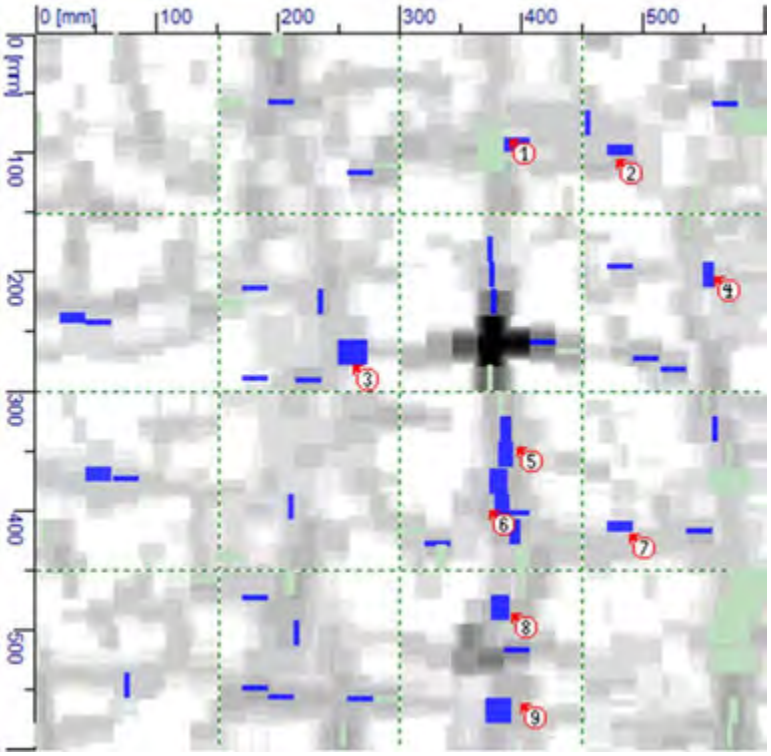
Inspector : Koji KAWAMATA Date : 14 Nov 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Horizontal	57	D13
②	Horizontal	46	D10
③	Vertical	44	D25
④	Vertical	50	D10
⑤	Vertical	48	D13
⑥	Vertical	47	D13
⑦	Horizontal	55	D10
⑧	Vertical	47	D16
⑨	Vertical	49	D22

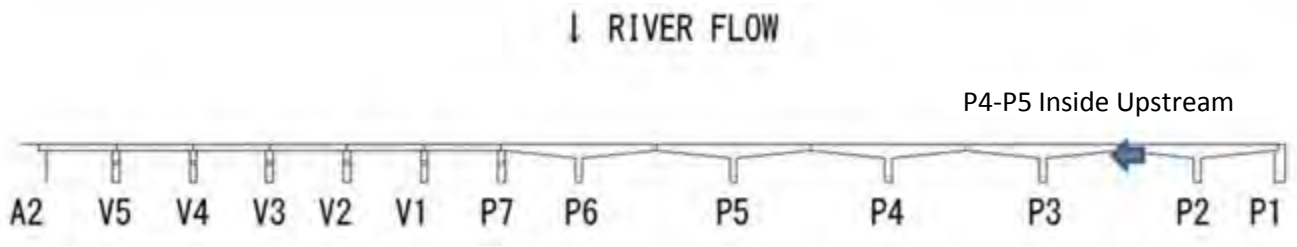
Record of Electromagnetic Inspection (4/5)

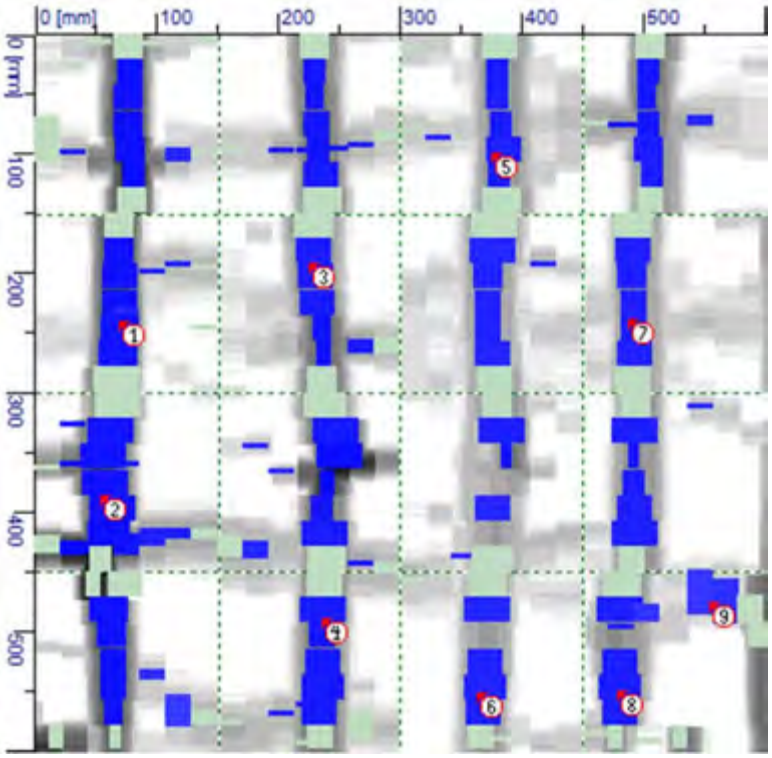
Inspector : Koji KAWAMATA Date : 14 Nov 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Vertical	19	D32
②	Vertical	19	D38
③	Vertical	29	D29
④	Vertical	26	D29
⑤	Vertical	32	D29
⑥	Vertical	35	D35
⑦	Vertical	33	D22
⑧	Vertical	29	D29
⑨	Vertical	55	D38

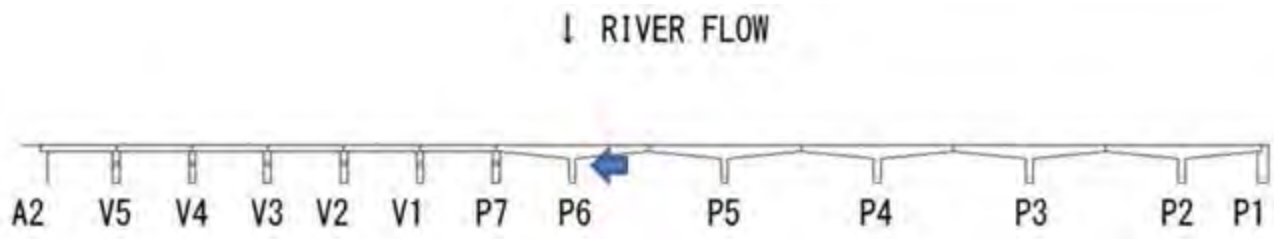
Record of Electromagnetic Inspection (5/5)

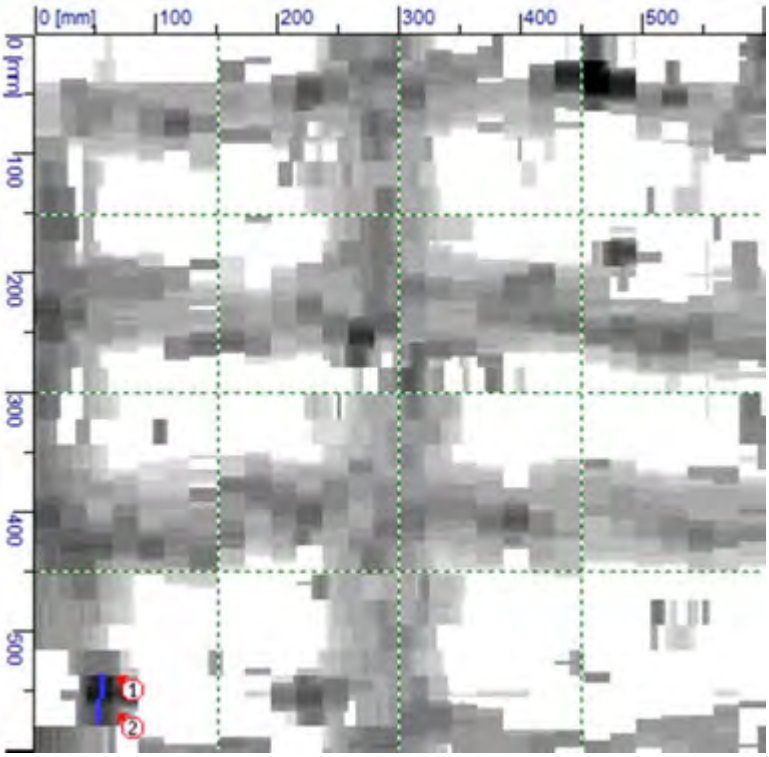
Inspector : Koji KAWAMATA Date : 14 Nov 2014

Bridge No.	5	**Location (State)**	Goa
Bridge Name	Zuari Bridge	**Road Name**	NH17

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Vertical	47	-
②	Vertical	55	-
③			
④			
⑤			
⑥			
⑦			
⑧			
⑨			

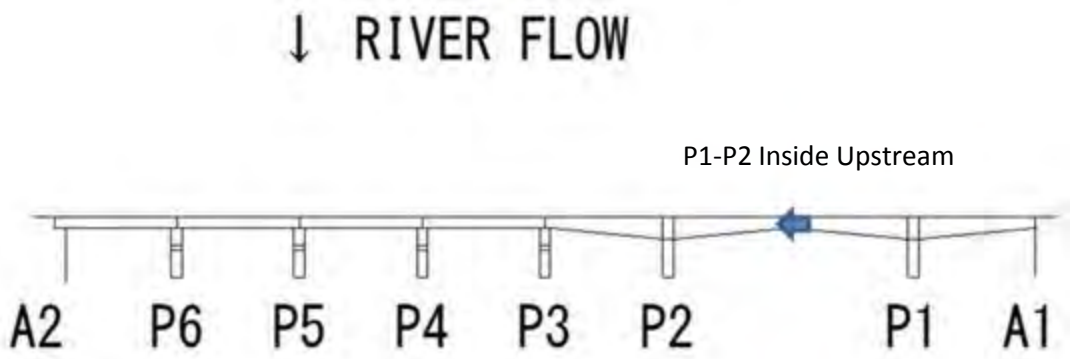
Record of Electromagnetic Inspection (1/2)

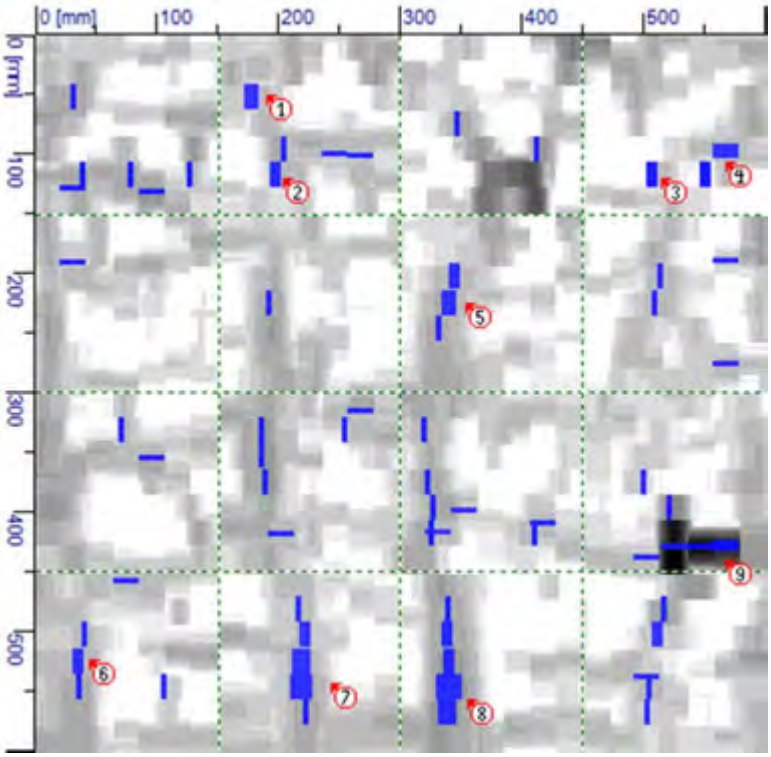
Inspector : Koji KAWAMATA Date : 15 Jan 2014

Bridge No.	8	**Location (State)**	Goa
Bridge Name	Borim Bridge	**Road Name**	NH17B

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Vertical	55	D13
②	Vertical	45	D10
③	Vertical	31	D10
④	Horizontal	51	D13
⑤	Vertical	50	D13
⑥	Vertical	50	D10
⑦	Vertical	48	D19
⑧	Vertical	43	D22
⑨	Horizontal	15	D10

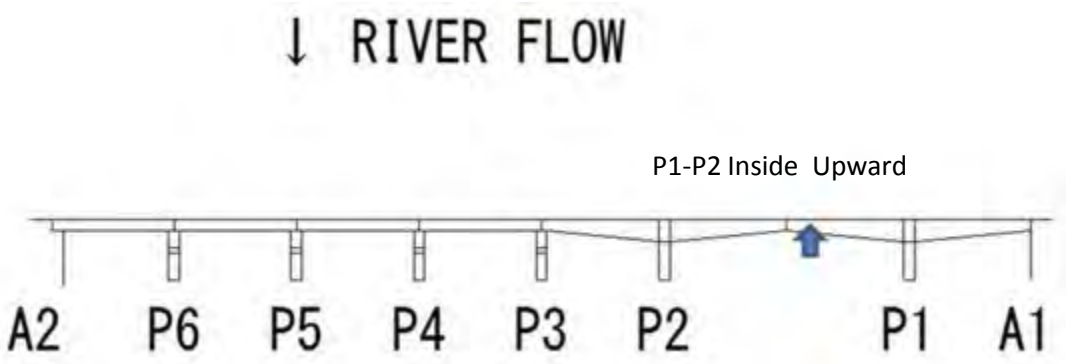
Record of Electromagnetic Inspection (2/2)

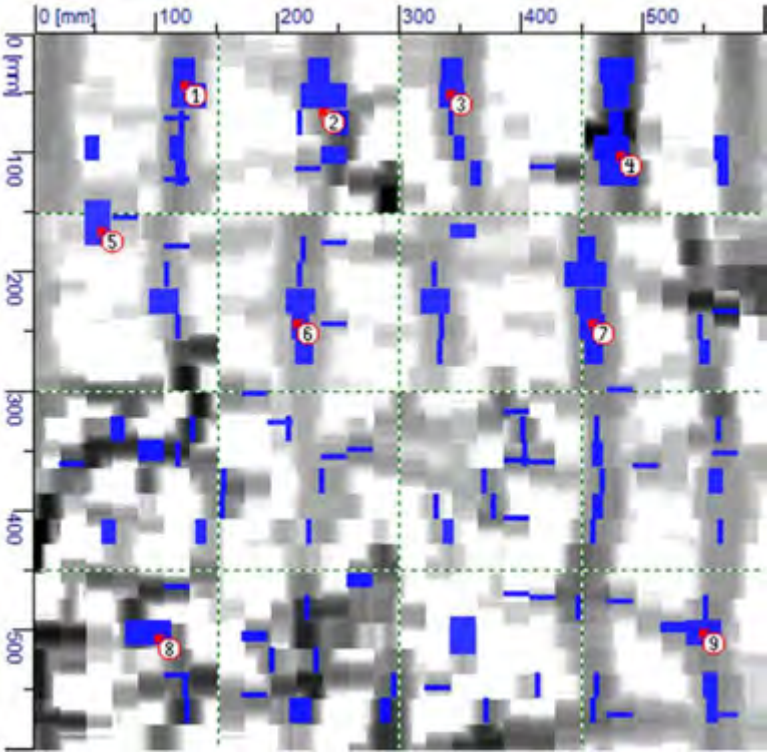
Inspector : Koji KAWAMATA Date : 15 Jan 2014

Bridge No.	8	**Location (State)**	Goa
Bridge Name	Borim Bridge	**Road Name**	NH17B

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Vertical	33	D19
②	Vertical	38	D38
③	Vertical	35	D19
④	Vertical	19	D29
⑤	Horizontal	54	D38
⑥	Vertical	43	D25
⑦	Vertical	32	D22
⑧	Vertical	27	D38
⑨	Horizontal	34	D10

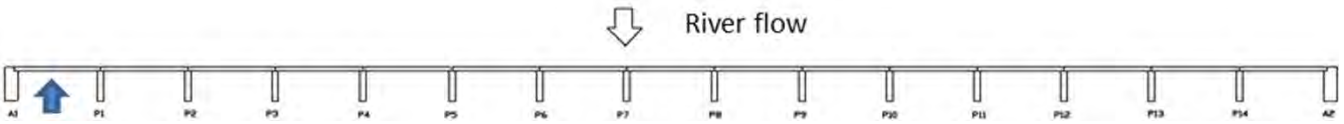
Record of Electromagnetic Inspection (1/3)

Inspector : Koji KAWAMATA Date : 17 Jan 2014

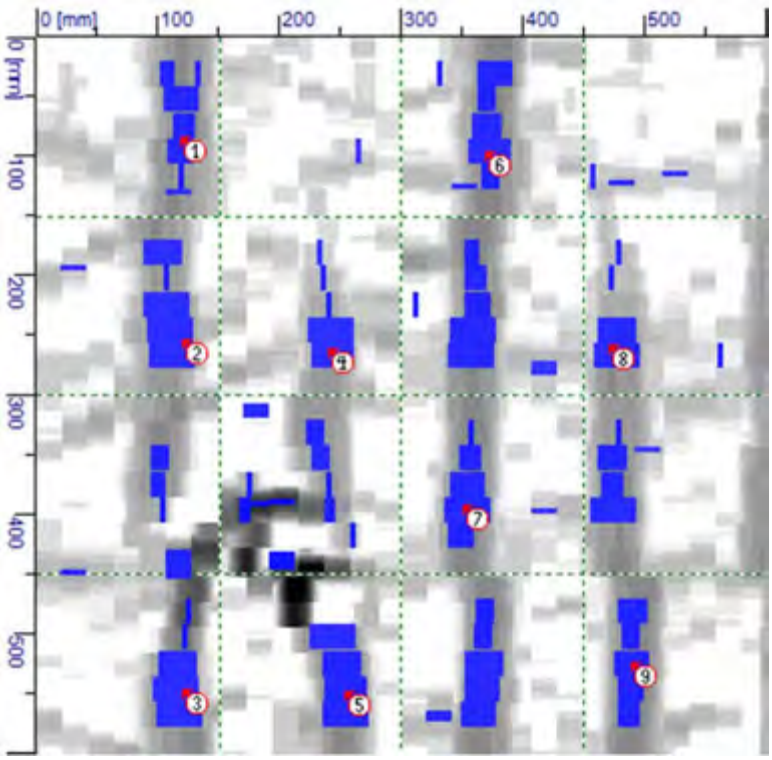
Bridge No.	11	**Location (State)**	Kerala
Bridge Name	Valapattanam Bridge	**Road Name**	NH17

Sketch of the Bridge

Side View



P14-A2 Upward



	Direction	Cover(mm)	Rebar(mm)
①	Vertical	36	D19
②	Vertical	46	D38
③	Vertical	46	D38
④	Vertical	49	D38
⑤	Vertical	38	D35
⑥	Vertical	43	D35
⑦	Vertical	40	D29
⑧	Vertical	43	D32
⑨	Vertical	38	D29

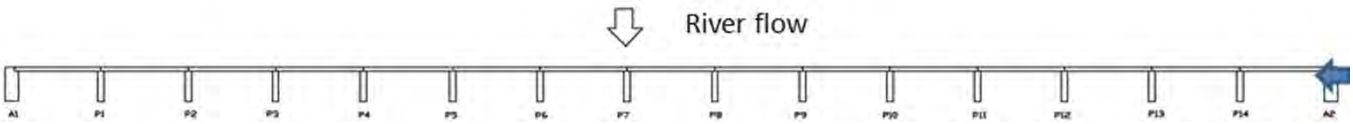
Record of Electromagnetic Inspection (2/3)

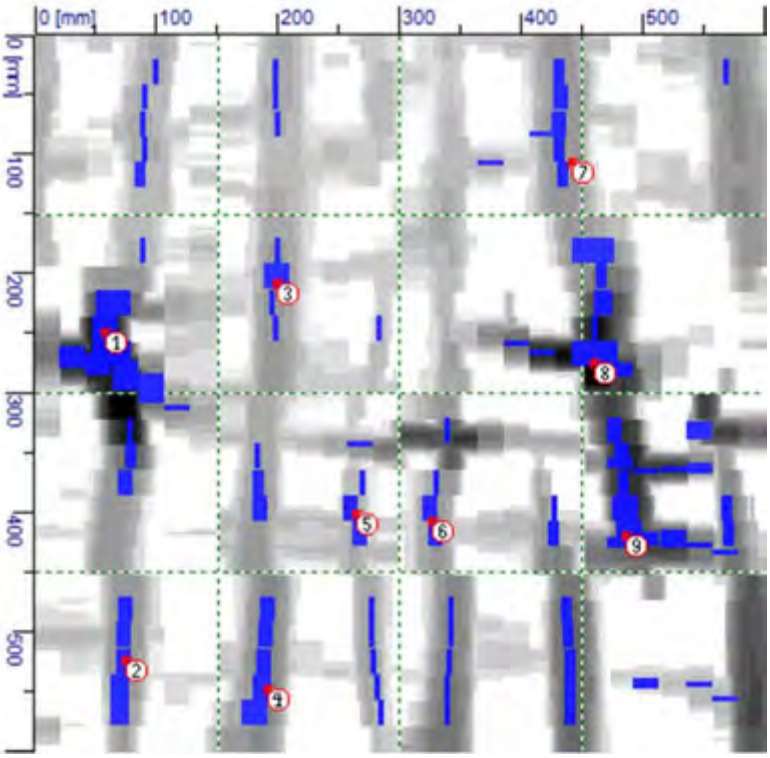
Inspector : Koji KAWAMATA Date : 17 Jan 2014

Bridge No.	11	**Location (State)**	Kerala
Bridge Name	Valapattanam Bridge	**Road Name**	NH17

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Vertical	18	D32
②	Vertical	43	D16
③	Vertical	50	D22
④	Vertical	44	D22
⑤	Vertical	41	D13
⑥	Vertical	41	D13
⑦	Vertical	41	D13
⑧	Vertical	26	D38
⑨	Vertical	27	D22

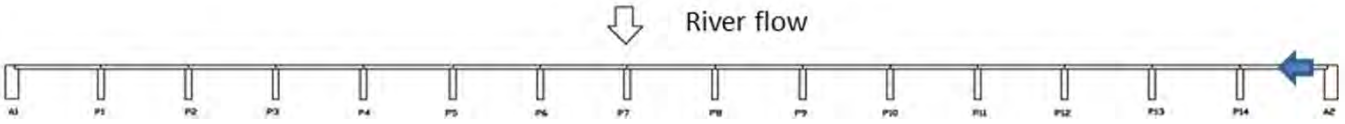
Record of Electromagnetic Inspection (3/3)

Inspector : Koji KAWAMATA Date : 17 Jan 2014

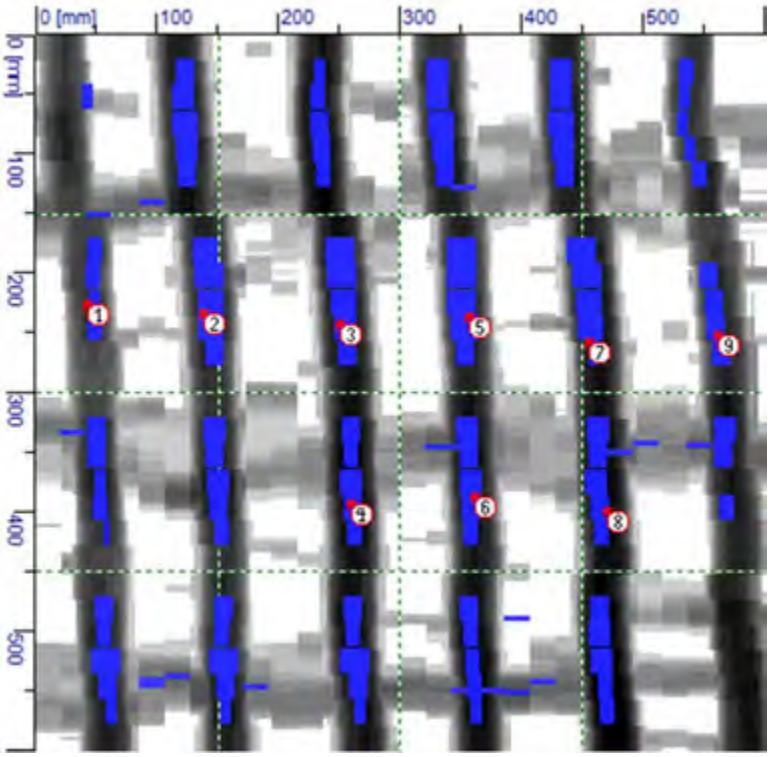
Bridge No.	11	**Location (State)**	Kerala
Bridge Name	Valapattanam Bridge	**Road Name**	NH17

Sketch of the Bridge

Side View



A1-P1 Inside Downstrem



	Direction	Cover(mm)	Rebar(mm)
①	Vertical	39	D13
②	Vertical	42	D25
③	Vertical	37	D22
④	Vertical	35	D19
⑤	Vertical	40	D25
⑥	Vertical	36	D19
⑦	Vertical	32	D22
⑧	Vertical	34	D16
⑨	Vertical	37	D16

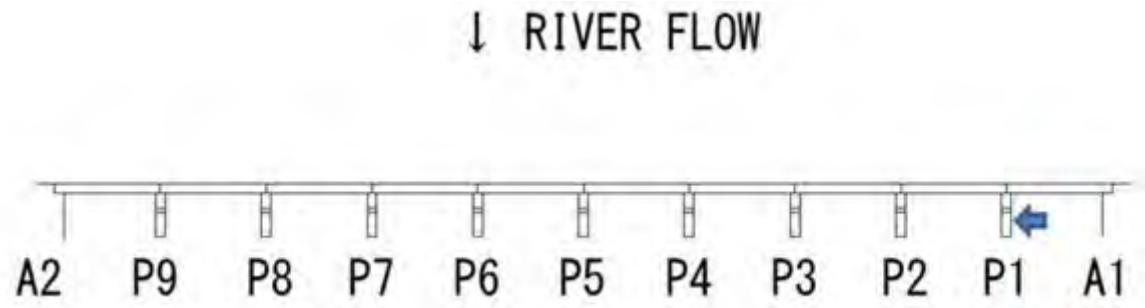
Record of Electromagnetic Inspection (1/6)

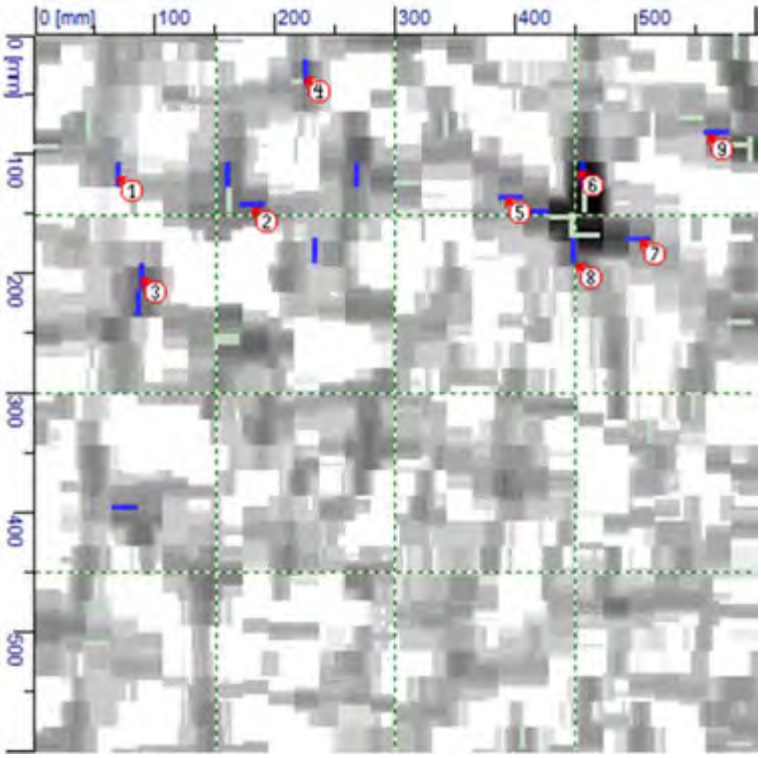
Inspector : Koji KAWAMATA Date : 13 Nov 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Vertical	50	–
②	Horizontal	43	–
③	Vertical	44	–
④	Vertical	53	–
⑤	Horizontal	56	–
⑥	Vertical	46	–
⑦	Horizontal	55	–
⑧	Vertical	46	–
⑨	Horizontal	48	–

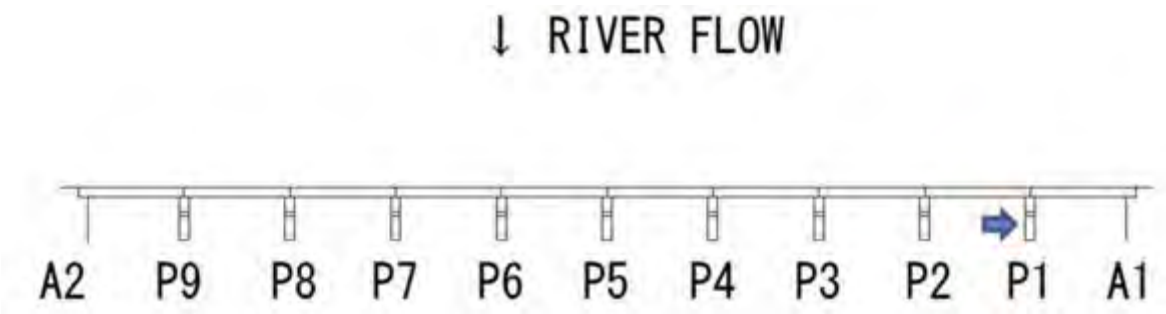
Record of Electromagnetic Inspection (2/6)

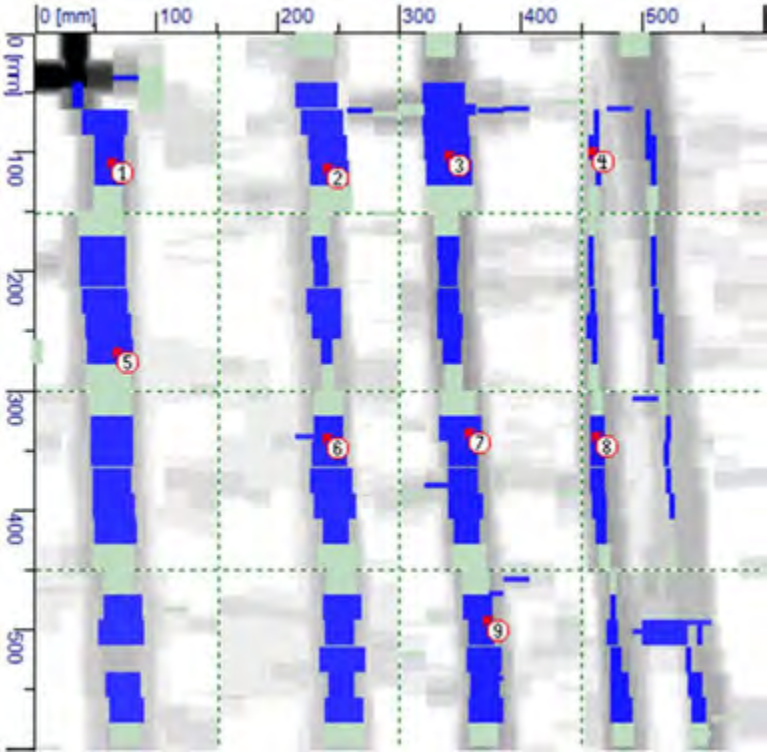
Inspector : Koji KAWAMATA Date : 13 Nov 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Vertical	33	D25
②	Vertical	42	D32
③	Vertical	32	D38
④	Vertical	29	D10
⑤	Vertical	40	D38
⑥	Vertical	42	D35
⑦	Vertical	29	D25
⑧	Vertical	26	D13
⑨	Vertical	33	D25

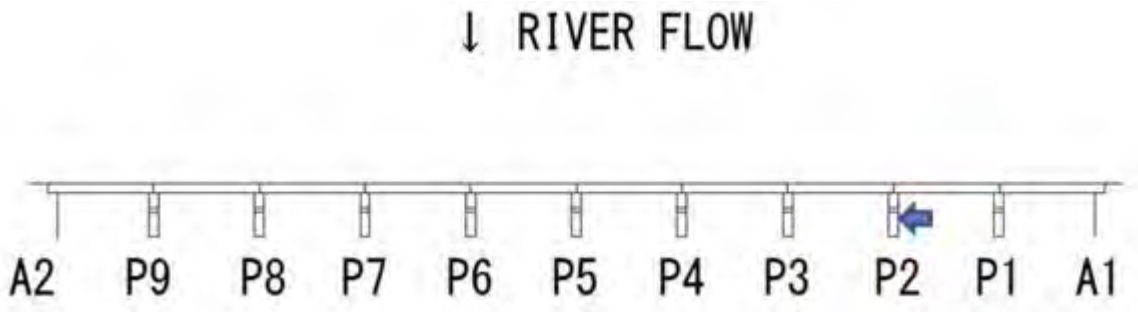
Record of Electromagnetic Inspection (3/6)

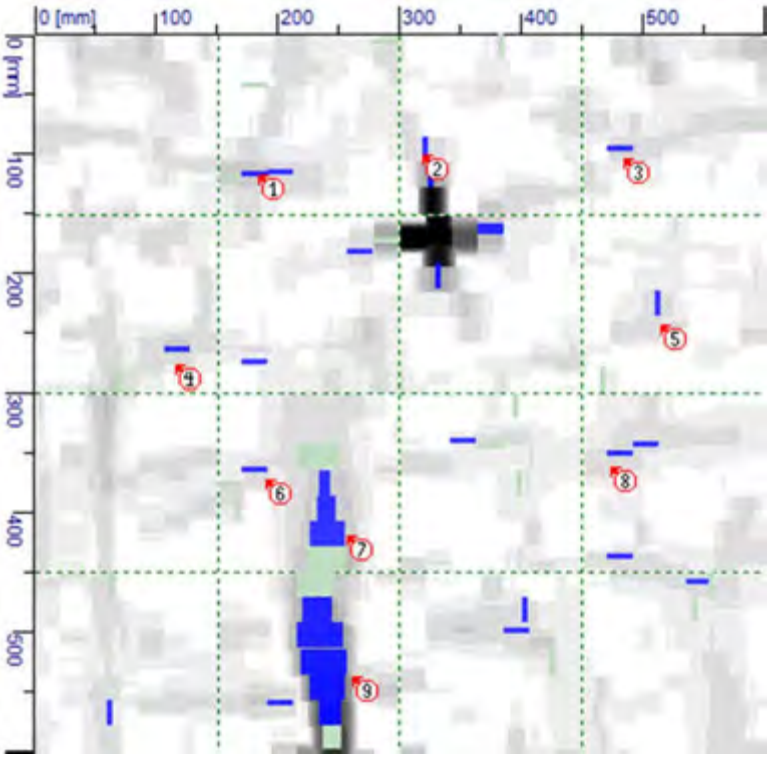
Inspector : Koji KAWAMATA Date : 13 Nov 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Horizontal	44	–
②	Vertical	50	–
③	Horizontal	50	–
④	Horizontal	46	–
⑤	Vertical	56	–
⑥	Horizontal	52	–
⑦	Vertical	53	D29
⑧	Horizontal	47	D6
⑨	Vertical	19	D29

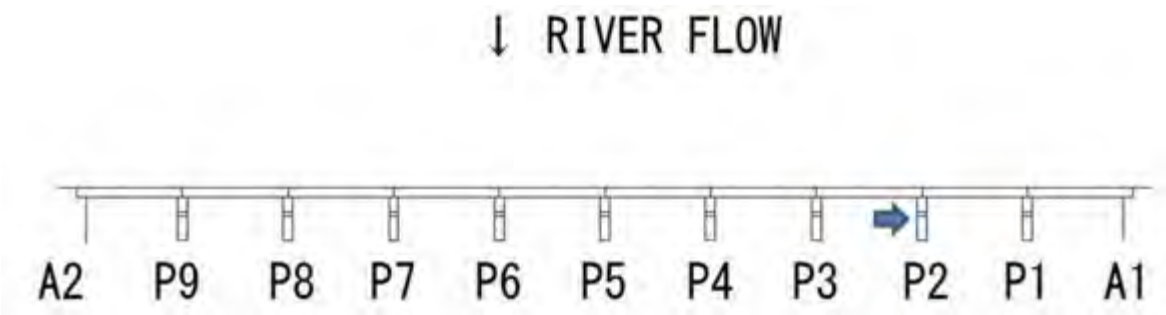
Record of Electromagnetic Inspection (4/6)

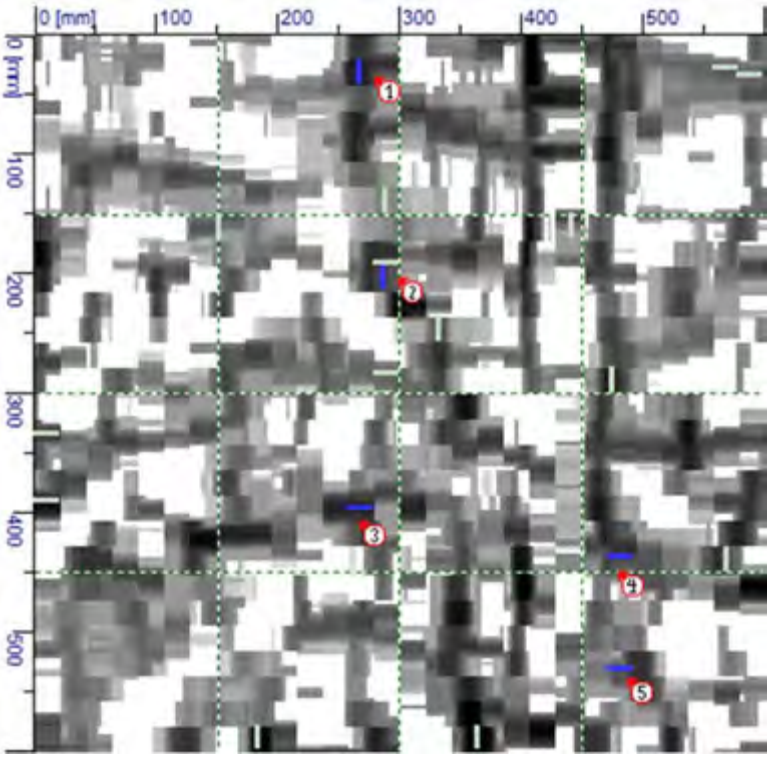
Inspector : Koji KAWAMATA Date : 13 Nov 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Vertical	51	–
②	Vertical	55	–
③	Horizontal	50	–
④	Horizontal	49	–
⑤	Horizontal	54	–
⑥			
⑦			
⑧			
⑨			

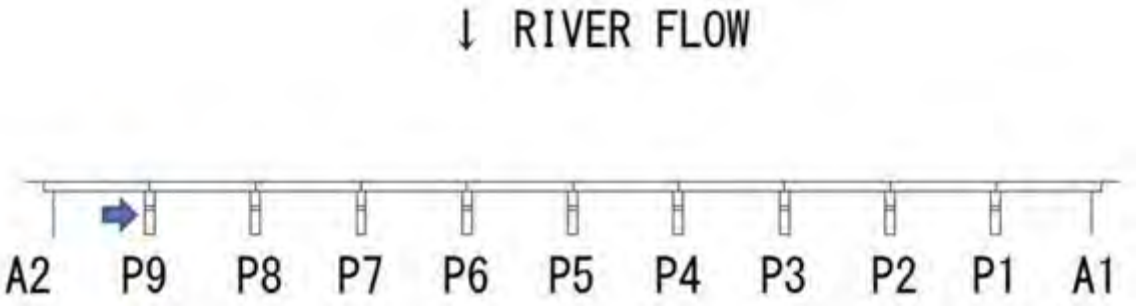
Record of Electromagnetic Inspection (5/6)

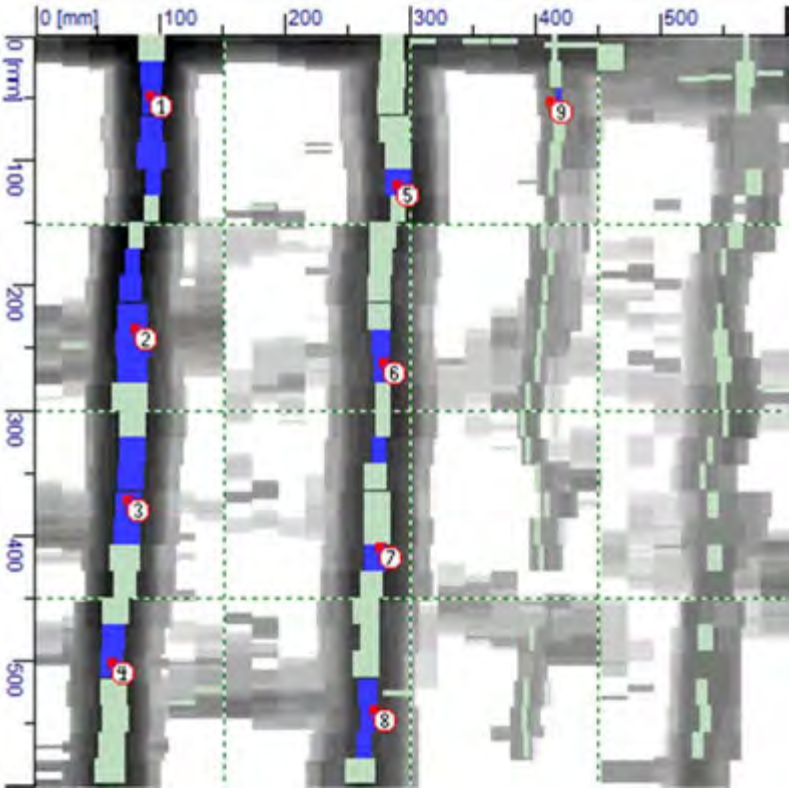
Inspector : Koji KAWAMATA Date : 13 Nov 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Vertical	53	D19
②	Vertical	59	D29
③	Vertical	59	D22
④	Vertical	53	D19
⑤	Vertical	60	D22
⑥	Vertical	60	D16
⑦	Vertical	60	D19
⑧	Vertical	58	D13
⑨	Vertical	60	–

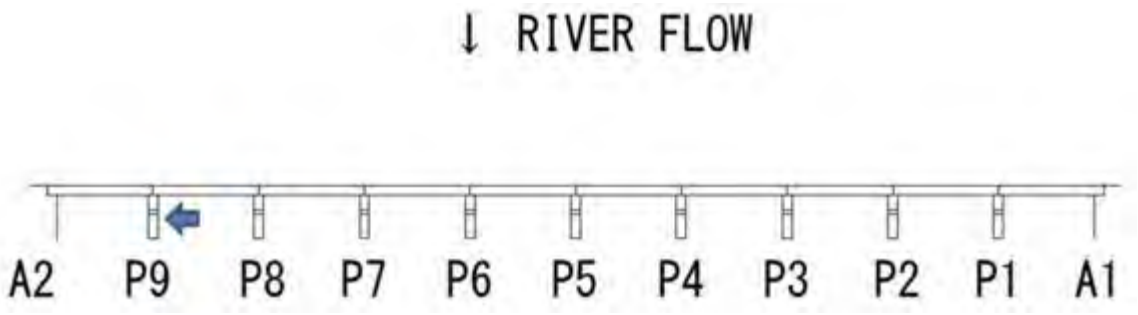
Record of Electromagnetic Inspection (6/6)

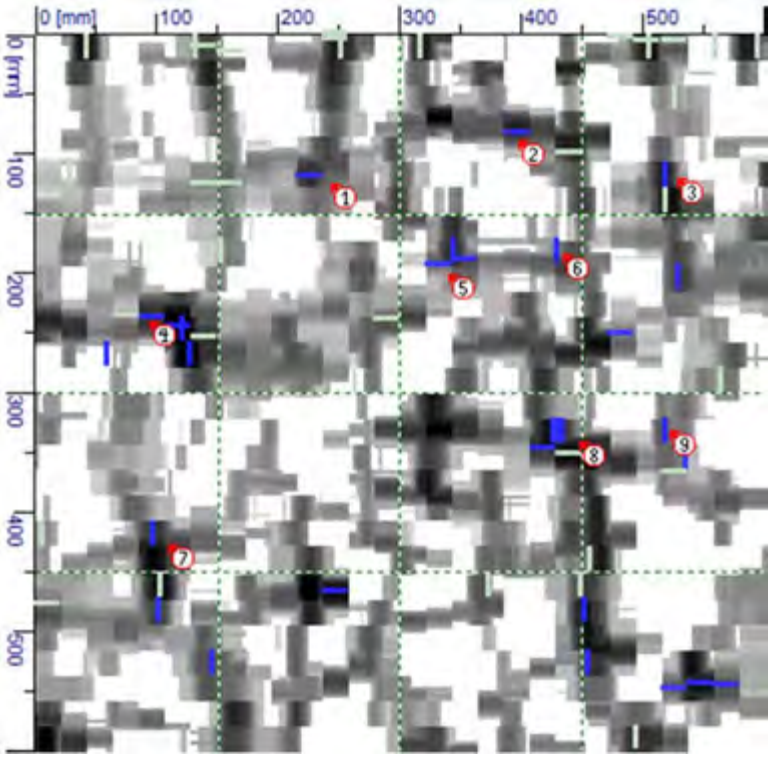
Inspector : Koji KAWAMATA Date : 13 Nov 2014

Bridge No.	14	**Location (State)**	Gujarat
Bridge Name	Shetrunji Bridge	**Road Name**	NH8E

Sketch of the Bridge

Side View





	Direction	Cover(mm)	Rebar(mm)
①	Horizontal	47	D25
②	Horizontal	43	D32
③	Vertical	41	D38
④	Horizontal	44	D10
⑤	Vertical	44	D38
⑥	Vertical	45	D35
⑦	Vertical	44	D25
⑧	Vertical	46	D13
⑨	Vertical	43	D25

付録-3

社会環境配慮

1. Scoping (draft as of Feb. 2013) for short listed 8 bridges

Table 1 Short Listed Bridges

Location (state)	Br. No	Bridge Name	Concept of Repair / Reconstruction	Time of the Work
Assam	1	Kaliabhomora	Replacement by steel girder for Gerber Girder	Work will be carried out after completion of new Bridge
	2	Badarpurghat	New Bridge Construction	Only pedestrian and motorbike or existing Bridge after completion of new Bridge
Goa	3	Zuari	New Bridge Construction and Connection of Centre Hinge	Connection work can be carried out after completion of new Bridge
	4	Borim	New Bridge Construction and Connection of Centre Hinge	Connection work can be carried out after completion of new Bridge
Kerala	5	Mahe	Replacement by steel grinder for Superstructure	Work will be carried out after completion of temporary Bridge
	6	Valapattanam	Replacement by steel girder for Superstructure Reinforcement by carbon fiber or piers	Girder replacement work and reinforcement can be carried out after completion of temporary Bridge
	7	Perumba	Replacement by steel girder or Superstructure	Girder replacement work can be carried out after completion of temporary Bridge
Gujarat	8	Shetrunji	Replacement by steel girder for Superstructure	Girder replacement work can be carried out in dry season. Vehicles can ass river bed during dry season.

Table 2 Scoping Matrix (Kaliabhomora)

	No	Affected Activities / Impact Items (JICA)	**Overall Rating**	Pre/ During Construction Phase									Operation Phase		
				Land acquisition and Loss of properties (including demolition of structures)	Change of Land use plan, Control of various activities by regulations for the construction	Reclamation of Wetland, etc.	Deforestation	Alteration to ground by cut land, filling, drilling, tunnel, etc.	Operation of Construction Equipment and Vehicles	Construction of Roads, tollgates, parking lots, Access roads for bridges and other related facilities	Traffic Restriction in construction area	Influx of construction workers, construction of base camp	Increase of Through Traffic	Appearance/ Occupancy of Roads and related building structures including bridge and embankment	Increasing influx of settlers
Pollution	1	Air Pollution	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	2	Water pollution	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	3	Waste	**B**	B	C	C	C	C	C	C	C	C	C	C	C
	4	Soil contamination	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	5	Noise and Vibration	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	6	Ground Subsidence	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	7	Odor	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	8	Sediment quality	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Natural Environment	9	Protected Area	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	10	Ecosystem	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	11	Hydrology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	12	Topography and geology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	13	Involuntary resettlement	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	14	The poor	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	15	Indigenous and ethnic people	**C**	C	C	C	C	C	C	C	C	C	C	C	C

	No	Impact Items (JICA) \ Affected Activities	Overall Rating	Pre/ During Construction Phase: Land acquisition and Loss of properties (including demolition of structures)	Change of Land use plan, Control of various activities by regulations for the construction	Reclamation of Wetland, etc.	Deforestation	Alteration to ground by cut land, filling, drilling, tunnel, etc.	Operation of Construction Equipment and Vehicles	Construction of Roads, tollgates, parking lots, Access roads for bridges and other related facilities	Traffic Restriction in construction area	Influx of construction workers, construction of base camp	Operation Phase: Increase of Through Traffic	Appearance/ Occupancy of Roads and related building structures including bridge and embankment	Increasing influx of settlers
	16	Local economy such as employment and livelihood	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	17	Land use and utilization of local resources	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	18	Waste Usage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	19	Existing social infrastructures and services	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	20	Social institutions such as social infrastructure and local decision making institutions	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	21	Misdistribution of benefit and damage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	22	Local conflict of interests	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	23	Cultural Heritage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	24	Landscape	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	25	Gender	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	26	Right of Children	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	27	Infectious diseases such as HIV/AIDS	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	28	Labor environment (including work safety)	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Others	29	Accidents	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	30	Cross Boundary impacts and climate change	**C**	C	C	C	C	C	C	C	C	C	C	C	C

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)
Source: JICA Survey Team

Table 3 Reasons for Scoping (Kaliabhomora)

Category	No	Impacted Item on JICA Guidelines	Rating: Pre/ During Construction	Rating: Operation Phase	Reasons of the Rating
Pollution	1	Air pollution	C	C	**Construction phase:** Temporary negative impacts are expected on air quality due to construction machines and equipment. However few residences are observed around the construction area, therefore impacts are limited. **Operation phase:** No impacts are expected.
	2	Water pollution	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	3	Waste	B	C	**Construction phase:** Construction waste such as concrete may be generated by demolition of superstructure. **Operation phase:** No impacts are expected

Category	No	Impacted Item on JICA Guidelines	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
	4	Soil contamination	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	5	Noise and vibration	C	C	**Construction phase:** Noise and vibration generation is expected due to works of construction machines and equipment. Although limited numbers of residences are observed nearby construction area, expected impact is negligible. **Operation phase:** No impacts are expected.
	6	Ground subsidence	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	7	Odor	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	8	Sediment quality	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
Natural environment	9	Protected area	C	C	**Construction phase:** The project site and the surrounding area are not designated as national park and protected area. Therefore no activities give negative impact on this item. **Operation phase:** No impacts are expected.
	10	Ecosystem	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	11	Hydrology	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	12	Topography and geology	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
Social environment	13	Involuntary resettlement	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impact is expected
	14	The poor	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	15	Indigenous and ethnic people	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	16	Local economy such as employment and livelihood	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	17	Land use and utilization of local resources	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	18	Water usage	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	19	Existing social infrastructures and services	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.

Category	No	Impacted Item on JICA Guidelines	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
	20	Social institutions such as social infrastructure and local decision making institutions	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	21	Misdistribution of benefit and damage	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	22	Local conflict of interests	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	23	Cultural heritage	C	C	**Construction phase:** Temple is located in the north-bank of the bridge. However no impacts are expected. **Operation phase:** No impacts are expected.
	24	Landscape	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	25	Gender	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	26	Right of children	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	27	Infectious diseases such as HIV/AIDS	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	28	Labor environment	C	C	**Construction phase:** Construction work environment needs to be considered in accordance with relevant laws and regulations. **Operation phase:** No impact is expected.
Others	29	Accidents	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	30	Cross boundary impacts and climate change	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)
Source: JICA Survey Team

Table 4 Scoping Matrix (Badarpurghat)

	No	Affected Activities / Impact Items (JICA)	Overall Rating	Pre/ During Construction Phase									Operation Phase		
				Land acquisition and Loss of properties (including demolition of structures)	Change of Land use plan, Control of various activities by regulations for the construction	Reclamation of Wetland, etc.	Deforestation	Alteration to ground by cut land, filling, drilling, tunnel, etc.	Operation of Construction Equipment and Vehicles	Construction of Roads, tollgates, parking lots, Access roads for bridges and other related facilities	Traffic Restriction in construction area	Influx of construction workers, construction of base camp	Increase of Through Traffic	Appearance/ Occupancy of Roads and related building structures including bridge and embankment	Increasing influx of settlers
Pollution	1	Air Pollution	**B**	C	C	C	C	C	B	B	C	C	C	C	C
	2	Water pollution	**A**	C	C	C	C	C	A	C	C	C	C	C	C
	3	Waste	**B**	C	C	C	B	B	C	C	C	C	C	C	C
	4	Soil contamination	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	5	Noise and Vibration	**B**	C	C	C	C	C	B	B	C	C	C	C	C
	6	Ground Subsidence	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	7	Odor	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	8	Sediment quality	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Natural Environment	9	Protected Area	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	10	Ecosystem	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	11	Hydrology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	12	Topography and geology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	13	Involuntary resettlement	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	14	The poor	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	15	Indigenous and ethnic people	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	16	Local economy such as employment and livelihood	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	17	Land use and utilization of local resources	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	18	Waste Usage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	19	Existing social infrastructures and services	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	20	Social institutions such as social infrastructure and local decision making institutions	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	21	Misdistribution of benefit and damage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	22	Local conflict of interests	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	23	Cultural Heritage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	24	Landscape	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	25	Gender	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	26	Right of Children	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	27	Infectious diseases such as HIV/AIDS	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	28	Labor environment (including work safety)	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Others	29	Accidents	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	30	Cross Boundary impacts and climate change	**C**	C	C	C	C	C	C	C	C	C	C	C	C

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)

Source: JICA Survey Team

Table 5 Reasons for Scoping (Badarpurghat)

Category	No	Impacted Item on JICA Guidelines	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
Pollution	1	Air pollution	B	C	**Construction phase:** Temporary Negative impacts are expected on air quality due to construction machines and equipment. **Operation phase:** No impacts are expected.
	2	Water pollution	A	C	**Construction phase:** Turbid water may be generated by the activities **Operation phase:** No impacts are expected.
	3	Waste	B	C	**Construction phase:** Construction wastes such as concrete may be generated. **Operation phase:** No impacts are expected.
	4	Soil contamination	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	5	Noise and vibration	B	C	**Construction phase:** Noise and vibration is expected to be generated due to works of construction machines and equipment. **Operation phase:** Noise and vibration generation is expected by vehicles passing on the new road. Few impacts are expected.
	6	Ground subsidence	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	7	Odor	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	8	Sediment quality	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
Natural environment	9	Protected area	C	C	**Construction phase:** The project site and the surrounding area are not designated as national park and protected area. **Operation phase:** No impacts are expected.
	10	Ecosystem	C	C	**Construction phase:** No Mangrove area is observed. **Operation phase:** No impacts are expected.
	11	Hydrology	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	12	Topography and geology	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
Social environment	13	Involuntary resettlement	C	C	**Construction phase:** Residential area is located in the north bank of the bridge. However few impacts are expected. **Operation phase:** No impacts are expected.
	14	The poor	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	15	Indigenous and ethnic people	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	16	Local economy such as employment and livelihood	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	17	Land use and utilization of local resources	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	18	Water usage	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	19	Existing social infrastructures and services	C	C	**Construction Phase:**. No activities give negative impact on this item **Operation phase:** No impacts are expected

Category	No	Impacted Item on JICA Guidelines	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
	20	Social institutions such as social infrastructure and local decision making institutions	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	21	Misdistribution of benefit and damage	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	22	Local conflict of interests	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	23	Cultural heritage	C	C	**Construction phase:** Temporary temple is observed in the north bank. However no impact is expected. **Operation phase:** No impacts are expected.
	24	Landscape	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	25	Gender	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	26	Right of children	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	27	Infectious diseases such as HIV/AIDS	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	28	Labor environment	C	C	**Construction phase:** Construction work environment needs to be considered in accordance with relevant laws and regulations. **Operation phase:** No impact are expected
Others	29	Accidents	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.
	30	Cross boundary impacts and climate change	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No impacts are expected.

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)
Source: JICA Survey Team

Table 6 Scoping Matrix (Zuari)

	No	Affected Activities / Impact Items (JICA)	Overall Rating	Pre/ During Construction Phase									Operation Phase		
				Land acquisition and Loss of properties (including demolition of structures)	Change of Land use plan, Control of various activities by regulations for the construction	Reclamation of Wetland, etc.	Deforestation	Alteration to ground by cut land, filling, drilling, tunnel etc.	Operation of Construction Equipment and Vehicles	Construction of Roads, tollgates, parking lots, Access roads for bridges and other related facilities	Traffic Restriction in construction area	Influx of construction workers, construction of base camp	Increase of Through Traffic	Appearance/ Occupancy of Roads and related building structures including bridge and embankment	Increasing influx of settlers
Pollution	1	Air Pollution	**B**	C	C	C	C	C	B	B	C	C	B	C	C
	2	Water pollution	**B**	C	C	C	C	B	C	C	C	C	C	C	C
	3	Waste	**B**	C	C	C	B	B	C	C	C	C	C	C	C
	4	Soil contamination	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	5	Noise and Vibration	**B**	C	C	C	C	C	B	B	C	C	B	C	C
	6	Ground Subsidence	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	7	Odor	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	8	Sediment quality	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Natural Environment	9	Protected Area	**B**	C	C	C	B	B	C	C	C	C	C	C	C
	10	Ecosystem	**B**	C	C	C	B	B	C	C	C	C	C	C	C
	11	Hydrology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	12	Topography and geology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	13	Involuntary resettlement	**B**	B	C	C	C	C	C	C	C	C	C	C	C
	14	The poor	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	15	Indigenous and ethnic people	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	16	Local economy such as employment and livelihood	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	17	Land use and utilization of local resources	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	18	Waste Usage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	19	Existing social infrastructures and services	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	20	Social institutions such as social infrastructure and local decision making institutions	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	21	Misdistribution of benefit and damage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	22	Local conflict of interests	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	23	Cultural Heritage	**B**	B	C	C	C	C	C	C	C	C	C	C	C
	24	Landscape	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	25	Gender	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	26	Right of Children	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	27	Infectious diseases such as HIV/AIDS	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	28	Labor environment (including work safety)	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Others	29	Accidents	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	30	Cross Boundary impacts and climate change	**C**	C	C	C	C	C	C	C	C	C	C	C	C

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)

Source: JICA Survey Team

Table 7 Reasons for Scoping (Zuari)

Category	No	Impacted Item on JICA Guidelines	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
Pollution	1	Air pollution	B	B	**Construction phase:** Operation of construction machines will give impact along the new alignment in the residential area **Operation phase:** Increase of traffic volume on the new approach road will give impact to the residential
	2	Water pollution	B	C	**Construction phase:** Activities such as drilling and excavation in the rivers give negative impact on this item **Operation phase:** No activities give negative impact on this item.
	3	Waste	B	C	**Construction phase:** Construction wastes such as cutting tree and waste soil may be generated **Operation phase:** No activities give negative impact on this item.
	4	Soil contamination	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	5	Noise and vibration	B	B	**Construction phase:** Noise and vibration generation is expected due to works of construction machines and equipment in the residential area along the planned approach road. **Operation phase:** Increase of traffic volume on the new approach road will give impact to the residential
	6	Ground subsidence	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No activities give negative impact on this item.
	7	Odor	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No activities give negative impact on this item.
	8	Sediment quality	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No activities give negative impact on this item.
Natural environment	9	Protected area	B	C	**Construction phase:** Cutting mangrove is necessary in CRZ **Operation phase:** No activities give negative impact on this item.
	10	Ecosystem	B	C	**Construction phase:** Cutting mangrove is necessary in CRZ **Operation phase:** No activities give negative impact on this item.
	11	Hydrology	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No activities give negative impact on this item.
	12	Topography and geology	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No activities give negative impact on this item.
Social environment	13	Involuntary resettlement	B	C	**Construction phase:** Number of Resettlement is limited, but land acquisition is required. **Operation phase:** No activities give negative impact on this item.
	14	The poor	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	15	Indigenous and ethnic people	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	16	Local economy such as employment and livelihood	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	17	Land use and utilization of local resources	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	18	Water usage	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	19	Existing social infrastructures and services	C	C	**Construction phase:** No impacts is expected on this item **Operation phase:** No impacts is expected
	20	Social institutions such	C	C	**Construction phase:** No activities give negative impact on this item.

Category	No	Impacted Item on JICA Guidelines	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
		as social infrastructure and local decision making institutions			**Operation phase:** No activities give negative impact on this item.
	21	Misdistribution of benefit and damage	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	22	Local conflict of interests	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	23	Cultural heritage	C	C	**Construction phase:** A grave yard monument and small temple is located on the south bank, however no activities give negative impact. **Operation phase:** No activities give negative impact on this item.
	24	Landscape	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	25	Gender	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	26	Right of children	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	27	Infectious diseases such as HIV/AIDS	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	28	Labor environment	C	C	**Construction phase:** Construction work environment needs to be considered in accordance with relevant laws and regulations. **Operation phase:** No activities give negative impact on this item.
Others	29	Accidents	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	30	Cross boundary impacts and climate change	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)
Source: JICA Survey Team

Table 8 Scoping Matrix (Borim)

	No	Affected Activities / Impact Items (JICA)	Overall Rating	Pre/ During Construction Phase									Operation Phase		
				Land acquisition and Loss of properties (including demolition of structures)	Change of Land use plan, Control of various activities by regulations for the construction	Reclamation of Wetland, etc.	Deforestation	Alteration to ground by cut land, filling, drilling, tunnel etc.	Operation of Construction Equipment and Vehicles	Construction of Roads, tollgates, parking lots, Access roads for bridges and other related facilities	Traffic Restriction in construction area	Influx of construction workers, construction of base camp	Increase of Through Traffic	Appearance/ Occupancy of Roads and related building structures including bridge and embankment	Increasing influx of settlers
Pollution	1	Air Pollution	**B**	C	C	C	C	C	B	B	C	C	B	C	C
	2	Water pollution	**B**	C	C	C	C	B	C	C	C	C	C	C	C
	3	Waste	**B**	C	C	C	B	B	C	C	C	C	C	C	C
	4	Soil contamination	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	5	Noise and Vibration	**B**	C	C	C	C	C	B	B	C	C	B	C	C
	6	Ground Subsidence	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	7	Odor	**C**	C	C	C	C	C	C	C	C	C	C	C	C

	No	Affected Activities / Impact Items (JICA)	Overall Rating	Pre/ During Construction Phase									Operation Phase		
				Land acquisition and Loss of properties (including demolition of structures)	Change of Land use plan, Control of various activities by regulations for the construction	Reclamation of Wetland, etc.	Deforestation	Alteration to ground by cut land, filling, drilling, tunnel etc.	Operation of Construction Equipment and Vehicles	Construction of Roads, tollgates, parking lots, Access roads for bridges and other related facilities	Traffic Restriction in construction area	Influx of construction workers, construction of base camp	Increase of Through Traffic	Appearance/ Occupancy of Roads and related building structures including bridge and embankment	Increasing influx of settlers
	8	Sediment quality	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Natural Environment	9	Protected Area	**A**	C	C	C	A	A	C	C	C	C	C	C	C
	10	Ecosystem	**A**	C	C	C	A	A	C	C	C	C	C	C	C
	11	Hydrology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	12	Topography and geology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	13	Involuntary resettlement	**B**	B	C	C	C	C	C	C	C	C	C	C	C
	14	The poor	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	15	Indigenous and ethnic people	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	16	Local economy such as employment and livelihood	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	17	Land use and utilization of local resources	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	18	Waste Usage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	19	Existing social infrastructures and services	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	20	Social institutions such as social infrastructure and local decision making institutions	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	21	Misdistribution of benefit and damage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	22	Local conflict of interests	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	23	Cultural Heritage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	24	Landscape	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	25	Gender	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	26	Right of Children	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	27	Infectious diseases such as HIV/AIDS	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	28	Labor environment (including work safety)	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Others	29	Accidents	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	30	Cross Boundary impacts and climate change	**C**	C	C	C	C	C	C	C	C	C	C	C	C

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)

Source: JICA Survey Team

Table 9 Reasons for Scoping (Borim)

Category	No	Impacted Item on JICA Guidelines	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
Pollution	1	Air pollution	B	B	**Construction phase:** Operation of construction machines will give impact along the new alignment in the residential area **Operation phase:** Increase of traffic volume on the new approach road will give impact to the residential
	2	Water pollution	B	C	**Construction phase:** Activities such as drilling and excavation in the rivers give negative impact on this item **Operation phase:** No activities give negative impact on this item.
	3	Waste	B	C	**Construction phase:** Construction wastes such as cutting tree and waste soil may be generated **Operation phase:** No activities give negative impact on this item.
	4	Soil contamination	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	5	Noise and vibration	B	B	**Construction phase:** Noise and vibration generation is expected due to works of construction machines and equipment in the residential area along the planned approach road. **Operation phase:** Increase of traffic volume on the new approach road will give impact to the residential
	6	Ground subsidence	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No activities give negative impact on this item.
	7	Odor	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No activities give negative impact on this item.
	8	Sediment quality	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No activities give negative impact on this item.
Natural environment	9	Protected area	A	C	**Construction phase:** Cutting mangrove is necessary in CRZ. The impacted area is covered by high density mangrove community. **Operation phase:** No activities give negative impact on this item.
	10	Ecosystem	A	C	**Construction phase:** Cutting mangrove is necessary in CRZ. The impacted area is covered by high density mangrove community and swampy low grass. **Operation phase:** No activities give negative impact on this item.
	11	Hydrology	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No activities give negative impact on this item.
	12	Topography and geology	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No activities give negative impact on this item.
Social environment	13	Involuntary resettlement	B	C	**Construction phase:** Number of Resettlement is limited, but land acquisition is required. **Operation phase:** No activities give negative impact on this item.
	14	The poor	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	15	Indigenous and ethnic people	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	16	Local economy such as employment and livelihood	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	17	Land use and utilization of local resources	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	18	Water usage	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	19	Existing social infrastructures and services	C	C	**Construction phase:** No impacts is expected **Operation phase:** No impacts is expected
	20	Social institutions such	C	C	**Construction phase:** No activities give negative impact on this item.

Category	No	Impacted Item on JICA Guidelines	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
		as social infrastructure and local decision making institutions			**Operation phase:** No activities give negative impact on this item.
	21	Misdistribution of benefit and damage	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	22	Local conflict of interests	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	23	Cultural heritage	C	C	**Construction phase:** A church is located on the north-bank, however no activities give negative impact. **Operation phase:** No activities give negative impact on this item.
	24	Landscape	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	25	Gender	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	26	Right of children	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	27	Infectious diseases such as HIV/AIDS	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	28	Labor environment	C	C	**Construction phase:** Construction work environment needs to be considered in accordance with relevant laws and regulations. **Operation phase:** No activities give negative impact on this item.
Others	29	Accidents	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	30	Cross boundary impacts and climate change	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)
Source: JICA Survey Team

Table 10 Scoping Matrix (Mahe)

	No	Affected Activities / Impact Items (JICA)	Overall Rating	Pre/ During Construction Phase									Operation Phase		
				Land acquisition and Loss of properties (including demolition of structures)	Change of Land use plan, Control of various activities by regulations for the construction	Reclamation of Wetland, etc.	Deforestation	Alteration to ground by cut land, filling, drilling, tunnel, etc.	Operation of Construction Equipment and Vehicles	Construction of Roads, tollgates, parking lots, Access roads for bridges and other related facilities	Traffic Restriction in construction area	Influx of construction workers, construction of base camp	Increase of Through Traffic	Appearance/ Occupancy of Roads and related building structures including bridge and embankment	Increasing influx of settlers
Pollution	1	Air Pollution	**B**	B	C	C	C	C	B	B	C	C	C	C	C
	2	Water pollution	**A**	C	C	C	C	C	A	C	C	C	C	C	C
	3	Waste	**B**	B	C	C	C	C	C	C	C	C	C	C	C
	4	Soil contamination	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	5	Noise and Vibration	**B**	B	C	C	C	C	B	B	C	C	C	C	C
	6	Ground Subsidence	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	7	Odor	**C**	C	C	C	C	C	C	C	C	C	C	C	C

	No	Affected Activities / Impact Items (JICA)	Overall Rating	Pre/ During Construction Phase: Land acquisition and Loss of properties (including demolition of structures)	Change of Land use plan, Control of various activities by regulations for the construction	Reclamation of Wetland, etc.	Deforestation	Alteration to ground by cut land, filling, drilling, tunnel, etc.	Operation of Construction Equipment and Vehicles	Construction of Roads, tollgates, parking lots, Access roads for bridges and other related facilities	Traffic Restriction in construction area	Influx of construction workers, construction of base camp	Operation Phase: Increase of Through Traffic	Appearance/ Occupancy of Roads and related building structures including bridge and embankment	Increasing influx of settlers
	8	Sediment quality	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Natural Environment	9	Protected Area	**B**	C	C	B	B	C	C	C	C	C	C	C	C
	10	Ecosystem	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	11	Hydrology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	12	Topography and geology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	13	Involuntary resettlement	**B**	B	C	C	C	C	C	C	C	C	C	C	C
	14	The poor	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	15	Indigenous and ethnic people	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	16	Local economy such as employment and livelihood	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	17	Land use and utilization of local resources	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	18	Waste Usage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	19	Existing social infrastructures and services	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	20	Social institutions such as social infrastructure and local decision making institutions	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	21	Misdistribution of benefit and damage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	22	Local conflict of interests	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	23	Cultural Heritage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	24	Landscape	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	25	Gender	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	26	Right of Children	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	27	Infectious diseases such as HIV/AIDS	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	28	Labor environment (including work safety)	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Others	29	Accidents	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	30	Cross Boundary impacts and climate change	**C**	C	C	C	C	C	C	C	C	C	C	C	C

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)

Source: JICA Survey Team

Table 11 Reasons for Scoping (Mahe)

Category	No	Impacted Item on JICA Guidelines	Rating: Pre/ During Construction	Rating: Operation Phase	Reasons of the Rating
Pollution	1	Air pollution	B	C	**Construction phase:** Temporary negative impacts are expected on air quality due to construction machines and equipment. **Operation phase:** Negative impacts on air quality are expected

Category	No	Impacted Item on JICA Guidelines	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
					due to emission from vehicles passing on the new road
	2	Water pollution	A	C	**Construction phase:** Turbid water may be generated by construction work. **Operation phase:** No serious impacts are expected
	3	Waste	B	C	**Construction phase:** Construction waste is expected to be generated by demolition of superstructure. **Operation phase:** No serious impacts are expected
	4	Soil contamination	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	5	Noise and vibration	B	C	**Construction phase:** Noise and vibration generation is expected due to works of construction machines and equipment. **Operation phase:** No impacts are expected.
	6	Ground subsidence	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	7	Odor	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	8	Sediment quality	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
Natural environment	9	Protected area	B	C	**Construction phase:** Construction site is located in CRZ. **Operation phase:** No impacts are expected.
	10	Ecosystem	C	C	**Construction phase:** No Mangroves are observed. **Operation phase:** No impacts are expected.
	11	Hydrology	C	C	**Construction and Operation phase:** No impacts are expected. **Operation phase:** No impacts are expected.
	12	Topography and geology	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
Social environment	13	Involuntary resettlement	B	C	**Construction phase:** Some buildings may need to be relocated for the construction of temporary bridge. **Operation phase:** No impact is expected.
	14	The poor	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	15	Indigenous and ethnic people	C	C	**Construction phase:** No indigenous people groups are identified in the project area. **Operation phase:** No impacts are expected.
	16	Local economy such as employment and livelihood	C	C	**Construction phase:** It is commercial area and many shops are observed. However the number of residents and workers affected is limited. **Operation phase:** Few impacts are expected.
	17	Land use and utilization of local resources	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	18	Water usage	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	19	Existing social infrastructures and services	C	C	**Construction phase:** .Library is located in north-west bank of the river. However it is not directly affected.

Category	No	Impacted Item on JICA Guidelines	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
					Operation phase: No impacts are expected.
	20	Social institutions such as social infrastructure and local decision making institutions	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	21	Misdistribution of benefit and damage	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	22	Local conflict of interests	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	23	Cultural heritage	C	C	**Construction phase:** Mosque is located in north-west bank of the river. However it is not directly affected.. **Operation phase:** No impacts are expected.
	24	Landscape	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	25	Gender	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	26	Right of children	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.
	27	Infectious diseases such as HIV/AIDS	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** Road operation which causes infectious diseases is not expected.
	28	Labor environment	C	C	**Construction phase:** Construction work environment needs to be considered in accordance with relevant laws and regulations. **Operation phase:** No impact is expected.
Others	29	Accidents	C	C	**Construction phase:** No impact is expected. **Operation phase:** No impact is expected.
	30	Cross boundary impacts and climate change	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected.

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)
Source: JICA Survey Team

Table 12 Scoping Matrix (Valapattanam)

No	Affected Activities / Impact Items (JICA)	Overall Rating	Pre/ During Construction Phase									Operation Phase		
			Land acquisition and Loss of properties (including demolition of structures)	Change of Land use plan, Control of various activities by regulations for the construction	Reclamation of Wetland, etc.	Deforestation	Alteration to ground by cut land, filling, drilling, tunnel, etc.	Operation of Construction Equipment and Vehicles	Construction of Roads, tollgates, parking lots, Access roads for bridges and other related facilities	Traffic Restriction in construction area	Influx of construction workers, construction of base camp	Increase of Through Traffic	Appearance/ Occupancy of Roads and related building structures including bridge and embankment	Increasing influx of settlers

	No	Affected Activities / Impact Items (JICA)	Overall Rating	Pre/ During Construction Phase									Operation Phase		
				Land acquisition and Loss of properties (including demolition of structures)	Change of Land use plan, Control of various activities by regulations for the construction	Reclamation of Wetland, etc.	Deforestation	Alteration to ground by cut land, filling, drilling, tunnel, etc.	Operation of Construction Equipment and Vehicles	Construction of Roads, tollgates, parking lots, Access roads for bridges and other related facilities	Traffic Restriction in construction area	Influx of construction workers, construction of base camp	Increase of Through Traffic	Appearance/ Occupancy of Roads and related building structures including bridge and embankment	Increasing influx of settlers
Pollution	1	Air Pollution	**B**	C	C	C	C	C	B	B	C	C	C	C	C
	2	Water pollution	**A**	C	C	C	C	C	A	C	C	C	C	C	C
	3	Waste	**B**	B	C	C	C	C	C	C	C	C	C	C	C
	4	Soil contamination	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	5	Noise and Vibration	**B**	C	C	C	C	C	B	B	C	C	C	C	C
	6	Ground Subsidence	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	7	Odor	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	8	Sediment quality	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Natural Environment	9	Protected Area	**B**	B	C	C	C	C	C	C	C	C	C	C	C
	10	Ecosystem	**B**	B	C	C	C	C	C	C	C	C	C	C	C
	11	Hydrology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	12	Topography and geology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	13	Involuntary resettlement	**B**	B	C	C	C	C	C	C	C	C	C	C	C
	14	The poor	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	15	Indigenous and ethnic people	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	16	Local economy such as employment and livelihood	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	17	Land use and utilization of local resources	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	18	Waste Usage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	19	Existing social infrastructures and services	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	20	Social institutions such as social infrastructure and local decision making institutions	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	21	Misdistribution of benefit and damage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	22	Local conflict of interests	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	23	Cultural Heritage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	24	Landscape	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	25	Gender	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	26	Right of Children	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	27	Infectious diseases such as HIV/AIDS	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	28	Labor environment (including work safety)	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Others	29	Accidents	**C**	C	C	C	C	C	C	C		C	C	C	C
	30	Cross Boundary impacts and climate change	**C**	C	C	C	C	C	C	C	C	C	C	C	C

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)

Source: JICA Survey Team

Table 13 Reasons for Scoping (Valapattanam)

Category	No	Impacted Item on JICA Guidelines	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
Pollution	1	Air pollution	B	C	**Construction phase:** Temporary negative impacts are expected on air quality due to construction machines and equipment. **Operation phase:** No impacts are expected.
	2	Water pollution	A	C	**Construction phase:** Turbid water may be generated by construction work **Operation phase:** No impacts are expected
	3	Waste	B	C	**Construction phase:** Construction waste is expected to be generated by demolition of superstructure. **Operation phase:** No serious impacts are expected
	4	Soil contamination	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	5	Noise and vibration	B	C	**Construction phase:** Noise and vibration is expected to be generated due to works of construction machines and equipment. Residential area located in south bank needs to be considered. **Operation phase:** No impacts are expected
	6	Ground subsidence	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	7	Odor	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	8	Sediment quality	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
Natural environment	9	Protected area	B	C	**Construction phase:** The project site is located in CRZ. **Operation phase:** No impacts are expected
	10	Ecosystem	B	C	**Construction phase:** Mangrove was observed around the site. The location of the construction of the temporary bridge needs to be assessed. **Operation phase:** No impacts are expected
	11	Hydrology	C	C	**Construction and Operation phase:** No impacts are expected. **Operation phase:** No impacts are expected.
	12	Topography and geology	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
Social environment	13	Involuntary resettlement	B	C	**Construction phase:** There is residential area located in south bank of the bridge and it may be partly affected. **Operation phase:** No impacts are expected
	14	The poor	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	15	Indigenous and ethnic people	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	16	Local economy such as employment and livelihood	C	C	**Construction phase:** Industrial area is observed nearby the project site. However the impact is limited. **Operation phase:** No impacts are expected
	17	Land use and utilization of local resources	C	C	**Construction phase:** No activities give negative impact on this item.

Category	No	Impacted Item on JICA Guidelines	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
					Operation phase: No impacts are expected
	18	Water usage	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	19	Existing social infrastructures and services	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts is expected
	20	Social institutions such as social infrastructure and local decision making institutions	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	21	Misdistribution of benefit and damage	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	22	Local conflict of interests	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	23	Cultural heritage	C	C	**Construction phase:** No cultural structures are observed in the project site. **Operation phase:** No impacts are expected.
	24	Landscape	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	25	Gender	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	26	Right of children	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	27	Infectious diseases such as HIV/AIDS	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	28	Labor environment	C	C	**Construction phase:** Construction work environment needs to be considered in accordance with relevant laws and regulations. **Operation phase:** No impact is expected
Others	29	Accidents	C	C	**Construction phase:** No impact is expected. **Operation phase:** No impact is expected.
	30	Cross boundary impacts and climate change	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)
Source: JICA Survey Team

Table 14 Scoping Matrix (Perumba)

	No	Affected Activities / Impact Items (JICA)	Overall Rating	Pre/ During Construction Phase									Operation Phase		
				Land acquisition and Loss of properties (including demolition of structures)	Change of Land use plan, Control of various activities by regulations for the construction	Reclamation of Wetland, etc.	Deforestation	Alteration to ground by cut land, filling, drilling, tunnel, etc.	Operation of Construction Equipment and Vehicles	Construction of Roads, tollgates, parking lots, Access roads for bridges and other related facilities	Traffic Restriction in construction area	Influx of construction workers, construction of base camp	Increase of Through Traffic	Appearance/ Occupancy of Roads and related building structures including bridge and embankment	Increasing influx of settlers
Pollution	1	Air Pollution	**B**	C	C	C	C	C	B	B	C	C	C	C	C
	2	Water pollution	**A**	C	C	C	C	C	A	C	C	C	C	C	C
	3	Waste	**B**	B	C	C	C	C	C	C	C	C	C	C	C
	4	Soil contamination	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	5	Noise and Vibration	**B**	C	C	C	C	C	B	B	C	C	C	C	C
	6	Ground Subsidence	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	7	Odor	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	8	Sediment quality	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Natural Environment	9	Protected Area	**B**	B	C	C	C	C	C	C	C	C	C	C	C
	10	Ecosystem	**B**	B	C	C	C	C	C	C	C	C	C	C	C
	11	Hydrology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	12	Topography and geology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	13	Involuntary resettlement	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	14	The poor	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	15	Indigenous and ethnic people	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	16	Local economy such as employment and livelihood	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	17	Land use and utilization of local resources	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	18	Waste Usage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	19	Existing social infrastructures and services	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	20	Social institutions such as social infrastructure and local decision making institutions	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	21	Misdistribution of benefit and damage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	22	Local conflict of interests	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	23	Cultural Heritage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	24	Landscape	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	25	Gender	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	26	Right of Children	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	27	Infectious diseases such as HIV/AIDS	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	28	Labor environment (including work safety)	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Others	29	Accidents	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	30	Cross Boundary impacts and climate change	**C**	C	C	C	C	C	C	C	C	C	C	C	C

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)

Source: JICA Survey Team

Table 15 Reasons for Scoping (Perumba)

Category	No	Impacted Item on JICA Guidelines (Philippines Item)	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
Pollution	1	Air pollution	B	C	**Construction phase:** Temporary negative impacts are expected on air quality due to construction machines and equipment. **Operation phase:** No impacts are expected.
	2	Water pollution	A	C	**Construction phase:** Turbid water may be generated by construction work. **Operation phase:** No impacts are expected
	3	Waste	B	C	**Construction phase:** Construction waste is expected to be generated by demolition of superstructure. **Operation phase:** No serious impacts are expected
	4	Soil contamination	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	5	Noise and vibration	B	C	**Construction phase:** Noise and vibration generation is expected due to works of construction machines and equipment. **Operation phase:** No serious impacts are expected
	6	Ground subsidence	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	7	Odor	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	8	Sediment quality	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
Natural environment	9	Protected area	B	C	**Construction phase:** The project site is located in CRZ. **Operation phase:** No impacts are expected
	10	Ecosystem	B	C	**Construction phase:** Mangrove was observed around the site. The location of the construction of the temporary bridge needs to be assessed. **Operation phase:** No impacts are expected
	11	Hydrology	C	C	**Construction and Operation phase:** Construction of bridges on the route may change hydrological situation of the rivers, and may give impact. **Operation phase:** No impacts are expected.
	12	Topography and geology	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
Social environment	13	Involuntary resettlement	C	C	**Construction phase:** Mainly commercial area is observed. Few impacts are expected. **Operation phase:** No impacts are expected
	14	The poor	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	15	Indigenous and ethnic people	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	16	Local economy such as employment and livelihood	C	C	**Construction phase** No impacts are expected**:** **Operation phase:** Few impacts are expected.

Category	No	Impacted Item on JICA Guidelines (Philippines Item)	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
	17	Land use and utilization of local resources	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	18	Water usage	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	19	Existing social infrastructures and services	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	20	Social institutions such as social infrastructure and local decision making institutions	C	C	**Construction phase:** No impacts are expected **Operation phase:** No impacts are expected
	21	Misdistribution of benefit and damage	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	22	Local conflict of interests	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	23	Cultural heritage	C	C	**Construction phase:** Temple and religious facility are observed. However they are not directly affected. **Operation phase:** No impacts are expected
	24	Landscape	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	25	Gender	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	26	Right of children	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	27	Infectious diseases such as HIV/AIDS	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected
	28	Labor environment	C	C	**Construction phase:** Construction work environment needs to be considered in accordance with relevant laws and regulations. **Operation phase:** No impact is expected
Others	29	Accidents	C	C	**Construction phase:** Construction vehicles may use existing local road near residential areas, thus number of traffic accident may increase. **Operation phase:** No impacts are expected
	30	Cross boundary impacts and climate change	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No impacts are expected

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)
Source: JICA Survey Team

Table 16 Scoping Matrix (Shetrunji)

	No	Affected Activities / Impact Items (JICA)	Overall Rating	Pre/ During Construction Phase									Operation Phase		
				Land acquisition and Loss of properties (including demolition of structures)	Change of Land use plan, Control of various activities by regulations for the construction	Reclamation of Wetland, etc.	Deforestation	Alteration to ground by cut land, filling, drilling, tunnel, etc.	Operation of Construction Equipment and Vehicles	Construction of Roads, tollgates, parking lots, Access roads for bridges and other related facilities	Traffic Restriction in construction area	Influx of construction workers, construction of base camp	Increase of Through Traffic	Appearance/ Occupancy of Roads and related building structures including bridge and embankment	Increasing influx of settlers
Pollution	1	Air Pollution	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	2	Water pollution	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	3	Waste	**B**	B	C	C	C	C	C	C	C	C	C	C	C
	4	Soil contamination	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	5	Noise and Vibration	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	6	Ground Subsidence	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	7	Odor	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	8	Sediment quality	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Natural Environment	9	Protected Area	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	10	Ecosystem	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	11	Hydrology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	12	Topography and geology	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	13	Involuntary resettlement	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	14	The poor	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	15	Indigenous and ethnic people	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	16	Local economy such as employment and livelihood	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	17	Land use and utilization of local resources	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	18	Waste Usage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	19	Existing social infrastructures and services	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	20	Social institutions such as social infrastructure and local decision making institutions	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	21	Misdistribution of benefit and damage	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Social Environment	22	Local conflict of interests	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	23	Cultural Heritage	**B**	B	C	C	C	C	C	C	C	C	C	C	C
	24	Landscape	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	25	Gender	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	26	Right of Children	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	27	Infectious diseases such as HIV/AIDS	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	28	Labor environment (including work safety)	**C**	C	C	C	C	C	C	C	C	C	C	C	C
Others	29	Accidents	**C**	C	C	C	C	C	C	C	C	C	C	C	C
	30	Cross Boundary impacts and climate change	**C**	C	C	C	C	C	C	C	C	C	C	C	C

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)

Source: JICA Survey Team

Table 17 Reasons for Scoping (Shetrunji)

Category	No	Impacted Item on JICA Guidelines	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
Pollution	1	Air pollution	C	C	**Construction phase:** Operation of construction equipment and vehicles may cause dust in the dry season. However residential area is not located nearby construction area. **Operation phase:** No activities give negative impact on this item
	2	Water pollution	C	C	**Construction phase:** No activities give negative impact on this item since the repair works are conducted in the dry-up river during dry season. **Operation phase:** No activities give negative impact on this item.
	3	Waste	B	C	**Construction phase:** Construction wastes such as concrete may be generated by demolition of superstructure **Operation phase:** No activities give negative impact on this item.
	4	Soil contamination	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	5	Noise and vibration	C	C	**Construction phase:** Noise and vibration generation is expected due to works of construction machines and equipment. However construction point on the bridge is far from residential area, thus the impact is negligible. **Operation phase:** No activities give negative impact on this item.
	6	Ground subsidence	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No activities give negative impact on this item.
	7	Odor	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No activities give negative impact on this item.
	8	Sediment quality	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No activities give negative impact on this item.
Natural environment	9	Protected area	C	C	**Construction phase:** Construction site is located in CRZ, however, no activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	10	Ecosystem	C	C	**Construction phase:** No mangrove area is observed **Operation phase:** No activities give negative impact on this item.
	11	Hydrology	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No activities give negative impact on this item.
	12	Topography and geology	C	C	**Construction phase:** No activities give negative impact on this item **Operation phase:** No activities give negative impact on this item.
Social environment	13	Involuntary resettlement	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	14	The poor	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	15	Indigenous and ethnic people	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	16	Local economy such as employment and livelihood	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	17	Land use and utilization of local resources	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	18	Water usage	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	19	Existing social infrastructures and services	C	C	**Construction phase:** Although the bridge is closed during rehabilitation works, a detour is set up in the dry-up river during construction. **Operation phase:** No impacts is expected

Category	No	Impacted Item on JICA Guidelines	Rating		Reasons of the Rating
			Pre/ During Construction	Operation Phase	
	20	Social institutions such as social infrastructure and local decision making institutions	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	21	Misdistribution of benefit and damage	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	22	Local conflict of interests	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	23	Cultural heritage	B	C	**Construction phase:** A community temple is located on the west-bank, and construction activities may affect to the temple. **Operation phase:** No activities give negative impact on this item.
	24	Landscape	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	25	Gender	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	26	Right of children	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	27	Infectious diseases such as HIV/AIDS	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	28	Labor environment	C	C	**Construction phase:** Construction work environment needs to be considered in accordance with relevant laws and regulations. **Operation phase:** No activities give negative impact on this item.
Others	29	Accidents	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.
	30	Cross boundary impacts and climate change	C	C	**Construction phase:** No activities give negative impact on this item. **Operation phase:** No activities give negative impact on this item.

Impact Rating: (A): Serious impact is expected. (B): Some impact is expected. (C): Few impacts are expected. (D): Extent of impact is unknown (serious impacts are not expected, but detailed survey is required on preparatory survey stage)

Source: JICA Survey Team

付録-4

交通量調査結果

Summary of Traffic Volume in Numbers and Passenger Car Units

S.No	Name of Bridge	PCU factors	0.5	0.75	1.0	1.0	1.0	3.0	4.5	4.5	1.5	3.0	8.0	
		Vehicular type / Traffic volume	Motor Bike	Three Wheeler	Car, Jeep	Passenger Van	Pick-up (Single/ Double Cab)	Medium Truck (2 axels)	Large Truck (3 axels and more)	Container Trailer	Minibus (29 seats and below)	Bus	Others	Total
1	Kaliabhomora	ADT (In Number of vehicles)	710	227	2,036	440	524	817	850	131	349	372	120	**6,576**
		ADT (In PCU)	355	170	2,036	440	524	2,451	3,825	590	524	1,116	960	**12,990**
2	Badarpughat	ADT (In Number of vehicles)	1,196	1,904	1,198	1,233	74	2,383	1,389	11	107	240	69	**9,804**
		ADT (In PCU)	598	1,428	1,198	1,233	74	7,149	6,251	50	161	720	552	**19,413**
3	Zuari	ADT (In Number of vehicles)	13,131	168	13,927	170	4	2,111	-	-	404	1,374	9	**31,298**
		ADT (In PCU)	6,566	126	13,927	170	4	6,333	-	-	606	4,122	72	**31,926**
4	Borim	ADT (In Number of vehicles)	8,388	200	7,155	524	210	4,220	683	399	695	198	22	**22,694**
		ADT (In PCU)	4,194	150	7,155	524	210	12,660	3,074	1,796	1,043	594	176	**31,575**
5	Mahe	ADT (In Number of vehicles)	6,861	4,131	6,362	180	587	1,449	531	903	271	1,059	54	**22,388**
		ADT (In PCU)	3,431	3,098	6,362	180	587	4,347	2,390	4,064	407	3,177	432	**28,473**
6	Valapattnam	ADT (In Number of vehicles)	11,142	5,565	9,848	1,507	1,931	1,651	834	516	1,829	2,099	7	**36,929**
		ADT (In PCU)	5,571	4,174	9,848	1,507	1,931	4,953	3,753	2,322	2,744	6,297	56	**43,155**
7	Perumba	ADT (In Number of vehicles)	9,245	4,415	6,460	288	1,120	2,119	597	293	66	1,269	-	**25,872**
		ADT (In PCU)	4,623	3,311	6,460	288	1,120	6,357	2,687	1,319	99	3,807	-	**30,070**
8	Shetrunji	ADT (In Number of vehicles)	6,531	1,207	1,876	794	-	364	1,404	135	130	360	169	**12,970**
		ADT (In PCU)	3,266	905	1,876	794	-	1,092	6,318	608	195	1,080	1,352	**17,485**

付録4-1

Traffic Volume at Kaliabhomora Bridge

SL NO	Vehicular type / Time		Type 1 Motor Bike	Type 2 Three Wheeler	Type 3 Car, Jeep	Type 4 Passenger Van	Type 5 Pick-up (Single/ Double Cab)	Type 6 Medium Truck (2 axels)	Type 7 Large Truck (3 axels and more)	Type 8 Container Trailer	Type9 Minibus (29 seats and below)	Type 10 Bus	Type 11 Others	Total No.of Vehicles	Total PCU
1	6.00	7.00	27	12	47	19	10	51	37	1	14	14	20	252	646
2	7.00	8.00	39	19	49	24	14	54	45	1	16	13	16	290	681
3	8.00	9.00	60	11	70	28	13	38	33	3	15	18	10	299	582
4	9.00	10.00	46	12	123	17	27	19	14	-	30	8	5	301	428
5	10.00	11.00	50	12	162	18	25	22	5	-	39	8	5	346	450
6	11.00	12.00	58	15	136	22	29	18	12	2	28	14	10	344	508
7	12.00	13.00	37	22	150	15	40	22	10	3	35	10	-	344	447
8	13.00	14.00	64	19	142	24	43	31	41	1	38	13	15	431	753
9	14.00	15.00	54	17	129	83	23	39	14	-	31	8	4	402	557
10	15.00	16.00	71	12	170	91	23	40	7	1	25	10	17	467	688
11	16.00	17.00	66	17	162	20	41	50	14	-	26	3	3	402	554
12	17.00	18.00	66	18	156	14	22	43	19	-	18	5	3	364	519
13	18.00	19.00	35	10	125	18	29	35	37	13	15	11	4	332	615
14	19.00	20.00	22	11	123	21	31	67	103	16	8	9	1	412	978
15	20.00	21.00	7	3	57	2	17	40	45	12	2	10	-	195	491
16	21.00	22.00	5	7	53	4	22	51	35	14	1	18	3	213	540
17	22.00	23.00	1	1	40	1	16	20	65	10	4	19	-	177	519
18	23.00	24.00	-	2	48	1	18	31	66	2	2	26	2	198	565
19	0.00	1.00	-	-	12	2	10	29	53	10	-	35	1	152	508
20	1.00	2.00	-	-	18	2	13	24	68	6	-	55	-	186	603
21	2.00	3.00	-	-	8	1	9	19	52	24	-	38	-	151	531
22	3.00	4.00	-	-	23	-	17	25	39	4	-	13	-	121	348
23	4.00	5.00	-	-	13	1	9	25	21	4	-	10	-	83	241
24	5.00	6.00	2	7	20	12	23	24	15	4	2	4	1	114	242
ADT (In Number of vehicles)			710	227	2,036	440	524	817	850	131	349	372	120	6,576	
PCU factors			0.5	0.75	1.0	1.0	1.0	3.0	4.5	4.5	1.5	3.0	8.0		
ADT (In PCU)			355	170	2,036	440	524	2,451	3,825	590	524	1,116	960	12,990	12,990

Traffic Volume at Badarpughat Bridge

			Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Type 8	Type9	Type 10	Type 11	Total	
SL NO	Vehicular type / Time		Motor Bike	Three Wheeler	Car, Jeep	Passenger Van	Pick-up (Single/ Double Cab)	Medium Truck (2 axels)	Large Truck (3 axels and more)	Container Trailer	Minibus (29 seats and below)	Bus	Others	No.of Vehicles	PCU
1	6.00	7.00	46	49	44	54	5	93	54	-	5	21	11	382	843
2	7.00	8.00	68	113	57	73	2	116	53	-	5	5	1	493	868
3	8.00	9.00	65	130	77	69	7	86	49	-	3	22	5	513	872
4	9.00	10.00	53	181	77	74	11	124	30	-	5	11	1	567	880
5	10.00	11.00	116	137	84	61	5	93	37	-	3	2	8	546	831
6	11.00	12.00	105	176	53	64	10	118	36	-	-	2	1	565	842
7	12.00	13.00	125	166	78	79	4	121	39	-	2	3	1	618	907
8	13.00	14.00	78	109	59	84	14	106	41	-	5	13	8	517	891
9	14.00	15.00	100	140	74	88	-	135	53	-	11	10	4	615	1,039
10	15.00	16.00	76	130	82	85	6	96	69	1	3	9	4	561	975
11	16.00	17.00	84	131	101	90	-	119	88	1	13	7	1	635	1,137
12	17.00	18.00	91	132	82	91	-	120	81	2	17	13	11	640	1,204
13	18.00	19.00	59	107	61	85	6	140	70	-	12	19	3	562	1,096
14	19.00	20.00	25	72	54	89	-	92	87	3	-	14	1	437	941
15	20.00	21.00	29	52	54	60	-	111	90	1	3	23	5	428	1,024
16	21.00	22.00	53	47	49	41	2	145	109	2	16	23	-	487	1,181
17	22.00	23.00	3	5	20	20	2	98	101	-	3	2	2	256	822
18	23.00	24.00	7	7	18	6	-	74	52	-	-	-	-	164	489
19	0.00	1.00	2	3	10	-	-	97	31	-	-	2	1	146	458
20	1.00	2.00	1	-	14	2	-	54	32	1	-	1	-	105	330
21	2.00	3.00	-	-	28	10	-	51	60	-	-	5	1	155	484
22	3.00	4.00	-	-	5	6	-	43	42	-	-	5	-	101	344
23	4.00	5.00	1	-	7	-	-	74	37	-	1	20	-	140	458
24	5.00	6.00	9	17	10	2	-	77	48	-	-	8	-	171	500
ADT (In Number of vehicles)			1,196	1,904	1,198	1,233	74	2,383	1,389	11	107	240	69	9,804	
PCU factors			0.5	0.75	1.0	1.0	1.0	3.0	4.5	4.5	1.5	3.0	8.0		
ADT (In PCU)			598	1,428	1,198	1,233	74	7,149	6,251	50	161	720	552	19,413	19,413

Traffic Volume at Zuari Bridge

			Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Type 8	Type9	Type 10	Type 11	Total	
SL NO	Vehicular type / Time		Motor Bike	Three Wheeler	Car, Jeep	Passenger Van	Pick-up (Single/ Double Cab)	Medium Truck (2 axels)	Large Truck (3 axels and more)	Container Trailer	Minibus (29 seats and below)	Bus	Others	No.of Vehicles	PCU
1	6.00	7.00	243	6	312	14	-	113	-	-	22	53	-	763	983
2	7.00	8.00	758	5	848	12	-	67	-	-	27	52	-	1,769	1,640
3	8.00	9.00	1,208	7	1,408	10	-	152	-	-	37	114	-	2,936	2,881
4	9.00	10.00	993	9	1,001	8	-	158	-	-	13	104	-	2,286	2,318
5	10.00	11.00	983	9	1,009	4	-	114	-	-	27	90	-	2,236	2,164
6	11.00	12.00	842	8	857	8	-	83	-	-	11	51	-	1,860	1,711
7	12.00	13.00	602	14	607	12	-	76	-	-	4	39	1	1,355	1,290
8	13.00	14.00	603	17	650	16	-	82	-	-	11	53	-	1,432	1,402
9	14.00	15.00	730	11	711	4	-	142	-	-	19	61	3	1,681	1,750
10	15.00	16.00	925	3	808	12	-	191	-	-	49	95	5	2,088	2,256
11	16.00	17.00	802	7	811	14	3	126	-	-	14	82	-	1,859	1,879
12	17.00	18.00	1,020	19	1,014	4	1	116	-	-	17	93	-	2,284	2,196
13	18.00	19.00	628	14	610	20	-	139	-	-	43	111	-	1,565	1,769
14	19.00	20.00	840	9	844	5	-	78	-	-	30	66	-	1,872	1,753
15	20.00	21.00	588	6	569	3	-	70	-	-	15	42	-	1,293	1,229
16	21.00	22.00	385	1	554	2	-	16	-	-	6	19	-	983	863
17	22.00	23.00	209	1	382	1	-	40	-	-	3	38	-	674	727
18	23.00	24.00	154	1	209	1	-	36	-	-	3	31	-	435	493
19	0.00	1.00	127	2	161	3	-	48	-	-	11	27	-	379	471
20	1.00	2.00	98	3	102	4	-	62	-	-	2	36	-	307	454
21	2.00	3.00	65	3	87	3	-	22	-	-	4	18	-	202	251
22	3.00	4.00	115	-	110	5	-	64	-	-	4	47	-	345	512
23	4.00	5.00	63	1	93	-	-	55	-	-	8	11	-	231	335
24	5.00	6.00	150	12	170	5	-	61	-	-	24	41	-	463	601
ADT (In Number of vehicles)			13,131	168	13,927	170	4	2,111	-	-	404	1,374	9	31,298	
PCU factors			0.5	0.75	1.0	1.0	1.0	3.0	4.5	4.5	1.5	3.0	8.0		
ADT (In PCU)			6,566	126	13,927	170	4	6,333	-	-	606	4,122	72	31,926	31,926

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Traffic Volume at Borim Bridge

			Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Type 8	Type9	Type 10	Type 11	Total	
SL NO	Vehicular type / Time		Motor Bike	Three Wheeler	Car, Jeep	Passenger Van	Pick-up (Single/ Double Cab)	Medium Truck (2 axels)	Large Truck (3 axels and more)	Container Trailer	Minibus (29 seats and below)	Bus	Others	No.of Vehicles	PCU
1	6.00	7.00	77	8	92	16	52	102	9	7	11	6	1	381	625
2	7.00	8.00	356	3	210	73	7	164	15	6	43	15	-	892	1,166
3	8.00	9.00	918	7	486	75	16	257	11	17	61	18	-	1,866	2,084
4	9.00	10.00	695	1	485	51	6	340	16	5	84	5	-	1,688	2,146
5	10.00	11.00	521	18	412	27	17	189	15	1	42	2	2	1,246	1,454
6	11.00	12.00	456	10	394	35	11	218	25	4	37	4	-	1,194	1,528
7	12.00	13.00	465	6	379	28	15	231	72	9	35	9	1	1,250	1,804
8	13.00	14.00	407	1	373	11	6	251	36	7	23	10	-	1,125	1,605
9	14.00	15.00	356	62	383	15	8	163	15	4	36	10	2	1,054	1,305
10	15.00	16.00	469	3	439	35	7	253	56	7	52	26	1	1,348	1,924
11	16.00	17.00	597	22	541	39	65	369	27	14	54	8	4	1,740	2,389
12	17.00	18.00	708	7	550	22	-	340	26	12	48	11	2	1,726	2,243
13	18.00	19.00	607	7	532	44	-	298	34	15	64	18	2	1,621	2,165
14	19.00	20.00	619	3	515	24	-	276	59	23	35	12	2	1,568	2,152
15	20.00	21.00	400	3	393	10	-	148	30	54	20	11	-	1,069	1,490
16	21.00	22.00	311	1	341	4	-	112	34	14	9	4	-	830	1,079
17	22.00	23.00	127	-	135	-	-	67	17	3	3	-	-	352	494
18	23.00	24.00	88	1	104	2	-	54	46	37	9	3	3	347	733
19	0.00	1.00	50	3	79	4	-	41	24	48	8	5	-	262	584
20	1.00	2.00	36	3	46	3	-	49	17	33	9	7	1	204	484
21	2.00	3.00	29	3	42	2	-	37	18	26	4	4	1	166	396
22	3.00	4.00	13	11	75	-	-	40	19	13	6	3	-	180	372
23	4.00	5.00	27	3	60	2	-	88	24	23	-	2	-	229	559
24	5.00	6.00	56	14	89	2	-	133	38	17	2	5	-	356	794
ADT (In Number of vehicles)			8,388	200	7,155	524	210	4,220	683	399	695	198	22	22,694	
PCU factors			0.5	0.75	1.0	1.0	1.0	3.0	4.5	4.5	1.5	3.0	8.0		
ADT (In PCU)			4,194	150	7,155	524	210	12,660	3,074	1,796	1,043	594	176	31,575	31,575

Traffic Volume at Mahe Bridge

			Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Type 8	Type9	Type 10	Type 11	Total	
SL NO	Vehicular type / Time		Motor Bike	Three Wheeler	Car, Jeep	Passenger Van	Pick-up (Single/ Double Cab)	Medium Truck (2 axels)	Large Truck (3 axels and more)	Container Trailer	Minibus (29 seats and below)	Bus	Others	No.of Vehicles	PCU
1	6.00	7.00	46	30	117	4	27	42	12	28	2	18	2	328	573
2	7.00	8.00	95	48	188	6	23	53	24	19	5	44	4	509	825
3	8.00	9.00	264	199	238	14	30	41	19	45	27	70	2	949	1,241
4	9.00	10.00	435	305	353	7	39	45	23	14	27	76	6	1,330	1,463
5	10.00	11.00	272	229	356	13	32	45	8	19	17	76	1	1,068	1,227
6	11.00	12.00	496	363	354	29	29	49	19	31	13	66	4	1,453	1,554
7	12.00	13.00	642	441	474	16	51	118	16	53	16	73	3	1,903	2,124
8	13.00	14.00	613	344	439	10	50	92	17	44	16	73	1	1,699	1,865
9	14.00	15.00	546	315	405	15	45	41	8	56	31	66	2	1,530	1,646
10	15.00	16.00	416	279	347	9	25	80	14	53	16	70	2	1,311	1,590
11	16.00	17.00	444	325	380	5	24	81	20	40	22	67	4	1,412	1,654
12	17.00	18.00	554	331	392	6	49	81	22	39	16	81	1	1,572	1,765
13	18.00	19.00	419	295	319	7	22	88	13	35	5	59	4	1,266	1,475
14	19.00	20.00	456	214	351	12	23	50	23	13	6	53	3	1,204	1,279
15	20.00	21.00	474	174	402	2	34	80	32	51	5	76	2	1,332	1,671
16	21.00	22.00	312	93	351	8	22	79	41	57	9	35	-	1,007	1,403
17	22.00	23.00	186	81	253	5	18	66	31	52	22	15	4	733	1,111
18	23.00	24.00	67	13	193	2	9	66	37	41	5	6	2	441	838
19	0.00	1.00	29	11	85	4	13	67	34	69	2	6	1	321	818
20	1.00	2.00	14	4	78	1	10	56	41	35	2	7	1	249	641
21	2.00	3.00	14	6	63	1	2	45	21	40	-	3	-	195	496
22	3.00	4.00	22	9	66	-	3	23	17	19	3	7	1	170	351
23	4.00	5.00	18	6	69	2	3	27	23	23	-	4	1	176	396
24	5.00	6.00	27	16	89	2	4	34	16	27	4	8	3	230	470
ADT (In Number of vehicles)			6,861	4,131	6,362	180	587	1,449	531	903	271	1,059	54	22,388	
PCU factors			0.5	0.75	1.0	1.0	1.0	3.0	4.5	4.5	1.5	3.0	8.0		
ADT (In PCU)			3,431	3,098	6,362	180	587	4,347	2,390	4,064	407	3,177	432	28,473	28,473

Traffic Volume at Valapattanam Bridge

			Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Type 8	Type9	Type 10	Type 11	Total	
SL NO	Vehicular type / Time		Motor Bike	Three Wheeler	Car, Jeep	Passenger Van	Pick-up (Single/ Double Cab)	Medium Truck (2 axels)	Large Truck (3 axels and more)	Container Trailer	Minibus (29 seats and below)	Bus	Others	No.of Vehicles	PCU
1	6.00	7.00	136	74	113	7	27	57	35	7	5	41	-	502	761
2	7.00	8.00	308	152	236	22	53	106	33	18	8	76	-	1,012	1,367
3	8.00	9.00	701	263	445	102	98	96	34	17	14	110	-	1,880	2,061
4	9.00	10.00	1,124	623	760	280	234	135	35	12	7	125	-	3,335	3,305
5	10.00	11.00	1,560	651	1,154	440	360	107	18	9	116	145	-	4,560	4,274
6	11.00	12.00	905	486	686	276	312	75	22	16	109	130	-	3,017	3,041
7	12.00	13.00	621	363	570	84	124	78	24	11	141	120	-	2,139	2,325
8	13.00	14.00	609	324	582	23	95	70	27	6	131	145	-	2,012	2,238
9	14.00	15.00	516	334	484	28	61	36	22	7	124	109	-	1,721	1,833
10	15.00	16.00	589	429	549	42	92	44	31	13	164	112	-	2,065	2,211
11	16.00	17.00	685	385	692	25	109	54	32	25	167	133	-	2,307	2,525
12	17.00	18.00	923	383	725	42	72	55	43	34	206	212	-	2,695	3,044
13	18.00	19.00	738	272	628	6	33	50	26	16	122	157	-	2,048	2,233
14	19.00	20.00	681	234	795	34	90	83	56	42	187	188	-	2,390	2,970
15	20.00	21.00	433	210	459	29	54	68	52	80	259	166	-	1,810	2,601
16	21.00	22.00	212	136	167	12	16	61	34	12	6	30	-	686	892
17	22.00	23.00	124	90	155	13	18	50	36	17	11	18	-	532	775
18	23.00	24.00	97	45	119	11	20	54	45	24	8	14	-	437	759
19	0.00	1.00	34	40	134	8	9	73	38	34	13	17	4	404	844
20	1.00	2.00	36	11	126	2	9	82	47	21	8	7	1	350	756
21	2.00	3.00	20	7	66	5	16	77	39	32	5	9	-	276	687
22	3.00	4.00	13	5	66	3	12	46	41	21	7	6	1	221	545
23	4.00	5.00	24	10	68	7	9	55	29	26	2	11	-	241	552
24	5.00	6.00	50	38	69	6	8	39	35	16	9	18	1	289	559
ADT (In Number of vehicles)			11,142	5,565	9,848	1,507	1,931	1,651	834	516	1,829	2,099	7	36,929	
PCU factors			0.5	0.75	1.0	1.0	1.0	3.0	4.5	4.5	1.5	3.0	8.0		
ADT (In PCU)			5,571	4,174	9,848	1,507	1,931	4,953	3,753	2,322	2,744	6,297	56	43,155	43,155

Traffic Volume at Perumba Bridge

			Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Type 8	Type9	Type 10	Type 11	Total	
SL NO	Vehicular type / Time		Motor Bike	Three Wheeler	Car, Jeep	Passenger Van	Pick-up (Single/ Double Cab)	Medium Truck (2 axels)	Large Truck (3 axels and more)	Container Trailer	Minibus (29 seats and below)	Bus	Others	No.of Vehicles	PCU
1	6.00	7.00	114	67	111	9	15	49	20	8	-	26	-	419	593
2	7.00	8.00	279	130	196	11	37	91	36	8	3	76	-	867	1,185
3	8.00	9.00	663	234	349	34	66	89	24	10	12	113	-	1,594	1,733
4	9.00	10.00	859	339	437	13	77	116	15	11	5	97	-	1,969	1,974
5	10.00	11.00	680	344	446	11	89	112	22	7	1	95	-	1,807	1,897
6	11.00	12.00	562	351	424	8	96	142	21	11	1	93	-	1,709	1,923
7	12.00	13.00	561	295	418	10	109	150	37	8	2	78	-	1,660	1,926
8	13.00	14.00	605	331	394	10	71	146	22	11	-	90	-	1,680	1,882
9	14.00	15.00	421	264	390	16	87	131	21	12	4	77	-	1,423	1,680
10	15.00	16.00	496	356	472	38	80	155	22	5	15	85	-	1,724	1,969
11	16.00	17.00	550	324	438	23	79	153	28	16	13	94	-	1,718	2,017
12	17.00	18.00	760	296	448	21	66	142	41	23	3	94	-	1,894	2,138
13	18.00	19.00	580	282	456	14	47	91	32	11	1	89	-	1,603	1,754
14	19.00	20.00	628	236	359	4	44	67	24	4	1	75	-	1,442	1,452
15	20.00	21.00	454	148	331	4	38	75	19	14	-	30	-	1,113	1,175
16	21.00	22.00	399	105	217	12	13	53	30	10	2	24	-	865	934
17	22.00	23.00	212	103	182	7	19	48	31	11	-	6	-	619	742
18	23.00	24.00	148	51	107	8	21	46	26	21	3	8	-	439	626
19	0.00	1.00	105	35	74	3	10	50	23	16	-	1	-	317	494
20	1.00	2.00	55	23	48	5	18	34	28	14	-	-	-	225	407
21	2.00	3.00	32	25	28	8	4	51	18	24	-	1	-	191	420
22	3.00	4.00	13	15	41	6	8	35	16	18	-	3	-	155	340
23	4.00	5.00	26	20	37	8	11	47	22	10	-	6	-	187	387
24	5.00	6.00	43	41	57	5	15	46	19	10	-	8	-	244	422
ADT (In Number of vehicles)			9,245	4,415	6,460	288	1,120	2,119	597	293	66	1,269	-	25,872	
PCU factors			0.5	0.75	1.0	1.0	1.0	3.0	4.5	4.5	1.5	3.0	8.0		
ADT (In PCU)			4,623	3,311	6,460	288	1,120	6,357	2,687	1,319	99	3,807	-	30,070	30,070

Traffic Volume at Shetrunji Bridge

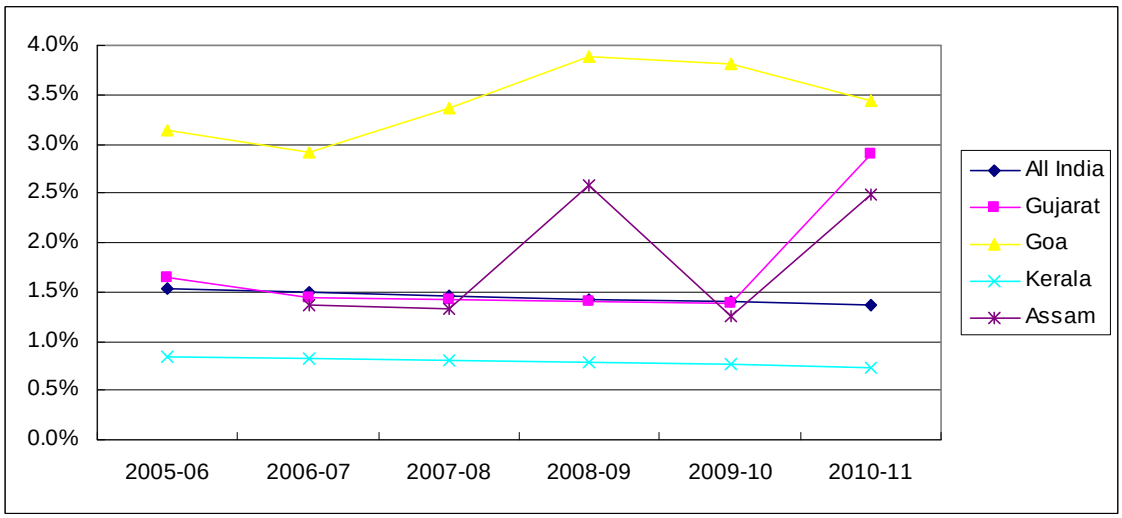
			Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Type 8	Type9	Type 10	Type 11	Total	
SL NO	Vehicular type / Time		Motor Bike	Three Wheeler	Car, Jeep	Passenger Van	Pick-up (Single/ Double Cab)	Medium Truck (2 axels)	Large Truck (3 axels and more)	Container Trailer	Minibus (29 seats and below)	Bus	Others	No.of Vehicles	PCU
1	6.00	7.00	29	10	16	8	-	9	57	14	-	18	2	163	463
2	7.00	8.00	150	48	45	32	-	4	87	9	4	40	13	432	862
3	8.00	9.00	348	70	95	37	-	24	52	5	7	30	9	677	860
4	9.00	10.00	538	129	98	58	-	12	73	4	6	12	11	941	1,037
5	10.00	11.00	513	130	127	54	-	14	59	9	8	11	10	935	1,008
6	11.00	12.00	448	124	136	32	-	23	59	5	12	3	9	851	941
7	12.00	13.00	434	80	102	40	-	21	58	2	6	7	7	757	838
8	13.00	14.00	580	73	127	33	-	18	70	5	9	11	18	944	1,087
9	14.00	15.00	534	79	100	54	-	25	36	5	6	6	9	854	839
10	15.00	16.00	559	79	108	52	-	27	55	10	12	15	9	926	1,007
11	16.00	17.00	531	83	123	48	-	26	57	3	6	16	7	900	960
12	17.00	18.00	563	88	145	66	-	27	88	5	10	19	12	1,023	1,226
13	18.00	19.00	474	74	112	71	-	24	63	3	9	23	20	873	1,087
14	19.00	20.00	321	44	137	50	-	20	57	1	6	20	12	668	867
15	20.00	21.00	201	32	92	45	-	18	76	6	10	25	3	508	799
16	21.00	22.00	124	28	89	36	-	13	83	2	3	12	2	392	686
17	22.00	23.00	65	9	59	12	-	14	64	8	-	18	3	252	554
18	23.00	24.00	37	7	36	17	-	5	57	2	-	14	7	182	455
19	0.00	1.00	32	8	34	12	-	11	42	5	-	9	-	153	340
20	1.00	2.00	10	2	23	13	-	5	52	14	-	11	3	133	412
21	2.00	3.00	8	2	14	6	-	8	29	4	2	1	1	75	212
22	3.00	4.00	7	2	22	4	-	5	41	3	13	5	-	102	279
23	4.00	5.00	8	2	21	8	-	1	46	2	1	17	-	106	306
24	5.00	6.00	17	4	15	6	-	10	43	9	-	17	2	123	364
ADT (In Number of vehicles)			6,531	1,207	1,876	794	-	364	1,404	135	130	360	169	12,970	
PCU factors			0.5	0.75	1.0	1.0	1.0	3.0	4.5	4.5	1.5	3.0	8.0		
ADT (In PCU)			3,266	905	1,876	794	-	1,092	6,318	608	195	1,080	1,352	17,485	17,485

付録-5

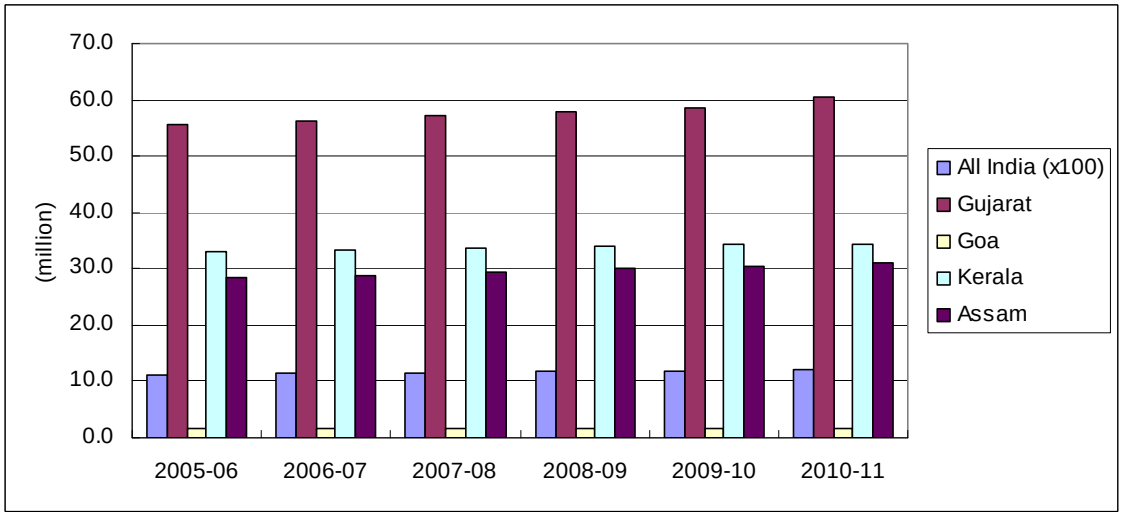
交通需要予測

Population

Population Growth Rates from 2005-11



Population from 2005-11

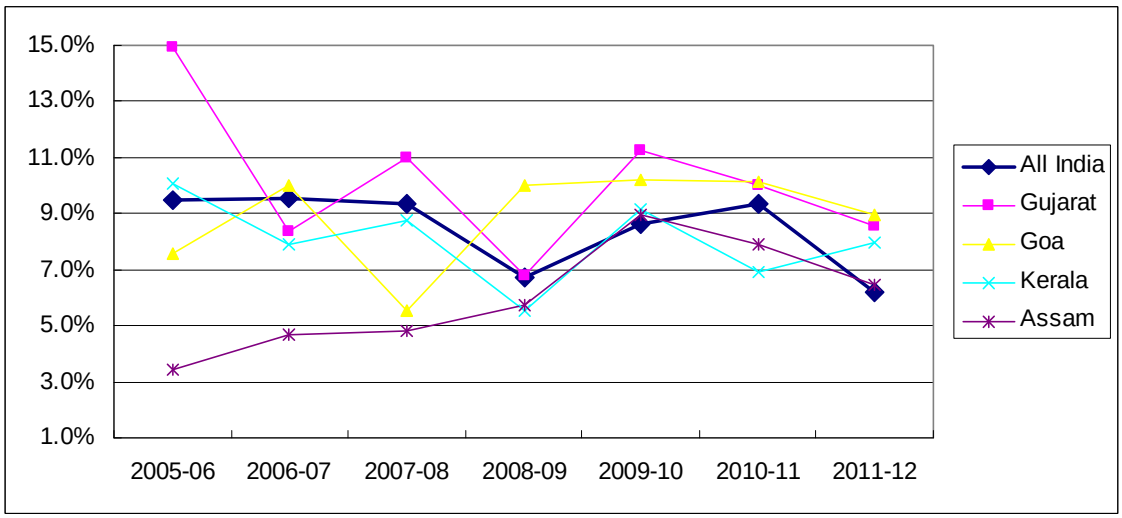


Year	Population				
	All India	Gujarat	Goa	Kerala	Assam
2004-05	1,102,800,000	54,600,000	1,429,000	32,875,000	-
2005-06	1,119,800,000	55,500,000	1,474,000	33,154,000	28,506,000
2006-07	1,136,600,000	56,300,000	1,517,000	33,426,000	28,896,000
2007-08	1,153,100,000	57,100,000	1,568,000	33,694,000	29,282,000
2008-09	1,169,400,000	57,900,000	1,629,000	33,958,000	30,037,000
2009-10	1,185,800,000	58,700,000	1,691,000	34,216,000	30,413,000
2010-11	1,201,900,000	60,400,000	1,749,000	34,467,000	31,169,272

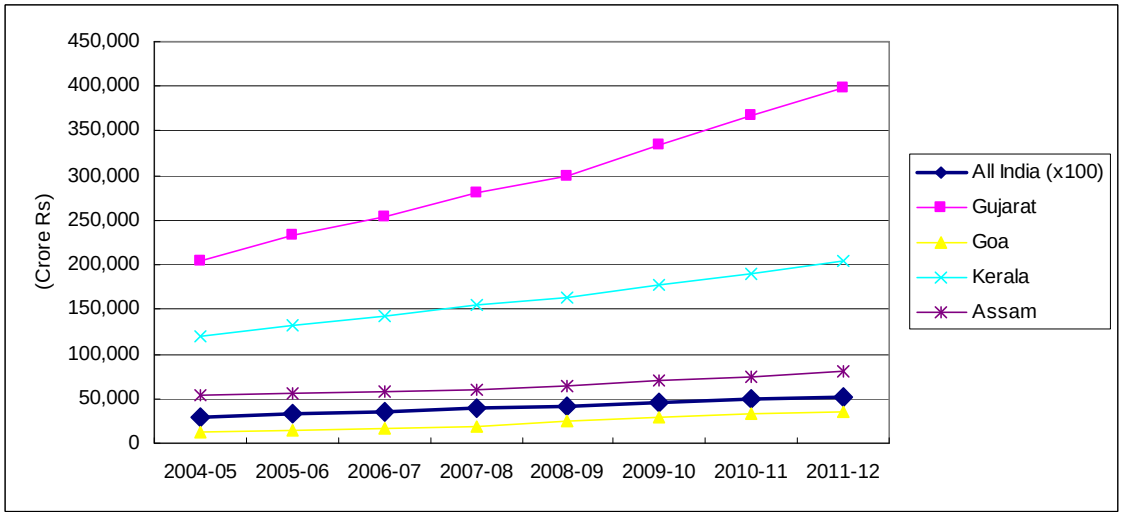
Source:
Economic Survey 2012-13; Government of India; 2013
Socio-Economic Review 2012-13, Gujarat State; Government of Gujarat; Feb-2013
Economic Survey 2012-13; Government of Goa; 2013
Economic Review 2013; Kerala State Planning Board; 2014
Economic Survey, Assam, 2012-13; Government of Assam; 2014

GDP/GSDP

Growth Rates of GDP/GSDP from 2005-12



GDP/GSDP from 2005-12



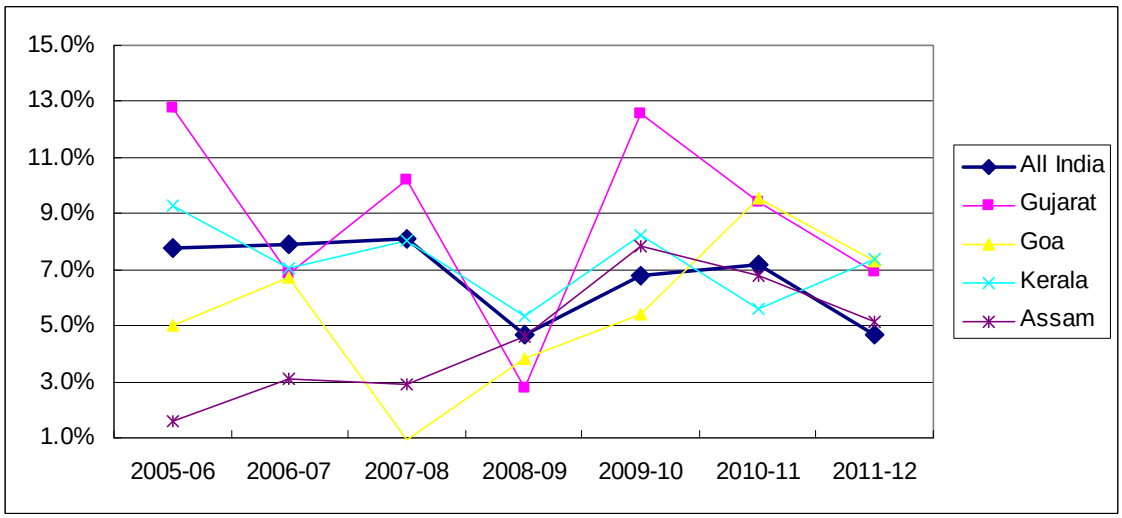
Unit: (Crore Rs.)

	All India	Gujarat	Goa	Kerala	Assam
2004-05	2,971,464	203,373	12,713	119,264	53,398
2005-06	3,253,073	233,776	14,327	131,294	55,214
2006-07	3,564,364	253,393	16,523	141,667	57,783
2007-08	3,896,636	281,273	19,565	154,093	60,568
2008-09	4,158,676	300,341	25,414	162,659	64,044
2009-10	4,516,071	334,127	29,126	177,571	69,794
2010-11	4,937,006	367,540	33,175	189,851	75,298
2011-12	5,243,582	398,884	35,135	204,957	80,172

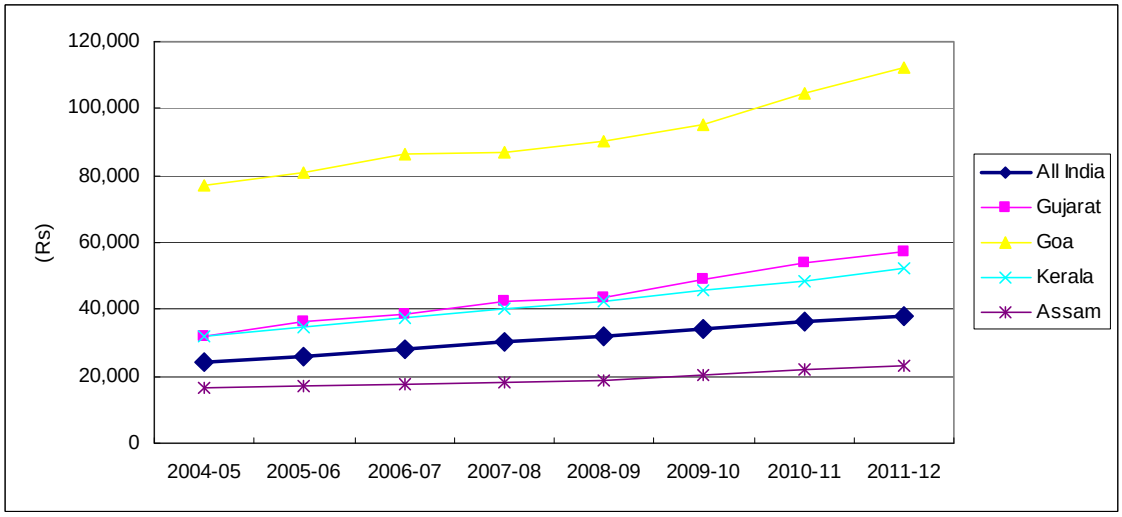
Source:
Economic Survey 2012-13; Government of India; 2013
Socio-Economic Review 2012-13, Gujarat State; Government of Gujarat; Feb-2013
Economic Survey 2012-13; Government of Goa; 2013
Economic Review 2013; Kerala State Planning Board; 2014
Economic Survey, Assam, 2012-13; Government of Assam; 2014

PCI

Growth Rates of Per Capita Income (GNP/GNSP)



Per Capita Income (GNP/GNSP)



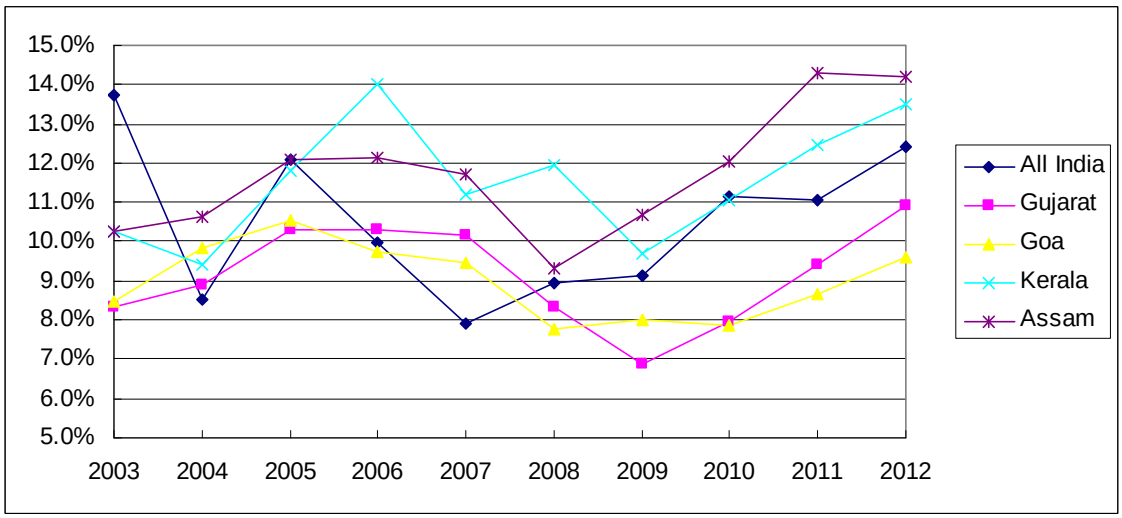
Unit: Rs

	All India	Gujarat	Goa	Kerala	Assam
2004-05	24,143	32,021	76,968	31,871	16,782
2005-06	26,015	36,102	80,844	34,837	17,050
2006-07	28,067	38,568	86,257	37,284	17,579
2007-08	30,332	42,498	87,085	40,288	18,089
2008-09	31,754	43,685	90,409	42,433	18,922
2009-10	33,901	49,168	95,320	45,921	20,406
2010-11	36,342	53,789	104,443	48,504	21,793
2011-12	38,037	57,508	112,073	52,095	22,910

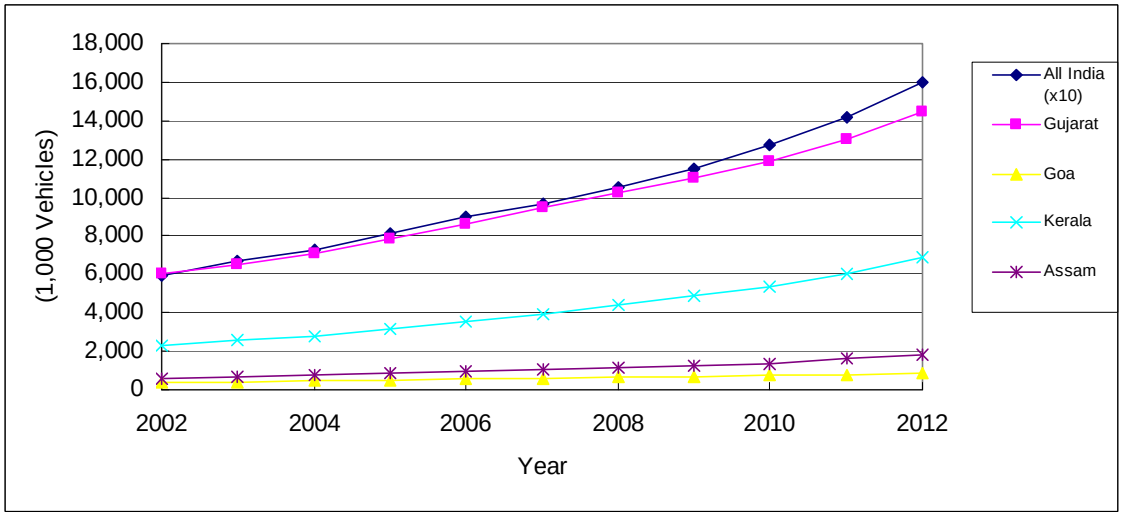
Source:
Economic Survey 2012-13; Government of India; 2013
Socio-Economic Review 2012-13, Gujarat State; Government of Gujarat; Feb-2013
Economic Survey 2012-13; Government of Goa; 2013
Economic Review 2013; Kerala State Planning Board; 2014
Economic Survey, Assam, 2012-13; Government of Assam; 2014

Number of Registered Vehicles

Growth Ratio for Registered Number of Vehicles



Registered Number of Vehicles



(thousand)

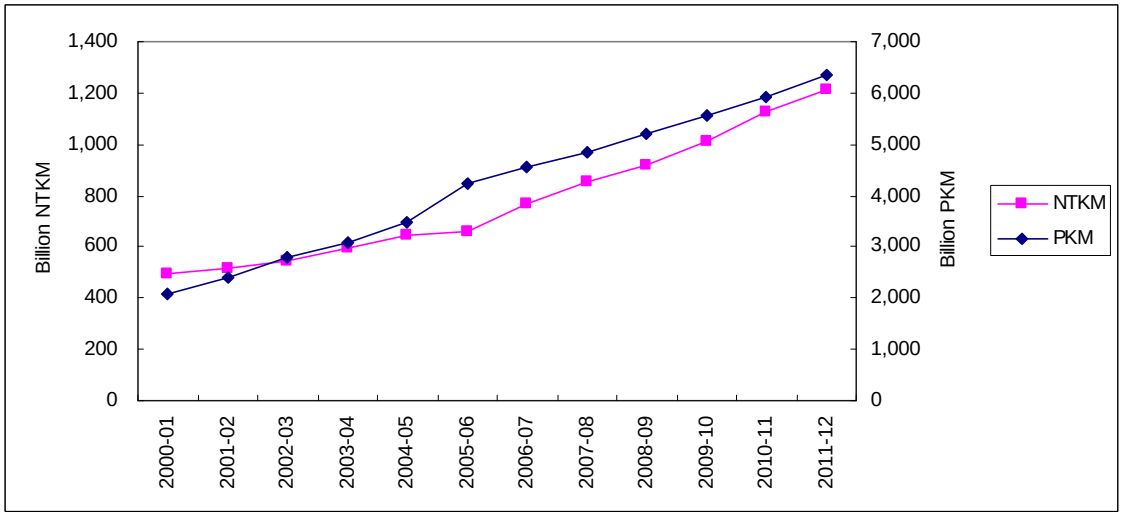
	All India	Gujarat	Goa	Kerala	Assam
2002	58,924	6,008	366	2,315	596
2003	67,007	6,508	397	2,552	657
2004	72,718	7,087	436	2,792	727
2005	81,499	7,817	482	3,122	815
2006	89,618	8,622	529	3,559	914
2007	96,707	9,497	579	3,957	1,021
2008	105,353	10,289	624	4,430	1,116
2009	114,951	10,999	674	4,860	1,235
2010	127,746	11,873	727	5,398	1,384
2011	141,866	12,993	790	6,072	1,582
2012	159,491	14,414	866	6,893	1,807

Source: Road Transport Year Book (2011-12); Transport Reserch Wing, MORTH

NTKM/PKM

Growth Ratio for NTKM/PKM

NTKM/PKM



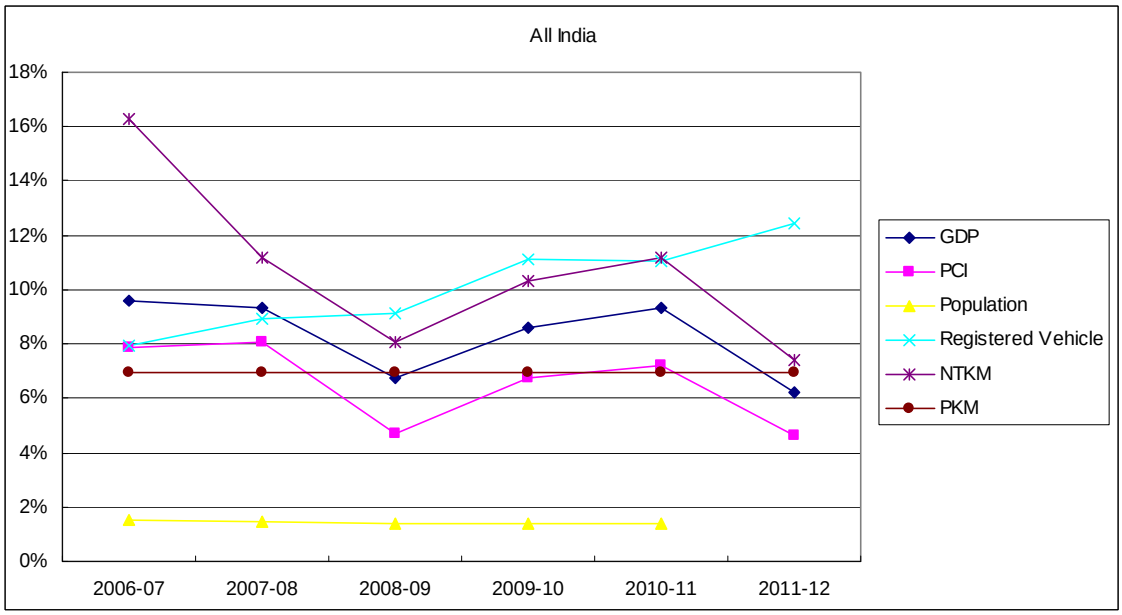
(billion)

	Tonne-Kilometres	Passenger-Kilometres
	NTKM	PKM
2000-01	494.0	2,076
2001-02	515.0	2,413
2002-03	545.0	2,815
2003-04	595.0	3,070
2004-05	646.0	3,469
2005-06	658.9	4,252
2006-07	766.2	4,546
2007-08	851.7	4,860
2008-09	920.2	5,197
2009-10	1,015.1	5,556
2010-11	1,128.4	5,940
2011-12	1,212.4	6,351

Source: Road Transport Year Book (2011-12); Transport Reserch Wing, MORTH

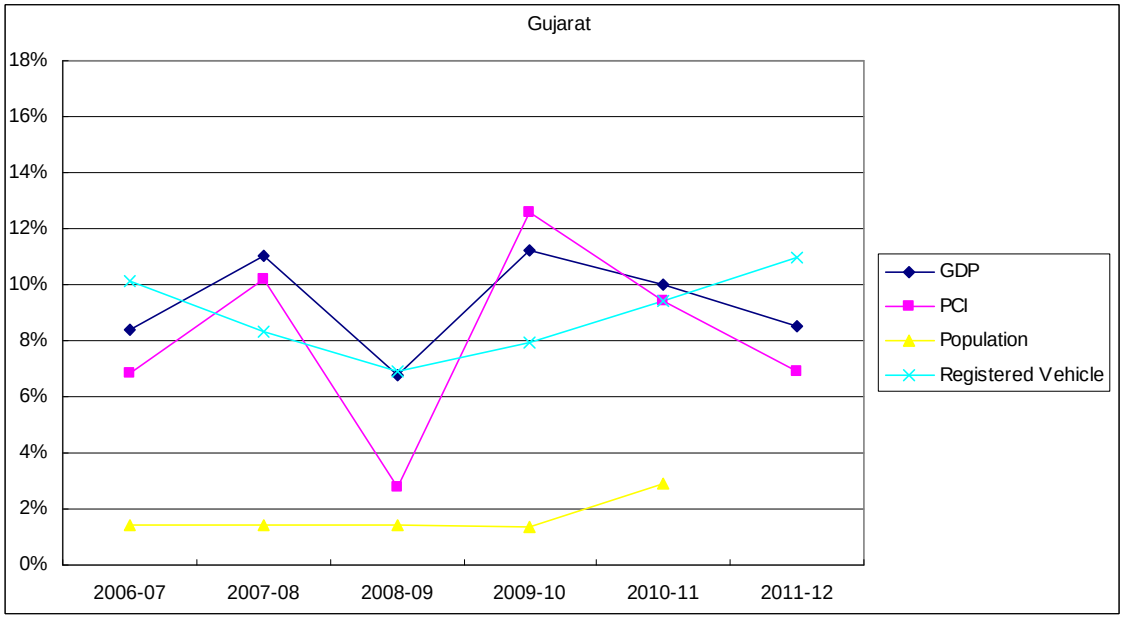
Comparison with Growth Rates of Major Indicators

All India



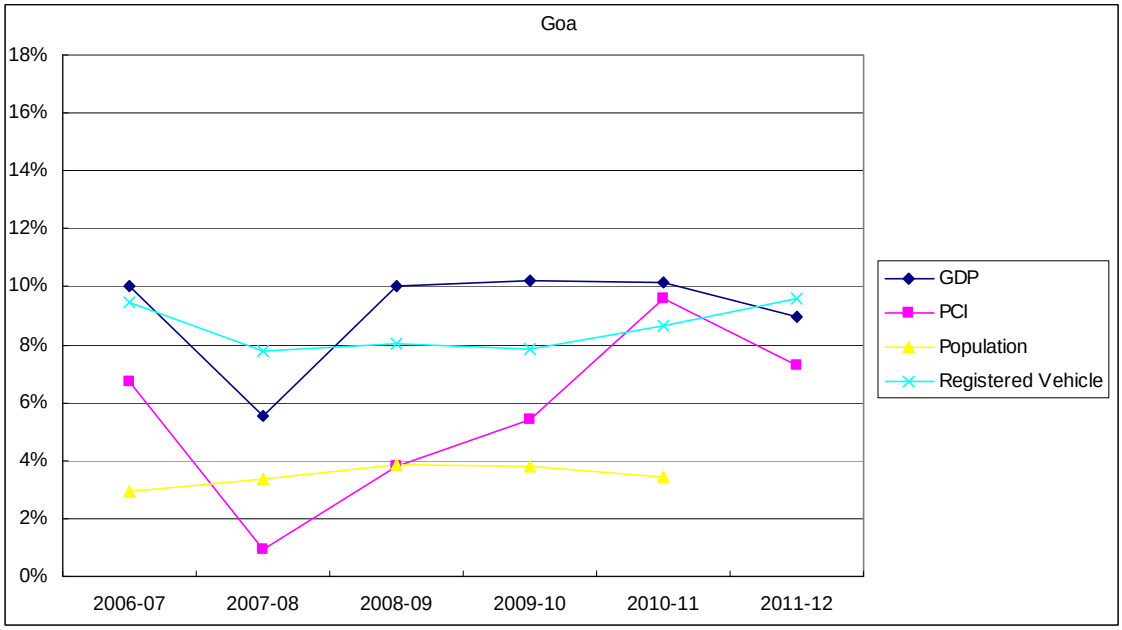
Source: Study Team

Gujarat State



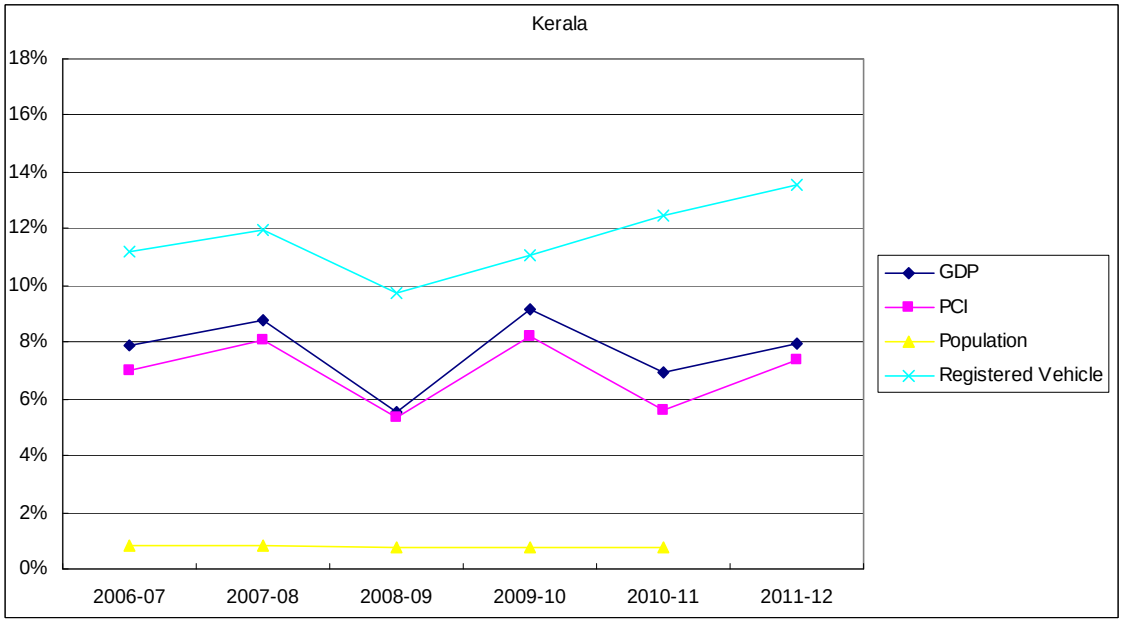
Source: Study Team

Goa State



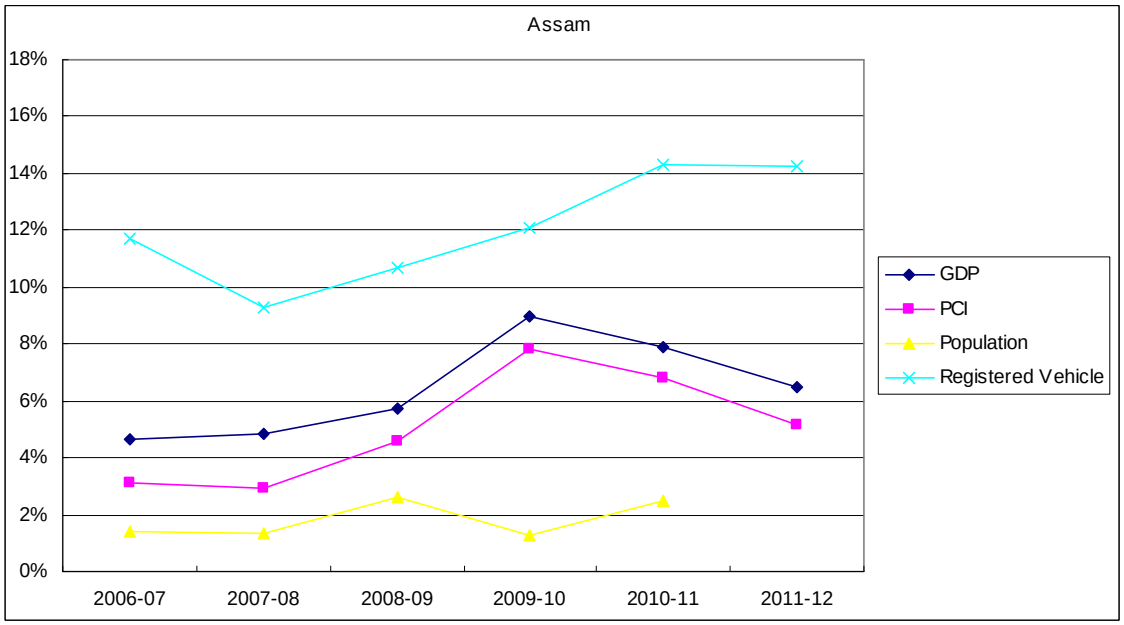
Source: Study Team

Kerala State



Source: Study Team

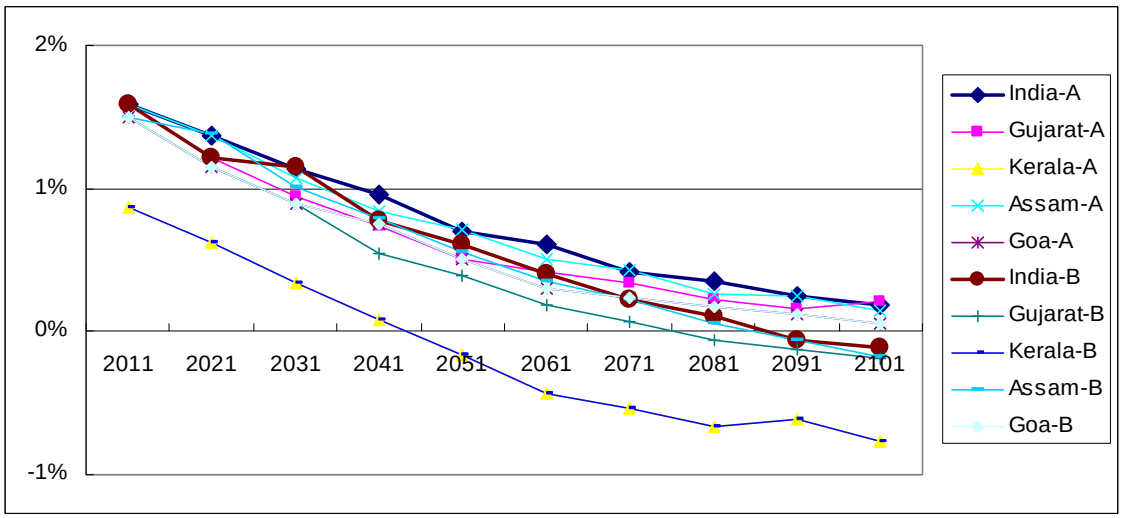
Assam State



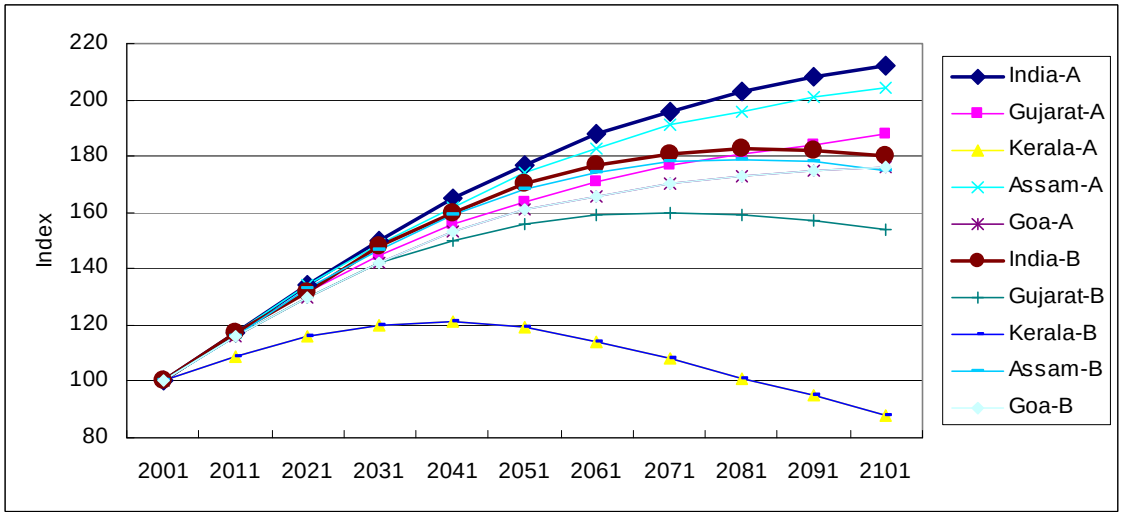
Source: Study Team

Future Population

Future Population Growth Rates from 2011-2101



Future Population from 2011-2101



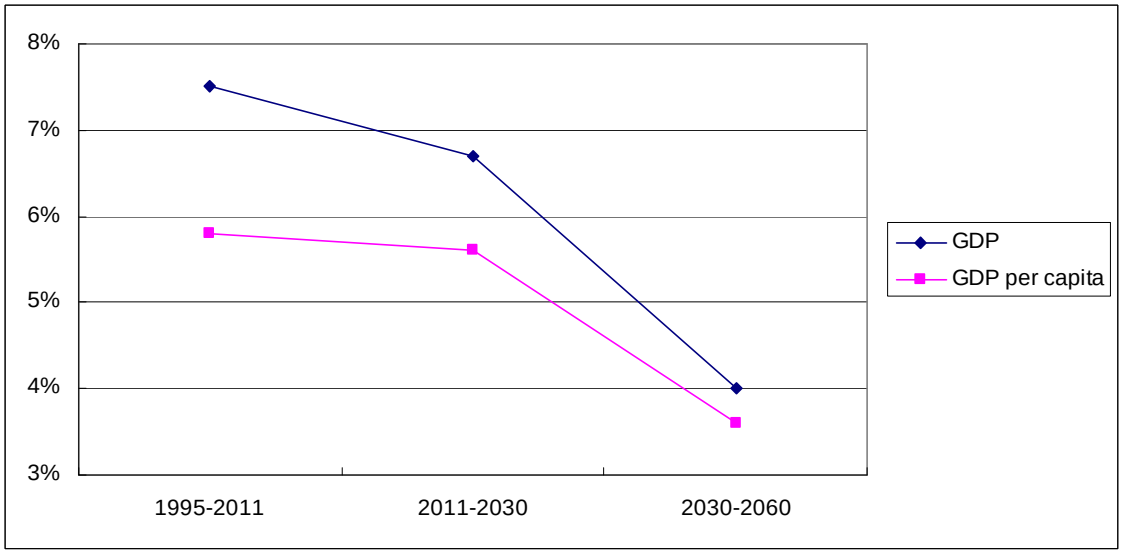
(Index)

	Scenario A					Scenario B				
	India-A	Gujarat-A	Kerala-A	Assam-A	Goa-A	India-B	Gujarat-B	Kerala-B	Assam-B	Goa-B
2001	100	100	100	100	100	100	100	100	100	100
2011	117	117	109	117	116	117	116	109	116	116
2021	134	132	116	134	130	132	130	116	133	130
2031	150	145	120	149	142	148	142	120	147	142
2041	165	156	121	162	153	160	150	121	159	153
2051	177	164	119	174	161	170	156	119	168	161
2061	188	171	114	183	166	177	159	114	174	166
2071	196	177	108	191	170	181	160	108	178	170
2081	203	181	101	196	173	183	159	101	179	173
2091	208	184	95	201	175	182	157	95	178	175
2101	212	188	88	204	176	180	154	88	175	176

Source: The Future Population of India; Population Foundation of India; Aug 2007

Prospected GDP/GDP-PC

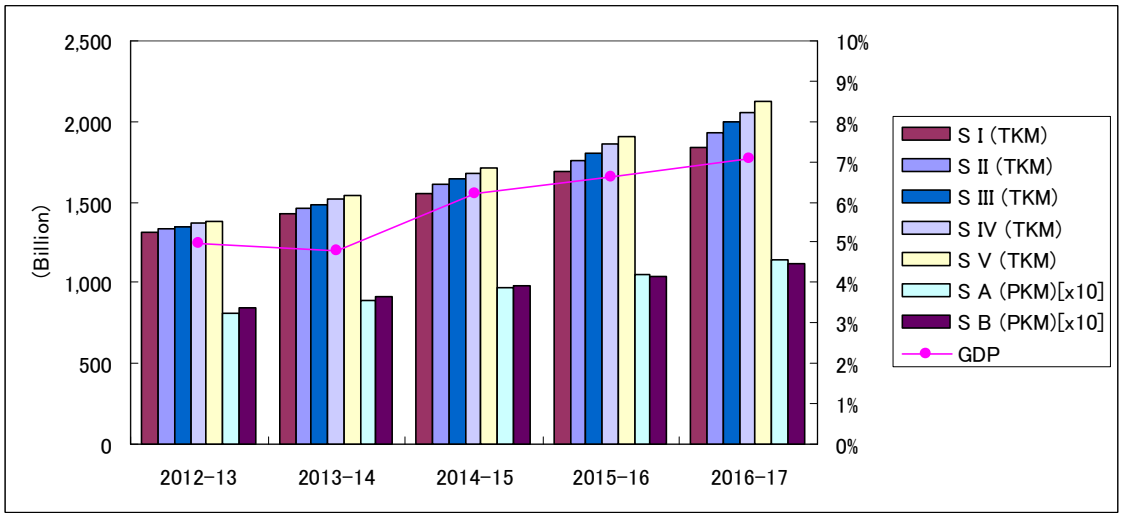
Growth Rates of GDP/GDP-PC from 1995-2060



Year	GDP	GDP per capita
1995-2011	7.5%	5.8%
2011-2030	6.7%	5.6%
2030-2060	4.0%	3.6%
2011-2060	5.1%	4.4%

Source: Looking to 2060; OECD; Nov 2012

Planned NTKM/PKM and Prospected GDP from 2012 to 2017



Year	Tonne-Kilometre					Passenger-Kilometre	
	S I	S II	S III	S IV	S V	S A	S B
2011-12	1,210					7,491	
2012-13	1,315	1,337	1,351	1,366	1,381	8,150	8,483
2013-14	1,429	1,465	1,489	1,513	1,538	8,868	9,111
2014-15	1,553	1,605	1,641	1,677	1,714	9,648	9,762
2015-16	1,688	1,760	1,808	1,858	1,909	10,497	10,438
2016-17	1,835	1,928	1,993	2,059	2,126	11,421	11,140

Source: Twelfth Five Year Plan (2012-2017) Vol. II; Planning Commission, Government of India; 2013

Year	GDP
2012	5.0%
2013	4.8%
2014	6.2%
2015	6.6%
2016	7.1%

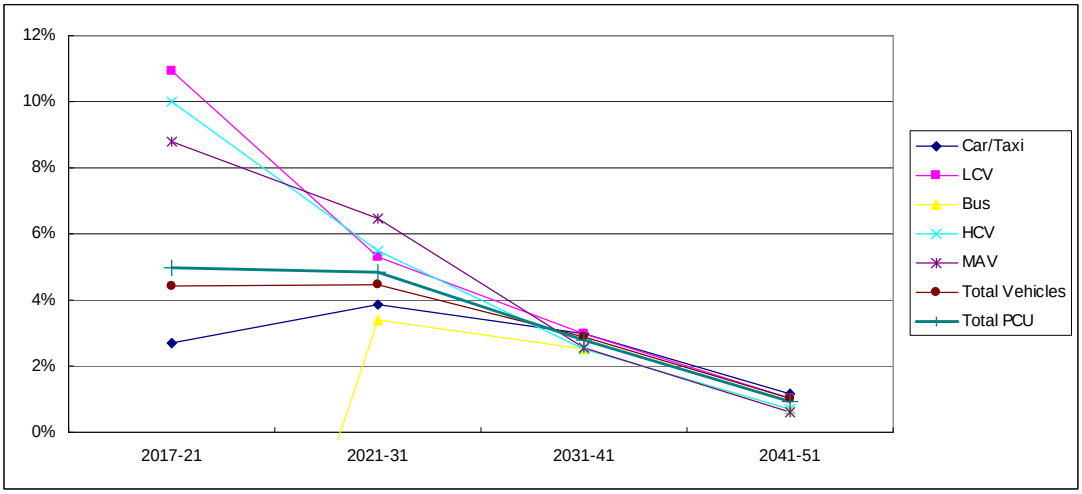
Source: Global Economic Prospects; World Bank; Jan 2014

Traffic Forecast in Mumbai Trans Harbor Link

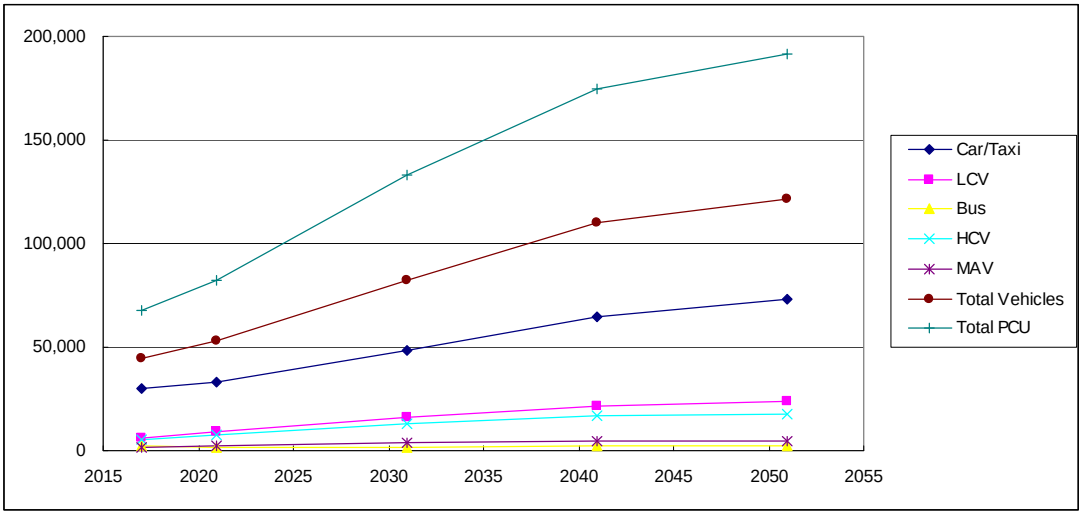
The traffic forecast in MTHL includes the following conditions;

- Toll fee
- Navi Mumbai Airport will be opened in 2016.
- Navi Mumbai SEZ will be developed in 2017.
- MTHL Metro is considered in 2021.

Growth Rates of Traffic Forecast from 2001-2051



Traffic Forecast from 2001-2051



Year	Vehicle Types (vehicles)					Total Vehicles	Total PCU
	Car/Taxi	LCV	Bus	HCV	MAV		
2017	29,725	6,325	2,325	5,225	1,375	44,975	68,050
2021	33,075	9,575	1,200	7,650	1,925	53,425	82,650
2031	48,225	16,075	1,675	13,075	3,600	82,650	132,788
2041	64,800	21,600	2,150	16,725	4,625	109,900	174,638
2051	72,705	23,875	2,300	17,940	4,915	121,735	191,355
PCU Factor	1.0	1.5	3.0	3.0	4.5		

Source: Final Feasibility Report, Vol. 1 of 2, Text; Mumbai Metropolitan Region Development Authority; Dec 2012

付録-6

橋梁状況調査のための入札書類

TABLE OF CONTENTS

Section	Particulars	Page No
	NOTICE INVITING TENDER	2
2.	INSTRUCTIONS TO BIDDERS	4
3.	GENERAL (FINANCIAL AND LEGAL) CONDITIONS OF THE CONTRACT	22
4.	SPECIAL CONDITIONS OF THE CONTRACT	27
5.	SCOPE OF WORK	30
6.	FORMATS TO BE USED FOR SUBMISSION OF PROPOSAL	33
7.	FORMATS FOR SUBMISSION OF BANK GUARANTEES	41
8.	DRAFT AGREEMENT	44

SECTION 1

NOTICE INVITING TENDER
(National Competitive Bidding)

BID NO. RW/

The Employer i.e. Ministry of Road Transport & Highways, New Delhi invites bids through e-procurement for following work under each Regional Office of the Ministry from empanelled consultants in Category II and III:

Sl. No.	Name of work	Earnest Money (Rs. in lakh)
1.	Collection and analysis of bridge condition and bridge inventory data by MBIU or any other equipment for the purpose of the Major/Minor Bridges on all NHs including those with NHAI for a period of five years	5.00

The tender documents pertaining to each package may be purchased in person or through authorized representative on written request/requisition from the prospective bidders wherein the full name and address of the prospective bidders should be mentioned; from Ministry against a non-refundable fee of *Rs. 25,000 (twenty five thousand)* in the form of Demand Draft drawn on any scheduled bank or any multinational bank having its branch in India in favour of the address mentioned against each zone as below.

Package No.	Office Address.	DD to be drawn in favour of	States/UT included	Tentative length of NHs in the States
1	*Chief Engineer (Bridge) S&R, Ministry of Road Transport & Highways, 1, Parliament Street, Transport Bhawan, New Delhi*	Pay and Accounts Officer (NH), New Delhi payable at New Delhi.	Jammu and Kashmir, Himachal Pradesh, Punjab, Chandigarh, Haryana,	6800
2			Uttarakhand,	2200
3			Uttar Pradesh, Delhi,	8000
4			Rajasthan.	7200
5			Bihar,	4200
6			West Bengal, Andaman and Nicobar Islands	3000
7			Odisha	4500
8			Jharkhand	2400
9			Andhra Pradesh	6800
10			Gujarat	3800
11			Madhya Pradesh	5200
12			Chhattisgarh	2400

13			Tamil Nadu, Puducherry	5100
14			Karnataka	4800
15			Maharashtra, Goa, Dadar & Nagar Hawelli	5800
16			Kerala	1600
17			Assam, Manipur, Sikkim, Tripura, Meghalaya, Nagaland, Mizoram	8100
18			Arunachal Pradesh	1600

Tender documents may also be downloaded from the Ministry's website www.morth.nic.in, but in that case, cost of Bid document may be furnished with an Application fees of Rs. 25000/- for each zone with the submission of bid to Chief Engineer(B) S&R, Ministry of Road Transport & Highways, Transport Bhawan, New Delhi. The format of the downloaded tender document should not be disturbed / altered, otherwise the bid will be rejected. The tender documents are non- transferable and only the firms to whom the tenders have been issued may submit their bids.

Alongwith the e-bids, technical bids should be submitted in hard bound form with page numbering and index. Any additional information shall also be furnished by the bidder in hard bound form with proper indexing and page numbering. The details submitted in other forms like spiral bound form, loose form etc would be rejected. The financial Bid will be submitted online only.

The last date for submission of the Bid Documents is 06-12-2013 up to 0100 hours. The technical bids would be opened online on 06-12-2013 at 1530 hours.

SECTION 2

2. INSTRUCTION TO BIDDERS

2.1 INTRODUCTION

2.1.1 The Ministry of Road Transport & Highways (MORT&H), New Delhi is responsible for the development, maintenance and management of National Highways and for matters connected or incidental thereto.

2.1.2 MORT&H officiates from Transport Bhawan located at 1, Parliament Street, New Delhi. MORT&H also has Regional offices in most of the State Capitals. Issues relating to Planning for National Highways are being done by MORT&H and the execution of work at site are being done through agencies namely, National Highways Authority of India (NHAI), National Highway (NH) wing of State Public Works Department (PWD), Border Roads Organisation (BRO) etc.

2.1.3 Bids are invited by MORT&H from established and reliable agencies / institutions for Collection of bridge condition and bridge inventory data of Bridges on National Highways for a period of five years. The consultants who are not empanelled in category II and III need not apply.

2.2 DEFINITIONS

a) **"MORT&H"** means Ministry of Road Transport & Highways
b) "**The Employer**" means the Chief Engineer (B) S&R, Ministry of Road Transport & Highways Government of India, stationed at Transport Bhawan, 1, Parliament Street, New Delhi.
c) **"The Consultant"** means agency appointed by MORT&H with a stipulated mandate or Firm, or Institution undertaking Collection of bridge condition and bridge inventory data under each Regional Office of the Ministry for a period of five years
d) **"The Bidder"** means a firm or JV or Consortium which participates in the tender and submits its proposal.
e) **"The Products/equipment/ system**" means all the equipments such as Mobile Bridge Inspection Unit or similar type of equipment which is required to collect bridge inventory & bridge condition data.
f) **"Successful Bidder"** means the Bidder, who, after the complete evaluation process, gets the Letter of Award. The Successful Bidder shall be deemed as "Consultant" appearing anywhere in the document.
g) "**The Letter of Acceptance**" means the issue of a signed letter by the Employer of its intention to accept the offer of successful bidder and awarding the work mentioning the total Contract Value.
h) **"The Contract"** means the agreement entered into between the Employer and the Consultant, as recorded in the Contract documents signed by the parties, including all attachments and appendices thereto and all documents incorporated by references therein
i) **"The Contract Price**" means the price payable to the Successful Bidder under the Letter of Acceptance for the full and proper performance of its

contractual obligations. The Contract Price shall be deemed as **"Contract Value"** appearing anywhere in the document.

j) **"Services"** means collecting data related to inventory and condition of bridges

k) **"NIT"** is the Notice Inviting Tender. It is essentially the Press Notification of the Tender.

l) **"Mobile Bridge Inspection Unit (MBIU)"** is state of the art vehicle, which allow unrestricted access to all under bridge related tasks; inspections, painting, repairs, general maintenance, installation & maintenance of under bridge pipe & cables, stripping operations, replacement & maintenance of bearings, etc. MBIU is designed for completing all types of Bridge Inspection and Maintenance work.

2.3 BID DOCUMENT

2.3.1 The process and procedures of bidding, the materials to be supplied and the various terms and conditions of this tender are provided in the Bid Document. The Bid Document include:

Section 1	Notice Inviting Tender
Section 2	Instructions to Bidders
Section 3	General (Financial & legal) Conditions of Contract
Section 4	Special Conditions of Contract
Section 5	Scope of the work
Section 6	Formats for Submission of Proposals
Section 7	Formats for submission of bank guarantees.
Section 8	Draft Contract Agreement

2.3.2 The Bidder should carefully read all the instructions, terms and conditions, specifications and various forms that are provided in the Bid Document. The tender may be rejected if any or all of the information asked for in this document are not furnished along with the tender or if the tender is not responsive technically or financially in accordance with the Bid Document.

2.4 PRE-BID MEETING

Pre bid meeting is scheduled on _____. Clarifications sought during the meeting will be issued at the same time and if any issue could not be resolved on the same day, clarifications of the same can be collected from office of the Chief Engineer (B) S&R, MORT&H, 5 days prior to bid submission. No separate information will be passed on to any individual Bidder in this regard. The same will be loaded on Ministry website also.

2.5 AMENDMENT OF BID DOCUMENTS

At any time, 5 days prior to bid submission, the Employer may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify bid documents by amendments.

2.6 COST OF BIDDING

The Bidder has to bear all the costs associated with the preparation and submission of the bid. Employer will, in no case, be responsible or liable for any of the costs, regardless of the conduct or outcome of the bidding process.

2.7 APPLICATION FEE (AF) AND EARNEST MONEY DEPOSIT (EMD)

2.7.1 The proposal should be submitted along with EMD (for the amount given in section 1 of this document) in the form of a Bank Guarantee and the format specified in section 7 of this document **valid for 45 days beyond the validity of the bid.** The Bid submitted without EMD will be summarily rejected. Application fees of Rs. 25,000/- should also be accompanied with the furnished offer, in case, the Bid documents has been downloaded from the Ministry's website www.morth.nic.in

2.7.2 The EMD of the successful Bidder will be returned when the Bidder has signed the Contract Agreement with the Employer and has furnished the required Performance Guarantee for the amount equivalent to 10% of the contract price on the prescribed format specified in section 7, with in 15 days from the receipt of the Letter of Acceptance. Ministry has issued a circular vide letter No.RW-NH-35071/2/2013-S&R(B) dated 16th January, 2014. The performance security shall be as per this circular which is placed at Annexure-D.

2.7.3 The EMD will be forfeited:

(a) If a Bidder withdraws its bid during the period of bid validity. Or
(b) If the Bidder fails to accept the Employer's corrections of arithmetic errors in the Bidder's bid (if any), or
(c) If the Successful Bidder fails to sign the contract agreement with the Employer with in the prescribed period, or
(d) If the Successful Bidder fails to furnish the Performance with in the stipulated time.

2.7.4 The technically unqualified bidders would be informed regarding their non qualification, and thereafter EMD, price bid (Financial proposal) would be returned unopened after the evaluation of the financial proposal and signing the contract agreement with the successful bidder.

2.8 BID PRICES

2.8.1 Bidder shall give the pricing as individual and as a total composite price inclusive of all levies & taxes i.e. Sales Tax, Octroi, Entry Tax, Custom/ Excise Duty Packing, Forwarding, Freight, Insurance etc. except service tax. Client shall reimburse only service tax.

2.8.2 Custom/Excise duty exemption will be as per the applicable provisions of relevant act. Octroi / Entry tax will be as applicable. For these taxes the bidder may find out themselves the applicable exemptions and quote accordingly. The Employer would not be liable to pay them later as these taxes are supposed to be taken in to account by the bidder in the bid.

2.8.3 If any or all of the information asked in the Section-6 are not available in the Financial Proposal, the bid is liable for rejection.

2.9 DISCOUNTS

The Bidders are informed that discount, if any, should be indicated separately at part-I and part-II of section 6.

2.10 BID VALIDITY

The bids shall remain valid for a period up to and including the date 120 (one hundred and twenty) days from the last date of submission of bids.

2.11 SUBMISSION OF PROPOSALS

All the proposals will have to be submitted through **e-portal and in HARD BOUND** (Hard bound implies such binding between two covers through stitching or otherwise whereby it may not be possible to replace any paper without disturbing the document) form with all pages sequentially numbered either at the top or at the bottom right hand corner of each page eg. by writing page 1 of 10 on page 1, if total pages are 10. It should also have an index giving page wise information of above documents. Incomplete proposal or those received without hard bound will summarily be rejected.

The Bidders are required to fill up and submit the Section 6 documents with their proposals. Clause-by-clause compliance should be provided against the technical specifications of the equipment mentioned in Section 6.

The proposals shall be submitted in two parts, viz.,

Envelope-1: Containing application fee of Rs. 25,000 (Rupees Five Thousand only) if a Bid document has been downloaded from the Ministry's website and an EMD as prescribed in the tender document in section 2.7.1. The envelope should be superscribed as **"Envelope 1 – EMD / Application Fee for Collection of bridge condition and bridge inventory data for**

the State of …….under ….. Regional Office" at the top left corner.

Envelope-2: Pre-qualification Proposal and Technical Proposal superscribed as **"Envelope 2 – Pre-qualification and Technical Proposal for Collection of bridge condition and bridge inventory data Bid for the State of …….under …….Regional Office"** (Containing duly signed PRE-QUALIFICATION PROPOSAL SUBMISSION FORM as prescribed in Section-6, Other required Prequalification documents, all technical literature, brochures etc.). In the technical proposal, there should not be any indication about the prices (printed or otherwise) of any of the products offered.

Financial Proposal through e-bid containing only the Section-6 – Price Schedule superscribed as **"Financial Proposal for Collection of bridge condition and bridge inventory data for the States of …….under …..Regional Office"**

Note: Financial Bid should only be submitted through e-portal only.

All the sealed envelopes should again be placed in a sealed cover super scribed as **"Collection of bridge condition and bridge inventory data Bid from: M/s _____)"** **"NOT TO BE OPENED BEFORE ……,** which should be received in the office of respective the Chief Engineers (B) S&R, Transport Bhawan up to ……[*Insert last date of physical submission of Technical Bid*] at 1500 Hrs.

Any individual(s) signing the bid or other documents connected therewith should specify whether he is signing the offer as Chief Executive of a single firm / agency / institution making the offer, Lead partner of the consortium of firm / agency / institution making the offer, a Director, Manager or Secretary in case of the authority conferred by Memorandum of Association.

The power of attorney should be executed separately by each member of JV/ consortium authorizing the individual to sign the bid document on behalf of JV/ consortium

2.11.1 In the case of a firm not registered under the Indian Partnership Act, all the partners or the attorney duly authorized by all of them should sign the bid and all other connected documents. The original power of attorney or other documents empowering the individual or individuals to sign should be furnished to the Employer for verification, if required.

2.11.2 The consultant shall submit, a copy of original document defining constitution or legal status, place of registration, principal place of business

and power of attorney along with the proposal. In case of a company, Memorandum of Association and Article of Association, Name of directors and share holders may also be furnished.

2.11.3 The Bids and all correspondence and documents relating to the bids, shall be written in the English language.

2.12 LATE BIDS

Any bid received by the Employer after the time and date for receipt of bids prescribed by the Employer in the tender as per Section-2.11 may be rejected and returned unopened to the Bidder.

2.13 MODIFICATION AND WITHDRAWAL OF BIDS

2.13.1 The Bidder is allowed to modify or withdraw its submitted bid at any time prior to the last date prescribed for receipt of bids, by giving a written notice to the Employer.

2.13.2 Subsequent to the last date for receipt of bids, no modification/withdrawal of bids shall be allowed.

2.13.3 The Bidders cannot withdraw the bid in the interval between the last date for receipt of bids and the expiry of the bid validity period specified in the Bid. Such withdrawal may result in the forfeiture of its EMD from the Bidder.

2.14 LOCAL CONDITIONS

2.14.1.1 Each Bidder is expected to visit and examine the sites / its surroundings for getting fully acquainted with the local conditions & factors and to obtain all information, which would have any effect on the execution / performance of the contract and / or the cost for preparing the bid, at their own interest and cost. The Employer shall not entertain any request for clarification from the Bidder regarding such local conditions.

2.14.1.2 The Bidder and any of their employees/agents/subconsultants will be granted permission by the Employer to enter upon its premises and lands for the purpose of such inspection, but only upon the express condition that the Bidder and any of their employees/agents/subconsultants will be responsible for any personal injury (whether fatal or otherwise), loss of or damage to life, property and other loss damage, costs and expenses however caused, which, but for the exercise of such permission would not have arisen.

2.14.1.3 It is the Bidder’s responsibility that such factors have properly been investigated and considered while submitting the bid proposals and no claim whatsoever including those for financial adjustment to the contract awarded under the bidding documents will be entertained by the Employer. Neither any change in the time schedule of the contract nor any financial adjustments arising thereof shall be permitted by the Employer on account of failure of the Bidder to know the local laws / conditions.

2.14.1.4 The site related information furnished by EMPLOYER in this Bid Document is only indicative. The bidders are advised to undertake site visits and make their own assessment as to the correctness of the information. Requests for price revision after bid opening on account of inaccuracies in information given by EMPLOYER shall not be entertained at any stage

2.15 CONTACTING THE EMPLOYER

Any effort by a Bidder influencing the Employer's bid evaluation, bid comparison or contract award decisions may result in the rejection of the bid.

2.16 ELIGIBILITY/ PRE-QUALIFICATION CRITERIA

2.16.1 A consultant is allowed to submit only one bid for a package. Alternative proposals i.e. one as sole or in JV with other consultant and another in JV with any other consultant for the same package will be summarily rejected. In such cases, all the involved proposals shall be rejected.

2.16.1.1 A consultant can bid for more than one package by submitting separate application document along with application fee and EMB for each package. A consultant can bid for more than one package with same/common/different team for each package. If the consultant has applied for more than one packages with same/common team, only one package will be award to the consultant with that team based on the sequence of opening indicated in the RFP document. For avoidance of doubt, it is to make clear that, after one package is awarded, the subsequent packages with same/common team will not be opened. Upto two number of packages will be awarded to consultant with different team for each package. However, if the CV of same Key Personnel is submitted by more than one consultant, zero marks shall be given for such CV. The financial proposal for different packages will be opened on e-tendering mode in the ascending order of package Number indicated in section 1 of RFP document. The packages will be awarded to the consultant on the basis of sequence of opening and award principle will be as under:

i. One consultant individually or as JV will get maximum of two Packages
ii. Once a consultant individually or as JV gets two packages based on the sequence of opening , their financial bids for remaining packages will not be opened.

If a bidder comes successful bidder, all the team key personals will called for interview. The LOA will be issued only after getting satisfied with the key personals.

2.16.1.2 If the consultant submits bids as sole applicant in one package and in JV with other consultant with same team of key personnel/common key personnel in another package, both bids shall be summarily rejected.

2.16.1.3 Bidders that meet **ALL** of the following pre-qualification criteria need only apply.

(i) The bidder should have average annual turnover over above Indian Rs. 3**.00 crore** in the last three financial years (for currencies other than Indian Rupees, the applicable conversion [selling] rate of Reserve Bank of India on the last date of bid submission shall apply). Documentary proof in the form of a Certificate from the statutory auditor/charted accountant of the Bidder's company strictly as per the format specified in Section 6 duly signed and stamped by the statutory auditor/charted accountant needs to be submitted as proof for the above. Any declaration or letter from the Bidder in any other format will not be accepted.

(ii) The bidder solely or as lead partner of JV must have successfully collected bridge data related to condition survey and/or inventorization of bridges separately or as part of preparation of feasibility / detailed project reports for at least 2 projects during the last 5 years**.** The bidder shall furnish contact particulars of the relevant Officers of these agencies to enable EMPLOYER to verify the claim of the bidder. The bidder should also furnish the following;

(a) Forms strictly as per format provided in Section – 6.

(b) Successful completion certificate mentioning start and end date of the work duly signed by the client organization's project in-charge / any equivalent officer / the authorized signatory.

(c) Copies of work orders / contracts from the client stating the project title, project value and the brief scope of work of the project.

(iii) The consultant must be empanelled in the category II or III of Ministry's list.

2.16.2 Each bidder should further demonstrate availability of key personnel with adequate experience as required; as per clause 2.17.5.

2.16.3 **Bids submitted by a Joint Venture or Consortium shall meet the following:**

2.16.3.1 The Registered JV Agreement should legally bind on all partners/members.

2.16.3.2 Consortium or Joint venture allowed (maximum 2 partners). One of the members/partners shall be nominated by the JV/Consortium as being incharge, and this authorization shall be evidenced by submitting a Power of Attorney signed by legally authorized signatories of each member/partner.

2.16.3.3 The partner in-charge shall be authorized to incur liabilities and receive instructions for an on behalf of any and all partners of the Joint Venture/ Consortium during the entire execution of the Contract.

2.16.3.4 All partners of the Joint Venture/Consortium shall be liable jointly and severally for the execution of the contract in accordance with the Contract terms, and a statement to this effect shall be included in the Agreement (in case of successful bidder).

2.16.3.5 The joint-venture/consortium agreement shall indicate precisely the responsibility of all members in respect of planning, design construction equipment, key personnel, work execution and financing of the project. All the members should have active participation during the currency of the contract. This shall not be varied/ modified subsequently without prior approval of the Employer.

2.16.3.6 Copy of the agreement entered into by the partners shall be submitted with the Bid.

2.16.3.7 In case of a joint venture the minor partner must have executed at least one project in the relevant field. Manufacturer or authorized supplier of MBIU or similar bridge inspection unit can also be a minor partner. In that case atleast the lead partner must have executed two projects in the relevant field.

2.16.3.8 For calculation of annual average turnover, annual turnover of each partner in proportion to their JV participation will be evaluated. However, each partner should have minimum average turnover of Rs. 0.25 crore in the last three financial years.

2.17 EVALUATION

2.17.1 Any time during the process of evaluation, the Employer may seek for clarifications from any or all Bidders.

2.17.2 **Evaluation procedure**

Stage-1(a): Responsiveness w.r.t. Application Fee & EMD:

First, the envelope containing Application fee (in case of Bid Document downloaded from MORT&H's web site) and Earnest Money Deposit will be opened and if both are found furnished by the Bidders in the prescribed manner as mentioned in para 2.7.1, then the second envelope containing Pre-Qualification & Technical Proposal documents shall be opened. At any stage during the evaluation, if the EMD is found invalid, the respective Bidder's bid will be summarily rejected.

Stage-1(b): Technical Proposal Evaluation:

The Bidder shall have to fulfill all the Pre-qualification Criteria as specified in para 2.16.1.3, in totality and submit all the required documents that relate to

the Pre-qualification Criteria terms and conditions. These documents will be scrutinized along with the Technical Proposal in this phase of evaluation. Those bidders who do not fulfill the terms and conditions of Pre-qualification Criteria as specified in this tender or whose Technical Proposal is non-responsive will not be eligible for further Financial Proposals Evaluation. Technical Proposals of the Bidders would be evaluated for the clause-by-clause compliance of the technical specifications as mentioned in the Bid document. Evaluation of Pre-qualification and Technical Proposal by MORT&H shall not be questioned by any of the Bidders. The Employer reserves the right to ask for a technical elaboration/clarification in the form of a technical presentation from the Bidder on the already submitted Technical Proposal at any point of time before opening of the Financial Proposal. Finally bidders would be evaluated for technical competence using the marking system as in 2.17.3 and only those bidders who score $\geq$ 75% marks shall qualify for Financial bid opening. Decision of Authorities in the technical evaluation shall be taken as FINAL and no questions shall be entertained in this regard.

Stage-2: Financial Proposal Evaluation:

The financial Bids submitted on e-portal will be open for short list-qualified firms, which can be seen on the computers of the firms. The Price Bids of only the qualifying firms who are short-listed in Stage-I will be evaluated. The date of opening shall be intimated to the qualified bidders at the appropriate time. The unqualified bidders would be informed regarding their non qualification alongwith the reason electronically and thereafter their price bid (Financial proposal) will not be opened. The financial proposal shall be excluding service tax which will be payable after the consultant submits the proof of deposit of service tax. The Financial Proposal Evaluation will be based on the total payouts including all other taxes, duties and levies for Collection of bridge condition and bridge inventory data under each Regional Office of the Ministry for a period of five years as per financial proposal. The financial evaluation is as under:

(i) The bids for different packages will be opened on e-tendering mode in ascending order of package number, as indicated in Section 1 of the RFP document. as per the sequence of packages indicated in Section 1 of RFP document.

(ii) The Evaluation Committee will determine whether the submitted Financial Proposal is complete (i.e. whether they have included cost of all items of the corresponding proposals; if not, then the cost towards such missing items will be considered as NIL, but the Consultant shall, however, be required to carry out such obligations without any additional compensation.) and without computational error. In case under such circumstances, if Client feels that the work cannot be carried out within the overall cost as per the submitted financial proposal, such proposals shall be considered non responsive.

(iii) The lowest financial proposal (F_M) will be given a financial score (S_F) of 100 points. The financial scores of other proposals will be computed as follows:

$S_F = 100 \times F_M/F$ (F= amount of financial proposal)

(iv) Proposals will finally be ranked according to their combined technical (S_T) and financial (S_F) scores as follows:

$S = S_T \times Tw + S_F \times Fw$

Where S is the combined score, and Tw and Fw are weights assigned to Technical Proposal and Financial Proposal, that shall be 0.80 and 0.20 respectively.

(v) The selected Consultant shall be the first Ranked Applicant (H-1, having the highest combined score). The second ranked applicant (H-2) shall be kept in reserve and may be invited for negotiation in case the first ranked Applicants withdraws, or fails to comply the requirements specified in this document. In the event the proposals of two or more consultants have the same scores in the final ranking, the proposal with the highest technical score should be ranked first.

(vi) If any consultant is H-1 bidder in more than two packages, based on sequence of opening, upto two number of packages will be awarded to the consultant in the order of sequence of the financial proposal and remaining financial proposals of the consultant, if any will not be opened.

(vii) In case H1 applicant withdraws or fails to comply the requirements specified in this document, H2 may be called for negotiation and in case he matches the rates with H1 or at his rates, whichever is lower, the work will be awarded to H2 bidder.

2.17.3 **Evaluation of technical bid shall be done based on the following**:

Sl. No	**Evaluation Criteria**	**Max. Marks**
1	Past experience of firm or Institution in collection of bridge data related to condition survey and/or inventorization separately or as part of preparation of feasibility / detailed project reports.	25
2	Past experience of firm in collecting bridge related data with Mobile Bridge Inspection unit/similar equipment.	5
3	Key Personnel	55
4	Methodology & Work Plan	10
5	Structure and Organization	5
	TOTAL	100

Only bids securing $\geq$ 75% marks shall qualify for further consideration. *Bidders shall fill up all formats as given in Section –6*

2.17.4 The marking criteria will be based on the following:

1. Past experience of consultant in collecting bridge data related to condition survey and/or inventorization separately or as part of

preparation of feasibility / detailed project reports as per clause 2.17.3(1) in following preference in last 5 years. Maximum marks in 2.17.4.(1) will be limited to 25.

a) On bridges with overall length greater than 60m with at least one span length greater than 40m	- 5 marks/assignment, max of 25 marks
b) On bridges with overall length greater than 60m with any span length (other than bridges mentioned under sub item (a) above)	- 4 marks/assignment, max of 20 marks
c) On any other bridge (other than bridges mentioned under sub item (a)and (b) above)	- 3 mark/ assignment, max of 15 marks

2. Past experience of Consultant in collecting bridge related data with Mobile Bridge Inspection Unit/similar equipment in last 5 years Subjected to satisfactory certificate from client as per clause 2.17.3(2).

Past experience of firm in collecting bridge condition/inventory data using Mobile Bridge Inspection Unit/similar equipment.	1 mark/ assignment, max of 5 marks.

3. Key Personnel will be evaluated as per clause 2.17.5

4. Methodology & Work Plan- Maimum 10 marks: The marks will be provided on the basis of quality of approach and the methodology, work program and manning schedule proposed.

5. Structure and Organization- Maximum 5 marks:-

Sl.No.	Formation of company	Marks
1	5 years before date of NIT	5
2	3 to 5 year before date of NIT	2

The bidders are advised in their own interest to frame the technical proposal in an objective manner as far as possible so that these could be properly assessed in respect of points to be given as part of evaluation criteria.

2.17.5 List of key personnel to be deployed on contract work

Sl. No.	Personnel	Essential Qualification	Number
1	Team Leader cum Senior Bridge Engineer	BE/BTech Civil +15 years' professional experience	1
2	Bridge Engineer	BE/BTech Civil +10 years' professional experience	1
3	Assistant Engineer (Civil)	BE/BTech Civil or Diploma in Civil +3 years' professional experience	3
4	Data Entry Operator	Graduate + 1 years' experience in work of similar nature	2
		Total	**7**

2.17.5.1 Qualification and competence of following professional/sub-professional staff for the assignment shall only be evaluated. The weightage for various key staff are as under:-

S. No	Staff Position	Marks
1	Team Leader cum Senior Bridge Engineer- 1 Number	20
2	Bridge Engineer- 1 Number	15
3	Assistant Engineer (Civil) -3 Numbers	18
4	Data Entry Operator- 2 Numbers	2
	Total	55

2.17.5.2 Sub criteria for qualification of key Personnel (i.e. Professional staff)

S. No	Qualification	Marks (%)
1	General qualifications	25
2	Adequacy for the project	70
3	Employment with the firm	5
	Total	**100**

2.17.5.2.1 Sub Criteria for General Qualification-:

S. No	Qualification	Marks
1	Educational Qualification	10
2	Professional Experience	10
3	Training, publication etc.	5
	Total	**25**

2.17.5.2.1.1 Sub Criteria for Educational Qualification- Maximum 10 Marks.:-

S. No	Staff Position	Qualification	Marks
1	Team Leader cum Senior	BE/BTech in Civil	8

	Bridge Engineer	Engineering	
		MTech/ME in Structural Engineering or equivalent	+2
2	Bridge Engineer	BE/BTech in Civil Engineering	8
		MTech/ME in Structural Engineering or equivalent	+2
3	Assistant Engineer (Civil)	BE/BTech in Civil Engineering	10
		Diploma in Civil Engineering	6
4	Data Entry Operator	Graduation	8
		Certificate course in computer	+2

2.17.5.2.1.2 Sub Criteria for Professional Experience - Maximum 10 Marks.:-

S. No	Staff Position	Experience	Marks
1	Team Leader cum Senior Bridge Engineer	More than 20 year professional experience	10
		Between 15 to 20 year professional experience	8
2	Bridge Engineer	More than 15 year professional experience	10
		Between 10 to 15 year professional experience	8
3	Assistant Engineer (Civil)	BE/BTech holder with More than 2 year professional experience or Diploma holder with more than 5 year professional experience	10
		BE/BTech holder with less than 2 year professional experience or Diploma holder between 3 to 5 year professional	8

		experience	
4	Data Entry Operator	More than 3 year experience	10
		Between 1 to 3 year experience	8

2.17.5.2.1.3 Sub Criteria for Training, publication etc.- Maximum 5 Marks.:-

Key professional who has undergone training in the relevant filed or whose technical; article has been published will be given 5 marks.

2.17.5.2.2 Sub Criteria for Adequacy for the project- Maximum 70 marks:-

S. No	Staff Position	Experience	Marks
1	Team Leader cum Senior Bridge Engineer	(i)Experience in specific positions in similar projects	15marks/assignment, maximum 30 marks.
		(ii)Experience relevant to particular assignment, not included in (i) above	10marks/assignment, maximum 40 marks
2	Bridge Engineer	(i)Experience in specific positions in similar projects	15marks/assignment, maximum 30 marks.
		(ii)Experience relevant to particular assignment, not included in (i) above	10marks/assignment, maximum 40 marks
3	Assistant Engineer (Civil)	(i)Experience in specific positions in similar projects	15marks/assignment, maximum 30 marks.
		(ii)Experience relevant to particular assignment, not included in (i) above	10marks/assignment, maximum 40 marks
4	Data Entry Operator	(i)Experience in specific positions in similar projects	15marks/assignment, maximum 30 marks.
		(ii)Experience	10marks/assignment,

		relevant to particular assignment, not included in (i) above	maximum 40 marks

2.17.5.2.3 Sub Criteria for Employment with the firm –maximum 5 marks-:

S. No	Criteria	Marks
1	Employed for more than 3 years	5
2	Employed for 1 to 3 years	3
3	Employed for less than one year	1

2.18 NOTICES

Any notice to be served under this contract shall be deemed to be validly served if sent by registered post, speed post or fax to the Consultant's registered office herein before mentioned or in respect of the Employer, to the Superintending Engineer, of the Concerned Regional Office, Ministry of Road Transport & Highways as the case may be. Any notice so posted shall be prima-facie proof of serving at the expiration of the time within which in the normal course of posting, it would have reached the address to which it was sent.

2.19 MISCELLANEOUS

a. The contract or any interest there under shall not be assignable to any third party by the consultant unless such assignment is mutually agreed to in writing by both the Employer and the consultant.
b. No modification to the Contract document shall be binding unless it is in writing and signed by both the parties to the Contract.
c. The terms and conditions in the Bidding document and the bids submitted and accepted constitute the entire Contract Agreement between the parties. Signed contract agreement shall supersede previous communications, representations or agreements either oral or written between the parties with respect to the subject matter of the Contract Agreement and no agreement or understanding varying or extending the Contract Agreement shall be binding on either the Employer or the Consultant. Contract shall have to be executed in writing and signed by duly authorized officers or representatives of both the parties.
d. All the provisions of the contract agreement shall be harmoniously construed. In case of variation between certain points in the Tender document and the attached specifications / requirements for the inspection and acceptance of the system, the provision contained in Contract Agreement shall have and over riding effect.

e. The contract shall be concluded in good faith and shall be kept confidential by both the contracting parties.
f. The headings of Clauses are for the purposes of reference only and shall have no effect on the meaning or substances of any clause of the contract.
g. Any further modifications/improvements in the system desired by the Employer shall be carried out by the consultant on mutually agreed terms.
h. The contract shall be governed, interpreted and executed according to the Indian Law.
i. The complete tender document comprising page 1 to page 46 forms the "Accepted Tender" (AT). The authorized signatory of the consultant i.e. the firm is supposed to initial every page of the AT with complete signatures at places where the representatives of the Employer has signed to acknowledge the acceptance of AT within one week failing which it will deemed as accepted by the consultant. The number of this AT would be quoted in all future correspondence.

2.20 COMING INTO FORCE

After submission of performance Guarantee, the contract will be signed the contract shall come into force with effect from the date of its signing contract agreement by both the contracting parties. The contract agreement will be operated by the Authorized Representative of Director General (Road Development) & Special Secretary, Ministry of Road Transport & Highways, New Delhi (India) on behalf of the President of India.

2.21 After signing of contract the Employer will be issuing letter to proceed to the consultant. The consultant shall start the work within 28 days from letter to proceed, failing which a penalty @0.001% per month will be imposed on the consultant.

2.22 FORCE MAJEURE

a. If either party is temporarily unable by reason of force majeure or the laws or regulations of India to meet any of its obligations under the contract, and if such party gives to the other party written notice of the event within fourteen (14) days after its occurrence, such obligations of the party as it is unable to perform by reason of the event shall be suspended for as long as the inability continues.

b. Neither party shall be liable to the other party for loss or damage sustained by such other party arising form any event referred to in above mentioned section or delays arising from such event.

c. The term ‘force majeure’ as employed herein shall mean acts of God, strikes, lock outs or other industrial disturbances, acts of the public enemy, wars, blockades, insurrection riots, epidemics, landslides,

earthquakes, storms, lightning, floods, washouts, civil disturbances, explosions, and any other similar events, not within the control of either party and which by the exercise of due diligence neither party is able to overcome.

2.23 ADDRESS AND COMMUNICATION

a. All communications to the Employer are to be addressed to the Superintending Engineer, of the Regional Office……[*Insert location name*], Ministry of Road Transport & Highways, (India)

b. All communications to the consultant are to be addressed to

(to be filled by the consultant at the time of bidding)

SECTION 3

3.0 GENERAL (FINANCIAL AND LEGAL) CONDITIONS OF THE CONTRACT

3.1 GENERAL

3.1.1 The consultant will bear all the cost relating to deployment & operation & maintenance of MBIU or similar machine. The Consultant will procure/hire all necessary equipment/machine required for collection of bridge condition and bridge inventory data for a period of five years. No separate charges shall be paid for visit of engineers or attending to faults and repairs or supply of spare parts.

3.2 PAYMENT TERMS

3.2.1. Payments will be made in **Indian Rupees only**

3.2.2 Payments shall be adjusted for deductions for advance payments, security deposit, other recoveries in terms of the Contract and taxes at source, as applicable under the law.

3.2.3 **ADVANCE PAYMENT**

3.2.3.1 The Employer will make the advance payment to the Consultant against provision by the Consultant of an Unconditional Bank Guarantee from a Commercial bank acceptable to the Employer in amounts equal to 110% of the advance payment, up to 10% of Contract Value. The guarantee shall remain effective until the advance payment including interest has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Consultant.

3.2.3.2 The Consultant is to use the advance payment only to pay for procurement/hiring of Equipment/ Mobilization expenses required specifically for the Work. The Consultant shall demonstrate the advance payment has been used in this way by supplying copies of invoices or other documents.

3.2.3.3 The advance payment shall be repaid with interest @ SBI PLR+ 2% applicable on the date of release of mobilization advance by deducting from payments otherwise due to the Consultant.

3.2.3.4 The mobilization advance with interest will be recovered in two installments from second & third running bill. In any case, the mobilization advance with interest must be recovered within a year from the date of agreement. No account shall be taken of the advance payment or its repayment in assessing valuations of work.

3.2.4 PAYMENT SCHEDULE

Payments will be made within 30 days of successful submission of desired half yearly summary on the Bridge Condition/Inventory Survey, to the Superintending Engineer of the Regional Office at …….. as per following payment schedule:

RA Bill No.	Deliverable	Payment (% of Contract Price)
1	On bringing MBIU at site	10%
2	First half yearly report for 1st year on submission of Condition Survey Report for complete bridges.	15%
3	Second half yearly report for 1st year	15%
4	First half yearly report for 2nd year	7.5%
5	Second half yearly report for 2nd year	7.5%
6	First half yearly report for 3rd year	7.5%
7	Second half yearly report for 3rd year	7.5%
8	First half yearly report for 4th year	7.5%
9	Second half yearly report for 4th year	7.5%
10	First half yearly report for 5th year	7.5%
11	Second half yearly report for 5th year	7.5%

3.2.5 The part payment can be allowed, if the consultant submits report for some Bridges, on pro-rata basis.

3.3 PRICES

3.3.1 The rates and prices quoted by the bidder shall be fixed for the duration of the contract and shall not be subjected to any adjustment.

3.3.2 Bidder shall give the pricing as individual and as a total composite price inclusive of all levies & taxes i.e. Sales Tax, Octroi, Entry Tax, Custom/ Excise Duty Packing, Forwarding, Freight, Insurance etc. except service tax. Client shall reimburse only service tax.

3.3.3 Custom/Excise duty exemption will be as per the applicable provisions of relevant act. Octroi / Entry tax will be as applicable. For these taxes the bidder may find out themselves the applicable exemptions and quote accordingly. The Employer would not be liable to pay them later as these taxes are supposed to be taken in to account by the bidder in the bid.

3.4 EMPLOYER'S RIGHTS

3.4.1 The Employer reserves the right to make changes within the scope of the Contract Agreement at any point of time.

3.4.2 The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids, at any time prior to award of contract without assigning any reason whatsoever and without thereby incurring any liability to the affected bidder or bidders on the grounds of Employer's action.

3.5 SUBCONTRACTING BY THE BIDDER

3.5.1 If sub contracting for specialized work, is required, the Successful Bidder will take prior permission from MORT&H. Under all circumstances, the value of works sub-contracted by Successful Bidder should not exceed 25% of the Contract Price. The Bidder is required to provide the details of the activities that it proposes to subcontract to third parties as per format given in Section – 6.

3.5.2 In any case, the Successful Bidder shall be solely responsible to ensure compliance of all obligations under the contract.

3.5.3 Changes in a Firm

(i) Where the consultant is a partnership Firm, partners shall not be changed in the Firm except with the previous consent in writing of the Director General (Road Development) & Special Secretary, MORT&H, [DG (RD)&SS], which may be granted only on a written undertaking by the all (old/new) partners to perform the contract and accept all liabilities incurred by the firm under the contract prior to the date of such undertaking.

(ii) On the death of any partner of the consultant firm before complete performance of the contract, the DG(RD) & SS may, at the option of the consultant, cancel the contract, and in such case the consultant shall have no claim whatsoever to compensation against the Employer.

(iii) If the contract is not determined as provided in sub-clause (ii) above, notwithstanding the retirement of a partner from the Firm, he shall continue to be liable under the contract for acts of the Firm until a copy of the public notice given by him under section 32 of the Partnership Act has been sent by him to the DG (RD) & SS by registered post acknowledgement due.

3.6 STANDARDS GOVERNING THE TENDER

Wherever applicable, the standards published by following recognized bodies shall be applicable for equipment, if any to be supplied under this contract.

(i) Bureau of Indian Standards (BIS)

(ii) International Standards Organisation (ISO)

3.7 DELAYS IN COLLECTION OF DATA AND PROVIDING TECHNICAL SUPPORT / STAFF / TEAM LEADER

Should any of the said services / personnel not be executed / provided during the contract period, the Employer shall in respect of any delays, have the right to claim and deduct from the payments due affected by such delay as agreed, liquidated damages in respect of such said services / personnel for the sum of 1% of the contract price of the unexecuted portion of the anticipated services / personnel for each and every week or part of a week subject to a maximum of 10% of the contract price for delayed services / personnel. Should the said delay in respect of execution of the said services / personnel exceed two and a half months, the Employer shall have the right to terminate this contract fully, or in so far as it relates to the services / personnel which are subject matter of such delay, by sending written notice to that effect to the Consultant, in which case the furnished performance Bank Guarantee will be revoked.

However, if the completion of service is delayed due to the reasons beyond the control of the consultant as mentioned in clause 2.21, suitable extension may be granted by the Chief Engineer (B) SR&T of MoRT&H on receipt of express request along with full justification. In case of grant of any time extension, the consultant upon advice shall also suitably extend the validity of the Bank Guarantee. It is made explicitly clear that the payment of penalty shall not relieve the consultant from the obligations and liabilities under the contract agreement.

The Employer is also entitled to cancel the contract either in whole or in part, if the consultant fails to redo the rejected data of inventory and condition survey within one month from the date of its notification, in which case the furnished performance Bank Guarantee will be revoked.

3.8 LAWS GOVERNING THE CONTRACT

(a) This contract shall be governed by the laws of India for the time being in force.
(b) Irrespective of the place of installation, the place of performance or place of payment under the contract, the contract shall be deemed to have been made at the place from which the acceptance of tender has been issued.
(c) Jurisdiction of courts: The courts of the place from where the acceptance of tender has been issued shall alone have jurisdiction to decide any dispute arising out of or in respect of the contract.

3.9 CONSEQUENCE OF BREACH

The decision of the DG (RD) & SS, as to any matter or thing concerning or arising out of the consultant or any partner of the consultant firm has committed a breach of any of the conditions of the contract, shall be final and binding on the consultant.

Should the consultant or a partner in the consultant firm commit breach of either of the conditions of the contract, it shall be lawful for the DG (RD) & SS to cancel the contract, and award the contract to another consultant, at the risk and cost of the consultant.

3.10 RIGHT OF ACCEPTANCE OF OFFER

The Employer reserves the right to accept partly or reject any offer without assigning any reason thereof. The Employer does not pledge itself to accept the lowest or any other tender and reserves to itself the right of acceptance of the whole or any part of the tender or portion of the quantity offered and the consultant shall supply the same at the rate quoted.

3.11 BANKRUPTCY

If the consultant commits any act of bankruptcy or goes into liquidation or shall commence winding up by reasons of its insolvency or shall make an assignment for the benefit of creditor or goes into liquidation, this agreement may be terminated wholly or in part by the Employer and amount paid in advance if any received by the consultant shall become due to the Employer including interest.

4. SPECIAL CONDITIONS OF THE CONTRACT

4.1 DEFINITION

These conditions given in this Section 4, supplement the “Instructions to the Bidders” given in Section 2 & "General (Financial and Legal) Conditions of the Contract" given in Section 3 and in case of any conflict, the conditions given herein shall prevail over those in Sections 2 and 3.

4.2 EQUIPMENT

4.2.1 Equipment / system ,if any to be procured/hired by the Consultant shall conform to the relevant technical requirements necessary for execution of the contract.

4.2.2 Bidders have to give clause-by-clause compliance to the clauses mentioned in Section 5 of this document along with reference to documentary support, giving the Page / Para number of the document. The clauses for which the compliances are required to be provided by the Bidders are given in the Section-6.

.4.2.3 The cost of all data and / or analysis shall be fully borne by the consultant. Material put up for inspection shall be those to be supplied and in quantities laid down in the Schedule of Quantities. Any variation shall require the prior approval of the Employer before the material is manufactured/ offered for inspection.

4.2.4 The Employer shall inspect and re-check the data at all stages and shall have full powers to reject all or any data that may be considered defective or inferior in quality. The Consultant shall carry out any additional collection of data at his cost as are necessary in the opinion of the Employer.

4.2.5 All material/equipment brought to site shall be permitted to be erected/utilized only after initial inspection / acceptance by the Employer.

4.2.6 The completed installation at all stages shall be subjected to checks and tests as decided by Employer. The consultant shall be liable to remedy all of such defects as discovered during these checks and tests and make good all deficiencies brought out.

4.2.7 The consultant shall advise the Employer at least 15 days in advance for inspection when any equipment or a portion of the work is offered for inspection. The Employer shall carry out inspection upon receipt of such advice.

4.3 PERFORMANCE AND SPARES

Consultant shall maintain sufficient spares for equipments utilized for conducting Bridge Inventory and Condition Survey by him for the satisfactory performance of the Contract.

4.4 INSURANCE

4.4.1 All insurances (e.g. all risk insurance including transit, fire, theft etc., third party insurance, workmen's compensation insurance etc.) are the responsibility of the Bidder. The equipments utilized by the Consultant under the contract shall be fully insured by the Bidder against any kind of loss or damage incidental to manufacture or acquisition, transportation, storage, delivery and installation. The period of insurance shall be from the date of commissioning of products/equipment at each site till the completion of contract period.

4.4.2 The consultant shall cause all its workmen and the workmen of any sub consultants of the Consultant to be covered by workmen's compensation insurance in accordance with applicable laws. The consultant agrees that the Employer shall not be liable for any damages or compensation payable to any workman or other person in the employment of the Consultant.

4.4.3 The Consultant hereby undertakes:

(a) adequate all-risks insurance in respect of all the equipment and
(b) any additional insurance required by law in respect of the Contract Works and the performance thereof by the Consultant, including in respect of motor vehicles used by the Consultant in relation thereto.
(c) any other insurance sufficient to provide adequate coverage for those types of risk which are reasonably foreseeable in the performance of the Contract Works.

4.5 ARBITRATION

(a) In the event of any question, dispute or difference arising under general conditions or special conditions of contract, or in connection with this contract (except as to any matters the decision of which is specially provided for by the general or the special conditions), the same shall be referred to the sole arbitrator, appointed by the Indian Road Congress (IRC). The arbitrator will be a retired Government Servant of Chief Engineer Level. The 'Award' of the arbitrator shall be final and binding on the parties to this contract.
(b) In the event of the Arbitrator's dying, neglecting or refusing to act or resign or being unable to act for any reason, or his Award being set aside by the Court for any reason, it shall be lawful for the IRC to appoint

another arbitrator in place of the outgoing arbitrator in the manner aforesaid.

(c) It is further a term of this contract that no person, other than the person appointed by the IRC as aforesaid, should act as arbitrator and that, if for any reason that is not possible, the matter is not to be referred to Arbitration at all.

(d) The arbitrator may, from time to time with the consent of all the parties to the contract, extend the time for making the Award.

(e) Upon every and any such reference, the assessment of the costs incidental to the reference and Award, respectively, shall be at the discretion of the arbitrator.

(f) Subject as aforesaid, the Arbitration Act, 1996 as amended and the rules there under and any statutory modification thereof for the time being in force shall be deemed to apply to the Arbitration proceedings under this clause.

(g) If the value of the claim in a reference exceeds Rs. 1 lakh, the arbitrator shall give reasoned Award.

(h) The venue of arbitration shall be the place from which formal Acceptance of Tender is issued or such other place as the DG(RD) & SS at his discretion may determine.

5. SCOPE OF WORK

Collection of bridge condition and bridge inventory data under each Regional Office of the Ministry for a period of five years.

5.1 METHOD OF WORK

5.1.1 The work shall be executed to the highest standards using state of art technologies. The consultant shall ensure that the entire bridge is inspected and data collected as per Annexure A & B. .

5.1.2 The complete operation and collection of data shall be subject to checks at all stages as prescribed in the bid or as deemed necessary by the Employer. Consultant shall be liable to rectify such defects in data as brought out by the Employer during these checks and verification and make good all deficiencies at his own cost.

5.1.3 The consultant shall establish an office in the city where concerned Regional office of MoRT&H is located, manned by senior personnel during the course of the data collection. The address of the office including the personnel manning it including their Telephone,& FAX numbers and e-mail address, will be intimated by the consultant to the Employer before commencement of the services.

5.2 DATA COLLECTION

5.2.1 The bridge condition data is to be collected twice in a year during “pre-monsoon” period and “post-monsoon” period for five years utilizing Mobile Bridge Inspection Unit/similar equipment. Formats for collection of bridge condition data are enclosed at **Annexure-A.** Bridge inventory data is to be collected during the first six months of the contract period utilizing Mobile Bridge Inspection Unit/similar equipment. Format for collection of bridge inventory data are enclosed at **Annexure-B.** Bridge Inventory and Condition data shall be collected from the entire NH network, except portion entrusted to NHAI or as per direction of Employer.

5.2.2 A team of minimum 3 personnel (Team Leader or Bridge Engineer with atleast two Assistant Engineers) shall travel with the MBIU/similar equipment for collection of bridge condition and bridge inventory data.

5.2.3 During the Inspection, if any bridge requires to be repaired, consultant shall report the same to the Employer within 15 days of Inspection.

5.2.4 Condition survey report and recommendation submitted by the consultant will be used as input for granting permission for movement of over-dimension and overweight vehicles(ODC/OWC) on the Bridges of National Highways, as per the circular issued vide Ministry letter No. RW-NH-35072/1/2010-S&R(B) dated 24-1-2013. Consultants are advised to go

through the circular before bidding. The above mentioned circular (clause 4.4) envisage that the applicant has to provide Route Survey Report Plan alongwith the Condition Survey Report for all the Bridges enroute. The consultant engaged in Bridge Condition Survey should have following responsibilities with respect to movement of OWC/ODC.

I. The consultant shall submit the Condition Survey Report along with the photographs and the recommendation regarding safe/unsafe for allowing the movement of ODC/OWC under consideration, as per IRC SP:18 or IRC SP:35 for all simply supported structure/bridges. The proforma for Condition Survey for ODC/OWC movement is at **Annexure-C**. Consultant has to submit the condition survey report as per Annexure C in addition to format enclosed at Annexure A.

II. For Longer spans and for Type of Structures not covered in the referred charts of the circular dated 24-01-2013, specific studies may be carried out on identical system, which shall form the basis of clearance for movement of OW/ODC.

III. The authorized representative of the consultant shall provide a notarized undertaking that the Condition Survey Report submitted by the consultant is as per actual and any deviation in report from actual condition of the bridge will be the sole responsibility of the consultant. Further, the consultant should also undertake that any deviation from actual condition viz a viz reported condition shall invite action against the consultant as deemed fit by the Ministry.

IV. The report shall also provide the detailed report on safety of the bearings of the bridges, in view of the proposed movement of ODC/OWCs.

V. The Consultant shall also submit the report on damage of Bridge if any within a month, just after the crossing of the ODC/OWC.

VI. In case the Condition Survey Report conceals any substantial information in respect of routes for which Condition Survey Report is submitted, the consultant may be debarred/black listed for a certain period and the same will be informed to Registrar of Companies.

5.3 SUBMISSION OF REPORTS

5.3.1 Consultant shall submit condition survey report and recommendation on load carrying capacity (GVW) for ODC/OWC movement , whenever sought by Ministry as per format- C and Ministry's circular dated 24.01.2013

5.3.2 Further reporting shall consist of the following:

1. Monthly summary reports are to be submitted by 05th of every month.
2. Half-yearly Summary Reports on pre-monsoon/post-monsoon survey.
3. Annual Summary Reports (every January for the previous calendar year).

5.3.3 Digital Photographs with date stamp and geographic coordinates, clearly showing the condition of the bridge shall be submitted along with each report.

5.3.4 Half-yearly summary report and annual summary report shall be submitted in 3 hard bound copies and 2 copies of the CDs.

5.3.5 Only Employer and the authorized representative will have the authority to see, print & study the reports.

5.3.6 Any modifications in the desired report shall be carried out by the consultant after written instructions from the Employer.

5.3.7 The consultant has to get the data loaded on Ministry's website in co-ordination with Employer and NIC official at Ministry's before release of payments.

5.3.8 The consultant will be highlighting the critical issue requiring immediate/urgent attention/action to the employer in his half yearly reports. If required consultant should intimate the rehabilitation requirement separately.

5.3.9 The consultant while inspecting the bridge should also carryout cleaning and greasing of Bearings, cleaning of expansion joint, drainage sprouts and weed out vegetation.

5.4 PREVENTIVE AND CORRECTIVE MAINTENANCE DURING THE CONTRACT PERIOD

5.4.1 During the contract period, the consultant shall inter alia:

(a) Diagnose and rectify equipments procured for the work.
(b) Repair and replace the faulty equipment or part thereof
(c) Carry out the periodic preventive maintenance.
(d) Ensure commitments as per Requirements.

5.4.2 The consultant shall prepare the schedule of preventive maintenance for each quarter and shall submit the same to the Employer in advance.

5.4.3 The consultant shall be solely responsible for the maintenance, repair of the equipments procured.

Section – 6

6.0 FORMATS TO BE USED FOR SUBMISSION OF PROPOSAL

6.1 FINANCIAL PROPOSAL SUBMISSION FORM

_____ (Location)
_____ (Date)

From

_____
_____
_____
_____
_____

To
The Chief Engineer(B) S&R
Ministry of Road Transport & Highways,
Transport Bhawan, New Delhi-110001

Subject: Collection of bridge condition and bridge inventory data using MBIU/similar equipment for a period of five years (Package No._____).

Ref.: Tender No. RW/

Dear Sir/Madam

We, the undersigned, offer to provide the services as required in the above referenced tender and our Proposal (Pre-Qualification, Technical and Financial). Our attached financial proposal for *Collection of bridge condition and bridge inventory data for a period of five years* is INR_____(Amount in words). This amount is inclusive of all taxes, duties etc.

Our Proposal is binding upon us and subject to the modifications resulting from contract negotiations, up to expiration of the validity period of the Proposal.

We undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely "Prevention of Corruption Act 1988".

We understand you are not bound to accept any Proposal you receive.

Yours sincerely,

Authorized signatory:
Name and title of Signatory:
Name of Firm:
Address:

Detailed breakup of cost for Collection of bridge condition and bridge inventory data under each Regional Office of the Ministry for a period of five years

1. Operation & Maintenance, Technical support system/staff for data collection, analysis, monthly report.

Sl. No.	**Particulars**	**1st Year**	**2nd Year**	**3rd Year**	**4th Year**	**5th Year**
1	Ownership, Operation and maintenance cost including fuel charges of Equipment procured for collection of data, if any					
2	Total Expenses for Key/Sub personnel including salary and deployment of computers/laptops, phone, fax, printer, digital camera with GPS and gate stamping facility.					
3	Transport expenses					
4	Office Rental					
5	Report preparation					
6	Wages of additional staff like operator - cum- mechanic for MBIU					
7	Consumables					
8	Any other item					
9	Miscellaneous					
	Total year wise Amount	**a1**	**a2**	**a3**	**a4**	**a5**
	Total amount for five years (a1+a2+a3+a4+a5)			In Words Rupees……		

2. Discounts, if any: INR……

GRAND TOTAL AMOUNT FOR FIVE YEARS (CONTRACT PRICE):
[(1-2)] = INR ……..…… (in figures)
…….. (in words)

6.2 PRE-QUALIFICATION PROPOSAL SUBMISSION FORM

_____ (Location)
_____ (Date)

From

_____
_____
_____
_____
_____

To
The Chief Engineer(B) S&R
Ministry of Road Transport & Highways,
Transport Bhawan, New Delhi-110001

Subject: Collection of bridge condition and bridge inventory data using MBIU/similar equipment under each Regional Office of the Ministry for a period of five years (Package No._____).

Ref.: Tender No. RW/

Dear Sir/Madam,

We, the undersigned, confirm that we meet all the pre-qualification criteria listed in the bid document.

We are submitting the following documents for our eligibility for the above assignment.

Form PQ-1,
Form PQ-2,
Form PQ-3
Form PQ-4
Form PQ-5

Our Proposal is binding upon us and subject to the modifications resulting from contract negotiations, up to expiration of the validity period of the Proposal

We undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely "Prevention of Corruption Act 1988". We understand you are not bound to accept any Proposal you receive.

Yours sincerely,
(Signature of the Authorized signatory):
Name and Designation of the Authorized signatory:
Name and Address of Firm:
Phone, Fax & E-Mail
Seal:

Form: PQ-1

BIDDER'S ANNUAL TURNOVER
Proof for clause 2.16.1.3 (i)

_____ (Location)
_____ (Date)

From

_____
_____
_____
_____
_____

To
The Chief Engineer(B) S&R
Ministry of Road Transport & Highways,
Transport Bhawan, New Delhi-110001

Subject: Collection of bridge condition and bridge inventory data using MBIU/similar equipment under each Regional Office of the Ministry for a period of five years (Package No._____).
Ref.: Tender No. RW/

Dear Sir/Madam,

We hereby certify that the average annual turnover of M/s. _____ (name of the bidder) is not less than Rs. 1 crore (Rupees One crore) during the last three financial years.

Sl. No.	Firm	Year (2009-2010)	Year (2010-2011)	Year (2011-2012)
		Amount	Amount	Amount
1				

If the audited figures for 2011-12 is not available for any reason, it shall be indicated so and the audited figures of 2008-09 shall be included.

Yours Sincerely,

(Signature of Statutory Auditor)
Name of the Statutory Auditor:
Name of the Statutory Auditor Firm:
Seal:

Important Notes: The above data should relate only to the Bidder /JV who has submitted the tender. Data relating to sister companies, group companies, parent company, subsidiary companies shall not be considered.

Form: PQ-2

SIMILAR WORK EXPERIENCE
Declaration for clause 2.17.4

_____ (Location)
_____ (Date)

From

_____

_____

_____

_____

_____

To
The Chief Engineer(B) S&R
Ministry of Road Transport & Highways,
Transport Bhawan, New Delhi-110001

Subject: Collection of bridge condition and bridge inventory data using MBIU/similar equipment under each Regional Office of the Ministry for a period of five years (Package No._____).
Ref.: Tender No. RW/

We hereby declare and confirm that we, _____ (Name of the Bidder), having registered office at _____ (address) have successfully executed the following qualifying works in the last 5 years. We are providing the details below: (Note: add rows as required).

Sl. No.	Name of the client organization	Purchase Order (P.O) No. & Date of issue of P.O.	Project Value	Brief Scope of Work	Whether the successful completion certificate as required, is attached?		Whether the copies of the purchase orders / contracts from the client as required, is attached?	
					Yes/No	Pg. No. on the Proposal	Yes/No	Pg. No. on the Proposal

Yours Sincerely,
(Signature of Authorized Signatory)
Name and Designation of the Authorized Signatory:
Name and address of the Bidder Company:

Seal:

Form: PQ-3

SUBCONTRACT DECLARATION & REQUEST FORM
Declaration for clause 3.5

_____ (Location)
_____ (Date)

From

_____
_____
_____
_____
_____

To
The Chief Engineer(B) S&R
Ministry of Road Transport & Highways,
Transport Bhawan, New Delhi-110001

Subject: Collection of bridge condition and bridge inventory data using MBIU/similar equipment under each Regional Office of the Ministry for a period of five years (Package No._____).

Ref.: Tender No. RW/

1. We hereby declare and confirm that we, _____ (Name of the Bidder), having registered office at _____ (address), undertake that the following services towards this tender will not be sub-contracted and will be executed only by the employees of our Company who are on our payrolls.

2. We are intending to subcontract the following works to the respective subconsultants as found in the table below. We submit the same for your approval.

Sl. No.	Name of Subcontracted Service	Details of the Subcontract work	Brief Profile of the Subconsultant proposed	Sub-Consultant Name, Address and Contact Numbers	Value of the subcontracted work.

3. We also undertake that under all circumstances, the value of the works sub-contracted by us will not exceed 25% of the contract price.

Yours Sincerely,

(Signature of Authorized Signatory)
Name and Designation of the Authorized Signatory:
Name and address of the Bidder Company:
Seal:

Form: PQ-4

KEY PROFESSIONEL

_____ (Location)
_____ (Date)

From

_____
_____
_____
_____
_____

To
The Chief Engineer(B) S&R
Ministry of Road Transport & Highways,
Transport Bhawan, New Delhi-110001

Subject: Collection of bridge condition and bridge inventory data using MBIU/similar equipment under each Regional Office of the Ministry for a period of five years (Package No._____).
Ref.: Tender No. RW/

Dear Sir/Madam,

We, M/s _____, hereby propose to engage following key personnel meeting the specified requirements stated in the Bid Document. The Bio data for each candidate indicating their qualification and experience is enclosed in the prescribed format.

1.	**Title of position***	**Team Leader cum Senior Bridge Engineer**
	Name	
2.	**Title of position***	**Bridge Engineer**
	Name	
3.	**Title of position***	**Assistant Engineer (Civil)**
	Name	
	Name	
	Name	
	Name	
4.	**Title of position***	**Data Entry Operator**
	Name	
	Name	
	Name	

Yours Sincerely,

(Signature of Authorized Signatory)
Name and Designation of the Authorized Signatory:
Name and address of the Bidder Company:
Seal:

Form: PQ-5

RESUME OF PROPOSED PERSONNEL

Name of Bidder

Position		
Personnel information	**Name**	**Date of birth**
	Professional qualifications	
	Total years of professional experience	
	Training, publication etc.	
Present employment	**Name of employer**	
	Address of employer	
	Telephone	**Contact (manager / personnel officer)**
	Fax	**E-mail**
	Job title	**Years with present employer**

Summarize professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience

Section -7

FORMAT FOR SUBMISSION OF BANK GUARANTEES (PERFORMANCE BANK GUARANTEE)

(To be stamped in accordance with Stamp Act if any, of the country of issuing bank)

To
The Chief Engineer(B) S&R
Ministry of Road Transport & Highways,
Transport Bhawan, New Delhi-110001
Against contract awarded vide letter of award ref. no. _____ dated _____ for the Tender No. _____ dated _____ for the Package…… (hereinafter termed as the said "Contract") entered into between The Chief Engineer(Bridge) S&R, [for Director General (Road Development) & Special Secretary], Ministry of Road Transport & Highways (hereinafter called "THE EMPLOYER") and M/s _____ having its registered office at _____ and branch office at _____ (hereinafter called the successful bidder), this is to certify that at the request of the successful bidder, we _____ Bank having its Registered/Head office at _____ and branch at _____ are holding in trust, in favour of THE EMPLOYER, the amount of Rs. _____(Rs. in words_____) to indemnify and keep indemnified THE EMPLOYER against any loss or damage that may be caused to or suffered by THE EMPLOYER by reason of any breach by the successful bidder of any of the terms and conditions of the said contract/and/or in the performance thereof. We agree that the decision of THE EMPLOYER, whether any breach of any of the terms and conditions of the said contract and/or in the performance thereof has been committed by the Successful bidder and the amount of loss or damage that has been caused or suffered by THE EMPLOYER shall be final and binding on us and the amount of the said loss or damage shall be paid by us forthwith on demand, and without demur to THE EMPLOYER. The decision of THE EMPLOYER in this regard shall be final and binding upon the successful bidder and the bank.

We _____ Bank further agree that the guarantee herein contained shall remain in full force and effect up to the date six months after the expiry of the Contract period i.e._____ (hereinafter referred as the said date) and that if any claim accrues or arises against us, we _____ Bank by virtue of this guarantee before the said date, the same shall be enforceable against us. Notwithstanding the fact that the same is enforced within six months after the said date, provided that notice of any such claim has been given to us by THE EMPLOYER within this period. Payment under this letter of guarantee shall be made within seven days upon receipt of notice to that effect from THE EMPLOYER.

It is fully understood that this guarantee is effective from the date of the said contract and that we _____ Bank undertake that no change or addition or modification of the terms of the contract or the work to be performed thereunder or any of the contract documents which may be made between "THE EMPLOYER" and the successful bidder, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

We undertake to pay to THE EMPLOYER any money so demanded, notwithstanding any dispute or disputes raised by the Successful bidder in any suit or proceeding pending before any court or Tribunal relating thereto, our liability under this present being absolute and unequivocal.

The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the Successful bidder shall have no claim against us for making such payment.

We _____ Bank further agree that THE EMPLOYER shall have the fullest liberty, without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said

contract or to extend time for performance by the Successful bidder from time to time or to postpone for any time any of the power exercisable by THE EMPLOYER against the said Successful Bidder and is to forbear or Bank shall not be released from our liability under this guarantee by reason of any such variation or extension being granted to the said Successful bidder or for any forbearance by THE EMPLOYER or any other matter or thing what-so-ever, which under the law relating to sureties would, but for this provision have the effect of so releasing us from liability under this guarantee.

This guarantee will not be discharged due to the change in the constitution of the Bank or Successful Bidder.

Notwithstanding anything contained hereinbefore:

Our liability under this bank guarantee is limited to Rs. _____ (Rs. in words)
Will remain in force upto six months after the expiry of Contract period i.e. _____;
And unless a claim or demand under this guarantee is made on us in writing on or before _____ all our liability shall cease.

DATE _____

SIGNATURE OF THE AUTHORIZED SIGNATORY OF THE BANK
(WITH CODE NO.)_____
SEAL OF THE BANK _____
SIGNATURE OF THE WITNESS _____

Name and Address of the Witness _____

The bank guarantee shall be issued either by a bank (Nationalized/Scheduled) located in India

BANK GUARANTEE FORMAT FOR EARNEST MONEY DEPOSIT (EMD)

(To be stamped in accordance with Stamp Act if any, of the country of issuing bank)

Ref.: **Tender No. _____, dated** _____

Bank Guarantee:

Date:

WHEREAS, _____(Name of Bidder) __ (hereinafter called "the bidder") has submitted his bid dated _____ (date) for the **Tender No. _____, dated** _____ (hereinafter called "the Bid").

KNOW ALL MEN by these presents that We, _____ [Name of Bank) of _____ [Name of Country] having our registered office at _____ (hereinafter called "the Bank") are bound unto _____ [Name of Employer] (hereinafter called "the Employer") in the sum of Rs. _____ (Rupees _____ Lakhs Only) for which payment will and truly to be made to the said Employer the Bank binds himself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this _____day of _____ 2011.

THE CONDITIONS of this obligation are:

1. If the Bidder withdraws his Bid during the period of bid validity specified in the Bid document; or
2. If the Bidder does not accept the correction of arithmetical errors of his Bid Price in accordance with the Instructions to Bidder; or
3. If the Bidder having been notified of the acceptance of his Bid by the Employer during the period of bid validity,
   a. fails or refuses to execute the Form of Agreement in accordance with the Instructions to Bidders, if required; or
   b. fails or refuses to furnish the Performance Security, in accordance with the Instructions to Bidders,

we undertake to pay the Employer up to the above amount upon receipt of his first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of one or any of the conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date 180 (one hundred and eighty) days after the deadline for submission of bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date.

Notwithstanding anything contained herein before, our liability under this guarantee is restricted to Rs._____ (Rs._____) and the guarantee shall remain valid till _____. Unless a claim or a demand in writing is made upon us on or before _____ all our liability under this guarantee shall cease.

DATE _____

SIGNATURE OF THE BANK _____
SEAL OF THE BANK _____
SIGNATURE OF THE WITNESS _____
Name and Address of the Witness _____

The bank guarantee shall be issued by a bank (Nationalized/Scheduled) located in India

Section -8

DRAFT AGREEMENT

Contract agreement for Collection of bridge condition and bridge inventory data under Regional Office/ELO of the Ministry for a period of five years.

(To be executed on appropriate Stamp Paper of Govt. of India)

This Contract agreement is made on _____ between the President of India, represented by the Chief Engineer (B) S&R [for Director General (Road Development) & Special Secretary], Ministry of Road Transport & Highways, India (hereinafter referred to as the 'Employer / Client' the term which shall mean and include its heads, administrators, executors and assignees) of the first part and M/s _____ , (hereinafter referred to as the Consultant) of the second part.

2. WHEREAS the Consultant represents that it is well reputed Consultant for conducting bridge condition survey and inventory data for bridges on the NH network using Mobile Bridge Inspection Unit or similar type of equipment.

3. And WHEREAS the Consultant has offered to the Employer for Collection of bridge condition and bridge inventory data under Regional Office/ELO of the Ministry for a period of five years(hereinafter called services) as given at para 5(iii) below.

4. And WHEREAS the Employer agrees to get the services and the Consultant agrees to provide the services in pursuant to the bid submitted by the consultants vide letter No._____ Dated _____ (hereinafter referred to as "the offer") and the Employer has by his letter of acceptance No._____ Dated _____ accepted the offer submitted by the consultant at the contract price of Rs._____ (in words) with details mentioned in para 5(iv) below in accordance with the terms and conditions below hereinafter contained and schedule of payment as mentioned in para 5(v) AND WHEREAS the consultant has agreed to provide services and has furnished performance security pursuant to para 2.7.2 of the instructions to bidders, section- 2.

5. Now this agreement witnessed as follows:-

   (i) In this agreement words and expressions shall have the same meanings as are respectively assigned to them in the condition of contract hereinafter referred to:

   (ii) The following documents/ sections of the Bidding Document shall be deemed to form and be read and construed as part of this agreement

Section 1	Letter of Acceptance
Section 2	Instructions to Bidders
Section 3	General (Financial and Legal) Conditions of Contract
Section 4	Special Conditions of Contract
Section 5	Scope of Work
Section 6	Formats submitted with the proposal

   (iii) Scope and object of the Contract is Collection of bridge condition and bridge inventory data under each Regional Office of the Ministry for a period of five years.

(iv) Referring to consultant's price bid No. _____ dated _____ the total price of the Collection of bridge condition and bridge inventory data under Regional Office/ELO of the Ministry for a period of five yearsis INR……..

(v) Schedule of Payment
Payments will be made from respective regional officer, within 30 days of successful submission of desired half yearly summary reports to the Superintending Engineer of the Regional Office at …….. as per following payment schedule:

RA Bill No.	Deliverable	Payment (% of Contract Price)
1	On bringing MBIU at site	10%
2	First half yearly report for 1st year on submission of Condition Survey Report for complete bridges.	15%
3	Second half yearly report for 1st year	15%
4	First half yearly report for 2nd year	7.5%
5	Second half yearly report for 2nd year	7.5%
6	First half yearly report for 3rd year	7.5%
7	Second half yearly report for 3rd year	7.5%
8	First half yearly report for 4th year	7.5%
9	Second half yearly report for 4th year	7.5%
10	First half yearly report for 5th year	7.5%
11	Second half yearly report for 5th year	7.5%

(vi) In consideration of the payments to be made by the Employer to the Consultant as hereinafter mentioned, the consultant hereby covenants with the Employer to execute and complete the works and remedy any defects therein in all respects inconformity with the provisions of the Contract.

(vii) The consultant hereby also covenants that all the partners of Joint Venture shall be jointly and severally responsible to the Employer for the execution of the contract in accordance with the contract terms.

(viii) The Employer hereby covenants to the consultant in consideration of the execution and completion of the works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the contract at the times and in the manner prescribed by the Contract.

In witness whereof the parties hereto have caused this agreement to be executed the day the year first before written, signed, sealed and Delivered by the said Employer through his authorized representative and the Consultant through his Power of Attorney Holders.

(For an on behalf of the
Consultant)

_____

The Chief Engineer(B) S&R
Ministry of Road Transport &
Highways,
Transport Bhawan, New Delhi-
110001

Witness

1. Signature _____

Name _____

Address _____

2. Signature _____

Name _____

Address _____

1. Signature _____

Name _____

Address _____

2. Signature _____

Name _____

Address _____

ANNEXURE A

PROFORMA FOR CONDITON SURVEY OF BRIDGES

1.	NH NO.	
2.	Location of bridge in Km	
3.	Name of River/Water Body/Bridge	
4.	Year of completion of bridge	
5.	Type of bridge (RCC/PSC, slab, timer, steel	
6.	Total length of bridge in 'm' with span	
7.	Width of carriageway and footpaths	
8.	Whether located in back waters/chemical zone?	
	Condition of the various bridge components:	
	Name of components	**Condition**
9.	**Approaches:**	
9.1	Condition of pavement surface	Check unevenness settlement, cracking, potholes etc.
9.2	Side slopes	Erosion embankment, damage to pitching etc.
9.3	Approach slab	Check, settlement, cracks, movement etc.
9.4	Retaining walls	Check subsidence, tilting, weepholes etc.
10.	**Protection Works:**	
10.1	Slope pitching, apron, floor protection, toe walls	Nature of damage, if any. etc
10.2	Scour in river bed	Check any abnormal scour noticed
11.	**Waterway:**	
11.1	Obstruction in waterways, island formation, Vegetation growth etc.	Presence and its impact on flow
11.2	Flow pattern and banks	Meandering inflow and erosion of banks
12.	**Foundation:**	
12.1	Type	CC/RCC/Masonry/well/Pile
12.2	Material	CC/Masonry/Timber
12.3	Condition of foundation	Settlement, Scour, Tilting
12,4	Piers/Abutments	Settlement, Scour Tilting
		Cracking, Disintegration, Decay, spelling, Rusting , Exposed reinforcement
13.	**Substructure**	
13.1	Type	Well(solid/hollow),Circular/Oval
13.2	Condition	Cavitation, honeycombing, spalling, rusting, strains.
14.	**Bearing:**	

14.1	**Type**	(Sliding plae/Rocker-roller/Elastomeric/Paper/Concrete etc)
14.2	**Condition**	Movement/sliding
		Loss of shape, rusting, cleanliness, greasing, etc
15.	**Superstructure:**	
15.1	**Structural System**	Simply supported/continuous/Continuous overhand/balance cantilever
15.2	**Type**	(RCC/PSC/Steel/Timer/masonary etc)
15..3	**Arrangement**	T-beam, slab/b0x-girer
15.4	**Condition (girder)**	
15.5	**Condition (Deck)**	
		Cracking/Spalling/scaling/exposed reinforcement/leakage/vibration/exposed reinforcement
15.6	**In case of steel bridges**	Corrosion/painting/loose rivet joints
15.7	**In case of masonry bridges**	Pointing/joints mortar and bulging of spandrel
16.	**Expansion joint:**	
16.1	**Type**	
16.2Conditon		
17,	**Wearing coat:**	
17.1	**Type**	(Concrete/Bituminous)
17.2	**Surface condition**	Cracks/potholes/riding Quality
17.3	**Drainage Spouts**	Clogging and damage if any
18.3	**Gabdrauks/Parapet:**	
18.1	**Type**	
18.2	**Damage/missing parts if any**	
19.	**Footpaths:**	
21,	**Type**	Water/sewer/electrical/Telephone
22	**Leakage/Damage if any**	
23	**Special Observation/Remarks if any**	

ANNEXURE B

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	
27(a)	LWL/GL	
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 Foundation	
77.	Distress and Repair Guide Bunds	
78.	Distress and Repair in Substructure including Bearings	
79.	Distress and Repair in Superstructure	
80.	Any other Observations	

Annexure-C

GOVERNMENT OF INDIA
MINISTRY OF ROAD TRANSPORT & HIGHWAYS

Parivahan Bhavan,
1, Parliament Street,
New Delhi-110001

RW-NH-35072/1/2013-S&R(B) Dated: 30-09-2013

To

1. The Chief Secretaries of all State Governments/Union Territories.
2. The Principal Secretaries /Secretaries of all States/U.Ts. Public Works Department dealing with National Highways, other Centrally Sponsored Schemes and State Schemes.
3. The Engineers-in-Chief and Chief Engineers of Public Works Departments of States/U.Ts dealing with National Highways, other Centrally Sponsored Schemes and State Schemes.
4. The Chairman, National Highways Authority of India (NHAI), G-5&6, Sector-10, Dwarka, New Delhi-110 075.
5. Director General (Border Roads), Seema Sadak Bhawan, Ring Road, New Delhi-110 010.
6. All the Empanelled consultant in the category.

Sub: Tentative guidelines for submitting the Bridge Condition Survey Report for National Highways by the Ministry empanelled consultant as required in the Ministry's guidelines issued vide letter of even no. dated 24-1-2013.

Ministry has issued guidelines for granting permission for movement of over-dimension and overweight vehicles on the Bridges of National Highways vide Ministry letter No. RW-NH-35072/1/2010-S&R(B) dated 24-1-2013. The above mentioned circular (clause 4.4) envisage that the applicant has to provide Route Survey Report Plan alongwith the Condition Survey Report for all the Bridges enroute. The required Condition Survey has to be done by the Ministry's empanelled consultant in category II & III. It may be understood that as per the circular of even no. dated 24-1-2013, Ministry will be taking decision to allow/not allow movement of ODC/OWC based on the Condition Survey Report submitted by the empanelled consultant.

In view of Ministry's decision on the consultant reports and recommendation, Ministry has decided that the consultant engaged in Bridge Condition Survey should have following responsibilities.

(i) The consultant shall submit the Condition Survey Report along with the photographs and the recommendation regarding safe/unsafe for allowing the movement of ODC/OWC under consideration, as per IRC SP:18 or

IRC SP:35 for all simply supported structure/bridges. The modified proforma for Condition Survey is at Annexure-I of this circular.

(ii) For Longer spans and for Type of Structures not covered in the referred charts of the circular of even No. dated 24-01-2013, specific studies may be carried out on identical system, which shall form the basis of clearance for movement of OW/ODC.

(iii) As the consultants are being hired by the consignor/operator/applicant, the authorized representative of the consultant shall provide a notarized undertaking that the Condition Survey Report submitted by the consultant is as per actual and any deviation in report from actual condition of the bridge will be the sole responsibility of the consultant. Further, the consultant should also undertake that any deviation from actual condition viz a viz reported condition shall invite action against the consultant as deemed fit by the Ministry.

(iv) The report shall also provide the detailed report on safety of the bearings of the bridges, in view of the proposed movement of ODC/OWCs.

(v) The Consultant shall also submit the report on damage of Bridge if any within a month, just after the crossing of the ODC/OWC. In case the consultant fails to do so the next report submitted by the firm will not be entertained.

It is further informed to the consultant that in case the consultant Condition Survey Report conceals any substantial information in respect of routes for which Condition Survey Report is submitted, the consultant may be debarred/black listed for a certain period and the same will be informed to Registrar of Companies.

This issue with the approval of the competent authority

Yours faithfully,

(Alok Kumar Pandey)
Superintending Engineer (S,R&T) (Bridge)
For Director General (Road Development) & SS

Copy with enclosures for information and necessary action to:

1. All Technical officers in the Ministry of Road Transport & Highways
2. All ROs and ELOs
3. The Secretary General, Indian Roads Congress
4. The Director, IAHE
5. Technical Circular File of S&R Section

Copy for kind information to:

1. PS to Hon'ble Minister (RT&H)/PS to MOS(T)/PS to MOS(S).
2. Sr. PPS to Secretary (RT&H)
3. PS to DG (RD) & SS

Standard Proforma for Inspection Report (for passage of ODC/OWC)

*__IMPORTANT NOTES__:

1. THIS PROFORMA IS APPLICABLE FOR INSPECTION OF CONVENTIONAL BRIDGES ONLY WITH SPECIFIC OBJECTIVE OF PASSAGE OF ODC/OWC WITH PAY LOAD AS SPECIFIED.

2. IN CASE THERE ARE TWO INDEPENDANT CARRIAGEWAY'S, THE SURVEY IS TO BE CARRIED OUT ONLY FOR THE SPECIFIC CARRIAGEWAY THROUGH WHICH OWC IS PROPOSED TO BE CARRIED.

3. ATTACH A DIAGRAMMATIC SKETCH SHOWING THE SALIENT STRUCTURAL SCHEME AND GEOMETRIC DETAILS OF THE BRIDGE ALONG WITH THE PHOTOGRAPHS OF VARIOUS COMPNENTS OF THE BRIDGE HIGHLIGHTING IT'S STRUCTURAL CONDITION

Sl. No.	Item No.	Description	Observations/ Measurements	Remarks
1	1	**GENERAL**		
2	1.1	Name of the bridge/No. of the bridge/Name of the river		
3	1.2	Name/No. of highway/Bridge location		
4	1.3	Year of construction **(if available or through local inquiry)**		
5	1.4	Bridge superstructure Type **(Solid slab, voided slab, RCC/PSC T Girder, Box Girder.... Refer MORTH Guideline)**		
6	1.5	Bride Statical System **(Simply Supported/Continuous)**		
7	1.6	Pay load to be carried over the bridge. (GVW)		
8	1.7	Type of HT arrangement to be considered.		
9	2	**SALIENT STRUCTURAL SCHEME & GEOMETRIC DETAILS OF THE BRIDGE**		
10	2.1	Type of bridge **(River bridge, ROB, flyover, ...etc)**		
11	2.2	Span arrangement **(Provide c/c of exp. Jt. As well as effective span along with skew angle if any)**		

12	2.3	Maximum height between soffit of Superstructure & river bed		
13	2.4	Width of carriageway **(between inner to inner edge of kerbs/crash barrier)**		
14	2.5	Width of footpath **(Please also mention whether the footpath is raised and whether it is provided on both sides or only on one side)**		
15	2.6	Overall deck width **(from outer to outer)**		
16	2.7	Type of carriageway **(Type 1 to 5... Refer MORTH Guideline)**		
17	2.8	Depth of Superstructure **(Please capture overall depth as well as depth of Girder)**		
18	2.9	Type of Pier **(Circular, Rectangular, Plate Type ... etc.)**		
19	2.10	Type of Abutment **(Solid Type, Spill through type....etc.)**		
20	2.11	Type of foundation **(Add only in case visible)**		
21	2.12	Nos. of Girders & X – girders in Superstructure **(to be picked up for each type of spans)**		
22	2.13	Horizontal alignment of bridge **(report whether it is curved or straight)**		
23	3	**DATE OF INSPECTION**		
24	4	**APPROACHES**		
25	4.1	Approach geometrics **(report whether approach geometry is conducive)**		
26	5	**PROTECTIVE WORKS**		
27	5.1	Extent of scour		
28	6	**CONDITION OF FOUNDATION (TO BE REPORTED FOR EACH FOUNDATION)**		
29	6.1	Report settlement if any		
30	6.2	Report cracking, disintegration, decay erosion, cavitation, etc.		
31	6.3	Report damage due to impact of floating bodies, boulders, etc.		

32	7	CONDITION OF SUBSTRUCTURE **(PIERS, ABUTMENTS ...ETC) (TO BE REPORTED FOR EACH SUBSTRUCTURE)**		
33	7.1	Report cracking, disintegration, decay, tilting etc.		
34	8	CONDITION OF BEARINGS **(TO BE REPORTED FOR EACH SPAN)**		
35	8.1	Metallic bearings		
36	8.1.1	Report general condition **(check rusting, cleanliness, ceasing of plates)**		
37	8.1.2	Functioning **(report excessive movement, tilting, jumping off girders)**		
38	8.1.3	Report cracks in supporting member **(abutment cap, pier cap, pedestal)**		
39	8.1.4	Report effectiveness of anchor bolts **(check whether they are in position and tight)**		
40	8.2	Elastomeric bearings		
41	8.2.1	Report condition of pads **(oxidation, creep, fattening, bulging, splitting)**		
42	8.2.2	Report general cleanliness		
43	9	CONDITION OF SUPERSTRUCTURE **(TO BE REPORTED FOR EACH SPAN)**		
44	9.1	Reinforced concrete and pre-stressed concrete members		
45	9.1.1	Report spalling, disintegration or honey combing etc.		
46	9.1.2	Report cracking **(pattern, location, explain preferably by plotting on sketch)**		
47	9.1.3	Report corrosion of reinforcements, if any		
48	9.1.4	Report damages if any due to moving vehicles		
49	9.1.5	Report condition of articulation **(cracks if any)**		
50	9.1.6	Report deflection, if excessive		
51	9.1.7	Report cracks in end anchorage zone **(for prestressed concrete members)**		
52	9.1.8	Report deflection at central hinge, tip of cantilever for cantilever		

		bridges		
53	9.2	Steel members		
54	9.2.1	Report corrosion, if any		
55	9.2.2	Report condition of connection **(adequacy, looseness of rivets, bolts or worn out welds, etc.)**		
56	9.2.3	Report deflection, if excessive		
57	9.2.4	Report buckling, if any		
58	9.3	Masonry arches		
59	9.3.1	Report condition of joints mortar, pointing masonry etc.		
60	9.3.2	Profile report flattening by observing rise of the arch at centre and quarter points.		
61	9.3.3	Report cracks if any **(indicate location, pattern, extent, depth, explain by sketches)**		
62	9.3.4	Check drainage of spandrel fillings **(report bulging of spandrel Walls if any)**		
63	9.3.5	Check growth of vegetation		
64	10	Certificate to be accorded by the inspecting official		
65	10.2.3	Report perceptible vibrations, if any.		
66	10.2.4	Report on alignment of members of superstructure.		
67	11.1	Report functioning of expansion joints (Report cracks in deck in the existing gap and approximate temperatures)		
68	11.2	Report condition of sealing material (for neoprene sealing material, check for splitting oxidation, creep flattening, bulging and for bitumen filler, check for hardening, cracking, etc.)		
69	11.7	Report rattling of expansion joints, if any.		

THIS IS TO CERTIFY THAT MY FIRM HAS CARRIED OUT A ROUTINE VISUAL INSPECTION OF THIS BRIDGE FOR THE ASSESSMENT OF ADEQUACY OF THE BRIDGE FOR THE PASSAGE OF ODC/OWC WITH THE SPECIFIED PAY LOAD. THE INFORMATION CONTAINING IN THIS VISUAL INSPECTION REPORT ARE CORRECT TO THE BEST OF MY KNOWLEDGE.

Name of the inspector	

Qualification of the inspector *	
Signature of the inspector	
Signature of Director of Consultant Company	
Date	
* THE INSPECTOR CARRYING OUT THE BRIDGE INSPECTION SHALL BE AN EXPERIENCED AND QUALIFIED BRIDGE ENGINEER, WITH NECESSARY SKILL TO ASSESS THE BRIDGE CONDITION BASED ON VISUAL INSPECTION. HE SHOULD HAVE MINIMUM QUALIFICATION OF M.TECH IN CIVIL ENGINEERING AND EXPERIENCE OF AT LEAST 15 YEARS ON BRIDGE DESIGN/CONSTRUCTION /MAINTENANCE. THE SIGNED CV OF THE INSPECTOR SHOULD BE ATTACHED WITH REPORT.	

Annexure-D

GOVERNMENT OF INDIA
MINISTRY OF ROAD TRANSPORT & HIGHWAYS

Parivahan Bhavan,
1, Parliament Street,
New Delhi-110001

RW-NH-35071/2/2013-S&R(B) Dated: 16th January 2014

To

7. The Chief Secretaries of all State Governments/Union Territories.
8. The Principal Secretaries /Secretaries of all States/U.Ts. Public Works Department dealing with National Highways, other Centrally Sponsored Schemes and State Schemes.
9. The Engineers-in-Chief and Chief Engineers of Public Works Departments of States/U.Ts dealing with National Highways, other Centrally Sponsored Schemes and State Schemes.
10. The Chairman, National Highways Authority of India (NHAI), G-5&6, Sector-10, Dwarka, New Delhi-110 075.
11. Director General (Border Roads), Seema Sadak Bhawan, Ring Road, New Delhi-110 010.

Sub: Points to be covered in the RFP documents of Consultancy Assignment on National Highways & related Centrally sponsored works.

Sir,

Ministry had detailed deliberation on the role of Technical Consultants with all the stake holders including the Consultants working on National Highways and on Centrally sponsored road projects executed on BOT, Annuity & EPC modes, wherein the responsibility of preparation of design and drawing for the Project is of the Concessionaire / Contractor. The Technical Consultancy firms are supposed to assist the Concessionaire/ Contractor in the preparation of design and drawings. Subsequently the role of supervision is also to be done by the Authority Engineer /Independent Consultant/Independent Engineer, who is again a/from consulting firm. In light of the increasing role of Technical Consultants in the building of road infrastructure, the Ministry has accordingly decided that the RFP documents for selection of Technical Consultants shall suitably incorporate following points.

a) The selection criteria for all consultancy works shall be quality cum cost based selection (QCBS) with 80:20 weightage for technical & financial scores respectively. In order to encourage new Consultants, the finalized RFP/RFQ shall allow JV/Associates for all type of consultancy assignments. For larger Consultancy works (more than Rs.1.5 crs) a short list shall be prepared for inviting bids depending upon technical contents of the work out of interested

empanelled Consultants of suitable categories, to be duly identified by the Ministry.

b) In the matter of Extension of Time in consultancy contract it is decided that the suitable clauses shall be incorporated in the RFP document so as to extend the consultancy contracts of IC/AE/IE and DPR/FS from time to time. The extension of time shall be done by Chief Engineer level in the Ministry / BRO / State PWD and by Member level in NHAI and it shall be made before expiring of the original / extended time. The requirement of man power shall be accessed at the level of CE/Member on monthly basis and any change considered necessary in the deployment level in the Consultants Team shall be intimated to them 30 days prior to the expiry of the original time.

c) The RFP document for DPR shall preparation keep 6 months time for acceptance of final DPR after submission by the Consultant. If no issues have been raised or there are no unaddressed issues with regard to submission, the DPR shall be deemed to have been approved after lapse of 6 months and payment shall be released accordingly. The Performance Securities of the Consultants shall be released/deemed to be released after one year from acceptance/deemed acceptance.

d) The inputs for Senior Bridge Engineer, Highway Design Engineer, Road Safety Expert, Traffic & Transport Engineer, shall be taken up to 40% in the field and the balance from the Headquarters, since for their services, substantial support is needed from the Headquarters. Besides, for the positioning of legal, Financial and Contract specialists the input shall be minimum 20% period in the field and balance 80% at Headquarters. The same may be included in RFP document suitably.

2. In all future projects proposed to be taken up under BOT/EPC, Detailed Project Reports shall be prepared instead of feasibility only primarily to ascertain the realistic and firm cost of the project, before bidding the civil works on EPC / BOT /Annuity mode and shall be disclosed on website for information of all interested bidders. The scope of the consultancy assignment shall include all components of DPR except the detailed design. It may be referred to as the PROJECT REPORT to differentiate it from a FR and DPR. In case of unavoidable circumstances the bidding of projects may be allowed based on Feasibility study.

3. A single Bank Guarantee to cover for performance of all projects under one Executive Agency (NHAI/PWD/BRO/Ministry zones) shall be taken as tabulated below instead of taking it again and again. Also the Retention money may be allowed to be released against equal amount of Bank Guarantee. In order to maintain cash flow of the consultants and to protect the interest of Authority suitably, Ministry has decided not to deduct retention money of the consultants if retention money exceed beyond Rs. 4 crores with such Executive Agencies with multiple projects.

Performance Guarantee	
Remaining cumulative Value of	BG Value (in Rs. crores.)

Consultancy Fee as per Contracts under a Agency(NHAI/PWD/BRO/Ministry) (Cr)	
0-20	0.5
20-40	1
40-100	2.50
100-200	4.0
Beyond 200	5.0

On submission of requisite Guarantees as above the existing Performance Guarantees would be returned duly discharged. The excess Retention amount above Rs.4 crores shall be returned against Bank Guarantee and shall not be recovered any further.

However, those consultants, who do not wish to avail the above provisions, may continue to provide BG as per current practice. The position will be reviewed in each case at the time of signing of a new contract.

4) At present, after completion of the original Consultancy Contract, the escalation of 5% per year is paid only on remuneration. It has now been decided that this 5% escalation will henceforth be extended to cover all items of the Contract, i.e. vehicle hire, office rent, consumables, furniture etc. As required, after review by the Competent Authority in this regard.

These may be implemented with immediate effect under intimation to the Ministry.

(A.P. PATHAK)
CE (S&R) (Bridge)

Copy for information and necessary action to:

6. All Technical officers in the Ministry of Road Transport & Highways
7. All ROs and ELOs
8. The Secretary General, Indian Roads Congress
9. The Director, IAHE
10. Technical Circular File of S&R Section

Copy for kind information to:

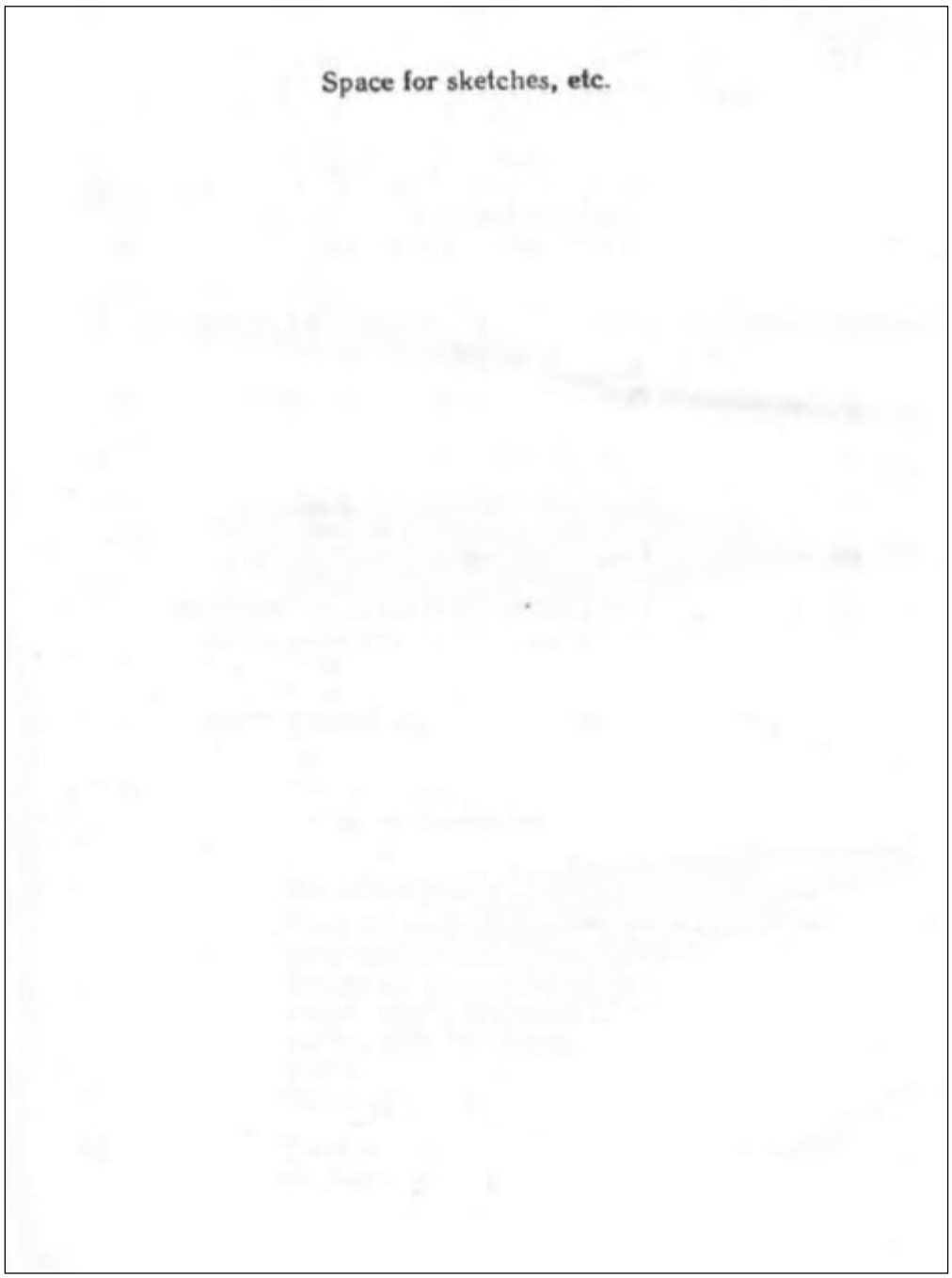
4. PS to Hon'ble Minister (RT&H)/PS to MOS (T)/PS to MOS(S).
5. Sr. PPS to Secretary (RT&H)
6. PS to DG (RD) & SS

付録-7

橋梁点検フォーム

Bridge Inspection Form used by Assam PWD (1 of 8)

Assam PWD has used the form based on IRC Code SP18-1996



Source :IRC Code SP-1996

Bridge Inspection Form used by Assam PWD (2 of 8)

PROFORMA FOR INSPECTION REPORT

1.	..	**General**
1.1.	..	Name of bridge/No. of the bridge, name of the river
1.2.	..	Name, No. of Highway, Bridge Location
2.	..	**Type of bridge**
3.	..	**Date of last inspection**
4.	..	**Approaches**
4.1.	..	Condition of pavement surface (Report unevenness settlement, cracking, pot-holes, etc.)
4.2.	..	Side slopes (report pitched or unpitched, condition of pitching/turfing any signs of slope failure, etc.)
4.3.	..	Erosion of embankment by rain cuts or any other damage to embankment
4.4.	..	Approach slab (report settlement, cracks, movement, etc.)
4.5.	..	Approach geometrics (report whether it satisfies the standards as in force)
5.	..	**Protective Works**
5.1.	..	Type (mention whether guidebund or protection around abutments or spurs)
*5.2.	..	Report damage of the layout, cross-section profile (check whether the layout and the cross-sections are in order)
5.3.	..	Report condition of slope pitching, apron and toe walls indicating the nature of damage if any (check for proper slope, thickness of

Source :IRC Code SP-1996

Bridge Inspection Form used by Assam PWD (3 of 8)

		pitching in the slopes, width and thickness of apron, erosion of toe walls, etc.)
5.4.	..	Report condition of floor protection works, indicate nature of damage if any, (condition of impervious floor, flexible apron, curtain walls, etc.)
5.5.	..	Extent of scour (report any abnormal scour)
*5.6.	..	Reserve stone material (check against specified quantity)
6.	..	**Waterway**
6.1.	..	Report presence of obstruction, undergrowth, etc.
*6.2.	..	Report maximum observed scour and location and compare with the design values
6.3.	..	Report any abnormal change in flow pattern
6.4.	..	Report maximum flood level observed during the year and mark the same on the pier/abutment both on the U/S and D/S
6.5.	..	Report abnormal afflux if any
6.6.	..	Report adequacy of waterway
7.	..	**Foundations**
7.1.	..	Report settlement if any
7.2.	..	Report cracking, disintegration, decay, erosion, cavitation, etc.
7.3.	..	Report damage due to impact of floating bodies, boulders, etc.
7.4.	..	For sub-ways report seepage if any, damage to the foundations, etc.
8.	..	**Substructure** (piers, abutments and wing-walls)
8.1.	..	Report efficiency of drainage of the backfill behind abutments (check functioning of weep holes, evidence of moisture on abutment faces, etc.)

Source :IRC Code SP-1996

Bridge Inspection Form used by Assam PWD (4 of 8)

8.2.	..	Report cracking, disintegration, decay, etc.
8.3.	..	For sub-ways report condition of side retaining walls like cracking, disintegration, etc., and seepage, if any
9.	..	**Bearings**
9.1.	..	Metallic bearings
9.1.1.	..	Report general condition (check rusting, cleanliness, ceasing of plates)
*9.1.2.	..	Functioning (report excessive movement, tilting, jumping off guides)
9.1.3.	..	Greasing/oil bath (report date of last greasing/ oil bath and whether to be redone or not)
9.1.4.	..	Report cracks in supporting member (abutment cap, pier cap, pedestal)
9.1.5.	..	Report effectiveness of anchor bolts (check whether they are in position and tight)
9.2.	..	Elastomeric bearings
9.2.1.	..	Report condition of pads (oxidation, creep, flattening, bulging, splitting)
9.2.2.	..	Report general cleanliness
9.3.	..	Concrete bearings
9.3.1.	..	Report any signs of distress (cracking, spalling, disintegrating)
9.3.2.	..	Report any excessive tilting
10.	..	**Superstructure**
10.1.	..	Reinforced concrete and prestressed concrete members
10.1.1.	..	Report spalling, disintegration or honey combing, etc.
10.1.2.	..	Report cracking (pattern, location, explain preferably by plotting on sketch)
10.1.3.	..	Report corrosion of reinforcements if any
10.1.4.	..	Report damages if any due to moving vehicles

Source :IRC Code SP-1996

Bridge Inspection Form used by Assam PWD (5 of 8)

*10.1.5.	..	Report condition of articulation (cracks if any)
*10.1.6.	..	Report perceptible vibrations if any
*10.1.7.	..	Report excessive deflections or loss of camber if any (measure at same point each time)
*10.1.8.	..	Report cracks in end anchorage zone (for prestressed concrete members)
*10.1.9.	..	Report deflection at central hinge, tip of cantilever for cantilever bridges
10.2.	..	Steel members
10.2.1.	..	Report condition of paint
10.2.2.	..	Report corrosion if any
*10.2.3.	..	Report perceptible vibrations, if any
*10.2.4.	..	Report on alignment of members
10.2.5.	..	Report condition of connection (adequacy, looseness of rivets, bolts or worn out welds, report specially on connection of stringers to cross girders, cross girders to main girders, gussets or splices, etc.)
10.2.6.	..	Report camber and deflection
10.2.7.	..	Report buckling, if any
10.2.8.	..	Report on the cleanliness of members and joints (check choking of drainage holes provided in the bottom booms)
10.3.	..	Masonry arches
10.3.1.	..	Report condition of joints mortar, pointing, masonry, etc.
10.3.2.	..	Profile report flattening by observing rise of the arch at centre and quarter points.
10.3.3.	..	Report cracks if any (indicate location, pattern, extent, depth, explain by sketches)
10.3.4.	..	Check drainage of spandrel fillings (report bulging of spandrel walls if any)
10.3.5.	..	Check growth of vegetation
10.4.	..	Timber members
10.4.1.	..	Report condition of paint

Source :IRC Code SP-1996

Bridge Inspection Form used by Assam PWD (6 of 8)

10.4.2.	..	Check decay, wear and tear, structural defects needing immediate replacement if any
10.4.3.	..	Report condition of joints, splices, spikes, etc.
10.4.4.	..	Report excessive sag, if any
*10.5.	..	Suspension bridges
*10.5.1.	..	Report condition of cables
*10.5.2.	..	Report condition of suspenders and their connectors
*10.5.3.	..	Report condition of structural steel
*10.5.4.	..	Report condition of painting
*10.5.5.	..	Report excessive oscillations if any requiring need of guy ropes
*10.5.6.	..	Report looseness of joints, bolts, rivets, welds
*10.5.7.	..	Report condition of anchors (evidence of movement)
*10.5.8.	..	Report condition of towers and saddles (verticality, lateral support)
11.	..	**Expansion joints**
11.1.	..	Functioning (Report cracks in deck in the existing gap and approximate temperatures)
11.2.	..	Report condition of sealing material (for neoprene sealing material, check for splitting, oxidation, creep, flattening, bulging and for bitumen filler, check for hardening, cracking, etc.)
11.3.	..	Report secureness of the joints
*11.4.	..	Top sliding plate (report corrosion, damage to welds, etc.)
*11.5.	..	Locking of joints (report locking of joints especially for finger type expansion joints)
11.6.	..	Check for debris in open joints
11.7.	..	Report rattling, if any
12.	..	**Wearing Coat** (concrete/bitumen)
12.1.	..	Report surface condition (cracks, spalling, disintegration, pot-holes, etc.)

Source :IRC Code SP-1996

Bridge Inspection Form used by Assam PWD (7 of 8)

12.2.	..	Report evidence of wear (tell-tale rings, check for thickness as against actual thickness, report date of last inspection)
13.	..	**Drainage spouts**
13.1.	..	Check clogging, deterioration and damage, if any
13.2.	..	Check the projection of the spout on the underside (see whether structural members are being affected)
13.3.	..	Report adequacy, thereof
13.4.	..	For sub-ways report about adequacy of pumping arrangements, etc
14.	..	**Handrails**
14.1.	..	Report general condition (check expansion gaps, missing parts, if any, etc.)
14.2.	..	Report damage due to collision
14.3.	..	Check alignment (report any abruptness in profile)
15.	..	**Footpaths**
15.1.	..	Report general condition (damage due to mounting of vehicles)
15.2.	..	Report missing footpath slabs
16.	..	**Utilities**
16.1.	..	Report leakage of water and sewage pipes
16.2.	..	Report any damage by telephone and electric cables
16.3.	..	Report condition of lighting facilities
16.4.	..	Report damages due to any other utilities
17.	..	**Bridge Number**
17.1.	..	Report condition of painting.

Source :IRC Code SP-1996

Bridge Inspection Form used by Assam PWD (8 of 8)

18.	..	**Aesthetics**
18.1.	..	Report any visual intrusion (Bill-boards, paints on structural members, etc.)
19.	..	Report whether maintenance recommended during last inspection has been done or not (give details).
20.	..	Maintenance and improvement recommendations

Sl. No.	*Item needing attention*	*Action recommended*	*Time when to be completed*	*Remarks*

21.	..	Certificate to be accorded by the inspecting official.

Certified that I have personally inspected this bridge.

Date :

Signature
Designation of the inspecting officer.

Note : **Items marked * need not be filled up for Minor Bridges.**

Source :IRC Code SP-1996

付録-8

EIRR 計算書

EIRR Calculation Table

(1) Kaliabhomora Bridge (Assam)

EIRR = 49.1%

(Rs Million)

Year		Cost									(Total)	Benefit		(Total)	Net Cash Flow
		With Project						Without Project				VOC	Time		
		New Bridge			Rehabilitation										
		D/D	Const	S/V	D/D	Const	S/V	D/D	Const	S/V					
1	2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2017	0.0	0.0	0.0	**10.8**	0.0	0.0	0.0	0.0	0.0	10.8	0.0	0.0	0.0	-10.8
5	2018	0.0	0.0	0.0	0.0	**278.1**	**25.2**	0.0	0.0	0.0	303.3	0.0	0.0	0.0	-303.3
6	2019	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.5	16.5	16.5
7	2020	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.4	17.4	17.4
8	2021	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0	9.0	9.0
9	2022	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.3	9.3	9.3
10	2023	0.0	0.0	0.0	0.0	0.0	0.0	**10.8**	0.0	0.0	-10.8	0.0	9.6	9.6	20.4
11	2024	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**278.1**	**25.2**	-303.3	2,148.3	774.8	2,923.0	3,226.3
12	2025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	2026	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	2027	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	2028	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	2029	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	2030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

(2) Badarpurghat Bridge (Assam)

EIRR = 39.0%

(Rs Million)

Year		Cost									(Total)	Benefit		(Total)	Net Cash Flow
		With Project						Without Project				VOC	Time		
		New Bridge			Rehabilitation										
		D/D	Const	S/V	D/D	Const	S/V	D/D	Const	S/V					
1	2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2017	**42.3**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.3	0.0	0.0	0.0	-42.3
5	2018	0.0	**544.1**	**49.5**	0.0	0.0	0.0	0.0	0.0	0.0	593.6	0.0	0.0	0.0	-593.6
6	2019	0.0	**544.1**	**49.5**	0.0	0.0	0.0	0.0	0.0	0.0	593.6	0.0	0.0	0.0	-593.6
7	2020	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.8
8	2021	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.8
9	2022	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.8
10	2023	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.8
11	2024	0.0	0.0	0.0	0.0	0.0	0.0	**42.3**	0.0	0.0	-42.3	2,462.4	556.4	3,018.8	3,061.1
12	2025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**544.1**	**49.5**	-593.6	2,573.9	575.4	3,149.2	3,742.8
13	2026	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**544.1**	**49.5**	-593.6	2,690.5	594.9	3,285.5	3,879.0
14	2027	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	2028	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	2029	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	2030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

(3) Zuari Bridge (Goa)

														EIRR =	38.1%
															(Rs Million)
Year		Cost									Benefit				Net
		With Project						Without Project			(Total)	VOC	Time	(Total)	Cash
		New Bridge			Rehabilitation										Flow
		D/D	Const	S/V	D/D	Const	S/V	D/D	Const	S/V					
1	2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2017	**90.9**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.9	0.0	0.0	0.0	-90.9
5	2018	0.0	**1159.7**	**105.8**	0.0	0.0	0.0	0.0	0.0	0.0	1,265.4	0.0	0.0	0.0	-1,265.4
6	2019	0.0	**1159.7**	**105.8**	**6.3**	0.0	0.0	0.0	0.0	0.0	1,271.7	0.0	0.0	0.0	-1,271.7
7	2020	0.0	0.0	0.0	0.0	**153.0**	**13.5**	0.0	0.0	0.0	166.5	305.2	28.1	333.3	166.8
8	2021	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	323.9	29.4	353.3	353.3
9	2022	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	343.6	30.7	374.4	374.4
10	2023	0.0	0.0	0.0	0.0	0.0	0.0	**6.3**	0.0	0.0	-6.3	364.6	32.2	396.7	403.0
11	2024	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**153.0**	**13.5**	-166.5	4,000.6	8,982.8	12,983.4	13,149.9
12	2025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.2	35.2	35.2
13	2026	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	36.8	36.8
14	2027	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.5	38.5	38.5
15	2028	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.3	40.3	40.3
16	2029	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.1	42.1	42.1
17	2030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.1	44.1	44.1

(4) Borim Bridge (Goa)

														EIRR =	31.3%
															(Rs Million)
Year		Cost									Benefit				Net
		With Project						Without Project			(Total)	VOC	Time	(Total)	Cash
		New Bridge			Rehabilitation										Flow
		D/D	Const	S/V	D/D	Const	S/V	D/D	Const	S/V					
1	2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2017	**46.8**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.8	0.0	0.0	0.0	-46.8
5	2018	0.0	**601.2**	**54.9**	0.0	0.0	0.0	0.0	0.0	0.0	656.1	0.0	0.0	0.0	-656.1
6	2019	0.0	**601.2**	**54.9**	**0.0**	**0.0**	**0.0**	0.0	0.0	0.0	656.1	0.0	0.0	0.0	-656.1
7	2020	0.0	0.0	0.0	1.8	37.8	3.6	0.0	0.0	0.0	43.2	0.0	6.8	6.8	-36.4
8	2021	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	7.0
9	2022	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.3	7.3	7.3
10	2023	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5
11	2024	0.0	0.0	0.0	0.0	0.0	0.0	**1.8**	**37.8**	**3.6**	-43.2	2,535.2	3,693.7	6,228.9	6,272.1
12	2025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	8.0	8.0
13	2026	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.3	8.3	8.3
14	2027	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.5	8.5	8.5
15	2028	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.8	8.8	8.8
16	2029	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	9.1	9.1
17	2030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.4	9.4	9.4

(5) Mahe Bridge (Kerala)

EIRR = 31.6%

(Rs Million)

Year		Cost										Benefit			Net
		With Project						Without Project			(Total)	VOC	Time	(Total)	Cash
		New Bridge			Rehabilitation										Flow
		D/D	Const	S/V	D/D	Const	S/V	D/D	Const	S/V					
1	2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2017	0.0	0.0	0.0	**9.0**	0.0	0.0	0.0	0.0	0.0	9.0	0.0	0.0	0.0	-9.0
5	2018	0.0	0.0	0.0	0.0	**232.2**	**20.7**	0.0	0.0	0.0	252.9	0.0	0.0	0.0	-252.9
6	2019	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	2.6	2.6
7	2020	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	2.8	2.8
8	2021	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0
9	2022	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0
10	2023	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	1.1
11	2024	0.0	0.0	0.0	0.0	0.0	0.0	**9.0**	0.0	0.0	-9.0	299.2	344.8	644.0	653.0
12	2025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**232.2**	**20.7**	-252.9	311.9	357.2	669.1	922.0
13	2026	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	2027	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	2028	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	2029	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	2030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

(6) Valapattanam Bridge (Kerala)

EIRR = 45.1%

(Rs Million)

Year		Cost										Benefit			Net
		With Project						Without Project			(Total)	VOC	Time	(Total)	Cash
		New Bridge			Rehabilitation										Flow
		D/D	Const	S/V	D/D	Const	S/V	D/D	Const	S/V					
1	2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2017	0.0	0.0	0.0	**32.4**	0.0	0.0	0.0	0.0	0.0	32.4	0.0	0.0	0.0	-32.4
5	2018	0.0	0.0	0.0	0.0	**417.6**	**37.8**	0.0	0.0	0.0	455.4	0.0	0.0	0.0	-455.4
6	2019	0.0	0.0	0.0	0.0	**417.6**	**37.8**	0.0	0.0	0.0	455.4	0.0	0.0	0.0	-455.4
7	2020	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.5	15.5	15.5
8	2021	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.1	8.1	8.1
9	2022	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.4	8.4	8.4
10	2023	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.7	8.7	8.7
11	2024	0.0	0.0	0.0	0.0	0.0	0.0	**32.4**	0.0	0.0	-32.4	1,250.4	1,849.7	3,100.1	3,132.5
12	2025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**417.6**	**37.8**	-455.4	1,308.6	1,923.7	3,232.3	3,687.7
13	2026	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**417.6**	**37.8**	-455.4	1,369.5	2,000.6	3,370.2	3,825.6
14	2027	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	2028	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	2029	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	2030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

(7) Perumba Bridge (Kerala)

EIRR = 38.7%

(Rs Million)

Year		Cost										Benefit			Net
		With Project						Without Project			(Total)	VOC	Time	(Total)	Cash
		New Bridge			Rehabilitation										Flow
		D/D	Const	S/V	D/D	Const	S/V	D/D	Const	S/V					
1	2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2017	0.0	0.0	0.0	**10.8**	0.0	0.0	0.0	0.0	0.0	10.8	0.0	0.0	0.0	-10.8
5	2018	0.0	0.0	0.0	0.0	**281.7**	**25.2**	0.0	0.0	0.0	306.9	0.0	0.0	0.0	-306.9
6	2019	0.0	0.0	0.0	0.0	**0.0**	**0.0**	0.0	0.0	0.0	0.0	0.0	3.0	3.0	3.0
7	2020	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	3.2	3.2
8	2021	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	1.1
9	2022	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	1.2	1.2
10	2023	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	1.2	1.2
11	2024	0.0	0.0	0.0	0.0	0.0	0.0	**10.8**	0.0	0.0	-10.8	557.3	596.1	1,153.4	1,164.2
12	2025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**281.7**	**25.2**	-306.9	587.0	623.5	1,210.6	1,517.5
13	2026	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	2027	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	2028	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	2029	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	2030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

(8) Shetrunji Bridge (Gujarat)

EIRR = 21.7%

(Rs Million)

Year		Cost										Benefit			Net
		With Project						Without Project			(Total)	VOC	Time	(Total)	Cash
		New Bridge			Rehabilitation										Flow
		D/D	Const	S/V	D/D	Const	S/V	D/D	Const	S/V					
1	2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	2018	0.0	0.0	0.0	**16.2**	0.0	0.0	0.0	0.0	0.0	16.2	0.0	0.0	0.0	-16.2
6	2019	0.0	0.0	0.0	0.0	**412.2**	**37.8**	0.0	0.0	0.0	450.0	0.0	0.0	0.0	-450.0
7	2020	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0
8	2021	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	2.1	2.1
9	2022	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	2.2	2.2
10	2023	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	2.3	2.3
11	2024	0.0	0.0	0.0	0.0	0.0	0.0	**16.2**	0.0	0.0	-16.2	239.5	217.8	457.3	473.5
12	2025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**412.2**	**37.8**	-450.0	253.8	228.9	482.7	932.7
13	2026	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	2027	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	2028	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	2029	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	2030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Study Team

Note: D/D: Detail Design
Const: Construction
S/V: Supervision

付録-9

ムンバイ トランスハーバーリンク

Data Collection Survey on Bridge Sector

Mumbai Trans Harbour Link (MTHL)

20th January 2014

Oriental Consultants Co., Ltd.
East Nippon Expressway Company Limited

Contents

ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

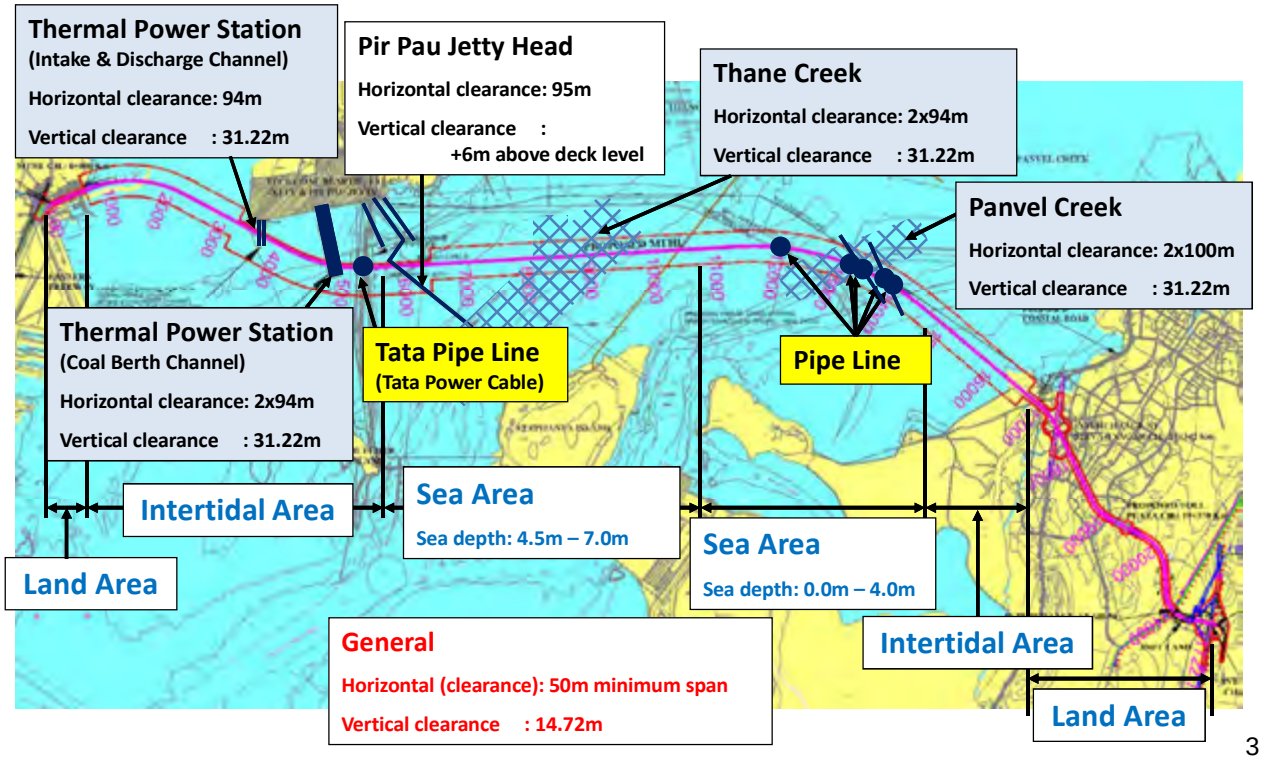
1. Original Design
2. Applicable Japanese Technology
3. Comparative Study for Alternatives (draft)
4. Next Step

1. Original Design

ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

■ Route Alignment

< Navigation Clearance and Pipe Line >



1. Original Design

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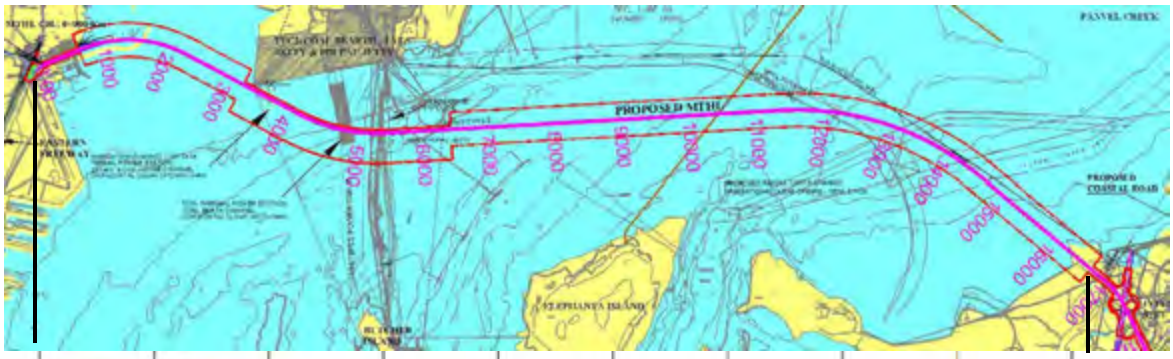
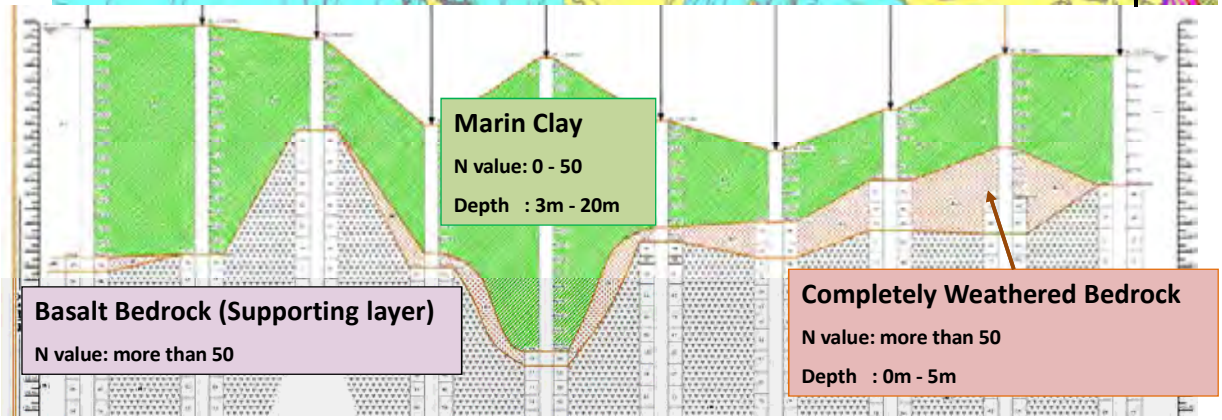
■ Geological Condition





1. Original Design

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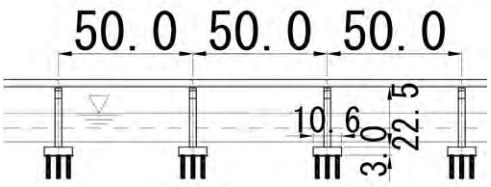
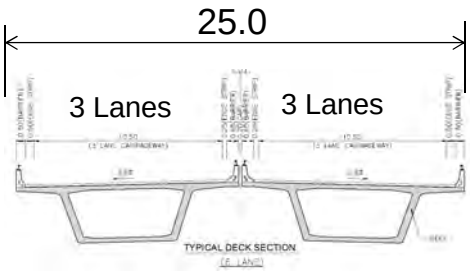
■ Bridge Type of Marine Viaducts and Bridges

- General Section

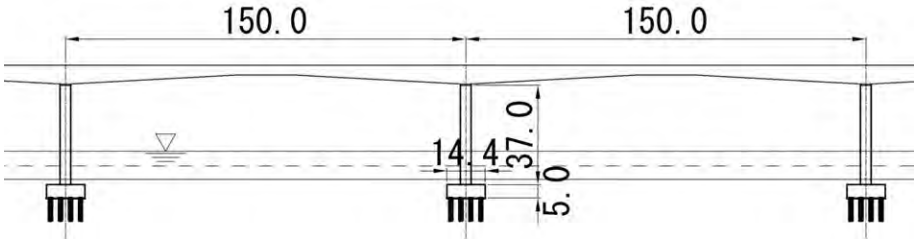
PC Box (50 m)





- Navigation Channel, Pipeline Section

PC Box (150 – 180 m)



1. Original Design

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EAST NIPPON EXPRESSWAY COMPANY LIMITED

■ Construction Cost

- Total Cost: 77,000 million Rs
- Marine Viaducts and Bridges: 60,300 million Rs (78%)

■ Construction Period: 72 months

Activity Code	Activity	Y1 Q1	Y1 Q2	Y1 Q3	Y1 Q4	Y2 Q1	Y2 Q2	Y2 Q3	Y2 Q4	Y3 Q1	Y3 Q2	Y3 Q3	Y3 Q4	Y4 Q1	Y4 Q2	Y4 Q3	Y4 Q4	Y5 Q1	Y5 Q2	Y5 Q3	Y5 Q4	Y6 Q1	Y6 Q2	Y6 Q3	Y6 Q4	Y7 Q1	Y7 Q2	Y7 Q3	Y7 Q4	Y47 Q4
01) Pre-construction Activities																													
01-01	Contract Award			☆																									
01-02	Surveys																												
01-03	Preliminary Design Activities																												
01-04	Contractor's Compound																												
01-05	Precasting Yard																												
02) Main Bridge Works																													
02-01	Piling and Pile Caps																												
02-02	Sub-structure																												
02-03	Superstructure																												
02-04	Pavement and bridge furniture																												
03) Highway Works and Other Structures																													
03-01	Earthworks																												
03-02	ROB, Under Passes, Drainage etc																												
03-03	Interchanges at Sewri and Chirle																												
03-04	Pavement and street furniture																												
04) Other Works																													
04-01	Toll Plaza																												
04-02	Intelligent Traffic Surveillance System																												
04-03	Mechanical and Electrical Works																												
04-04	Landscaping																												
05) Concession Period																													
05-01	Highway Operations Start Date (for 40 years)																										☆		
05-02	Concession Period End Date																											☆	

1) Actual phasing of works will vary depending on contractors own construction plan.
2) Orange highlight indicates monsoon period.

2. Applicable Japanese Technology

ORIENTAL CONSULTANTS CO., LTD.
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(1) Large Block Steel Box Girder

- Construction period can be shorten by large block erection method by floating crane.
- Number of substructure can be reduced by long span.

Steel Box Girder Bridge (Tokyo Bay Aqua Line) Span Length: 240 - 80 m

2. Applicable Japanese Technology

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(2) Steel Girder Cable Stayed Bridge

- Number of substructure can be reduced by long span more than 300 m.
- Bridge appearance will be symbolic.

Steel Cable Stayed Bridge (Yokohama Bay Bridge) Span Length: 460 m

2. Applicable Japanese Technology

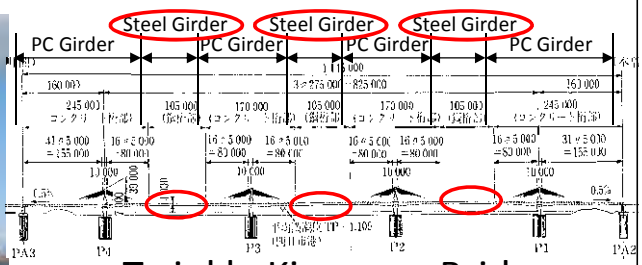
ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

(3) Extra-dosed Bridge

- Construction cost is cheaper than Cable Stayed Bridge.
  - PC Extra-dosed Bridge

Tokunoyama Hattoku Bridge
(Span Length: 220 m)

- PC and Steel Composite Extra-dosed Bridge

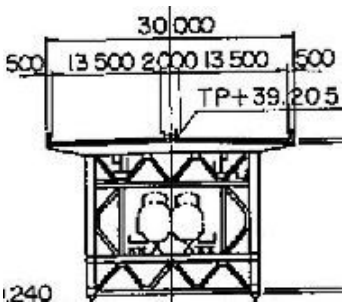


Twinkle Kisogawa Bridge
(Span Length: 275 m)

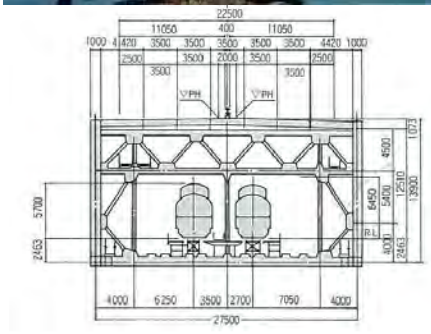
2. Applicable Japanese Technology

ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

(3) Double-deck Truss Bridge (Road and Railway)



Truss Bridge Type
(Kansai International Airport Viaduct)
Span Length: 150 m



Cable-stayed Type
(Hitsuishijima Bridge)
Span Length: 420 m

2. Applicable Japanese Technology

ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

(4) Steel Pile Sheet Pile Foundation

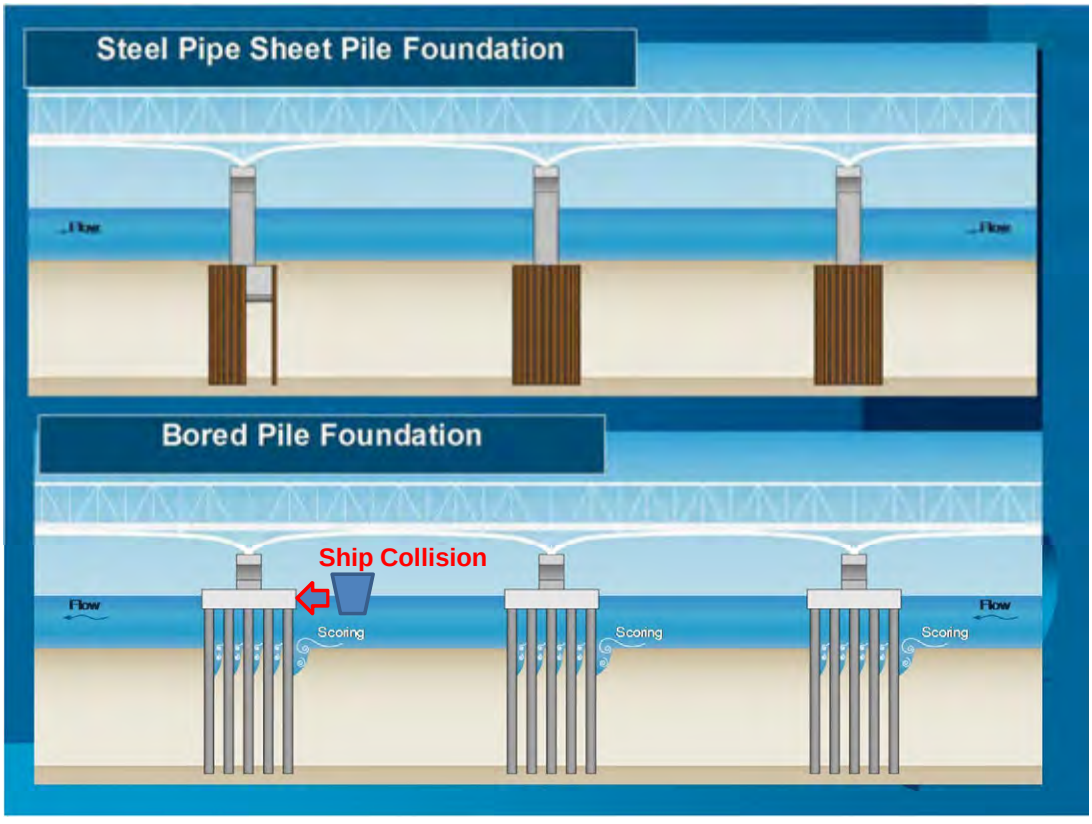
Advantages of Steel Pile Sheet Pile Foundation

- Good constructability
- Prevention from scouring on sea bed
- Safety for ship collision

2. Applicable Japanese Technology

ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

(4) Steel Pile Sheet Pile Foundation



2. Applicable Japanese Technology

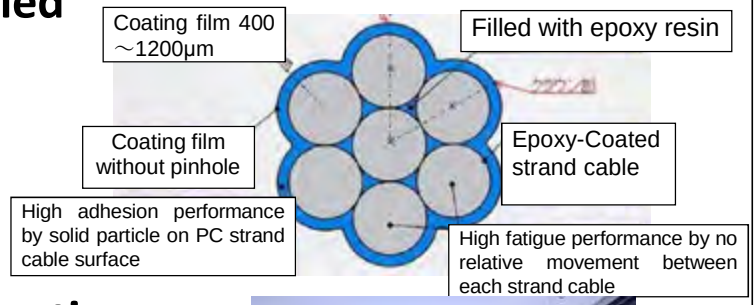
ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

(5) Countermeasure for Salt Damage

- Epoxy Coated Reinforcing Bar

Epoxy Coated Reinforcing Bar

- Epoxy Coated and Filled PC Strand Cable



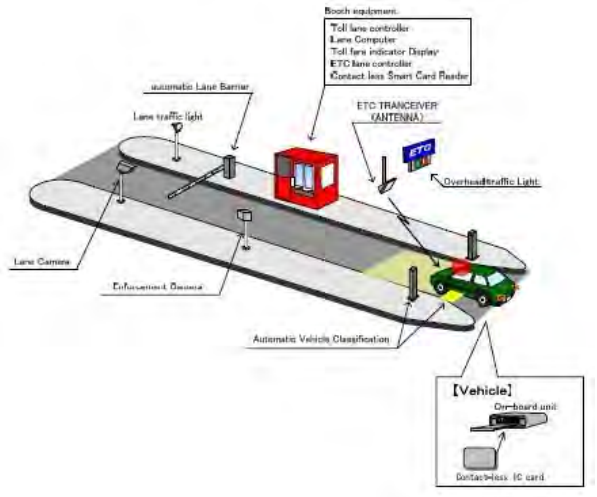
- Thick Anticorrosion Coating on Steel Girder surface

2. Applicable Japanese Technology

ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

(6) Intelligent Transport Systems (ITS)

- Electronic Toll Collection (ETC)



Before installation ETC

After installation ETC

2. Applicable Japanese Technology

ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

(6) Intelligent Transport Systems (ITS)

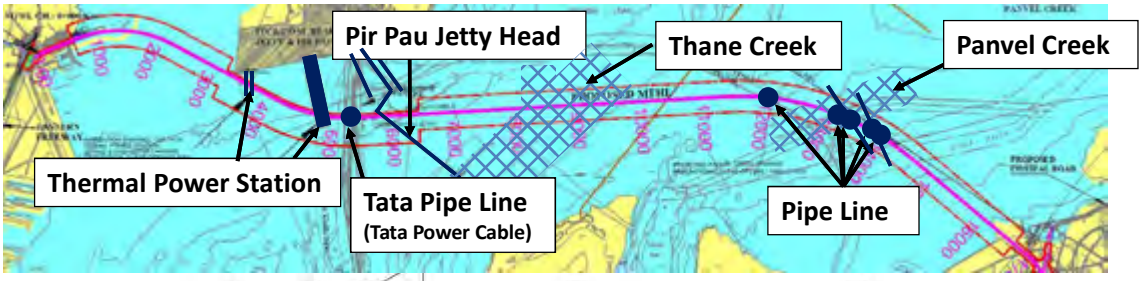
- Information Panel

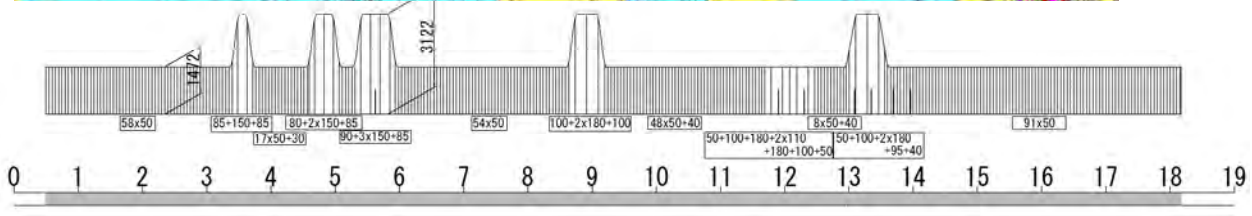
- Control Centre

3. Comparative Study for Alternatives

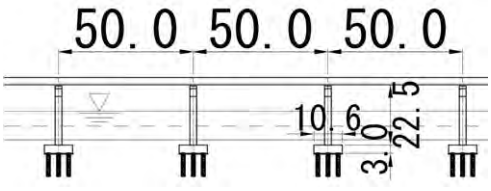
ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

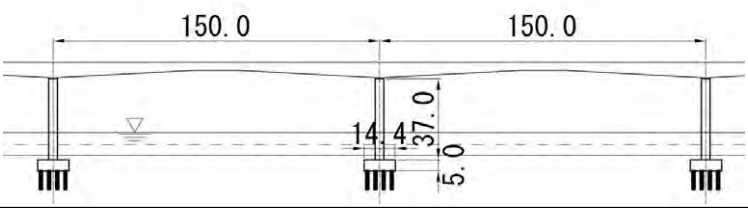
■ Original Design





PC Box Girder (50 m - 180m)

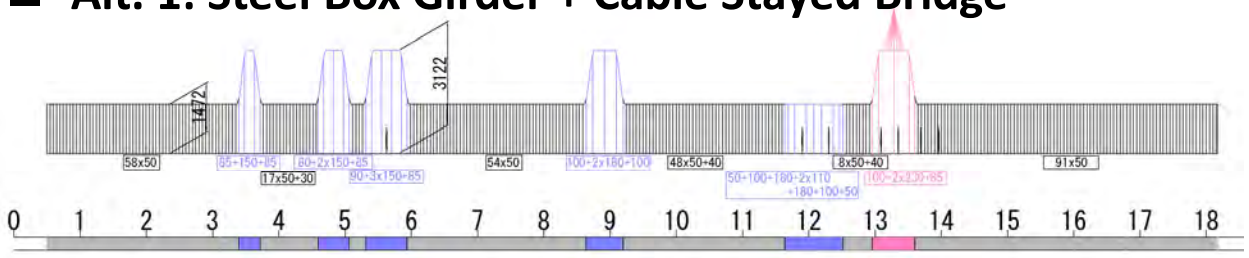




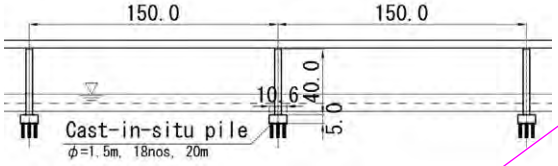
3. Comparative Study for Alternatives

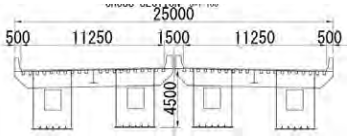
ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

■ Alt. 1: Steel Box Girder + Cable Stayed Bridge

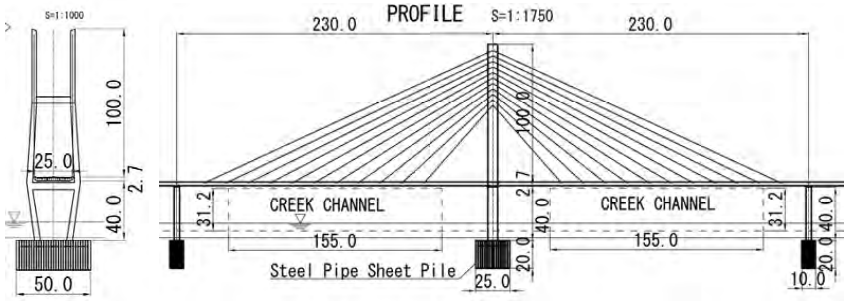


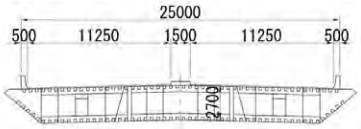
Steel Box Girder (150-180 m)





Cable Stayed Bridge (230m)

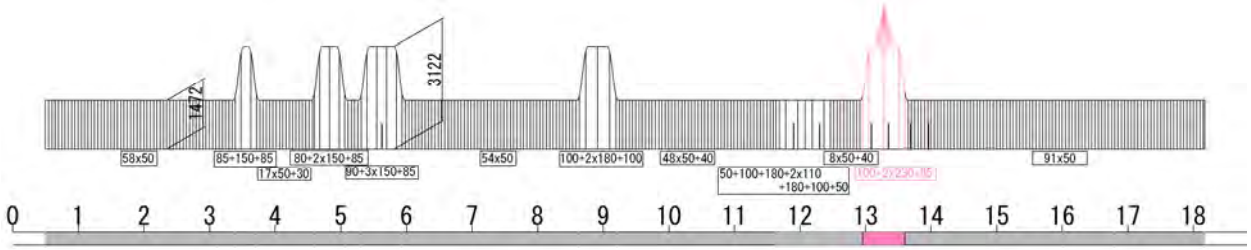




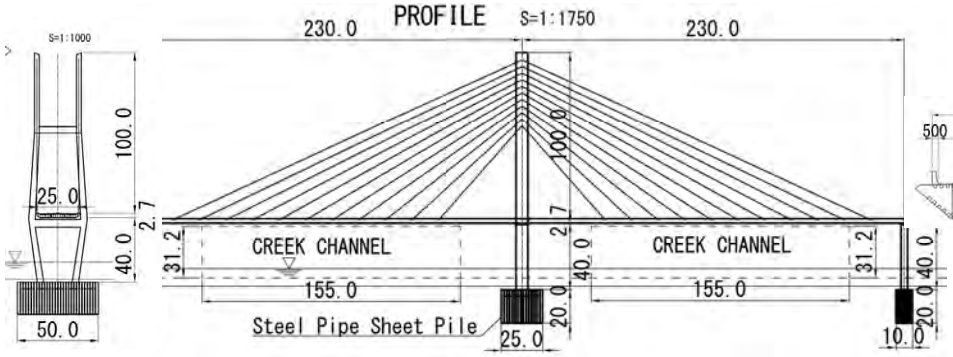
3. Comparative Study for Alternatives

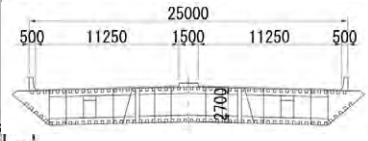
ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

■ Alt. 1': Cable Stayed Bridge



Cable Stayed Bridge (230m)

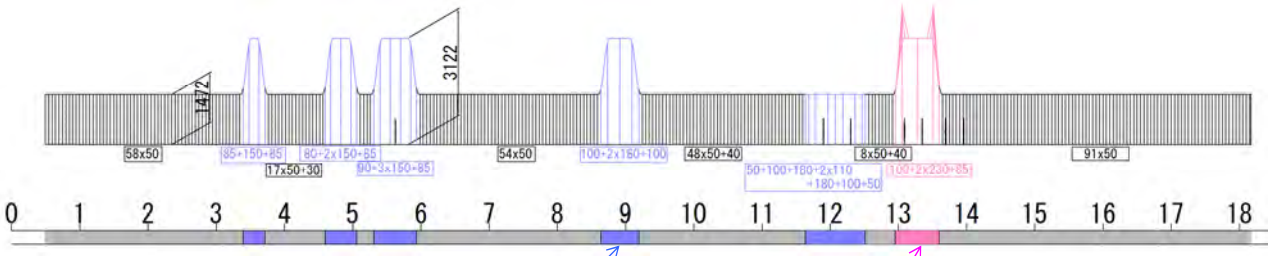




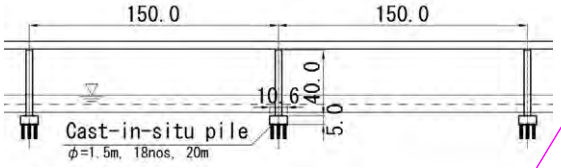
3. Comparative Study for Alternatives

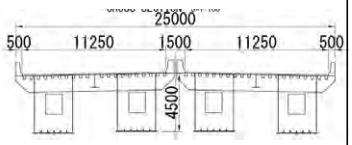
ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

■ Alt. 2: Steel Box Girder + Composite Extra-dosed Bridge

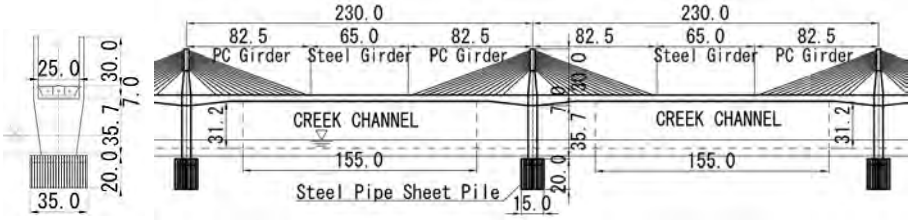


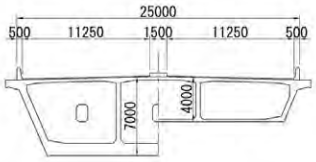
Steel Box Girder (150-180m)

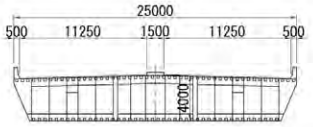




Composite Extra-dosed Bridge (230m)



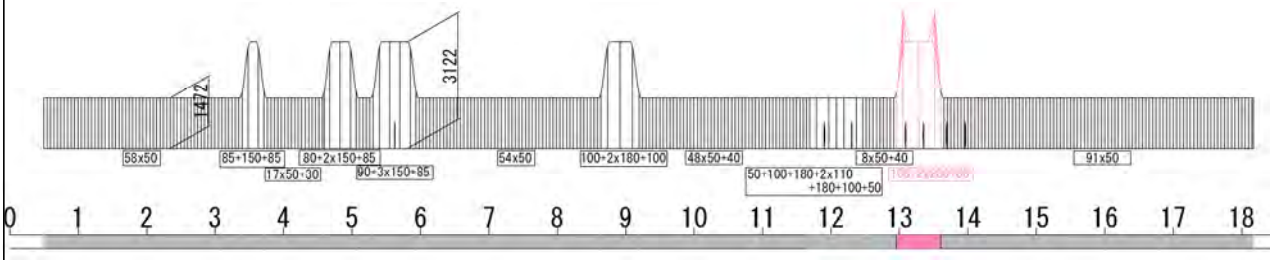




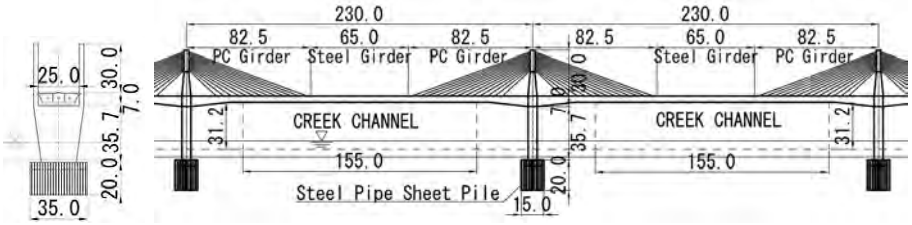
3. Comparative Study for Alternatives

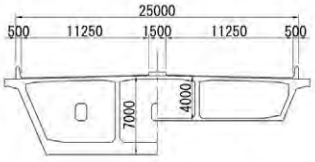
ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

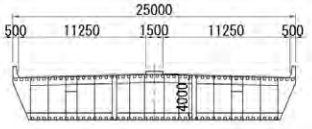
■ Alt. 2': Composite Extra-dosed Bridge



Composite Extra-dosed Bridge (230m)



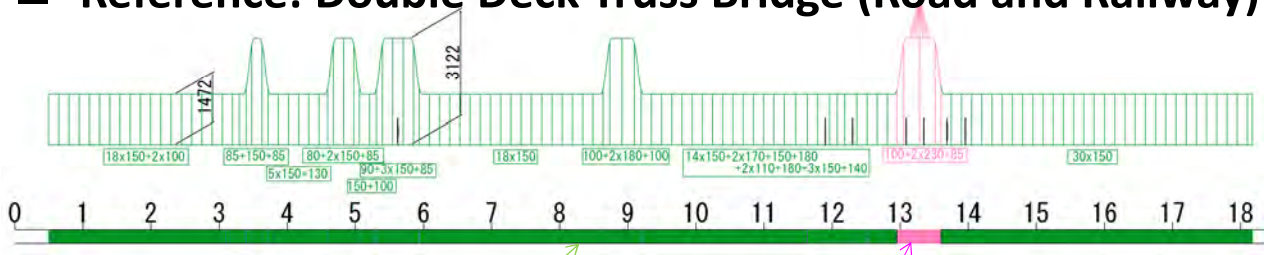




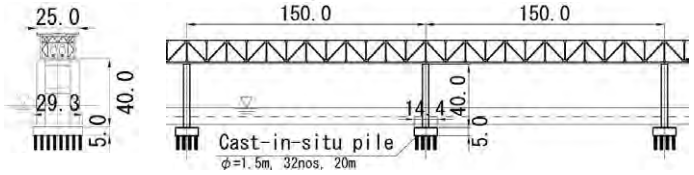
3. Comparative Study for Alternatives

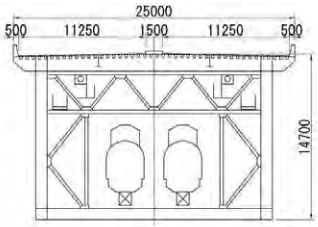
ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

■ Reference: Double Deck Truss Bridge (Road and Railway)

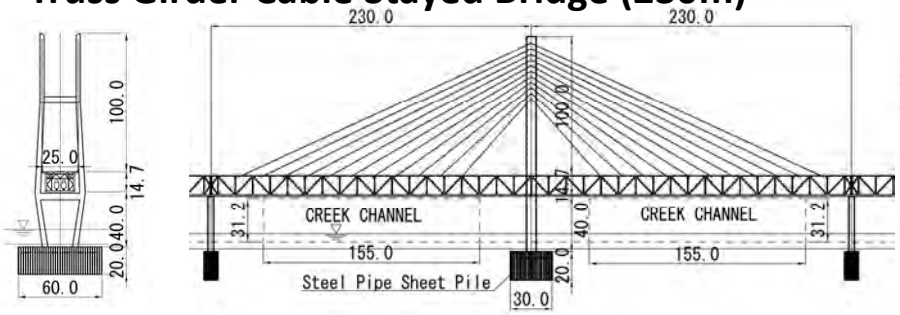


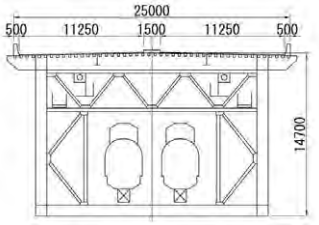
Truss Girder Bridge (150m)





Truss Girder Cable Stayed Bridge (230m)





3. Comparative Study for Alternatives

ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

■ Comparison Table (draft)

	Original	Alt. 1: Steel Box + Cable Stayed Bridge	Alt. 1': Cable Stayed Bridge	Alt. 2: Steel Box + Composite Extra-dosed Bridge	Alt. 2': Composite Extra-dosed Bridge	Reference: Double Deck Bridge (Road and Railway)
Construction Cost (Ratio)	100%	119%	105%	117%	103%	235%
Construction Period	72 months	60 months	72 months	66 months	72 months	72 months
Safety for Ship Collision	✓ Normal	✓ Good	✓ Good	✓ Good	✓ Good	✓ Good
Prevention of Scouring	✓ Normal	✓ Good	✓ Good	✓ Good	✓ Good	✓ Good
Symbolic Appearance	✓ Normal	✓ Good	✓ Good	✓ Good	✓ Good	✓ Good

4. Next Step

■ Next Meeting (March 2014)

- Rough Economic Analysis (EIIR)
- Evaluation for Alternatives
- Rough Implementation Schedule

↓

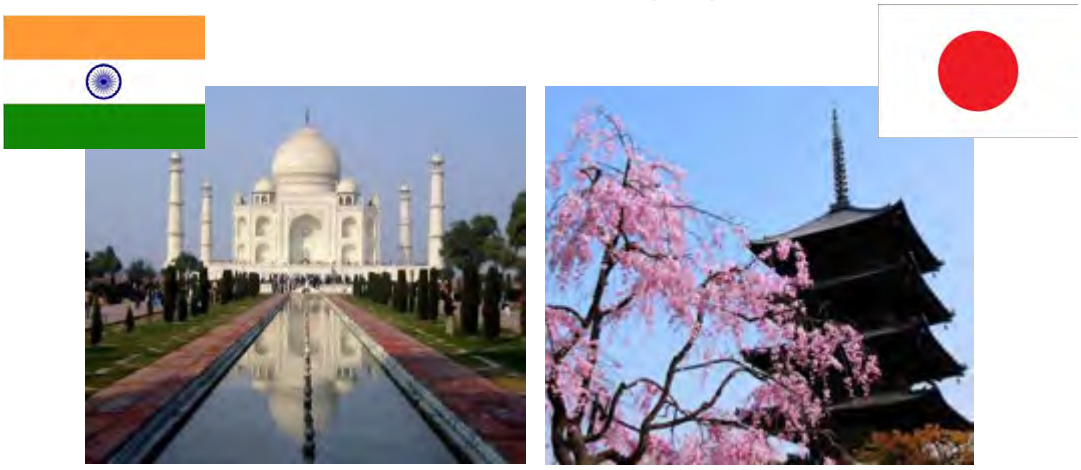
Official Request for Japanese ODA from GOI

↓

Feasibility Study by JICA
- Preliminary Design
- Economic Analysis
- Implementation Schedule
- Environmental Impacts Assessment

ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

THANK YOU



Oriental Consultants Co., Ltd.
East Nippon Expressway Company Limited

Request to the MMRDA

ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED

Design Report (MTHL Final Detailed Feasibility Study)

- Final Reports
- Final Drawings
- Other Reports

Design Condition

- Information of Navigation Clearance
- Information of Pile Lines
- Information of Other Condition

Technical Review and Recommendation of Mumbai Trans Harbour Link (MTHL)

21st March 2014

JICA Survey Team

Oriental Consultants Co., Ltd.
East Nippon Expressway Company Limited

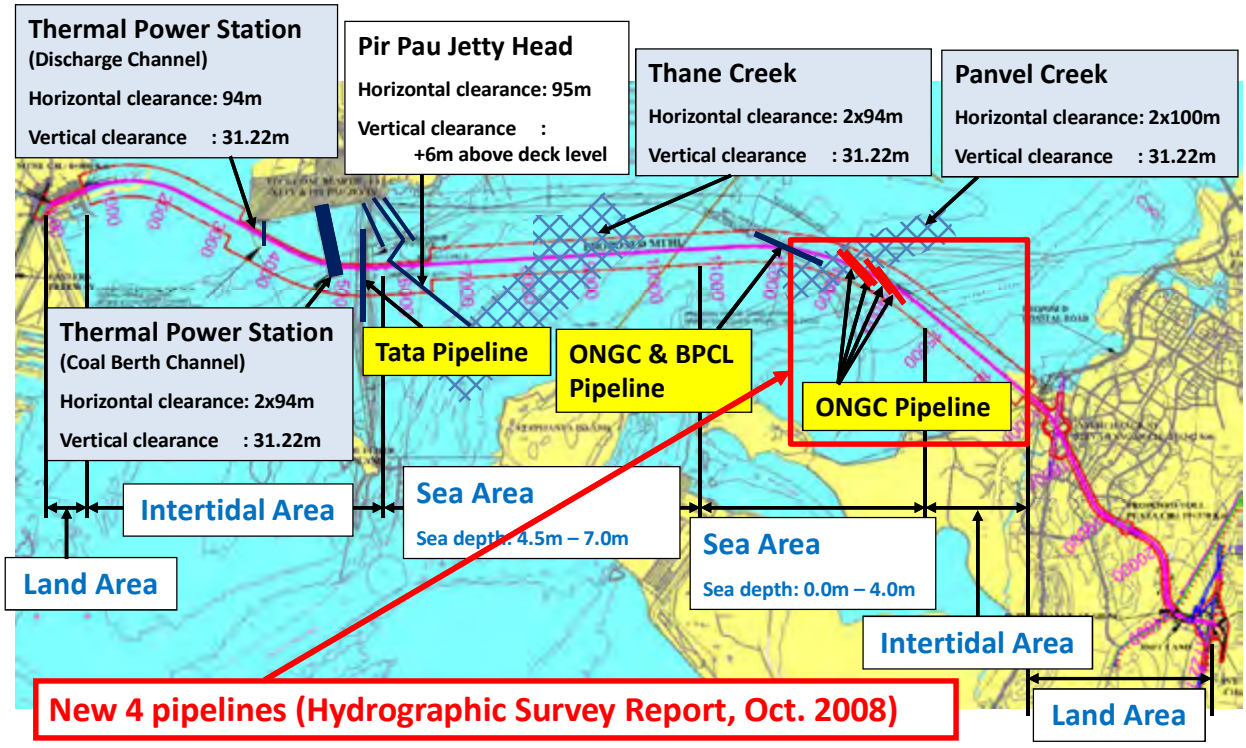
Contents

1. Pipeline and Navigation Clearance
2. Study for Span Configuration
3. Comparative Study for Alternatives
4. Recommendation
5. Rough Implementation Schedule
6. Items to be Confirmed by MMRDA

1. Pipeline and Navigation Clearance

JICA Survey Team

■ Location of Pipeline and Navigation Clearance

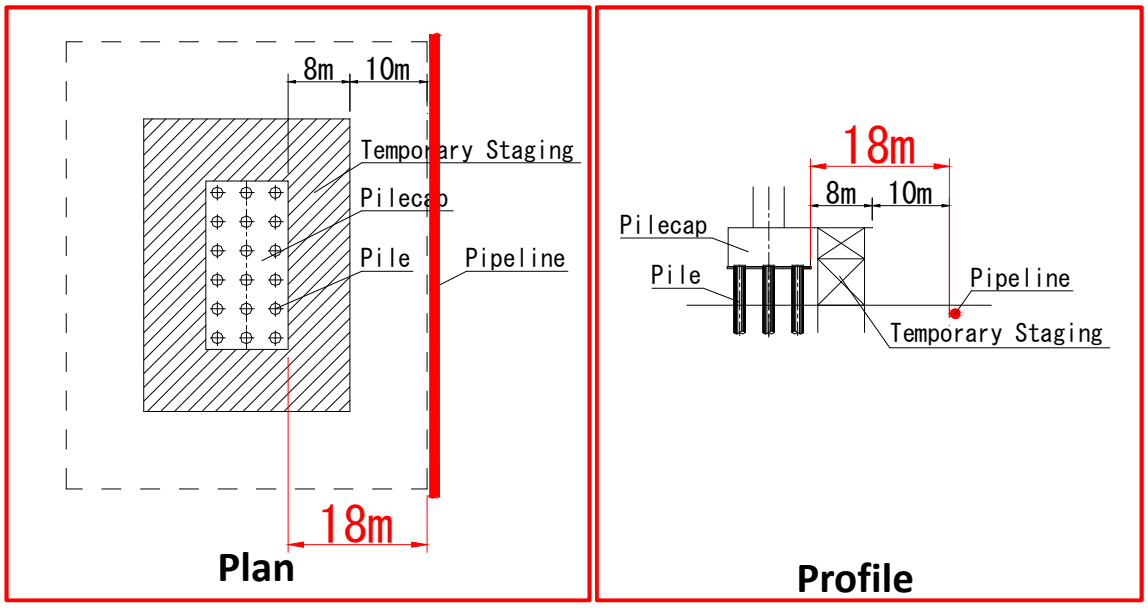


2. Study for Span Configuration

JICA Survey Team

■ Distance between Foundation and Pipeline

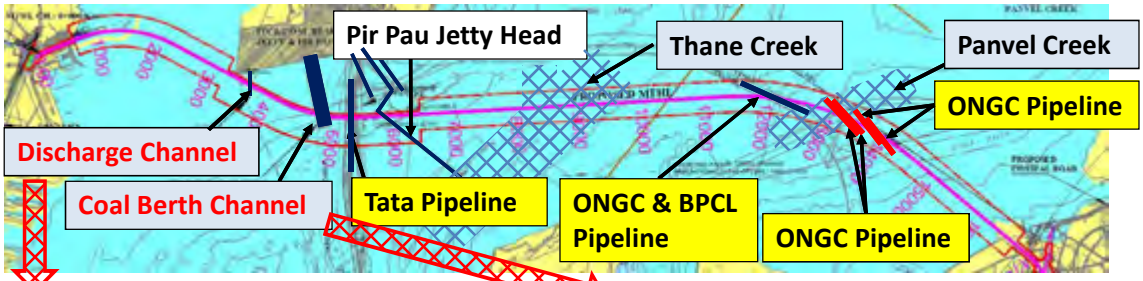
Temporary staging is required to construct foundation.



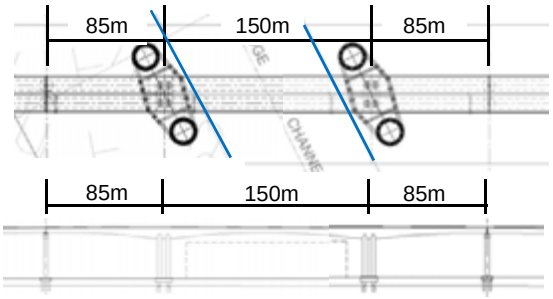
Distance to be secured is estimated 18m.

2. Study for Span Configuration

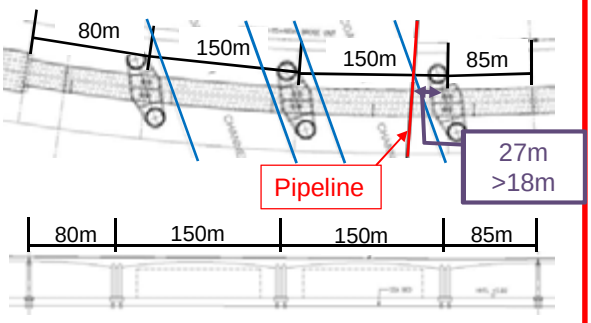
JICA Survey Team



Discharge Channel Bridge



Coal Berth Channel Bridge

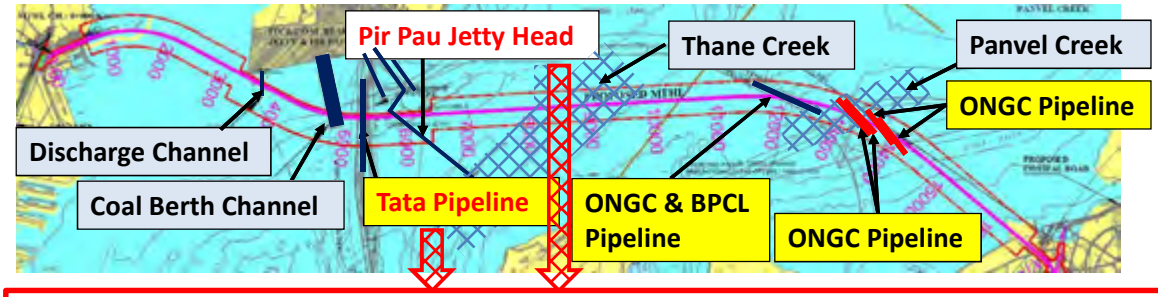


Original span configuration is acceptable.

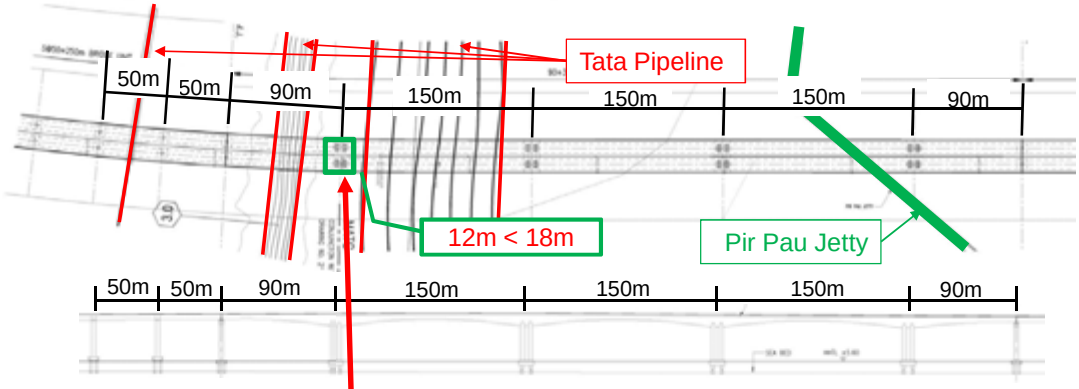
*Restriction of navigation clearance is required during construction.

2. Study for Span Configuration

JICA Survey Team



Tata Pipeline & Pir Pau Jetty Viaduct



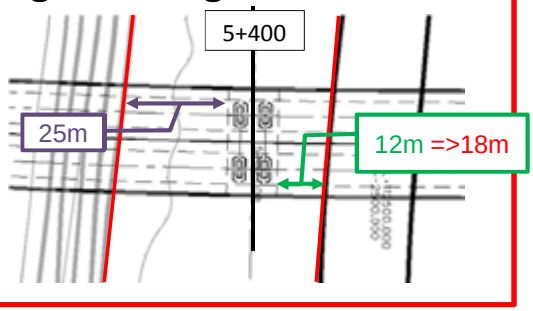
Original pier location shall be shifted.

2. Study for Span Configuration

JICA Survey Team

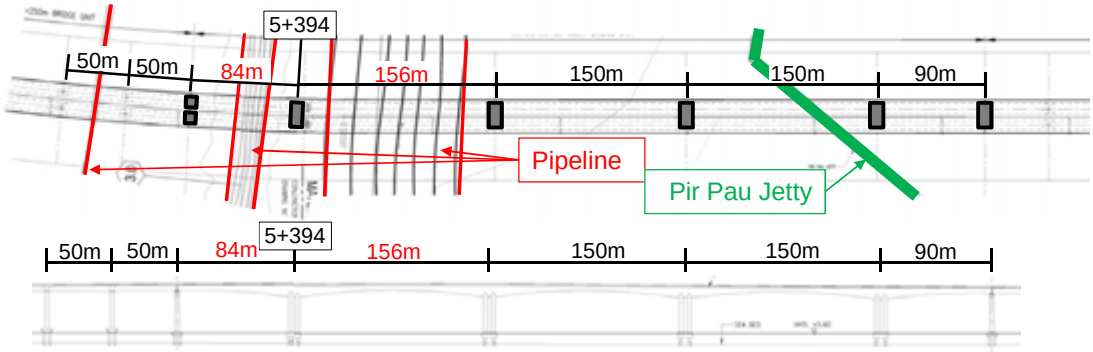
Tata Pipeline & Pir Pau Jetty Viaduct

Original Design



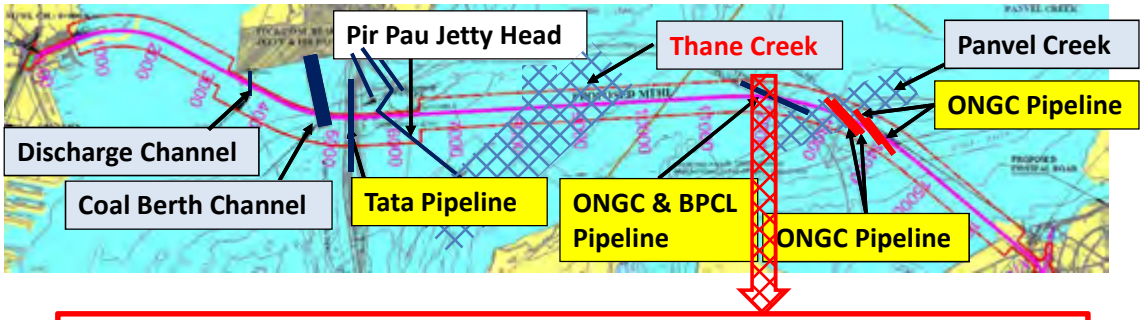
Pier location shall be shifted 6m to secure distance of 18m between foundation and pipelines.

Modified span configuration

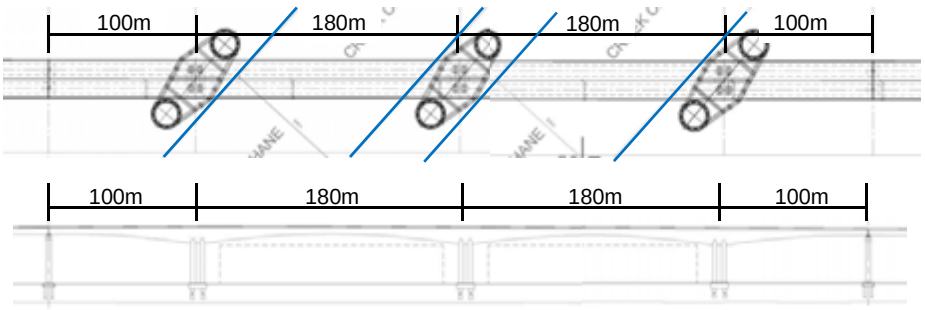


2. Study for Span Configuration

JICA Survey Team



Thane Creek Bridge

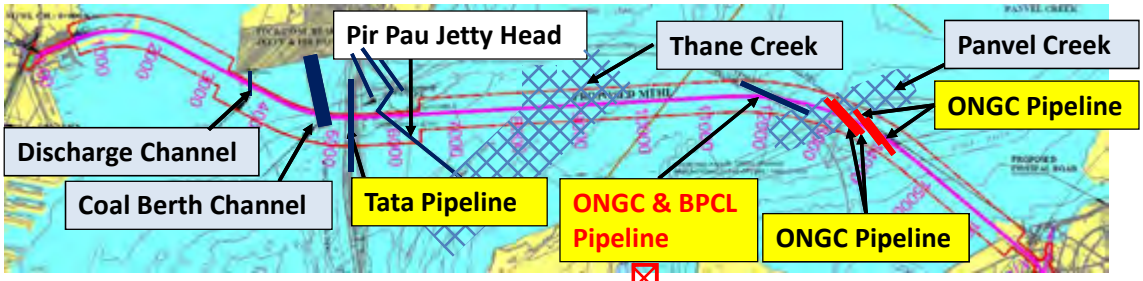


Original span configuration is acceptable.

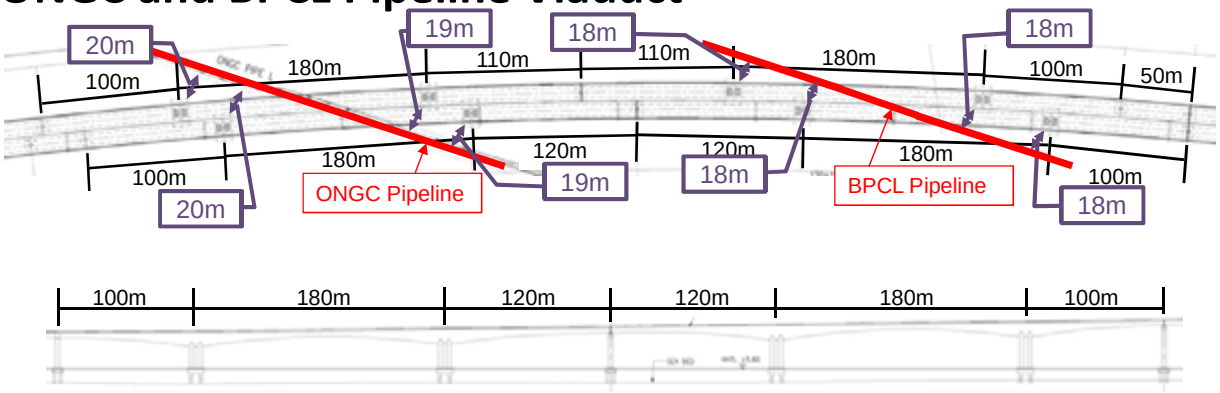
***Restriction of navigation clearance is required during construction.**

2. Study for Span Configuration

JICA Survey Team



ONGC and BPCL Pipeline Viaduct



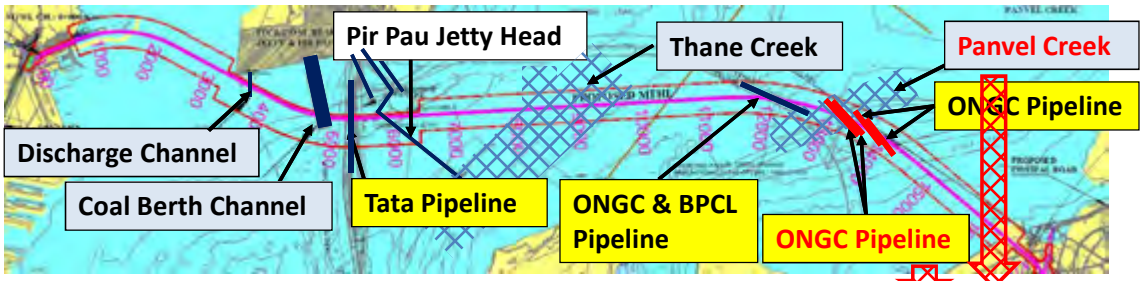
Original span configuration is acceptable.

*Restriction of navigation clearance is required during construction.

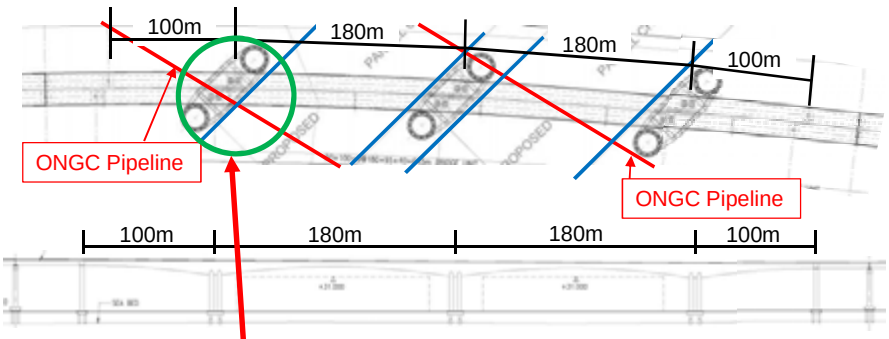
9

2. Study for Span Configuration

JICA Survey Team



Panvel Creek and ONGC Pipeline Viaduct



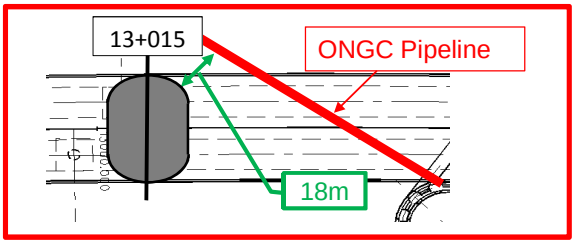
Original pier location shall be shifted.

10

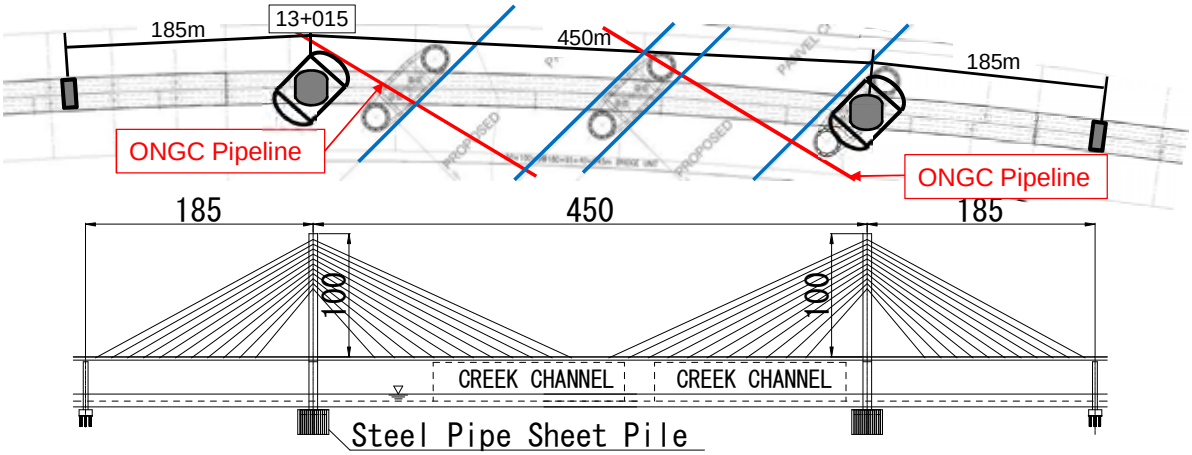
2. Study for Span Configuration

JICA Survey Team

Opt. 1: Cable Stayed Bridge (Span 450m)



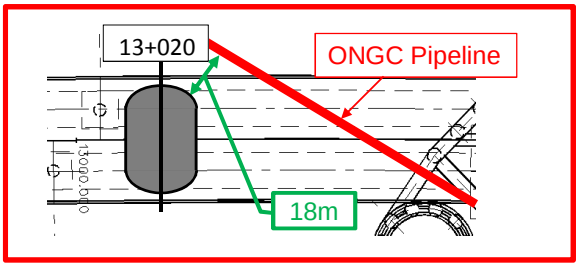
Modified span configuration: Opt. 1



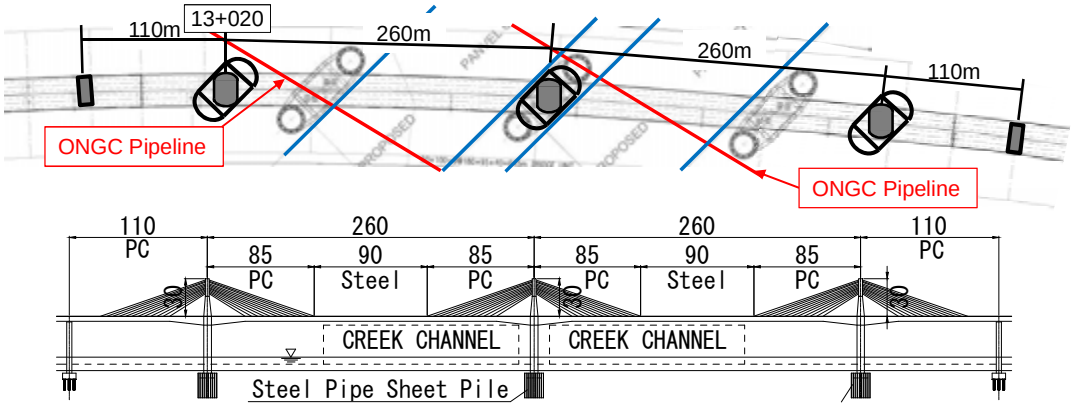
2. Study for Span Configuration

JICA Survey Team

Opt. 2: Composite Extra-dosed Bridge (Span260m)

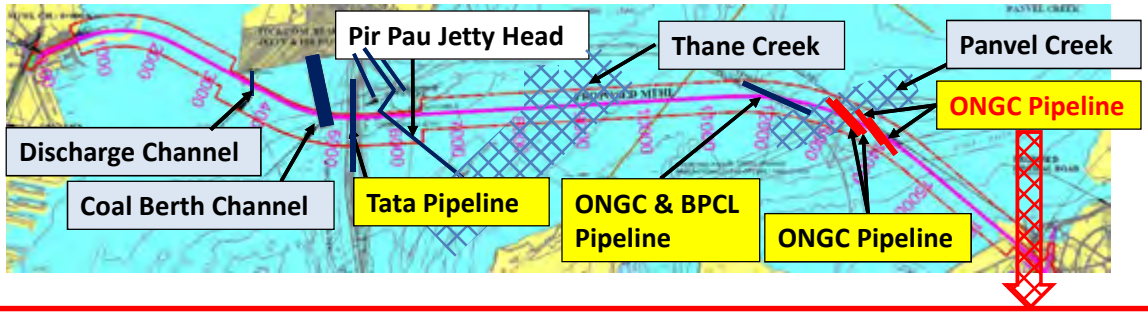


Modified span configuration: Opt. 2

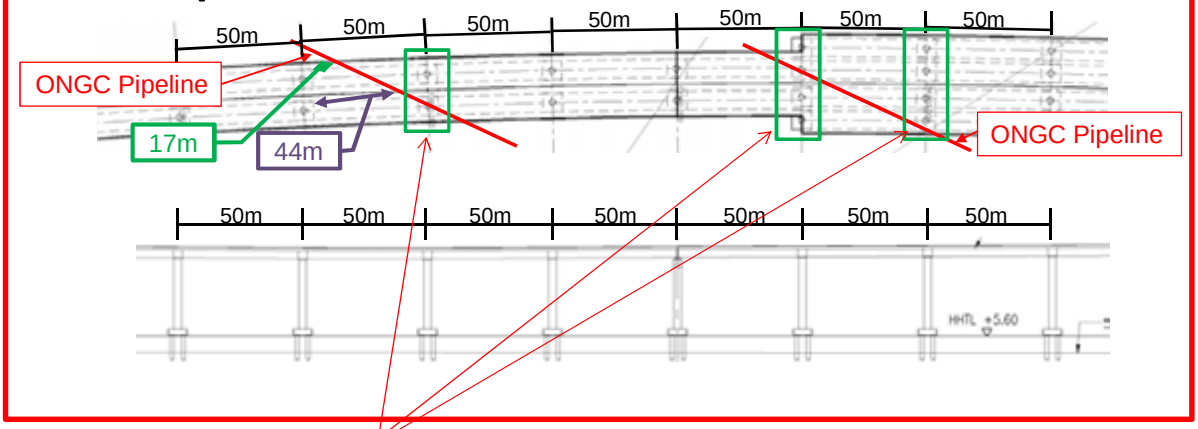


2. Study for Span Configuration

JICA Survey Team



ONGC Pipeline Viaduct



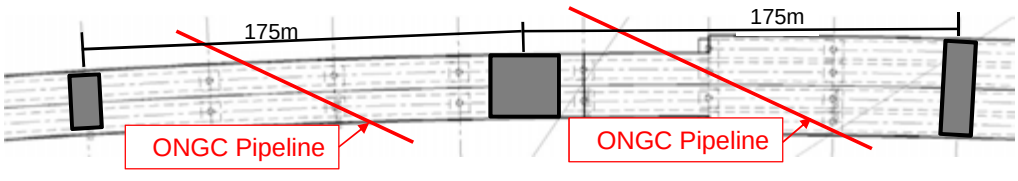
Original pier location shall be shifted.

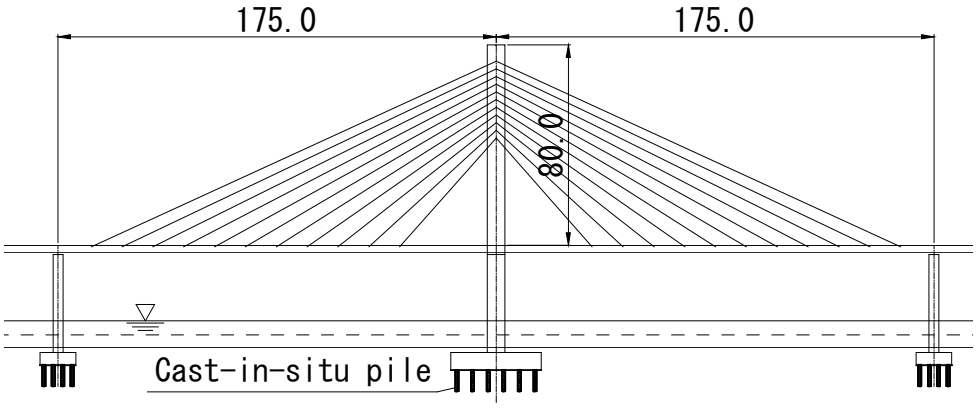
2. Study for Span Configuration

JICA Survey Team

ONGC Pipeline Viaduct

Modified span configuration (Cable Stayed Bridge)

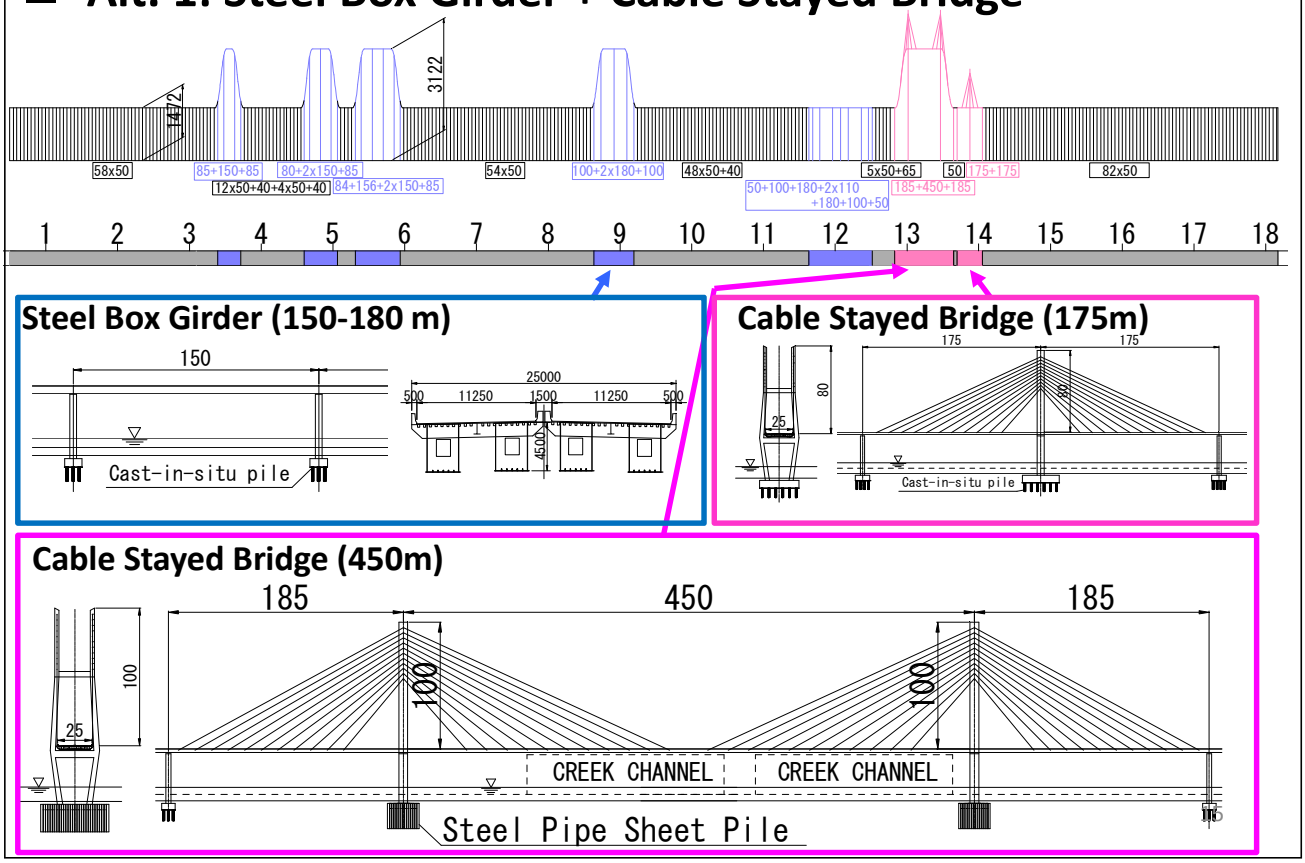




3. Comparative Study for Alternatives

JICA Survey Team

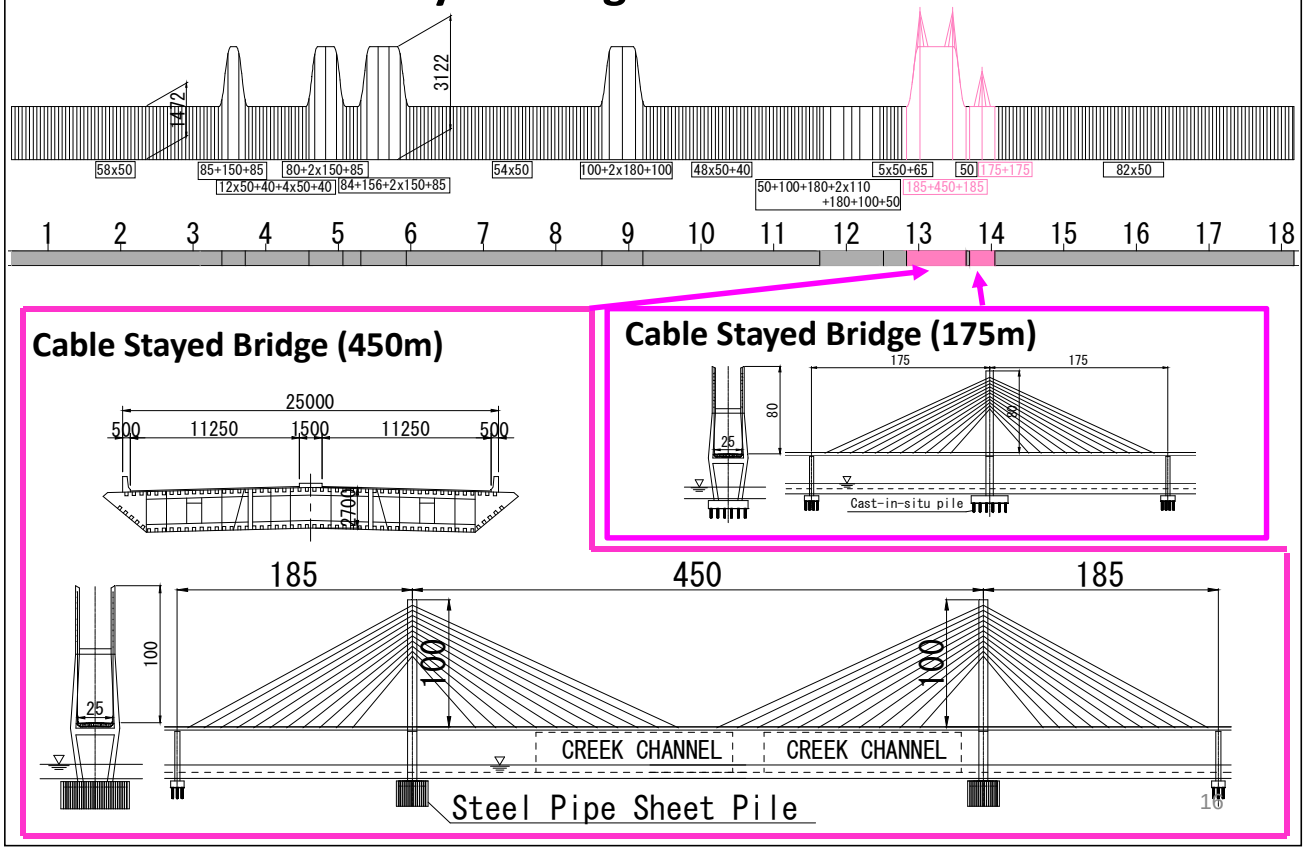
■ Alt. 1: Steel Box Girder + Cable Stayed Bridge



3. Comparative Study for Alternatives

JICA Survey Team

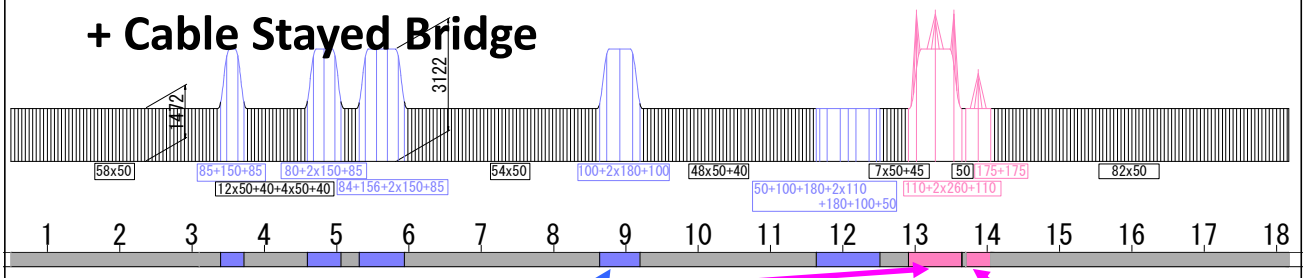
■ Alt. 1': Cable Stayed Bridge



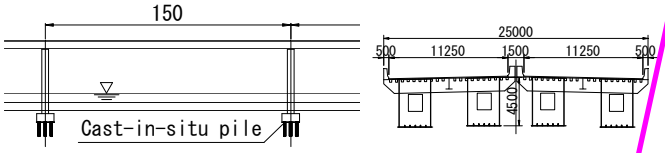
3. Comparative Study for Alternatives

JICA Survey Team

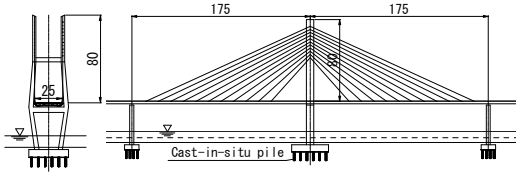
■ Alt. 2: Steel Box Girder + Composite Extra-dosed Bridge + Cable Stayed Bridge



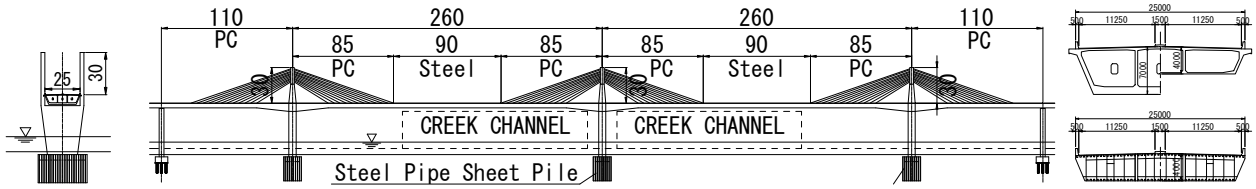
Steel Box Girder (150-180m)



Cable Stayed Bridge (175m)



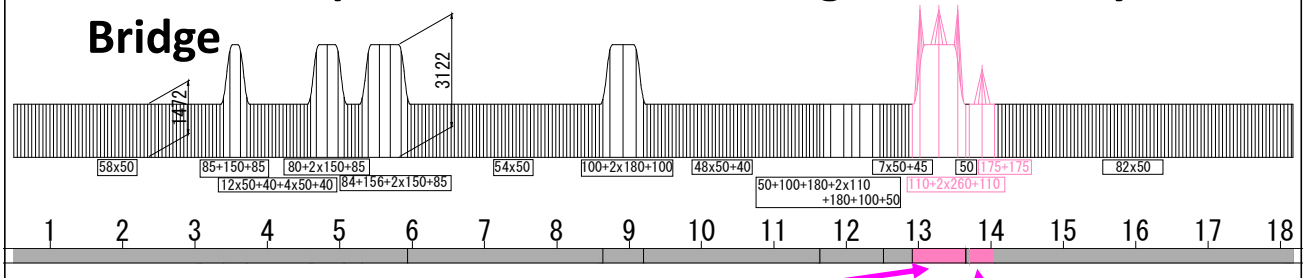
Composite Extra-dosed Bridge (260m)



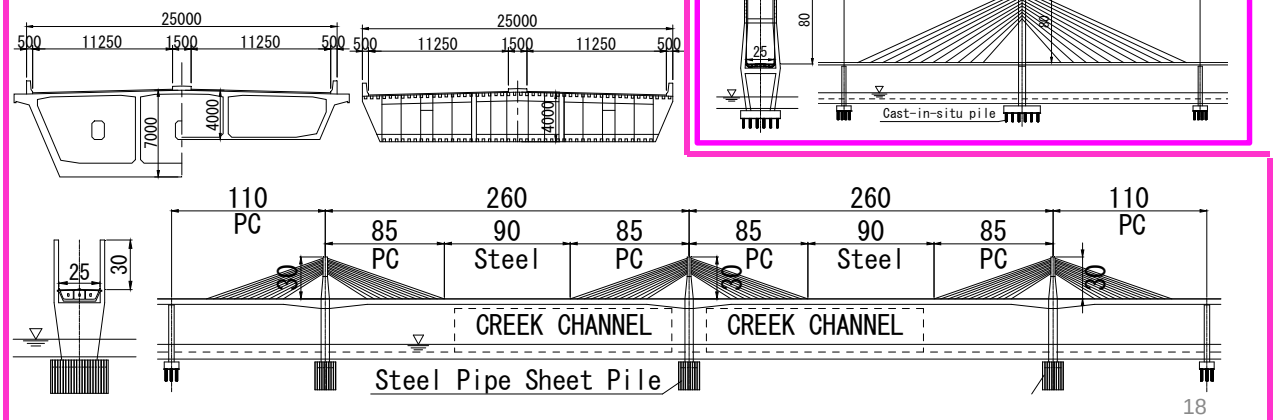
3. Comparative Study for Alternatives

JICA Survey Team

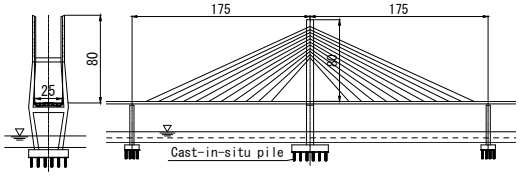
■ Alt. 2': Composite Extra-dosed Bridge + Cable Stayed Bridge



Composite Extra-dosed Bridge (260m)



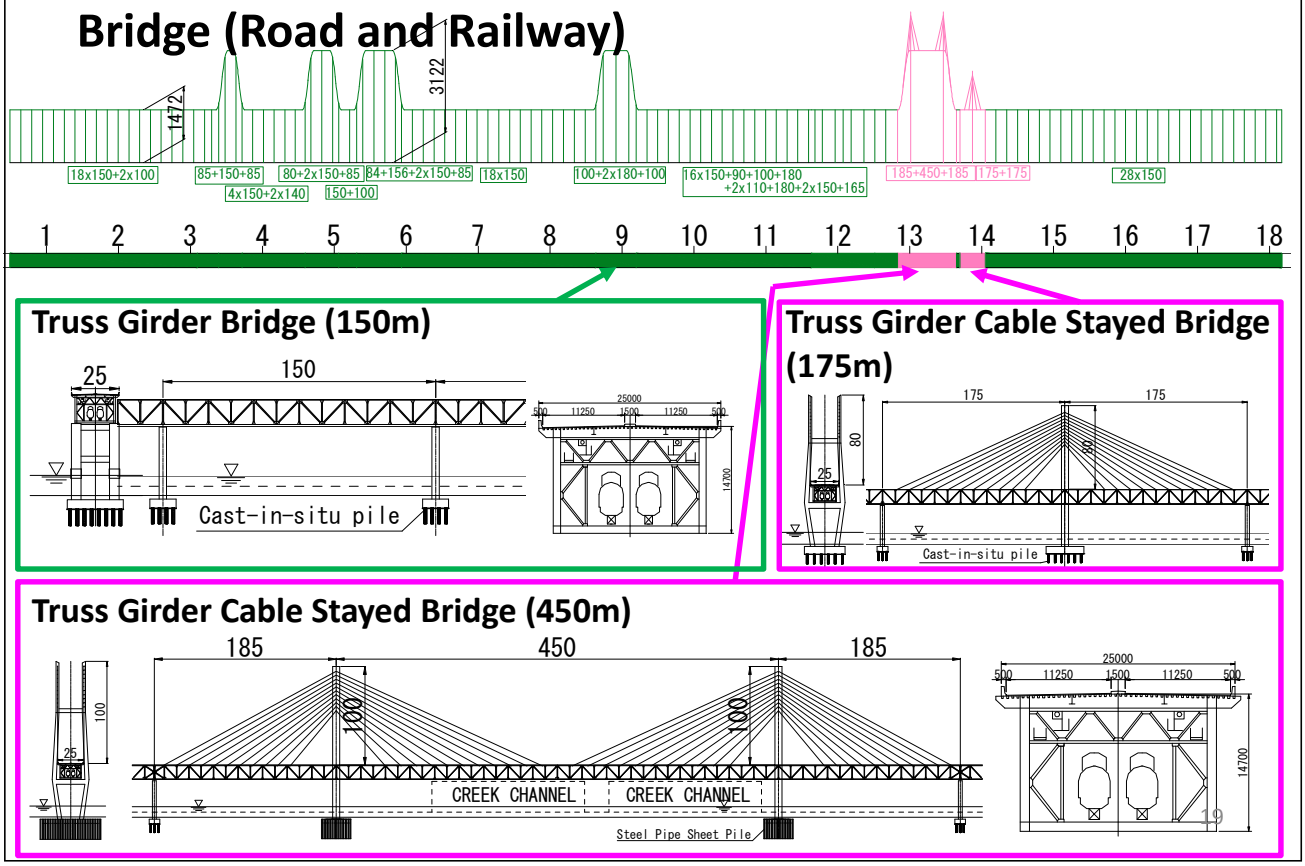
Cable Stayed Bridge (175m)



3. Comparative Study for Alternatives

JICA Survey Team

■ Reference: Double Deck Truss Bridge + Cable Stayed Bridge (Road and Railway)



19

3. Comparative Study for Alternatives

JICA Survey Team

■ Comparison Table

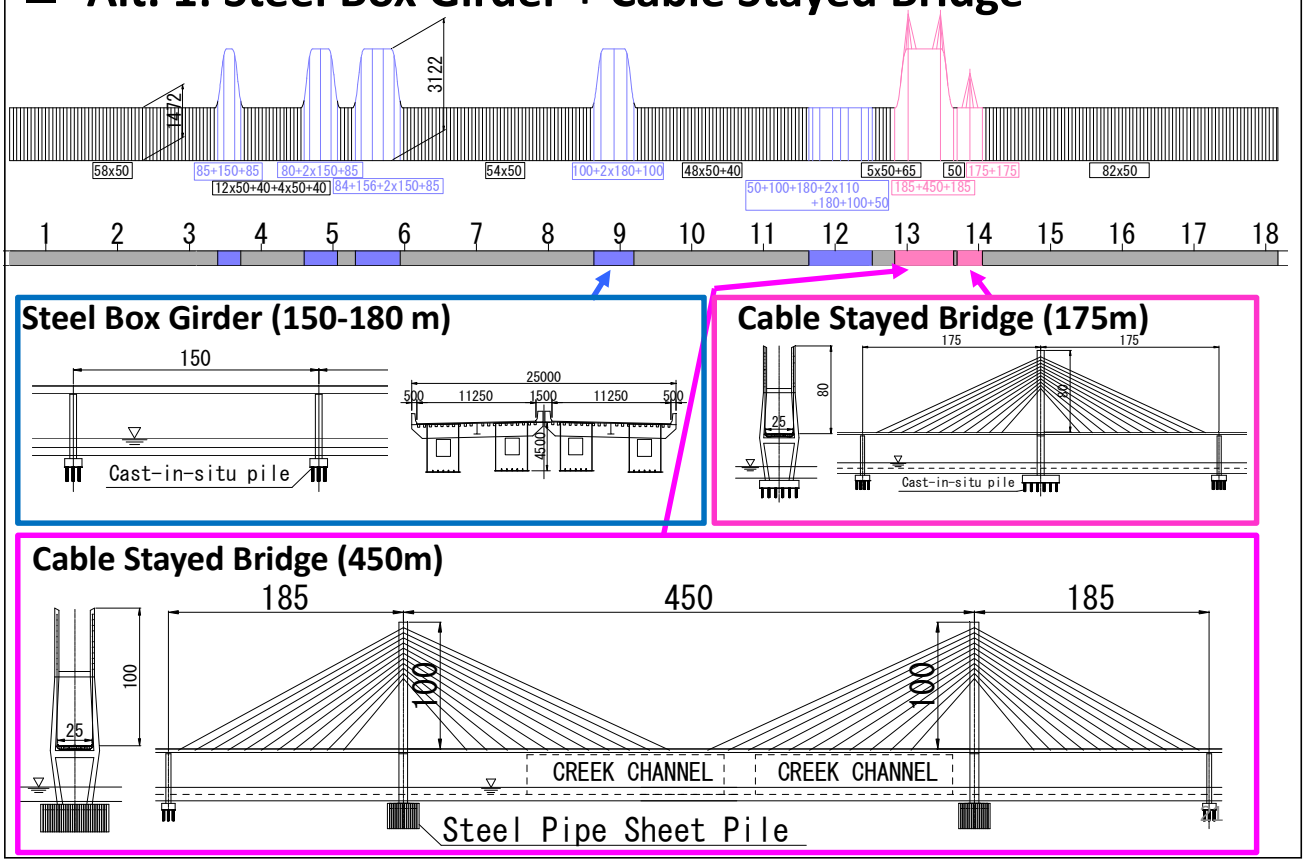
	Original	Alt. 1: Steel Box + Cable Stayed Bridge	Alt. 1': Cable Stayed Bridge	Alt. 2: Steel Box + Composite Extra-dosed Bridge	Alt. 2': Composite Extra-dosed Bridge	Reference: Double Deck Bridge (Road and Railway)
Safety for Pipeline	✓ Impossible	✓ Good	✓ Good	✓ Normal	✓ Normal	✓ Good
Safety for Ship Collision	✓ No Good	✓ Good	✓ Good	✓ Normal	✓ Normal	✓ Good
Prevention of Scouring	✓ No Good	✓ Good	✓ Good	✓ Good	✓ Good	✓ Good
Symbolic Appearance	✓ No Good	✓ Good	✓ Good	✓ Good	✓ Good	✓ Good
Construction Period	72 months ✓ Normal	60 months ✓ Good	72 months ✓ Normal	66 months ✓ Good	72 months ✓ Normal	72 months ✓ Normal
EIRR	16%	15%	15%	15%	15%	-
Construction Cost (Ratio)	100%	121%	110%	118%	107%	218%
Evaluation	✓ Impossible	✓ Recommended				

20

4. Recommendation

JICA Survey Team

■ Alt. 1: Steel Box Girder + Cable Stayed Bridge



4. Recommendation

JICA Survey Team

(1) Large Block Steel Box Girder

- Large block steel box girder shall be adopted in sections of span length of 150 m and 180 m.
- Construction period can be shorten by large block erection method by floating crane.

Steel Box Girder Bridge (Tokyo Bay Aqua Line) Span Length: 240 - 80 m

4. Recommendation

JICA Survey Team

(2) Steel Girder Cable Stayed Bridge

- Steel girder cable stayed bridge shall be adopted in sections of span length of 450 m and 175 m.
- Bridge appearance will be symbolic.

Steel Cable Stayed Bridge (Yokohama Bay Bridge) Span Length: 460 m

4. Recommendation

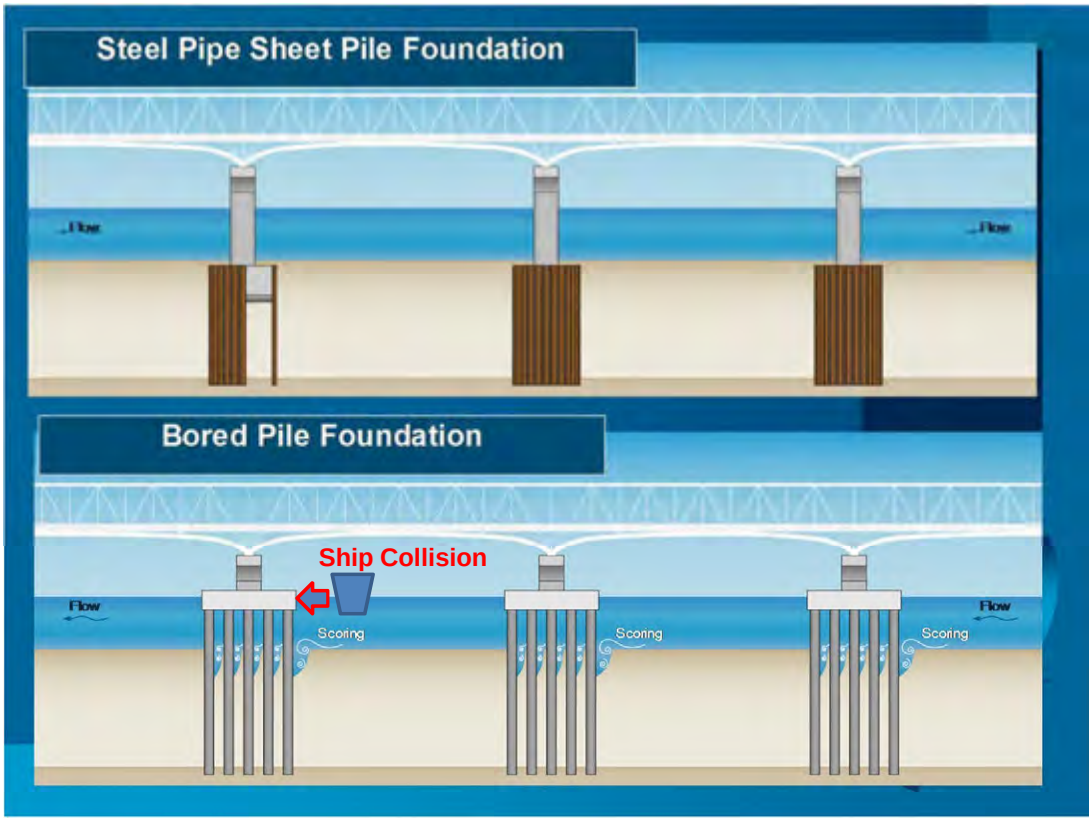
JICA Survey Team

(3) Steel Pile Sheet Pile Foundation

- Steel pile sheet pile foundation shall be adopted in sections of navigation clearance.
- Advantages of Steel Pile Sheet Pile Foundation
  - Good constructability
  - Prevention from scouring on sea bed
  - Safety for ship collision

4. Recommendation

(3) Steel Pile Sheet Pile Foundation

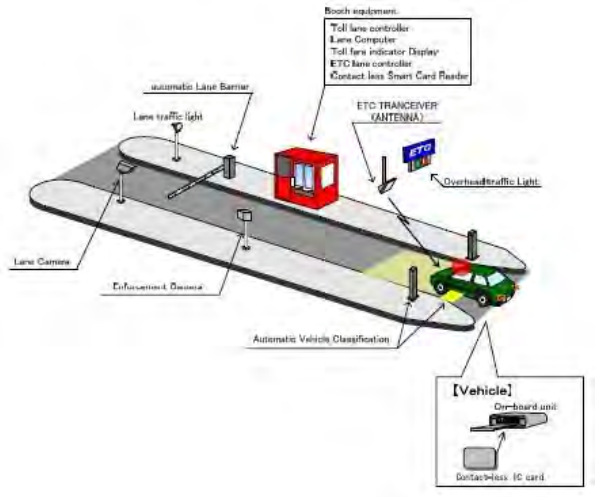


4. Recommendation

(4) Intelligent Transport Systems (ITS)

ITS shall be installed to operate roads in Mumbai urban area.

- Electronic Toll Collection (ETC)



Before installation ETC

After installation ETC

4. Recommendation

JICA Survey Team

(4) Intelligent Transport Systems (ITS)

- Information Panel

- Control Centre

5. Rough Implementation Schedule

JICA Survey Team

Item		2014	2015	2016	2017	2018	2019	2020	2021	2022
Feasibility Study	6 M	■								
Signing of Loan Agreement	1 M		■							
Selection of Consultant	10 M		■	■						
Detailed Design Tender Assistance	18 M			■	■	■				
Construction Works	60 M				■	■	■	■	■	■

6. Items to be Confirmed by MMRDA

1. EIA Report

- EIA was conducted in 2004 by MSRDC (Maharashtra State Road Development Corporation).
- MTHL Project received Environmental Clearance from MoEF (Ministry of Environment and Forest) on March 2005.
- The Environmental Clearance was updated in 2013, and its validity is for 5 years?

2. RAP Report

THANK YOU

JICA Survey Team

Oriental Consultants Co., Ltd.
East Nippon Expressway Company Limited