National Highways Authority of India

(Ministry of Road Transport & Highways)
Government of India

FOUR/SIX LANING OF GANDHIDHAM (KANDLA) – MUNDRA PORT SECTION OF NH-8A (EXTENSION) (APPROX. LENGTH 71.400 KM) IN THE STATE OF GUJARAT UNDER NHDP PHASE – III THROUGH PUBLIC-PRIVATE/PUBLIC SECTOR PARTNERSHIP (PPP) ON DESIGN, BUILD, FINANCE, OPERATE AND TRANSFER ("DBFOT") BASIS

CONCESSION AGREEMENT

between

National Highways Authority of India

G - 5&6, Sector – 10, Dwarka, New Delhi – 110 075

and

M/s KM Toll Road Private Limited

H Block, 1st Floor, Dhirubhai Ambani Knowledge City,
Navi Mumbai – 400 710

VOLUME - II

(SCHEDULES & ANNEXURES)

March, 2010

Public Private Partnership in

National Highways

CONCESSION AGREEMENT

Government of India
New Delhi

VOLUME – I : CONCESSION AGREEMENT

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National Highways Authority of India

(Ministry of Shipping, Road, Transport & Highways)
Government of India

SCHEDULES

for

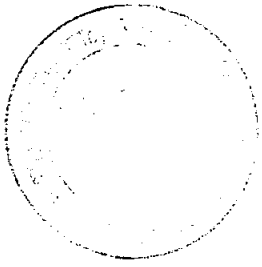
FOUR/SIX LANING OF GANDHIDHAM – MUNDRA PORT (SIRACHA JUNCTION) SECTION OF NH-8A (EXTENSION) (APPROX. LENGTH 71.400 KM) IN THE STATE OF GUJARAT UNDER NHDP PHASE III THROUGH PUBLIC-PRIVATE/PUBLIC SECTOR PARTNERSHIP (PPP) ON DESIGN, BUILD, FINANCE, OPERATE AND TRANSFER ("DBFOT") BASIS

KM TOLL ROAD PVT LTD

AUGUST 2009

G-5 & 6, Sector – 10, Dwarka, New Delhi – 110 075

Technical Schedules



SCHEDULE – A

(See Clause 10.1) SITE OF THE PROJECT

1 The Site

1.1 Site of the Four-Lane Project Highway shall include the land, buildings, structures and road works as described in Annex-I of this Schedule-A.

1.2 An inventory of the Site including the land, buildings, structures, road works, trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Authority Representative and the Concessionaire, and such inventory shall form part of the memorandum referred to in Clause 10.3.1 of the Agreement.

1.3 Additional land required for Toll Plazas, Traffic Aid Posts, Medical Aid Posts and vehicle rescue posts or for construction of works specified in the Change of Scope Order issued under Clause 16.2.3 of this Agreement shall be acquired in accordance with the provisions of Clause 10.3.6 of this Agreement. Upon acquisition, such land shall form part of the Site and vest in the Authority.

2 Additional land for Six-Laning

2.1 Additional land required for Six-Laning has been described in Annex-II of this Schedule-A. Such land shall be acquired by the Authority, at its own cost, no later than two years prior to the Scheduled Six-Laning Date, and shall thereupon form part of the Site. Any delay in granting Right of Way in respect of the land included in Annex-II or part thereof shall entitle the Concessionaire to Damages in accordance with Clause 10.3.4.

2.2 If any land not forming part of this Schedule-A is required for construction of any bypass, bridge, overpass, underpass, underbridge, overbridge, intersection, interchange or any other structure forming part of Six-Laning, the same shall be acquired by the Authority no later than two years prior to the Scheduled Six-Laning Date. The location and alignment of such land shall be determined by the Authority, in consultation with the Concessionaire, before proceedings for its acquisition are initiated. In the event of any delay in the acquisition of land hereunder, the Concessionaire shall be entitled to complete and commission the Construction Works thereon within a period of two years from the date of such acquisition.

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Annex - I

(Schedule-A)

Site for Four-Laning

[Note: Through suitable drawings and description in words, the land , buildings, structures and road works comprising the site shall be specified briefly but precisely in this Annex-I]

1. The Site

The project road is starting from Gandhidham town (km 0/000) and terminates at Siracha Junction (km 73/400) on Mandvi Road (NH-8A, Extension) in the Kachchh district. The project road traverses in east-west direction between Gandhidham and Adipur junction and beginning of proposed Anjar bypass (km 0/000 – km 11/300), the proposed Anjar bypass traverse north-south in the beginning and east-west throughout (km 11/300 - km 21/800), thereafter the alignment traverse in north-east to south-west direction between km 21/800 – km 49/600. The proposed Gundala and Bhujpur village realignment are to the north of existing alignment. The alignment between km 49/600 and km 73/400 traverses in east-west direction. The project road initially traverses in plain/flat terrain (km 0/000 to km 11/300), the remaining majority of road section traverses through plain/undulating terrain. The length of the project road is about 73.40km. The project road section has existing 2-lane configuration throughout with flexible pavement. This is one of the important routes connecting Kandla Port to Mundra Port through NH-8A (Extension).

2. Land

The site of the project Highway comprises the land (Existing Right of Way, ROW) as described below:

S.No.	Existing Chainage (Km)		Total ROW (in m)	Remarks
	From	To		
1	0.000	11.30	30	Gandhidham to Anjar
2	18.000	73.400	30	Anjar to Siracha Junction

3. Carriageway

The present carriageway of the Project Highway is two-lane with Paved / Earthen Shoulder on both sides. An inventory of existing carriageway is presented at Appendix A - I.

4. Major Bridges

The site includes the following Major Bridges:

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S. No.	Chainage (in Km)	Type of Structure	No. of Spans	Width (in m)	Remarks
1	*29/500*	*RCC slab*	*11x 7.97*	7.50	
2	*36/946*	*RCC slab*	*10 x 8.32*	7.53	
3	*44/625*	*RCC slab*	*10 x9.96*	7.42	
4	*61/000*	*RCC T beam & slab*	*7 x 18.56*	10.90	
5	*68/150*	*RCC T beam & slab*	*8 x 18.56*	10.90	Existing vented Causeway at km 68/150 is being upgraded as Major Bridge and being executed by PWD, Govt. of Gujarat

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5. Railway Over Bridges

The site includes the following Railway Over Bridges:

S. No.	Chainage (in Km)	Type of Structure	No. of Spans	Width (in m)
Nil				

6. Grade Separators

The site includes the following Grade Separators:

S. No.	Chainage (in Km)	Type of Structure	No. of Spans	Width (in m)
Nil				

7. Minor Bridges

The site includes the following Minor Bridges:

S. No.	Chainage (in Km)	Type of Structure	No. of Spans	Width (in m)
1	30/479	RCC slab	3 x 5.95	7.64
2	32/450	RCC slab	5 x 5.92	7.64
3	33/950	RCC slab	3 x 6	7.50
4	40/100	RCC slab	3 x 6.9	7.50
5	50/150	RCC slab	4 x 7.15 + 1 x 5.4	7.40
6	51/500	RCC slab	2 x 7	7.58
7	60/270	RCC slab	2 x 5.3	7.00
8	61/865	RCC slab	2 X 5.3	7.00
9	62/050	RCC Slab	1 x 6.9	7.00
10	63/595	RCC slab	4 x 10.1	11.00
11	63/695	RCC slab	3 x 10.4	11.15
12	64/559	RCC slab	3 x 10.5	10.90
13	66/338	RCC Slab	3 x 5.0	7.00
14	71/759	RCC slab	3 x 10.4	11.00

8. Total Number of Structures

The Total Number of Structures on the Site is noted below:

a) No. of Major Bridges = 4

b) No. of Railway Over Bridge = Nil

c) No. of Grade Separators = Nil

d) No. of Minor Bridges = 14

e) No. of Vehicular and Non Vehicular Underpasses = Nil

f) No. of Box Culverts = Nil

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g) No. of Pipe Culverts = 56

h) No. of Slab Culverts = 34

9. Bus bays and Truck Lay byes

The total number of bus byes and truck lay byes on the Project Highway is noted below:

a) No. of Bus bays on LHS = Nil

b) No. of Bus bays on RHS = Nil

c) No. of Truck lay-byes on LHS = Nil

d) No. of Truck lay-byes on RHS = Nil

10. Permanent Bridge, Bypass or Tunnel costing Rs 50 crore or more

The Site Includes the following permanent bridge / bypass / tunnel which were constructed at the cost more than Rs 50 crore or more are noted below:

a) Bridge: Nil

b) Bypass: Nil

c) Tunnel: Nil

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Existing Carriageway Width

Existing Chainage		Carriageway Width	Paved shoulder (both Side)	Earthen shoulder (both Side)
From	To	(m)	(m)	(m)
0	3000	7.00	1.50	1.20
3000	5000	7.00	1.20	0.90
5000	8000	7.00	1.30	1.30
8000	9500	7.00	1.50	0.40
9500	11300	7.00	1.20	1.00
11300	18000	Missing link (Part of SH-45, Anjar Town Road, Panchayat Road & SH-6)		
18000	23000	7.00	1.20	0.50
23000	25000	7.00	1.50	0.60
25000	28000	7.00	1.25	0.75
28000	29000	7.00	1.00	0.80
29000	30000	7.00	1.20	0.65
30000	38000	7.00	1.50	0.60
38000	39000	7.00	1.00	0.75
39000	42000	7.00	1.25	0.75
42000	43000	7.00	1.20	0.60
43000	47000	7.00	1.25	0.80
47000	49000	7.00	1.20	0.70
49000	51000	7.00	1.00	0.60
51000	55000	7.00	1.20	0.65
55000	58000	7.00	1.10	0.60
58000	60000	7.00	1.15	0.70
60000	64000	7.00	-	2.00
64000	65000	7.00	-	1.50
65000	72000	7.00	-	1.65
72000	74000	7.00	-	1.55

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SCHEDULE - B

(See Clause 2.1)

DEVELOPMENT OF THE PROJECT HIGHWAY

1 Development of the Project Highway

Development of the Project Highway shall include construction of the Project Highway as described in this Schedule-B and in Schedule-C.

2 Four-Laning

2.1 Four-Laning shall include the Four-Lane Project Highway as described in Annex-I of this Schedule-B and Annex-I of Schedule-C.

2.2 Four-Laning shall be completed by the Concessionaire in conformity with the Specifications and Standards set forth in Annex-I of Schedule-D.

3 Six-Laning

3.1 Six-Laning shall include the Six-Lane Project Highway as described in Annex-II of this Schedule-B and Annex-II of Schedule-C

3.2 Six-Laning shall be completed by the Concessionaire in conformity with the Specifications and Standards set forth in Annex-II of Schedule-D

Annex - I

(Schedule-B)

Description of Four-Laning

1 Width of Carriageway

1.1 The paved carriageway shall be 18.0 meters wide excluding the median:

Provided that in the following urban stretches, the width of carriageway shall be:

S.No.	Name of Township	Location (chainage)	Width
	Nil		

1.2 Except as otherwise provided in this Agreement, but subject to the provisions of Annex-II of this Schedule-B, the width of the paved carriageway shall conform to Clause 1.1 above.

2 Project Facilities

Project facilities shall be constructed in conformity with Annex-I of Schedule-C.

3 Specifications and Standards

The Project Highway shall be constructed in conformity with the Specifications and Standards specified in Annex-I of Schedule-D.

4 Other Features of Four/Six Laning

4.1 Cross Sections

The Project Highway shall be widened to Four lane dual configuration with paved shoulder with or without Service Roads. The entire road portion shall be 4 lane while the bridges and other structures shall be 6 lane. The typical cross sections along with different types of cross section required to be developed in different segments of the project highway are indicated in Appendix B I. The typical cross-sections drawings of 4 lane highway are presented in Figure B1 to B 9.

4.2 Alignment Plan and Longitudinal Section

The Plan & Profile of project highway is given at **Appendix B II** in soft copy.

4.3 Bypasses & Realignment

There is one bypass and two realignments in the project highway. The details of bypass and realignments to be provided are given at **Appendix B III.**

4.4 Service Road

Service Roads shall be provided in lengths indicated in **Appendix B IV.** However, the concessionaire will construct the service road on either side of carriageway in the other project stretches at his own cost, when traffic reaches a level of 60,000 PCU..

4.5 Proposed Right of Way

The details of the Proposed ROW are given in **Appendix B V.**

4.6 At Grade Intersection

At grade intersections shall be provided at the intersection of service roads and all intersecting roads at locations specified in **Appendix B VI** for major intersections and in **Appendix B VII** for minor intersections.

4.7 Grade Separated Interchanges

The grade separated interchanges shall be as provided as given at **Appendix B VIII.**

4.8 Underpasses

Vehicular underpass shall be provided at location given at **Appendix B IX.** Pedestrian / Cattle underpass shall be provided at location given at **Appendix B X.**

Since the Project Highway is in marine environment, coating of reinforcement bars with Cement Polymer Composite Coating system (CPCC)satisfying the codal practice or specification and to the standards as per IRC SP: 80-2008 may be used..

4.9 Major Bridges

Major bridges as listed in Appendix B XI shall be provided, widened, reconstructed or extended.

Since the Project Highway is in marine environment, coating of reinforcement bars with Cement Polymer Composite Coating system (CPCC) satisfying the codal practice or specification and to the standards as per IRC SP: 80-2008 may be used..

4.10 Minor Bridges

Minor bridges as listed in **Appendix B XII** shall be provided, widened, reconstructed, or extended.

Since the Project Highway is in marine environment, coating of reinforcement bars with Cement Polymer Composite Coating system (CPCC) satisfying the codal practice or specification and to the standards as per IRC SP: 80-2008 may be used..

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4.11 Culverts

Culverts shall be provided, widened, reconstructed, or extended as listed in **Appendix B XIII**

4.12 ROB

Details of ROB to be provided are given at **Appendix B XIV.** Following points shall be taken care of:

i) The proposed span arrangement of the ROB is tentative and subject to change as per availability of railway boundaries / requirement of the railways.

ii) ROB shall be designed, constructed and maintained as per the requirements of Railway authorities. The construction plans shall be prepared in consultation with the concerned railway authority.

iii) The ROB shall be constructed and maintained by the concessionaire under supervision of the Railways.

iv) All expenditure related to construction, maintenance and supervision of ROB (except P&E charges) shall be borne by the Concessionaire.

v) During construction, the existing level crossing shall be widened to 12 meters or two separate level crossings of 7 meters each shall be provided.

Since the Project Highway is in marine environment, coating of reinforcement bars with Cement Polymer Composite Coating system (CPCC) satisfying the codal practice or specification and to the standards as per IRC SP: 80-2008 may be used.

4.13 Entry / Exit Ramps

Entry / exit ramps for the entering into or exiting from the project highway shall be provided wherever necessary. A tentative list is given in **Appendix B XV.**

4.14 Slope Protections

The side slope shall be protected by using suitable slope protection measures wherever required along the present highway. A tentative location is given in **Appendix B XVI.**

Annex - II

(Schedule-B)

Description of Six-Laning

Width of Carriageway

1.1 The paved carriageway shall be 25.0 meters wide excluding the median:

Provided that in the following urban stretches, the width of carriageway shall be:

S.No.	Name of Township	Location (chainage)	Width
	Nil		

1.2 Except as otherwise provided in this Agreement, the width of the paved carriageway shall, at all times on and after the Scheduled Six-Laning Date, conform to Clause 1.1 above.

2 Project Facilities

Project facilities shall be constructed in conformity with the Specifications and Standards specified in Annex-II of Schedule-C.

3. Standards and Specifications

The Project Highway shall be constructed in conformity with the Specifications and Standards specified in Annex-II of Schedule-D

Appendix B I

Typical Cross-sections

Sl. No.	Stretches				Cross Section Type
	Existing Chainage		Design Chainage		
	From	To	From	To	
1	0.00	0.52	0.00	0.52	Mirror of D
2	0.52	0.66	0.52	0.66	A
3	0.66	1.93	0.66	1.92	Mirror of D
4	1.93	2.83	1.92	2.82	A/C
5	2.83	3.60	2.82	3.58	A
6	3.60	4.12	3.58	4.10	Mirror of D
7	4.12	5.05	4.10	5.02	A/C
8	5.05	5.50	5.02	5.46	A
9	5.50	7.82	5.46	7.78	D
10	7.82	8.68	7.78	8.63	A/C
11	8.68	9.37	8.63	9.31	D
12	9.37	10.46	9.31	10.40	C
13	10.46	10.98	10.40	10.90	A
14	10.98	-	10.90	11.60	C
15	Anjar Bypass		11.60	15.55	B
16	Anjar Bypass		15.55	16.15	C
17	Anjar Bypass		16.15	16.40	B
18	Anjar Bypass		16.40	16.95	C
19	Anjar Bypass		16.95	19.31	B
20	Anjar Bypass		19.31	19.85	C
21	Anjar Bypass		19.85	20.10	B
22	21.95	22.29	20.10	20.43	Mirror of E
23	22.29	22.51	20.43	20.65	B
24	22.51	22.67	20.65	20.81	Mirror of E
25	22.67	23.47	20.81	21.61	B
26	23.47	24.08	21.61	22.22	E
27	24.08	24.58	22.22	22.71	B
28	24.58	24.69	22.71	22.82	E
29	24.69	24.80	22.82	22.93	B
30	24.80	27.00	22.93	25.10	E
31	27.00	28.35	25.10	26.44	A
32	28.35	29.15	26.44	27.22	B
33	29.15	32.10	27.22	30.16	Mirror of E
34	32.10	33.03	30.16	31.07	C

Sl. No.	Stretches				Cross Section Type
	Existing Chainage		Design Chainage		
	From	To	From	To	
35	33.03	33.80	31.07	31.85	Mirror of E
36	33.80	34.06	31.85	32.10	B
37	34.06	36.71	32.10	34.77	Mirror of E
38	36.71	37.43	34.77	35.49	B
39	37.43	38.23	35.49	36.31	Mirror of E
40	38.23	44.90	36.31	42.97	B
41	44.90	45.73	42.97	43.80	C
42	45.73	49.40	43.80	47.45	B
43	Gundala Realignment		47.45	48.20	C
44	Gundala Realignment		48.20	49.90	B
45	Gundala Realignment		49.90	50.70	C
46	Gundala Realignment		50.70	55.35	B
47	57.73	58.38	55.35	56.01	Mirror of E
48	58.38	59.55	56.01	57.18	B
49	59.55	60.38	57.18	58.00	C
50	60.38	60.99	58.00	58.62	Mirror of E
51	60.99	61.33	58.62	58.95	B
52	61.33	62.46	58.95	60.06	D
53	62.46	62.62	60.06	60.22	A
54	62.62	63.35	60.22	60.95	D
55	63.35	64.71	60.95	62.30	Mirror of E
56	Bhujpur Realignment		62.30	65.30	B
57	68.00	68.70	65.30	66.01	B
58	68.70	69.80	66.01	67.11	Mirror of E
59	69.80	70.50	67.11	67.81	C
60	70.50	71.80	67.81	69.11	Mirror of E
61	71.80	72.87	69.11	70.18	D
62	72.87	74.20	70.18	71.48	B

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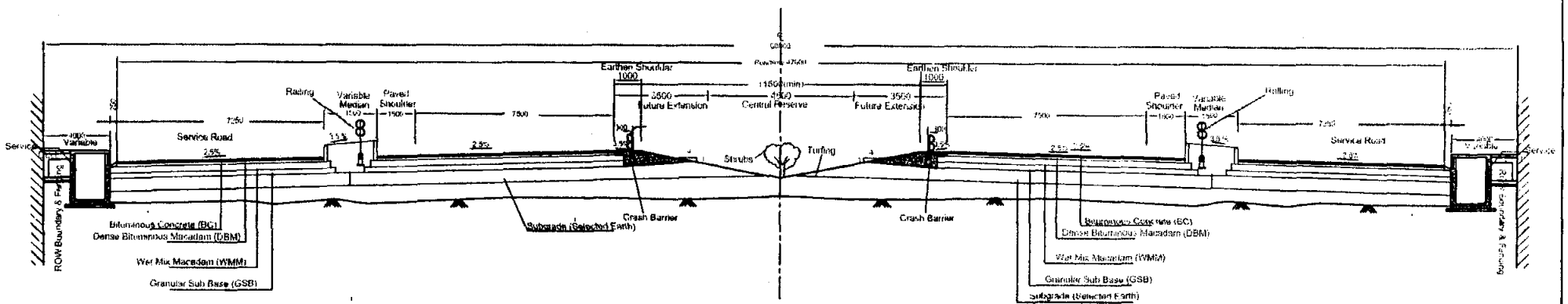
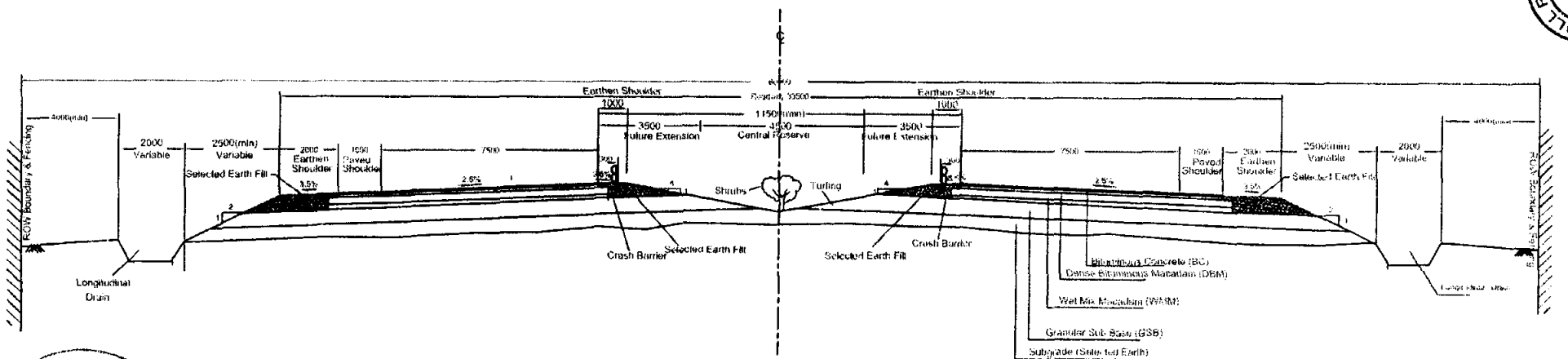


Type A: Typical Cross-Section of 4/6-Lane Main Carriageway + Service Road in Urban Section (ROW 60m)

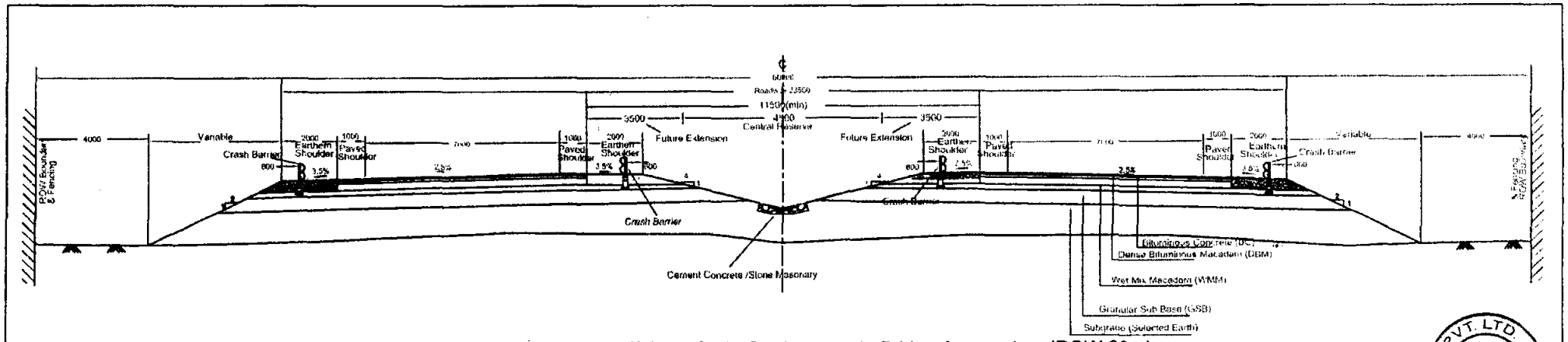


Type B: Typical Cross-Section of 4/6-Lane Main Carriageway in Rural Section (ROW 60m)

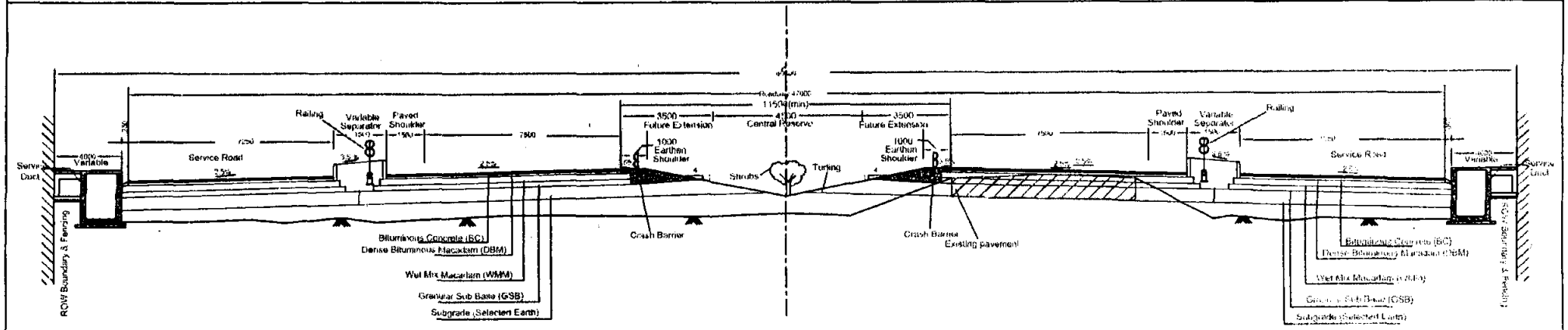
GENERAL NOTES:

1. All Dimensions are in millimetre unless otherwise metioned.
2. The width of Footpaths/Separators shall be adjusted as per site condition.
3. The Pavement composition shall be provided as per typical pavement details
4. The railing/drain/footpath/separator/fencing shall be provided as per cross section element details.
5. Normal cross Camber on Service road = 2.5%
6. Surface treatment of central median :
   Grass turfing - Inward cross camber 4:1
7. For Embankment Height > 3.0m : Crash Barriers to be provided

NATIONAL HIGHWAYS AUTHORITY OF INDIA	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat	Fig. No.	B 1	Typical Cross Sections	Revision No:
		Page. No	B - 6		Date: October 2008
		SCALE	NOT TO SCALE		RITES THE INFRASTRUCTURE PEOPLE (A Government of India Enterprise)



Type C: Typical Cross-Section of 4/6-Lane Main Carriageway in Bridge Approaches (ROW 60m)



Type D: Typical Cross-Section of 4/6-Lane Main Carriageway Left side Widening + Service Road in Urban Section (ROW 60m)

GENERAL NOTES:

1. All Dimensions are in millimetre unless otherwise metioned.
2. The width of Footpaths/Separators shall be adjusted as per site condition.
3. The Pavement composition shall be provided as per typical pavement details
4. The railing/drain/footpath/separator/fencing shall be provided as per cross section element details.
5. Normal cross Camber on Service road = 2.5 %
6. Surface treatment of central median :
   Grass turfing - inward cross camber 4:1
7. For Embankment Height > 3.0m : Crash Barriers to be provided

NATIONAL HIGHWAYS AUTHORITY OF INDIA	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat	Fig. No.	B 2	Typical Cross Sections	Revision No:
		Page. No.	B - 9		Date: October 2008
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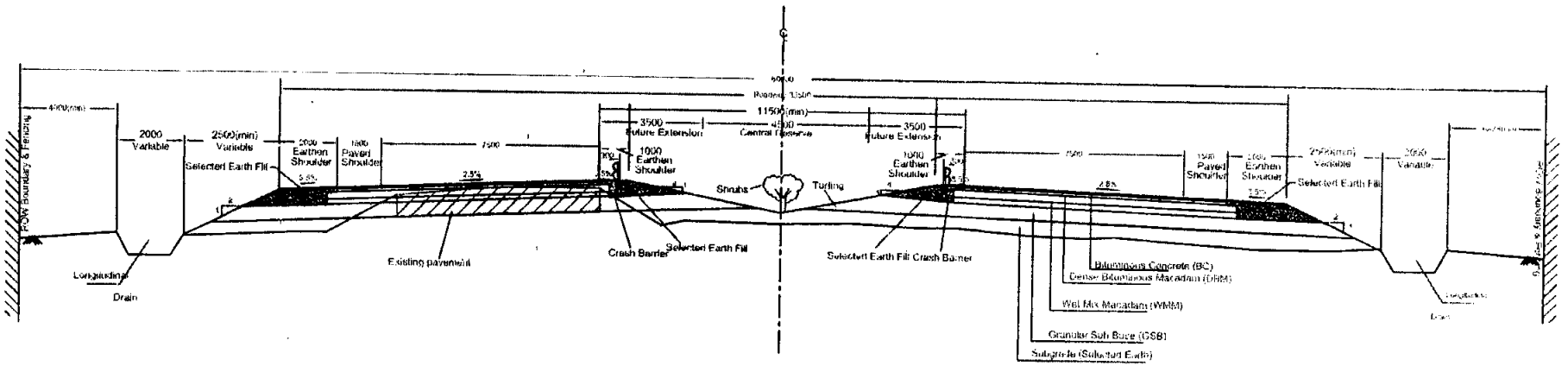

Type E: Typical Cross-Section of 4/6-Lane Main Carriageway Right side widening in Rural Section (ROW 60m)

GENERAL NOTES:

1. All Dimensions are in millimetre unless otherwise metioned.
2. The width of Footpaths/Separators shall be adjusted as per site condition.
3. The Pavement composition shall be provided as per typical pavement details
4. The railing/drain/footpath/separator/fencing shall be provided as per cross section element details.
5. Normal cross Camber on Service road = 2.5%
6. Surface treatment of central median :
   Grass turfing - inward cross camber 4:1
7. For Embankment Height > 3.0m : Crash Barriers to be provided

NATIONAL HIGHWAYS AUTHORITY OF INDIA	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat	Fig. No. B 3 Page. No. B - 10 SCALE NOT TO SCALE	Typical Cross Sections	Revision No: Date: October 2008

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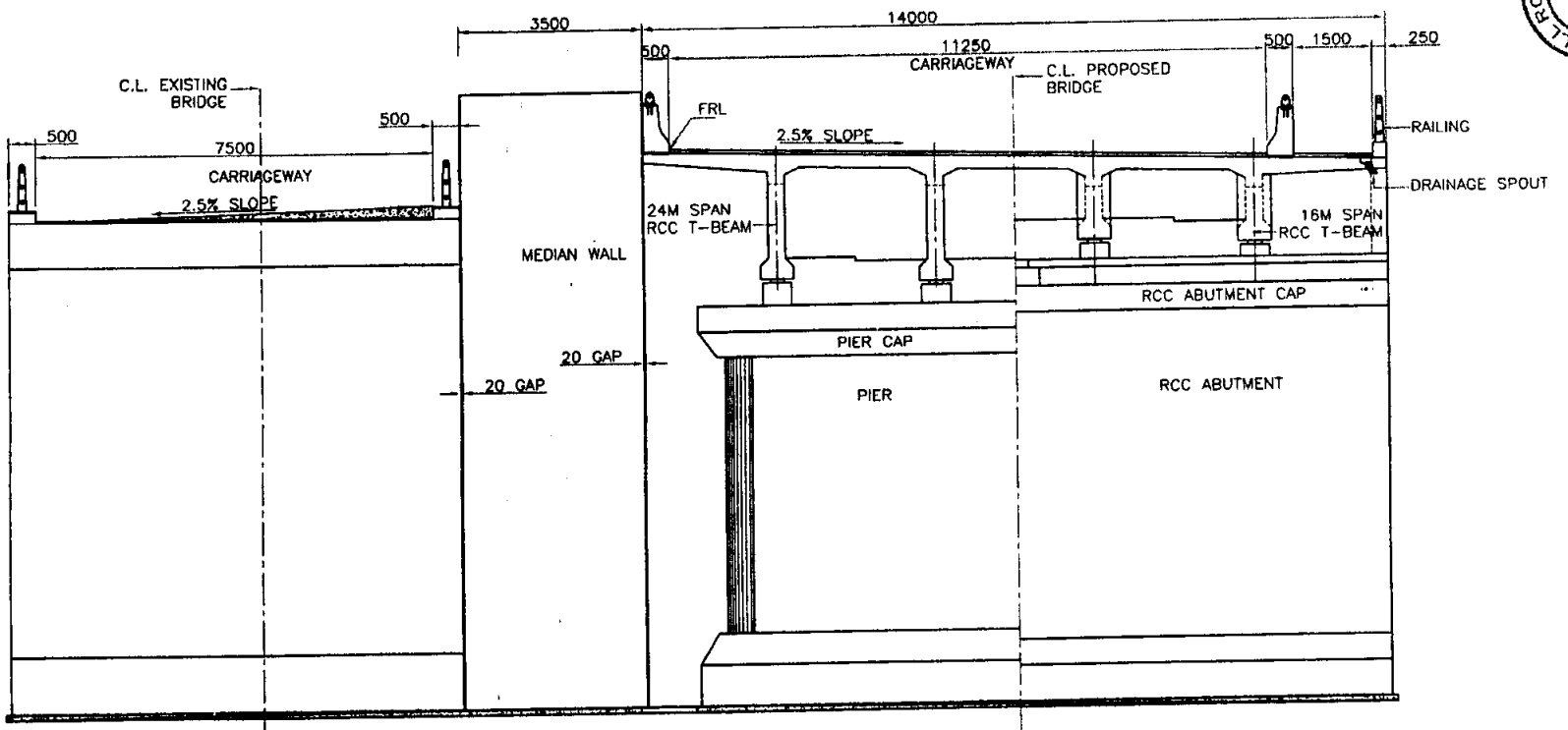

MINOR BRIDGE SECTIONAL ELEVATION

NATIONAL HIGHWAYS AUTHORITY OF INDIA	Four/Six laning of Gandhidham (Kandla) - Mundra Port section of NH-8A (Extension) (approx. length 71.400 km) in the State of Gujarat under NHDP Phase III through Public-Private/Public Sector partnership (PPP) on Design, Build,Finance, Operate and Transfer ("DBFOT") basis	Fig. No.	B 4	Typical Cross Sections	Revision No:
		Page No	B - 11		Date: October 2008
		SCALE	NOT TO SCALE		RITES THE INFRASTRUCTURE PEOPLE (A Government of India Enterprise)

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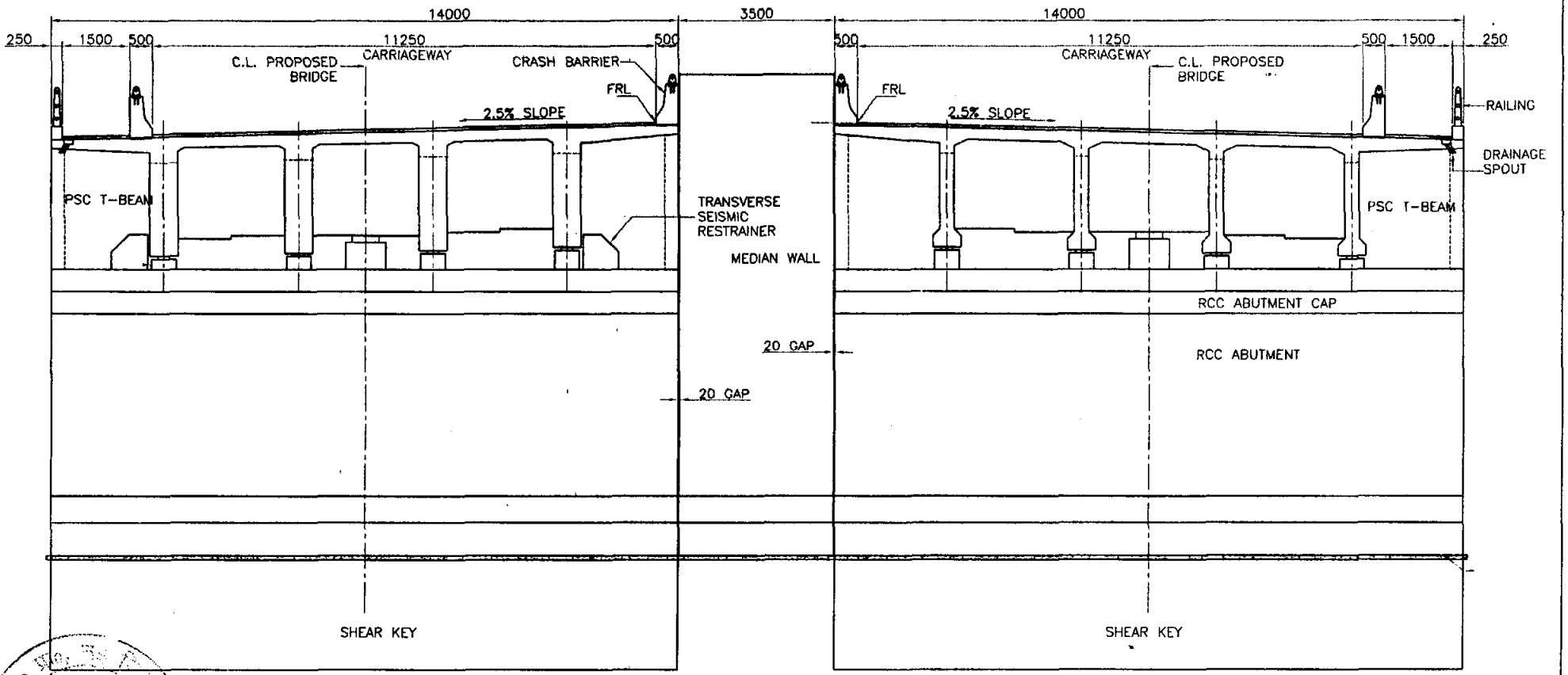

MINOR BRIDGE SECTIONAL ELEVATION

NATIONAL HIGHWAYS AUTHORITY OF INDIA	Four/Six laning of Gandhidham (Kandla) - Mundra Port section of NH-8A (Extension) (approx. length 71.400 km) in the State of Gujarat under NHDP Phase III through Public-Private/Public Sector partnership (PPP) on Design, Build,Finance, Operate and Transfer ("DBFOT") basis	Fig. No.	B 5	Typical Cross Sections	Revision No:
		Page No	B - 12		Date: October 2008
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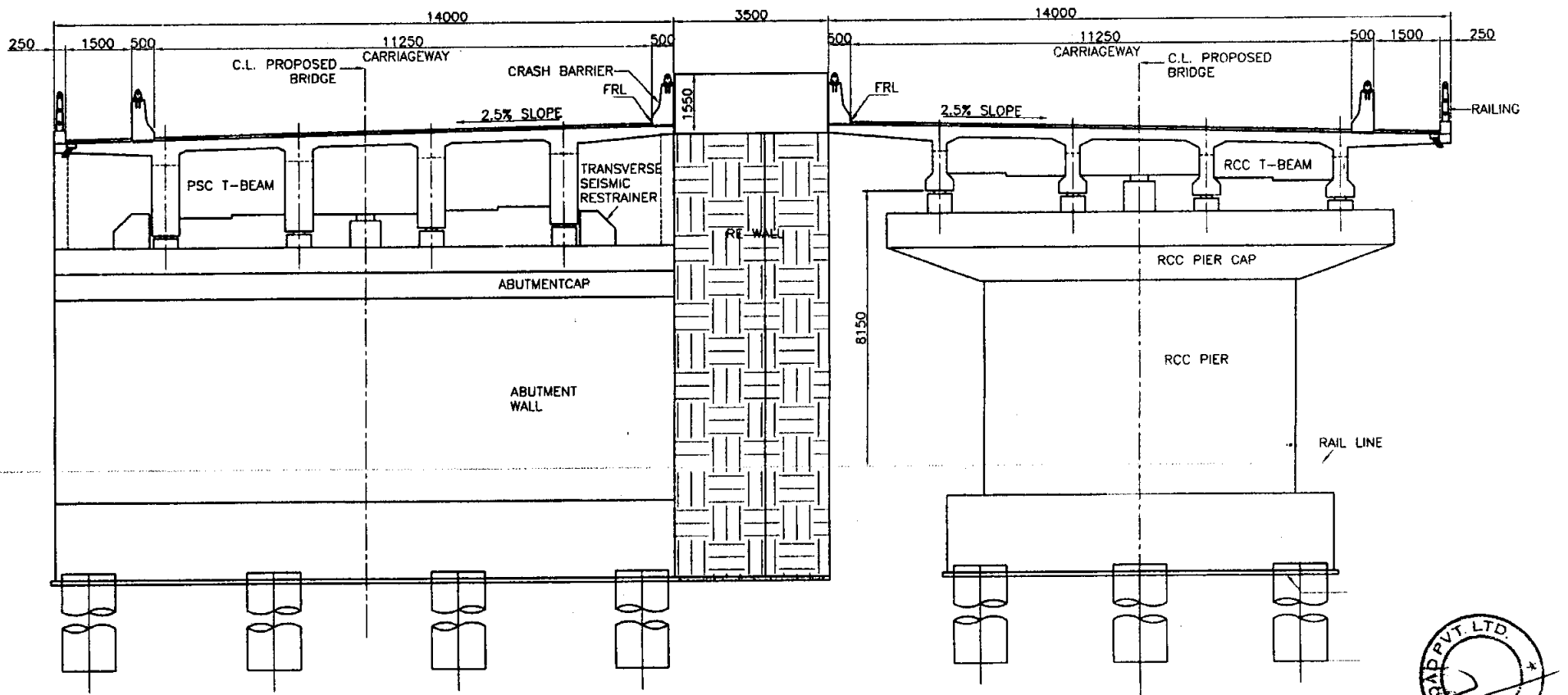

SECTIONAL ELEVATION AT ABUTMENT

SECTIONAL ELEVATION AT PIER

NATIONAL HIGHWAYS AUTHORITY OF INDIA	Four/Six laning of Gandhidham (Kandla) - Mundra Port section of NH-8A (Extension) (approx. length 71.400 km) in the State of Gujarat under NHDP Phase III through Public-Private/Public Sector partnership (PPP) on Design, Build,Finance, Operate and Transfer ("DBFOT") basis	Fig. No.	B 6	Typical Cross Sections	Revision No:
		Page No	B - 13		Date: October 2006
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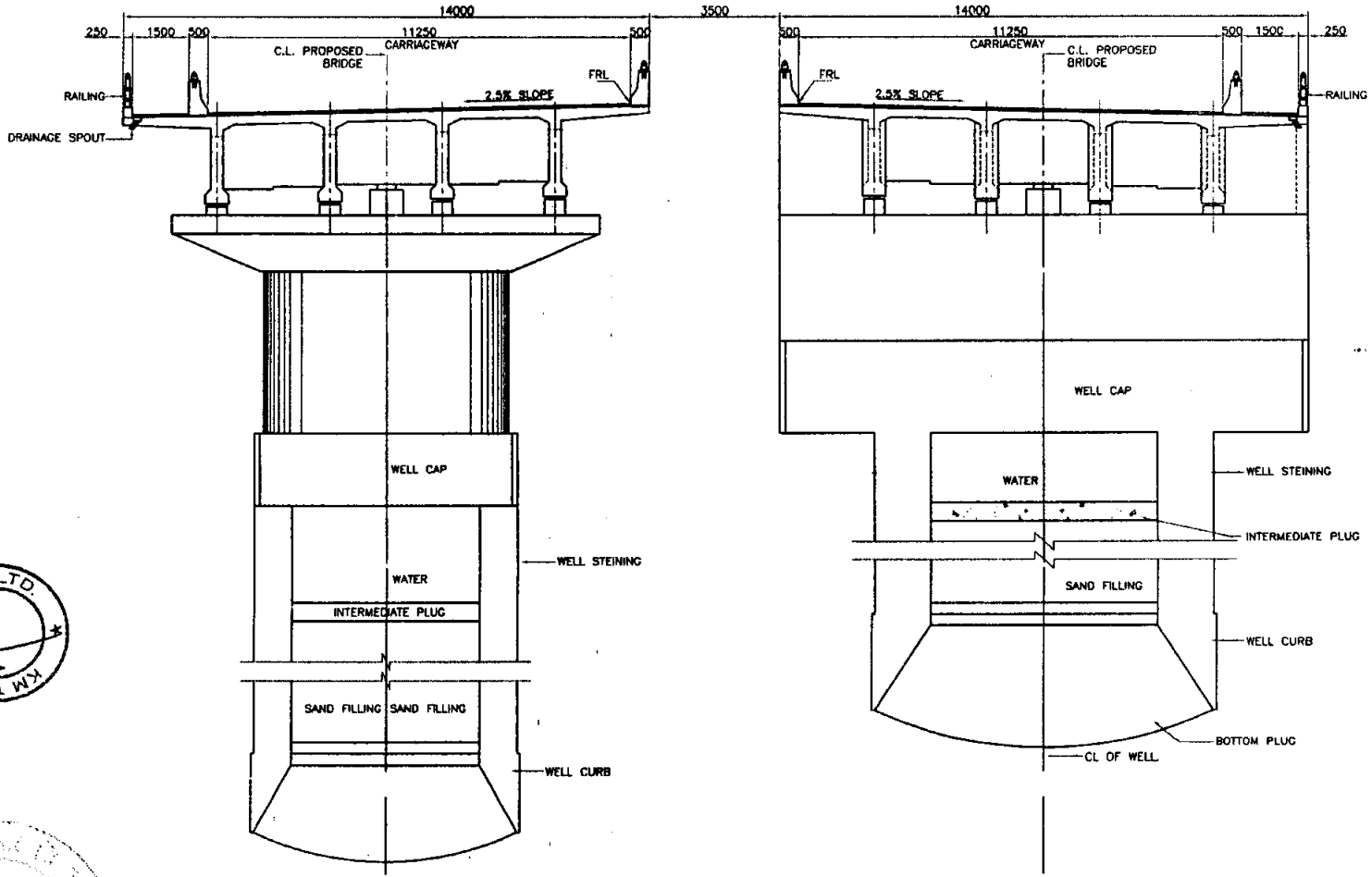

SECTION AT PIER

SECTION AT ABUTMNET

MAJOR BRIDGE SECTIONAL ELEVATION

NATIONAL HIGHWAYS AUTHORITY OF INDIA	Four/Six laning of Gandhidham (Kandla) - Mundra Port section of NH-8A (Extension) (approx. length 71.400 km) in the State of Gujarat under NHDP Phase III through Public-Private/Public Sector partnership (PPP) on Design, Build,Finance, Operate and Transfer ("DBFOT") basis	Fig. No.	B 7	Typical Cross Sections	Revision No:
		Page No	B - 14		Date: October 2008
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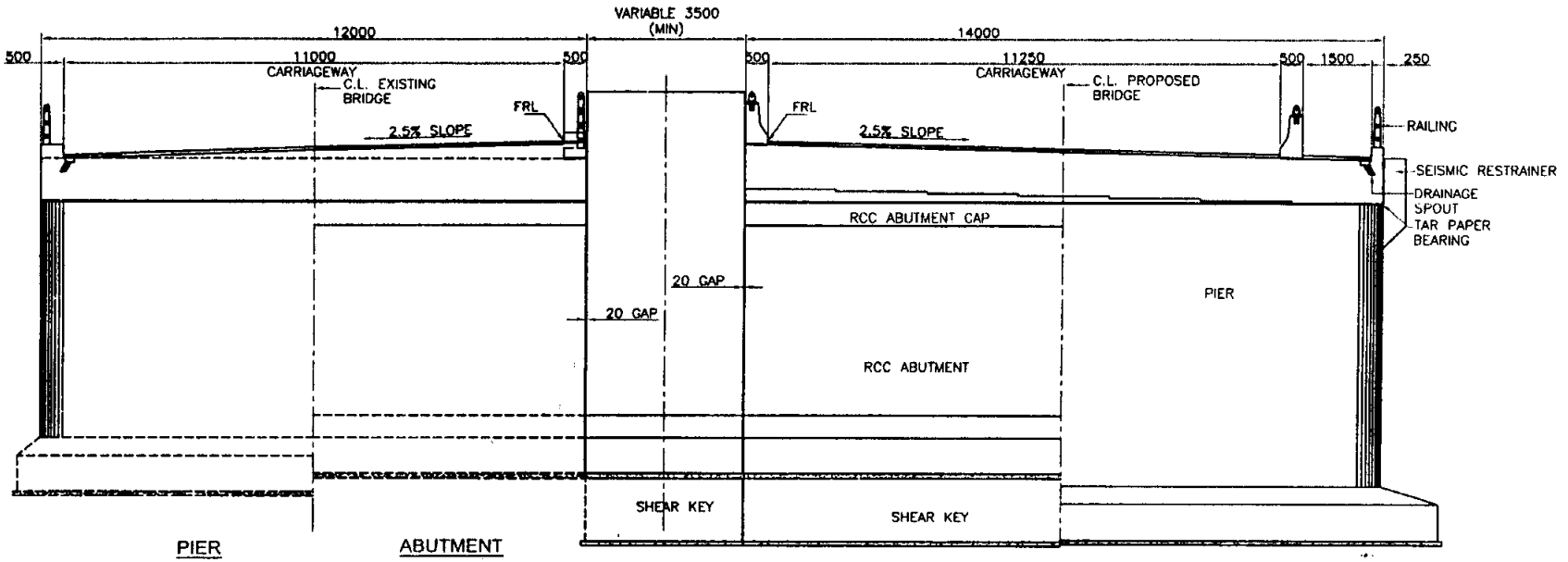

MINOR BRIDGE SECTIONAL ELEVATION

NATIONAL HIGHWAYS AUTHORITY OF INDIA	Four/Six laning of Gandhidham (Kandla) - Mundra Port section of NH-8A (Extension) (approx. length 71.400 km) in the State of Gujarat under NHDP Phase III through Public-Private/Public Sector partnership (PPP) on Design, Build,Finance, Operate and Transfer ("DBFOT") basis	Fig. No.	B 8	Typical Cross Sections	Revision No:
		Page No.	B - 15		Date: October 2008
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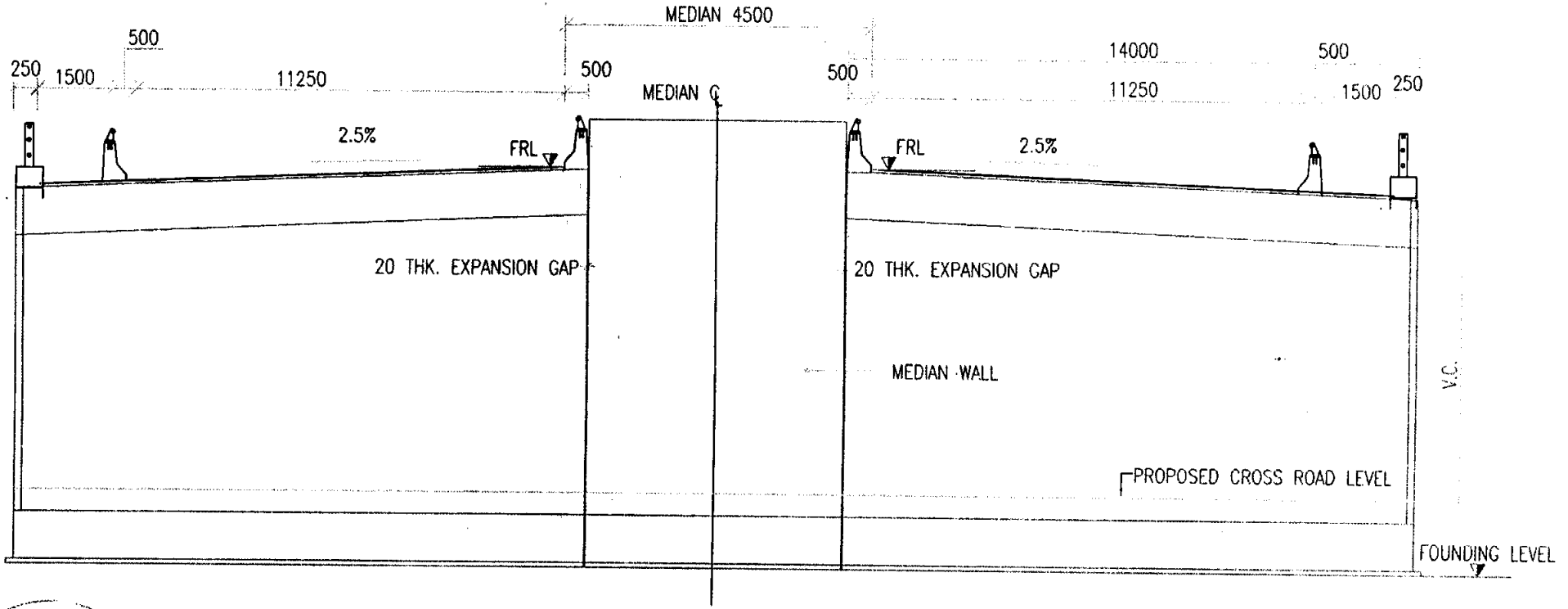
RITES THE INFRASTRUCTURE PEOPLE (A Government of India Enterprise)



UNDERPASS SECTION ELEVATION

NOTE:

V.C.= 5.5M FOR VEHICULAR UNDERPASS (VP)

V.C.= 3.5M FOR NON-VEHICULAR UNDERPASS (NVP)

NATIONAL HIGHWAYS AUTHORITY OF INDIA	Four/Six laning of Gandhidham (Kandla) - Mundra Port section of NH-8A (Extension) (approx. length 71.400 km) in the State of Gujarat under NHDP Phase III through Public-Private/Public Sector partnership (PPP) on Design, Build,Finance, Operate and Transfer ("DBFOT") basis	Fig. No.	B 9	Typical Cross Sections	Revision No:
		Page No:	B - 16		Date: October 2008
		SCALE	NOT TO SCALE		RITES THE INFRASTRUCTURE PEOPLE (A Government of India Enterprise)

Appendix B II

Plan and Profile

Alignment Plan and longitudinal Section of project highway is at volume III. An alignment plan and vertical profile of project highway are to be designed as per provisions of Manual of Specifications and Standards for 4- laning of National Highways through Public Private Partnership published by IRC

Appendix B III

Details of Bypass/Realignment

1. Bypass

Name of Bypass	Existing Chainage		Design Chainage		Length (Km)
	From	To	From	To	
Anjar Bypass	11+300	21+800	11+280	19+950	8.90

2. Realignments

Name of Realignment	Existing Chainage		Design Chainage		Length (Km)
	From	To	From	To	
Gundala Village Realignment	49+280	53+350	47+350	51+150	3.80
Bhujpur Village Realignment	64+750	68+000	62+150	65+350	3.20

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Appendix B IV

Details of Service Roads

Sl. No.	Existing chainage		Design Chainage		Length (Km)	Width (m)	Side	Cross Section type
	From	To	From	To				
1	0/000	9/370	0/000	9/300	9.3	7	Both	As per Cross Section Schedule
2	10/630	11/340	10/550	11/280	0.73	7	Both	As per Cross Section Schedule
3	27/000	28/350	25/100	26/400	1.3	7	Right	As per Cross Section Schedule
4	61/330	63/350	58/950	60/950	2.0	7	Both	As per Cross Section Schedule
5	71/800	73/000	69/100	70/300	1.2	7	Both	As per Cross Section Schedule

The total length of Service Road on both side of project highway is 27.76 km.

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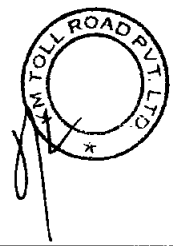
Appendix B V

Details of Proposed ROW

SL. No.	Design Chainage	Proposed ROW (in Meters)
1	From km 0+000 to km 71+400	60



At Grade Major Intersections:

Sl. No.	Existing Chainage	Design Chainage	Side (Left / Right)	Carriageway Width (m)	Category
1	73/400	70/690	Left	5.5 m	Adani Power Station, SH6

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List of Minor Intersections

Sl. No.	Existing Chainage	Design Chainage	Surface type	Side (Left / Right)	Carriageway Width (m)	Category
1	1+940	1+930	BT	Right	5.0	Vardhman Society, Local Road
2	2+800	2+785	BT	Left	3.5	Adipur, Village Road
3	2+800	2+785	BT	Right	3.5	Galpadar, Village Road
4	5+265	5+230	BT	Right	3.5	Oil Company, Local Road
5	5+520	5+485	BT	Right	5.0	V trans Company, Local Road
6	5+885	5+850	Gravel	Right	8.0	Local Road
7	6+080	6+040	Gravel	Right	3.5	Local Road
8	6+420	6+400	Gravel	Right	3.0	Industry, Local Road
9	6+885	6+840	Gravel	Right	5.0	Industry, Local Road
10	6+925	6+875	BT	Left	3.0	Local Road
11	7+010	6+959	BT	Left	3.0	Local Road
12	7+065	7+015	BT	Left	3.0	Local Road
13	7+645	7+600	Gravel	Right	3.0	Local Road
14	7+740	7+700	BT	Right	5.0	Genus Industry, Local Road
15	8+857	8+800	BT	Right	5.5	Meghpar, Village Road
16	9+340	9+280	Gravel	Left	3.0	Local Road
17	Proposed Anjar Bypass	11+850	BT	Left	6.0	School, Local Road
18		11+850	BT	Right	6.0	Anjar Town, Local Road
19	21+980	20+120	BT	Left	3.5	Mithiyada, Village Road
20	23+120	21+264	Earthen	Right	3.0	Local Track
21	24+050	22+200	Gravel	Right	3.0	Local Track
22	24+456	22+600	Gravel	Right	2.5	Local Track
23	26+170	24+300	BT	Left	3.5	Mithiyada, Village Road
24	27+264	25+380	BT	Left	3.0	Bhimnath Mandir, Local Road
25	27+335	25+450	BT	Right	3.0	Khedoi, Village Road
26	28+315	26+400	BT	Right	3.0	Water Chamber, Local Road
27	28+630	26+700	BT	Left	7.0	Man Industries, Local Road
28	28+835	26+900	BT	Left	7.0	Man Industries, Local Road
29	30+580	28+650	Gravel	Right	5.5	Crusher, Local Road
30	30+965	29+037	BT	Left	3.0	Bhuvad, Village Road
31	35+760	33+825	BT	Right	3.0	Chandrora, Village Road
32	36+570	34+640	Earthen	Right	2.8	Chandrora, Village Road
33	36+835	34+900	BT	Right	3.0	Chandrora, Village Road
34	41+080	39+155	Gravel	Left	7.5	Local Road
35	42+200	40+270	BT	Left	3.5	Vavaar, Village Road
36	42+230	40+300	Gravel	Right	3.5	Local Road
37	43+390	41+475	BT	Right	3.5	Chasra, Village Road
38	44+325	42+395	BT	Right	3.5	Ashram ,Local Road
39	44+870	42+940	BT	Left	3.5	Getco, Local Road
40	Proposed Gundala Realignment	49+650	BT	Left	3.75	Gundala, Village Road
41		49+650	BT	Right	3.75	Ratariya, Village Road
42	55+320	52+985	BT	Left	3.5	Borara, Village Road
43	56+990	54+640	BT	Right	3.5	Toda, Village Road

Sl. No.	Existing Chainage	Design Chainage	Surface type	Side (Left / Right)	Carriageway Width (m)	Category
44	57+175	54+820	BT	Left	3.0	Modadiya, Village Road
45	58+360	56+990	BT	Left	3.0	Modadiya, Village Road
46	58+405	57+045	BT	Left	3.0	Paragpar, Village Road
47	61+525	59+130	Earthen	Left	3.0	Samaghogha, Local Road
48	61+525	59+130	Earthen	Right	5.0	Bariya, Local Road
49	61+910	59+510	Earthen	Right	7.5	Jindal Factory, Local Road
50	61+950	59+552	BT	Left	3.5	Samaghogha, Village Road
51	62+860	60+455	BT	Right	7.5	Jindal Factory, Local Road
52	Bhujpur Realignment	65.150	BT	Right	3.0	Gadela, Village Road
53	71+900	69+206	BT	Left	3.0	Navinal, Village Road
54	72+300	69+560	BT	Right	3.0	Deshalpar, Village Road
55	72+390	69+700	BT	Right	3.0	Deva, Village Road

Note: All Minor junctions are connected through service / slip road or left entry & left exit on main road at selected locations.

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Appendix B VIII

Details of Proposed Grade Separated Interchanges

Nil

Appendix B IX

Details of Proposed Vehicular Underpasses

S.No.	Existing Chainage	Design Chainage	Name of Intersecting Roads	Proposed Structural Configuration	Proposed structural Type	Proposed Span Arrangement	Total Width of Structure	Clear Height
1	2/400	2.390	Galpadar Village Road	New 2 X 3 Lane	RCC Box Structures	1x10m	2 x 14m	5.5m
2	4/625	4.610	Airport Road	New 2 X 3 Lane	RCC Box Structures	2x10m	2 x 14m	5.5m
3	8/300	8.250	Welspun Local Road	New 2 X 3 Lane	RCC Box Structures	1x10m	2 x 14m	5.5m
4	11/300	11.280	Adipur- Anjar Road	New 2 X 3 Lane	RCC Box Structures	2x10m	2 x 14m	5.5m
5	Anjar Bypass	15.900	Deavriya - Vidi Village Road	New 2 X 3 Lane	RCC Box Structures	1x10m	2 x 14m	5.5m
6	21/500	19.635	Ex. NH 8A (Extn.) (Anjar Bypass End Jn.)	New 2 X 3 Lane	RCC Box Structures	2x10m	2 x 14m	5.5m
7	32/580	30.640	Bhuvad - Mathra Village Road	New 2 X 3 Lane	RCC Box Structures	1x10m	2 x 14m	5.5m
8	45/300	43.375	Bhadreshwar – Kundrori Road (SH46)	New 2 X 3 Lane	RCC Box Structures	2x10m	2 x 14m	5.5m
9	49/800	47.840	Ex. NH 8A (Extn.) (Gundala Realign. Start Jn.)	New 2 X 3 Lane	RCC Box Structures	1x10m	2 x 14m	5.5m
10	Gundala Realignment	50.280	Bidada Village Road	New 2 X 3 Lane	RCC Box Structures	1x10m	2 x 14m	5.5m
11	59/685	57/285	New connectivity to Mundra Port & Bhuj Road (SH 48)*	New 2 X 3 Lane	RCC Box Structures	2x10m	2 x 14m	5.5m
12	65/200	62.800	Ex. NH 8A (Extn.) (Bhujpur Realign. Start Jn.)	New 2 X 3 Lane	RCC Box Structures	1x10m	2 x 14m	5.5m

*The conceptual plan is indicated in enclosed Figure No. B 10

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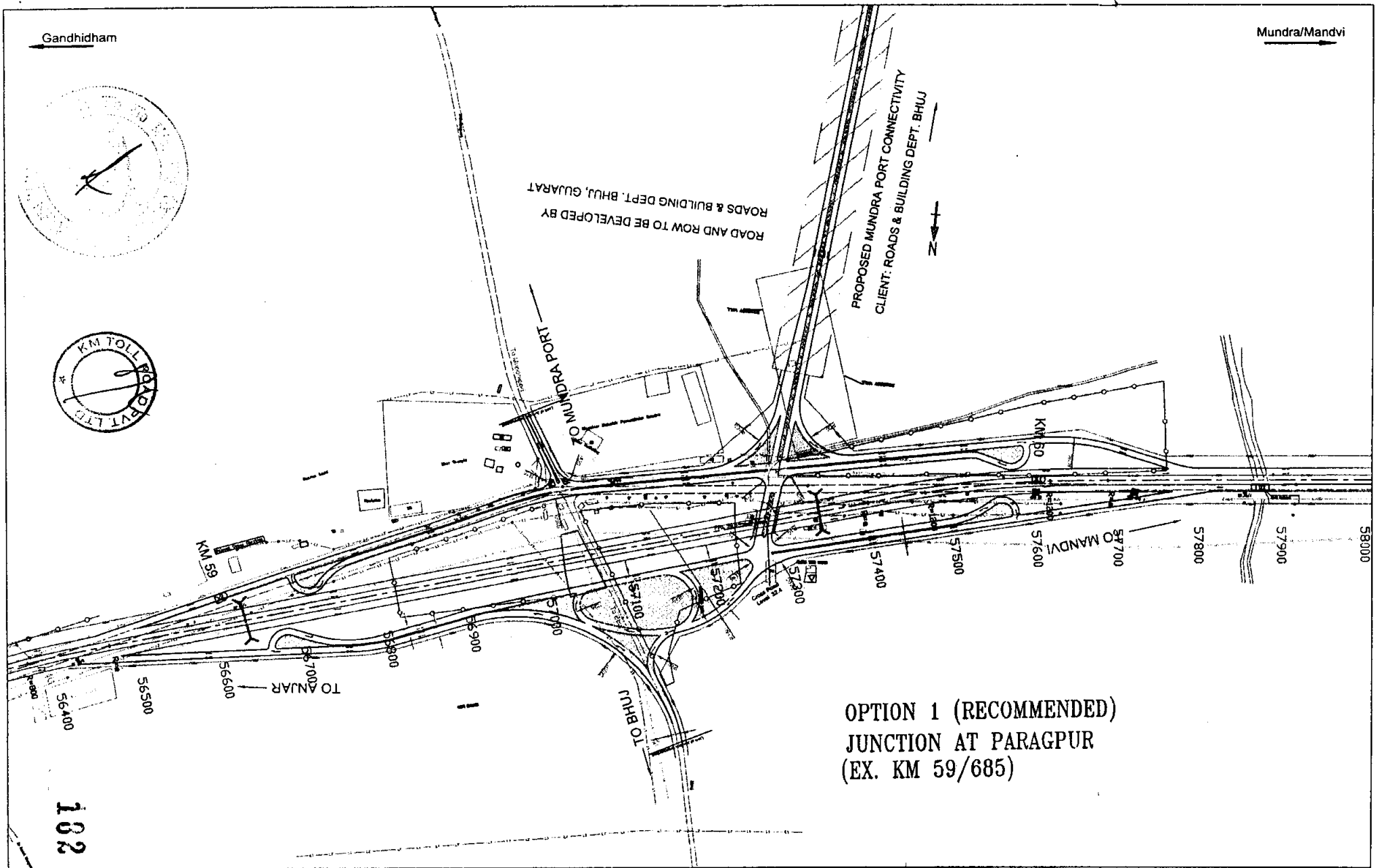

NATIONAL HIGHWAYS AUTHORITY OF INDIA	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat	Fig. No.	B 10	Junction at Km 59+685	Revision No: R 1
		Page. No.	B -25 (A)		July 2009
		SCALE	1:4000		

RITES THE INFRASTRUCTURE PEOPLE (A Government of India Enterprise)

Appendix B X

Details of Proposed Non-Vehicular/Pedestrian/Cattle Underpasses

S.No.	Existing Chainage	Design Chainage	Name of Intersecting Roads	Proposed Structural Configuration	Proposed structural Type	Proposed Span Arrangement	Total Width of Structure	Clear Height
1	Anjar Bypass	16.775	Anjar Local Road	New 2 X 3 Lane	Box Structure	1x10m	2 x 14m	3.5m
2	70/200	67.480	Jabalpur Village Road	New 2 X 3 Lane	Box Structure	1x10m	2 x 14m	3.5m

A. Construction of New Major Bridges

S.No.	Name of Bridge	Bridge No.	Existing Chainage	Design Chainage	Type of Crossing	Proposed Structural Configuration	Proposed Structure Type	Proposed Span Arrangement	Total Width of The Structure
1	Bridge on River Chhasara	-	44/625	42.725	Right Angle Crossing	New 2X3 Lane Bridge	RCC T-Girder Superstructure & Well Foundation	5x20 m	2 x 14 m
2	Bridge on Bhukhi/Toda River	-	56/995	54.720	Right Angle Crossing	New 2X3 Lane Bridge	RCC T-Girder Superstructure & Well Foundation	7x24 m	2 x 14 m

B. Rehabilitation/Repair/widening of existing Major bridges

S.no.	Name of bridge	Bridge no.	chainage (km)	Width (proposed / existing)	Span arrangement	Type of structure			Improvement proposal
						Foundation	Sub structure	Super Structure	
1	Bridge on river Khedoi* (Existing)		29 + 500	8.2 / 8.2	11 X 7.97 m. TTL = 87.67 m	No defect observed in visible portion of foundation	Reinforcement exposed at a Pier Cap. CRM Piers with joint Surface cracks developed in some Pier	RCC Solid slab superstructure over tar paper bearings. Severe reinforcement exposed at soffit of deck slab & also at edges	To be retained and no Widening proposed only repairing, construct a new 3-lane bridge parallel to existing one as per widening scheme.
	Bridge on river Khedoi (Proposed)			14	3 X 24+1 X 16 TTL = 88 m	RCC Open Foundation	RCC wall type abutment and Pier	RCC T Beam & slab	A new 3-lane bridge parallel to existing one is proposed
2	Bridge on river Chandroda* (Existing)		36 + 946	8.5/ 8.5	10 X 8.32 TTL = 83.2 m	No defect observed in visible portion of foundation	CC wall type pier, abutment and straight return wall. Scour occurred at bottom of piers & reinf exposed at various places	RCC Solid slab type, visually no cracks found, few reinf exposed at soffit of deck.	The bridge is in fairly good condition. Clear width between kerb is 7.5m. May be used as 2-Lane bridge without footpath with repairing and proper bed protection works.
	Bridge on river Chandroda (Proposed)			14	5 X 16.6 m TTL = 83.0 m	RCC Open Foundation	RCC wall type abutment and Pier	RCC T Beam & slab	A new 3-lane bridge parallel to existing one is proposed

S.no.	Name of bridge	Bridge no.	chainage (km)	Width (proposed / existing)	Span arrangement	Type of structure			Improvement proposal
						Foundation	Sub structure	Super Structure	
3	Bridge on river Surai (Existing)		61+000	12/12	7 X 18.56 m TTL = 129.92 m	Well Foundation	CC wall type pier, abutment	RCC T-Beam and slab type	Minor repair and camber correction.
	Bridge on river Surai (Proposed)			14	7 X 18.56 m TTL = 129.92 m	Well Foundation	RCC wall type pier and cantilever pier cap, RCC wall type abutment and cantilever return wall.	RCC T-Beam and slab type,	A new 3-lane bridge parallel to existing one is proposed
4	Bridge on river Nagwanti (Existing)		68+150	12/12	8 X 18.56 m TTL = 148.5 m	Well foundation found	CC wall type pier, abutment	RCC T-Beam and slab type	Minor repair and camber correction.
	Bridge on river Nagwanti (Proposed)			14	8 X 18.56 m TTL = 148.5 m	Well Foundation	RCC wall type pier and cantilever pier cap, RCC wall type abutment and cantilever return wall.	RCC T-Beam and slab type,	A new 3-lane bridge parallel to existing one is proposed

Note: Existing major bridge at km 29/500 & km 36/946 (both having 2-lane carriageway configuration) to be reconstructed as 3 lane structure during capacity augmentation satisfying the project and traffic requirement.

A. Construction of New Minor Bridges

Sl.No.	Name of Bridge	Bridge No.	Existing Chainage	Design Chainage	Type of Crossing	Proposed Structural Configuration	Proposed Structural configuration	Proposed Span arrangement	Total width of the Structure	Remarks
1	-	-	Anjar Bypass	15.400	Right	New 2 X 3 Lane	RCC Slab & Open Foundation	1 X 10	2 x 14m	New
2	-	-	Anjar Bypass	15.740	Right	New 2 X 3 Lane	RCC T Beam & Slab Sup. & open Foundation	1 X 20	2 x 14m	New
3	-	-	Anjar Bypass	17.200	Right	New 2 X 3 Lane	RCC Slab & Open Foundation	1 X 10	2 x 14m	New
4	-	-	30+479	28.550	Right	New 2 X 3 Lane	RCC T Beam & Slab Sup. & open Foundation	1 X 18	2 x 14m	Recon
5	-	-	32+450	30.500	Right	New 2 X 3 Lane	RCC Box Cell	3 X 10	2 x 14m	Recon
6	-	-	40/100	38.090	Right	New 2 X 3 Lane	RCC T Beam & Slab Sup. & open Foundation	1 X 21	2 x 14m	Recon
7	-	-	Gundala Realign	48.400	Right	New 2 X 3 Lane	RCC T Beam & Slab Sup. & open Foundation	2 X 17	2 x 14m	New
8	-	-	Gundala Realign	49.510	Right	New 2 X 3 Lane	RCC T Beam & Slab Sup. & open Foundation	1 X 14	2 x 14m	New
9	-	-	60/270	57.900	Right	New 2 X 3 Lane	RCC Box Cell	1 X 10	2 x 14m	Recon
10	-	-	61/865	59.460	Right	New 2 X 3 Lane	RCC Box Cell	1 X 10	2 x 14m	Recon
11	-	-	62/050	59.660	Right	New 2 X 3 Lane	RCC Box Cell	1 X 7	2 x 14m	Recon
12	-	-	Bhujpur Realign	64.360	Right	New 2 X 3 Lane	RCC T Beam & Slab Sup. & open Foundation	1 X 14	2 x 14m	New
13	-	-	Bhujpur Realign	64.560	Right	New 2 X 3 Lane	PSC T Beam & Slab Sup. & open Foundation	1 X 26.9	2 x 14m	New

Recon = Reconstruction; Realign = Realignment

B. Rehabilitation/Repair/widening of existing Minor bridges

S.No.	NAME OF BRIDGE	BRIDGE No.	EXISTING CHAINAGE (Km)	WIDTH (Proposed / Existing)	SPAN ARRANGEMENT	TYPE OF STRUCTURE			IMPROVEMENT PROPOSAL
						Foundation	Sub structure	Super Structure	
1	(Existing)	34/3*	33/950	7.5 / 7.5	3x6.0 (18.0m)	Open Foundation	Stone masonry pier, RCC cap repaired. Stone masonry abutment.	RCC slab. Drainage spouts both sides. Soffit of slab partly repaired.	Structure in fair condition. Clear width between kerb is 7.5m.
	(Proposed)			14	1 x 18 m	Open Foundation	RCC Wall type Abutment	RCC T Beam & Slab	A new 3-lane bridge parallel to existing one is proposed
2	Stream (Existing)	64/2	63+595	11.0 / 11.0	4 x 10.4 m	Open Foundation	Semi-circular wall type RCC pier and RCC type abutment.	RCC slab.	Structure in fair condition.
	Stream (Proposed)			14	4 X 10.4 m	Open Foundation	RCC Wall type Abutment & Piers	RCC Slab	A new 3-lane bridge parallel to existing one is proposed.

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S.No.	NAME OF BRIDGE	BRIDGE No.	EXISTING CHAINAGE (Km)	WIDTH (Proposed / Existing)	SPAN ARRANGEMENT	TYPE OF STRUCTURE			IMPROVEMENT PROPOSAL
						Foundation	Sub structure	Super Structure	
3	Stream (Existing)	64/3	63+695	11.15 / 11.15	3 x 10.4 m	Open Foundation	Semi-circular wall type RCC pier and RCC type abutment.	RCC slab.	Structure in fair condition.
	Stream (Proposed)			14	3 X 10.4 m	Open Foundation	RCC Wall type Abutment & Piers	RCC Slab	A new 3-lane bridge parallel to existing one is proposed
4	Stream (Existing)	65/2	64+559	10.90 / 10.90	3 x 10.5 m	Open Foundation	Semi-circular wall type RCC pier and RCC type abutment.	RCC slab.	Structure in fair condition.
	Stream (Proposed)			14	3 X 10.5 m	Open Foundation	RCC Wall type Abutment & Piers	RCC Slab	A new 3-lane bridge parallel to existing one is proposed

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S.No.	NAME OF BRIDGE	BRIDGE No.	EXISTING CHAINAGE (Km)	WIDTH (Proposed / Existing)	SPAN ARRANGEMENT	TYPE OF STRUCTURE			IMPROVEMENT PROPOSAL
						Foundation	Sub structure	Super Structure	
5	Irrigation Canal (Existing)	72/1	71+758	11.0 /11.0	3 x 10.4 m	Open Foundation	Semi-circular wall type RCC pier and RCC type abutment.	RCC slab.	Structure in fair condition.
	Irrigation Canal (Proposed)			14	3 X 10.4 m	Open Foundation	RCC Wall type Abutment & Piers	RCC Slab	A new 3-lane bridge parallel to existing one is proposed

Note: Existing minor bridge at km 33/950 (2-lane carriageway) to be reconstructed as 3 lane structure during capacity augmentation satisfying the project and traffic requirement.

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Improvement proposals for culverts

A. Reconstruction / Widening Scheme for Culverts

S.No.	Existing C D No.	Existing Chainage	Design Chainage	Type of Structure		Recommendation	Span Arrangement		Proposed Total Width
				Existing	Proposed		Existing (m)	Proposed (m)	
1	3/1	2/910	2915	Slab	Pipe	Reconstruction	1x5.80x1.15	5x1.20 m dia.	55.0m
2	4/1	3/150	3160	Pipe	Pipe	Widening	2x1.0	2x1.00 m dia.	46.0m
3	11/1	10/405	10325	Pipe	Pipe	Widening	2x1.0	2x1.0 m dia.	46.0m
4	12/1	11/026	10950	Slab	Slab	Reconstruction	1x6.0x1.0	1x6.00x1.50	47.5m
5	22/3	21/818	19950	Slab	Slab	Reconstruction	1x4.45x3.0	1x4.5x3.0	33.5m
6	23/1	22115	20260	Slab	Slab	Widening (1-MCW)	1x2.8x3.0	1x3.0x3.5	23.0m
7	23/2	22/437	20580	Pipe	Pipe	Reconstruction	2x0.75	2x1.20 m dia.	36.0m
8	23/3	22/840	20980	Pipe	Pipe	Widening	2x1.0	2x1.00 m dia.	26.0m
9	24/1	23/095	21235	Pipe	Pipe	Reconstruction	2x0.75	2x1.20 m dia.	33.5m
10	25/1	24099	22235	Pipe	Pipe	Reconstruction	2x0.75	2x1.20 m dia.	38.0m
11	25/2	24/680	22820	Pipe	Pipe	Reconstruction	1x0.75	1x1.20 m dia.	36.0m
12	26/1	25/975	24110	Pipe	Pipe	Widening	2x1.0	2x1.00 m dia.	33.5m
13	28/1	27/255	25370	Pipe	Pipe	Widening	2x1.0	2x1.00 m dia.	39.0m
14	28/2	27/410	25520	Pipe	Pipe	Widening	2x1.0	2x1.00 m dia.	39.0m
15	28/3	27/649	25765	Pipe	Pipe	Reconstruction	2x0.75	2x1.20 m dia.	45.0m
16	29/1	28/091	26205	Pipe	Pipe	Reconstruction	2x0.9	2x1.20 m dia.	45.0m
17	29/2	28/275	26360	Pipe	Pipe	Reconstruction	1x0.75	1x1.20 m dia.	45.0m
18	30/2	29/675	27745	Slab	Slab	Reconstruction	2x2.0x2.5	1x4.0x2.5	33.5m
19	31/1	30/055	28125	Slab	Slab	Widening (1-MCW)	1x2.6x2.2	1x2.6x2.2	23.0m
20	31/2	30/232	28300	Slab	Slab	Reconstruction	1x5.0x2.7	1x5.0x4.5	33.5m
21	31/4	30/695	28720	Pipe	Pipe	Reconstruction	1x0.9	1x1.20 m dia.	42.0m
22	31/5	30/875	28945	Slab	Slab	Widening (1-MCW)	1x4.5x2.3	1x4.5x2.3	23.0m
23	32/1	31/126	29195	Slab	Slab	Widening (1-MCW)	1x2.2x1.85	1x2.2x1.85	23.0m
24	32/2	31/215	29285	Pipe	Pipe	Widening	2x0.9	2x0.90 m dia.	22.0m
25	32/3	31/322	29390	Slab	Slab	Widening (1-MCW)	1x2.0x2.0	1x2.0x2.0	23.0m
26	32/4	31/628	29695	Slab	Slab	Widening (1-MCW)	1x2.6x2.5	1x2.6x4.0	23.0m
27	33/1	32/007	30075	Slab	Slab	Widening (1-MCW)	1x2.5x1.8	1x2.5x3.0	23.0m
28	33/2	32/180	30250	Slab	Pipe	Reconstruction	1x2.7x2.2	4x1.20 m dia.	37.0m
29	33/4	32/896	30970	Pipe	Pipe	Reconstruction	2x0.75	2x1.20 m dia.	36.0m
30	34/1	33/040	31085	Slab	Slab	Widening (1-MCW)	1x1.47x1.35	1x1.5x1.4	23.0m
31	34/2	33/336	31380	Pipe	Pipe	Reconstruction	1x0.6	2x1.20 m dia.	36.0m
32	35/1	34/742	32810	Pipe	Pipe	Reconstruction	2x0.75	2x1.20 m dia.	33.5m
33	36/1	35/081	33150	Pipe	Pipe	Widening	2x0.9	2x0.90 m dia.	24.0m
34	36/2	35/325	33405	Pipe	Pipe	Reconstruction	2x0.9	2x1.20 m dia.	38.0m
35	36/3	35/435	33520	Slab	Pipe	Reconstruction	1x2.8x2.5	1x1.20 m dia.	35.0m
36	37/1	36/472	34540	Pipe	Pipe	Reconstruction	2x0.9	2x1.20 m dia.	37.0m
37	37/2	36/581	34650	Slab	Slab	Widening (1-MCW)	1x1.35x1.2	1x1.5x2.5	23.0m
38	38/1	37/621	35685	Pipe	Pipe	Reconstruction	2x0.75	2x1.20 m dia.	35.0m

S.No.	Existing C D No.	Existing Chainage	Design Chainage	Type of Structure		Recommendation	Span Arrangement		Proposed Total Width
				Existing	Proposed		Existing (m)	Proposed (m)	
39	38/2	37/748	35815	Pipe	Pipe	Reconstruction	2x0.75	2x1.20 m dia.	33.5m
40	38/3	37/988	36055	Pipe	Pipe	Widening	2x0.9	2x0.90 m dia.	25.0m
41	39/1	38/597	36685	Pipe	Pipe	Reconstruction	2x0.9	2x1.20 m dia.	38.5m
42	39/2	38/963	37055	Slab	Pipe	Reconstruction	1x1.4x2.1	4x1.20 m dia.	34.5m
43	40/1	39/225	37300	Pipe	Pipe	Reconstruction	2x0.75	2x1.20 m dia.	34.5m
44	41/2	40/237	38300	Slab	Pipe	Reconstruction	2x1.88x2.15	3x1.20 m dia.	38.5m
45	41/3	40/755	38795	Pipe	Pipe	Reconstruction	1x0.75	1x1.20 m dia.	35.0m
46	41/4	40/916	38960	Pipe	Pipe	Reconstruction	2x0.75	2x1.20 m dia.	34.5m
47	41/5	40/984	39010	Pipe	Pipe	Widening	2x1.0	2x1.00 m dia.	25.0m
48	42/1	41/022	39060	Pipe	Pipe	Reconstruction	2x0.9	2x1.20 m dia.	38.5m
49	42/2	41/338	39415	Pipe	Pipe	Reconstruction	2x0.9	2x1.20 m dia.	33.5m
50	43/1	42/260	40345	Slab	Box	Reconstruction	1x1.0x1.0	1x2.0x2.0	33.5m
51	43/2	42/690	40730	Pipe	Pipe	Reconstruction	2x0.75	2x1.20 m dia.	35.5m
52	44/1	43/625	41700	Slab	Slab	Reconstruction	1x2.8x1.25	1x3.0x2.50	33.5m
53	44/2	43/722	41795	Slab	Slab	Reconstruction	1x5.7x3.25	1x6.0x4.50	33.5m
54	44/3	43/878	41950	Pipe	Pipe	Reconstruction	2x0.9	3x1.20 m dia.	44.0m
55	46/1	45/500	43570	Pipe	Pipe	Reconstruction	2x0.75	2x1.20 m dia.	33.5m
56	47/1	46/475	44540	Pipe	Pipe	Reconstruction	2x0.9	2x1.20 m dia.	36.0m
57	47/2	46/625	44690	Pipe	Pipe	Widening	2x1.0	2x1.00 m dia.	23.0m
58	48/1	47/424	45490	Pipe	Pipe	Widening	2x1.0	2x1.00 m dia.	23.0m
59	48/2	47/925	45985	Slab	Slab	Reconstruction	1x2.4x2.95	1x2.5x4.0	33.5m
60	54/1	53/080	50770	Pipe	Pipe	Reconstruction	2x0.75	1x1.20 m dia.	33.5m
61	54/2	53/151	50805	Pipe	Pipe	Reconstruction	2x0.9	1x1.20 m dia.	33.5m
62	54/3	53/880	51540	Pipe	Pipe	Reconstruction	1x0.75	1x1.20 m dia.	34.5m
63	55/1	54/800	52455	Pipe	Pipe	Reconstruction	3x0.75	3x1.20 m dia.	38.0m
64	56/1	55/545	53200	Pipe	Pipe	Reconstruction	4x0.75	4x1.20 m dia.	40.0m
65	57/1	56/390	54045	Pipe	Pipe	Reconstruction	2x0.75	2x1.20 m dia.	35.0m
66	58/1	57/712	55378	Pipe	Pipe	Reconstruction	2x0.75	2x1.20 m dia.	35.0m
67	59/1	58/250	55885	Pipe	Box	Reconstruction (2-MCW)	1x0.75	1x2.0x2.0	33.5m
68	61/1	60/575	58195	Pipe	Pipe	Reconstruction	1x0.6	1x1.20 m dia.	55.0m
69	63/1	62/541	60140	Slab	Slab	Reconstruction	1x6.0 x1.8	1x6.0x5.0	47.5m
70	64/1	63/312	60900	Slab	Slab	Reconstruction	1x6.0x2.0	1x6.0x4.0	33.5m
71	65/1	64/212	61810	Pipe	Pipe	Widening (1-MCW)	4x1.0 m dia.	4x1.0 m dia.	26.0m
72	71/1	70/975	68290	Pipe	Pipe	Reconstruction	2x0.9	2x1.20 m dia.	47.5m
73	73/1	72/225	69535	Slab	Pipe	Reconstruction	1x6.0x1.35	4x 1.2m dia.	55.0m
74	73/2	72/587	69900	Slab	Box	Reconstruction (2-MCW)	1x3.0x1.0	1x2.0x2.0	47.5m
75	73/3	72/935	70245	Slab	Pipe	Reconstruction	1x2.50x2.0	4x 1.2m dia.	55.0m

B. Proposed New Culverts

S.No	Existing Chainage	Design Chainage	Proposed Structure	Proposed Size Arrangement	Proposed Total Width (m)
1	0/540	540	Pipe	1x1.20 m dia.	57.0m
2	1/385	1385	Pipe	1x1.20 m dia.	57.5m
3	1/680	1680	Pipe	1x1.20 m dia.	56.0m
4	2/205	2200	Pipe	2x1.20 m dia.	57.0m
5	2/655	2650	Pipe	2x1.20 m dia.	57.0m
6	3/940	3910	Pipe	1x1.20 m dia.	55.0m
7	4/625	4600	Pipe	1x1.20 m dia.	57.0m
8	5/415	5380	Pipe	2x1.20 m dia.	55.5m
9	5/940	5890	Pipe	1x1.20 m dia.	55.5m
10	6/535	6490	Pipe	1x1.20 m dia.	54.0m
11	7/080	7030	Pipe	1x1.20 m dia.	55.5m
12	7/450	7400	Pipe	1x1.20 m dia.	56.0m
13	8/030	7960	Pipe	2x1.20 m dia.	57.0m
14	8/490	8440	Pipe	2x1.20 m dia.	57.0m
15	9/110	9040	Pipe	1x1.20 m dia.	56.5m
16	9/630	9550	Pipe	2x1.20 m dia.	57.0m
17	Anjar Bypass	11800	Pipe	2x1.20 m dia.	33.5m
18	Anjar Bypass	12200	Pipe	2x1.20 m dia.	33.5m
19	Anjar Bypass	12755	Pipe	2x1.20 m dia.	35.0m
20	Anjar Bypass	13360	Pipe	2x1.20 m dia.	36.5m
21	Anjar Bypass	13660	Pipe	2x1.20 m dia.	44.0m
22	Anjar Bypass	14380	Pipe	2x1.20 m dia.	39.0m
23	Anjar Bypass	14810	Pipe	2x1.20 m dia.	45.0m
24	Anjar Bypass	15080	Pipe	3x1.20 m dia.	41.0m
25	Anjar Bypass	15970	Pipe	2x1.20 m dia.	51.0m
26	Anjar Bypass	16200	Pipe	2x1.20 m dia.	33.5m
27	Anjar Bypass	17030	Pipe	2x1.20 m dia.	35.5m
28	Anjar Bypass	17670	Pipe	2x1.20 m dia.	35.0m
29	Anjar Bypass	17940	Pipe	3x1.20 m dia.	39.5m
30	Anjar Bypass	18460	Pipe	3x1.20 m dia.	41.5m
31	Anjar Bypass	18750	Pipe	2x1.20 m dia.	35.0m
32	Anjar Bypass	19050	Pipe	2x1.20 m dia.	36.0m
33	Anjar Bypass	19510	Pipe	4x1.20 m dia.	57.0m
34	23/610	21850	Pipe	1x1.20 m dia.	37.5m
35	24/330	22460	Pipe	2x1.20 m dia.	40.5m
36	25/185	23330	Pipe	1x1.20 m dia.	35.5m
37	25/580	23720	Pipe	1x1.20 m dia.	36.5m
38	26/690	24800	Pipe	1x1.20 m dia.	35.5m
39	27/075	25190	Pipe	1x1.20 m dia.	55.0m
40	33/685	31730	Pipe	1x1.20 m dia.	33.5m
41	35/825	33890	Pipe	1x1.20 m dia.	36.0m

S.No	Existing Chainage	Design Chainage	Proposed Structure	Proposed Size Arrangement	Proposed Total Width (m)
42	37/302	35365	Pipe	2x1.20 m dia.	37.0m
43	43/160	41235	Pipe	1x1.20 m dia.	35.0m
44	45/200	43270	Pipe	1x1.20 m dia.	53.0m
45	45/860	43935	Pipe	1x1.20 m dia.	35.0m
46	47/045	45115	Box	1x2.0x2.0	33.5m
47	48/240	46305	Pipe	1x1.20 m dia.	34.0m
48	48/610	46675	Box	1x2.0x2.0	33.5m
49	49/635	47685	Pipe	2x1.20 m dia.	50.0m
50	Gundala Realignment	49035	Pipe	2x1.20 m dia.	36.0m
51	Gundala Realignment	49650	Pipe	2x1.20 m dia.	46.0m
52	Gundala Realignment	50055	Pipe	2x1.20 m dia.	46.0m
53	Gundala Realignment	50505	Pipe	2x1.20 m dia.	33.5m
54	53/505	51160	Pipe	1x1.20 m dia.	33.5m
55	54/255	51910	Pipe	1x1.20 m dia.	33.5m
56	55/070	52720	Pipe	1x1.20 m dia.	34.0m
57	55/940	53600	Pipe	1x1.20 m dia.	33.5m
58	58/650	56280	Pipe	1x1.20 m dia.	35.5m
59	59/020	56655	Box	1x2.0x2.0	33.5m
60	59/355	57000	Pipe	1x1.20 m dia.	34.5m
61	59/735	57320	Pipe	2x1.20 m dia.	47.0m
62	60/800	58425	Pipe	1x1.20 m dia.	33.5m
63	64/840	62445	Pipe	2x1.20 m dia.	37.5m
64	Bhujpur Realignment	63180	Pipe	1x1.20 m dia.	33.5m
65	Bhujpur Realignment	63550	Pipe	1x1.20 m dia.	33.5m
66	Bhujpur Realignment	63945	Pipe	1x1.20 m dia.	33.5m
67	68/630	65945	Pipe	2x1.20 m dia.	35.0m
68	69/145	66450	Pipe	1x1.20 m dia.	35.0m
69	69/590	66905	Box	1x2.0x2.0	33.5m
70	70/010	67320	Pipe	2x1.20 m dia.	47.0m
71	70/655	67960	Pipe	1x1.20 m dia.	39.0m
72	71/310	68620	Box	1x2.0x2.0	33.5m
73	73/250	70560	Pipe	2x1.20 m dia.	55.5m
74	73/445	70740	Pipe	2x1.20 m dia.	57.0m
75	73/670	70980	Pipe	2x1.20 m dia.	40.0m

Annex - II

(Schedule-A)

Site for Six-Laning

1. The Site

The project road is starting from Gandhidham town (km 0/000) and terminates at Siracha Junction (km 73/400) on Mandvi Road (NH-8A, Extension) in the Kachchh district. The project road initially traverses in plain/flat terrain (km 0/000 to km 11/300), the remaining majority of road section traverses through plain/undulating terrain. The length of the project road is about 71.40km. The project road section has existing 4-lane configuration throughout with flexible pavement. This is one of the important routes connecting Kandla Port to Mundra Port through NH-8A (Extension).

2. Land

The site of the project Highway comprises the land described below:

S.No.	Existing Chainage (Km)		Total ROW (in m)	Remarks
	From	To		
1	0.000	71.40	60*	Gandhidham to Siracha Junction

**60 m width of ROW is the minimum width of the ROW along the Project Highway. The width shall increase/vary at various locations (junctions/toll plaza/bus bays etc.) to accommodate the designed features.*

The additional Land requirement for Six Laning is Nil.

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Appendix B XIV

Details of Proposed ROB/RUB

S.No.	ROB/RUB	Existing Chainage	Design Chainage	Name of Crossing	Existing Structure	Proposed Structural Configuration	Proposed Structure Type	Proposed Span Arrangement	Total Width of the Structure
1	ROB	10/021	9938	New	Level Crossing	New 2 X 3 Lane	RCC T-Beam	20+30+20 = 70m*	2 x 14 m

Note:

- *The proposed span arrangement of the ROB is tentative and subject to change as per availability of railway boundaries / requirement of the railways.*
- *ROB shall be designed, constructed and maintained as per the requirements of Railway authorities. The construction plans shall be prepared in consultation with the concerned railway authority.*
- *The ROB shall be constructed and maintained by the concessionaire under supervision of the Railways.*
- *All expenditure related to construction, maintenance and supervision of ROB (except P&E charges) shall be borne by the Concessionaire.*
- *During construction, the existing level crossing shall be widened to 12 meters or two separate level crossings of 7 meters each shall be provided.*

Appendix B XV

Entry / Exit Ramps and locations

S. No	Location	Design Chainage	Left	Right
1	Near Galpadar	1+700	-	Entry
2	Near Galpadar	1+800	Exit	-
3	Near Galpadar	2+900	Entry	Exit
4	Near Airport Junction	3+800	Exit	Entry
5	Near Airport Junction	5+200	Entry	Exit
6		7+700	Exit	Entry
7		8+900	Entry	Exit
8	Near start of Anjar Bypass	10+700	Exit	Entry
9	Near start of Anjar Bypass	11+900	Entry	Exit
10	Near Vidi Village	15+500	Exit	Entry
11	Near Vidi Village	16+350	Entry	Exit
12	Near Vidi Village	16+400	Exit	Entry
13	Near Vidi Village	17+200	Entry	Exit
14	Near end of Anjar Bypass	19+100	Exit	Entry
15	Near end of Anjar Bypass	20+000	Entry	Exit
16	Near Khedoi Reserve Forest	22+000	-	Entry
17	Near Khedoi Reserve Forest	22+250	-	Exit
18		24+100	Exit	-
19		24+400	Entry	-
20	Near Khedoi Village	25+200	Exit	-
21	Near Khedoi Village	25+300	-	Entry
22		25+500	Entry	-
23		26+650	Exit	-
24		27+000	Entry	-
25		28+400	-	Entry
26		28+650	-	Exit
27		28+900	Exit	-
28		29+200	Entry	-
29	Near Bhuvad-Mathada Road	30+100	Exit	Entry
30	Near Bhuvad-Mathada Road	31+100	Entry	Exit
31	Near Chandroda Village	33+700	Exit	Entry
32	Near Chandroda Village	33+900	Entry	Exit
33		38+900	Exit	-
34		39+200	Entry	-
35	Near Vavaar Village Road	40+100	Exit	Entry
36	Near Vavaar Village Road	40+400	Entry	Exit
37	Near Chasra Village Road	41+400	-	Entry
38	Near Chasra Village Road	41+600	-	Exit
39	Near Mokha Junction	42+800	Exit	Entry
40	Near Mokha Junction	44+000	Entry	Exit
41	Near Start of Gundala Realignment	47+400	Exit	Entry
42	Near Start of Gundala Realignment	48+250	Entry	Exit
43	Near End of Gundala Realignment	49+800	Exit	Entry
44	Near End of Gundala Realignment	50+900	Entry	Exit
45	Near Borara Village Road	52+900	Exit	-
46	Near Borara Village Road	53+100	Entry	-

S. No	Location	Design Chainage	Left	Right
47	[redacted]	54+500	Exit	Entry
48	[redacted]	54+900	Entry	Exit
49	[redacted]	56+000	Exit	-
50	[redacted]	56+400	Entry	-
51	Near Pragpar Junction	56+900	Exit	Entry
52	Near Pragpar Junction	57+850	Entry	Exit
53	Near Bariya Road	59+000	Exit	Entry
54	Near Start of Bhujpur Realignment	62+300	Exit	Entry
55	Near Start of Bhujpur Realignment	63+200	Entry	Exit
56	Near Jabalpur Village	67+000	Exit	Entry
57	Near Jabalpur Village	68+100	Entry	Exit
58	Near Deshalpar Road	70+000	Entry	Exit

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Tentative Location of Slope Protection *

Sl. No.	Location	Design Chainage
1	Major Bridge at 29+500	27.470
2	Major Bridge at 36+946	35.015
3	Major Bridge at 44+625	42.725
4	Major Bridge at 56+995	54.720
5	Major Bridge at 61+000	58.825
6	Major Bridge at 68+150	65.480
7	Minor Bridge in Anjar Bypass	15.400
8	Minor Bridge in Anjar Bypass	17.200
9	Minor Bridge in Gundala Realignment	49.500
10	Minor Bridge at 63+595	61.200
11	Minor Bridge at 63+695	61.300
12	Minor Bridge at 64+559	62.160
13	Minor Bridge in Bhujpur Realignment	64.380
14	Minor Bridge at 71+758	69.070

* Slope protection in the form of stone pitching.

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SCHEDULE – C

(See Clause 2.1)

PROJECT FACILITIES

1 Project Facilities

The Concessionaire shall construct the Project Facilities in accordance with the provisions of this Agreement. Such Project Facilities shall include:

(a) toll plaza;
(b) roadside furniture;
(c) street lighting;
(d) pedestrian facilities;
(e) landscaping and tree plantation;
(f) rest areas;
(g) truck lay-byes;
(h) bus-bays and bus shelters;
(i) cattle crossings;
(j) development of site for wayside amenities;
(k) traffic aid posts;
(l) medical aid posts;
(m) vehicle rescue posts; and
(n) telecom system.

2 Project Facilities for Four-Laning

Project Facilities forming part of Four-Laning and to be completed on or before the Project Completion Date have been described in Annex-I of this Schedule-C.

3 Project Facilities for Six-Laning

Project Facilities forming part of Six-Laning and to be completed on or before the Scheduled six laning Date have been described in Annex-II of this Schedule-C.

Annex - I

(Schedule-C)

Project Facilities for Four-Laning

1. Project Facilities

The Concessionaire shall construct the Project Facilities described in this Annex-I to form part of the Four-Lane Project Highway. The Project Facilities shall include:

(a) toll plazas;

(b) roadside furniture;

(c) pedestrian facilities;

(d) tree plantation;

(e) truck lay-byes;

(f) bus-bays and bus shelters; and

(g) others

1. Highway Lighting
2. Highway Patrol
3. Ambulances
4. Cranes
5. Telecom System
5. Utilities
6. Rainwater Harvesting

2. Description of Project Facilities

Each of the Project Facilities is briefly described below:

a) Toll Plazas (1 no.)

At chainage Km 44+550 (designed) after Mokha Junction (SH 46) (Km 46+500 of existing NH8AE from 'zero chainage' at Gandhidham)

b) Road Side Furniture

The provision of road side furniture shall be finalized as per NHAI Manual of Specifications and in consultation with the Independent Consultant.

(i) Traffic Signs and Pavement Markings

Traffic signs and pavement markings shall include roadside signs, overhead signs; curb mounted signs and road marking along the Project Highway. The design and marking for the Project Highway shall be as per the design standard indicated in Schedule-D and the location for various treatments shall be finalized in consultation with the Independent Engineer.

(ii) Metal Beam Crash Barrier

(iii) Traffic Safety Devices

(iv) Boundary Stones

(v) Hectometer / Kilometer Stones

(vi) Traffic Blinker Signal (L.E.D) at intersections

c) Pedestrian Facilities

Pedestrian facilities in the form of guard rails, footpath, lighting, etc shall be provided

d) Landscaping and Tree Plantation

Landscaping of Highway shall be done on, but not limited to the following,

Median

Vehicular and Non-vehicular/Pedestrian Underpasses

Entry and Exit Ramps

At-Grade islands of the intersection locations

Toll Plaza area

e) Truck Lay-byes

Tentative locations of truck lay-byes on either side of the road are given below; however, suitable locations shall be decided in consultation with NHAI and Independent Engineer.

Location of Truck Lay Bys

Sl. No.	Existing Chainage (Km.)	Design Chainage (km)	Location
1	46+500 of NH8AE	44+550	After Mokha Junction (SH 46)

f) Bus Bays / Bus Shelters (46 Nos.)

The concessionaire shall provide minimum of 46 nos. of Bus Bays along the project highway and the locations are given in **Appendix C** I. The design of Bus

Bays should be aesthetically pleased with surrounding. The locations of these bus bays shall be finalized by the concessionaire in consultation with the IC.

g) Others

The following facilities shall be provided as per Concession Agreement and "Manual of Specification and Standards for four laning of National Highways through PPP".

1) Highway Lighting

A tentative list of High Mast Lighting to be provided is given in **Appendix CII.** At the minor junctions solar lighting shall be provided.

2) Highway Patrol

1 (One) number of Highway Patrol Unit shall be provided as per Clause 20.4 of Draft Concession Agreement.

3) Ambulances

1 (One) number of Ambulance Unit shall be provided as per Clause 21.3 of Draft Concession Agreement.

4) Cranes

1 number Crane shall be provided at each Vehicle Rescue Post as per Clause 17.5.2 of Draft Concession Agreement.

5) Telecom System

Telecom System facilities shall be provided as specified in the manual.

Note: In case of any discrepancy in number or location of any of the project facility mentioned in this Annex I, the Independent Engineer shall finalize the number/location of these facilities as per site requirement.

4.15 Utilities

Provision of accommodating utilities has been made over as well as underground within utility corridor on either side of the Project Highway.

4.16 Rainwater Harvesting

As per Ministry of Environment and Forests Notification, New Delhi dated 14.01.1997 (as amended on 13.01.1998, 05.01.1999 & 6.11.2000), the construction of Rain water, harvesting structure is mandatory in and around Water Crisis area, notified by the Central Ground Water Board.

Annex - II

(Schedule-C)

Project Facilities for Six-Laning

1 Project Facilities

The Concessionaire shall construct the Project Facilities described in this Annex-II to form part of the Six-Lane Project Highway. The Project Facilities shall include:

a) toll plazas;

b) roadside furniture;

c) street lighting;

d) pedestrian facilities;

e) landscaping and tree plantation;

f) rest areas;

g) truck lay-byes;

h) bus-bays and bus shelters;

i) cattle crossings;

j) development of site for wayside amenities

k) traffic aid posts;

l) medical aid posts;

m) vehicle rescue posts; and

n) telecom system

2 Description of Project Facilities

Each of the Project Facilities is briefly described below:

To be described briefly. See Note below.

b) Toll Plazas (1 no.)

At chainage Km 44+550 (designed) after Mokha Junction (SH 46) (Km 46+500 of existing NH8AE from 'zero chainage' at Gandhidham)

b) Road Side Furniture

The provision of road side furniture shall be finalized as per NHAI Manual of Specifications and in consultation with the Independent Consultant.

(i) Traffic Signs and Pavement Markings

Traffic signs and pavement markings shall include roadside signs, overhead signs; curb mounted signs and road marking along the Project Highway. The design and marking for the Project Highway shall be as per the design standard indicated in Schedule-D and the location for various treatments shall be finalized in consultation with the Independent Engineer.

(ii) Metal Beam Crash Barrier

(iii) Traffic Safety Devices

(iv) Boundary Stones

(v) Hectometer / Kilometer Stones

(vi) Traffic Blinker Signal (L.E.D) at intersections

f) Pedestrian Facilities

Pedestrian facilities in the form of guard rails, footpath, lighting, etc shall be provided

g) Landscaping and Tree Plantation

Landscaping of Highway shall be done on, but not limited to the following,

Median

Vehicular and Non-vehicular/Pedestrian Underpasses

Entry and Exit Ramps

At-Grade islands of the intersection locations

Toll Plaza area

h) Truck Lay-byes

Tentative locations of truck lay-byes on either side of the road are given below; however, suitable locations shall be decided in consultation with NHAI and Independent Engineer.

Location of Truck Lay Bys

Sl. No.	Existing Chainage (Km.)	Design Chainage (km)	Location

Sl. No.	Existing Chainage (Km.)	Design Chainage (km)	Location
1	46+500 of NH8AE	44+550	After Mokha Junction (SH 46)

f) Bus Bays / Bus Shelters (46 Nos.)

The concessionaire shall provide minimum of 46 nos. of Bus Bays along the project highway and the locations are given in **Appendix C I**. The design of Bus Bays should be aesthetically pleased with surrounding. The locations of these bus bays shall be finalized by the concessionaire in consultation with the IC.

g) Others

The following facilities shall be provided as per Concession Agreement and "Manual of Specification and Standards for four laning of National Highways through PPP".

1) Highway Lighting

A tentative list of High Mast Lighting to be provided is given in **Appendix C II.** At the minor junctions solar lighting shall be provided.

2) Highway Patrol

1 (One) number of Highway Patrol Unit shall be provided as per Clause 20.4 of Draft Concession Agreement.

3) Ambulances

1 (One) number of Ambulance Unit shall be provided as per Clause 21.3 of Draft Concession Agreement.

4) Cranes

2 number Cranes shall be provided at each Vehicle Rescue Post as per Clause 17.5.2 of Draft Concession Agreement.

5) Telecom System

Telecom System facilities shall be provided as specified in the manual.

Note: In case of any discrepancy in number or location of any of the project facility mentioned in this Annex I, the independent Engineer shall finalize the number/location of these facilities as per site requirement.

4.15 Utilities

Provision of accommodating utilities has been made over as well as underground within utility corridor on either side of the Project Highway.

4.16 Rainwater Harvesting

As per Ministry of Environment and Forests Notification, New Delhi dated 14.01.1997 (as amended on 13.01.1998, 05.01.1999 & 6.11.2000), the construction of Rain water, harvesting structure is mandatory in and around Water Crisis area, notified by the Central Ground Water Board.

Appendix C I

Locations of Bus Bays

Sl. No.	Existing Chainage		Nearby Village
	Left	Right	
1	2400	2400	Galpadar
2	3450	3450	Nageshwar Society
3	4620	4620	Airport Junction
4	8857	8857	Meghpar
5	4600*	4600*	Vidi
6	21925	22070	Mithyada Road
7	26200	26200	Mithyada Road
8	27300	27300	Khedoi
9	32600	32600	Bhuvad, Mithyada Junction
10	36900	36900	Chandrora
11	42200	42165	Vavaar
12	45300	45350	Bhadreswar (Mokha Junction)
13	2690*	2690*	Gundala
14	55300	55280	Mundra, Borara
15	[illegible]	56915	Toda
16	57200	[illegible]	Modaliya
17	59400	59500	Paragpar
18	61955	61955	Samaghoga
19	62550	62550	Jindal Saw Mills
20	2000*	2000*	Bhujpur
21	70200	70200	Jabalpur
22	71890	71890	Navinal
23	72260	72260	Deshalpar
24	73370	73370	Siracha Junction

Note: *Proposed Chainage along new Bypass/Realignment.

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Appendix C II

Tentative locations for High Mast Lighting

S.No	Location	Existing Chainage	Design Chainage	Number of Lights
1	Junction near Galpadar Village	2/400	2.390	2
2	Gandhidham-Airport Junction	4/625	4.610	2
3	Junction near Meghpar Village	8/300	8.250	2
4	Adipur-Anjar Road Junction	11/300	11.280	2
5	Junction near Vidi Village (Anjar Bypass)	Anjar Bypass	15.900	2
6	Anjar Local Road	Anjar Bypass	16.775	2
7	Junction at end of Proposed Anjar Bypass	21/500	19.635	2
8	Junction at Bhuvad-Mithyara Road	32/580	30.640	2
9	Mokha Junction	45/300	43.375	2
10	Junction at start of Proposed Gundala Realignment	49/800	47.840	2
11	Ratariya Road Junction on Realignment near Gundala Village	Gundala Realignment	50.280	2
12	Paragpar Junction	59/900	57.525	4
13	Junction at start of Proposed Bhujpur Realignment	65/200	62.800	2
14	Jabalpur Village Road	70/200	67.480	2

SCHEDULE – D

(See Clause 2.1)

SPECIFICATIONS AND STANDARDS

1 **Four-Laning**

The Concessionaire shall comply with the Specifications and Standards set forth in Annex-I of this Schedule-D for construction of the Four Lane Project Highway.

2 **Six-Laning**

The Concessionaire shall comply with the Specifications and Standards set forth in Annex-II of this Schedule-D for construction of the Six-Lane Project Highway

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Annex - I
(Schedule-D)

Specifications and Standards for Four-Laning

1 Manual of Specifications and Standards to apply

Subject to the provisions of Paragraph 2 of this Annex-I, Four-Laning of the Project Highway shall conform to the Manual of Specifications and Standards for DBFOT Road Projects published by IRC (IRC: SP: 84-2009). (An authenticated draft copy of the Manual (IRC: SP: 84-2009) has been provided to the Concessionaire as part of the bid documents)

2 Deviations from the Manual

Notwithstanding anything to the contrary contained in the aforesaid Manual, the following Specifications and Standards shall apply to the Four Lane Project Highway, and for purposes of this Agreement, the aforesaid Manual shall be deemed to be amended to the extent set forth below:

Sr. No.	Clause referred in Manual	Item	Provision as per Manual	Modified Provision
	Nil			

Annex - II

(Schedule-D)

Specifications and Standards for Six-Laning

1 Manual of Specifications and Standards to apply

Subject to the provisions of Paragraph 2 of this Annex-II, Six-Laning of the Project Highway shall conform to the Manual of Specifications and Standards for DBFOT Road Projects published by the Authority/MOSRTH on 27th May 2008. (An authenticated copy of the Manual has been provided to the Concessionaire as part of the bid documents.)

2 Deviations from the Manual

Notwithstanding anything to the contrary contained in the aforesaid Manual, the following Specifications and Standards shall apply to the Six Lane Project Highway, and for purposes of this Agreement, the aforesaid Manual shall be deemed to be amended to the extent set forth below:

S. No.	Location	Item	Description of Deviation	Clause Reference
				Para of 6 lane Manual
Nil				

MANUAL OF SPECIFICATIONS & STANDARDS FOR FOUR LANING OF HIGHWAYS THROUGH PUBLIC PRIVATE PARTNERSHIP

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(10th June, 2009)

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2.	The Director General (Road Development) & Special Secretary to the Govt. of India	Ministry of Shipping, Road Transport & Highways, Transport Bhawan, New Delhi - 110 001
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INTRODUCTION

The Manual of Specifications & Standards for Four laning of Highways through Public Private Partnership has been under the consideration of Project Preparation, Contract Management & Quality Assurance Committee (G-1) since January 2009. The draft was discussed by G-1 Committee in a number of meetings.

The Project Preparation, Contract Management & Quality Assurance Committee (personnel given below) in its meeting held on 25.05.2009 has finalized the Manual and recommended its submission to the General Specifications & Standards Committee(GSS) for their consideration.

Puri, S.K.	–	Convenor
Datta, P.K.	–	Co-Convenor
Ramana, K. Venkata	–	Member-Secretary

Members

Alam, Perwez	Kumar,Mahesh
Bahadur, A.P.	Mahalaha,R.S.
Basu,B.K.	Nirmal,S.K.
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Ex-Officio Member

President, IRC	DG(RD), MoSRT&H
(D.B. Deshpande)	

Secretary General, IRC
(R.P. Indoria)

The draft Manual was approved by the General Specifications and Standards Committee(GSS)in its meeting held on 10.06.2009 and the Executive Committee in its meeting held on 18.06.2009 and authorized the Secretary General, IRC to place the same before Council. The document was approved by the IRC Council in its 188th meeting held on 19.06.2009 and the Secretary General was authorized to incorporate the comments offered by the Council members and thereafter have it printed.

SECTION - 1

GENERAL

SECTION - 1

GENERAL

1.1 This Manual is applicable for Four Laning of Highways through Public Private Partnership (PPP) mode. The scope of the work shall be as defined in the Concession Agreement. This Manual shall be read harmoniously with the intent of the Concession Agreement.

1.2 The Project Highway and the project facilities shall conform to the requirements of design and specifications set out in this Manual, which are the minimum prescribed. The project report and other information provided by the Authority[1] shall be used by the Concessionaire only for its own reference and for carrying out further investigations. The Concessionaire shall be solely responsible for undertaking all the necessary surveys, investigations and detailed designs in accordance with good industry practice and due diligence, and shall have no claim against the Authority for any loss, damage, risk, costs, liabilities or obligations arising out of or in relation to the project report and other information provided by the Authority.

1.3 At least 2 weeks prior to commencement of the work, the Concessionaire shall draw up a Quality Assurance Manual (QAM) covering the Quality System (QS), Quality Assurance Plan (QAP) and documentation for all aspects of the bridge and road works and send three copies each to the Independent Engineer (IE) for review. The class of quality assurance shall not be less than Q-3 (Refer IRC:SP:47 and IRC:SP:57).

1.4 The Codes, Standards and Technical Specifications applicable for the design and construction of project components are:

i) Indian Roads Congress (IRC) Codes and Standards; (Refer Appendix-2).

ii) Specifications for Road and Bridge Works issued by the Ministry of Road Transport & Highways(MORTH) hereinafter referred to as MORTH or Ministry's Specifications.

iii) Any other standards referred to in the Manual and any supplement issued with the bid document.

1.5 Latest version of the Codes, Standards, Specifications, etc., notified/published at least 60 days before the last date of bid submission shall be considered applicable.

1.6 The terms 'Ministry of Surface Transport', 'Ministry of Shipping, Road Transport & Highways' and 'Ministry of Road Transport and Highways' or any successor or substitute thereof shall be considered as synonymous.

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[1] *Authority / Government / Client*

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1.7 The terms 'Inspector' and 'Engineer' used in MORTH Specifications shall be deemed to be substituted by the term "Independent Engineer", to the extent it is consistent with the provisions of the Concession Agreement and this Manual. The role of the Independent Engineer shall be as defined in the Concession Agreement.

1.8 In case of any conflict or inconsistency in the provisions of the applicable IRC Codes, Standards or MORTH Specifications, the provisions contained in this Manual shall apply.

1.9 In the absence of any specific provision on any particular issue in the aforesaid Codes or Specifications read in conjunction with the Specifications and Standards contained in this Manual, the following standards shall apply in order of priority.

i) Bureau of Indian Standards (BIS)

ii) American Association of State Highway and Transportation Officials (AASHTO) Standards or American Society for Testing and Materials (ASTM) Standards or Euro Codes or British Standards or Australian Standards

iii) Any other specifications/standards proposed by the Concessionaire and reviewed by the IE.

1.10 All items of building works shall conform to Central Public Works Department (CPWD) Specifications for Class 1 building works[2] and standards given in the National Building Code (NBC). For the Project Highway through the state entity, to the extent specific provisions for building works are made in IRC/MORTH Specifications, the same shall prevail over the CPWD/NBC provisions For this purpose, building works shall be deemed to include toll plaza complex, road furniture, roadside facilities, landscape elements and/or any other works incidental to the building works.

1.11 Guidelines for Preparing Schedules of the Concession Agreement

Certain paras (full or part) in Sections 1 to 13 of this Manual refer to the Schedules of the Concession Agreement. While finalizing the feasibility/project report for the Project Highway, and the scope of the project, each of these Paras should be carefully examined and addressed by the Authority with a view to making appropriate provisions in the Schedules of the Concession Agreement. (A list of the Paras that refer to such Schedules has been provided at Appendix-1 for ready reference).

1.12 Alternative Standards and Specifications

The requirements stated in the Manual are the minimum. The Concessionaire will, however, be free to adopt international practices, alternative specifications, materials and standards to bring in innovation in the design and construction provided they are

[2] *The State Government may prescribe concerned State PWD Specifications, if so desired.*

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better or comparable with the standards prescribed in the Manual. The specifications and techniques which are not included in the MORTH/IRC Specifications shall be supported with authentic standards and specifications mentioned in Para 1.9. Such a proposal shall be submitted by the Concessionaire to the Independent Engineer. In case, the Independent Engineer is of the opinion that the proposal submitted by the Concessionaire is not in conformity with any of the international standards or codes, then he will record his reasons and convey the same to the Concessionaire for compliance. A record shall be kept by the Independent Engineer, of the non-compliance by the Concessionaire of the minimum Specifications and Standards specified in the Manual. Adverse consequences, if any, arising from any such non-compliance, shall be treated as "Concessionaire Default" and shall be dealt in accordance with the provisions of the Concession Agreement.

1.13 General considerations for Planning, Design and Construction

The Project Highway shall be planned as a "partially access controlled highway" where access to the highway shall be provided only at pre-determined locations. In doing so, the Concessionaire shall take measures to overcome the physical and operational constraints and plan, design and construct the Project Highway using appropriate methods, management techniques and technologies. General considerations shall, without being limited to, be as follows:-

a) The constraints

The physical constraints in the existing highway are in the form of limitation of right of way, un-regulated access, inadequate service roads and underpasses, numerous at-grade junctions, lack of physical separation between local and through traffic etc. The operation constraints arise out of the necessity or possibility of closing a portion of the road for construction and/ or diverting the traffic to temporary diversions, thereby reducing the capacity and safety of the existing highway. The solutions evolved by the Concessionaire shall be such that these operational constraints are overcome through appropriate planning, design and construction method, techniques and technologies and by adopting suitable traffic management measures.

b) Safety of design

All designs shall be safe to ensure that the Project Highway or any part thereof (for example embankment, pavement, retaining structures, bridges, culverts, etc) does not collapse (global stability) nor its serviceability/performance (for example settlement, roughness, undulations, deflections, etc) deteriorates below acceptable level as prescribed in Schedule K of the Concession Agreement.

c) Durability

The Project Highway shall not only be safe but also durable. This would mean that the deteriorating effects of climate and environment (for example

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wetting and drying, freezing and thawing, if applicable, temperature differences, aggressive environment leading to corrosion, etc) in addition to the traffic shall be duly considered in design and construction to make the Project Highway durable.

d) Mitigating disruptive effects of construction

The planning, design and construction of the highway shall be such that the construction of Project Highway does not have adverse impact on the environment and does not disrupt the lives and business activities of the people living close to the Project Highway.

1.14 Safety during Construction and Operation & Maintenance

1.14.1 The Concessionaire shall develop, implement and administer a surveillance and safety programe for providing a safe environment on or about the Project Highway, and shall comply with the safety requirements set forth in the Concession Agreement.

1.14.2 Before taking up any construction or maintenance operation/work, the Concessionaire shall prepare a Traffic Management Plan for each work zone and furnish it to the Independent Engineer for comments duly incorporating the following:

i) Designate a Site Safety Team headed by a qualified Safety Officer.

ii) Traffic safety devices as per IRC:SP:55 with the following specifications:

a) Signages of retro-reflective sheet of high intensity grade.

b) Delineators in the form of cones/drums (300 to 500 mm dia and 1000 mm high) made of plastic/rubber having retro reflective red and white band, at a spacing of maximum 5 m along with a reflective tape (red and white band) to be tied in between the gaps of cones/ drums. A bulb/flasher using solar energy is to be placed on the top of the cone/drum for night delineation.

c) Barricades using iron sheet (plain) with adequate iron railing/frame painted with retro-reflective paint in alternate black and white (or yellow and black) stripes. Warning lights at 5.0 m spacing shall be mounted on the barricades and kept lit in the dark hours and night.

iii) The arrangement of traffic during construction and maintenance shall conform to the requirements of Clause 112 of MORTH Specifications. Ensure availability of 7 m paved carriageway for traffic without potholes or other defects. At locations where available carriageway is less than 7 m, provide round the clock traffic signals with marshals carrying mobile/ walky-talky at both ends to control both directions of traffic.

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iv) Sprinkling of water for dust control at work zones, haul roads and plant/ camp sites.

v) Noise/Pollution suppression measures at work zones, haul roads and plant/camp sites.

vi) Mechanical, electrical and fire safety practices.

vii) Safety measures like PPE (Personal Protection Equipment) for workers engaged.

viii) First Aid and Emergency Response Arrangements i.e. First Aid Box, Ambulance, paramedical staff, alarms, etc.

ix) Safety training/awareness programmes.

x) Formats to maintain the accident records/emergency response provided during accidents.

xi) A penalty scheme for violations in provision of adequate traffic control devices and proper traffic management should be proposed by the Concessionaire. In case of default, the amount of penalty shall be paid by the Concessionaire to the Authority.

xii) A compensation scheme including insurance cover for third party for workers, road users and road side residents in case of death/injury/damage to the vehicle/property resulting from accidents on the Project Highway, irrespective of the person at fault should be proposed by the Concessionaire.

1.14.3 The Concessionaire shall also be responsible for ensuring compliance of all labour laws and regulations including those relating to the welfare of workers engaged both directly and indirectly on the Project Highway, besides their occupational safety and health.

1.15 The Concessionaire shall set up field laboratory for testing of materials and finished products as stipulated in Clause 121 of MORTH Specifications. It shall make necessary arrangements for additional/confirmatory testing of any materials/products at the government accredited laboratory, for which facilities at site laboratory are not available.

1.16 Environment Mitigation Measures

The Concessionaire shall carry out tests/monitor various parameters impacting the environment of the Project Highway keeping in view the guidelines of the Ministry of Environment and Forests and submit proposals for mitigation of adverse environment impact including provision of noise barriers, etc. for review and comments of the IE, if any and undertake implementation of the proposals in consultation with the IE.

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1.17 Utilities

The details of the new utilities which are to be constructed or provided for along or across the Project Highway shall be as specified in Schedule 'B' of the Concession Agreement.

1.18 Review and comments by the Independent Engineer

In cases where the Concessionaire is required to send any drawings or documents to the Independent Engineer for review and comments, and in the event such comments are received by the Concessionaire, it shall duly consider such comments in accordance with the Concession Agreement and Good Industry Practice for taking appropriate action thereon. The correspondence between the Concessionaire and the Independent Engineer shall be deemed valid only if a copy thereof is endorsed to and received by the Authority.

1.19 Definitions and Interpretation

1.19.1 Unless specified otherwise in this Manual, the definitions contained in the Model Concession Agreement (MCA) for Public Private Partnership (PPP) in Highways as published by the Planning Commission, Government of India, shall apply.

1.19.2 Built-up area shall mean sections of the Project Highway that are situated within the limits of a municipal town and shall include sections of 200 m or more in non-municipal areas where dwellings/shops have been built on one or both sides of the Project Highway on at least 50 per cent of the total length comprising such section. The Built up areas shall be as specified in Schedule 'B' of the Concession Agreement.

1.19.3 The definition of PCU used in this Manual shall be as per IRC Codes and Guidelines.

1.20 This Manual is for 4-laning of the Project Highway. However, in some stretches, as indicated in Schedule 'B' of the Concession Agreement, 6-lane divided carriageway shall be provided as part of 4-laning of the Project Highway (Refer para 2.18). This shall not be construed as 6-laning of the Project Highway.

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SECTION - 2

GEOMETRIC DESIGN AND GENERAL FEATURES

SECTION - 2

GEOMETRIC DESIGN AND GENERAL FEATURES

2.1 General

i) This section lays down the standards for geometric design and general features for four-lane divided carriageway.

ii) a) In built-up areas, 6-lane divided carriageway along with service roads shall be provided as part of 4-laning of the Project Highway. Such stretches where the requirement of 6-laning is dispensed with and only 4-laning with or without service road and footpath is to be provided will be as indicated in Schedule 'B' of the Concession Agreement.

b) Where there is constraint of ROW width, the Authority may specify construction of a bypass. The alignment of the bypasses shall be as specified in Schedule 'B' and in conformity with the site earmarked in Schedule 'A' of the Concession Agreement.

iii) The geometric design of the Project Highway shall conform to the standards set out in this section as a minimum.

iv) As far as possible, uniformity of design standards shall be maintained throughout the length of the Project Highway. In case of any change, it shall be effected in a gradual manner.

v) Where the existing road geometrics are deficient with respect to minimum requirements and its improvements to the prescribed standards is not feasible due to any constraint in acquisition of additional land, such stretches shall be as specified in Schedule 'B' of the Concession Agreement.

vi) Existing horizontal curves, which are found deficient in radius, layout, transition lengths or super-elevation shall be corrected to the standards specified in this section.

vii) Any deficiencies in the vertical profile in respect of grades, layout of vertical curves and sight distance shall be corrected to meet the minimum requirements specified in this section.

2.2 Design Speed

2.2.1 The design speeds given in Table 2.1 shall be adopted for various terrain classification (Terrain is classified by the general slope of the ground across the highway alignment).

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Table 2.1 Design Speed

Nature of Terrain	Cross slope of the ground	Design speed (km/hr)	
		Ruling	Minimum
Plain and Rolling	Up to 25 percent	100	80
Mountainous and Steep	More than 25 percent	60	40

Short stretches (say less than 1 km) of varying terrain met with on the road stretch shall not be taken into consideration while deciding the terrain classification for a given section of Project Highway.

2.2.2 In general, the ruling design speed shall be adopted for the various geometric design features of the road. Minimum design speed shall be adopted only where site conditions are restrictive and adequate land width is not available. Such stretches shall be as indicated in Schedule 'B' of the Concession Agreement.

2.3 Right-of-Way

The ROW available for the Project Highway shall be as given in Schedule 'A' of the Concession Agreement. The Authority would acquire the additional land required, if any. The land to be acquired shall be indicated in Schedule 'B' of the Concession Agreement. The minimum Right of Way for non-urban and urban areas should be as prescribed in IRC:73 and IRC:86 respectively.

2.4 Lane Width of Carriageway

The standard lane width of the Project Highway shall be 3.5 m.

2.5 Median

2.5.1 The median shall be either raised or depressed. The width of median is the distance between inside edges of carriageway. The type of median shall depend upon the availability of Right of Way. The minimum width of median, subject to availability of Right of Way, for various locations shall be as in Table 2.2.

Table 2.2 Width of Median

Type of Section	Minimum Width of Median (m)		
	Plain and Rolling terrain		Mountainous and Steep terrain
	Raised	Depressed median	Raised
Open country with isolated built up area	4.5	7.0	2.0
Built up area	2.0	Not Applicable	2.0
Approach to grade separated structures	4.5	Not Applicable	2.0

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The type and widths of median in various stretches of Project Highway shall be as indicated in Schedule 'B'.

2.5.2 The median shall have suitably designed drainage system so that water does not stagnate in the median.

2.5.3 In case of depressed median, a minimum 0.6 m width adjacent to carriageway in either direction shall be paved.

2.5.4 As far as possible, the median shall be of uniform width in a particular section of the highway. However, where changes are unavoidable, a transition of 1 in 20 shall be provided.

2.5.5 In the case of depressed median, metal beam type (double beam) crash barriers shall be provided at either side of the median. Suitable shrubs as per Section 11 of this Manual shall be provided.

2.5.6 Suitable antiglare measures such as metal/plastic screens shall be provided in flat stretches or on horizontal curves to reduce headlight glare from opposite traffic. The total height of screen including the height of the barrier shall be 1.5 m.

2.6 Shoulders

2.6.1 Width of shoulders

The shoulder width on the outer side (left side of carriageway) shall be as given in Tables 2.3. and 2.4.

Table 2.3 Width of Shoulders in P'ain and Rolling Terrain

Type of Section	Width of Shoulder (m)		
	Paved	Earthen	Total
Open country with isolated built up area	1.5	2.0	3.5
Built up area	2.0	-	2.0
Approaches to grade separated structures	2.0	-	2.0
Approaches to bridges	1.5	2.0	3.5

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Table 2.4 Width of Shoulders in Mountainous and Steep Terrain (Hilly Area)

Type of Section	Width of Shoulder, including drain and crash barrier as applicable (m)	
Open country with isolated built up area	1.5 (on hill side) 2.0 (on valley side)	Earthen Shoulder
Built up area and approaches to grade separated structures/bridges	1.5 (on hill side) 2.0 (on valley side)	Raised Footpath along with provision of adequate drainage along and across the footpath

Note :In mountainous and steep terrain, the scope of work defined by the Authority may be two-lane carriageways on different alignments (contours). In that case, IRC:SP:73–2007 Manual of Specifications and Standards for Two-Laning of Highways shall apply to the two-lane carriageways on different alignments (contours).

2.6.2 Type of shoulder

The type of shoulder shall be as below:

i) In the built-up section and approaches to the grade separated structures, the shoulder shall be paved in full width.

ii) Earthen shoulders shall be covered with 150 mm thick layer of granular material conforming to the requirements given in Clause 401 of MORTH Specifications.

iii) In embankments with height more than 6.0 m, the granular shoulder may be raised with provision of kerb channel to channelize the drainage as an erosion control device in accordance with Section 6.

iv) The composition and specification of the paved shoulder shall be same as of the main carriageway.

2.7 Roadway Width

2.7.1 The width of roadway shall depend upon the width of carriageway, shoulders and the median.

2.7.2 On horizontal curves with radius up to 300 m, width of pavement and roadway in each carriageway shall be increased as per Table 2.5.

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Table 2.5 Extra Width of Pavement and Roadway In Each Carriageway

Radius of Curve	Extra Width
75-100 m	0.9 m
101-300 m	0.6 m

2.8 Crossfall

2.8.1 The crossfall on straight sections of road carriageway, paved shoulders and paved portion of median shall be 2.5 percent for bituminous surface and 2.0 percent for cement concrete surface.

2.8.2 The crossfall shall be unidirectional for either side carriageway sloping towards the shoulder in straight reaches and towards the lower edge on horizontal curves. The camber on the existing road shall be modified to unidirectional crossfall.

2.8.3 The crossfall for granular shoulders on straight portions shall be at least 0.5 percent steeper than the slope of the pavement and paved shoulder subject to a minimum of 3.0 percent. On super elevated sections, the earthen portion of the shoulder on the outer side of the curve would be provided with reverse crossfall of 0.5 percent so that the earth does not drain on the carriageway and the storm water drains out with minimum travel path.

2.9 Geometric Design

2.9.1 Geometric design shall conform to IRC:73, except as otherwise indicated in this Manual.

2.9.2 All horizontal curves shall consist of circular portion flanked by spiral transitions at both ends.

2.9.3 Superelevation

Superelevation shall be limited to 7 percent, if radius of curve is less than desirable minimum radius. It shall be limited to 5 percent, if radius is more than desirable minimum.

2.9.4 Radii of horizontal curves

The minimum and absolute minimum radii of horizontal curves for various classes of terrain are given in Table 2. 6

Table 2.6 Minimum Radii of Horizontal Curves

Nature of terrain	Desirable Minimum	Absolute minimum
Plain and Rolling	400 m	250 m
Mountainous and Steep	150 m	75 m

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The radius of horizontal curves for various terrain conditions shall not be less than the desirable minimum values given in Table 2.6 except for Sections as indicated in Schedule 'B'. For such Sections, the radius shall not be less than absolute minimum.

2.9.5 Sight distance

The safe stopping sight distance and desirable minimum sight distance for divided carriageway for various design speeds are given in Table 2.7. The desirable values of sight distance shall be adopted unless there are site constraints. A minimum of safe stopping sight distance shall be available throughout.

Table 2.7 Safe Sight Distance

Design Speed (km/hr)	Safe Stopping sight distance (m)	Desirable minimum sight distance (m)
100	180	360
80	130	260
60	90	180
40	45	90

2.9.6 Vertical alignment

2.9.6.1 The vertical alignment should provide for a smooth longitudinal profile. Grade changes shall not be too frequent as to cause kinks and visual discontinuities in the profile. In this regard, directions given in IRC : 73 should be kept in view.

2.9.6.2 Gradients

The ruling and limiting gradients are given in Table 2.8.

Table 2.8 Gradients

Nature of terrain	Ruling gradient	Limiting gradient
Plain and Rolling	3.3%	5.0%
Mountainous	5.0%	6.0%
Steep	6.0%	7.0%

2.9.6.3 Long sweeping vertical curves shall be provided at all grade changes. These shall be designed as square parabolas.

2.9.6.4 Design of vertical curves and its coordination with horizontal curves, shall be in accordance with IRC:SP:23.

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2.10 Lateral and Vertical Clearance at Underpasses

Wherever a cross road is proposed to be taken below the Project Highway, minimum clearances at underpasses shall be as follows:

2.10.1 Lateral clearance

i) Full roadway width at the approaches shall be carried through the underpass. This width shall not be less than 12 m (7 m carriageway + 2 x 2.5 m shoulder width on either side) or as indicated in Schedule 'B'.

ii) Guardrails/crash barriers shall be provided for protection of vehicles from colliding with the abutments and piers and the deck of the structures.

iii) The width of cattle and/or pedestrian underpass shall not be less than 5 m.

2.10.2 Vertical clearance

Vertical clearance at underpasses shall not be less than the values given below:

i)	Vehicular underpass	5.5 m
ii)	Pedestrian and Cattle underpass	3.0 m (to be increased to 4.5 m, in case certain categories of animals such as elephant/camel are expected to cross the Project Highway frequently. This will be as specified in Schedule 'B')

Wherever existing slab culverts and minor bridges allow a vertical clearance of more than 2 m, these can be used in dry season for pedestrian and cattle crossing by providing necessary flooring. This will not be a substitute for normal requirements of pedestrian and cattle crossings as per Para 2.13.3.

2.11 Lateral and Vertical Clearance at Overpasses

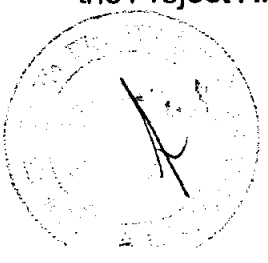
Wherever any structure is provided over the Project Highway; the minimum clearances at overpasses shall be as follows:

2.11.1 Lateral clearance

Full roadway width shall be carried through the overpass structure unless otherwise specified in Schedule 'B'. Provision shall also be made for future widening of the Project Highway to 6-lane with service roads. The abutments and piers shall be provided with suitable protection against collision of vehicles. Crash barriers shall be provided on abutment side and on sides of piers for this purpose. The ends of crash barriers shall be turned away from the line of approaching traffic.

2.11.2 Vertical clearance

A minimum 5.5 m vertical clearance shall be provided at all points of the carriageway of the Project Highway.



2.12 Access Control

2.12.1 Access

Access to the Project Highway shall be partially controlled. In general, access to the Project Highway shall be provided at the following locations:

i) Intersection with National Highways

ii) Intersection with State Highways

iii) Intersection with Major District Roads

iv) Intersection with Village Roads/Other District Roads, subject to a minimum distance of 3 km from the nearest intersection.

The locations of intersections shall be specified in Schedule 'B'.

2.12.2 Service roads

2.12.2.1 The location and length of service roads, to be constructed by the Concessionaire shall be specified in Schedule 'B' of the Concession Agreement. The width of the service road shall be 7.0 m.

2.12.2.2 For the stretches where total length of a bridge is less than 60 m and the service road is required to be provided on both sides of the stream, then the service road, shall continue across the stream and suitably designed 2-lane bridge structure shall be provided. In cases involving bridges of 60 m length or more, separate bridge structures may not be provided and service road shall be merged with the Project Highway at 50 m distance before the bridge structure, unless otherwise specified in Schedule 'B' of the Concession Agreement.

2.12.2.3 Wherever service roads are provided, provision shall be made for proper entry and exit ramps between the main highway and the service roads, duly keeping in view future widening of main highway to six-lanes. The layout shall be as per Fig. 2.1A to 2.1H.

2.13 Grade Separated Structures

2.13.1 The type, location, length, number and the openings required and approach gradients for various grade separated structures shall be as specified in Schedule 'B' of the Concession Agreement. The approach gradient to the grade separated structure shall not be steeper than 2.5 percent (1 in 40).

2.13.2 Vehicular underpass/overpass

The vehicular under/overpass structures shall be provided at the intersection of the Project Highway with all the National Highways and State Highways. Such under/over passes

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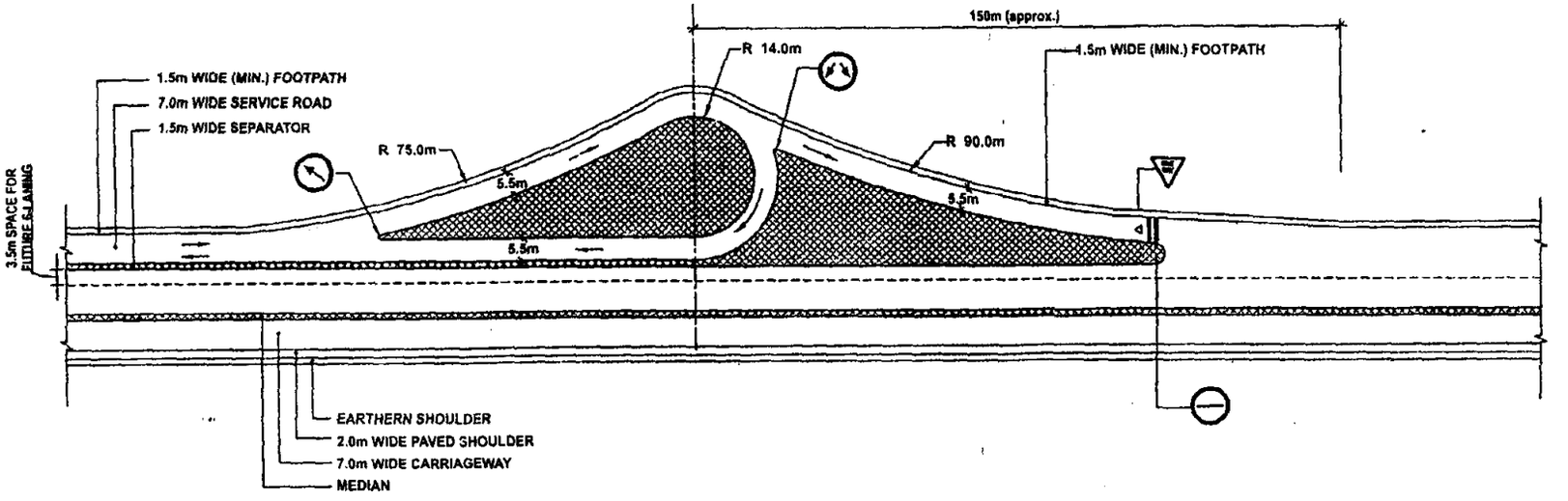

FIG. 2.1A Suggestive Layout for Entry Ramp to Highway
(AT THE END OF SERVICE ROAD)

NOTE:-

1. DETAILED SYSTEM OF ROAD MARKING AS PER IRC:35
2. DETAILED SYSTEM OF ROAD SIGNS AS PER IRC:67

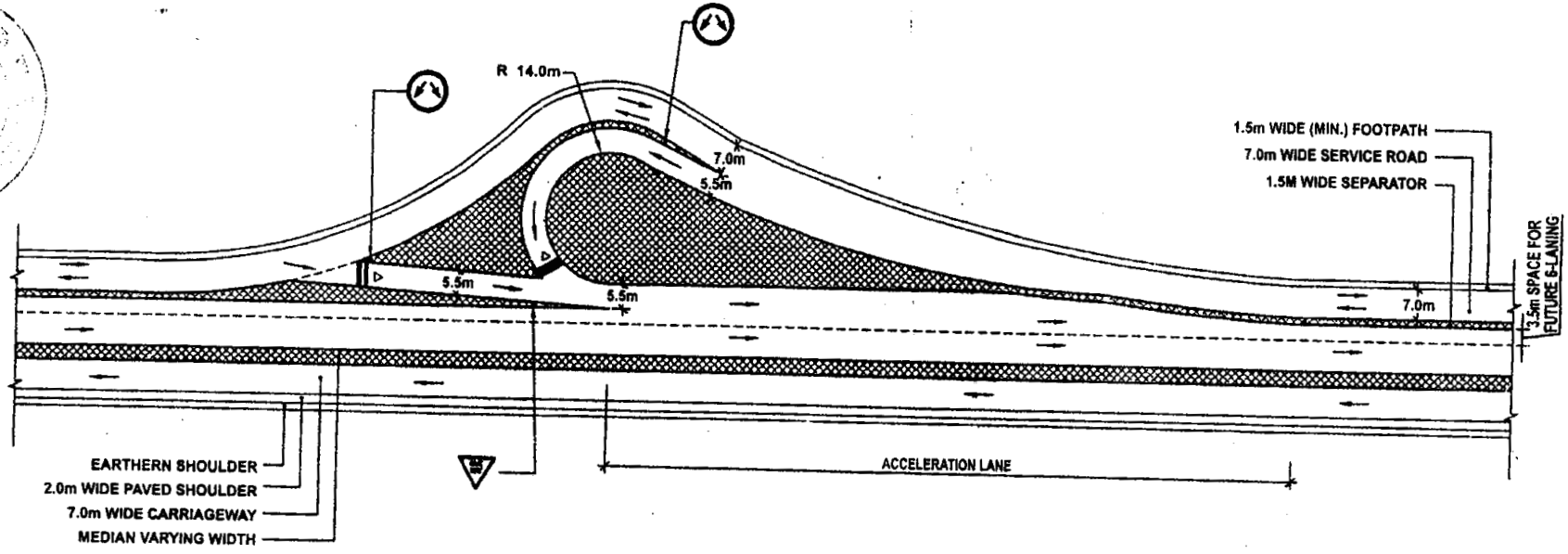

FIG. 2.1B Suggestive Layout for Entry Ramp to Highway
(SERVICE ROAD ON BOTH SIDES OF
ENTRY RAMP)

NOTE:-

1. DETAILED SYSTEM OF ROAD MARKING AS PER IRC:35
2. DETAILED SYSTEM OF ROAD SIGNS AS PER IRC:67

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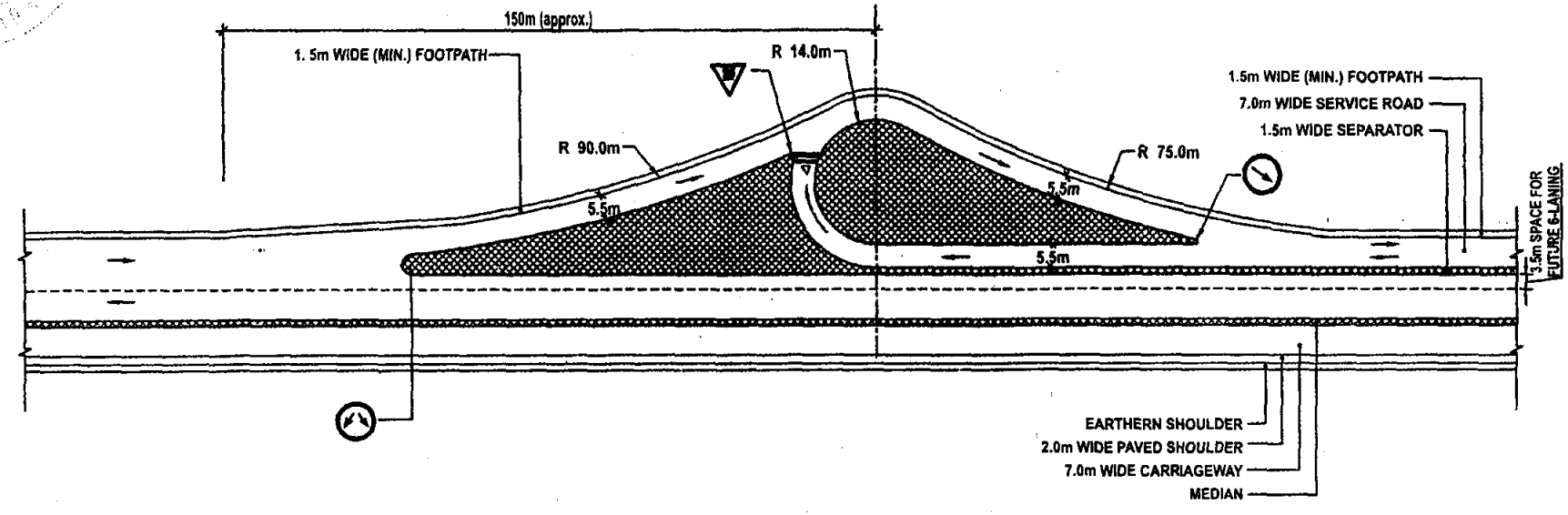

FIG. 2.1C Suggestive Layout for Exit Ramp from Highway
(AT THE END OF SERVICE ROAD)

NOTE:-

1. DETAILED SYSTEM OF ROAD MARKING AS PER IRC:35
2. DETAILED SYSTEM OF ROAD SIGNS AS PER IRC:67

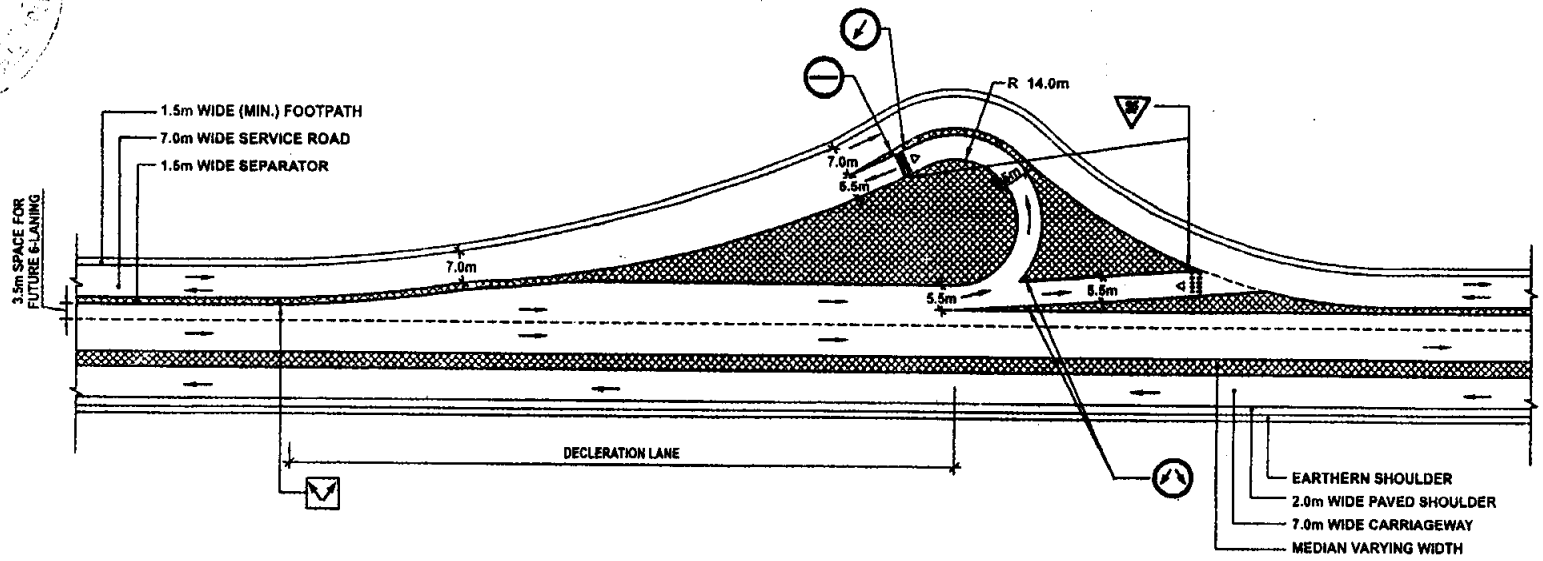

FIG. 2.1D Suggestive Layout for Exit Ramp from Highway
(SERVICE ROAD ON BOTH SIDES OF
EXIT RAMP)

NOTE:-

1. DETAILED SYSTEM OF ROAD MARKING AS PER IRC:35
2. DETAILED SYSTEM OF ROAD SIGNS AS PER IRC:67

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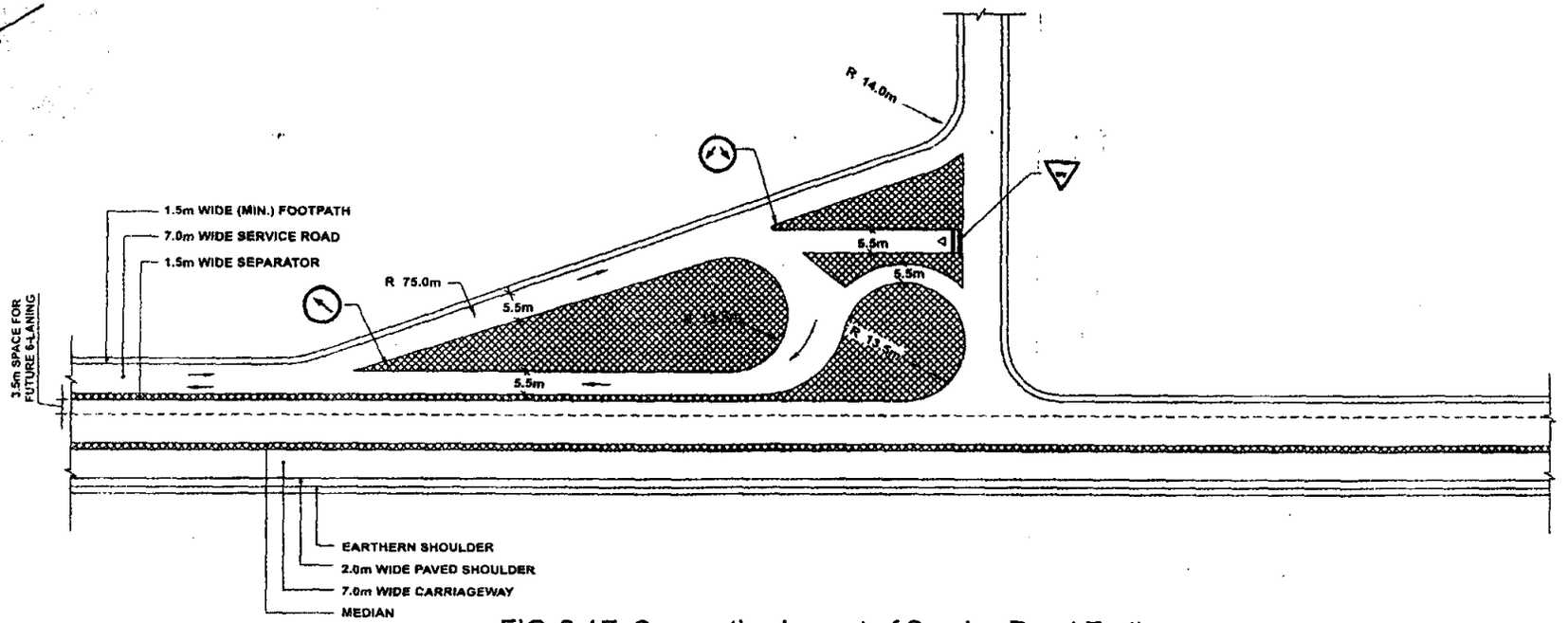
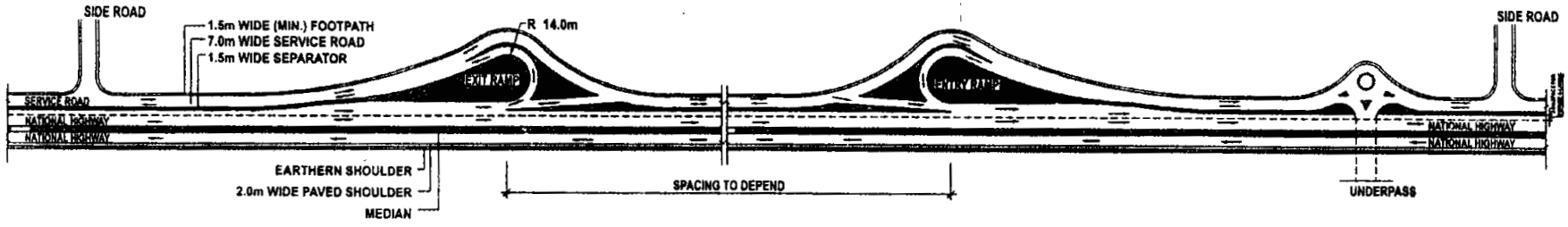


FIG. 2.1E Suggestive Layout of Service Road Ending at a Junction with Cross-Road

NOTE:-

1. THE SUGGESTIVE LAYOUT SHOWS MEETING OF SERVICE ROAD WITH A CROSS ROAD, THE MOVEMENTS FROM CROSS ROAD ON TO THE MAIN HIGHWAY SHALL BE DEALT IN ACCORDANCE WITH SECTION 2.2.1 (3).
2. THE OTHER END OF SERVICE ROAD SHALL BE PROVIDED WITH END TREATMENT AS PER FIGURE 2.1.B.
3. DETAILED SYSTEM OF ROAD MARKING AS PER IRC:35
4. DETAILED SYSTEM OF ROAD SIGNS AS PER IRC:67



NOTE:-

1. DETAILED SYSTEM OF ROAD MARKING AS PER IRC:35
2. DETAILED SYSTEM OF ROAD SIGNS AS PER IRC:67

Fig. 2.1F Suggestive Layout showing Configuration of Service Road, Entry/Exit Ramps, Side Road and Underpass

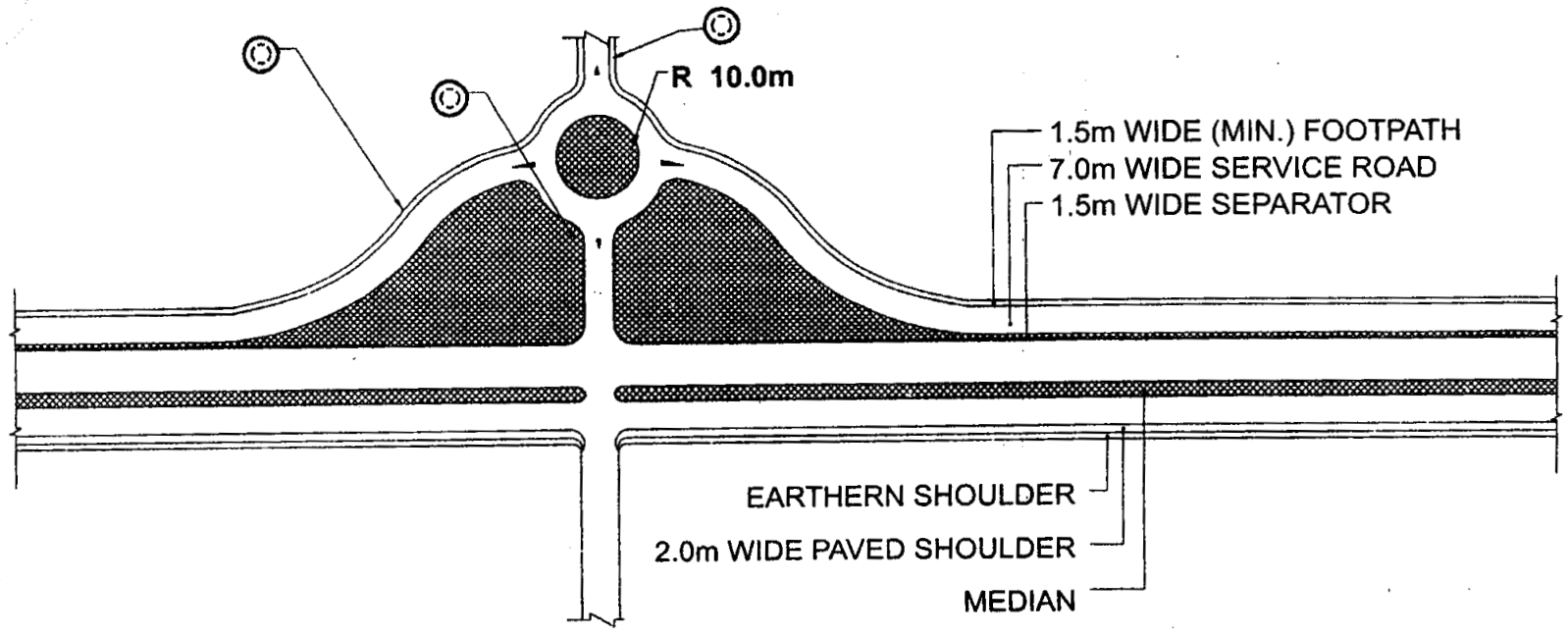


FIG. 2.1G Suggestive Layout of Service Road Continuing at Intersection

NOTE:-

1. DETAILD SYSTEM OF ROAD MARKINGS AS PER IRC:35

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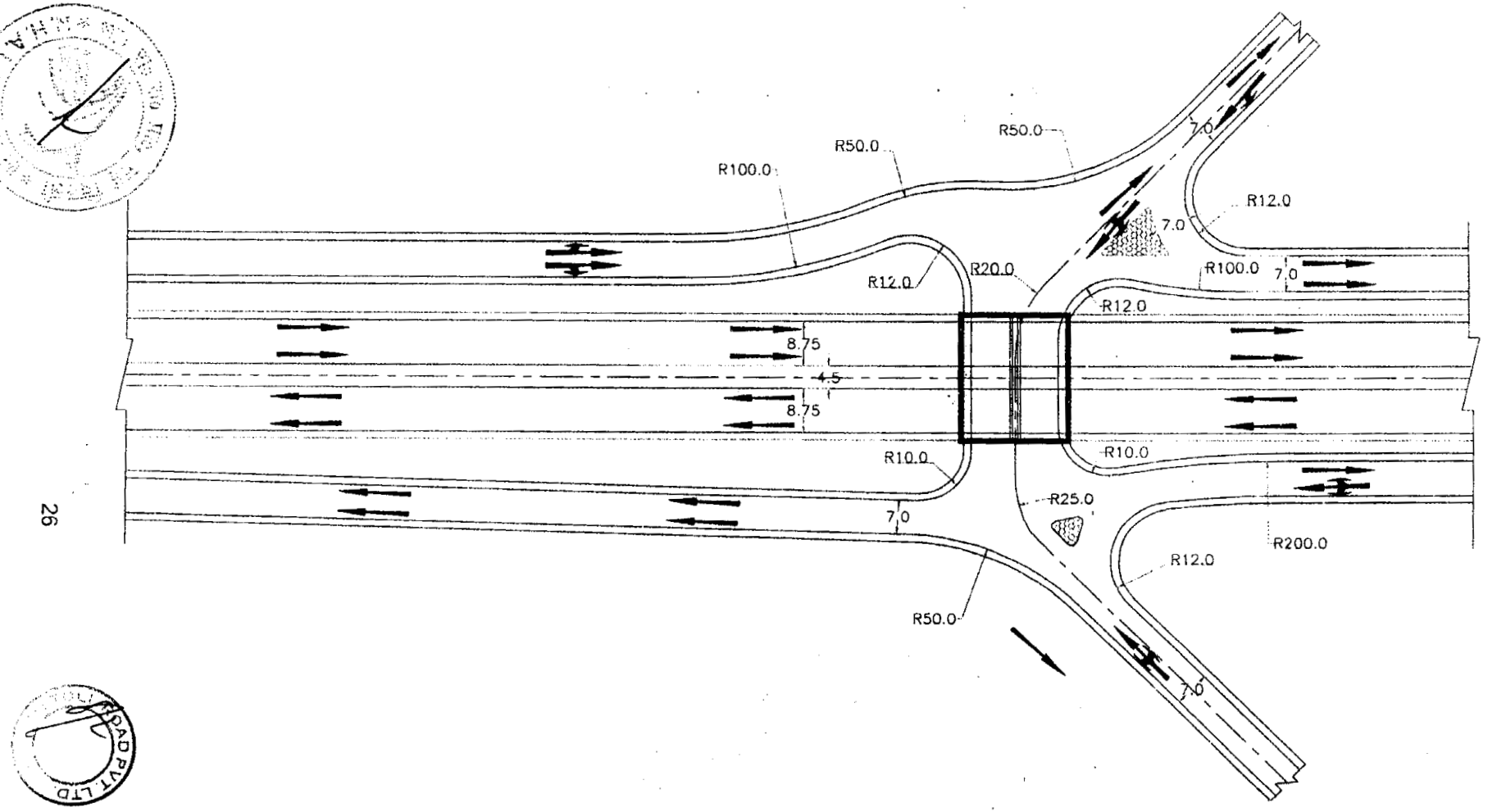

FIG. 2.1H Suggestive Layout for Connecting Service Road to Underpass on Cross Road

NOTE:-

1. AILL DIMENSIONS IN MM

shall also be provided across other categories of roads carrying an average daily traffic of more than 5000 Passenger Car Units (PCUs) on the date of inviting bids. The structure may be either an underpass or an overpass depending upon the nature of terrain, vertical profile of road, availability of adequate right of way, etc. Unless otherwise specified in Schedule 'B' of the Concession Agreement, the Project Highway shall be carried at the existing level in rural areas and the cross road would be either an underpass or overpass and the entire cost involved in lowering or raising the existing cross road would be included as part of the cost of the Project Highway. However, in urban areas, the cross road shall be carried at the existing level, unless otherwise specified in Schedule 'B' of the Concession Agreement. Decision whether the cross road or the Project Highway will be carried at the existing level will be taken at the time of preparing the feasibility report and would be based on considerations of drainage, land acquisition, provision of ramps for the grade separated facility, height of embankment and project economy etc.

2.13.3 Cattle and pedestrian underpass/overpass

These shall be provided as specified in Schedule 'B' of the Concession Agreement.

i) An underpass/overpass for crossing of cattle and pedestrians may not be necessary within a distance of 2 km from Vehicular underpasses.

ii) The width of Pedestrian or Cattle crossing shall not be less than 5 m.

iii) The pedestrian crossings shall have provision for movement of physically challenged persons.

iv) Underpasses shall be preferred to overpasses.

v) Pedestrian underpass/overpass shall also be provided within a distance of 200 m from a school or hospital or factory/industrial area.

2.13.4 Road Over Bridges (ROBs)/Road Under Bridges (RUBs) shall be provided as per Section-7 of this Manual.

2.14 Median Openings

2.14.1 Median openings shall not be spaced closer than 2 km. Additional controlled openings shall also be provided for inspection, and diversion of traffic during repair and rehabilitation.

2.14.2 Median opening shall not be provided in front of the service road entry. The distance between the service road entry and the median opening shall be at least equal to the sum of length of acceleration lane, weaving length, and deceleration length. Location of opening shall be so decided as to minimize intraflow. This distance shall however be not less than 150 m.

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2.14.3 All median openings shall be provided with additional 3.5 m wide shelter lane by the side of median in both directions for waiting of vehicles to take U turn. Wherever required, horizontal geometrics of the road shall be suitably adjusted.

2.14.4 Length of median opening shall not be less than 20 m.

2.15 Fencing

Fencing shall be provided between the service road and the Project Highway to prevent the pedestrians, local vehicles and animals entering the highway. The fencing shall be either of metal double beam crash barrier or pedestrian guardrail given in Para 9.10 of this Manual.

2.16 Typical Cross-sections

Typical cross-sections of Project Highway are given in Fig. 2.2 to 2.10 for various locations as below:

Fig. 2.2 shows typical cross section Type-A1 for 4-lane divided highway in open country with isolated built-up area in plain/rolling terrain, without service roads and with depressed median

Fig. 2.3 gives typical cross section Type-A2 for 4-lane divided highway in open country in plain/rolling terrain with service roads on both sides and with depressed median

Fig. 2.4 shows typical cross section Type-A3 for 4-lane divided highway in open country with isolated built-up area in plain/rolling terrain, without service roads and with raised median

Fig. 2.5 gives typical cross section Type-A4 for 4-lane divided highway in open country in plain/rolling terrain with service roads on both sides and with raised median

Fig. 2.6 shows typical cross section Type-B for 4-lane divided highway in built-up section in plain and rolling terrain with service roads on both sides and with raised median

Fig. 2.7 shows typical cross section Type-C1 for 4-lane divided highway on different contours in open country with isolated built-up area in mountainous terrain.

Fig. 2.8 shows typical cross section Type-C2 for 4-lane divided highway on different contours in built up section in mountainous terrain.

Fig. 2.9 shows typical cross section Type-C3 for 4-lane divided highway at same level in open country with isolated built-up area in mountainous terrain.

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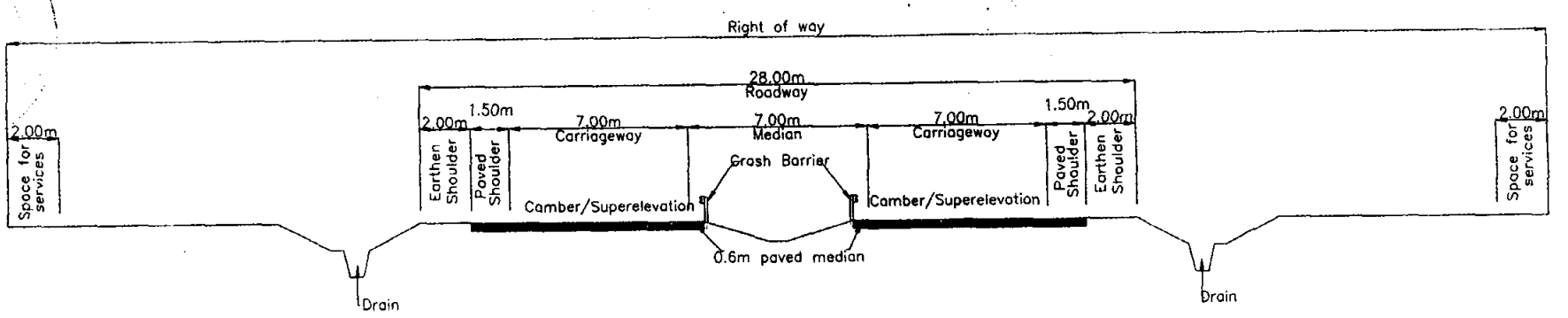
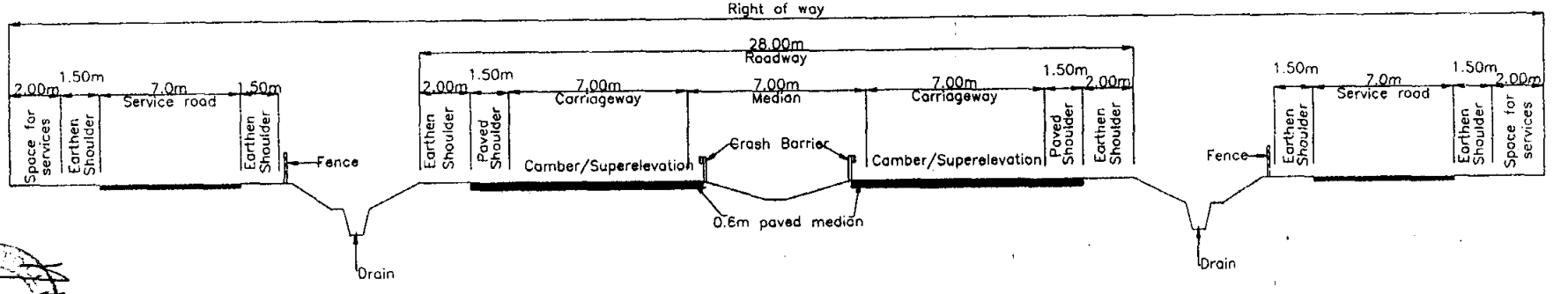


TYPICAL CROSS SECTION TYPE-A1
(Open country–Plain / Rolling terrain)
Fig : 2.2 4-Lane Divided Highway without Service Roads and with Depressed Median



TYPICAL CROSS SECTION TYPE-A2
(Open country–Plain / Rolling terrain)
Fig : 2.3 4-Lane Divided Highway with Service Roads and with Depressed Median

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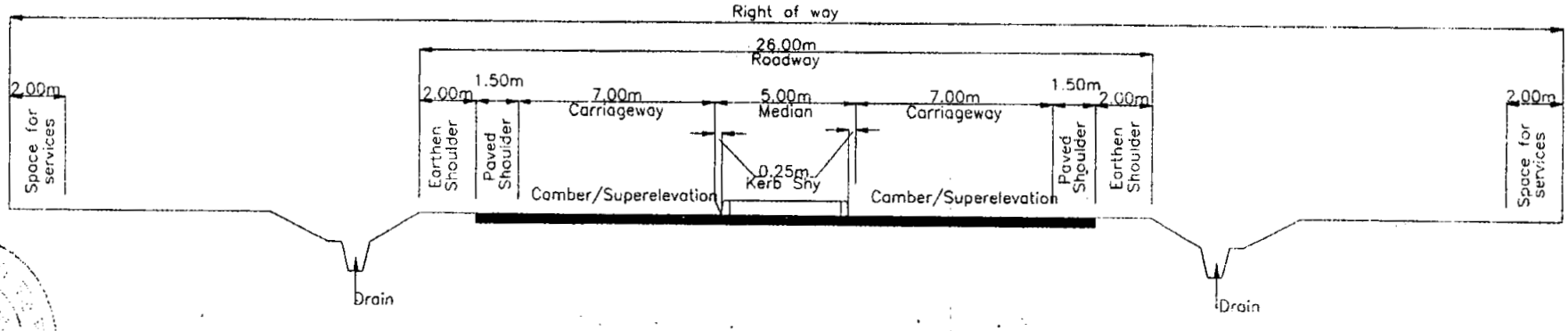
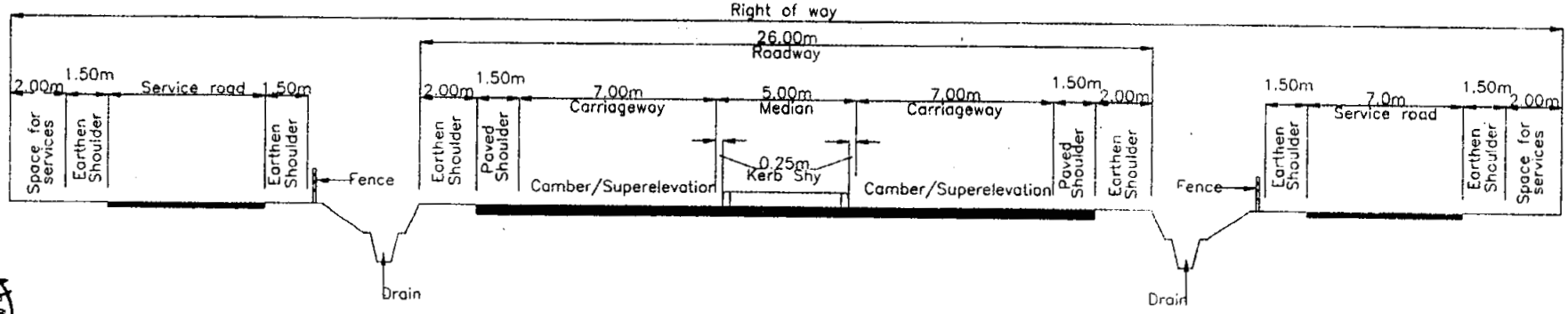
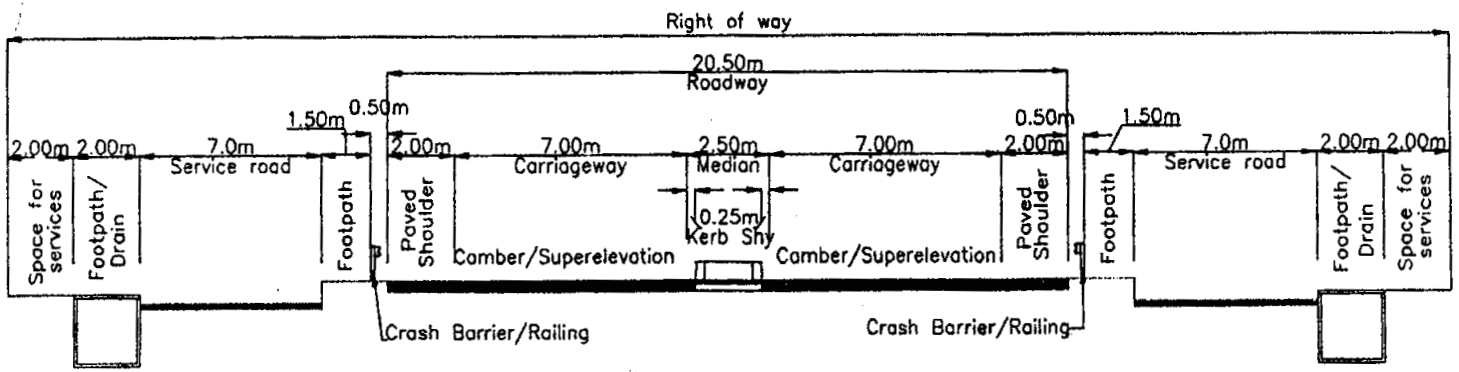


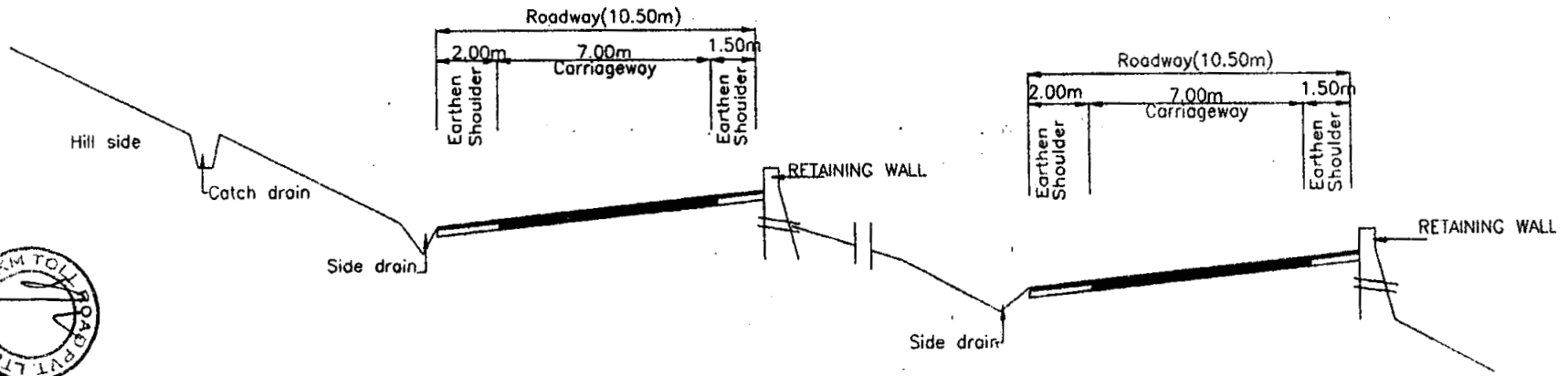
TYPICAL CROSS SECTION TYPE-A3
(Open country–Plain / Rolling terrain)
Fig : 2.4 4-Lane Divided Highway without Service Roads and with Raised Median



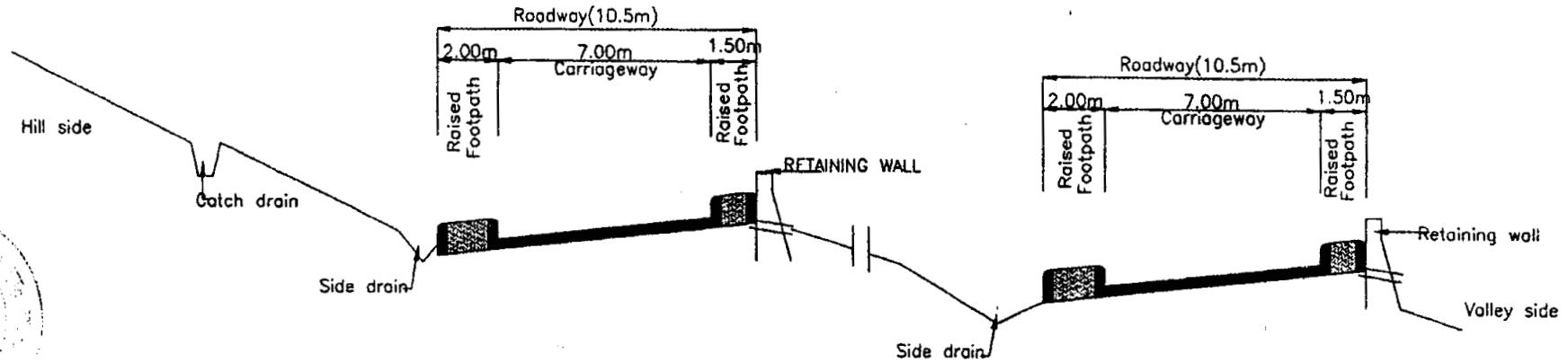
TYPICAL CROSS SECTION TYPE-A4
(Open country–Plain / Rolling terrain)
Fig : 2.5 4-Lane Divided Highway with Service Roads and with Raised Median



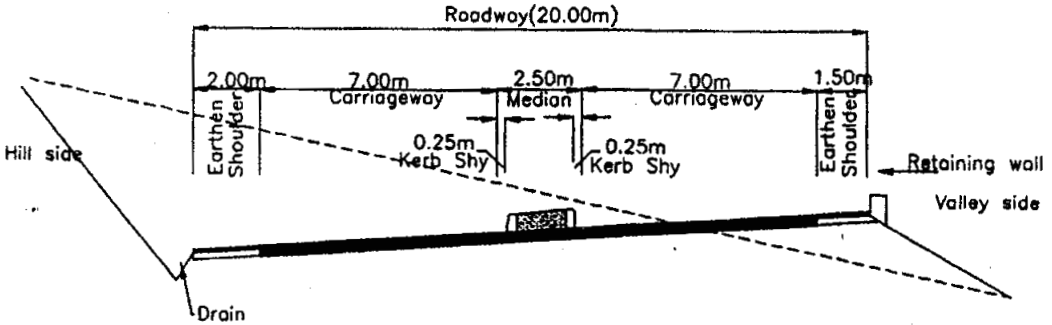
TYPICAL CROSS SECTION TYPE-B
(Built - up Section - Plain/Rolling terrain)
Fig : 2.6 4-Lane Divided Highway with Service Roads and with Raised Median



TYPICAL CROSS SECTION TYPE-C1
(Open country - Mountainous terrian)
Fig : 2.7 4-Lane Divided Highway on Different Contours



TYPICAL CROSS SECTION TYPE-C2
(Built up section - Mountainous terrian)
Fig : 2.8 4-Lane Divided Highway on Different Contours



TYPICAL CROSS SECTION TYPE-C3
(Open country - Mountainous terrian)
Fig : 2.9 4-Lane Divided Highway at same level with Raised Median

TYPICAL CROSS SECTION TYPE-C4
(Built up section - Mountainous terrian)
Fig : 2.10 4-Lane Divided Highway at same level with Raised Median

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Fig. 2.10 shows typical cross section Type-C4 for 4-lane divided highway at same level in built up section in mountainous terrain.

2.17 Capacity of Four-lane highway

For the purpose of augmentation of the facilities and upgradation of the Project Highway, the design service volume for different terrain conditions and level of service shall be as specified in Table 2.9.

Table 2.9 Design Service Volume for Four-lane Highways in PCUs per day

Terrain	Design Service Volume in PCUs per day	
	Level of Service 'B'	Level of Service 'C'
Plain and Rolling	40,000	60,000
Mountainous and Steep	20,000	30,000

Note :The definition of PCU here is as per IRC Codes and Guidelines and not the definition given in MCA

2.18 Warrants for Six-Laning

Unless otherwise specified in the Concession Agreement, the Project Highway shall be widened to 6-lane when total traffic including the traffic on service roads, if any, reaches the design service volume corresponding to Level of Service 'C' for 4-lane highway specified in Table 2.9.

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SECTION - 3

INTERSECTIONS AND GRADE SEPARATORS

RAIL ROAD PVT. LTD.

SECTION - 3

INTERSECTIONS AND GRADE SEPARATORS

3.1 Introduction

3.1.1 The intersections to be provided shall be one of the following types:

i) At-grade Intersections

ii) Grade separated Intersections without ramps

iii) Interchanges

The types and locations of Intersections, Interchanges and Grade-separated Intersections without ramps shall be based on requirements stipulated in IRC:SP:41, IRC:5, IRC:92, MORTH Specifications for Road and Bridge works. These shall be specified in Schedule 'B' of the Concession Agreement.

3.1.2 The existing intersections, which are deficient with respect to the minimum requirements shall be improved to the prescribed standards. Additional land, if any, required for improving the existing intersections shall be provided by the Authority.

3.2 At-grade Intersections

3.2.1 The type of intersections to be adopted shall be decided on the basis of parameters like number of intersecting legs, traffic volume/speed, type of traffic control etc. Properly designed intersections shall be provided at all at-grade crossings. Rotary shall not be provided.

3.2.2 i) The intersections shall be designed having regard to flow, speed, composition, distribution and future growth of traffic. Design shall be specific to each site with due regard to physical conditions of the site available. The design of different elements of intersection shall be done as per IRC:SP:41 "Guidelines on Design of At-grade Intersections in Rural and Urban Areas" including other criteria given in this Manual. MORTH - Type Designs for Intersection on National Highways may also be referred to, wherever required to develop suitable layout and design of At-grade Intersections.

ii) At multi leg intersections, the points of conflict should be studied carefully and possibilities of realigning one or more of the intersecting legs and combining some movements to reduce the conflicting movements shall be examined. The object shall be to simplify the design and appropriate control devices added to ensure more efficient and safe operation.

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iii) The channelising islands shall start from the edge of the paved shoulder. This principle shall also apply in case of MORTH – Type Designs for Intersections on National Highways.

3.2.3 Cross roads shall join directly on to service roads and the entry to and exit from the Project Highway shall be through end connections as shown in fig. 2.1A to H.

3.3 Grade separated Intersections and Interchanges

3.3.1 Grade separated intersections, without ramps, shall be provided at locations where traffic on cross roads is moderate to heavy. Under this type, two cross roads separate at different grades (as Road Under Bridge or Road Over Bridge). The access from Project Highway to the cross roads in case of such grade separated intersections without ramps, shall be through other existing roads/ service roads.

3.3.2 An interchange is justified at locations where traffic on cross road is heavy and an at grade intersection fails to handle the volume of turning, merging and diverting traffic.

3.3.3 Geometric standards for design

The geometric design standards for various elements of grade separators shall be as given in IRC:92. Gradient for approaches shall not be steeper than 2.5 percent (1 in 40).

3.3.4 Design of structures

Design of structures shall conform to Section 7 of this Manual. Minimum length of viaduct required to be provided shall be specified in Schedule 'B'.

3.3.5 Lighting

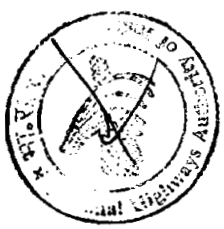
Lighting requirement shall be as per Section 12 of this Manual. The top and underside of the grade separated structures and interchange area at the ground level upto 50 m beyond the point from where flaring of the main carriageway takes place shall be provided with lighting.

3.4 Detailed Design and Data for Review by the IE

The Concessionaire shall submit the details of the ground surveys, traffic data, traffic forecast, design and drawings of the intersections and interchanges showing all safety features to the Independent Engineer for review and comments, if any.

SECTION - 4

EMBANKMENT & CUT SECTIONS



SECTION - 4

EMBANKMENT & CUT SECTIONS

4.1 General

4.1.1 The design and construction of the road in embankment and in cuttings shall be carried out in accordance with Section 300 of MORTH Specifications and the requirements, and standards and specifications given in this Section. This Section also covers specifications for sub-grade and earthen shoulders.

4.1.2 Efforts should be made to remove the inherent deficiencies in plan and profile of the existing road. The final centre line of the road and the road levels shall be fixed duly considering all the relevant factors covering structural soundness, safety and functional requirements as per relevant IRC Codes and provisions of this Manual.

4.1.3 The existing road embankment shall be widened/modified to the specified cross-sectional details.

4.2 Embankment

4.2.1 The height of the embankment shall be measured with respect to the finished road levels. The following principles shall be kept in view while fixing the road level:

i) No section of the road is overtopped. The finished road level shall be at least 0.6 m above ground level (except in cutting and transition length).

ii) The bottom of sub-grade is generally 1.0 m above the high flood level/ high water table. However, in the case of existing old roads where it may be difficult to fulfill this criterion without needing reconstruction or raising in substantial length, the criteria may be relaxed depending on site conditions, ensuring that the bottom of sub-grade is 0.6 m above High Flood Level (HFL). The HFL should be decided by intelligent inspections, local observations, enquiries and studying the past records. If raising of any section(s) of the existing road is required, the same shall be specified in Schedule 'B' of the Concession Agreement.

4.2.2 Materials and physical requirements

4.2.2.1 Sourcing of materials for embankment and subgrade construction, as well as compliance with environmental requirements in respect of excavation and borrow areas under the applicable laws shall be the sole responsibility of the Concessionaire.

4.2.2.2 The material to be used in sub-grade shall satisfy the design California Bearing Ratio (CBR) at the specified density and moisture content.

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4.2.2.3 The embankment and subgrade shall be compacted to satisfy the minimum compaction requirements given in Clause 305 of MORTH Specifications.

4.2.3 Structural features and design of embankment

4.2.3.1 Embankment with height 6.0 m or above shall be designed in accordance with IRC:75 taking into account slope stability, bearing capacity, consolidation, settlement and safety considerations based on geotechnical and investigation data. Where the embankment is to be supported on a weak stratum, appropriate remedial/ground improvement measures shall be taken.

4.2.3.2 Side slopes shall not be steeper than 2H:1V unless soil is retained by suitable soil retaining structures.

4.2.3.3 The side slopes shall be protected against erosion by providing a suitable vegetative cover, kerb channel, chute, stone/cement concrete block pitching or any other suitable protection measures depending on the height of the embankment and susceptibility of soil to erosion. Drainage arrangement shall be provided as per Section 6 of this Manual.

4.2.4 Use of pond ash for embankment construction

Where pond ash is used for embankment construction in pursuance of the instructions of the Ministry of Environment and Forests or otherwise, the embankment shall be designed and constructed in accordance with IRC: SP:58.

4.3 Roadway in Cutting

The road level shall be fixed, keeping in view the provisions of relevant IRC Codes.

4.4 Soil Investigations and Design Report

4.4.1 General

The Concessionaire shall carry out necessary soil surveys, and field and laboratory investigations for selecting appropriate borrow pits, identifying and treating problematic ground locations, if any, and for finalizing structural features and design of the embankment and cut sections and establishing improved ground properties. A report on the soil investigation shall be furnished along with the design.

4.4.2 Soil investigations for embankment

Soil investigations shall cover the following:

a) Soil investigations and tests in accordance with the requirements specified in IRC:SP:19 and shall be reported in the Proforma given in Table 1 of

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IRC:SP:19. In addition to this, all tests as per the requirements of MORTH Specifications shall be reported.

b) In respect of embankments with height more than 6 m, additional investigations and soil tests as per IRC:75 and Appendix 10 of IRC:SP:19.

c) Information regarding the topography, high flood level, natural drainage conditions, highest sub-soil water level, and the nature and extent of inundation, if any.

d) The characteristics of embankment foundation including the presence of any unsuitable/weak strata, marshy areas, water logged areas, etc.

e) Along the alignment of the road, where unstable strata, soft material or poor subsoil conditions have been met with at the foundation level, the soil profile shall be drawn after determining through borings, the type of soil at different levels. The borings shall be at maximum interval of 100 m to a depth of 2 m or more below the existing ground as necessary. In the case of high embankments, the borings shall be taken down to a depth equal to twice the height of the embankment.

f) Any particular construction problems of the area or other important features.

g) Geotechnical properties of pond ash, covering parameters specified in Table 1 of IRC:SP:58 and Optimum Moisture Content (OMC) – dry density relationship for heavy compaction. This information shall be furnished, in case pond ash is used in embankment construction.

4.4.3 Soil investigations for cut sections

Soil investigations and tests shall be carried out in accordance with the requirements specified in IRC:SP:19 and information regarding depth of water table, seepage flow, presence of any weak, unstable or problematic strata.

4.4.4 Design Report

The Concessionaire shall prepare the design report with all relevant details including the following:

i) Road Embankment

a) The detailed design of the embankment, remedial/ground improvement treatment where required. For embankments with height more than 6 m, construction methodology should also be included.

b) Design of retaining walls/reinforced earth structures.

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c) Design of protection measures for embankment slope and drainage arrangement.

d) Design of pond ash embankment in case use of pond ash is proposed.

e) Any additional information relevant to the design of embankment.

ii) Cut Section

a) Type of cutting involved and proposed cut slopes shall be provided in accordance with the nature of the soil encountered. Where required, benching including use of slope stability measures like pitching, breast walls, etc. shall be adopted to make the slopes stable and safe

b) Design and details of erosion control, slope protection measures, etc.

c) In cut sections in hilly terrain, the problem of seepage flow is common. Where such conditions exist, necessary measures shall be taken including provision of deep side drains to intercept the seepage flow and discharge the drained water into suitable outlets to avoid any damage to road and cut slopes. Design and details of drainage arrangement for sub-soil and surface water shall be furnished. It should be ensured that rain water and seepage water is quickly drained out. The gradient of drain shall not be flatter than 1 in 200.

d) Any other additional information relevant to the design of cut slopes.

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SECTION - 5

PAVEMENT DESIGN

SECTION - 5

PAVEMENT DESIGN

5.1 General

5.1.1 The design and construction of new pavement sections, and of strengthening measures (overlay) for the existing pavement shall be carried out in accordance with the criteria, standards and specifications given in this section. Where alternative specifications or materials are proposed to bring in innovation in design etc., provisions of Para 1.12 of this Manual shall apply.

5.1.2 The design of new pavement sections or strengthening of existing pavements shall take into account all relevant factors for assuring reliable performance and shall also satisfy the specified minimum performance requirements.

5.1.3 The Concessionaire shall undertake the necessary soil, material and pavement investigations and traffic volume and axle load studies in accordance with the good industry practice for preparing detailed designs.

5.1.4 The materials, mixes and construction practice shall meet the requirements prescribed in the MORTH/IRC Specifications.

5.1.5 Where problematic conditions such as expansive soils, swamps or marshes, flooding, poor drainage, frost susceptible areas etc. are found to exist, adequate measures shall be adopted to deal with such site conditions.

5.2 Type of Pavement

5.2.1 Unless otherwise specified in Schedule 'B', the Concessionaire may adopt any type (flexible/rigid) of pavement structure for new construction.

5.2.2 Strengthening of the existing flexible pavement will be carried out by providing appropriate bituminous overlay, unless specified otherwise in Schedule 'B' of the Concession Agreement.

5.2.3 The Authority may require provision of cement concrete pavement on the new carriageway and/or replacement of existing pavement depending upon specific site conditions. Such requirements shall be as specified in Schedule 'B' of the Concession Agreement. The minimum design, construction, performance and maintenance requirements for cement concrete pavements will be specified by the Authority and Schedule-K of the Concession Agreement will be modified accordingly.

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5.3 Method of Design – New Pavements

5.3.1 Method of design of flexible pavement

The new pavement shall be designed in accordance with the IRC: 37 Guidelines for the Design of Flexible Pavements.

5.3.2 Method of design of rigid pavement

Rigid pavement shall be designed in accordance with the method prescribed in IRC:58 "Guidelines for the Design of Plain Jointed Rigid Pavements for Highways".

5.4 Design Requirements for New Pavement Sections

5.4.1 Flexible pavement - design period and strategy

i) Flexible pavement shall be designed for a minimum design period of 15 years or operation period, whichever is more. Stage construction will be permissible subject to the requirements specified in para (ii) below.

ii) Alternative strategies or combination of initial design, strengthening and maintenance can be developed by the Concessionaire to provide the specified level of pavement performance over the operation period subject to satisfying the following minimum design requirements.

a) The thickness of sub-base and base of pavement section is designed for a minimum design period of 15 years or the operation period, whichever is more and the initial bituminous surfacing for a minimum design period of 10 years.

b) The pavement shall be strengthened by bituminous overlay as and when required to extend the pavement life to full operation period. The thickness of bituminous overlay shall be determined on the basis of IRC:81.

5.4.2 Rigid pavement – design period and strategy

i) Rigid pavement shall be designed for a minimum design period of 30 years. The stage construction shall not be permitted.

ii) The Pavement Quality Concrete (PQC) shall rest over Dry Lean Concrete (DLC) subbase of 150 mm thickness.

iii) The DLC will meet the minimum cement and compressive strength requirement as prescribed in IRC:SP:49. DLC will extend beyond the PQC (including that in shoulder, if any) by 0.5 m on either side.

iv) Below DLC layer, a properly designed drainage layer Granular Sub Base (GSB) of 150 mm thickness shall be provided throughout the road width. It shall be designed to obtain a drainage coefficient of not less than 20 m per day.

5.4.3 Pavement performance requirements

i) The pavement structure shall be capable of giving the specified performance over the entire operation period.

ii) The new pavement surface shall satisfy the following standards,

a)	Surface Finish	As per requirements of Clauses 902 and 903 of MORTH Specifications
b)	Roughness in each lane	Not more than 2000 mm/km for each lane in a km length
c)	Rutting	
	In wheel path measured by 3 m Straight Edge.	Nil
d)	Cracking or any other distress	Nil

iii) During the operation period, the pavement surface roughness or any structural or functional distress shall not exceed the values specified in Schedule–K of the Concession Agreement. Generally the pavement condition in terms of roughness, cracking and rutting should not deteriorate to the maximum values specified in Schedule-K for rectification, earlier than 5 years from the original level/ from the year of rectification. Any treatment in the form of renewal/ overlay carried out or required to restore/ correct/ improve the riding quality or any distress shall be of such thickness and specification that will restore the riding quality to roughness not exceeding 2000 mm/km.

iv) During the operation and maintenance period, the pavement strength shall be evaluated periodically through deflection measurements (Refer to para 5.8 (ii) of this Section) and the stretches exhibiting any structural deficiency shall be rectified.

5.5 Design Traffic

5.5.1 The design traffic shall be estimated in terms of cumulative number of standard axles (8160 kg) to be carried by the pavement during the design period.

5.5.2 Estimate of the initial daily average traffic flow shall be based on at least 7 days, 24 hr classified traffic counts. IRC:9 may be used as guidance for carrying out the traffic census.

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5.5.3 Any likely change in traffic due to proposed four laning of the facility and/or future development plans, land use, shall be duly considered in estimating the design traffic.

5.5.4 Traffic growth rate shall be established for each category of commercial vehicles to be considered for design of pavement. For traffic projections, the procedure outlined in IRC:108 may be followed. The Concessionaire shall adopt a realistic value of the rate of traffic growth, provided that annual rate of growth of commercial vehicles shall not be adopted less than 5 percent.

5.5.5 The design traffic in case of service road shall be five million standard axles. The crust composition shall be provided accordingly.

5.6 Sub-grade

The subgrade, whether in cut or fill, shall meet the requirements stipulated in Clause 305 of MORTH Specifications. The thickness of subgrade shall not be less than 500 mm

5.7 Pavement Components and Materials

i) The pavement construction materials for sub-base, base and bituminous surfacing shall conform to the requirements prescribed in MORTH Specifications and IRC Standards.

ii) Where several materials will adequately serve as component within the pavement structure, such as a sub-base or a base course, the Concessionaire shall have the option of using any of the materials/ specifications, subject to sound engineering practice and product quality requirements.

5.8 Performance Evaluation

i) Roughness in each lane for full length shall be measured bi-annually using appropriate approved method and equipment.

ii) The structural evaluation of the pavement shall be made by taking deflection measurements every 5 years in accordance with the procedure given in IRC:81, unless needed earlier for stretches exhibiting severe distress during the operation and maintenance period.

5.9 Strengthening of Existing Pavements

5.9.1 Before strengthening treatment is prescribed, a detailed pavement condition survey and evaluation shall be carried out in accordance with IRC:81 to determine

i) The extent of distress and nature of deficiency in the existing pavement structure, and

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ii) Whether any special treatments e.g. provision for remedying reflection cracking, pavement internal drainage, sub-grade improvement/ reconstruction, or rectification of any other deficiencies are warranted.

5.9.2 Necessary corrective measures to treat the identified deficiency shall be taken along with strengthening of the pavement.

5.9.3 In stretches where the pavement is damaged/deteriorated to such an extent that the use of Benkelman Beam method may not result in a realistic assessment of the strengthening treatment, pavement shall be designed as new pavement.

5.9.4 Where an existing pavement is built over an untreated expansive/black cotton soil subgrade, its improvement/ strengthening shall be treated separately. Such stretches shall require reconstruction with provision of necessary measures such as replacement/ treatment of expansive subgrade, drainage, etc. as per the prescribed specifications and IRC:37; and shall be designed as new pavement. Stretches to be reconstructed, whether due to expansive subgrade or having grossly deteriorated, etc. shall be specified in Schedule 'B' of the Concession Agreement.

5.9.5 No granular layer shall be provided over an existing bituminous surfacing. Situations may arise where it is envisaged to strengthen grossly deficient existing road with a granular layer in addition to the bituminous overlay, or where for camber and/or grade correction substantial thickness of profile corrective course is needed. In such cases, the existing bituminous surfacing shall be completely removed by scarifying/ milling and then the pavement built up with the granular layer(s) and bituminous overlay. The thickness and composition of bituminous surfacing (Binder course and Wearing course) over the granular layer shall conform to IRC:37.

5.9.6 Design of Overlay

i) The thickness of the bituminous overlay shall be determined on the basis of Benkelman Beam Deflection Technique and the design traffic as per the procedure outlined in IRC:81 "Guidelines for Strengthening of Flexible Road Pavement using Benkelman Beam Deflection Technique" as also from structural numbers of existing pavement layers.

ii) The design period will be the same as specified for the new pavement sections vide Para 5.4.1 of this Section. The initial strengthening shall be done for a minimum design period of 10 years. Subsequent strengthening to extend the pavement to full operation period shall be implemented at the end of initial design period or earlier, in case of any structural distress in the pavement or if the surface roughness exceeds the value specified in Schedule 'K' of the Concession Agreement.

iii) The design traffic will be estimated as per the procedure described for new pavement.

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iv) The thickness of bituminous overlay for pavement strengthening shall not be less than 50 mm bituminous concrete, after attending to the requirements of profile corrective course.

5.9.7 Bituminous mix for overlay

i) The specifications for the bituminous mixes for the overlay shall be as specified for bituminous surfacing for new pavement sections.

ii) Design of recycled mix where provided shall conform to the requirements of Clause 517 of MORTH Specifications.

5.9.8 Pavement performance requirements and evaluation

i) The strengthened pavement shall satisfy the minimum standard and maintenance requirements specified for new pavement sections in this Manual and Schedule-K of the Concession Agreement.

ii) The performance measurement and evaluation will be done as given in this Manual.

5.10 Paved Shoulders

i) Paved shoulders shall be provided as specified in this Manual

ii) If the thickness of the existing paved shoulder, if any, is less than the thickness of the existing pavement, the paved shoulders shall be reconstructed to the pavement thickness in the adjoining carriageway.

5.11 Construction, Workmanship and Quality of Works

All materials, construction operations, workmanship, surface finish and quality of completed construction for all pavement works including sub-grade, sub-base, base course, bituminous surface courses for both new pavement and strengthening of existing pavements, shoulders, service roads, etc. shall conform to the specified requirements and comply with the provisions of Section 900 of the MORTH Specifications.

5.12 Premature Distress

Notwithstanding the minimum design, specifications and standards specified in the preceding paras for new pavements and strengthening of existing pavements, if the pavement shows premature distress in the form of cracking, rutting, patching, loss of camber or any other structural or functional distress, necessary remedial measures by strengthening/resurfacing/recycling shall be undertaken for conforming to the minimum requirements prescribed in Schedule 'K' of the Concession Agreement. In case of repetition of the distress, reconstruction shall be resorted to after proper investigations.

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5.13 Detailed Design Report

5.13.1 The new pavement design and strengthening proposals formulated on the basis of the detailed investigations and studies shall be submitted to the Independent Engineer alongwith Data Collection, Data Evaluation and Design Reports.

5.13.2 Data collection

Following details shall be included in the report:

i) Soil investigation data for new pavements as per Table 13.2 of IRC:SP:19. Report shall include OMC–dry density relationship with heavy compaction and soaked CBR values in addition to other data and information as per the prescribed Proforma.

ii) Test values of aggregate for pavement courses as per Tables 13.3 and 13.4 of IRC:SP:19. All tests as per requirements of MORTH Specifications shall be reported in addition to the tests and information included in the above mentioned Tables.

iii) Classified traffic counts in Proforma 1 of IRC:SP:19.

iv) Axle load surveys and VDF values for each category of commercial vehicles as per Proforma 4 of IRC:SP:19.

v) Estimation of traffic growth and traffic projections for pavement design.

vi) Pavement condition data in the Proforma given in Table 2 of IRC:81.

vii) Pavement roughness data determined through appropriate method as approved by the Authority.

viii) Pavement Deflection Data measured by Benkelman Beam as per the procedure detailed in IRC:81. Pavement deflection data shall be recorded in the prescribed Proforma vide Table 3 of IRC:81. The deflection data shall be accompanied with the characteristics of the sub-grade soil covering type of sub-grade soil, field moisture content (at the time of deflection survey), average annual rainfall in the area, and pavement temperature at the time of deflection survey.

ix) Any other relevant information required by the Independent Engineer for review and comments, if any.

5.13.3 Data evaluation

The report shall inter alia cover:

i) Data evaluated – soil characteristics and subgrade strength, pavement distress, pavement deflection, riding quality, skid resistance, drainage aspects, etc.

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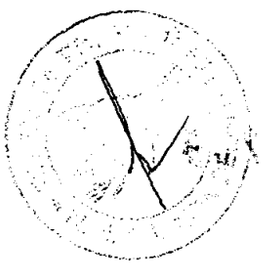
ii) Pavement deficiencies, drainage and constraints.

iii) Any other relevant details.

5.13.4 Detailed design

The Report shall contain the detailed design of the preferred solution along with any special treatment proposed for adoption. Any departures from the specifications stated herein shall be supported with authentic standards and specifications and accepted practice.



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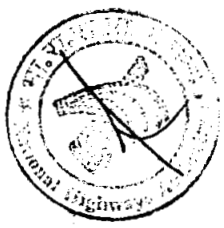
SECTION - 6

HIGHWAY DRAINAGE



SECTION - 6

HIGHWAY DRAINAGE

6.1 General

6.1.1 The design and construction of surface and subsurface drains for highway drainage shall be carried out in accordance with the requirements of this Section.

6.1.2 For efficient drainage system for the entire Project Highway including structures and facilities, directions contained in Clause 309 of MORTH Specifications, IRC:SP:42 and IRC:SP:50 as relevant shall be followed.

6.1.3 In road sections in cuttings and at underpasses where it may not be possible to drain out the water using gravity flow, necessary arrangement for pumping shall be made.

6.1.4 Detailed survey for levels along the proposed longitudinal drains shall be carried out on both sides of the Project Highway. The bottom levels of these drains shall meet the culverts and bridges.

6.2 Surface Drainage

6.2.1 The selection of type of roadside drains shall be based on the magnitude and duration of flow. The roadside drains shall be designed on the principles of flow in open channel.

6.2.2 The road side drains shall not pose any danger to traffic, slopes of cuttings, embankment, pavement or structures.

6.2.3 As far as possible, longitudinal slope shall not be less than 0.5 percent for lined drains and 1.0 percent for unlined drains. Permissible non-erodible flow velocity for corresponding earth surface as mentioned in Clause 9.4 of IRC:SP:42 shall be kept in view

6.2.4 The side slopes of the unlined drains shall be as flat as possible and shall not be steeper than 2H: 1V.

6.2.5 The drains shall be provided with CC lining in the following situations:

i) When due to space constraint, the drains are located near the toe of the embankment or near structures.

ii) Drains located in built-up areas.

iii) Flow velocity is more than 0.3 m to 1 m/s in silt and sand; and more than 1.5 m/s in stiff clay.

6.2.6 In built-up areas, covered or piped drains, with manholes at suitable intervals to desilt the pipes, shall be provided.

6.3 Median Drainage

6.3.1 Proper arrangement for drainage of median shall be provided. The median drain should have adequate longitudinal slope to the nearest culvert to drain off transversely.

6.3.2 In case the carriageway is sloping towards unkerbed median (wider than 5 m), provision of a central swale shall be made for drainage of the median. The swale shall slope longitudinally for drainage, water intercepted by inlets at intervals and discharged through transverse drains into outlet channel.

6.3.3 Median of width 7 m or less shall be turfed or paved and could be crowned for drainage across the pavement.

6.3.4 In superelevated sections, proper arrangement for drainage of raised carriageway and median shall be made without allowing water to drain on the other carriageway.

6.4 Drainage of Embankment with Height Above 3 m

6.4.1 In embankments with height more than 3 m and approaches to bridges, special arrangement for protection of embankment slopes shall be essential in order to ensure that embankment slopes maintain their shape during the monsoon season. In this respect, directions contained in Clause 7 of IRC:SP:42 may be followed as appropriate for the climatic conditions of the area of the Project Highway.

6.4.2 Drainage arrangement shall include provision of kerb channel at the edges of the roadway to channelise the water, and Cement Concrete (CC) lined chutes along the slopes at designed intervals to discharge the water into side channels at the bottom alongwith appropriate protection of the slope. The slope protection material and chutes shall be kept well maintained at all times.

6.4.3 The chute drains and drains at toe of the embankment shall be of Plain Cement Concrete (M 15 grade), over proper bedding.

6.5 Catch Water Drains

6.5.1 Suitable catch water drains shall be provided on the hill slope above cutting to collect and remove surface water run-off from upper reaches. These drains shall be of trapezoidal shape and stone lined and cement pointed.

6.5.2 The catch water drains shall be designed to carry the intercepted water to the nearest culvert or natural drainage channel.

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6.5.3 It shall be ensured that the catch water drains are provided in stable hill slopes outside the periphery of slide/unstable areas.

6.5.4 Where required, lined chutes shall be provided to lead the discharge to the catch pit of culvert or to a natural drainage channel.

6.6 Sub-surface Drains

6.6.1 The sub-surface drainage shall be provided

i) for lowering the level of water table for drainage of sub-grade;

ii) to intercept or drain out free water in cut slopes; and

iii) for drainage of pervious subbase in situations where it may not be practicable to extend the subbase across the shoulder.

6.6.2 Sub-surface drains shall not be used for surface drainage.

6.6.3 The sub-surface drains shall be:

i) Close jointed perforated pipes or open jointed unperforated pipes in trenches with backfill material around pipes.

ii) Aggregate drains consisting of free draining material in the trench without any pipe.

6.6.4 Perforated pipes and unperforated pipes shall meet the requirements of Clause 309.2 of the MORTH Specifications.

6.6.5 The internal diameter of the pipe shall not be less than 150 mm.

6.6.6 The sub-surface drains shall be located not less than 0.5 m below the sub-grade.

6.6.7 Backfill material:

i) Backfill material shall be free draining sand, gravel or crushed stone designed on inverted filter criteria for filtration and permeability, or of an appropriate grading conforming to the requirements of Table 300.3 of the MORTH Specifications.

ii) Thickness of backfill material around the pipe shall not be less than 150 mm. The minimum thickness of material above the top of the pipe shall be 300 mm.

6.6.8 Sub-surface drains outside the road pavement shall be sealed at the top to avoid percolation of surface water into these drains.

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6.6.9 Use of Geo-textile

i) The sub-surface drains may be designed using appropriate geotextile to serve the functions of filtration and separation.

ii) The sub-surface drains can be provided with geotextile either along the trench or around the pipe or both.

iii) The geotextile shall satisfy the requirements of Clause 702 of the MORTH Specifications.

6.6.10 Trench excavation, laying of pipe, backfilling, and use of geosynthetics shall conform to the requirements of Clause 309.3 of the MORTH Specifications.

6.6.11 The drain outlet shall be a free outlet and shall be provided as per Clause 309.3 of the MORTH Specifications.

6.6.12 Aggregate drains

i) The trench for aggregate drain shall be of minimum 300 mm width and cut to a depth to expose the granular pavement courses to be drained.

ii) Aggregate for the drain shall be gravel, stone aggregate or slag of grading as per Table 8 of IRC:SP:42.

iii) The aggregate drain shall be provided with a geo-textile wrap to act as filtration and separation layer.

6.6.13 Design of subsoil drainage shall be based on a rational basis. Reference may be made to IRC:SP:42.

6.7 Internal Drainage of Pavement Structure

i) Boxed type construction in which pavement is housed in earthen shoulders shall not be provided.

ii) The sub-base shall be extended across the shoulders for efficient drainage of pavement.

iii) The granular sub-base shall be of proper design and grading to perform satisfactorily as a drainage layer. The drainage layer shall not have material finer than 75 micron size.

iv) A suitable filter of granular material or geotextile to act as filtration and separation layer shall be incorporated, where necessary, between the sub-grade and sub-base to prevent clogging.

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6.8 Survey, Investigation and Design Report

The Concessionaire shall carry out proper surveys and investigations for detailed design of the drainage system. The proposal for drainage system supported with survey investigation report and detailed design report shall be submitted to the Independent Engineer for review and comments, if any.

6.8.1 Drainage studies

The survey and investigation and drainage studies shall include:

i) Alignment plan, longitudinal and cross sections, contour map.

ii) Hydrological data

Drainage area, water shed delineation, direction of flow, location of outfalls, existing surface drains, ground surface condition, rainfall, flood frequency, etc.

iii) Data for hydraulic design of drains

iv) Geo-technical investigations for sub surface strata, level of water table, seepage flow etc.

v) Identification of areas requiring sub-surface drainage.

vi) Any other relevant information

IRC:SP:19, IRC:SP:42, IRC:SP:48 and IRC:SP:50 may be referred to.

6.8.2 Design details

The report shall include:

i) Estimation of design discharge.

ii) Design of surface drains.

iii) Design of sub-surface drains.

iv) Drainage arrangement plan along with cross section of drains with longitudinal levels, cross drainage works and a strip chart.

v) Specifications of drains.

vi) Any additional information as required by the IE for review of the drainage system.

6.8.3 Responsibility for design and adequacy

The Concessionaire shall be fully responsible for design and adequacy of the drainage system throughout the operation period as per the requirements of the Concession Agreement.

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SECTION - 7

DESIGN OF STRUCTURES

SECTION - 7

DESIGN OF STRUCTURES

7.1 General

i) All bridges shall be designed in accordance with the relevant Codes, Standards and Specifications and Special Publications and Guidelines of the IRC. All construction of bridges shall conform to MORTH Specifications for Road and Bridge Works.

ii) All bridges shall have independent superstructure for each direction of travel unless specified otherwise in Schedule 'B'. Culverts may have single or independent superstructure.

iii) All bridges shall be high level bridges unless specified otherwise in Schedule 'B' of the Concession Agreement.

iv) Viaduct spans shall be provided if the height of solid embankment in built-up sections is more than 5 m.

v) The width of median in the culvert and bridge portion shall, as far as possible, be kept same as that in the approaches. In case width of median is different from that of approach section due to site constraints, suitable transition shall be provided near approaches for guiding vehicular traffic.

vi) The median in the portion of structures shall be treated as below:

   a) A suitably designed catch pit shall be provided to collect and carry discharge from median drain.

   b) For bridges, where the median is more than 1.2 m wide, the median shall be open to sky. The safety barrier on the median side shall be provided at a clear distance of 0.5 m from the edge of carriageway.

vii) Suitable provision shall be made for retaining the earth in the median portion either by extending the abutment wall or constructing a new retaining wall. The abutment wall shall have provision for taking the discharge from the median. Care shall also be taken to merge the wing wall /return wall and flooring of the old bridge with those of the new bridge.

viii) Any utility service to be carried by the structures shall be specified in Schedule 'B' of the Concession Agreement.

7.2 Design Loads and Stresses

i) The design loads and stresses shall be as per IRC:6 appropriate for the width of carriageway, velocity of stream, location, altitude, environment, etc.

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ii) All new structures shall be designed for the condition when footpath is used as carriageway. The footpath portion may be provided at the same level as the bridge carriageway and separated by crash barrier in non built-up areas. In built-up areas, raised footpaths shall be provided.

iii) All the components of structures shall be designed for a service life of 100 years except appurtenances like crash barriers, wearing surface and rubberized components in expansion joints and elastomeric bearings. All the requirements to achieve durability and serviceability shall be implemented.

7.3 Width of Structures

Width of the culverts and bridges shall be adopted as below:

i) New culverts

Overall width of all new culverts shall be equal to roadway width of the approaches. The outer most face of railing/parapet shall be in line with the outer most edge of shoulder. Typical cross section of the new culverts for a 4-lane project highway is given in Fig. 7.1.

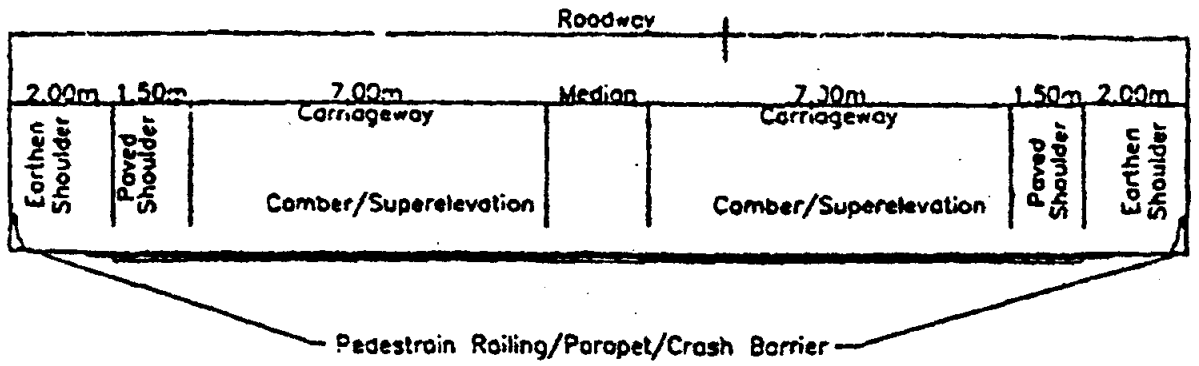

Fig: 7.1 Cross Section of Pipe Culverts at Road Level
4-Lane Divided Highway

ii) New bridges

a) The overall width of new bridges shall be same as the roadway width of the approaches. All new bridges shall have a footpath on left side of the traffic. Typical cross section of such type of new bridge with footpath for a 4-lane project highway is given in Fig. 7.2.

b) Where the daily traffic in PCUs exceeds 30,000 at the time of feasibility study/ bidding, the width of new bridge shall be as per Six-lane standards vide details given in Fig. 7.3 with footpath. Such bridges shall be indicated in Schedule 'B'.

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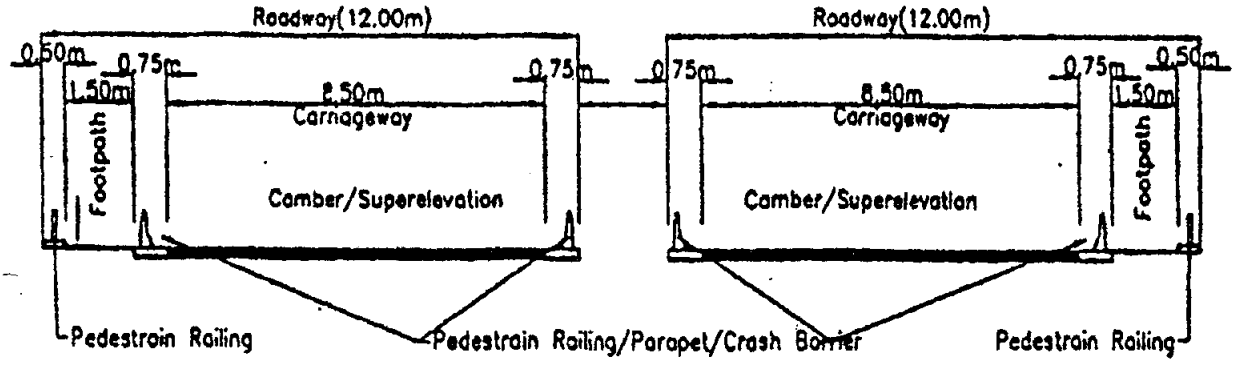

Fig. 7.2 Cross Section of Bridge at Deck Level - with Footpath
4-Lane Divided Highway

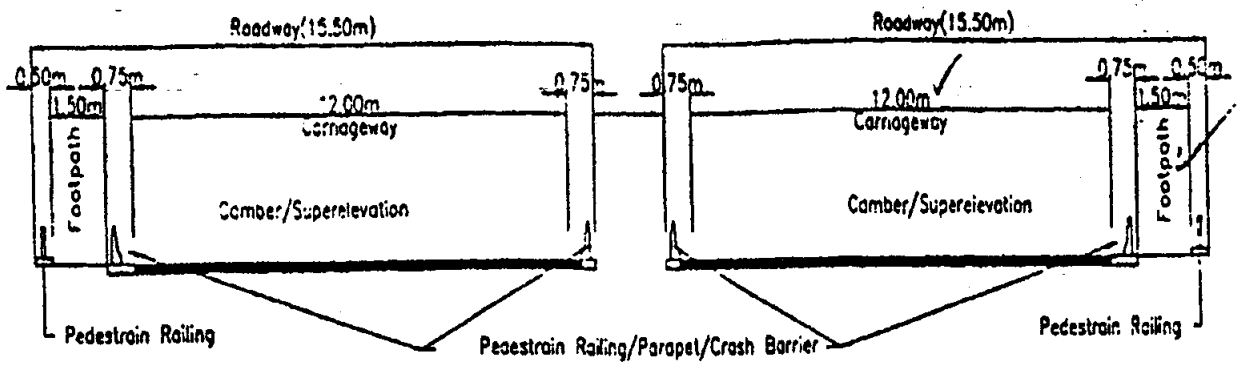

Fig. 7.3 Cross Section of Bridge at Deck Level - with Footpath
4-Lane Divided Highway (Both sides new Bridges for 6-Lane Standards)

c) Where the length of bridge structure including grade separated structures exceeds one km, provision shall be made for passing place at the rate of one passing place for every one km (or part thereof).These shall be indicated in Schedule 'B' of the Concession Agreement. However, no passing place would be provided where structures are six- lane wide.

iii) Existing culverts

a) All culverts which are structurally distressed or not having sufficient vent/ size shall be reconstructed as new structures of width as per Sub Para 7.3 (i) of this Section.

b) All existing culverts which are not to be reconstructed shall be widened equal to the roadway width of the approaches.

c) The culverts and Hume pipe structures shall be widened so as to make the deck width same as specified in Sub Para 7.3 (i) of this Section. If the width of additional widening is less than 0.5 m on either side, the widening of the structure may be dispensed with and traffic shall be guided with the help of crash barriers in a transition of 1 in 20 on either side approaches.

d) List of culverts to be reconstructed and/or widened shall be specified in Schedule 'B' of the Concession Agreement.

iv) Existing bridges

a) All bridges which are structurally distressed shall be reconstructed as new bridges of width as per Sub Para 7.3 (ii).

b) Components like bearings, expansion joints, railings, crash barriers, wearing surface, etc., which are not in sound condition, shall be replaced. Minor non-structural works shall be suitably repaired.

c) If the width of additional widening is 1.0 m (0.5 m on each side) or less, the widening of the structure may be dispensed with and traffic shall be guided with the help of crash barriers in a transition of 1 in 20 on either side approaches.

d) The bridges having 2-lane carriageway particularly those with T-beam/Box type superstructure with well/pile foundation, which are in sound condition, may be retained and proper transition between approach and bridge shall be provided. Typical cross sections at deck level for bridges with and without footpaths showing new bridge on one side and existing 2-lane bridge on the other side are given in Fig. 7.4 A and 7.4 B respectively.

e) The width of the new structures constructed on the other side of the existing bridge shall be as specified in Sub Para 7.3 (ii) of this Section.

f) List of bridge structures to be reconstructed and/or widened shall be specified in Schedule 'B' of the Concession Agreement.

7.4 Structure Types

i) The bridge structure should aesthetically blend with the environment.

ii) The type and span arrangement may be fixed so as to provide riding comfort.

iii) Wherever box girders are proposed for superstructure, the minimum clear depth inside the box shall be 1.50 m with suitable openings in the

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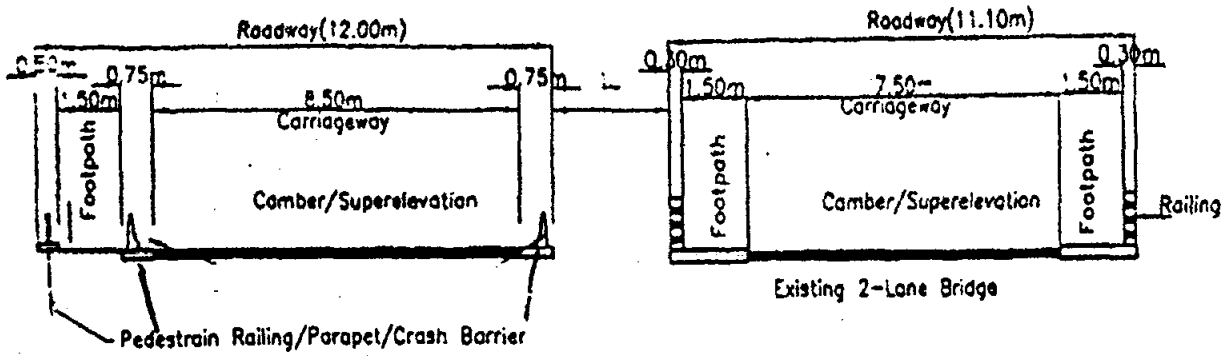

Fig. 7.4A Cross Section of Bridge at Deck Level - With Footpath
(T-Beam/Box Girder Type / Well / Pile Foundation)
4-Lane Divided Highway (One side new Bridge and other sides Existing for 2-Lane Bridge)

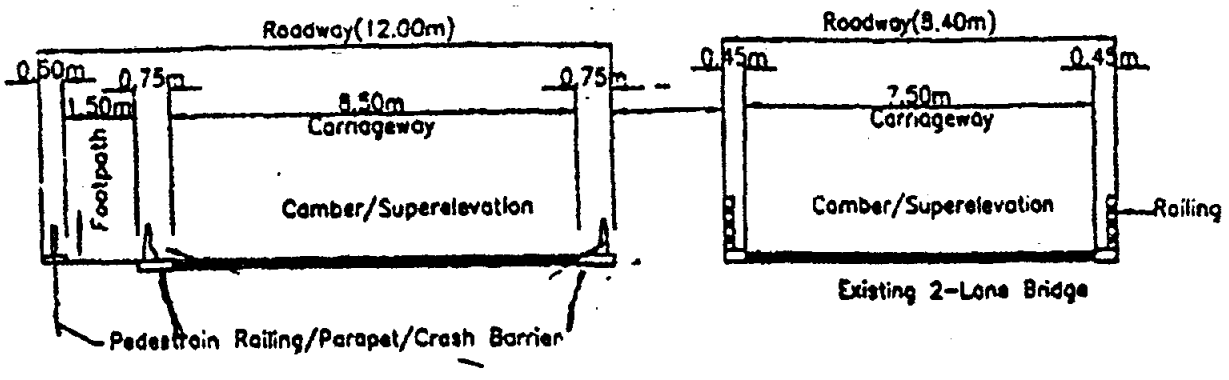

Fig. 7.4B Cross Section of Bridge at Deck Level - Without Footpath
(T-Beam/Box Girder Type / Well / Pile Foundation)
4-Lane Divided Highway (One side new Bridge and other sides Existing for 2-Lane Bridge)

diaphragms and box to facilitate inspection. Haunches of minimum size of 300 mm (horizontal) and 150 mm (vertical) shall be provided at the extreme corners of the box section. Suitable arrangements for lighting shall be made to enable inspection of the box.

iv) The following types of structures shall not be accepted.

a) Drop in spans with halved joints (articulations)

b) Trestle type frames for substructures

v) If construction of structures like cable stayed/ suspension bridge or with special techniques is envisaged, it shall be specified in Schedule 'B' of the Concession Agreement.

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7.5 Hydrology

All the structures shall have adequate waterway, which shall in any case be not less than that of existing bridge (except when such waterways can be reduced in cases like clogging or silting of spans, etc.). The design discharge shall be evaluated for flood of 100-year return period.

7.6 Sub-Soil Investigations

Independent sub-soil investigations shall be carried out to establish the soil parameters required for detailed design of foundations in accordance with relevant provisions of IRC:78 and MORTH Specifications.

7.7 Culverts and Bridges using Pipes

i) Reinforced concrete pipes for culverts and bridge structures shall be of Non Pressure (NP) - 4 type conforming to the requirements of IS: 458. Minimum diameter of pipes for new pipe culverts shall be 1200 mm.

ii) Existing culverts of diameter 900 mm and above, which are in sound condition and functioning satisfactorily, may be extended, using pipes of same diameter. All culverts having pipe diameter less than 900 mm shall be replaced with pipes of minimum 1200 mm diameter under both the carriageways. Minimum depth of earth cushion over pipe including road crust shall not be less than 1000 mm for new/reconstructed culverts. In case of existing sound and safe culverts, a minimum cushion of 600 mm may be acceptable. In case the cushion is insufficient, encasing of pipe in concrete shall be ensured. Floor protection shall be as specified in the relevant IRC Codes and Specifications.

7.8 Temporary Works

7.8.1 Form work

The Concessionaire shall be responsible for the safe, workable design and methodology for all temporary or permanent forms, staging and centering required for supporting and forming the concrete of shape, dimensions and surface finish as shown on the drawings (Refer IRC:87). Adequate foundation for the staging shall be ensured. Redundancy in support system shall also be ensured by providing diagonals and additional members. The following guidelines shall be adopted:

i) Formwork shall be of steel, marine ply or laminated plywood.

ii) Only such shuttering oil (release agent) shall be used, which permits easy removal of shutters without leaving stains or other marks on the surface of the concrete. Requirements given under Clause 3.5 of IRC:87 shall also be complied with.

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iii) In case of tubular staging of heights more than 10 m, special attention shall be paid to the structural adequacy of the system, efficacy of the connections (clamps etc), and foundations. Foundation blocks of adequate thickness in M15 cement concrete shall be provided under the base plates to prevent differential settlements. All bent tubular props shall be straightened before re-use and the member with deviation from straightness more than 1 in 600 of its length shall not be re-used. For re-used props, suitable reduction in the permissible loads shall be made depending upon their condition in accordance with recommendations of the manufacturer and as reviewed by the IE.

iv) In case of prestressed concrete members, the side forms shall be removed as early as possible and the soffit forms shall permit movement of member without restraint, when prestress is applied. Form supports and forms for cast-in-situ members shall not be removed until sufficient prestress has been applied to carry all anticipated loads during construction stage.

v) Adequate foundations for formwork shall be ensured.

7.8.2 Special temporary and enabling works

Designs, drawings and methodology proposed by the Concessionaire in the use of special temporary and enabling works like Launching Girders, Cantilever Construction Equipment, Tall Formwork, Shoring for Earth Retention, Lifting and Handling Equipments and the like shall be submitted to the Independent Engineer (IE) for his review and comments if any. The Concessionaire shall be fully responsible for the design and structural adequacy of all temporary and enabling works. Review by IE shall not relieve the Concessionaire of this responsibility

7.9 Foundations and sub-structures

7.9.1 The design of foundations and sub-structures shall conform to IRC:78.

7.9.2 Open foundations

The design of open foundations shall conform to IRC:78. Floor protection shall be provided as per Section 2500 of MORTH Specifications.

7.9.3 Pile foundations

i) The design of pile foundations shall be done as per IRC:78. The Concessionaire shall submit a method statement supported by the following:-

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a) Bore-log details for each foundation;

b) Design assumptions;

c) Design calculations both for single pile or group of piles and for pile type;

d) Type of piles-Bored cast-in-situ piles and driven piles;

e) Procedure adopted for installation of piles;

f) Arrangements for load testing of piles;

g) Format for reporting of test results.

ii) The Concessionaire shall submit the following information regarding proposed proprietary system of piling:

a) General features of the process/system alongwith specifications and standards;

b) Authenticated copies of license/agreement, if any;

c) Details of plant and equipment to be used along with the names of manufacturers and name of process/system;

d) Detaiis of projects where the process/system has been successfully used;

e) Limitations, if any;

f) Acceptance tests and criteria;

g) Installation and maintenance procedure and schedule; and

h) Performance warranty.

7.9.4 Well foundations

i) For conventional method of well sinking, the Concessionaire shall submit a method statement including the following:

a) Design calculations and drawings,

b) Procedure for sinking and plugging of well,

c) Format for reporting of test results.

ii) If proprietary system of well sinking like jack down method is proposed to be used, the Concessionaire shall submit relevant information covering inter-alia the following:

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a) General features of the system along with specifications and standards and justification for the thickness of steining proposed to be adopted;

b) Authenticated copies of license/agreement, if any;

c) Details of plant and equipment to be used along with the names of manufacturers and name of process/system;

d) Details of projects where the process/system has been successfully used;

e) Limitations, if any;

f) Acceptance tests and criteria;

g) Installation and maintenance procedure and schedule; and

h) Performance warranty.

iii) The Concessionaire in his Methods Statement shall include the procedure for sinking by special methods, carrying out tests, if any, of wells including design criteria/calculations, drawings and formats for reporting test results.

Approach Slabs

Approach slabs shall be provided as per Clause 217 of IRC:6 and Section 2700 of MORTH Specifications.

7.11 Superstructures

7.11.1 The design of reinforced and pre-stressed concrete superstructures shall be as per IRC:21 and IRC:18 respectively. The design of steel and steel-concrete composite super structures shall conform to IRC:24 and IRC:22 respectively.

7.11.2 The Concessionaire shall submit Method Statement indicating interalia the following:

i) Sources of materials,

ii) Design, erection and removal of formwork,

iii) Layout of casting yard together with necessary details,

iv) Production, transportation, laying, compacting and curing of concrete,

v) Sequence of concreting in cast-in-situ construction, side shifting of girders, if applicable and placing of girders on the bearings,

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vi) Details of construction joints,

vii) Prestressing system, if required,

viii) Methodology and equipment for side shifting and launching of pre-cast girders,

ix) Key personnel for execution and supervision,

x) Testing and sampling procedure,

xi) Equipment details.

7.12 Bearings

7.12.1 All bearings shall be easily accessible for inspection, maintenance and replacement. Suitable permanent arrangements shall be made for inspection of bearings from bridge deck. Design and specifications of bearings shall be as per IRC:83 (Part I, II and III). Spherical bearings shall conform to the requirements of BS:5400. The materials of bearings may however conform to the relevant BIS codes nearest to the specifications given in BS:5400. The drawing of bearings shall include the layout plan showing exact location on top of pier and abutment cap and the type of bearings i.e. fixed/free/rotational at each location along with notes for proper installation. The bearing should cater for movement in both longitudinal and lateral direction in respect of bridge structures more than 12 m wide.

7.12.2 The Concessionaire shall procure bearings only from the manufacturers approved by MORTH.

7.12.3 The Concessionaire, shall submit detailed specifications, designs and drawings including installation drawings and maintenance manual incorporating the replacement procedure.

7.12.4 The Concessionaire shall obtain and submit a complete Quality Assurance Programme (QAP) from the manufacturer. The QAP shall give the full details of the process of quality control, raw material testing, various stages of manufacture, testing of bearing components as well as testing of complete bearing in conformity with relevant part of IRC:83, prior to the commencement of manufacture of the bearings.

7.12.5 In addition to the routine testing of the materials and bearings at the manufacturer's premises, the Concessionaire shall arrange testing of random samples of one percent (minimum one number of each type) of bearings from independent agency approved by the IE.

7.12.6 The Concessionaire shall submit a certificate of confirmation regarding quality control measures taken during manufacture of the bearings and the material conforming

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to the prescribed standards and specifications. Full lot of bearings of the sample found to have inferior specifications to those certified by the manufacturer or to have major discrepancy in material specifications or which fail to meet the acceptance criteria, shall be rejected.

7.13 Expansion Joints

i) Structures shall have minimum number of expansion joints. This may be achieved by adopting longer spans, making the superstructure continuous or by adopting integrated structures. Expansion joints shall conform to IRC:SP: 69. The Concessionaire shall furnish guarantee/proprietary indemnity bonds from the manufacturers/suppliers of expansion joints for a period of 10 years.

ii) For existing bridges all expansion joints, which are older than 15 years shall be replaced.

iii) The Concessionaire shall procure expansion joints only from manufacturers approved by MORTH.

iv) The expansion joints should cater for movement in both longitudinal and lateral direction in respect of bridge structures more than 12 m wide.

7.14 Wearing Coat

i) The wearing coat may be either bituminous concrete or cement concrete. For new bridges and culverts, the wearing coat shall have unidirectional camber and shall be in conformity with Section 2700 of MORTH Specifications. For existing bridges, the camber as existing may be retained.

ii) Wearing coat older than 15 years or in damaged/distressed condition shall be replaced.

7.15 Reinforced Earth Retaining Structures

7.15.1 Reinforced earth retaining structures shall not be provided for height more than 6 m unless otherwise specified, and near water bodies. Such structures should be given special attention in design, construction, ground improvement where necessary, maintenance and selection of System/System design. Local and global stability of the structure shall be ensured.

7.15.2 Design Accreditation and warranty for life of the structure from the approved supplier/manufacturer shall be obtained and furnished. A qualified and experienced technical representative of the approved supplier/manufacturer shall be present on site throughout during the casting and erection phases to ensure that the quality of the works executed by the Concessionaire is in accordance with good industry practice.

7.15.3 The Concessionaire shall submit relevant information on the system covering inter-alia the following:

i) General features of the system along with specifications and standards;

ii) Authenticated copies of license/agreement, if any;

iii) Details of plant and equipment to be used along with the names of manufacturers and name of process/system;

iv) Details of projects where the process/system has been successfully used;

v) Limitations, if any;

vi) Acceptance tests and criteria;

vii) Installation and maintenance procedure and schedule; and

viii) Performance warranty.

7.15.4 The Concessionaire shall submit a method statement including the following:

i) Design assumptions calculations and drawings,

ii) Construction Procedure,

iii) Tests to be conducted including frequency and the formats for reporting the test results.

7.15.5 The packaging of reinforcing elements shall clearly indicate the name of the manufacturer/supplier and brand name, date of production, expiry, if any and batch identification number along with the manufacturers test certificates.

7.16 River Training and Protective Works

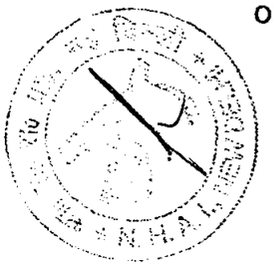
River training and protective works shall be provided wherever required for ensuring the safety of bridges and their approaches on either side. The special features and design of various types of river training and protective works shall be in accordance with IRC:89.

7.17 Safety Barriers

i) For bridges without foot paths, concrete crash barriers shall be provided at the edge of the carriageway on all new bridges.

ii) The type design for the crash barriers may be adopted as per IRC:5. The design loading for the crash barriers shall be as per Clause 209.7 of IRC:6.

iii) For bridges with foot paths, pedestrian railing shall be provided on the outer side of footpath.



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iv) The railings of existing bridges shall be replaced by crash barriers, where specified in Schedule 'B' of the Concession Agreement.

v) Parapets/Railings of the existing bridges/culverts to be repaired/replaced shall be specified in Schedule 'B' of the Concession Agreement.

7.18 Rail-Road Bridges

7.18.1 Unless otherwise specified in Schedule 'B' of the Concession Agreement, ROB/ RUB to be provided shall be as specified in this Manual, with particular reference to the provisions of Para 7.3 of this Section.

7.18.2 Road over bridge (road over rail)

i) In case a 2-lane bridge exists over the railway tracks, another two-lane bridge shall be constructed for one side traffic. The treatment to existing structure shall be given as in Sub-Para 7.3 (iv) of this Section.

ii) In case the bridge is to be provided over an existing level crossing, twin 2-lane bridges shall be constructed with overall width as given in Sub-Para 7.3 (ii) of this Section. If the alignment of road at the existing railway crossing has skew angle more than 45°, the alignment of road or of pier/ abutment shall be suitably designed to reduce skew angle up to 45°.

iii) The horizontal and vertical clearances to be provided shall be as per requirement of the Railway authorities.

iv) The Concessionaire shall be required to obtain approvals of all designs and drawings from the concerned Railway authorities.

v) The construction of ROB within the railway boundary shall be under the supervision of Railway authorities.

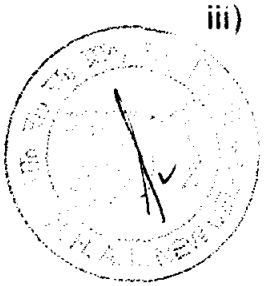
vi) The approach gradient shall not be steeper than 1 in 40.

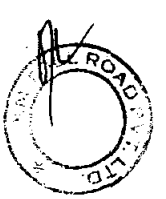
7.18.3 Road under bridges (road under railway line)

i) Full roadway width as in the approaches shall pass below the bridge structure allowing for widening of Project Highway to 6-lane at a later date. The service roads where provided shall be continued in the bridge portion also.

ii) The vertical and lateral clearances shall be as per guidelines given in Section 2 of this Manual.

iii) These structures shall be designed to carry railway loads. The Concessionaire shall be required to obtain approvals of all designs and drawings from the concerned Railway authorities. The design of structure shall be in accordance with relevant Railway codes.





(iv) The construction of RUB and its approaches shall be carried out in conformity with the terms specified in the approval granted by the Railway authorities.

7.19 Grade Separated Road Structures

i) The location, type and length of grade separated structures to be provided on the Project Highway shall be as specified in Schedule 'B' of the Concession Agreement.

ii) The vertical and lateral clearances shall be as per requirements given in Section 2 of this Manual. Design of structures shall conform to requirements specified in this Manual.

7.20 Drainage

An effective drainage system for the bridge deck shall be planned, designed and installed so as to ensure that water from the deck is taken down to ground level/drainage courses by adequate size of drainage spouts and pipes. The type of such arrangement shall be specified in Schedule 'B' of the Concession Agreement.

7.21 Structures in Marine Environment

Necessary measures/treatments for protecting structures in marine environment shall be as specified in Schedule 'B' of the Concession Agreement.

7.22 Repairs and Strengthening

i) Structures requiring repairs and strengthening shall be specified in Schedule 'B' of the Concession Agreement. This shall be based on detailed condition survey of existing structures and shall bring out the nature and extent of repairs to be carried out, covering the following in addition to other specific requirements:-

a) Repair/replacement of damaged railings and parapets, provision of crash barriers,

b) Replacement of wearing coat (old wearing coat shall be removed and replaced by bituminous wearing coat),

c) Replacement of expansion joints,

d) Replacement of bearings,

e) Structural repairs to substructure/super structure, including replacement of substructure/superstructure if required

f) Repair to flooring and protection works.

ii) The Concessionaire shall submit repairs and strengthening plan for structures in para (i) above to the Independent Engineer for review and comments, if any. For all other structures with minor deficiencies, not affecting structural inadequacies and integrity, appropriate repair measures may be proposed and submitted to the Independent Engineer for review and comments, if any.

iii) Strengthening/rehabilitation work shall be carried out in accordance with relevant IRC Codes and Guidelines.

iv) The Concessionaire shall take up repair and widening of existing bridge at a particular site only after the new bridge at that site is constructed and the same can be used by the traffic. Before taking up the works of repair and widening of the existing bridge, the Concessionaire shall make all arrangements to ensure that both way traffic can use the new bridge and a smooth flow of traffic is maintained. The Concessionaire shall take all precautions to guard against any traffic accident due to such diversion and shall use all necessary road signs, traffic management measures etc. for the purpose. After completion of repair and widening of the existing bridge, all arrangements shall be made so that both the old and the new bridges at the site can be used by the traffic. Repair works for substructure, foundation, and abutment etc., which will not affect or disturb the flow of traffic over the existing bridges, may, however, be taken up before completion of the new bridge. In such cases where new 2-lane bridges is not required to be constructed before COD, the existing bridge shall be repaired/strengthened by suitably regulating the traffic on the bridge or by temporary diversion.

7.23 Design Report

The Concessionaire shall furnish the design report including the following to the Independent Engineer for his review and comments, if any.

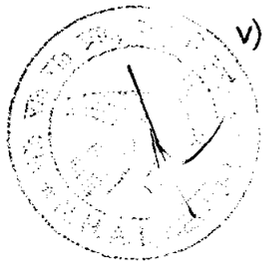
i) Sub soil exploration report as per IRC:78 as specified in Para 7.6 above.

ii) Hydrological Investigation report including design discharge calculation for the bridges, in case of any change in the proposed waterway of any bridge as specified in para 7.5 above.

iii) Designs and drawings of temporary works, foundations, substructures and superstructure of structures

iv) Detailed report regarding the bridges whose width is less than the roadway width and the proposal for their improvement.

v) Any other information relevant to the design report.



7.24 Responsibility for Design and Structural Adequacy

The Concessionaire shall be fully responsible for the design, structural adequacy and detailing of bridge and culvert structures. Review by IE shall not relieve the Concessionaire of this responsibility.

SECTION - 8

MATERIALS

SECTION - 8

MATERIALS

8.1 General

i) All materials to be used in works shall be in conformity with the requirements laid down for relevant item in IRC/MORTH Specifications unless otherwise specified in this Section. If the Concessionaire proposes to use any material, which is not covered in IRC/MORTH Specifications, it shall conform to relevant Indian Standards, if there are any, or to the International Standards. Proprietary products proposed to be used shall be proven by use in comparable international road and bridge projects, and shall be supported with authenticated licensing arrangement with the manufacturer.

ii) The Concessionaire shall identify the proposed sources of materials and submit the proposal prior to delivery. If it is found that proposed sources of supply do not produce uniform and satisfactory products at any time during execution, the Concessionaire shall procure acceptable materials conforming to the specifications from other sources.

iii) In case of manufactured items, the Concessionaire shall submit details pertaining to the product/process/system covering interalia:

a) Name of manufacturer and name of product/process/system;

b) General features of the product/process/system along with specifications and standards adopted for the product/process/ system;

c) Authenticated copies of license/agreement;

d) Details of projects where the product/process/system has been successfully used;

e) Limitations, if any;

f) Acceptance tests and criteria;

g) Installation and maintenance procedure and schedule; and

h) Performance warranty.

8.2 Structural Concrete

The Concrete for use in structures shall conform to the provisions in Clauses 302.6 to 302.9 of IRC:21 and Section 1700 of MORTH Specifications. Wherever High

Performance Concrete (HPC) is proposed to be used, the same shall conform to the provisions of IRC:SP:70. Sampling and testing of concrete shall be as per Clause 302.10 of IRC:21. Acceptance criteria for concrete shall conform to Clause 302.11 of IRC:21.

8.3 Cement

Any type of cement specified in IRC:21 may be used for the works subject to limitations, if any, specified therein.

8.4 Coarse Aggregates

Before commencement of the works, at least three samples, in accordance with the procedure laid down in IS:2430, shall be taken for each quarry source to ascertain the quality, suitability and fitness of the available material for use in the works. Fresh tests shall be conducted in case there is any change in the source or the type of rock being quarried. The proposal, along with a copy of test reports, shall be submitted.

8.5 Sand/Fine Aggregates

i) All fine aggregates shall conform to IS:383 and tests for conformity shall be carried out as per IS:2386 (Part I to VIII). The fineness modulus of fine aggregates shall be between 2.0 and 3.5.

ii) Before the commencement of the works, at least three samples as per IS:2430 shall be taken for each quarry source to ascertain the quality, suitability and fitness of the available material for use in the works and the proposal along with a copy of test reports shall be submitted to the IE for review and comments, if any.

iii) Fine aggregates having positive alkali-silica reaction shall not be used.

8.6 Water

i) Water for use in the works for mixing and curing of concrete shall be in conformity with Clause 302.4 of IRC:21.

ii) Water from each source shall be tested before the start of works and thereafter every three months and after each monsoon till the completion of the works and the proposal along with a copy of test reports shall be submitted to the IE for review and comments, if any.

8.7 Chemical Admixtures

8.7.1 The following guidelines shall apply in selection and use of admixtures:

i) Chemical admixtures shall comply with IS:9103 and meet the requirements stipulated in clause 5.5 of IS:456.

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ii) Admixtures generating hydrogen or nitrogen or containing nitrates, sulphides, sulphates, or any other material liable to affect the reinforcement/ embedments or concrete shall not be used.

iii) Compatibility of admixture with the cement being used shall be tested before actual use in the works. The test shall be repeated in case of change of type or grade or source of cement.

iv) Admixtures shall not impair the durability of concrete. They shall not combine with the ingredients to form harmful compounds or endanger the protection of reinforcement against corrosion.

v) The packaging of admixtures shall clearly indicate the name of the manufacturer/supplier, brand name (name of the product), date of production and expiry, batch/identification number.

8.7.2 In addition to the details as stipulated in Clause 1012.1 of MORTH Specifications, following information shall also be furnished:

i) pH value and colour.

ii) Latest date of test and name of the laboratory.

iii) Shelf life, maximum and minimum temperature for storage, precautions to be taken while mixing and any other instructions for use.

8.8 Steel

8.8.1 Steel for prestressing

In addition to the requirement mentioned in Clause 1009.2 of MORTH Specifications, the steel for prestressing shall satisfy following conditions:

i) Uncoated stress relieved low relaxation steel conforming to IS:14268.

ii) Prestressing steel shall be subjected to acceptance tests in respect of modulus of elasticity, relaxation loss at 1000 hrs., minimum ultimate tensile strength, stress-strain curve etc. prior to actual use on works as per guidelines contained in BS:4447. The modulus of elasticity value, as per acceptance tests, shall conform to the design value, which shall be within a range not more than 5 percent between the maximum and the minimum.

8.8.2 Reinforcement/Untensioned Steel

i) Only Fe 500 grade of steel shall be used on works and all reinforcing steel for use in works shall be procured from main/major producers. Fe 415 grade of steel can also be used where permissible as per IRC Codes and Guidelines.

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ii) Only fresh steel shall be brought to the site. Every bar shall be inspected before assembling on the work; and defective, brittle or burnt bars shall be discarded. Cracked ends of bars shall be cut before use.

iii) Only Thermo Mechanically Treated (TMT) bars conforming to IS:1786 shall be used as reinforcing steel.

iv) All reinforcement shall be free from loose rust and coats of paints, oil, mud or any other substance, which may destroy or reduce bond. The reinforcement bars bent and fixed in position shall be free from loose rust or scales, coats of paints, oil, mud or chloride contamination and other corrosion products. Where cleaning of corroded portions is required, proposal for effective method of cleaning such as sand blasting shall be submitted to the IE for prior review and comments.

v) Proprietary steel products will be permissible provided they conform to the minimum requirements.

8.8.3 Steel for bearings

Mild steel, high tensile steel, cast steel, steel forgings, and stainless steel shall conform to the provisions contained in Clause 925.1 of IRC:83 (Part III).

8.8.4 Structural Steel

All structural steel, castings and forgings, fasteners (bolts, nuts, washers and rivets), welding consumables and wire ropes and cables shall conform to the provisions of Clause 505.1.2, 505.2, 505.3, 505.4 and 505.6 respectively of IRC:24.

8.9 Bitumen

Bitumen shall be paving bitumen of viscosity grade complying with Indian Standard Specifications for "Paving bitumen" IS:73:2006 of grade appropriate for the traffic and climatic conditions of the Project Highway. The heavily trafficked roads in hot areas may find harder grade bitumen more appropriate while pavements in mountainous regions subject to sub-zero temperatures during winter months carrying relatively lower traffic loads and subject to the phenomenon of "Frost Heave" may find less viscous bitumen resistant to fatigue and cold cracking more appropriate.

8.10 Storage of Materials

All materials shall be stored at proper places so as to prevent their deterioration or intrusion of foreign matter and to ensure the preservation of their quality and fitness for the work. Any material, which has deteriorated or has been damaged or is otherwise

considered defective after review by the Independent Engineer shall not be used in the works and shall be removed from site by the Concessionaire at his cost. Such materials shall not be made acceptable by any modifications.

8.11 Report to be submitted

The Concessionaire shall prepare and submit report containing test results of all materials and finished products proposed to be used in the Project Highway.

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SECTION - 9

TRAFFIC CONTROL DEVICES/ROAD SAFETY DEVICES/ROAD SIDE FURNITURE

SECTION - 9

TRAFFIC CONTROL DEVICES/ROAD SAFETY DEVICES/ ROAD SIDE FURNITURE

9.1 General

Traffic Control Devices/ Road Safety Devices/Road Side Furniture shall comprise of road signs, road markings, object markers, hazard markers, studs, delineators, attenuators, safety barriers, pedestrian guard rails, boundary stones, kilometre stones, etc. Guidelines given in IRC:8, IRC:25, IRC:26, IRC:35, IRC:67, IRC:79, IRC:103 and Section 800 of MORTH Specifications shall be used for providing these items unless otherwise specified in this Section.

9.2 Road Signs

The three types of road signs viz., mandatory/regulatory signs, cautionary/warning signs and informatory signs shall be provided as given in IRC:67 and Section 802 of MORTH Specifications. Proper signs shall be provided for left in and left out at service roads for safe guidance of traffic. Clustering and proliferation of road signs shall be avoided for enhancing their effectiveness.

9.2.1 The material and specifications for Road Signs shall be governed by the Specifications for Road and Bridge Works issued by the MORTH.

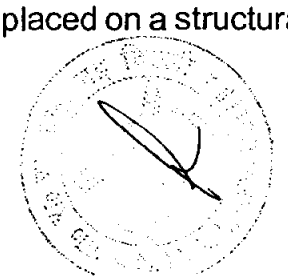
9.2.2 There shall be corresponding road markings with stop signs, give way signs, merging or diverging traffic signs, lane closed signs, road narrowing signs, slip roads/ diversion signs, compulsory keep left/right signs, or any other signs as per IRC:67.

9.2.3 Wherever the Project Highway alignment is on a curve, there shall be advance cautionary signs for sharp curves (depending on whether it is on left or right) and chevron signs (rectangular in shape with traffic yellow background and black arrow) at the outer edge of the curve. The sign for the curve ahead particularly in mountainous and steep terrain shall always be accompanied with chevron signs at the outer edge of the curve and appropriate delineation.

9.2.4 The Specifications and Standards of roads signs such as chevron, overhead, etc., which are not covered by IRC:67 would be as per International Standards.

9.2.5 All road signs shall be with retro-reflective sheeting of high intensity grade with encapsulated lens fixed over aluminium sub-strata as per Clause 801 of MORTH Specifications.

9.2.6 Kerb mounted signs shall be supported on GI pipes. Overhead signs shall be placed on a structurally sound gantry or cantilever structure made of GI pipes. Its height,



lateral clearance and installation shall be as per MORTH Specifications. The pedestal supporting the gantry or cantilever structure of the overhead signs shall be flushed at the ground level and in no case shall protrude more than 150 mm above ground level.

9.2.7 Locations and size of overhead traffic signs shall be specified in Schedule 'B' of the Concession Agreement. The following conditions may be considered while deciding about the locations of overhead signs:

i) Traffic volume at or near capacity,

ii) Restricted sight distance,

iii) Built-up stretches,

iv) Insufficient space for ground mounted signs,

v) Distances of important places and route highways at suitable intervals,

vi) Before major intersections.

9.2.8 No sign, signal or any other device erected for traffic control, traffic guidance and/or traffic information shall obscure any other traffic sign. Further, the signs and signals shall not carry any advertisement.

9.2.9 Each exit ramp shall have signs mounted on posts indicating the name of the place and the important roads it would lead to.

9.3 Road Markings

All road markings shall conform to IRC:35. Road markings shall comprise of carriageway markings, markings on intersections, hazardous locations, parking areas, etc. Where service roads are provided, proper layout and road markings shall be ensured so that merging with traffic is safe. The markings shall be done by means of a self propelled machine which has a satisfactory cut-off value capable of applying broken line automatically.

9.3.1 Material

i) Hot applied thermoplastic paint with glass beads shall be used as road marking material.

ii) Road markings may also be in the form of prefabricated sheet material, e.g. plastic sheets, which may be set into the pavement with upper surface flush with the pavement surface.

9.4 Road Delineators

These are roadway indicators, hazard markers and object markers as given in IRC:79.

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9.4.1 Roadway indicators

Circular Iron Posts of 1.0 m height covered with reflectorised synthetic material/film, as per criteria, placement and spacing given in IRC:79 shall be provided.

9.4.2 Hazard Markers shall be provided as given in IRC:79. In addition, the objects close to the road shall be painted with black and yellow stripes using the paint conforming to IS:164.

9.4.3 Object Markers shall be provided as given in IRC:79. In addition, the kerbs in the medians/traffic islands shall be painted with black and white stripes (black and yellow stripes at highly hazardous locations) using the paint conforming to IS:164.

9.4.4 Lighted Bollards shall be provided in the median/traffic islands of all major/ minor junctions as per International Standards.

9.5 Raised Pavement Markers (Cat's Eyes/Road Studs)

The cat's eyes or road studs shall be provided to improve the visibility in night-time and wet-weather conditions. These shall be prismatic retroreflective type two way markers conforming to ASTM D 4280 and provided as per Table 9.1.

9.6 Attenuators

Attenuators shall be provided at hazard markers locations given in IRC:79, structural columns of large direction signs, illumination lamp posts and at approaching traffic islands of toll plaza. It shall take repeated impacts without any additional recovery procedures and with minimal or no repairs. The attenuators modules shall be moulded from HDPE plastic. The design, size, number of modules, etc. of attenuators shall be as per International Standards and location specific duly considering the likely impact.

9.7 Road Side and Median Safety Barriers

There are two types of safety barriers viz., roadside safety barriers, and median safety barriers.

Table 9.1 Warrants for Road Studs

S. No.	Description of sections	Length of section to be provided with studs	Spacing of studs	Location of studs
1	All sections of Project Highway having radius of horizontal curve below 700 m	Length of horizontal curve including its transitions	5 m	Centre of the carriageway
2	All sections of Project Highway where vertical grade is steeper than 5 percent	Till the grade comes to 5 percent	5 m	Centre of the carriageway

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S. No.	Description of sections	Length of section to be provided with studs	Spacing of studs	Location of studs
3	All major/minor junctions and median openings	(i) 100 m on either side of the junction/median opening (approaching side)	5 m	Centre of the carriageway
		(ii) Three Rows of studs at a spacing of 0.15 m	0.15 m	across the main carriageway and the cross roads (approaching side 50 m before the junction/median opening)
4	All built-up areas	Length of built-up area	5 m	Centre of the carriageway
5	Uncontrolled Pedestrian Crossings	One row of studs across crossings the main carriageway		

Note :

1. Solar Studs shall be provided for locations at S. No. 3 (i) and 5 in Table 9.1.
2. White colour road studs shall be used at locations where lane marking in white colour is prescribed in

   IRC:35 - Amber colour shall be used at locations where lane marking in amber colour is prescribed in

   IRC:35 - Red colour may be used to indicate no entry (like contraflow side).

9.7.1 Road side safety barriers

i) **Warrants:** The longitudinal roadside barriers are basically meant to shield two types of roadside hazards i.e. embankments and roadside obstacles and also for preventing the vehicles veering off the sharp curves. The warrants for a fill section in terms of the height and slope needing protection with roadside barriers are shown in Fig. 9.1. The barrier is not warranted for embankment having a fill slope of 3H:1V or flatter. The warrants for roadside objects are mainly dependent upon the type of obstacle and the probability of their being hit. A barrier shall be installed only if the result of vehicle striking the barrier is likely to be less severe than the severity of accident resulting from the vehicle impacting the unshielded obstacle. Some of the commonly encountered roadside obstacles are bridge piers, abutments and railing ends, roadside rock mass, culverts, pipes and headwalls cut slopes, retaining walls, lighting supports, traffic signs and signal supports, trees and utility poles.

ii) **Types of Roadside Safety Barriers**

There are three types of longitudinal roadside safety barriers viz:

a) Flexible type (like wire rope fencing)

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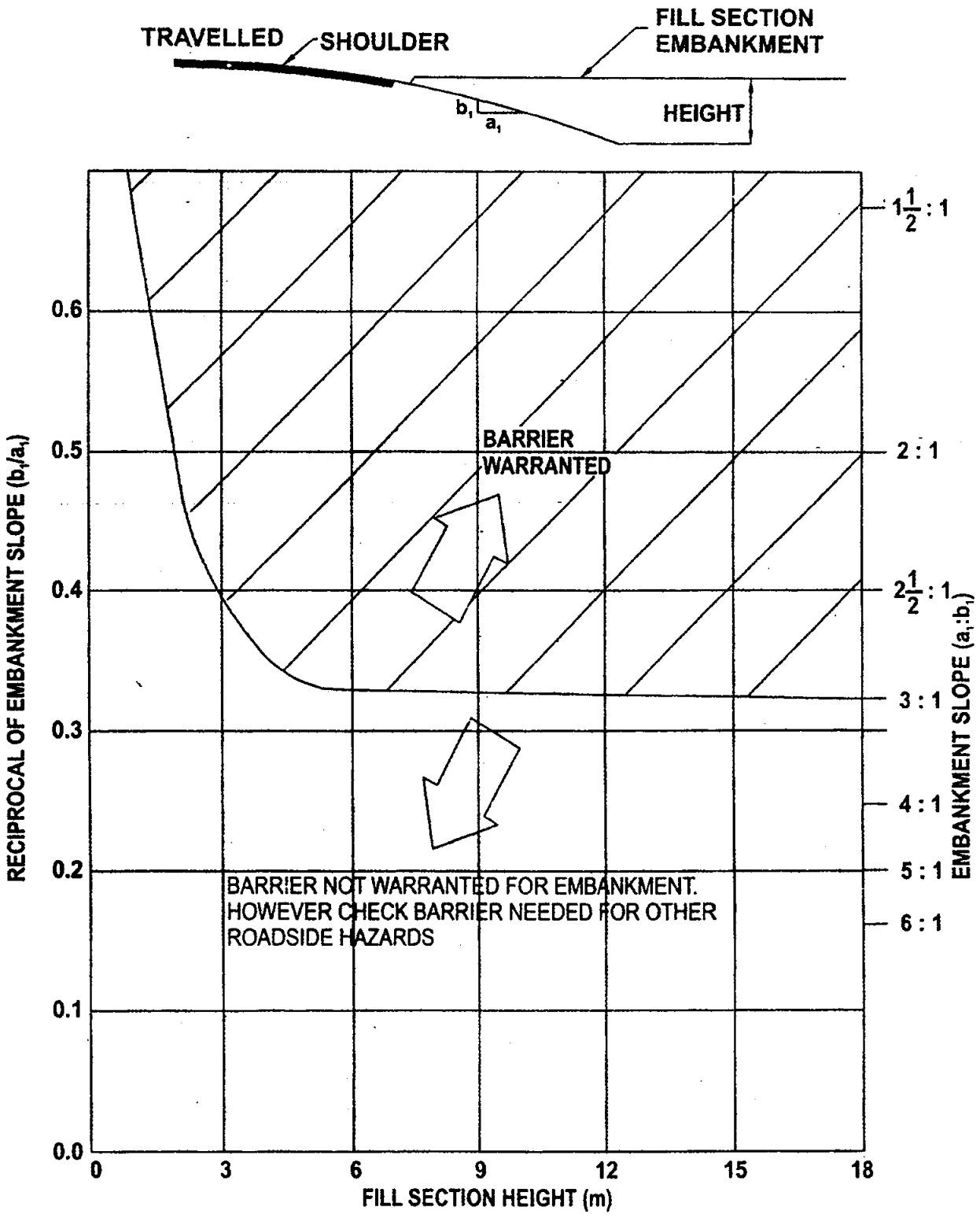

Fig. 9.1 Warrants for Roadside Barriers on Embankments

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b) Semi-rigid type like

- "W' beam type steel barrier
- Thrie beam type steel barrier

These steel barriers are of strong post type and usually remain functional after moderate collisions thereby eliminating the need for immediate repair.

c) Rigid type (like concrete crash barriers)

iii) **Road Side Steel Barriers**

a) **Design Aspects :** The "W" beam type safety barrier consists of steel posts and a 3 mm thick "W" beam rail element which is spaced away from the posts. The spacer minimizes vehicular snagging and reduces the likelihood of a vehicle vaulting over the barrier. The steel posts and the blocking out spacer shall both be channel section of 75 mm x 150 mm size and 5 mm thick. The rail shall be 700 mm above ground level and posts shall be spaced 2 m center-to-center. Typical details are shown in Fig. 9.2.

The thrie beam safety barrier shall have posts and spacers similar to the ones mentioned above for "W" beam type. The rail shall be placed at 850 mm above the ground level. This barrier has higher initial cost than the "W" beam type but is less prone to damages to vehicle collisions especially for shallow angle impacts. Typical details of Thrie beam barrier are shown in Fig. 9.3.

The "W" beam, the Thrie beam and the posts spacers and fasteners for steel barriers shall be galvanized by hot dip process.

b) **End treatment for steel barrier :** An untreated end of the roadside barrier can be hazardous, if hit, because the barrier beam can penetrate the passenger compartment and cause the impact vehicle to stop abruptly. End treatments should, therefore, form an integral part of safety barriers and the end treatment not spear vault or roll a vehicle for head on or angled impacts. The two end treatments recommended for steel barriers are "Turned down guardrail and Anchored in back slope".

Turned down guardrails have the "W" or Thrie sections reduced from full height to ground level with a gentle slope over a distance of 8 to 9 m. The turned down rail is intended to collapse on impact allowing the vehicle to pass over it without becoming airborne or unstable. In order to locate the barrier terminal away from the traveled way and to minimize drivers' reaction to a hazard near the road by gradually introducing a parallel barrier installation or to transition a roadside barrier nearer the roadway such as a bridge parapet or a railing, the turned down rail shall be flared away from the roadway. Suggested flare rates depending upon the design speed and type of barrier are given in Table 9.2.

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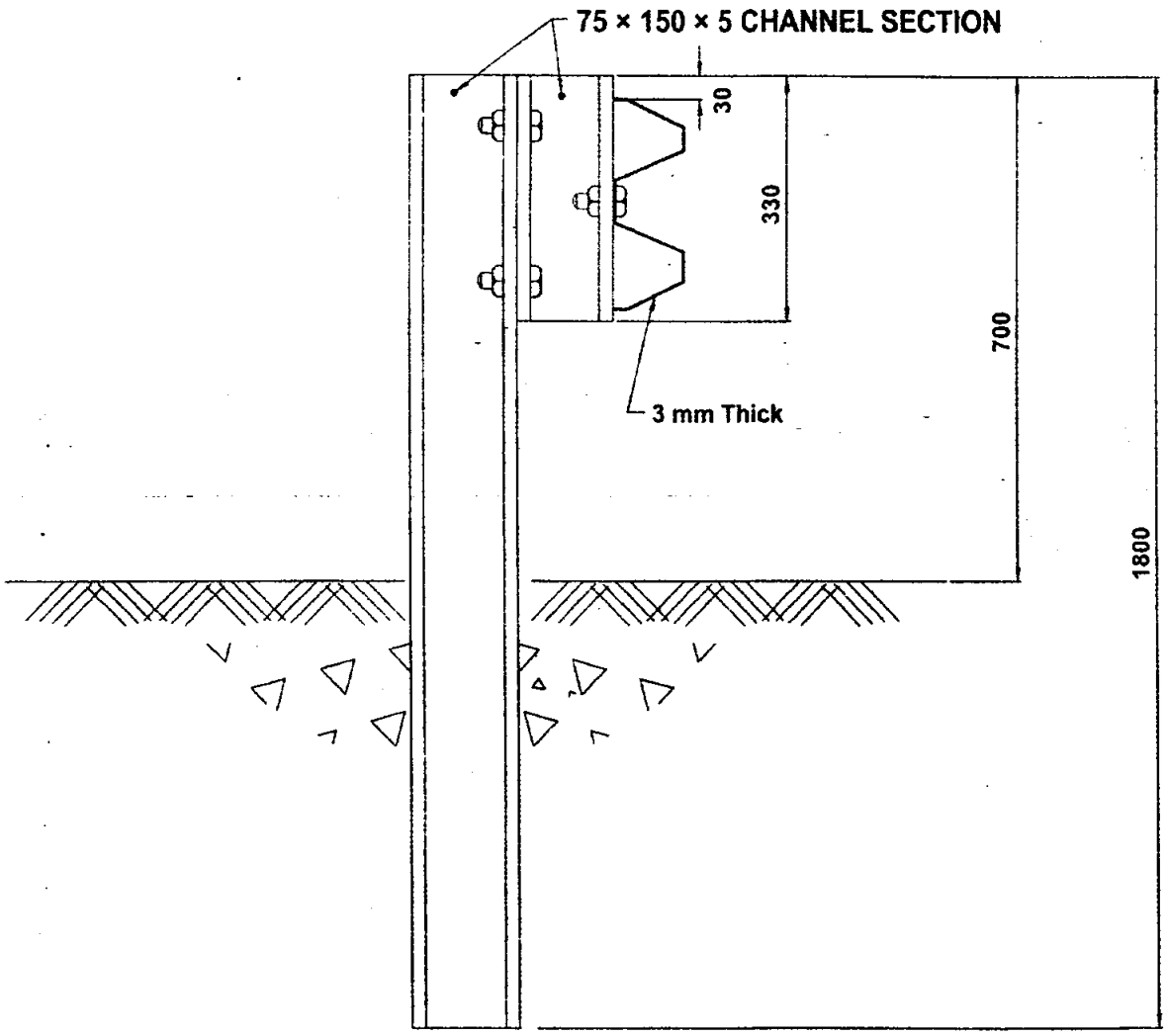

Fig. 9.2 Typical Details of "W" Beam Section

Note :- All dimensions are in mm

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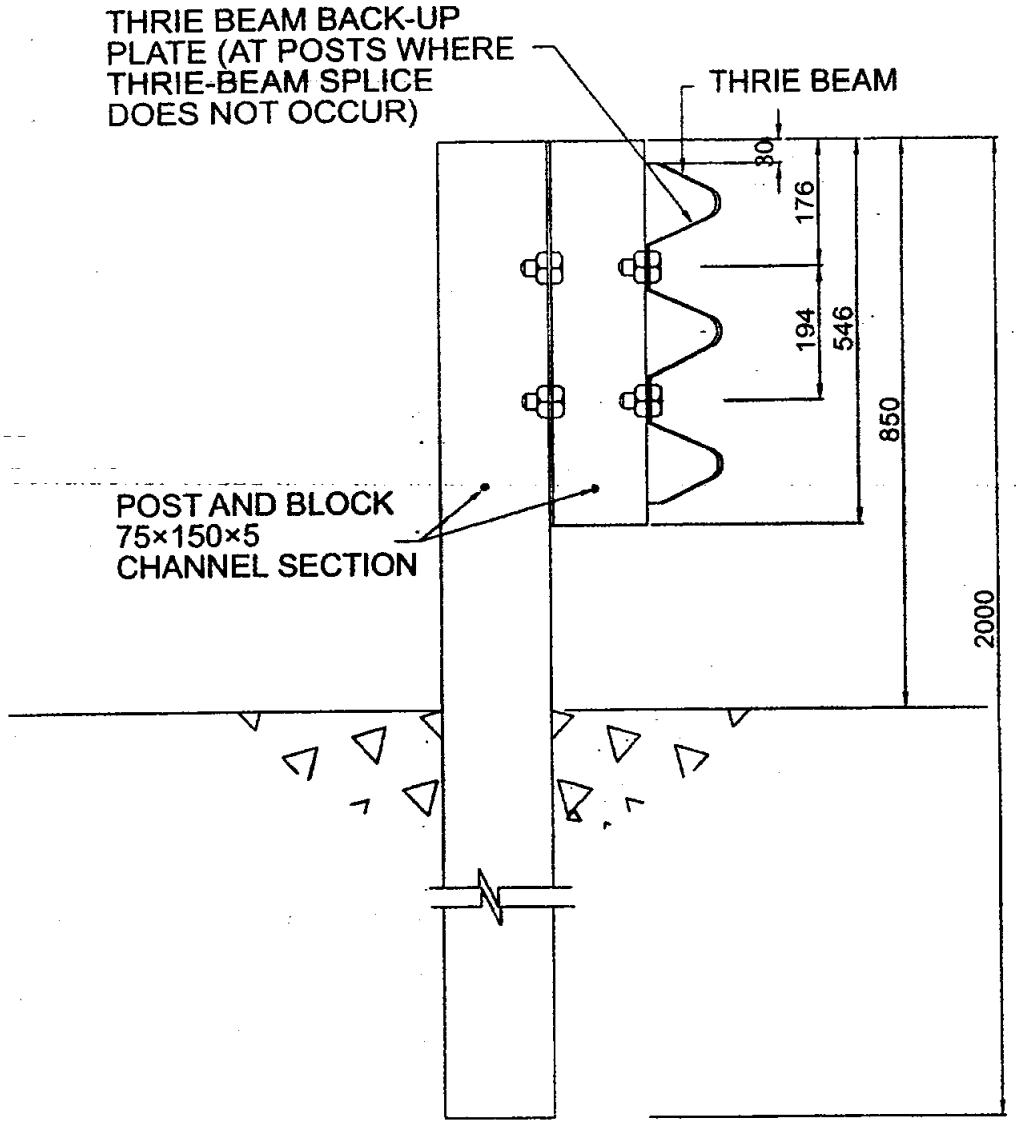

Fig. 9.3 Typical Details of Thrie Beam Section

Note :- All dimensions are in mm

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Table 9.2 Flare Rates

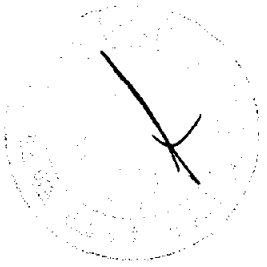
Design speed in km per hour	Flare Rates	
	Rigid barriers	Semi-rigid barriers
100	17:1	13:1
80	14:1	11:1
60	11:1	9:1
40	8:1	7:1

The posts in the end treatment should have the same cross-sections as provided in the main barrier.

At road cross-sections in cutting or if the road transitions from cut to fill, the safety barriers can be anchored in back slopes. The back slope covering the anchored portion of the barrier should be graded flat with side slopes preferably not steeper than 10:1. The anchored portion should develop a tensile strength in the rail element to prevent the rail from pulling out of the anchorage. The barrier can also be anchored in an earth berm specially constructed for this purpose provided the new berm itself is not a hazard to the traffic. The earth berm should be made impervious to erosion.

c) **Placement :** Placement recommendations determine the exact layout of the barrier and shall be made by the design engineer keeping in view the lateral offset of the barrier and flare rate. The final layout shall be a site-specific combination of these factors. The barriers shall be as far away from the traffic as possible and shall preferably have uniform clearance between the traffic and the hazard.

As far as possible the safety barrier shall be placed beyond 2.5 m of the traveled way. For long and continuous stretches, this offset is not critical. The distance between the barrier and the hazard shall not be less than the deflection of the barrier by an impact of a full sized vehicle. In case of embankments, a minimum distance of 600 mm shall be maintained between the barrier and the start of embankment slope of a hazard to prevent the wheels from dropping over the edge. Typical details are shown in Fig. 9.4.



Flatter flare rates may be used particularly where extensive grading would be required to ensure a flat approach from the traveled way subject to the availability of right of way.

iv) **Road Side Concrete Barriers**

a) **Design Aspects :** Roadside Concrete safety barriers are rigid barriers having a sloped front face and a vertical back face. The

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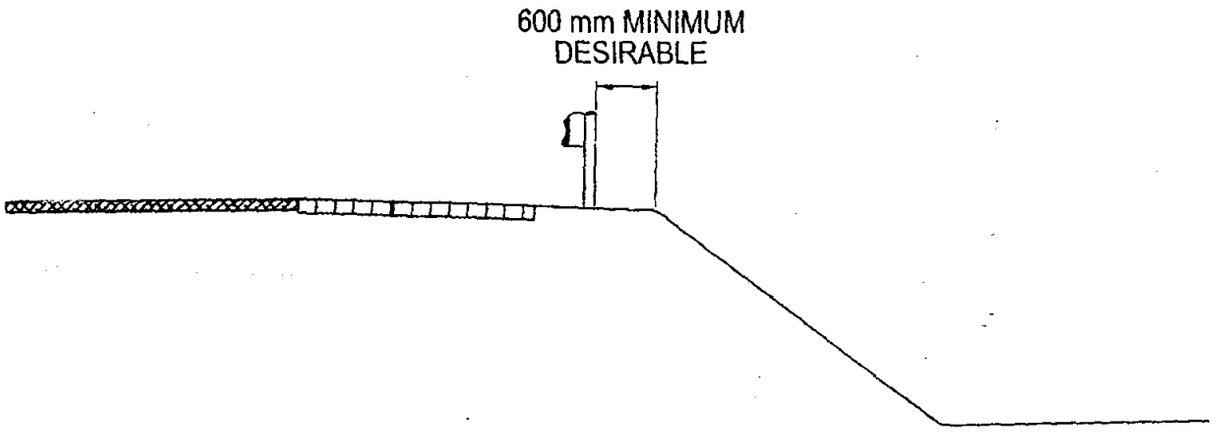

Fig. 9.4 Recommended Barrier Placement

recommended designs of the cast-in-situ and precast barriers are shown in Fig. 9.5 and 9.6 respectively. Based on evaluation of vehicle direction, sight distance, structural stability and the psychological effect of barrier height on driver reaction, the most desirable height of the median barrier is 800 mm. Variations upto 50 mm in height of barrier can be made in the total height of the barrier to meet the site requirements. It is, however, important to maintain the height of lower slope between 200 mm and 350 mm so as to reduce the chances of overturning of the vehicles.

The concrete barrier may be precast in lengths of upto 6 m depending upon the feasibility of transport and lifting arrangements. Concrete grade for the barriers shall not be leaner than M30. The minimum thickness of foundations shall be 25 mm thick cement concrete or hot mix asphalt placed at the base of barrier to provide lateral restraint. Where more than 75 mm thick overlay on the road pavement is anticipated, the foundation step may be increased to 125 mm. However, longitudinal roadside concrete barrier should have elaborate footing design which is structurally safe unless sufficient earth support is available.

b) **End Treatment :** Safety barrier shall be provided with an end treatment, which shall be obtained by tapering the height of terminating end of the median barrier within a length of 8 m to 9 m.

c) **Placement :** Placement recommendations for roadside steel barriers, mentioned in para 9.7.1 (iii) (c) above are applicable to concrete barriers as well.

9.7.2 Median barriers

i) **General :** Head-on-collisions, especially on highways with narrow medians, caused by out-of-control vehicles jumping across the medians

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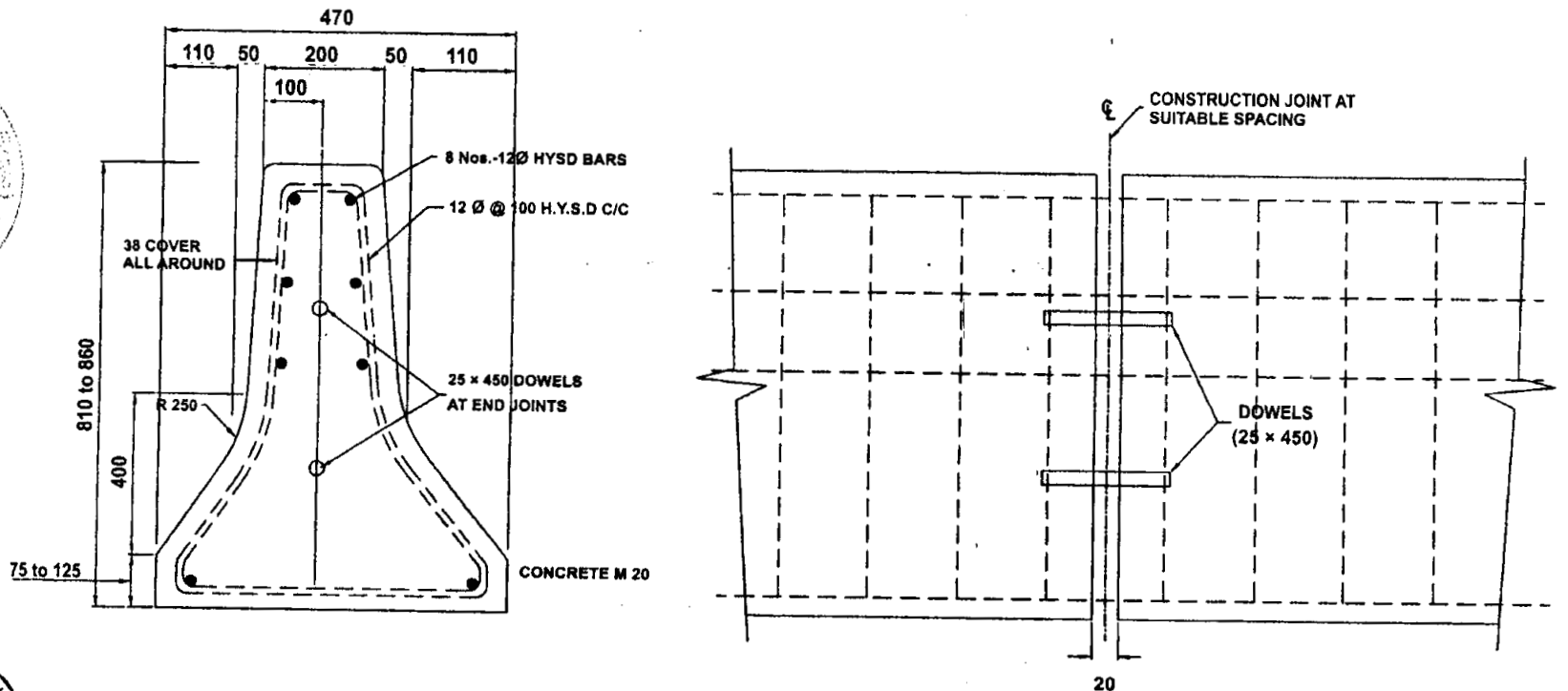

Fig. 9.5 Road Side Barrier Cast-in-Situ Design

NOTE:-

1. HYSD - High yield strength deformed reinforcement
2. All dimensions are in mm

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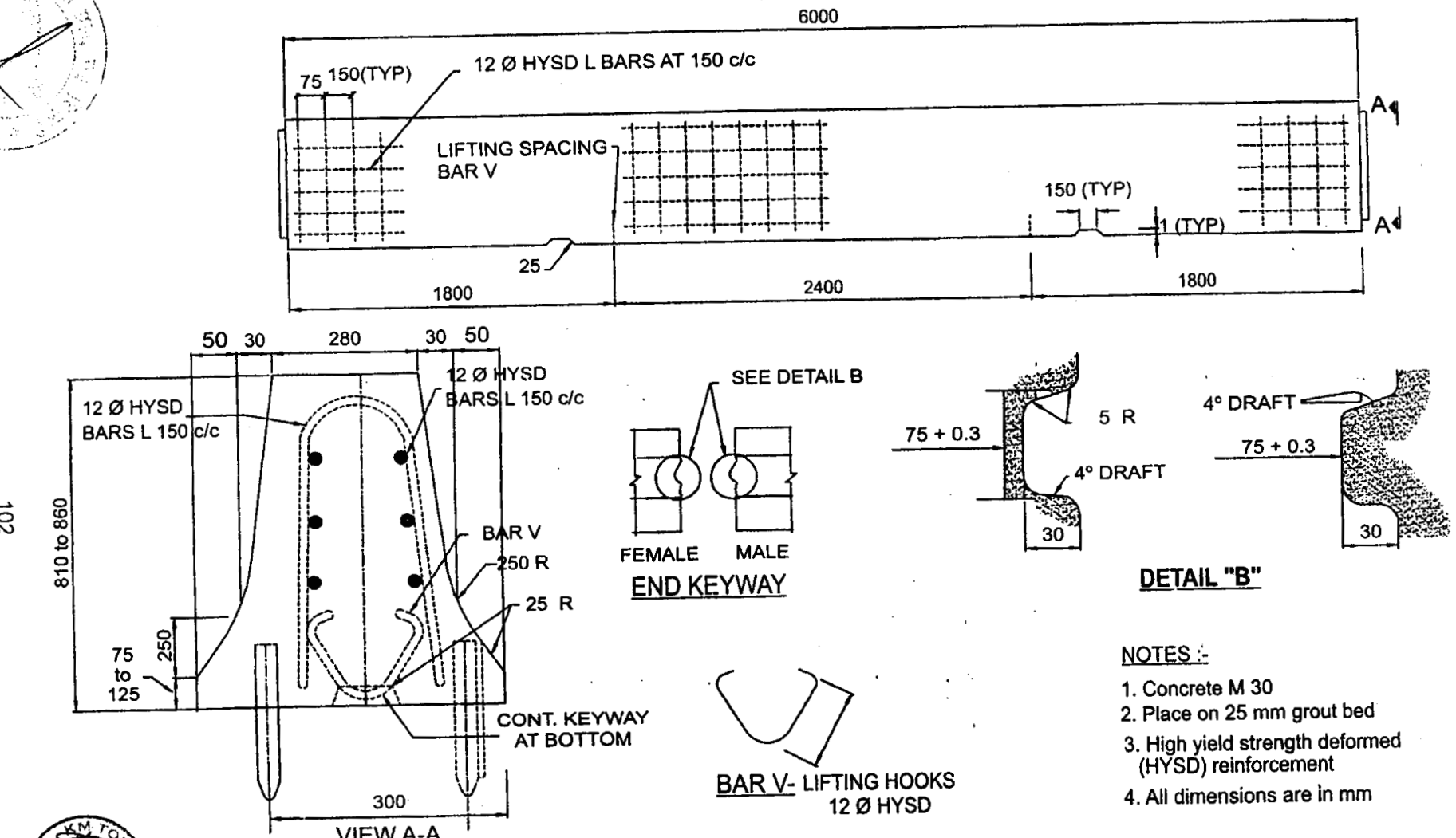

NOTES :-

1. Concrete M 30
2. Place on 25 mm grout bed
3. High yield strength deformed (HYSD) reinforcement
4. All dimensions are in mm

Fig. 9.6 Road Side Barrier Precast Design

are a major source of accidents. Fixed objects on medians also require shielding from the traffic flow. Provision of median safety barrier in such conditions is an important requirement.

ii) **Warrants :** The requirement of a median barrier is a function of the width of the median and the traffic volume on the road. Fig. 9.7 indicates the warrants for provision of median barriers in terms of the combination of median width and Average Daily Traffic (ADT) in PCUs. At ADT less than 20,000 PCUs and with medians wider than 9 m, the probability of a vehicle crossing across the median is relatively low and median barriers in such cases are optional. Medians with width between 9 m and 15 m do not warrant a barrier unless there is an adverse history of median crossovers.

Median barriers may be impractical where a road has a large number of closely spaced median openings since the barrier needs to be terminated with an end treatment at these points.

An evaluation of the number of median openings, accident history, alignment, sight distance, design speed, traffic volume and median width shall be made prior to taking a decision to install a median barrier.

Median barriers shall also be provided to shield fixed objects in a narrow median. If necessary, median barriers shall be flared to encompass a fixed object, which may be a lamp post, foundation of overhead signs, bridge pier etc.

iii) **Types of Median Barriers :** There are three types of median safety barrier viz., "W' beam type steel barrier, (Strong post type), Thrie beam type steel barrier, (Strong post type) and Concrete barriers

a) **Steel Median Barriers**

Design Aspects : The "W' beam barrier shall be similar to the roadside barrier described in Para 9.7.1 (iii) (a) above except that the "W' beam shall be provided on both sides of the post with similar spacers. Typical details are indicated in Fig. 9.8.

The Thrie beam barrier shall be similar to the roadside barrier described in Para 9.7.1 (iii) above except that the Thrie beam shall be provided on both sides of the post with similar spacers. Typical details are shown in Fig. 9.9.

End Treatment : Steel median barriers shall be provided with a "Turned-down-guardrail" end treatment as described in Para 9.7.1 (iii) (b) above except that no flaring is to be provided.

Placement : At locations, where the two adjacent carriageways are at the same level, the barrier shall be placed in the center of the median, duly taking into consideration, the drainage requirements. The placement of median barriers in cases where the two

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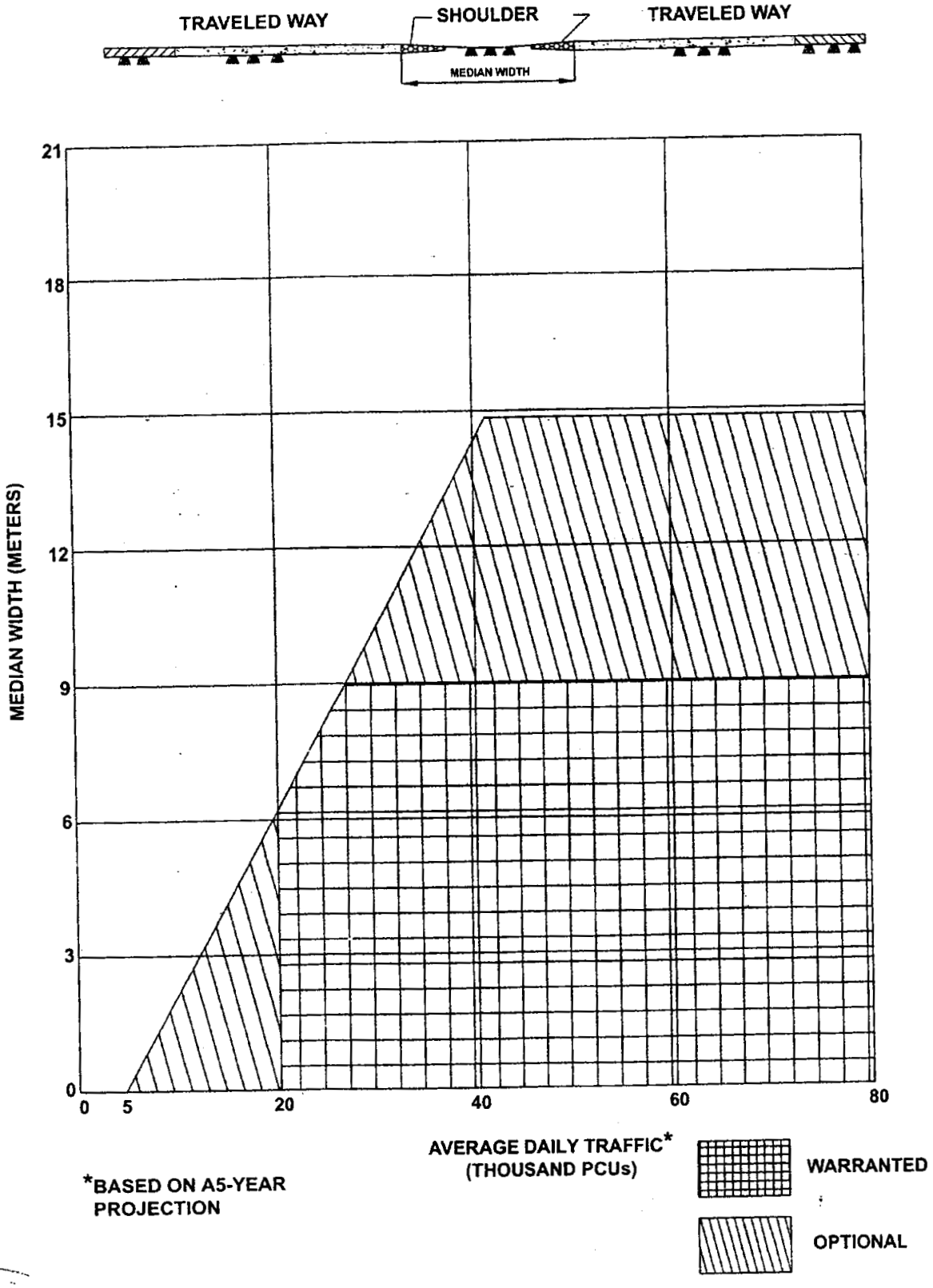

Fig. 9.7 Median Barrier Warrants

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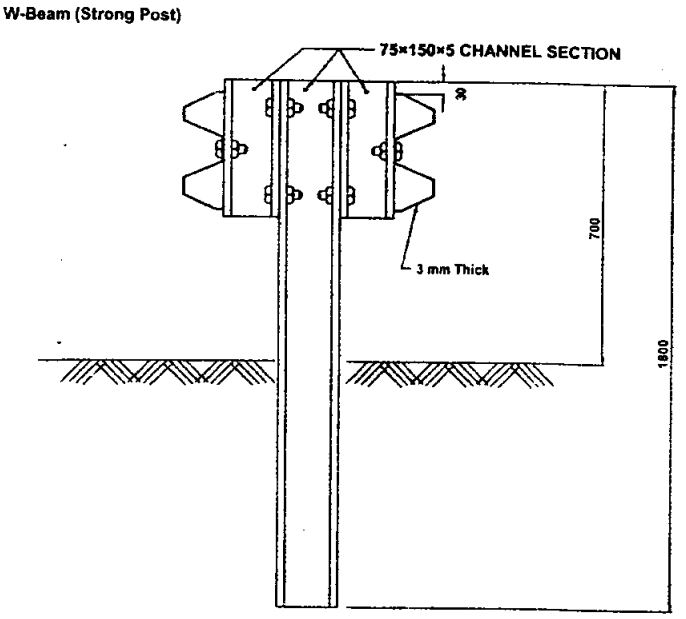

Fig. 9.8 Typical Details of "W" Beam Median Barrier

Note :- All dimensions are in mm

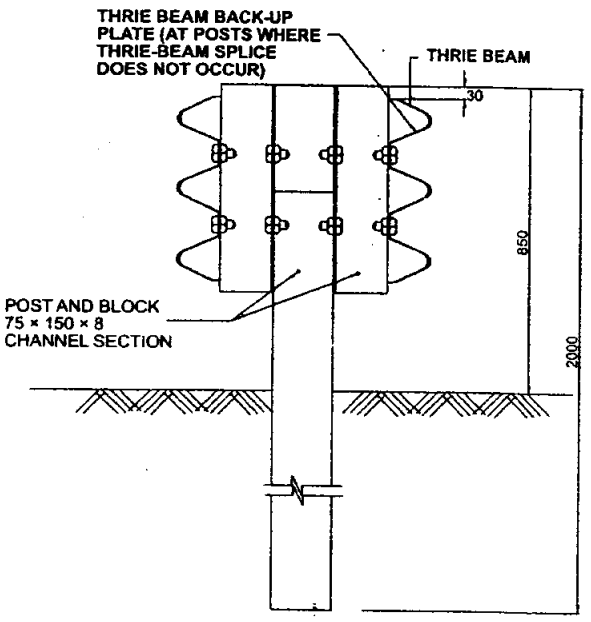

Fig. 9.9 Typical Details of Thrie Beam Median Barrier

Note :- All dimensions are in mm

carriageways are at different levels is a function of the slopes between the two medians. Recommended placement for various combinations is indicated in Fig. 9.10. In case the median barriers need to be flared e.g. for the protection of supports to overhead signs, the flare rates given in Table 9.2 shall be followed.

b) **Concrete Median Barriers**

Design Aspects : The design of cast-in-situ and precast median barriers is indicated in Fig. 9.11 and 9.12.

Median barrier shall be terminated sufficiently away from the median opening with the twin objectives of preventing impact by the turning traffic and providing adequate sight distance to the turning traffic. The terminating end of the median barrier shall be tapered in a length of 8 to 9 m.

Placement : Placement recommendations for steel median barriers mentioned in Para 9.7.2 (iii) (a) above apply to concrete median barriers also.

iv) **General**

Raised kerbs or drains shall not be provided between the traveled way and the barriers. These destabilize the vehicle balance and disturb its equilibrium before it strikes the barrier, thus defeating the essential purpose of safety and redirection of the impacting vehicle. Steel barriers shall be provided in rural sections whereas concrete barriers shall be provided in built-up sections. In addition to the warrants given in Para 9.7.1 (i) and 9.7.2 (ii) above, the safety barriers shall also be provided at the following locations :

a) Where embankment is retained by a retaining structure.

b) On valley side of highway in mountainous and steep terrain.

c) Between main carriageway and footpath in bridges.

d) At hazardous locations identified in Schedule 'B' or through safety audit.

The requirements of Safety Barriers for structures are given in Para 7.17 of this Manual.

9.8 Road Boundary Stones (RBS)

Road boundary stones shall be provided at the boundary on both sides of the Right of

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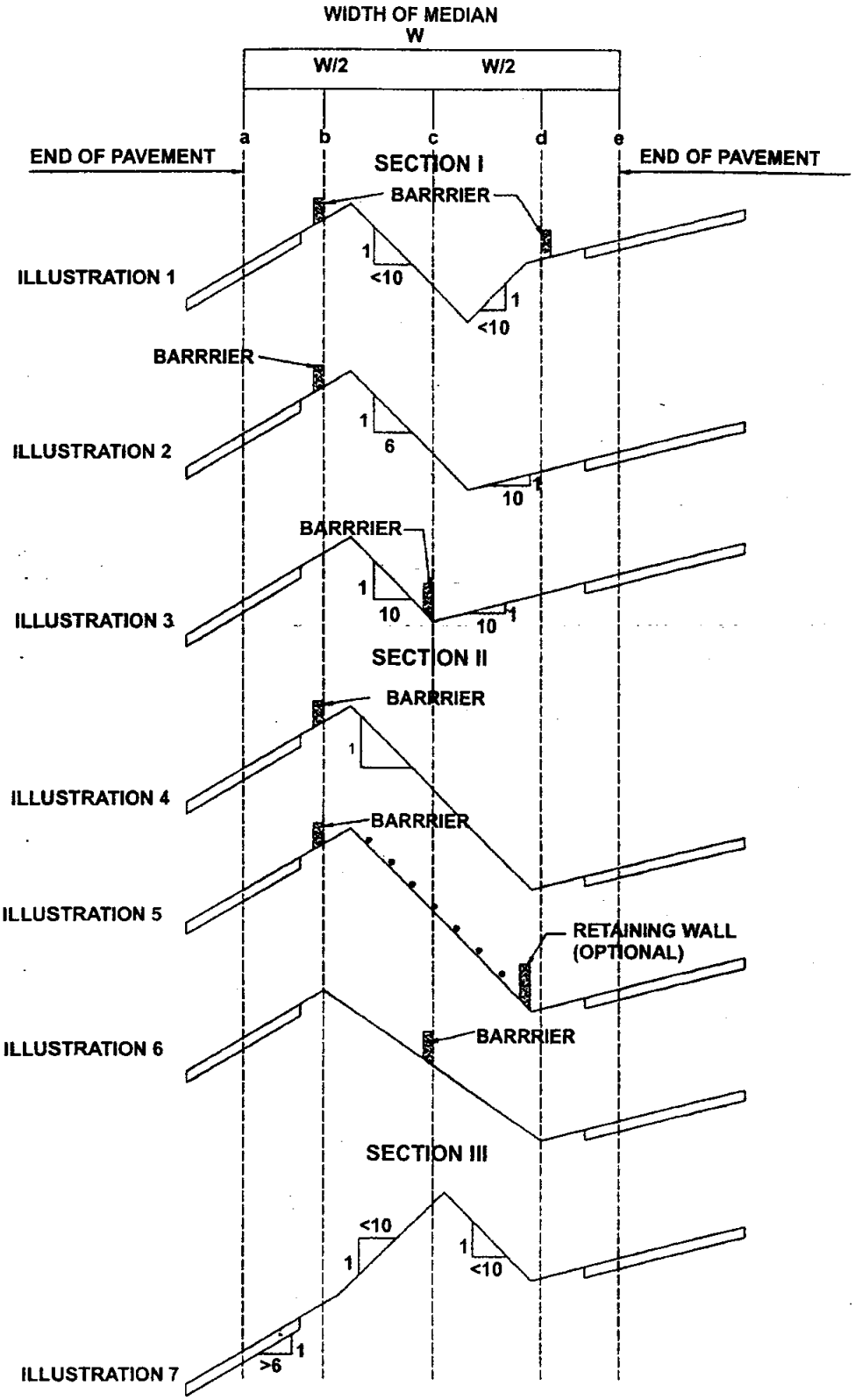

Fig. 9.10 Recommended Median Barrier Placement in Non-level Median

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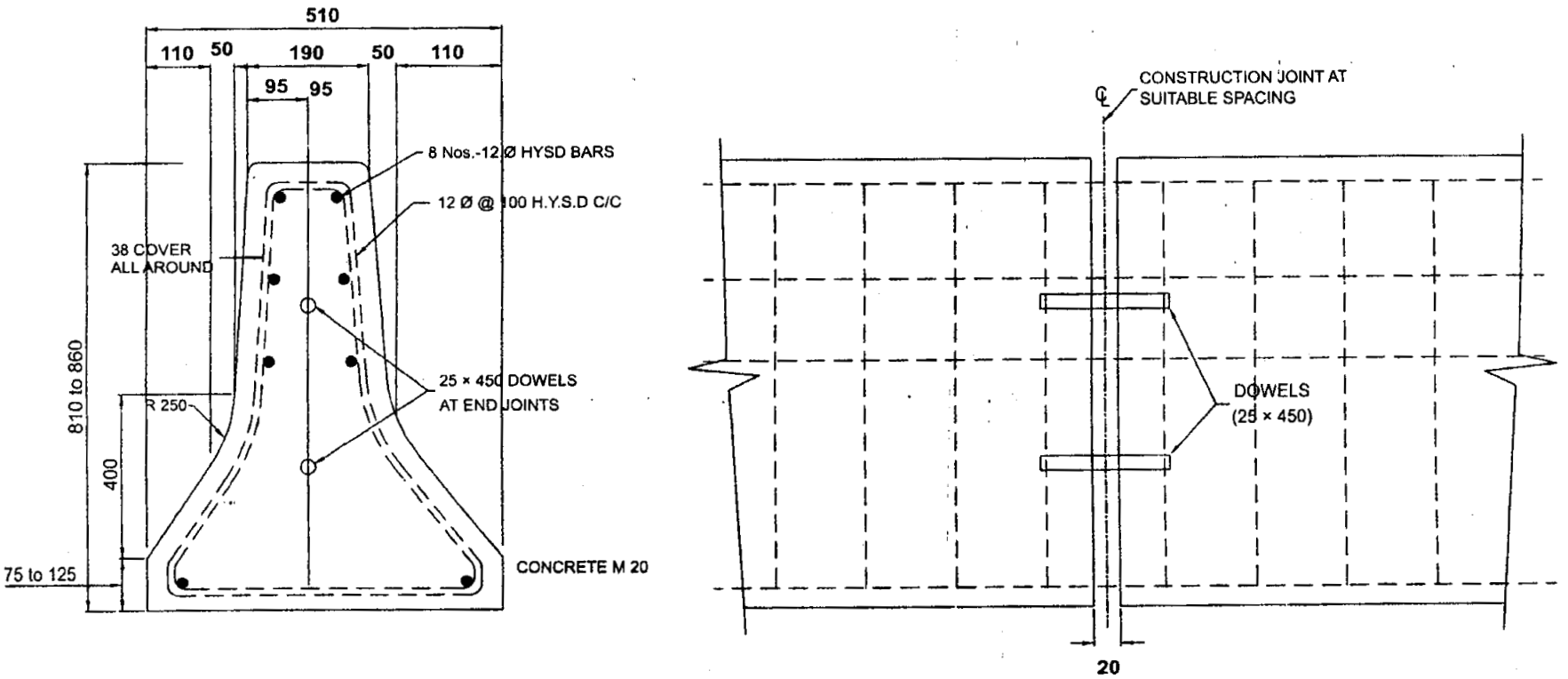

Fig. 9.11 Median Barrier Cast-in-Situ Design

NOTE :-
1. HYSD - High yield strength deformed reinforcement
2. All dimensions are in mm

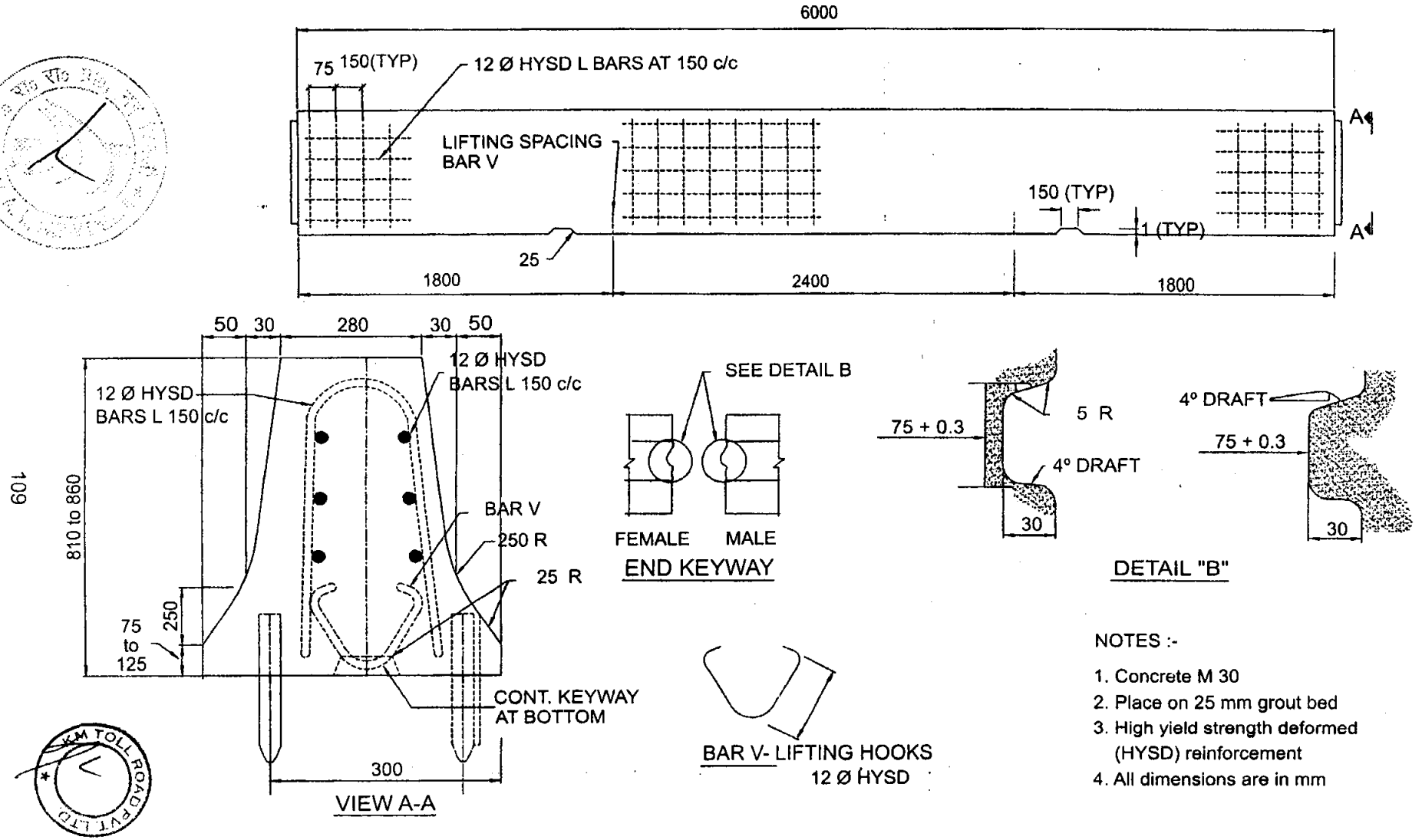

Fig. 9.12 Median Barrier Precast Design

Way. These shall be spaced at 200 m. The boundary stones shall be of cement concrete as per Type Design given in IRC:25. The boundary stones shall be painted with cement primer and enamel paint and marked 'RBS' by paint.

9.9 Kilometre and Hectometre Stones

i) The kilometre stones shall be provided at each kilometre on both sides of the Project Highway. The design and specification of kilometre stones shall conform to IRC:8. The matter to be written on various kilometre stones and the pattern thereof shall be as specified in IRC:8.

ii) Hectometre (200 m) Stones shall be provided at every 200 m distance on both sides of the Project Highway. The design and specification of 200 m stones shall conform to IRC:26. The matter to be written on the 200 m stones shall be as specified in IRC:26.

9.10 Pedestrian Railings/Guard Rails

Pedestrian Guardrails of iron/steel sections shall be provided as per IRC:103. The iron/steel guard rails shall be finished with epoxy primer and two coats of synthetic enamel paint after sand blasting (appropriate corrosion protection layer shall be provided in corrosive environment). In case iron/steel sections are not suitable in corrosive environment even after providing corrosion protection layer, concrete guard rails as per IRC:103 shall be provided in those sections.

9.11 Solar Based Beacons or Flashing Signals

These shall be provided at uncontrolled pedestrian crossings; near the public gathering places like educational institutions, worship places, hospitals, etc. cross roads; and median opening locations.

9.12 Design Report

The Concessionaire shall submit the proposals for traffic control/road safety devices and road furniture together with drawings and details to the Independent Engineer for review and comments, if any. The proposals shall include type, location, material specifications, installation details and the requisite warranties for satisfactory field performance (as applicable).

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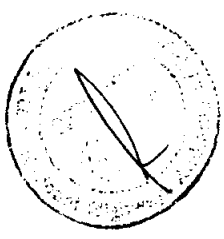
SECTION - 10

TOLL PLAZAS



SECTION - 10

TOLL PLAZAS

10.1 General

The Concessionaire shall provide the Toll Plazas at the locations specified in Schedule 'C' for collection of toll/fee as per the Concession Agreement. The fee collection system shall be speedy, efficient and user friendly. The design of the Toll Plazas should be such that they are aesthetically pleasing and efficient and the fee collection staff should be quick, courteous and adequately trained before deployment.

10.2 Location of Toll Plaza

The location of toll plaza shall be indicated in Schedule 'C' of the Concession Agreement. Their locations shall be decided keeping in view the following factors:

i) Land availability

ii) Stream of traffic on Toll Plaza

iii) Visibility for the approaching traffic

iv) Reasonably away from road intersections and/or rail crossings

v) Free from risk of flooding and submergence, etc.

vi) Preferably on flat land and away from congested urban locations.

10.3 Land for Toll Plaza

Adequate land for Toll Plaza shall be acquired to permit the provision of toll lanes for a projected peak hour traffic of 20 years subject to a minimum number of 16 toll lanes including all other buildings and structures to be accommodated at the Toll Plaza location. Land shall be acquired as per provisions of the Concession Agreement.

10.4 Lay out and Design of Toll Plaza

10.4.1 Typical layout of 5+5 toll plaza is given in Fig. 10.1. The layout shall provide for future expansion of toll lanes. Stage construction of Toll Plaza in respect of number of toll lanes shall be allowed. However, other structures as envisaged in the Concession Agreement shall be provided at the initial stage itself.

10.4.2 Width of toll lane

The width of each toll lane shall be 3.2 m, except for the lane for over dimensioned vehicles, where it shall be 4.5 m.

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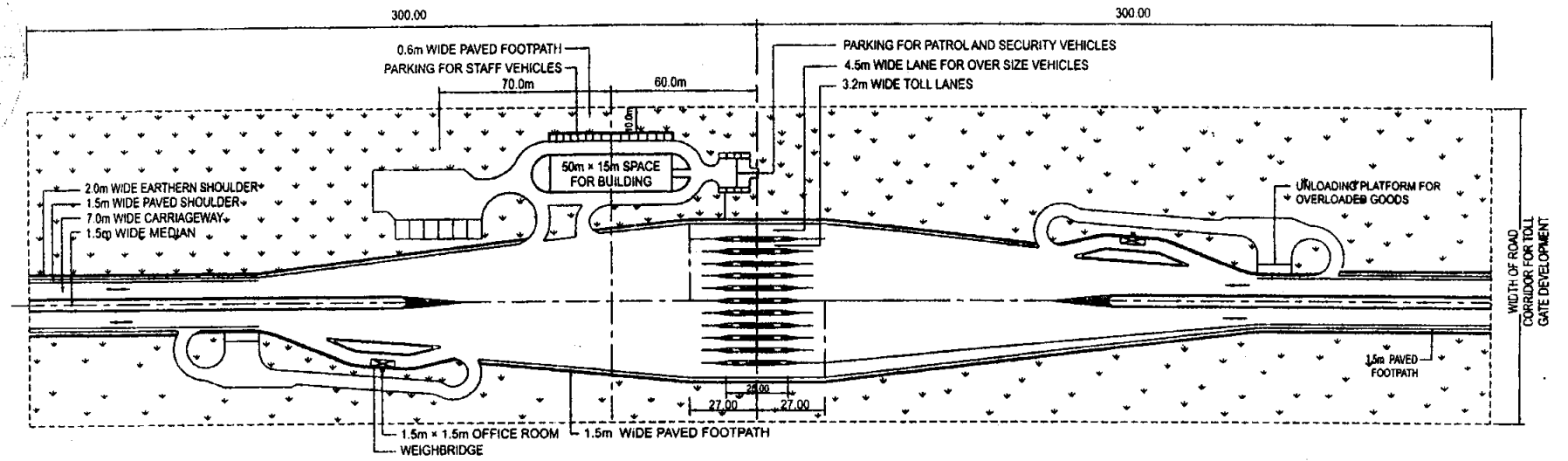

NOTE :-

DETAILED SYSTEM OF ROAD MARKING AS PER IRC:35

Fig. 10.1 Typical Layout for a Toll Plaza

10.4.3 Traffic islands at the toll plaza

Between each toll lane of the toll plaza, traffic islands are required to accommodate toll booth. These islands shall be of minimum 25 m length and 1.8 m width. Protective barriers of reinforced concrete and traffic impact attenuators shall be placed at the front of each island to prevent out of control approaching vehicles crashing into the toll booth. They would be painted with reflective chevron markings.

10.4.4 Toll booths

Toll booths may be provided of prefabricated materials or of masonry. The toll booths shall have adequate space for seating of toll collector, computer, printer, cash box, etc. It should have provision for light, fan and air conditioning. The typical details of traffic island with toll booth are given in Fig. 10.2.

Toll booth shall be placed at the centre of each traffic island. The toll booth shall have large glass window to provide the toll collector with good visibility of approaching vehicles. The bottom of the toll window should be placed at such a height (0.9 m) above ground level so as to provide convenience of operation. The toll booths shall be ergonomically designed and vandal proof. There shall be CCTV camera installed at each booth.

10.4.5 Tunnels

For the movement between toll office and toll booth of each toll lane, an underground tunnel across all toll lanes shall be provided. Its dimension would be sufficient to accommodate the required wiring/cable system and for convenient movement of personnel. It should also be provided with lighting and ventilation system so that the movement is convenient.

10.4.6 Transition

A transition of 1 in 20 to 1 in 10 may be provided from four-lane section to the widened width at Toll Plaza on either side.

10.4.7 Canopy

All the toll lanes and toll booths shall be covered with a canopy. The canopy shall be wide enough to provide weather protection to toll operators, drivers and facilities. The canopy shall be of aesthetically pleasing design with cylindrical support columns located at traffic island so that there is no restriction on visibility and traffic movement. The vertical clearance shall be as prescribed in this Manual.

10.4.8 Drainage

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The toll plaza shall be provided with surface and sub surface drainage system so that all

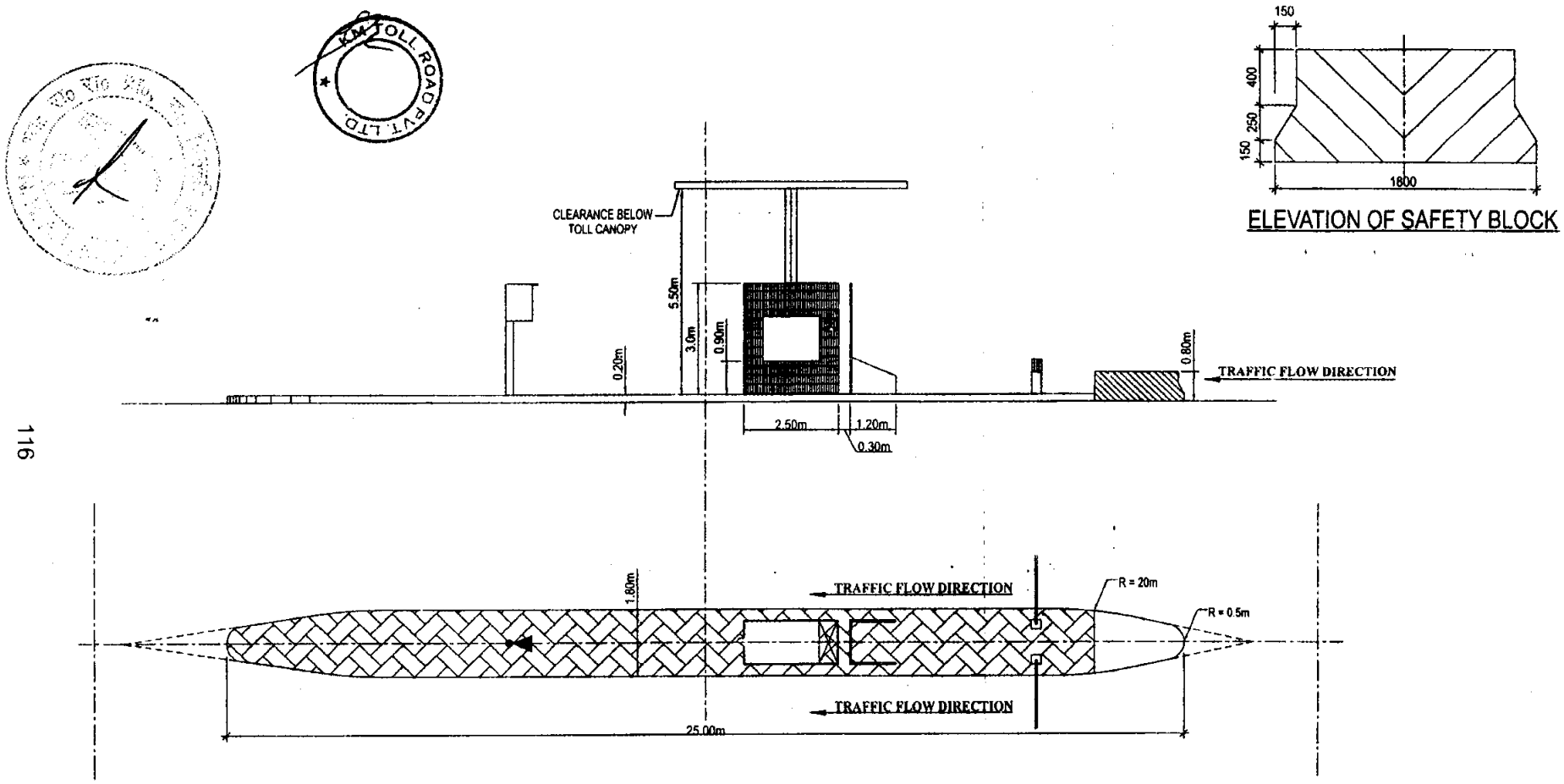

Fig. 10.2 Typical Layout for Traffic Island with Toll Booth

the storm water is drained off efficiently and no ponding or stagnation of water takes place at any area of the toll plaza.

10.4.9 Equipment for toll lanes

Each entry lane shall be equipped with a micro controller based Vehicle Counting-cum-Classifier Unit for counting the number of vehicles and their axle number and for identification of the category of vehicle. The semi-automatic toll collection system shall also have a ticket issuing machine for issue of the tickets for user fee at the press of a button on a touch panel and entry lane controller for controlling the equipment of the entry lane and for sending the data to the data processing equipment at Toll Plaza office. Each toll lane shall have electronically operated boom barrier along with synchronised system for traffic lights.

10.4.10 Electronic toll collection

The Electronic Toll Collection (ETC) system shall consist of an On Board Unit (with a Smart Card) fitted on a vehicle and a roadside antenna (Road Side Unit) to receive communication for identification of its code and other stored data and a system for transmitting data to and from the on board unit to the customer information management system through the road side unit.

10.4.11 Prevention of overloading

Toll plaza location shall also be provided with system for checking and preventing over-loading of vehicles at Toll Plaza. For this purpose, weigh in motion systems at approaches to each toll lane are to be installed. Separate space for static weigh bridge and area to hold off-loaded goods from overloaded vehicles shall be provided after the toll barriers for each direction of travel.

10.4.12 Number of lanes at toll plaza

The total number of toll booths and lanes shall be such as to ensure the service time of not more than 10 seconds per vehicle at peak flow regardless of methodology adopted for fee collection. For purpose of guidance following parameters are suggested as capacity of individual toll lane for design purpose:

i)	Semi-automatic toll lane (Automatic vehicle identification but manual fee transaction)	240 veh/hour
ii)	Electronic toll collection (ETC lanes) (Toll collection through on board unit and no stoppage of vehicles)	1200 veh/hour

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At least two toll lanes in each direction of travel shall be provided with the system of payment through ETC. Not less than 2 middle toll lanes shall be capable of being used as reversible lanes to meet the demand of tidal flow.

Toll plazas shall be designed for projected peak hour traffic of 20 years. As mentioned in Para 10.4.1, the stage construction of toll plaza in respect of number of toll lanes shall be allowed. If at any time, the queue of vehicles becomes so large that the waiting time of the user exceeds three minutes, the number of toll lanes shall be increased so that the maximum waiting time is brought down to less than three minutes.

10.4.13 Toll collection system

For smooth and efficient functioning of toll collection, the following arrangements/ facilities shall be provided:

i) The staff posted at the counters in the semi-automatic system of toll collection shall be provided with sufficient electronic equipment for the collection of toll and recording data, and small denomination notes/coins at the start of each shift.

ii) Intercom facility shall be provided between booths and the office of the supervisors.

iii) If the booth is closed for any reason, incoming traffic shall be guided into the adjoining working booth with the help of appropriate signs.

iv) The entire fee collection complex shall be adequately guarded.

10.4.14 Pavement

Concrete pavement shall be provided in the Toll Plaza area including tapering zone, from durability and long time serviceability consideration and to permit the provision of toll lanes initially for a projected peak hour traffic of 10 years. The concrete pavement may be widened to provide for future toll lanes required as per stage construction. The rigid pavement shall be designed as per IRC:58. For this work, use of paver shall not be insisted.

10.4.15 Traffic signs

A well thought out strategy should be evolved for providing traffic signs and road markings in and around the Toll Plaza in accordance with IRC:67 and IRC:35. The Concessionaire would design the configuration/placement of signs for toll plaza which are not given in IRC:67 and furnish to IE for review so as to ensure uniformity of signs in use on all the highways across the country.

Signs should be placed along the Project Highway, roadway of Toll Plaza to guide and render assistance to the drivers approaching the Toll Plaza. It is necessary to alert the

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driver about the existence of Toll Plaza one km ahead with a repeater sign 500 m ahead. Stop sign shall always be used in combination with certain road markings such as stop line and the word 'STOP' marked on the pavement.

The Toll Plaza sign should be supplemented by the sign advising the users of the notified toll rates (fees) for various types of vehicles and exempted categories of vehicles.

Appropriate Signs and Signals shall also be provided on the canopy of toll plaza to properly guide the approaching vehicles about the lane in operation, lane applicable to specific category of vehicle, lane with Electronic Toll System, reversible lane, etc.

10.4.16 Road markings

The road markings shall be used in accordance with Section 9 of this Manual. The road markings for the Toll Plaza area shall consist of lane markings, diagonals, chevron markings. Single centre line is provided at the centre of carriageway at toll gate to demarcate each service lane. Diagonal markings for central traffic island and chevron markings at side traffic island shall be provided to guide the approaching and separating traffic.

In order to control overspeeding of the vehicle approaching toll booth, transverse bar markings, as per typical details given in Fig. 10.3 shall be provided.

10.4.17 Lighting

The toll plaza shall have lighting system to provide visibility to drivers for the use of facility especially to access the correct service lane and also to the toll collector. Indian Standard 'Code of Practice for Lighting of Public Thoroughfare' IS:1944 shall be followed. This would be done by interior and exterior lighting as indicated below. Power supply shall be from public power supply system, but stand by generating set of the capacity to supply the required power shall be provided at toll plaza.

Interior Lighting : The toll booths and facility building office shall be illuminated adequately. Indoor lighting shall be with fluorescent lamps. Lighting should be provided in such a manner that glare is avoided or minimised. The level of illumination shall be 200 to 300 Lux as per IS:3646 part II.

Exterior Lighting : Lighting of the Toll Plaza is important for enhancing the night visibility. The lighting system shall consist of the following major components.

i) High Mast lighting

ii) Lighting on both side approaches to the Toll Plaza

iii) Canopy lighting of complex

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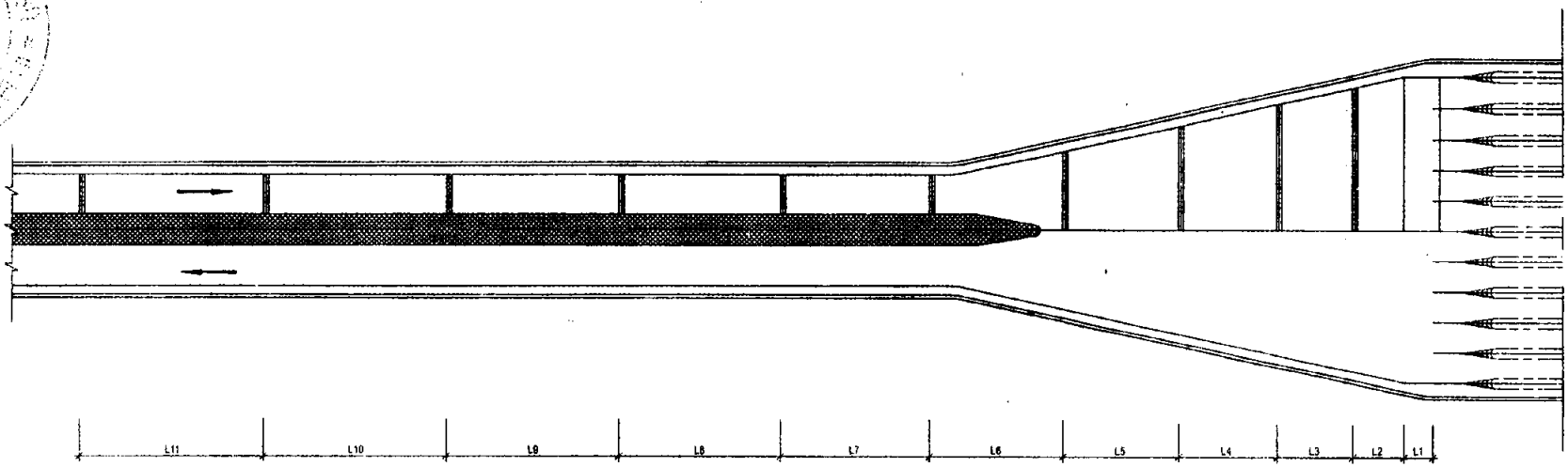
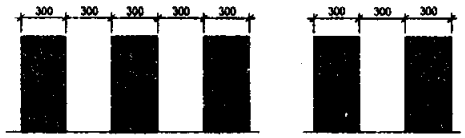


DISTANCE FROM PREVOPIS BAR MARKING (M)	NO. OF BAR MARKINGS
L1=6	1
L2=9	1
L3=13	2
L4=17	2
L5=20	2
L6=23	2
L7=26	3
L8=28	3
L9=30	3
L10=32	3
L11=32	3



WHITE TRANSVERSE BAR MARKING

NOTE:-

DETAILED SYSTEM OF ROAD MARKING AS PER IRC:35

Fig. 10.3 Details of Suggestive Transverse Bar Marking for Speed Control at Toll Plaza

High Mast Lighting : Normal low light poles are not able to give the required lighting conditions. It is, therefore, necessary to install high mast. A height of 30 m for the mast is considered suitable to have uniform spread of desired level of illumination in the Toll Plaza area for safe movement of vehicles.

Highway Lighting : A minimum requirement of illumination on the road surface of 40 Lux shall be ensured. Lighting in minimum 500 m length on both side approaches of toll plaza shall be provided to enhance the safety at night on the Project Highway and to make the drivers conscious of their approaching the toll gate. These shall be provided on the mild steel welded tubular pole of 10 m height from road surface and with 2 m overhang. Sodium Vapour lamp of 200-250 watts should be provided for these poles on both sides at 50 m staggered spacing. There should be provision for flashing signals for foggy weather conditions.

Canopy Lighting : A higher level of illumination upto 100 Lux by providing 150 watt metal halide lamps shall be provided at the toll gate and at toll booth locations. 1000-watt halogen lamps shall be provided at the selected nodes of space frame of the canopy to ensure uniform illumination of the area.

10.4.18 Water supply

Adequate water supply shall be provided. For working out water requirement and internal drainage system, reference may be made to IS:1172, IS:5339 and IS:1742.

10.4.19 Fire fighting system

Toll Plaza shall have fire fighting equipment, including smoke detectors and auto visual alarm system as per Section 4.17.1 of National Building Code, so that the personnel working in the complex and the office and the road users are protected against fire hazards.

10.4.20 Toll plaza complex

Toll plaza shall have a separate office building so as to provide comfortable office space for manager, cashier and other staff. There shall be separate rooms for TV monitors, meetings, toilets, and for the sale of passes, smart cards, on board units and public interaction. The building shall have a strong room for keeping the cash and a garage to accommodate the security van (during operation of loading the collected revenue). There shall be parking space in the same campus for vehicles for the staff and workers and other vehicles engaged in the operation of the Project Highway.

The size of the office complex depends on the minimum requirement of above facilities.

Provision for future expansion : The office building shall be located taking into consideration of future expansion.

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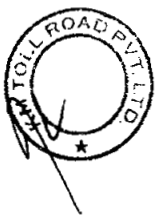
10.4.21 Toll audit

The toll plaza shall have toll audit system and fraud protection measures. The operations for toll collection, supervision, auditing and cash handling shall be done through the qualified personnel with adequate number so that each operation is efficiently handled.

10.5 Report to be submitted

The design and layout of Toll Plaza complex including all facilities shall be submitted to the Independent Engineer for review and comments, if any.



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SECTION - 11

LANDSCAPING AND TREE PLANTATION

SECTION - 11

LANDSCAPING AND TREE PLANTATION

11.1 General

The Concessionaire shall plant trees and shrubs of required number and type at the appropriate locations within the Right of Way and in the land earmarked by the Authority for afforestation keeping in view the IRC Guidelines on Landscaping and Tree Plantation. The Authority will specify the number of trees which are required to be planted by the Concessionaire as compensatory afforestation or otherwise. The Concessionaire shall also maintain the trees and shrubs in good condition during the Concession Period as per the maintenance schedule. The guidelines given in this Section shall be followed in plantation of trees and shrubs.

11.2 Design Considerations in Various Locations

11.2.1 Set-back distance of trees and other plantation

Trees on the roadside shall be sufficiently away from the roadway so that they are not a hazard to road traffic or restrict the visibility. Most vulnerable locations in this regard are the inside of curves, medians, junction corners and cut slopes. Trees shall be placed at a minimum distance of 14 m from the centre line of the extreme traffic lane to provide recovery area for the vehicle that runs off the road. A second row of trees 6 m further away will also be planted wherever possible. Preferably the first row of trees shall consist of species with thick shade and other rows of vertical type providing thin shade. Expansion of the Project Highway to 6-lanes shall be taken into consideration while locating the trees so that land is free of trees when further widening takes place. The distances for alternative rows of trees shall be reckoned from the nearest edge of the unidirectional carriageway. No plantation shall be allowed on the embankment slopes.

11.2.2 Set-back of trees on curves

Experience has been that growth of thick vegetation close to the formation on inside of horizontal curve leads to serious reduction of sight distance and causes avoidable accidents with cattle/children suddenly emerging from the side. Uncontrolled trees/ vegetation, may also affect visibility of traffic control devices and road signs. Therefore, in plain terrain a stopping sight distance of 180 m corresponding to the design speed of 100 km per hour may be ensured on all curved sections of the Project Highway along the innermost lane. However, where there are site restrictions their requirement may be reduced to 130 m corresponding to the design speed of 80 km per hour as a special case. The existing trees and vegetation on the sides have to be suitably thinned/trimmed, or even removed if necessary and a regular programme of pruning of the offending trees shall be undertaken as part of the maintenance operations.

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In all cases, location of trees shall be checked to ensure that clear vision of all highway signs/signals is available at all times to the motorists. Also, the foliage or trees shall not come in the way of roadway lighting.

11.2.3 Vertical clearance of trees and other plantations

For safe traffic operation, the vertical clearance available across the roadway shall be minimum 5 m. From this angle, the probable size of all plants shall be anticipated in advance, at the time of initial planting.

To allow for the effects of growth, wind and rain, trees shall be trimmed to 6 m and 6.5 m above the pavement in rural and urban areas respectively.

11.2.4 Plantation in medians

In the sections of the Project Highway where median width is more than 3 m, shrubs shall be planted and maintained to cut off headlight glare from traffic in the opposite direction. Flowering plants and shrubs are eminently suited for the purpose. These shall be planted either in continuous rows or in the form of baffles. The height of shrubs shall be maintained at 1.5 m to cut off the effect of traffic lights coming from the opposite direction.

In the sections, where the width of median is less than 3 m, shrubs or flowery plants may be planted in between crash barriers or other means like metal/plastic strips to cut off glare shall be provided.

The shape of shrubs and plants shall be suitably regulated so that there is no overgrowth either vertically or horizontally beyond the edge of the paved median.

In the vicinity of road intersections and median openings, median plantation shall be avoided or restricted to low-growing varieties to ensure adequate visibility.

11.2.5 Spacing of avenue trees

The spacing of avenue trees will depend on the type and growth characteristics of trees, requirement of maintenance, penetration of distant views, etc. A range of 10-15 m would meet the requirement for most varieties.

11.2.6 Choice of trees

The following guidelines shall be kept in view while selecting the species of trees to be planted:

i) Trees shall be selected with due regard to soil, rainfall, temperature and water level.

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ii) Trees which become very wide shall be avoided as their maintenance would cause interference with traffic flow.

iii) The species must be capable of developing a straight and clean bole upto a height of 2.5 to 3.5 m from the ground level.

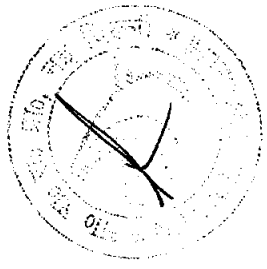
iv) The selected trees shall, preferably, be fast growing and wind-firm. These shall not be thorny or drop too many leaves.

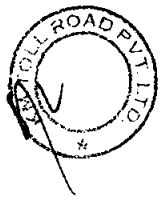
v) The trees shall be deep rooted, as shallow roots injure pavements.

vi) In urban areas, the species selected shall be of less spreading type, so that these do not interfere with overhead services, clear views of signs/ signals, and efficiency of roadway lighting.

11.3 Report to be submitted

The Concessionaire shall submit scheme for plantation and maintenance of plants and trees to the Independent Engineer for review and comments, if any.





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SECTION - 12

PROJECT FACILITIES

SECTION - 12

PROJECT FACILITIES

12.1 General

The requirement of the project facilities to be provided shall be indicated in Schedule 'C' of the Concession Agreement. This shall include information regarding location and size of the facilities. Land required for provision of facilities shall be acquired by the Authority and the date of handing over of the land to the Concessionaire shall be indicated in the Concession Agreement.

12.2 Pedestrian Facilities

12.2.1 General

Pedestrians are vulnerable to being involved in accidents. Therefore, adequate consideration shall be given to their safety through provision of facilities. The facilities for pedestrians given in this Section shall be provided on the Project Highway.

12.2.2 Footpaths (Sidewalks)

i) The sidewalks shall be provided in the built-up sections, on both sides, by barrier type (non-mountable) kerbs of height 200 mm above the adjacent road surface.

ii) The width of sidewalks depends upon the expected pedestrian flow and shall be fixed subject to land availability, but shall not be less than 1.5 m.

12.2.3 Pedestrian guard rails

Pedestrian guardrails shall be provided as specified in Section 9 of this Manual.

12.2.4 Pedestrian crossings

Pedestrian crossings shall be provided where they will be well used. Pedestrian crossings shall be suitably integrated with the overall design of the intersection.

The following criteria shall be followed regarding selection of pedestrian crossings:

i) **At-Grade Pedestrian Crossing (Pedestrian Crosswalk) :** Pedestrian crosswalks shall be provided at all important intersections and such other locations where substantial conflict exists between vehicular and pedestrian movements. Wherever possible, the crosswalks shall be at right angles to the carriageway and properly marked so that the pedestrians are subjected to minimum inconvenience. Crosswalks shall

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not substantially increase the walk distance of pedestrians. Adequate visibility, freedom from obstructions and sufficient space for waiting are the other important requirements for location of crosswalks.

At-grade pedestrian crossings shall be controlled. Controlled form of crossing shall be achieved through provision of Zebra Crossings, whether at signalized intersection or pedestrian actuated signal.

ii) **Zebra Crossing :** A Zebra Crossing shall not be sited within 150 m of another such crossing. The Zebra Crossing shall be somewhat set back from the carriageway line. However, the set back distance shall not be so much as to cause an appreciable increase in walking distance for the pedestrians. Pedestrian guardrails may be necessary where the setback distance is appreciable or at the skew crossings.

The width of the Zebra Crossing shall be adequate and shall generally lie within a range of 2.0 m to 4.0 m. The crossing shall, as far as possible, proceed uninterrupted through the median strip. In the event of the median strip being used as pedestrian refuge, adequate width of median shall be provided. In case of raised medians, such portion could be suitably depressed with kerb height not exceeding 150 mm.

In the vicinity of Zebra Crossing, guardrails of sufficient length shall be provided to deter pedestrians from crossing the road at any arbitrary point along the road.

iii) **Pedestrian Underpasses/Overpasses :** The pedestrian underpasses/ overpasses shall be provided as specified in Para 2.13.3 of this Manual.

12.3 Street Lighting

12.3.1 General

i) The Concessionaire shall provide lighting at locations of the Project Highway specified in Schedule 'B', using appropriate system and source of electric power as per the requirements of this Section.

ii) The Concessionaire shall make suitable arrangements for procuring power supply to ensure uninterrupted lighting during night and when visibility is low, including provision of DG sets as standby arrangements.

iii) The Concessionaire shall bear all costs of procurement, installation, running and operation cost of all lighting, including cost of energy consumption specified in this Section.

12.3.2 Specifications

i) Unless stated otherwise elsewhere in this Manual, the minimum level of illumination on the stretches of the Project Highway including Toll Plazas, truck lay-byes, interchanges etc. shall be 40 Lux.

ii) The layout of the lighting system together with type of luminaries for different locations shall be prepared by the Concessionaire in such a manner that the minimum illumination level prescribed in Para 12.3.2(i) can be achieved and shall be submitted to the Independent Engineer for review and comments, if any, for compliance by the Concessionaire.

iii) Overhead electrical power and telecommunication lines erected within the ROW by the Concessionaire shall be provided with adequate clearance so that safe use of the highway is not affected.

iv) Vertical and horizontal clearances for electrical installations shall conform to IRC:32.

v) All the fixtures, wires/cables, lights shall conform to relevant BIS Specifications as a minimum. The Concessionaire with the prior review and comments of the Independent Engineer can use fixtures with better specifications.

12.3.3 Locations where lighting is to be provided

Unless specified otherwise in Schedule 'C' of the Concession Agreement and elsewhere in this Manual, the Concessionaire shall provide lighting at the following locations of the Project Highway:

i) **Toll Plaza Area :** The lighting in and around Toll Plaza, toll booths, office building, on the approach road, etc. shall be as per Section 10 of this Manual.

ii) **Truck lay byes :** Lighting at the truck lay byes shall be as per Para 12.4 of this Manual.

iii) **At interchanges :** Lighting at the interchanges shall be as per Para 3.3.5 of this Manual.

iv) At Built-up sections on the Project Highway.

12.4 Truck Lay-byes

12.4.1 General

The Concessionaire shall construct and maintain adequate number and size of truck lay-byes for parking of trucks by the side of the Project Highway as indicated in Schedule 'B' of the Concession Agreement. The guidelines, as given here, shall be followed in regard to location, size and facilities to be provided at the truck lay-byes.

12.4.2 Location and size

Truck lay-byes shall, in general, be located near check barriers, interstate borders, places of conventional stops of the truck operators, etc. The places be identified on the basis of

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field survey and shall have adequate space for facilities as specified in subsequent Para 12.4.3 and future growth.

12.4.3 Facilities

The truck lay-byes shall have the following facilities:

i) Paved parking,

ii) Rest areas with toilets, drinking water,

iii) Telephone.

12.4.4 Lighting

The truck lay-byes and 50 m length of the Project Highway on its either side shall be illuminated at night to provide a minimum illumination of 40 Lux. Suitably designed electric poles having aesthetic appeal and energy saving bulbs may be used to provide required illumination. Alternatively, photo voltaic lamps may be used.

12.5 Bus Bays and Passenger Shelters

12.5.1 General

The buses shall be allowed to stop for dropping and picking up passengers only at the bus bays. The Authority will indicate in Schedule 'C' of the Concession Agreement, the number and broad location of bus bays to be provided by the Concessionaire. The bus bays shall conform to the specifications and standards given in this Section. In cases where bus stands are provided by the concerned State Government Transport Authorities, the Concessionaire shall provide only access road within the right of way.

12.5.2 Location

The location of the bus bays shall be fixed on the basis of following principles:

i) The bus stops shall be sited away from bridges and other important structures and embankment sections more than 3 m high.

ii) As far as possible, bus bays shall not be located on horizontal curves or at the summit of vertical curves.

iii) The location shall have good visibility, not less than the safe stopping sight distance.

iv) The bus bays shall not be located too close to the road intersections. A gap of 300 m from the tangent point of intersections to start/end of the bus bay shall be desirable. At minor intersections (e.g. junctions with village

roads), distance of 60 m may be adopted. However, if a substantial volume of buses is to turn right at the intersection, it is necessary that the bus bay shall be located sufficiently ahead of the intersection so that the buses can be manoeuvered easily from the pick-up stop on the left hand side to the extreme right lane for turning. The location of the bus bays may be fixed after due consultation with the local communities expected to use such facilities.

v) At major four-way intersections involving transfer of a substantial number of passengers from one pick-up stop to the other, it might be desirable to construct a single, composite bus stop of suitable design to cater to all the bus routes collectively.

vi) In hilly areas, the bus bays shall be located, preferably, where the road is straight on both sides, gradients are flat and the visibility is reasonably good (usually not less than 50 m). Subject to these requirements, it will be advisable to choose locations where it is possible to widen the roadway economically for accommodating bus bays.

vii) Where grade separator is provided, the location of bus bays shall be as under

a) Sufficiently away from the ground intersection.

b) Sufficiently away from the longitudinal slope of the approaches.

viii) The bus bay and passenger shelter shall be designed to provide for safe and convenient use by physically challenged persons as well.

12.5.3 Layout and Design

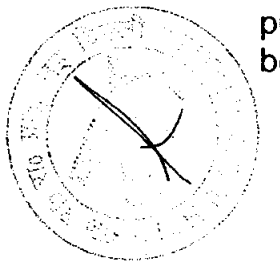
i) For plain area, typical layouts of bus bays given in Fig. 12.1 shall be adopted. The length "L" shown in Fig. 12.1 shall be 15 m, which shall be increased in multiples of 15 m if more than one bus is likely to halt at the bus bay at one time.

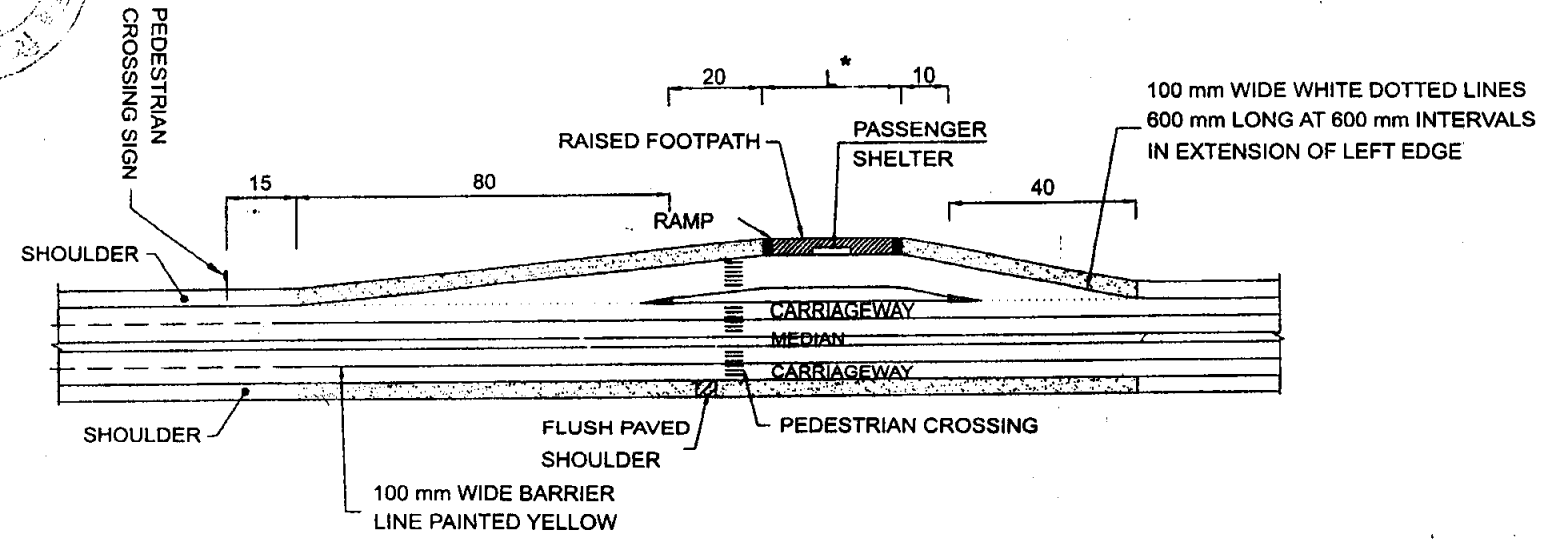
ii) For hilly areas, where there is a general constraint on space, the layout indicated in Fig. 12.2 may be adopted.

iii) The chanellizing island between the paved shoulder and bus bay shall not be raised; it shall be paved.

iv) Bus bays shall be provided on both carriageways of the Project Highway for each direction of travel independently. At intersections, the bus bays for up and down direction shall be located on farther sides of the intersection.

v) The bus bay shall be provided with a shelter for passengers. The shelter shall be structurally safe and aesthetic in appearance, while also being functional so as to protect the waiting passengers adequately from sun, wind and rain. If the shelter is constructed on the hillside, slopes shall be properly dressed and suitably protected to avoid slips. The shelter shall be set back from the kerb line by at least 500 mm.

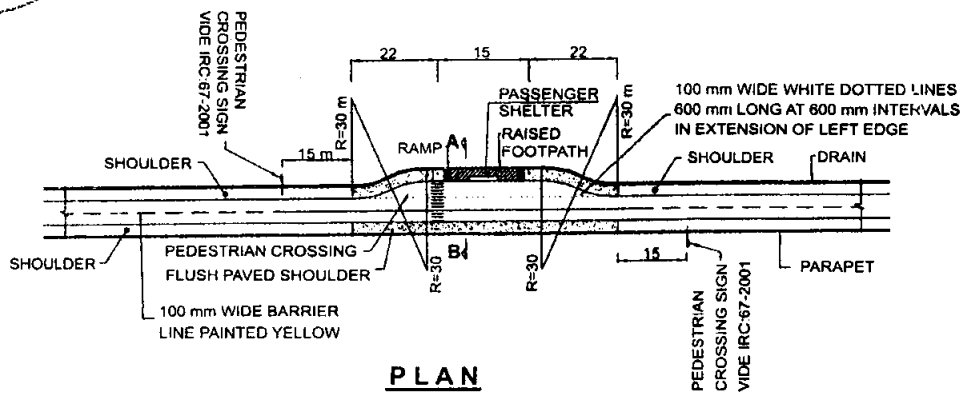




L*=15 m IF ONLY ONE BUS IS EXPECTED TO STOP AT A TIME IT MAY BE INCREASED BY 15 m FOR EVERY ADDITIONAL BUS EXPECTED TO STOP.

Fig. 12.1 Layout of Bus Stop

Note :- All dimensions are in metres except as shown otherwise.



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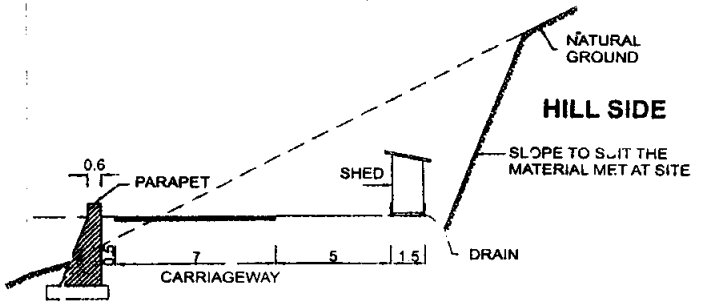

SECTION THROUGH ROAD ON A-B

Fig. 12.2 Layout of Pick-up Bus Stop in Hilly Area

Note :- All dimensions are in metres except as shown otherwise.

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12.5.4 Pavement

The pavement in the bus bays shall have adequate crust with respect to the wheel loads expected. Also, the surfacing shall be strong enough to withstand forces due to frequent braking and acceleration by the buses. The colour and texture of the bus bay surfacing shall be preferably distinctive from that of the main carriageway.

12.5.5 Drainage

i) The bus bays shall have proper cross slope to drain off the excess water. No water, which is likely to splash on the waiting passengers, shall be allowed to collect near the bus shelters.

ii) Suitable kerb gutter section with requisite longitudinal slope and outlets at intervals to ensure quick disposal of water shall be provided.

12.5.6 Road markings

Pavement markings as specified in Section 9 of this Manual shall be provided at the bus stops as shown in Fig. 12.1 and 12.2 with the word 'BUS' written prominently on the pavement. Pedestrian crossings shall be marked slightly behind the standing position of the buses in order to reduce pedestrian conflicts. The kerbs shall be marked with continuous yellow line to indicate "No Parking".

12.6 Rest Areas

Location and Layout of the rest areas shall be as indicated in Schedule 'B' of the Concession Agreement. Rest areas shall be provided by the Concessionaire on the lands included in the Site and procured by the Authority. Within the areas so provided, the Concessionaire shall construct and operate, or cause to be constructed and operated, paid facilities such as toilets, telephones, cafeteria, parking, etc.

12.7 Cattle Crossings

Facility for cattle crossings shall be provided as specified in Para 2.13.3 of this Manual.

12.8 Traffic Aid Posts

12.8.1 Traffic Aid Posts shall be established at Toll Plaza locations in accordance with the provisions of the Concession Agreement.

12.8.2 The Concessionaire shall establish and operate Highway patrol unit(s) manned by at least two persons apart from the driver for every unit which shall continuously patrol the highway in a stretch not exceeding 50 km and shall remain in contact with the Control Room on a real time basis. The patrol shall render assistance to users in distress and disabled vehicles through own intervention or by calling for assistance from Control Room,

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Crane operators or ambulance as required. The patrol shall promptly clear the road of any obstruction. Where the obstructions take time to be cleared, the section shall be cordoned off by placing traffic cones, which shall be illuminated during night. The patrol vehicle shall be large enough for seating at least four personnel besides the driver and space to carry essential traffic and incidence management and safety tools. It shall also have a light on its top and a siren on board. It shall be equipped with traffic cones and other accessories for traffic control which are fully visible during night time.

12.9 Medical Aid Posts

12.9.1 Medical Posts shall be established at Toll Plaza locations in accordance with the provisions of the Concession Agreement.

12.9.2 The Concessionaire shall provide ambulance(s) manned by at least two trained and certified paramedics so that the response time is not more than 20 minutes of call. Each ambulance shall be equipped with first aid, life saving medical services and support system implements for transporting the victims to the nearest trauma care hospitals, and providing emergency medical aid during transportation of victims from accident site to the nearest trauma care hospital.

12.10 Vehicle Rescue Posts

12.10.1 The Concessionaire shall provide a vehicle rescue post at Toll plaza location with all necessary equipment as specified in the Concession Agreement.

12.10.2 Crane(s) shall be available at the site of the incident within 30 minutes of call to clear the disabled/accidented vehicles.

12.11 Telecom System

The Concessionaire shall provide a Telecom System at Toll plaza location with all necessary equipment as specified in Schedule 'B' of the Concession Agreement.

12.12 Highway Traffic Management Systems (HTMS)

12.12.1 A real time system working round the clock shall be established for informing the road users of the road, traffic, and weather conditions on the Project Highway when the daily traffic exceeds 40,000 PCUs; for making interventions as required for smooth, safe and efficient traffic operation; and for providing rescue and relief to the users in distress. The system shall be capable of

i) acquisition of data from various sources such as the road, the users, the maintenance and operation patrol, the ambulance, and the intervention team

ii) three way communication between the data source and a Central Control Room, the Control Room and the data sources and display units, and between the maintenance and operation teams, through a transmission system, and

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iii) A Central Control Room to process all data and control the highway operation.

12.12.2 The systems and equipment of HTMS shall meet the following main climatic and environmental requirement as specified in IS:9000

a) Temperature Range of Operation – Low of 0°C (± 3°C) to high of 60°C (± 2°C)

b) Relative Humidity of 95 percent

c) Vibration Frequency Range of 10 Hz – 55 Hz

12.12.3 Data acquisition system : This shall consist of (a) Automatic Traffic Counter and Classifier (ATCC), with an in-road loop detectors and treadles. (b) Video cameras installed on road with such pan and tilts that a length of 2 km road is captured for video monitoring of traffic, (c) Emergency Call Boxes installed at every 2 km to enable any user to be instantly in contact with the Control Room, (d) Meteorological sensors for capturing data on temperature, weather, wind, (e) Mobile radios for patrol vehicles and ambulances to be in communication with Central Control Room and among themselves.

12.12.4 Emergency call boxes (ECB) with loud speaker, micro phone, activation button with LED indicating conversation, shall be housed in a vandal proof casing and operate in full to play mode in noise level of up to 95 decibels with in-built diagnostic features for automatic detection in case of damage by any object. Mobile communication system shall comprise the mobile radio base stations and control centre equipments. It shall have provision for mounted mobile set on ambulances, cranes and patrolling vehicles. The system shall have the facility to connect mobile to mobile, mobile to controller, and controller to mobile along with the systems for waiting, holding, and transfer of calls. The system shall use a pair of frequencies to be allotted to the Concessionaire with the approval of wireless planning and coordination (WPC), Deptt. of Telecommunications and shall operate for full duplex mode.

12.12.5 The design for the Variable Message Signs (VMS) will be modular with sign panels using LEDs/High-Gain Trans-Reflective LCDs for outdoor ambient lights. The sign panel should be such that a display is legible from a distance of about 200 m. For this purpose, panels shall have minimum dimensions of 3 m length x 1.8 m depth. The minimum height of the characters shall be 300 mm. The contrast ratio shall be more than 30 perpendicular to the bold face and more than 10 at an angle of ± 70° to the perpendicular. The equipment shall be capable of storing minimum 10 frames that can be triggered on receiving the tele-command. The sign panels shall be installed on the structure in such a manner that they are aesthetically pleasing and can withstand wind pressures. The equipment shall be capable of storing minimum semi-duplex mode and other known forces. The minimum vertical clearance available at VMS shall be 5.5 m from the road surface. Power supply shall be fed from the integrator locations. The locations for VMS shall be specified in Schedule 'B'.

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12.12.6 The meteorological sensors shall comprise thermocouple/pyrometer, humidity meter, anemometer, visibility meter and sensor for measuring pavement surface temperature. They shall be installed on a single pole with a specific attachment and power supply fed from the integrator. They shall have the facility to communicate on Polythene Insulated Jelly Filled copper cables (PIJF) /Optical Fibre Cable.

12.12.7 The Automatic Traffic Counter-cum-Classifier (ATCC) shall be capable of detecting and recording all categories of vehicles plying on the Project Highway based on their length and number of axles. The system shall be robust and capable of operating with minimum maintenance and may be either piezo-electric or infrared. It should have minimum accuracy level of 99 percent. The logic units shall be microprocessor based. The system should be able to record and store vehicle data for a period of at least two weeks with a Daily Traffic Volume of up to 1,00,000 vehicles. The system shall have compatibility to transfer the data on PIJF/Optical Fibre Cable/by using any of the available communication mode like GSM (Global System for Mobile Communications)/ GPRS (General Packet Radio Service), landline modem, CDMA (Code Division Multiple Access) depending upon the effective and economic operation of the particular mode available at the site. The system shall be electric/solar power operated depending upon the availability of source.

12.12.8 The Closed Circuit Television (CCTV) Surveillance shall comprise video camera, its housing and pan, and Tilt Heads. The video camera shall be mounted at a height so as to cover the target length of highway and the housing shall be able to withstand adverse weather conditions. It shall have a 360° angular travel in the horizontal plane and a tilt of 90° down from 0° horizontal. It shall have zoom lens with minimum power of 30 X, auto iris and infrared filter, infrared compatibility for night operation and remotely selectable operating modes. It shall have compatibility with co-axial cable/optical fibre cable.

12.12.9 The main control centre shall be designed for round-the-clock operations of monitoring, on-line information acquisition and processing the same for decision making. The Main Control Centre shall have equipment of central computer, call centre, terminal junction box, uninterrupted power supply (UPS) , counsel operator with monitors and joy sticks, rack accommodation, large display board, line printer and general purpose office computer with monitor, printer, fax and telephone. The system shall also have Network Management system (NMS) or real-time monitoring of Emergency Call Boxes (ECBs) and network diagnostics.

12.12.10 Transmission System : This shall consist of a backbone Optical Fiber Transmission system, cable system, interface system, network management system, repeater/amplification system, and power supply system. There shall be 3 or 4 sub-centres (as appropriate) housing all the interface equipment apart from the Control Centre, provided with, as appropriate, cables, interface, terminals (such as optical line terminals and interface, network management system equipment, optical fiber cable

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interface equipment and control centre interface equipment, data acquisition system interface, etc). The cables from ECBs, VMS, meteorological data systems, ATCC shall be Polythene Insulated Jelly filled (PIJF) copper cables and those from CCTV cameras shall be coaxial cables. Repeaters/ amplifiers shall be used to maintain the quality of signals. All the cables shall have at least 20 percent spare capacity to allow for expansion. The interface system shall be capable of handling the composite audio, video and data signals at various interface levels and process them.

12.12.11 Central Control Room (Control Centre) : The Central Control Room (CCR) shall be the repository of all the data acquired from the field and their processing, storing, and archiving. All the information for real time monitoring of the Project Highway shall be generated at the CCR and the relevant information shall be disseminated to the users through Variable message signs, and to the operation and management teams through mobile radio communication system for appropriate intervention. Another important function to be performed at the Control centre shall be the operation and management of the HTMS itself along with its various sub systems.

CCR shall have the following minimum equipment, hardware and software:

i) A Central Computer Server with integrated HTMS and HTMS software

ii) A Traffic Manager's Terminal for operation of the integrated traffic management system

iii) Call system equipment comprising Operator PC along with sub-systems and digital voice recorder.

iv) Mobile radio terminal comprising Operator PC and engineering terminal

v) Computers for Network Management System (NMS) for Fiber Optic Communication System.

vi) CCTV Console Equipment

vii) Computers for VMS, AVCC, MET, Traffic Control

viii) A large size screen

ix) A line Printer

x) An Office Computer

xi) A Power Supply and back up system

12.12.12 Dissemination of information : Information generated at the Control Centre shall be disseminated in the following manner:

a) **To the users :** By displays on the Variable Message Signs, via internet web pages, and by creating a node at the wayside amenities to display the relevant information.

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b) **To the Operation and maintenance teams :** By mobile phones.

c) **To the ambulances :** By mobile phones.

d) **To the trauma care centres :** Via ambulances.

12.13 Operation and Maintenance Centre

12.13.1 There shall be operation and maintenance centre(s) either at the toll plaza(s) or at any other location along the Project Highway as identified by the Concessionaire. The land for the same shall be acquired by the Concessionaire at his cost and risk. The operation and maintenance centre would have following minimum facilities:

i) Main control centre and Administrative block.

ii) Equipment for operation and maintenance and storage space for them.

iii) Storage space for equipment and material for traffic signs and markings.

iv) Workshop.

v) General garage and repair shop.

vi) Testing laboratory.

vii) Parking space for minimum 4 number of large vehicles and for other expected vehicle during peak hours including those for working staff and visitors.

12.13.2 All building works shall be designed to meet the functional requirements and shall be compatible with regional architecture and micro climate. Locally available materials shall be given preference but not at the cost of construction quality.

12.13.3 The circulation roads and parking spaces in the O&M centre shall be paved to withstand vehicle loads and forces due to frequent acceleration and deceleration of vehicles. Parking bays/lots shall have proper cross slope and drainage. The marking of the parking bays shall be as per IRC:35 to demarcate parking and circulation space. Parking lots shall have illumination as provided in IS:1944 (Parts I and II).

12.13.4 The whole campus of operation and maintenance centre shall have system for security with safe entry and exit.

12.14 Report to be submitted

The Concessionaire shall submit report containing the proposals for provision of project facilities on the Project Highway to the IE for review and comments, if any.

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SECTION - 13

SPECIAL REQUIREMENTS FOR HILL ROADS

SECTION - 13

SPECIAL REQUIREMENTS FOR HILL ROADS

13.1 General

13.1.1 The additional/new carriageway in hilly areas may either be constructed at the same level as that of the existing carriageway or at different levels to form a split highway depending upon the feasibility and geo-technical stability of the area.

13.1.2 The Concessionaire shall pay due attention to geo-technical, environmental and social aspects of hill roads and take appropriate measures to ensure the following:

(The guidelines given in IRC:SP:48 may be referred to, for details).

i) Stability against geological disturbances.

ii) Prevention of soil erosion.

iii) Provision of efficient drainage and preservation of natural drainage system.

13.1.3 If there are any landslide prone areas along the road alignment, adequate investigation shall be undertaken and appropriate remedial measures shall be provided as per guidelines given in IRC:SP:48.

13.1.4 Where any new construction/realignment is involved, the alignment shall avoid large scale cutting and filling and follow the profile of land, as far as possible.

Areas having potential landslide or settlement problems shall be avoided. Adverse impact on the environment shall be reduced by adopting proper mitigation measures. Refer to guidelines given in IRC:SP:48.

13.1.5 Unstable hill slopes shall be adequately addressed by providing appropriate bioengineering and stabilization measures.

13.1.6 Necessary safeguard shall be taken to protect ecologically sensitive areas like wild life and bird sanctuaries, reserve forests, national parks, etc.

13.1.7 Protective structures for traffic such as parapets, railings, roadside safety barriers, boulder nets, etc. shall be provided, where necessary.

13.1.8 In mountainous and steep terrain, the scope of work defined by the Authority may be two-lane carriageways on different alignments (contours). In that case, the Manual of Specifications and Standards for two-laning of Highways shall apply to the two-lane carriageways on different alignments (contours).

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13.2 Set Back Distance at Horizontal Curves

Requisite sight distance should be available across the inside of horizontal curves. Lack of visibility in the lateral direction may arise due to obstructions like walls, cut-slopes, wooded areas, etc. Set back distance from the central line of the carriageway, within which the offending obstructions should be cleared to ensure the needed visibility, can be determined using the Equation given in IRC:52.

13.3 Grade Compensation at Curves

At horizontal curves, the gradient shall be eased by applying the grade compensation correction for gradients steeper than 4 per cent in accordance with IRC:52.

13.4 Hairpin Bends

Hairpin bends, where unavoidable, may be designed either as a circular curve with transition curves at each end or as a compound circular curve.

Design criteria given in IRC:52 shall be adopted for the design of hairpin bends. At hairpin bends, the full roadway width shall be surfaced.

13.5 Climbing Lane

Climbing lane shall be provided, where specified in Schedule 'B' of the Concession Agreement, in order to address the necessity of making available separate lane for safe overtaking for vehicle traveling uphill.

Proper signs and road markings shall be provided to ensure that the absolute right of way for climbing vehicles is available.

13.6 Rock Blasting

Heavy rock blasting should be avoided. Controlled blasting shall be resorted to. Blasting shall be supervised by experienced personnel. Blasting and related operations shall be carried out in accordance with Clause 302 of MORTH Specifications.

13.7 Cut Slopes

Cut slopes shall be rendered stable in the construction stage itself, by cutting at the correct angle and benching etc. including slope stabilizing structures like drains, breast walls, pitching, etc.

13.8 Tunnels

Where it is necessary to cross hills or high ridges, the various alternatives including construction of tunnel to avoid deep cuts shall be considered and the most preferred

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alternative shall be chosen. The alternative to be followed shall be indicated in Schedule 'B' of the Concession Agreement. Where road is to be taken through tunnel, its salient details shall be indicated in Schedule 'B' of the Concession Agreement.

13.9 Drainage

For drainage of water from roadside, an effective system of drainage shall be constructed to lead the run-off to natural water courses. In particular, catch water drains (Refer to para 6.5 of this Manual) shall be provided above the cut slopes. It shall be ensured that water is not drained into villages and cultivated land. Location of cross drains and culverts should be so chosen as to avoid erosion of the outlet. Erosion control works like drop walls, apron at out-fall points along with pitching/paving of the channel shall be provided where required.

13.10 Retaining Walls

13.10.1 Retaining walls shall be provided

i) To support the down hill side unstable strata or fills,

ii) To achieve width of roadway, where cutting into hill is restricted,

iii) To arrest damage caused to the valley side and the road, by under cutting by a stream or other water course,

iv) At valley points, where water flows over the road,

v) At places where the valley side gets saturated in the monsoons and is likely to result in slips and damage to the road,

vi) At any other locations warranting provision of retaining walls.

13.10.2 The retaining walls on the existing roads shall be inspected by the Concessionaire to check and assess the requirements of repairs and/or strengthening or reconstruction. If so required, the repair, strengthening or reconstruction work shall be carried out as per the assessment.

13.10.3 For general features, arrangement and design, guidelines given in IRC:SP:48 may be referred to.

13.11 Aprons etc.

Construction of apron, pitching, flooring shall conform to Clauses 2503 to 2507 of MORTH Specifications.

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13.12 Disposal of Debris

Disposal sites shall be identified by the Concessionaire for disposal of waste, debris, etc. Tipping of waste into valley sides, stream channels, water bodies, and forest areas shall not be resorted to.

13.13 Report to be Submitted

The Concessionaire shall submit report containing proposal for special requirements in hill areas to the IE for review and comments, if any.

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Appendix - 1

List of Paras for preparing schedules of the Concession Agreement (Refer Para 1.11)

Section	Para	Particulars to be specified
Sector 1	1.17	Utilities to be constructed/shifted
	1.19.2	List of sections passing through built-up areas
	1.20	List of stretches where 6-laning shall be provided as part of 4-laning of the Project Highway
Section 2	2.1 (ii) (a)	List of stretches where requirement of 6-laning passing through built-up areas is dispensed with
	2.1 (ii) (b)	Construction of bypass, alignment and land for the bypass
	2.1 (v)	Land for geometric improvements, and such stretches
	2.2.2	Land for geometric improvements and such stretches for ruling design speed
	2.3	Right of way available and land to be acquired.
	2.5.1	Type and widths of median in various stretches
	2.9.4	List of sections where radius of curve less than desirable minimum
	2.10.1 (i)	Width of underpasses
	2.10.2 (ii)	Pedestrain and cattle underpasses where vertical clearance shall be 4.5 m
	2.11.1	Width of overpasses
	2.12.1	Locations of intersections
	2.12.2.1	Location and length of service roads
	2.12.2.2	Treatment of service road at bridge locations
	2.13.1	Location and other features of grade separated structures
	2.13.2	Type of structure for vehicular underpass or overpass and whether cross road shall be carried at the existing level
	2.13.3	Location of cattle and pedestrian underpasses or overpasses

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Section	Para	Particulars to be specified
	2.18	List of stretches that are not required to be constructed as 6-lanes when traffic exceeds specified design service volume.
Section 3	3.1.1 & 3.1.2	Location and type of intersection/interchange, other features and land requirements
	3.3.4	Length of viaduct at grade separated structures
Section 4	4.2.1 (ii)	Sections of existing road to be raised
Section 5	5.2.1	Type of pavement for new construction
	5.2.2	Type of strengthening of existing flexible pavement, if not bituminous overlay
	5.2.3	Requirement of CC pavement, and design, performance, construction and maintenance requirements
	5.9.4	Stretches to be reconstructed
Section 7	7.1 (ii)	Bridges which are not required to have independent superstructure
	7.1 (iii)	Bridges which are not required to be high level bridges
	7.1 (viii)	Utility services to be carried over the structures
	7.3 (ii) (b)	List of bridges required to be 6-lane wide
	7.3 (ii) (c)	List of bridges or grade separated structures where passing places are to be provided
	7.3 (iii) (d)	List of culverts to be reconstructed and/or widened
	7.3 (iv) (f)	List of bridge structures to be reconstructed and/or widened
	7.4 (v)	Requirement of special structures like cable stayed/ superstructure bridge, etc.
	7.15.1	Requirement of reinforced earth retaining structures when height more than 10 m.
	7.17 (iv)	Requirement of Crash barriers for existing bridges
	7.17 (v)	Parapets/railings of existing bridges to be repaired/ replaced.
	7.18.1	Locations where railway level crossings not to be replaced with ROBs/RUBs

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Section	Para	Particulars to be specified
	7.19 (i)	Location and type of grade-separated structures
	7.20	Type of drainage arrangement for the bridge deck
	7.21	Measures for protecting structures in marine environment
	7.22 (i)	Structures to be repaired/strengthened, nature and extent of repairs
Section 9	9.2.7	Locations and size of overhead traffic signs
	9.7.2 (iv)	Locations (hazardous) that require safety barriers
Section 10	10.1	Location of Toll Plaza
Section 11	11.1	Number of trees to be planted
Section 12	12.1	Project facilities and land for providing project
	12.3.1	Locations for providing lighting
	12.3.3	Situations/locations where lighting to be provided
	12.4.1	Location and number of truck lay-byes to be provided
	12.5.1	Location and number of bus bays to be provided
	12.6	Location and layout of rest areas
	12.12.5	Locations of VMS
Section 13	13.5	Requirement of climbing lane
	13.8	Alignment/construction of tunnel and its salient details

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Appendix - 2

Sl. No.	Code/ Document No.	Title of the Publication (Titles given in bold types have been Just Published)
		I. IRC SPECIFICATIONS, STANDARDS, DESIGN CODES
1.	IRC:2-1968	Route Marker Signs for National Highways (First Revision)
2.	IRC:3-1983	Dimensions & Weights of Road Design Vehicles (First Revision)
3.	IRC:5-1998	Standard Specifications and Code of Practice for Road Bridges, Section I - General Features of Design (Seventh Revision)
4.	IRC:6-2000	Standard Specifications and Code of Practice for Road Bridges, Section II - Loads and Stresses (Fourth Revision)
5.	IRC:7-1971	Recommended Practice for Numbering Bridges and Culverts (First Revision)
6.	IRC:8-1980	Type Designs for Highway Kilometre Stones (Second Revision)
7.	IRC:9-1972	Traffic Census on Non-Urban Roads (First Revision)
8.	IRC:10-1961	Recommended Practice for Borrowpits for Road Embankments Constructed by Manual Operation
9.	IRC:11-1962	Recommended Practice for the Design and Layout of Cycle Tracks
10.	IRC:12-1983	Recommended Practice for Location and Layout of Roadside Motor-Fuel Filling and Motor-Fuel Filling-cum-Service Stations (Second Revision)
11.	IRC:14-2004	Recommended Practice for Open Graded Premix Carpets (Third Revision)
12.	IRC:15-2002	Standard Specifications and Code of Practice for Construction of Concrete Roads (Third Revision)
13.	**IRC:16-2008**	**Standard Specifications and Code of Practice for Prime and Tack Coat (Second Revision)**
14.	IRC:17-1965	Tentative Specification for Single Coat Bituminous Surface Dressing **(Amalgamated with IRC:110-2005)**
15.	IRC:18-2000	Design Criteria for Prestressed Concrete Road Bridges (Post-Tensioned Concrete) (Third Revision)
16.	**IRC:19-2005**	**Standard Specification and Code of Practice for Water Bound Macadam (Third Revision)**
17.	IRC:20-1966	Recommended Practice for Bituminous Penetration Macadam (Full Grout)
18.	IRC:21-2000	Standard Specifications and Code of Practice for Road Bridges, Section III - Cement Concrete (Plain and Reinforced) (Third Revision)
19.	**IRC:22-2008**	**Standard Specifications and Code of Practice for Road Bridges, Section VI - Composite Construction (Limit States Design) (Second Revision)**

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Annex - II

(Schedule-D)

Specifications and Standards for Six-Laning

1 Manual of Specifications and Standards to apply

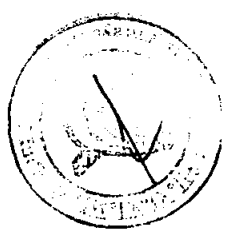
Subject to the provisions of Paragraph 2 of this Annex-II, Six-Laning of the Project Highway shall conform to the Manual of Specifications and Standards for DBFOT Road Projects published by the Authority/MOSRTH on 27th May 2008. (An authenticated copy of the Manual has been provided to the Concessionaire as part of the bid documents.

2 Deviations from the Manual

Notwithstanding anything to the contrary contained in the aforesaid Manual, the following Specifications and Standards shall apply to the Six Lane Project Highway, and for purposes of this Agreement, the aforesaid Manual shall be deemed to be amended to the extent set forth below:

S. No.	Location	Item	Description of Deviation	Clause Reference
				Para of 6 lane Manual
Nil				

Manual
of
Specifications and Standards
for
Six Laning
of
National Highways
through
Public Private Partnership



Government of India
Department of Road Transport & Highways
Ministry of Shipping, Road Transport & Highways

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FOREWORD

Government of India has taken a mission for improvement of road infrastructure in the country. An ambitious National Highway Development Project (NHDP) has been taken up into seven phases whereby around 26,000 km. length of National Highways is to be upgraded to 4-lane divided carriageway facility, 6,500 km of National Highways to be upgraded to six lane facility, 20,000 km of existing deficient stretches to be improved to two-lane with paved shoulder facility, construction of 1,000 km of expressways and construction of bypasses, ring roads, flyovers at major intersections, etc. The implementation of these phases now would be mainly through Public Private Partnership (PPP) for attracting private capital, improving efficiencies and optimising the cost. Several States are also pursuing programmes for development of State Highways and other roads through Public Private Partnership.

The Model Concession Agreement (MCA) for awarding PPP projects on National Highways has been revised. MCA follows the design, build, finance and operate (DBFO) approach that requires the private investor (Concessionaire) to bear the responsibility for detailed design, construction, operation & maintenance of the project highway during the period of concession. The Government will provide only the feasibility study report of the project prepared by a consultant. The Model Concession Agreement envisages a Manual of Specifications & Standards in one of its technical schedules.

Government is committed for providing road infrastructure comparable to world standards. Accountability for providing safe and reliable road network ultimately rests with the Government. It is, therefore, essential that the specifications and standards laid down for development of National Highways particularly through Public Private Partnership should cover sound engineering practices and safety features. More attention also needs to be given to amenities to the users so that they get the value for their money on these developed National Highways.

Ministry constituted a Technical Committee comprising of the following Officers for finalisation of the Manual for adoption in National Highway Works to be taken up through the Model Concession Agreement for PPP projects:

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1.	Sh. G. Sharan, Director General (Road Development), Deptt.of Road Transport & Highways (DoRT&H)	-	Chairman
2.	Sh. A. P. Bahadur, Chief Engineer, DoRT&H	-	Member
3.	Sh. S. B. Basu, Chief Engineer, DoRT&H	-	Member
4.	Sh. A. N. Dhodapkar, Chief Engineer, DoRT&H	-	Member
5.	Sh. A. V. Sinha, Member (Tech.), National Highways Authority of India (NHAI)	-	Member
6.	Sh. V.K. Sinha, Secretary General (IRC)	-	Member
7.	Sh. V.L. Patankar, Director, National Institute for Training of Highway Engineers (NITHE)	-	Member

Sh. R. K. Singh and Sh. Sudip Choudhary, Superintending Engineers in the Ministry helped in finalization of the Manual.

DoRT&H expresses its gratitude to the members of the technical committee and other Officers who took great pains and contributed immensely in finalization of this Manual. The efforts made by the experts and staff of IRC and Planning Commission are also acknowledged.

I am confident that this Manual will serve its intended purpose for Public Private Partnership Projects in Highways.

(G. Sharan)
Director General (Road Development)
Department of Road Transport & Highways
Ministry of Shipping, Road Transport & Highways

Dated: 27th May, 2008

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Introduction

This Manual has been prepared for 6 laning of National Highways on PPP mode.

The concept of developing a "forgiving" highway has been the main consideration in developing this Manual, besides amenities to the users who would be paying the fee for the use of the facilities and, therefore, expect higher level of facilities than available traditionally until now. The six lane highways will be high speed facilities and to carry high density of traffic. The development of six-lane highway would mostly be upgradation of the existing and recently constructed four-lane highways. Six lanning works have to be carried out with the existing high leval of traffic. These aspects have been kept into consideration while finalizing the Manual. More attention would be required for safety of vulnerable road users on a six lane highway. For this purpose, planning of service roads and intersections becomes more critical. Accordingly, grade separator interchanges and liberal provision of service roads have been incorporated in this Manual. The standards and specifications already available in Ministry's book of specifications and technical circulars and various codes of practices and guidelines of Indian Roads Congress (IRC) have formed the basis for evolving this Manual. Wherever suitable standards were not available in some of the new areas, the same have been developed and suggestive layouts provided. The Manual has also recognized the need for adoption of new technologies and materials.

This Manual would eventually form an integral part of the MCA and binding on the concessionaire. It may be possible that some of the provisions of this Manual may not be feasible due to site constraints or other reasons. Such project specific deviations would need to be stated precisely by the road authorities while inviting the bids so that bidders are fully aware and able to assess their project cost.

The technical standards prepared by IRC and accepted by Ministry as well as by State Governments are same both for National Highways and for State Highways. This Manual, therefore, can be used for State Highways as well, however, some of the provisions contained in this Manual such as for advance traffic management systems may not be feasible for State Highways and State governments can take a view on this without compromising on the overall safe operation of the Highway. The term "authority"

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used in the Manual could be replaced by the term "State Government of _____" or any other suitable terminology,

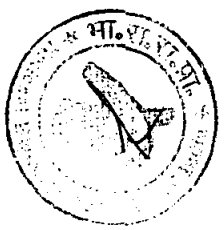
This Manual has been finalised for the projects to be taken up through Public Private Partnership. The concessionaire(s) shall undertake detailed planning and design of the project highway in accordance with provisions contained in this Manual and the limitations mentioned in the Model Concession Agreement (MCA). The Manual shall also be used by consultants for preparation of feasibility studies for project development. The Manual should also be used for development of six lane highways to be implemented through budgetary sources. This Manual should also form the basis for preparation of Detailed Project Report for six laning projects to be taken up other than PPP mode.

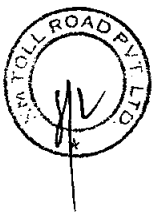
- The Manual is generic in nature. However, for the projects to be taken up through Public Private Partnership (PPP), consideration to the viability of the project may need to be given. Keeping this in view, following deviations can be permitted on case to case basis where the project may require viability gap funding (in accordance with the financial analysis undertaken by the implementing agency) of more than the prescribed limit.

(i) Provision of ATMS as prescribed in Section 2.3.3 and detailed in Section 4.18 shall be deferred in exceptional cases only.

(ii) The provision of restaurant, fuel facility and garage for minor repair as prescribed in Section 4.13.3 would be optional based on concessionaire assessment of their commercial viability.

(iii) Construction of separate bridge structure to maintain the continuity of the service road across the stream/dip in the ground may be dispensed with and the service road may be connected to the existing bridge structure for the highway traffic.





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MANUAL OF SPECIFICATIONS AND STANDARDS

FOR SIX LANING OF NATIONAL HIGHWAYS

[See Clause 2.1(a) of Concession Agreement]

SECTION – 1: GENERAL

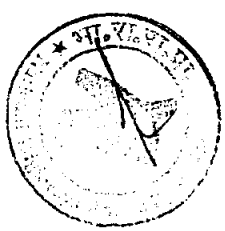
1.1 This Manual, forming part of Annex II to Schedule D of the Concession Agreement (refer Clause 2.1(a) of the Concession Agreement), sets forth the Specifications and Standards to be followed for development of the Project Highway as described in Schedule B and construction of project facilities as described in Schedule C, on the project site as described in Schedule A. The concessionaire shall make himself fully aware of the Project Site with regard to the features of the existing highway (such as location, layout, geometry, right of way, intersecting roads, existing accesses , etc) including the constraints at the site (such as limitation of right of way, existence of adjoining property, existing structures, plantation, utilities, etc), plan, design and construct the Project Highway comprising its various features (such as six-laning, service roads, entry/exit ramps, underpasses, overpasses, grade separators, widening / reconstruction of bridges, etc) and the project facilities (such as toll plazas, lighting, landscaping, etc) meeting the standards, specifications and quality specified in this Manual.

This Manual is mainly for six laning of existing four lane highway. However, this Manual shall also be applicable in those cases where the existing two lane facility is planned to be developed to six lane divided carriageway facility and at locations where six laning is planned as green field project.

1.2 Any project report and other information provided by the Authority shall be used by the concessionaire only for reference purpose and for carrying out further investigations. The concessionaire shall be solely responsible for undertaking all the activities that are necessary for the delivery of the project, such as planning, surveys, investigations, design, construction planning and management, traffic operation, safety to the users/abutting property holders and shall have no claim against Authority for any loss, damage, risk, costs, liabilities or obligations arising out of or in relation to the project report and other information provided by the Authority.

1.3 General consideration of planning, design and construction

The Project Highway shall be planned as a "partially access controlled highway" where access to the highway shall be provided only at pre-determined locations from service roads through properly designed entry/exit ramps and or from interchanges. In doing so, the concessionaire shall take measures to overcome the physical and operational constraints and plan, design and construct the Project Highway using appropriate methods, management techniques and technologies. General consideration shall, without being limited to, be as follows:-



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(a) **The constraints**

The physical constraints in the existing highway are in the form of limitation of right of way, un-regulated access, inadequate service roads and underpasses, numerous at-grade junctions, lack of physical separation between local and through traffic etc. The operational constraints arise out of the necessity or possibility of closing a portion of the road for construction and/or diverting the traffic to temporary diversions, thereby reducing the capacity and safety of the existing highway. The solutions evolved by the concessionaire shall be such that these operational constraints are overcome through appropriate planning, design and construction method, techniques and technologies and by adopting suitable traffic management measures.

(b) **Safety of design**

All designs shall be safe to ensure that the Project Highway or any part thereof (for example embankment, pavement, retaining structures, bridges, culverts, etc) does not collapse (global stability) nor its serviceability/performance (for example settlement, roughness, undulations, deflections, etc) deteriorates below acceptable level as prescribed in Schedule K of the Concession Agreement.

(c) **Durability**

The Project Highway shall not only be safe but also durable. This would mean that the deteriorating effects of climate and environment (for example wetting and drying, freezing and thawing, if applicable, temperature differences, aggressive environment leading to corrosion, etc) in addition to the traffic shall be duly considered in design and construction to make the Project Highway durable.

(d) **Mitigating disruptive effects of construction**

The planning, design and construction of the highway shall be such that the construction of Project Highway does not have adverse impact on the environment and does not disrupt the lives and business activities of the people living close to the highway.

1.4 Acceptable Standards

1.4.1 The concessionaire shall follow latest version, issued prior to a date 60 days before the last date of bid submission, of the following Indian Standards, Specifications, Codes of Practice, Guidelines, etc in the following order of priority:

i) Technical circulars issued by MOSRTH which are either published by Indian Roads Congress or are available on the website of MOSRTH in so far as they relate to matters covered in this Manual.

ii) Specifications for Road and Bridge Works issued by the Ministry of Shipping, Road Transport & Highways, hereinafter referred to as 'MOSRTH' or 'Ministry's' Specifications.

iii) Indian Roads Congress (IRC) Codes and Standards; as per ***Appendix D-1.***

iv) Bureau of Indian Standards (BIS) as per ***Appendix D-1.***

1.4.2 Where Indian standards are either not available, or if available, are not adequate, the Concessionaire shall be permitted to adopt international standards and specifications as followed in United States of America, United Kingdom, European Union, Japan, Germany or Australia. The concessionaire shall submit proposal in this regard to the Independent Engineer (IE - see Clause 23 of Concession Agreement) for review and comments.

1.4.3 All building works shall conform to the specification of Central Public Works Department (CPWD) and norms stipulated in the National Building Code (NBC). In case of conflict between CPWD and NBC norms, NBC norms shall prevail. To the extent specific provisions for building works are provided in IRC/MOSRTH specifications, the same shall prevail over the CPWD and NBC provisions. For this purpose, building works shall also deemed to include roadside facilities, landscape elements and/or any other works incidental to the building works. All items of lighting works of the building shall conform to CPWD Specifications for Electric Works (Part I and II).

1.4.4 The concessionaire shall also be permitted to use proprietary or patented designs subject to the condition that the concessionaire shall be solely responsible for their performance and durability.

1.5 Overall Scheme

The concessionaire shall prepare and submit, in accordance with provisions of this Manual and in compliance with Clause 12.1 of the Concession Agreement, the detailed design, construction methodology, quality assurance procedure and operation of the Project Highway and project facilities to the IE for his review. If, on review, the scheme is not found to conform to the provisions of this Manual, the concessionaire shall modify the scheme to make it conform to the provisions of this Manual. Increase in cost due to any modification suggested by the IE shall not be a reason for the concessionaire objecting to or contesting these modifications. The concessionaire shall proceed with the implementation of the project as per the scheme so modified.

1.6 Clarificatory role of Manual

Where the provisions of the Concession Agreement are general in nature, the provisions of this Manual shall be deemed to clarify or amplify these provisions.

1.7 Drawings to have comprehensive meaning

"Drawings" referred to in Clause 12.3 of the Concession Agreement shall not have a restrictive meaning but shall include charts, sketches, explanatory notes and documents explaining the design assumptions, designs, construction methodologies, etc which can demonstrate that "Drawings" conform to the provisions of this Manual. All drawings specifically referred to in this Manual shall form part of Schedule H of the Concession Agreement.

1.8 Interpretation of the Manual

(1) In case of any conflict between provisions of this Manual and IRC codes or Ministry's specifications, provisions of this Manual shall prevail.

1.9 The IE would ensure that the project highway is planned, designed and constructed in accordance with the provisions contained in this Manual. In case any non-conformity is found, the issue would be pointed out to the Concessionaire and reported to the executing agency (such as NHAI). If the issues do not get resolved at

the level of executing agency so that the provisions of Manual are complied with, the matter would be referred to the DORTH for a final decision before any step is taken by either party for arbitration. The concessionaire shall keep all the existing utilities in continuous satisfactory use as per Clause 11 of the Concession Agreement. Wherever existing utilities are to be shifted and/or new utilities are to be provided during the concession period, the same shall be accommodated within the utility corridor of 2.0 m width identified at the edges of the ROW subject to approval by the Authority.

1.10 The terms 'Ministry of Surface Transport', 'Ministry of Road Transport and Highways' and 'Ministry of Shipping, Road Transport & Highways' or any successor or substitute thereof shall be considered as synonymous.

1.11 The terms 'Inspector' and 'Engineer' used in MOSRTH Specification shall be deemed to be substituted by the term 'Independent Engineer'; to the extent its duties and functions are consistent with the provisions under Clause 23 of the Concession Agreement and this Manual. For avoidance of doubt, it is clarified that the role of 'Independent Engineer' is to 'review and comment', whereas approval will be accorded by the 'Concessionaire'/'Engineer' appointed by the 'Concessionaire' taking into account comments of the 'Independent Engineer'.

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SECTION – 2: PLANNING THE PROJECT HIGHWAY

2.1 GENERAL

The concessionaire shall plan for capacity augmentation and design the Project Highway in a manner that will ensure safe operation of the Project Highway as a "partially access controlled highway". The concept of providing 'forgiving highway' to the road users shall be kept in mind while planning and designing the Project Highway. For safe operation, high speed traffic and slow traffic/local traffic shall be separated by constructing parallel service roads.

Wherever applicable, the planning shall duly recognize the fact that a four lane highway has been constructed in recent past and the six lane highway has to be retrofitted on to the four lane highway. Generally the horizontal alignment and vertical profile of the existing four lane highway shall be retained. The improvements required from safety considerations shall be carried out within the available and proposed Right of Way (ROW). Construction activity may encroach upon the existing highway and reduce the capacity causing inconvenience to the toll paying traffic. Accordingly planning and construction of the Project Highway shall include measures to overcome above mentioned physical and operational constraints.

2.2 Operational Objectives of the Project Highway

The Project Highway will be operated as a partially controlled access highway so as to substantially improve the safety and operational efficiency of the existing highway. The partial control of access for the Project Highway shall be achieved through measures such as service road with physical separation for local traffic, grade separated intersections, acceleration / deceleration lanes, vehicular and pedestrian underpasses / overpasses as described in succeeding paragraphs.

The objective of planning shall be to ensure that long distance through traffic is able to operate at a speed dictated only by the flow on the main highway and not by any other factors, such as interference from local traffic, access traffic, or cross traffic. The traffic having short distance or local O-D, access traffic and cross traffic shall be separated from the long distance through traffic.

No at-grade cross movement on the Project Highway shall be allowed and shall be taken care of by allowing such movements through a system of parallel service roads interconnected through underpasses, overpasses or grade separators. All merging and diverging movements on the main highway shall be through acceleration and deceleration lanes.

All entry to the main highway and exit from it shall be through well designed entry/exit ramps at locations specified in Schedule B.

2.2.1 **The essential elements of planning of the Project Highway**

(1) There shall be **no direct access** to the main highway and all access shall be from service roads which shall be provided on both sides of the main highway. All traffic without exception, needing access to the main highway shall first come on to the service road and then join the main highway through an acceleration lane. Similarly, all traffic exiting the main highway shall first come on to the service road through an exit ramp from where it would distribute to the local road network for various destinations. The existing direct access to the highway shall be closed and alternative access through service road only shall be provided.

(2) There shall be **no at-grade intersection** of any road with the main highway, but only with the service road. The intersection of the Project Highway with another National Highway (NH), State Highway (SH) or Major District Road (MDR) shall be grade separated. The existing direct intersections shall be closed and remodeled accordingly.

(3) The intersecting roads, other than those covered in sub para (2) above, shall be designed to facilitate all movements in following manner:

a. Through a diamond shaped grade separated intersection for cross roads, or

b. Through underpass / overpass for crossing the Project Highway and then right turn through a ramp to merge with the Project Highway or service road if provided as per this Manual, or

c. Through merging with service road and crossing through the next available vehicular underpass.

(4) The service roads on both sides shall be continuous (except where discontinuity is permitted) and have widths as specified in the Manual.

(5) There shall be interconnection between the service roads of both sides through under passes which will facilitate cross movement of local traffic from one side to the other side and to facilitate change of direction of through traffic. Accordingly, the intersections on the service road including those at underpasses shall be designed for safe movements for all turnings.

(6) There shall be **pedestrian crossing** facility through the underpasses, and exclusive pedestrian underpasses as specified in the Manual.

2.2.2 **Minimum requirements of planning**

(1) **Service roads:** The service road shall be provided in continuous length on both sides. Unless otherwise specified in Schedule B, the continuity will be broken (i) at locations of major bridges, (ii) at locations of toll plaza in a length of about 1 km, (iii) in areas where no cross traffic or access traffic is expected (e.g. forest/ghat areas, uninhabited areas, etc) provided that the length of such section is not less than one km.

The service roads shall be connected to the main highway through properly designed entry/exit ramps at locations given in schedule B. The service roads, the ramps and the underpasses/flyovers shall take care of the

local/access traffic and ensure that no right or U turn is required to be provided on the main highway. At the ends, the service roads shall be provided with end treatment so that the local traffic is able to merge the highway in a safe and efficient manner. Some suggestive layouts for commonly occurring situations are given in fig. 2.1(A), 2.1 (B), 2.1(C), 2.1 (D), 2.2, 2.3 and 2.4. The spacing as indicated in figure 2.3 between two consecutive entry and exit ramps for service road would not be kept less than 500 m.

2.2.3 **Acceleration/ deceleration lanes:** Each entry and exit ramp shall have acceleration/ deceleration lane for the main highway. The length of the acceleration/ deceleration lanes shall be decided on the basis of speed differentials of the main highway traffic and the speed permitted on the ramps.

2.2.4 **Vehicular Underpasses:** Vehicular underpass shall be provided as specified in Schedule B and to connect service roads on both sides of the Project Highway in such a manner that no vehicle is required to travel more than 2 km on service road to approach an underpass for crossing over to the other side.

2.2.5 **Facilities for pedestrians and cyclists:**

Facilities for safe and unhindered movement of pedestrians and cyclists shall be provided on the project highway wherever it passes through urban/built-up areas and at grade separators. These facilities shall be planned in accordance with the relevant provisions contained in IRC-11, IRC-17 and IRC-103. Facilities shall also be planned and provided for crossing of pedestrians and cyclists. The crossing facilities can be either in conjunction with at grade intersections or through underpasses. The crossing facilities shall be provided through underpasses such that unless otherwise specified in schedule B, pedestrians do not have to walk for more than 0.5 km. to reach the crossing point. The existing slab culverts and minor bridges with span length equal to or more than 5m, a vertical clearance of more than 2.5m and not catering to perennial flow, can also be used for pedestrians and cycle crossings by providing necessary flooring. In rural stretches, pedestrian/cycle underpasses shall be provided at the locations of existing crossing points.

2.2.6 **Cattle crossings:**

Facilities for crossing of cattle through underpasses shall be provided at locations specified in Schedule 'B'.

2.2.7 **Median openings:**

Median openings shall be provided for emergency and for repair/maintenance works with detachable crash barrier at a spacing of 2 km.

2.2.8 **Elevated sections:**

In urban locations as specified in Schedule B where land acquisition is not possible, the highway shall be elevated. The cross section of the elevated section shall be standard 6 lane. However, if the actual site conditions do not permit construction of 6 lane elevated, a 4 lane elevated section will be acceptable with additional capacity being created at the ground level with effective traffic management mechanism.

2.2.9 **Physical separation:**

Service roads and the main highway shall be physically separated in all circumstances so that there is no interference to the traffic on main highway due to the traffic on service roads and merging / diverging takes place at specified locations and in the manner prescribed in the Manual.

2.2.10 **Traffic signs and road markings for guidance to user:**

(i) **The Project Highway shall be provided with a detailed system of traffic signs and markings. The traffic** signs for various situations/location would be in accordance with IRC 67 in terms of location, configuration and colour scheme.

(ii) Pavement marking shall also be carefully planned depending upon the requirement for each location and shall conform to IRC-35. The Project Highway shall incorporate all such safety features such as detailed system of signs and markings, delineators, cat's eyes, hazard markers, safety barriers at hazardous locations, pedestrian guardrails so that the Project Highway operates as a "Forgiving Highway".

2.3 User Facilities:

2.3.1 **Rest Areas:**

The Project Highway shall have rest areas as specified in Schedule C and be provided with facilities for the users so as to provide safe and comfortable journey. For this purpose, rest areas shall be planned with composite facilities for long distance travelers through personal cars, buses and goods vehicles. Due consideration shall be given to the requirements of different classes of road users including truck drivers.

Wherever some eateries or informal rest areas exist and cannot be relocated or accommodated within the planned rest area, they would be separated from the main highway with separation-island along with safe entry and exit with signs and markings.

2.3.2 **Bus-Bays:**

2.3.3 If the Project Highway has regular movement of buses either through Government or through private sector, bus bays shall be planned, designed and provided for the convenience of bus commuters and safe and unimpeded travel on Project Highway. The bus stops shall be located only within service roads with properly designed entry and exit from main highway as per sub para 2.2.2 (2) above. The location of Bus Bays shall be in accordance with the section 4.14 of the Manual and as given in Schedule 'C'

2.3.4 **Advanced Traffic Management Systems (ATMS):**

The Project Highway shall be provided with ATMS so as to have enhanced safety for the users / travellers, collect information for the traffic operations, provide information to the users on real time basis for the traffic

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flow conditions and incidents ahead. For this purpose, there would be a control centre and outdoor equipment connected through a transmission medium.

2.3.5 **Highway Patrol:**

The Project Highway shall be provided with highway patrol unit(s) for round the clock patrolling so as to provide assistance to the users in case of any need, monitor the travel conditions to provide information to the control section and to undertake immediate measures for managing the traffic flow in case of any incident.

2.3.6 **Ambulance(s):**

The Project Highway shall be provided with ambulance services so that the response time is not more than 10 minutes of the call.

2.3.7 **Crane(s):**

The Project Highway shall be provided with crane(s) with capacity to tow-away the disabled vehicles.

2.4 Avenue/median plantation:

The Project Highway shall have plantation of trees along the highway and low height shrubs on the medians. Plantation scheme shall be reviewed by IE so that it does not affect the road safety.

2.5 Drainage:

The Project Highway shall be provided with an elaborate drainage system to drain the storm water from the roadway and embankment and to ensure minimum disturbance to natural drainage of surface and subsurface water of the area.

2.6 Toll Plaza:

The Project Highway shall have toll plaza(s) as per the requirements and stipulations contained in Schedule C of the Concession Agreement.

2.7 Operation and maintenance centre:

The Project Highway shall have operation and maintenance centre(s) for carrying out operation and maintenance activities of the Project Highway.

2.8 Lighting System:

The Project Highway shall be provided with lighting system in urban stretches/ built up areas, grade separators, underpasses, toll plaza and its approaches, rest areas and bus stops.

2.9 New concepts, technologies and materials:

The Concessionaire would be permitted to adopt new technologies and materials as per the requirements of either the design or as a result of Environmental Impact Assessment (EIA) and Environmental Management

Plan (EMP) (such as noise barriers) or for providing cost effective solutions. These shall be subject to the review by I E for their design and adoption.

2.10 Measures to overcome physical constraints

Physical constraints in the form of limited width of ROW and existing structures (drains, service roads, retaining walls etc), existing access roads and junctions shall be overcome by (a) designing a cross-section that fits into the existing ROW while utilizing the facilities and structures already existing, (b) closing the existing accesses and junctions and providing alternative accesses in accordance with para 2.2.1 above, (c) providing innovative design solutions which economise on space requirement and utilize the existing facilities, and (d) adopting a construction technique appropriate for the purpose.

2.10.1 Wherever ROW is 45 m or more and the existing 4 lane highway is more or less concentrically placed the project highway shall be accommodated within the existing ROW, except in situations where additional widening is required from operational considerations.

2.10.2 The existing alignment and grade shall be followed as far as possible and widening of the carriageway shall be done depending upon the site situation by adding a lane, either on the inside or outside of the existing carriageway.

2.10.3 If the construction of underpasses dictates the floor level of the underpasses to be depressed below ground, it shall be done using such techniques or technologies, which do not interfere with the operation of the existing highway. In all such situations, providing drainage arrangements to continuously discharge the water shall be an integral part of the planning and construction.

2.11 Planning drawings:

The concessionaire shall plan the Project Highway conforming to the requirements spelt out above and submit Kilometre-wise strip plan for the entire project length schematically depicting therein the location of all features specified in Schedule B as well as the project facilities specified in Schedule C clearly indicating the existing features and proposed improvement plan to the IE for review and comments. The submissions shall also include a 3-D animated perspective (To give a drive through vision) of the Project Highway showing the proposed improvements and main features.

SECTION -3: SURVEY AND INVESTIGATIONS

All detailed survey and investigation that are required for planning, design and construction of the project highway, such as detailed topographic survey, traffic survey, hydraulic and drainage survey, road and bridge inventory and condition survey, subsurface investigation, material survey, pavement investigation, etc. shall be carried out in accordance with IRC: SP: 19, IRC: SP: 35 & IRC: SP: 54 and best industry practices.

Technologies and equipments used for undertaking these surveys and investigations shall be such which will ensure the degree of details and accuracy of investigation results required for proper planning, design and construction of the project highway.

All the data generated from these surveys and investigations shall be properly referenced, compiled, validated and presented in easily comprehensible forms, such as those prescribed in the publication referred to above. The data in electronic as well as hard copy formats shall along with the detailed drawings prepared in accordance with section 4 of this Manual form part of Schedule H to the Concession Agreement and shall be used for detailed design in accordance with section 4 of this Manual.

SECTION - 4: DESIGN

4.1 General

The designs shall be based on the detailed survey and investigation data collected by the concessionaire in accordance with Section 3 of this Manual. The drawings prepared on the basis of these designs along with the drawings required as per Section 3 of the Manual shall form part of Schedule H of the Concession Agreement.

All the designs and drawings shall be submitted to the I E for review and comments. The work shall be carried out in accordance with these drawings and such other additional drawings prepared or modified as per comments of the I E.

4.2 Geometric Design:

Geometric design of the highway, except for cross sectional requirements, shall be in accordance with IRC: 73, IRC: 86, IRC: 38 and IRC SP: 23. Uniformity of design standards shall be maintained throughout the length of Project Highway. All deficiencies in the existing highway geometry shall be rectified to meet the minimum standards specified in this Manual. The detailed plans, L-sections, cross-sections, strip plans and plans of other facilities of the existing highway to be prepared by the concessionaire shall be used for developing the layout of various features of the Project Highway.

4.2.1 General cross-sectional requirements:

The design of cross section of the six lane highway shall take into account the following general requirements:

(i) The new six lane highway, as far as possible, shall fit into the existing four lane section without rendering infructuous the existing four lane facilities unless essential or required to fulfill requirements of this Manual.

(ii) The developed cross sections for both the highway as well as the service road shall have operational safety in focus such as segregation, separation, turning radii, gradients, etc and provisions for various types of movements and maneuvers like merge, diverge, weave, etc shall be comprehensively considered and provided for.

(iii) Provisions shall be made in the cross-section for accommodating utilities both over as well as underground as the case may be. A 2.0 m wide strip of land at the extreme edge of ROW may be kept for accommodating utility services. Provisions contained in IRC 98 shall be followed to accommodate utility services for Project Highway in built up areas.

4.2.2 **Specific cross sectional requirements**

The cross section shall provide for the following:

4.2.2.1 **Rural Sections**

(i) Minimum width of median

(a) Raised median with mountable kerb (as per IRC: 86) 4.5 m

(b) Depressed median with crash barriers on both sides 7.0 m

(ii) Width of paved carriageway on both sides of median

(a) 3-lane carriageway with each lane of 3.5 m 10.5 m

(b) Median side paved strip adjacent to carriageway having same specification as main carriageway in case of

(i) Raised median 0.25 m

(ii) Depressed median 0.50 m

(c) Paved shoulder on left side of the pavement having same specification as main carriageway in Plain and rolling terrain 1.50 m

(iii) Width of earthen shoulder

(a) Plain and rolling terrain 2.00 m

(b) Mountainous and steep terrain

- Both carriageways side by side 2.5m
  (i/c drain of hill side and crash barrier on valley side)
- Two carriageways with separate alignments 2.5 m
  on valley side
  (i/c drain of hill side and crash barrier on valley side)

(iv) Side drain

Cross section shall be designed to cater for effective drainage of estimated peak hour run off.

(v) Width of service road Normal 7.0 m (Minimum 5.5 m)

(vi) Width of utility corridor on both sides 2.0 m

4.2.2.2 **Urban/ Built up Sections**

(i) Minimum width of median

(a) Flush median with central crash barrier 2.0 m

(b) Raised median with central crash barrier 1.2 m

(ii) Width of paved carriageway on both sides of median

(a) 3-lane carriageway with each lane of 3.5 m width 10.5 m

(b) Median side paved strip adjacent to carriageway of same specification as main carriageway in case of

(i) Raised median 0.50 m

(ii) Flush median full width (excluding crash barrier)

(c) Paved shoulder on left side of the pavement having same specification as main carriageway

(i) Plain and rolling terrain 1.50 m

(ii) Mountainous and steep terrain (since no service road is provided)

Both carriageways side by side at same level and two carriageways at separate alignments and at different levels:

Habitation on hill and valley side - 2.5m (on each side including drains on hill side)

Habitation on valley side - 2.5m (on valley side)

Habitation on hill side - 2.5m (on hill side including drain)

(iii) Width of earthen shoulder

(a) Plain and rolling terrain -1.5 m (when no service road is provided) - the portion be included in separation island (when service road is provided)

(b) Mountainous and steep terrain (since no service is provided)

Both carriageways side by side at same level and two carriageways at separate alignments and at different levels:

Habitation on hill and valley side - --------

Habitation on valley side - 2.5m (on hill side including drain)

Habitation on hill side - 2.5m (valley side including crash barrier)

(iv) Width of service road Normal 7.0 m (minimum 5.5 m)

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(v) Minimum width of separation-island between main carriageway and service road 1.5 m

(vi) Minimum width of footpath 1.5 m

(vii) Side drain

Cross section shall be designed to cater for effective drainage of estimated peak hour run off.

(viii) Width of utility corridor on both sides 1.5 m

The footpath shall be designed for use of pedestrians and cyclists as per site requirements. Side drain and utility corridor can be accommodated either under footpath or separation-island between main carriageway and service road depending upon local situation.

4.2.3 **Design Speed:**

The design speeds given in following table shall be adopted for various terrain conditions.

Nature of Terrain	Cross slope of the country (per cent)	Design speed (km/hr)	
		Ruling	Minimum
Plain	0 - 10	100	80
Rolling	> 10 - 25	80	65
Mountainous	> 25 - 60	50	40
Steep	> 60	40	30

Short stretches (say less than 1 km) of varying terrain in the project stretch shall not be taken into consideration while deciding the terrain classification for a given section of Project Highway.

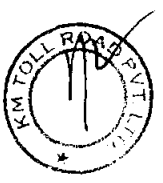
In general, the ruling design speed shall be adopted for geometric design of the highway. Only in exceptional circumstances minimum design speed may be adopted where site conditions are extremely restrictive and adequate land width is not available. Abrupt changes in design speed shall be avoided.

4.2.4 **Horizontal Alignment:**

(a) The design should follow the horizontal alignment of the existing four lane highway unless modification is required to meet the specific provisions under Schedule B or additional features / facilities to be provided as per this Manual. In case the existing facility is a two lane highway, the following general principles shall be kept in view while designing the horizontal alignment:

i. Alignment should be fluent and blend well with the surrounding topography.

ii. On new roads, the curves should be designed to have largest practical radius but in no case less than ruling value corresponding to ruling design speed.



iii. As a normal rule, sharp curves shall not be introduced at the end of long tangent since these can be extremely hazardous.

iv. The curves shall be sufficiently long and have suitable transitions to provide pleasing appearance.

v. Reverse curves may be needed in difficult terrain. Sufficient length between two curves shall be provided for introduction of requisite transition curves, and required superelevation.

vi. The curves in the same direction separated by short tangents known as broken back curves should be avoided as far as possible. Wherever possible, such portion may be designed with longer single curve.

vii. To avoid distortion in appearance, the horizontal alignment should be coordinated carefully with the longitudinal profile.

(b) All horizontal curves shall consist of circular portion flanked by spiral transitions at both ends.

(c) Radii of Horizontal Curves

The radius of horizontal curves for various terrain conditions shall not be less than the ruling minimum values as per IRC: 73 for the National Highways and the terrain of the project area except where site conditions are restrictive and adequate land is not available. Where such restrictions exist, the radius of curve shall not be less than the specified absolute minimum values in IRC: 73.

(d) Transition curves

Minimum length of transition curve shall be as per IRC: 73 for the specified design speed.

4.2.5 **Camber/Cross fall**

Camber / unidirectional cross fall shall be provided for each carriageway including paved shoulders in accordance with stipulations of IRC: 73. The cross fall for earthen shoulder shall be 0.5% steeper than that of the carriageway subject to a minimum of 3.0%. On curves, the shoulder on the high side of superelevated portion shall be provided with reverse slope from the superelevated carriageway portion. At the same time it should not be too great to give break in the cross slope. The rate of change between pavement cross slope and outside shoulder should not exceed 5%.

4.2.6 **Super elevation**

Super elevation shall be provided on curves as per details given in IRC: 73 corresponding to the design speed and radius of horizontal curve adopted.

4.2.7 **Sight Distance**

The design shall provide for values of intermediate sight distance as per details given in IRC: 73 corresponding to the design speed adopted unless there are site constraints, where a minimum of stopping sight distance shall definitely be available. The requisite site distance shall be available across the inside of horizontal curves. Where horizontal and summit curves overlap, the design shall provide for the required sight

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distance both in the vertical direction along the pavement and in the horizontal direction on the inside of curve.

4.2.8 **Vertical Alignment:**

The design should follow the vertical alignment of the existing four lane highway unless modification is required to meet the specific provisions under Schedule B or additional features / facilities to be provided as per this Manual. In case the existing facility is a two lane highway, the following general principles shall be kept in view while designing the vertical alignment:

(i) The vertical alignment shall provide for a smooth longitudinal profile. Grade changes shall not be too frequent as to cause kinks and visual discontinuities in the profile. In this regard, directions given in IRC: 73 shall be kept in view.

(ii) There shall be coordination between horizontal alignment and vertical profile of the Project Highway and guidelines given in IRC: 73 in this regard shall be followed.

(iii) Gradients up to the value corresponding to ruling gradient as per IRC: 73 shall be adopted as far as possible. Value corresponding to limiting gradient shall be adopted only in very difficult situations and for short lengths.

(iv) Long sweeping vertical curves shall be provided at all grade changes. These shall be designed as square parabolas.

(v) The vertical profile of the two carriageways shall be designed in such a manner that difference in road level between the two carriageways at the locations of median openings would not be more than 0.25m.

(vi) The aspect of efficient drainage shall also be kept into consideration while designing vertical profile and cross-sections of the highway as stipulated in IRC: SP: 42 and IRC: SP: 50.

4.2.9 **Geometric design requirement of additional features:**

a. Acceleration Lane:

(i) Length: Designed for a speed differential of 60 kph

(ii) Width: 5.5 m

(iii) Taper at merge: 1 in 15 beyond design length.

b. Deceleration lane:

Same as 'acceleration lane'

c. Length of Median Opening: Not less than 20 m

(for emergency and for repair/maintenance works)

Detachable guard barrier: At every opening.

d. Service Roads:

Design Speed:		40 km/hr (minimum)
Width:	Carriageway	Normal 7.0 m (Minimum 5.5 m)
	Paved shoulder	0.5 m on both sides (may be dispensed with in exceptional circumstances)
Camber/ Super elevation:		As per IRC (Unidirectional camber towards drain shall be provided)
Extra widening		: To be provided at flares for underpass approaches, adequate turning radius, U-turn facility etc as per requirement.
Gradient:		1 in 30 (ruling max)
		Underpass approaches – 1 in 50 generally, 1 in 30 max.

e. Bridges for service road:

(i) If total length of bridge required to be constructed is less than 60 m, on a stream, the service road shall continue across the stream through separate bridge structures, which may be vented causeway structure with vents designed to cater for ordinary flood discharge.

(ii) In cases involving bridges of length 60 m or more, separate bridge structures shall not be provided and service roads on both side of the stream shall be merged with the Project Highway. In such cases, in urban/built up areas, width of bridge to be constructed for main highway shall be increased by one traffic lane (i.e. 3.5 m) on both sides of carriageway to accommodate merging traffic of service road. For this purpose, service roads shall be merged by tapering of the road (1 in 20) with detailed system of signs and markings.

(iii) In cases of ROBs, the service roads on both the sides shall be joined through one of the viaducts of ROB. This arrangement shall be on either side of the railway crossing if the situation demands. For some proportion of service road traffic, safe entry and exit shall be provided from service roads to the ROB.

(iv) Bridges in built up area will invariably accommodate footpath unless specified otherwise in Schedule-B.

f. Junctions at Service Roads:

(i) With minor merging roads: Flaring at the junction like a 'left-in left-out' configuration but with provision for right turning through painted channelising islands.

(ii) At underpasses: Flaring at the junction with provision of painted channelising island to guide traffic movement to/ from the underpass.

g. Vehicular Underpasses:

Width	:	7.5 m minimum
		10.5 m (with footpath of 1.5 m on both sides) desirable

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Vertical Clearance : 5.0 m

h. Pedestrian / Cattle Underpass:

Width : 4.0 m minimum

Vertical Clearance : 2.5 m minimum; to be increased to 4.5m, in case certain categories of animals such as elephant/camel are expected to cross the Project Highway.

i. Grade Separated Intersection: The location of grade separated interchanges shall be as given in Schedule 'B'. Their layout and design shall be as per IRC: 92, keeping in view the site requirements. The crossing of side road to project highway shall depend upon the topography at the site.

4.3 Embankment

4.3.1 General

The height of the embankment shall be based on the final road levels. The following principles shall be followed for fixing the road level:

i) The top of sub-grade is at least 1.0 m above the high flood level/high water table/pond level. However, in exceptional circumstances not covered in the scope of work specified in Schedule-B, where it is found difficult to fulfill this criterion without needing reconstruction or raising in substantial length, a minimum difference of 0.6 m between the top of sub-grade and HFL/high water table/pond level shall be ensured.

ii) The road level of the new two-lane carriageway is not lower than the existing carriageway unless it improves vertical profile and also satisfies all other requirements set out in this Manual.

iii) To fulfill the minimum free board requirement and provide smooth vertical profile for portions forming approaches to structures.

iv) To raise the level of stretches of the existing road from drainage considerations as indicated in Schedule B of the Concession Agreement.

4.3.2 Structural features and design of embankment

i) Embankment shall be designed to ensure the stability of the roadway and shall incorporate only those materials, which are suitable for embankment construction as per Section 5 of this Manual.

ii) Side slopes shall not be steeper than 2H: 1V and where necessary, the embankment shall be retained by a retaining structure in accordance with clause 4.6.

iii) Where the embankment is to be supported on a weak stratum it shall be necessary to specially design the embankment and also adopt appropriate remedial / ground improvement measures.

iv) High embankments (height 6 m or above) in all soils shall be designed from stability considerations. For design of high embankments IRC: 75 and MOSRTH – Guidelines for Design of High Embankments may be referred to.

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v) The side slopes shall be protected against erosion by providing turfing / vegetative cover, stone/C.C. block pitching, geo-synthetics, gabion walls or any other measures depending on the height of the embankment, type of soil involved and susceptibility of soil to erosion as per IRC: 56. Pitching works on slopes shall be as per MOST Specifications.

4.3.3 **Use of Fly Ash for Embankment Construction**

(i) Fly ash shall be used for construction of embankment in accordance with guidelines of MOSRT&H. The embankment shall be designed and constructed in accordance with IRC: SP-58. The thickness of soil cover shall not be less than 1 m for embankments up to 3 m height. For high embankments the thickness of soil cover shall be increased as per design.

(ii) The side slopes of the embankment shall be protected against erosion as stated in para 4.3.2 (v) above.

(iii) The stability analysis of the embankment shall be carried out as per IRC: 75.

4.4 Pavement Design

4.4.1 **Type of Pavement.**

(i) Unless otherwise specified in Schedule-B, the concessionaire may adopt any type (flexible/rigid) pavement structure for new construction.

(ii) The concessionaire shall submit proposal with regard to the type of pavement proposed for strengthening of the existing pavement to IE for review and comments and finalize the proposal taking into account comments of IE.

4.4.2 **Design traffic**

Pavement of the main highway shall be designed for the cumulative number of standard axles of 8.16 tonnes over the design life of 20 years for the concession period of 15 years and above and the design life of 15 years for the concession period of less than 15 years. Base year traffic, axle load distribution, and vehicle damage factor for design shall be determined on the basis of survey and investigation to be carried out by the concessionaire in accordance with section 3 of this Manual. The cumulative axle load for the purpose of design shall not be less than the number of standard axles obtained if the base year traffic is cumulated at a rate of growth, which is the highest of the following in the initial 5 years:

(a) 5% per annum for all vehicles

(b) Trend growth of various vehicle categories

(c) Projected Growth rate of revenue assumed in the concessionaire's cash flow

(d) Growth determined from secondary socio economic data and elasticity factors.

and then reduces by 2 (two) percentage points for every 5 year subject to a minimum rate of growth of 5 % at any period of time.

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4.4.3 **Design procedures**

(i) For widening of the existing flexible pavement to meet the geometric design requirements specified in this Manual, the thickness and composition of layers for widening shall be same as that of existing pavement and further deficiencies in thickness shall be made up by overlay on the entire width of the pavement including paved shoulders. If the condition of existing pavement is so deficient that it cannot be improved by overlays, it will be scarified and the pavement shall be designed afresh.

(ii) In case the existing cement concrete pavement is to be widened, the widened pavement shall be of the same thickness and specification not inferior to that of the existing pavement. The widened pavement shall be joined with the exiting pavement by providing longitudinal joints of the same design and specification as that of the existing pavement. Similarly, the transverse joints with dowel bars of the same design as provided in the existing pavement shall be provided.

(iii) Flexible Pavement

The new flexible pavement shall be designed in accordance with IRC: 37 and strengthening of the existing flexible pavement in accordance with IRC: 81.

(iv) Rigid Pavement

The new rigid pavement shall be designed in accordance with IRC: 58. The existing rigid pavement may be rehabilitated / strengthened either by rigid or flexible overlays in accordance with good industry practice subject to review by the IE.

4.4.4 **Pavement Performance Indicators and Requirements**

i) The pavement performance and structural capacity shall be measured in terms of objective measurable performance and strength indicators, i.e., roughness, rutting, cracking and deflection.

ii) The new or strengthened flexible pavement surface on completion shall satisfy the following standards:

a.	**Roughness**	
	In each lane measured by Bump Integrator (BI)	Not more than 2000 mm/km for each lane in a km length
b.	**Rutting**	
	In wheel path measured	No Rutting

by 3 m. Straight Edge.

c.	**Cracking**	No Cracking
d.	**Deflection** to be determined as per IRC: 81	Not more than 0.5 mm characteristic deflection
e.	**Other distresses**	Nil

(iii) The new or strengthened rigid pavement surface on completion shall satisfy the following standards:

a.	**Roughness** In each lane measured by Bump Integrator (BI)	Not more than 2000 mm/km for each lane in a km length
b.	**Cracking**	No Cracks other than shrinkage cracks
c.	**Other distresses such as** **scaling, raveling, spalling at edges**	Nil

4.5 Design of structures

4.5.1 General

i) The complete structure shall be designed to be safe against collapse and to maintain at all times an acceptable serviceability level. These shall be also designed to be durable to withstand the deteriorating effects of climate and environment.

ii) All bridges shall have independent superstructure for each direction of travel. Culverts may have single or independent structure. Width of median in structural portion shall be kept same as that in the approaches.

iii) In cases where median is kept open to sky, suitable provision shall be made for retaining the earth likely to spill from median portion of immediate embankment behind abutment either by extending the abutment wall or constructing a new retaining wall. Care shall also be taken to merge the wing wall /return wall and flooring of the old bridge with that of the new bridge.

iv) All bridges shall provide for carriageway width as per para 4.5.5 below. Wherever specified in Schedule B, the superstructure shall also provide for pedestrian footpath.

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v) Utility service, if any, to be taken on the structures shall be as specified in Schedule B of the Concession Agreement.

vi) Concessionaire is encouraged to adopt innovative/latest techniques in design, construction and use of new materials. However, in all such cases Concessionaire shall submit all relevant details along-with guidelines and propriety literature proposed to be followed to IE for review and comments.

4.5.2 **Type of Structure**

i) The concession may choose any type of structure and structural system. Design and layout of structures shall be aesthetically pleasing to local environment.

ii) Bridge superstructure, substructure and foundation may be of plain or reinforced concrete, pre-stressed concrete or steel-concrete composite construction.

iii) The following types of structures shall not be accepted

a) Drop in spans with halved joints (articulations)

b) Trestle type frames for substructures

4.5.3 **Pipe Culverts**

(i) Minimum diameter of pipes for new pipe culverts shall be 1200 mm.

(ii) Existing culverts of diameter 900 mm and above, which are in sound condition and functioning satisfactorily, may be retained and extended.

(iii) All existing culverts of diameter less than 900 mm shall be dismantled and reconstructed.

(iv) Minimum depth of earth cushion over pipe including road crust shall not be less than 1000 mm for new / reconstructed culverts. In case of existing sound and safe culverts a minimum cushion of 600 mm may be acceptable.

4.5.4 **Design Period**

The design discharge shall be evaluated for flood of 50-year return period for calculation of waterway and design of foundations.

4.5.5 **Width of structures**

The width of the culverts and bridges shall be adopted as below:

i) New culverts and bridges

(a) The pipe/slab/box bridges/culverts shall have the same overall width as of the approach road. Overall width of these structures shall be such that the outer face of railing/parapet shall be in line with

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the outer edge of the shoulder. The median side inner edge of the safety barrier/kerb shall be at a minimum distance of 500 mm from the edge of the carriageway.

(b) All other new bridges shall be constructed to accommodate for six lane carriageway. In case existing bridge is retained for traffic in one direction, as mentioned below, a new three lane bridge shall be constructed for plying of traffic in other direction. Width of bridge shall be increased to provide for additional lane in urban/built up areas in accordance with para 4.2.9 e (ii) above. Width of immediate approaches shall be adjusted to provide smooth transition from approaches to bridge.

ii) Existing culverts and bridges:

(a) The pipe/slab/box bridges/culverts shall be widened preferably on the outer side so as to make the deck width same as specified in sub-para 4.5.5 (i) above.

(b) Bridges with two lane carriageway (7.5 m):

Widening as also dismantling of the bridges having T-beam or box type superstructure and deep foundations is generally difficult. Keeping in view the condition of superstructure, substructure and foundation, concessionaire may retain the existing two lane bridge and construct another two lane bridge by the side of existing bridge effectively providing four lane bridge carriageway for a three lane one way approach highway. Proper transition between approach and twin bridges shall be provided with the help of crash barriers for guidance and safety of vehicles. The wearing course damaged bearings and rubberized component of expansion joints older than 15 years of existing bridge shall be replaced before commissioning of the Project Highway. Alternatively, concessionaire may propose some innovative solution viz. to dismantle existing superstructure and construct new three lane superstructure to be supported by existing substructure and foundation if their condition is good and if on review by IE the proposal is found to be feasible and safe.

(iii) In cases where bridges are constructed with footpath as per requirement specified in Schedule B, cross section of immediate approaches shall have extra width and provide for footpath.

4.5.6 **Design loading and stresses**

(i) The design loads shall be as per IRC: 6 appropriate for the width of carriageway, type and properties of stream, location, altitude, etc.

(ii) In Seismic Zones IV & V, necessary precautions against dislodgement of superstructure shall be taken by provision of reaction blocks or other type of seismic arresters and increased width of pier/abutment cap.

4.5.7 **Analysis and design of structures**

All structures and their individual components shall be analysed and designed as per IRC:5, IRC:18, IRC:21, IRC:22, IRC:24, IRC:40, IRC:78 and IRC:83 (all parts) depending upon the type of structure / individual

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component proposed to be provided. The minimum cross sectional dimensions of each component shall be provided so as to satisfy the requirements specified in relevant IRC Code. The design shall take into account long term durability, serviceability, constructability, construction methodology and environmental factors. All river training and protection works shall be designed in accordance with IRC: 89.

4.6 Earth Retaining Structures

4.6.1 The concessionaire may adopt any type of earth retaining structure keeping in view the site conditions. The type of earth retaining structure shall be aesthetically pleasing and compatible with the adjoining structures. Earth retaining structures shall be designed for lateral earth pressure including inclined surcharge and hydrostatic pressure, if any.

4.6.2 If the retaining structure is a reinforced earth system, the basic design shall be provided by the system provider and the design shall conform to BS: 8006 in respect of limit state of collapse and serviceability. Complete design calculations and drawings showing ground improvement, foundation, facia, reinforcement, drainage, friction slab, crash barrier etc. shall be submitted to the IE for review and comments, if any.

4.7 Drainage System

The design of drainage system such as surface and sub-surface drainage for pavement, median, shoulder, high embankment shall be carried out in accordance with IRC: SP: 42 and IRC: SP: 50. Surface runoff from the main highway, embankment slopes and the service roads shall be discharged through longitudinal drains, which shall be designed for adequate cross section, bed slopes, invert levels and the outfalls. If necessary, the walls of the drains shall be designed to retain the adjoining earth. Where drains are required to be the covered, the cover of the drain shall be designed for carrying the maximum expected wheel load. The covered drains shall be provided with iron gratings, strong enough to withstand expected loading.

4.8 Safety Barrier

Safety barrier of rigid, flexible, or semi rigid type in accordance with MOSRTH guidelines/circular shall be provided at following locations:

(i) Where heights of embankment is 3 m or more,

(ii) Where embankment is retained by a retaining structure,

(iii) Where median is depressed, flushed or having the width less than 4.5 m. The barriers shall be for both directions of travel,

(iv) On valley side of highway in mountainous and steep terrain.

(v) Between main carriageway and footpath in bridges.

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(vi) At hazardous locations identified in schedule B or through safety audit.

4.9 Toll Plazas

4.9.1 Toll plazas shall be designed for projected peak hour traffic of 20 years. The total number of toll booths and lanes shall be such as to ensure the service time of not more than 10 seconds per vehicle at peak flow regardless of methodology adopted for fee collection. For purpose of guidance following parameters are suggested as a capacity of individual toll lane for design purpose:

(i)	Semi-automatic toll lane (Automatic vehicle identification but manual money transanction)	240 veh/hour
(ii)	Automatic toll lanes (Automatic vehicle identification and money transanction – smart card)	360 veh/hour
(iii)	Electronic toll collection (ETC lanes) (Toll collection through on board unit and no stoppage of vehicles)	1200 veh/hour

4.9.2 Two toll lanes in each direction of travel shall be provided with the system of payment through smart card and their configuration would be such that one lane in each direction could be upgraded in future to the system of Electronic Toll Collection (ETC). The implementation of ETC will be treated as change of scope when concessionaire would be asked to provide for the same. Not less than 2 middle toll lanes shall be capable of being used as reversible lane to meet the demand of tidal flow.

4.9.3 The width of each toll lane shall be 3.2 meters, except for the lane for over dimensional vehicles, where it shall be 4.5 m.

4.9.4 Between each toll lane of the toll plaza, traffic islands are required to accommodate toll booth. These islands shall be of minimum 25 m length and 1.8 m width. Protective barriers of reinforced concrete shall be placed at the front of each island to prevent out of control approaching vehicles crashing into the toll booth. They would be painted with reflective chevron markings.

4.9.5 Toll booth shall be placed at the centre of each traffic island with dimensions to accommodate toll collector's desk for toll equipment such as key board and console, video screen, card reader, note and coin storage, telephone and environmental control system. The toll booth shall have large glass window to provide the toll collector with good visibility of approaching vehicles. The bottom of the toll window should be placed at such a height (0.9 m) above ground level so as to provide convenience of operation. The Toll booths shall be ergonomically designed and vandal proof. There shall be CCTV camera installed at each booth.

4.9.6 For the movement between toll office and toll booth of each toll lane, an underground tunnel across all toll lanes shall be provided. Its dimension would be sufficient to accommodate the required wiring/cable system

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and for convenient movement of personnel. It should also be provided with lighting and ventilation system so that the movement is convenient.

4.9.7 The area of toll plaza covering the flared portion shall be provided with concrete pavement. All the toll lanes and toll booths shall be covered with a canopy. The canopy shall be wide enough to provide weather protection to toll operators, drivers and facilities. The canopy shall be of aesthetically pleasing design with cylindrical support columns located at traffic island so that there is no restriction on visibility and traffic movement. The vertical clearance shall be as prescribed in this Manual.

4.9.8 The toll plaza shall have lighting system to provide visibility to drivers for the use of facility especially to access the correct service lane and also to the toll collector. Indian Standard IS: 1944 shall be followed. The minimum requirement of illumination on the road surface of 30 lux shall be ensured. This would be done by providing high-mast lighting (minimum 25 m height), lighting at canopy, and lighting inside toll booths. Street lighting shall also be provided on both side approaches of toll plaza for a minimum length of 500 metres on each side. Power supply shall be from public power supply system but stand by generating set of the capacity to supply the required power shall be provided at toll plaza.

4.9.9 The toll plaza shall be provided with surface and sub surface drainage system so that all the storm water is drained off efficiently and no ponding or stagnation of water takes place at any area of the toll plaza.

4.9.10 Toll Plaza shall have fire fighting equipment including smoke detectors and auto visual alarm system as per section 4.17.1 of National Building Code so that the personnel working in the complex and the office are not subjected to hazardous situation due to fire.

4.9.11 The semi automatic toll collection system shall be equipped in each entry lane with a vehicle detector for counting the number of vehicles and their axle number and for identification of the category of vehicle. The system shall also have a ticket issuing machine for issue of the tickets for user fee at the press of a button on a touch panel and entry lane controller for controlling the equipment of the entry lane and for sending the data to the data processing equipment at toll plaza office. Each toll lane shall have electronically operated boom barrier along with synchronised system for traffic lights.

4.9.12 The smart card system would comprise the system for vehicle identification, barrier and synchronize traffic light and payment through smart card. The smart card would comprise reader/writer conforming to ISO Standards: 1443-A sealed to a National Electrical Manufacturers Association (NEMA) for Ingress Protection (IP-65) having transmission frequency of 13.56 MHz.

4.9.13 The Electronic Toll Collection system shall consist of an on board unit fitted on a vehicle and an antenna to receive communication for identification of its code and other stored data and a system for transmitting the data from the on board unit to the reader and from reader to the customer information management system.

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4.9.14 Toll plaza location shall also be provided with system for checking and preventing overloading of vehicles at toll plaza. For this purpose, weigh in motion systems at approaches to each toll lane are to be installed. Separate space for static weigh bridge and accommodation to store off-loaded goods from overloaded vehicles shall be provided after the toll barriers for each direction of travel.

4.9.15 Toll plaza shall have a separate office building so as to provide comfortable office space for manager, cashier & other staff. There shall be separate rooms for T.V. monitors, meetings, toilets, and for the sale of passes, smart cards, on board units and public interaction. The building shall have a strong room for keeping the money and a garage to accommodate the security van (during operation of loading the collected revenue). There shall be parking space in the same campus for vehicles for the staff and workers and other vehicles engaged in the operation of the Project Highway.

4.9.16 The toll plaza shall have toll audit system and fraud protection measures. The operations for toll collection, supervision, auditing and money handling shall be done through the qualified personnel so that each operation is efficiently handled.

4.9.17 Suggestive lay out of toll plaza showing the service lanes, office space, parking space, weigh bridges is given in fig. 4.1A and that for toll booth in fig. 4.1B.

4.10 Operation and Maintenance Centre

4.10.1 There shall be operation and maintenance centre(s) either at the toll plaza (s) or at any other location along the highway as identified by the concessionaire. The land for the same shall be acquired by the concessionaire at his cost and risk. The operation and maintenance centre would have following minimum facilities:

(i) Main control centre and Administrative block

(ii) Equipment for operation and maintenance and storage space for them.

(iii) Storage space for equipment and material for traffic signs and markings

(iv) Workshop

(v) General garage and repair shop

(vi) Testing laboratory

(vii) Parking space for minimum 4 no. of large vehicles and for other expected vehicle during peak hours including those for working staff and visitors.

4.10.2 All building works shall be designed to meet the functional requirements and shall be compatible with regional architecture and micro climate. Locally available materials shall be given preference but not at the cost of construction quality.

4.10.3 The circulation roads and parking spaces in the O&M centre shall be paved to withstand vehicle loads and forces due to frequent acceleration and deceleration of vehicles. Parking bays / lots shall have proper cross

slope and drainage. The marking of the parking bays shall be as per IRC: 35 to demarcate parking and circulation space. Parking lots shall have illumination as provided in IS: 1944 (Parts I and II).

4.10.4 The whole campus of operation and maintenance centre shall have system for security with safe entry and exit.

4.11 Traffic Signs

Unless otherwise provided in this Manual, road signs shall be provided in accordance with IRC: 67.

4.11.1 There shall be corresponding road markings with stop signs, give way signs, merging or diverging traffic signs, lane closed signs, road narrowing signs, slip roads/ diversion signs, compulsory keep left/right signs, or any other signs as per IRC-67 and/or as reviewed by IE.

4.11.2 Wherever Project Highway alignment is on a curve, there shall be an advance cautionary signs for sharp curves (depending whether it is on left or right) and chevron signs (rectangular in dimension with yellow background and black arrow) at the outer edge of the curve. The sign for the curve ahead particularly in mountainous and steep terrain shall always be accompanied with chevron signs at the outer edge of the curve and appropriate delineation.

4.11.3 Roads signs such as chevron, overhead etc. not covered by IRC-67 will be as given in this document would be as per BIS/British Standard/AASHTO/ASTM.

4.11.4 All road signs shall be with retro-reflective sheeting of high intensity grade with encapsulated lens fixed over aluminum base plate as per clause 801 of MOSRTH specification.

4.11.5 Kerb mounted signs shall be supported on GI pipes. Overhead signs shall be placed on a structurally sound gantry or cantilever structure made of GI pipes. Its height, lateral clearance and installation shall be as per MOST specifications. The pedestal supporting the gantry or cantilever structure of the overhead signs shall be flushed at the ground level and in no case shall protrude more than 15 cm above ground level.

4.11.6 It shall be ensured that any sign, signal or any other device erected for traffic control, traffic guidance and/or traffic information shall not obscure any other traffic sign and shall not carry any advertisement.

4.11.7 Each exit ramp shall have signs mounted on posts indicating the name of the place and the important roads it would lead to.

4.11.8 For toll plaza(s) advance direction signs shall be provided at 1 km and 500 m ahead of toll plaza. These signs are rectangular in shape, bilingual, gantry, cantilever mounted as illustrated in fig. 4.2 A and fig. 4.2 B. Wherever the local language is other than Hindi, local language instead of Hindi shall be used for sign at 500 m.

4.11.9 It is necessary that user be informed before using the road that a section of National Highway is a Toll Road. Similarly the user be also informed of the end of the Toll Road. Over head sign panels indicating that the toll road is ahead and that the toll road ends is illustrated in fig. 4.2 C and fig. 4.2 D.

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4.11.10 At the start of flare of the toll plaza, a sign displaying the fee rates shall be erected. Suggestive configuration is given in fig. 4.3. The colour of words and panels shall follow IRC: 67.

4.11.11 It shall be ensured that any sign, signal or any other device erected for traffic control, traffic guidance and/or traffic information shall not obscure any other traffic sign.

4.12 Pavement Marking

4.12.1 Pavement markings on the Project Highway shall be in accordance with IRC: 35. These markings shall be applied to road centre line, edge line, continuity line, stop line, give way lines, diagonal/chevron markings, zebra crossing and at parking areas by mean of an approved self propelled machine which has a satisfactory cut off value capable of applying broken line automatically.

4.12.2 Road markings shall be of hot applied thermoplastic paints with reflectorising glass beads as per relevant clauses of Section 803 of MOST specifications.

4.12.3 At toll plaza, transverse bar lines be used across the flared approach to toll gate to reduce the speed of approaching traffic. The width of these lines shall be 300 mm and details as given in fig. 4.4.

4.12.4 Concessionaire shall ensure that a detailed plan scheme and plan for traffic signs and pavement markings covering all length and features of Project Highway shall be prepared and submitted to IE for review and comment.

4.13 Rest Areas

4.13.1 Project Highway shall have Rest Area(s) planned such that they are spaced at the intervals of 90 minutes to one hour of driving time between two important cities/towns. They would not be located between 5 km of a town or city or near interchange where entrance and exit ramps could cause weaving conflict.

4.13.2 Rest areas shall be planned to cater for traffic moving in both directions such that there is no need for the vehicles on one carriageway to cross over to the other carriageway. The entry to this Rest Area(s) would be through deceleration lane and exit through acceleration lane. The minimum width of these lanes shall be 5.5 m.

4.13.3 Rest Area(s) shall be designed for the expected peak hour long term clientage and shall provide facilities for parking, restaurant, cafeteria, toilets, telephone and shops for selling items normally required for traveling, fuel and garage for minor repair, telephone, first aid. The parking should include parking for expected peak hour truck traffic and cafeteria suitable for fulfilling the need for Indian truck drivers and shall be paved by CC blocks strong enough to withstand expected loadings. The whole area shall be elaborately landscaped to

provide a pleasing environment. A suggestive lay out is given in fig. 4.5. This can be modified to accommodate location specific requirements.

4.13.4 At locations along the Project Highway where some existing eateries (Dhaba) or other informal rest areas are located, they shall be separated from the main highway with separation island and safe entry and exit to these establishment and parking spaces for expected peak hour vehicles shall be provided with proper signs and markings.

4.14 **Pick Up Bus Stops**

4.14.1 Pick up Bus Stops shall be designed as defined in schedule C or as per the actual peak hour demand at identified location(s). Bus stops shall be located on service road only and on both sides of the Project Highway for either direction of travel. The bus stop lay out shall provide safe entry and exit of buses from the Project Highway and safe movement of passengers. The shelter structure shall be aesthetically pleasing, structurally safe and functional so as to protect the waiting passengers adequately from sun, rains etc.

4.14.2 The bus bay and shelter shall be designed to provide for safe and convenient use by physically challenged passengers as well.

4.14.3 In rural areas the bus shelter shall be located at least 1.0 m away from the edge of the bus bay which shall be typically 30 m long. The plinth height of the bus stop shall be 0.3 m from the bus bay level and shall be 2 risers high. The minimum ceiling height of the structure shall be 2.1 m and the height of seating shall be 0.4 m from floor level.

4.14.4 The bus bay shall have length to accommodate the expected no. of buses in the peak time. The length and lay out shall be based on those given in IRC: 80 considered suitably modified for six lane dual carriageway highway. It shall be paved with pre-cast cement concrete (M-40) Blocks. The area of the bus stop used by pedestrians shall also be paved with pre-cast concrete blocks.

4.14.5 The barrier fences /pedestrian safety guard rails shall be erected between the bus loading area and the through lanes to prevent pedestrian crossings.

4.14.6 Pick up Bus Stop would be provided with litter bins. These would be simple in shape and their colour and finish shall make them conspicuous. Litter bin shall be post-mounted and/or swivel type. The mounting and fixing components shall be robust. The bin shall have drainage holes for periodic flushing. It shall also be theft, vandal-and fire-proof. It shall be resistant to wear and tear, and the material and design shall be such as to require minimal maintenance.

4.15 **Pedestrian crossing facility**

The Project Highway shall be provided with safe crossing facilities for the pedestrians. These shall be only at identified locations such as pedestrian /vehicular underpasses (in accordance with para 2.2.4). Pedestrian safety guardrail shall be provided to guide the pedestrian to the selected crossing /identified locations. For this

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purpose some of the common locations could be bus stops or other such locations with a possibility of peoples congregation from where the pedestrian safety guardrail be provided up to the nearest at-grade intersection or sub-way. The design of these facilities shall be in accordance with IRC:103. At the crossing points drop in the curve shall be provided to facilitate crossing of physically challenge users. Similarly, the gaps in the channeliser shall be provided so as to avoid the need for frequent climbing and getting down from the channelisers.

4.16 **Highway Landscaping**

4.16.1 Trees shall be planted in rows and on either side of the Project Highway with a staggered pitch as per IRC: SP: 21. A range of 10-15 m c/c is recommended for spacing of trees (parallel to the road). Setback distance of trees in different situations shall be as per IRC: SP: 21 and IRC: 66. The distance between the kerb, if any, and the nearest edge of tree trunk shall be at least 2 m. The plantation in median shall comprise shrubs whose height would normally not exceed 1-1.5 m and shall be as per IRC SP: 21.

4.16.2 The scheme for landscaping shall be part of the overall Environmental Mitigation Plan (EMP) as spelt out in Schedule C. In case of a discrepancy between the spacing for trees to be planted parallel to the road as specified in the IRC standards and the EIA Report, the lesser of the two distances shall be adopted.

4.16.3 For safe traffic operation, vertical clearance between the crown of the carriageway and lowest part of the overhang of the tree available across the roadway shall conform to the standards laid down in IRC: SP: 21. The pit size, fencing, watering and manuring requirements shall also conform to the above standard. Planting shall be such that it does not obstruct the visibility of traffic from any side and shall be pleasing in appearance.

4.17 **Advertisement/ Hoarding:**

No advertisement/ hoarding shall be allowed to be erected on the Project Highway.

4.18 **Advanced Traffic Management Systems (ATMS):**

4.18.1 A real time system working round the clock shall be established for informing the road users of the road, traffic, and weather conditions on the Project Highway; for making interventions as required for smooth, safe and efficient traffic operation; and for providing rescue and relief to the users in distress. The system shall be capable of (i) acquisition of data from various sources such as the road, the users, the maintenance and operation patrol, the ambulance, and the intervention team (ii) three way communication between the data source and a Central Control Room, the Control Room and the data sources and display units, and between the maintenance and operation teams, through a transmission system, and (iii) A Central Control Room to process all data and control the highway operation.

4.18.2 The systems and equipment of ATMS shall meet the following main climatic and environmental requirement as specified in IS-9000

(i) Temperature Range of Operation – Low of 0° Celsius (± 3° C) to high of 60° Celsius (± 2° C)

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(ii) Relative Humidity of 95%

(iii) Vibration Frequency Range of 10 Hz – 55 Hz

4.18.3 Data acquisition system: This shall consist of (a) Automatic Traffic Counter and Classifier (ATCC), with an in-road loop detectors and treadles. (b) Video cameras installed on road with such pan and tilts that a length of 2 km road is captured for video monitoring of traffic, (c) Emergency Call Boxes installed at every 2 km to enable any user to be instantly in contact with the Control Room, (d) Meteorological sensors for capturing data on temperature, weather, wind, (e) Mobile radios for patrol vehicles and ambulances to be in communication with Central Control Room and among themselves.

4.18.4 Emergency call boxes (ECBs) with loud speaker, micro phone, activation button with LED indicating conversation, shall be housed in a vandal proof casing and operate in full to play mode in noise level of up to 95 decibels with in built diagnostic features for automatic detection in case of damage by any object. Mobile communication system shall comprise the mobile radio base stations and control centre equipments. It shall have provision for mounted mobile set on ambulances, trains & patrolling vehicles. The system shall have the facility to connect mobile to mobile, mobile to controller, and controller to mobile along with the systems for waiting, holding, and transfer of calls. The system shall use a pair of frequencies to be allotted to the concessionaire with the approval of wireless planning & coordination (WPC), Deptt. of Telecommunications and shall operate for full duplex mode.

4.18.5 The design for the Variable Message Signs (VMS) will be modular with sign panels using LEDs / High-Gain Trans-Reflective LCDs for outdoor ambient lights. The sign panel should be such that a display is legible from a distance of about 200 m. For this purpose, panels shall have minimum dimensions of 3m length x 1.8 m depth. The minimum height of the characters shall be 300 mm. The contrast ratio shall be more than 30 perpendicular to the bold face and more than 10 at an angle of ± 70 degrees to the perpendicular. The equipment shall be capable of storing minimum 10 frames that can be triggered on receiving the tele-command. The sign panels shall be installed on the structure in such a manner that they are aesthetically pleasing and can withstand wind pressures. The equipment shall be capable of storing minimum semi-duplex mode and other known forces. The minimum vertical clearance available at VMSs shall be 5.5 m from the road surface. Power supply shall be fed from the integrator locations.

4.18.6 The meteorological sensors shall comprise thermocouple /pyrometer, humidity meter, anemometer , visibility meter and sensor for measuring pavement surface temperature. They shall be installed on a single pole with a specific attachment and power supply fed from the integrator. They shall have the facility to communicate on Polythene Insulated Jelly Filled copper cables (PIJF) /Optical Fibre Cable.

4.18.7 The Automatic Traffic Counter-cum-Classifier (ATCC) shall be capable of detecting and recording all categories of vehicles plying on the Project Highway based on their length and no. of axles. The system shall be robust and capable of operating with minimum maintenance and may be either piezo-electric or infrared. It should have minimum accuracy level of 99%. The logic units shall be microprocessor based. The system should be able to record and store vehicle data for a period of at least two weeks with a Daily Traffic Volume

of up to 1,00,000 vehicles. The system shall have compatibility to transfer the data on PIJF/Optical Fibre Cable/by using any of the available communication mode like GSM (Global System for Mobile Communications) / GPRS (General Packet Radio Service), landline modem, CDMA (Code Division Multiple Access) depending upon the effective and economic operation of the particular mode available at the site. The system shall be electric/solar power operated depending upon the availability of source.

4.18.8 The Closed Circuit Television (CCTV) Surveillance shall comprise video camera, its housing and pan, and Tilt Heads. The video camera shall be mounted at a height so as to cover the target length of highway and the housing shall be able to withstand adverse weather conditions. It shall have a 360 degree angular travel in the horizontal plane and a tilt of 90 degrees down from 0 degrees horizontal. It shall have zoom lens with minimum power of 30 X, auto iris and infrared filter, infrared compatibility for night operation and remotely selectable operating modes. It shall have compatibility with co-axial cable/optical fibre cable.

4.18.9 The main control centre shall be designed for round-the-clock operations of monitoring, on-line information acquisition and processing the same for decision making. The Main Control Centre shall have equipment of central computer, call centre, terminal junction box, uninterrupted power supply (UPS) , counsel operator with monitors and joy sticks, rack accommodation, large display board, line printer and general purpose office computer with monitor, printer, fax and telephone. The system shall also have Network Management system (NMS) or real-time monitoring of Emergency Call Boxes (ECBs) and network diagnostics.

4.18.10 Transmission System: This shall consist of a backbone Optical Fiber Transmission system, cable system, interface system, network management system, repeater/ amplification system, and power supply system. There shall be 3 or 4 sub-centres (as appropriate) housing all the interface equipment apart from the Control Centre, provided with, as appropriate, cables, interface, terminals (such as optical line terminals and interface, network management system equipment, optical fiber cable interface equipment and control centre interface equipment, data acquisition system interface, etc). The cables from ECBs, VMS, meteorological data systems, ATCC shall be Polythene Insulated Jelly filled (PIJF) copper cables and those from CCTV cameras shall be coaxial cables. Repeaters/ amplifiers shall be used to maintain the quality of signals. All the cables shall have at least 20 % spare capacity to allow for expansion. The interface system shall be capable of handling the composite audio, video and data signals at various interface levels and process them.

4.18.11 Central Control Room (Control Centre): The Central Control Room (CCR) shall be the repository of all the data acquired from the field and their processing, storing, and archiving. All the information for real time monitoring of the Project Highway shall be generated at the CCR and the relevant information shall be disseminated to the users through Variable message signs, and to the operation and management teams through mobile radio communication system for appropriate intervention. Another important function to be performed at the Control centre shall be the operation and management of the ATMS itself along with its various sub systems.

CCR shall have the following minimum equipment, hardware and software:

(1) A Central Computer Server with integrated ATMS and ATMS software

(2) A Traffic Manager's Terminal for operation of the integrated traffic management system

(3) Call system equipment comprising Operator PC along with sub-systems and digital voice recorder.

(4) Mobile radio terminal comprising Operator PC and engineering terminal

(5) Computers for Network Management System (NMS) for Fiber Optic Communication System.

(6) CCTV Console Equipment

(7) Computers for VMS, AVCC, MET, Traffic Control

(8) A large size screen

(9) A line Printer

(10) An Office Computer

(11) A Power Supply and back up system

4.18.12 Dissemination of information: Information generated at the Control Centre shall be disseminated in the following manner:

(a) To the users: By displays on the Variable Message signs, via internet web pages, and by creating a node at the way side amenities to display the relevant information.

(b) To the Operation and maintenance teams: By mobile phones

(c) To the ambulances: By mobile phones

(d) To the Trauma centres: Via ambulances

4.19 **Highway patrol**

Highway patrol unit(s) manned by at least two persons apart from the driver for every unit shall continuously patrol the highway in a stretch not exceeding 50 km and shall remain in contact with the Control Room on a real time basis. The patrol shall render assistance to users in distress and disabled vehicles through own intervention or by calling from assistance from Control Room, Crane operators or ambulance as required. The patrol shall promptly clear the road of any obstruction. Where the obstructions take time to be cleared, the section shall be cordoned off by placing traffic cones, which shall be illuminated during night. The patrol vehicle shall be large enough for seating at least four personnel beside the driver and space to carry essential traffic management tolls. It shall also have a light on its top and a siren on board. It shall be equipped with traffic cones and other accessories for traffic control which are fully visible during night time.

4.20 **Ambulance(s)**

Ambulance(s) manned by at least two trained paramedics shall be available on the Project Highway so that the response time is not more than 10 minutes of call. Each ambulance shall be equipped with first aid, life saving medical services and support system implements for transporting the victims to the nearest trauma hospitals, and providing emergency medical aid during transportation of victims from accident site to the nearest trauma hospital.

4.21 **Crane(s)**

Crane(s) shall be available within an hour of an incident to clear the disabled vehicle off the carriageway.

4.22 All intervention teams comprising patrol, ambulances and cranes shall be in communication with each other and the Control Room all the time and shall intervene within the stipulated time.

4.23 **Lighting system**

All light posts erected on the railings of bridges, structures shall have adequate height such that a uniform illumination of 40 lux is available.

All high mast lights in the interchange area shall illuminate the interchange with intensity of 40 lux.

All entry and exit ramp areas shall be uniformly illuminated with 40 lux intensity

All underpasses shall be illuminated with minimum intensity of 30 lux.

4.24 **Design Report and Drawings**

The concessionaire shall furnish the detailed report including designs and drawings for each component of the Project Highway such as geometry, pavement, structures, drainage, barriers, protective works, traffic control devices and other user facilities etc. as per the requirements specified above to the IE for his review and comments, if any. The drawings to be submitted shall satisfy the requirements (including scale and the size) specified in IRC: SP: 19 and IRC: SP: 54.

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SECTION -5: MATERIALS

5.1 General:

Sourcing of all materials as well as compliance with environmental requirements under the applicable laws in respect of all works to be executed under the Concession Agreement shall be the sole responsibility of the concessionaire. All materials, whether natural (such as earth, gravel, sand, aggregates, etc), processed (such as bituminous and concrete mixes), or manufactured (such as cement, steel, bitumen, etc) shall be incorporated in the work only if they are tested and found to meet the requirements of this Manual or, in the absence of any provision in this Manual, conform to the best industry practice.

5.2 Natural materials

5.2.1 Physical requirements of earth, gravel, sand, and aggregates shall conform to the requirements of the provisions of those clauses of MOST specifications as are relevant to the intended use of the materials.

5.2.2 Natural aggregates when crushed and blended for various uses, different size fractions shall be proportioned to form grading conforming to those clauses of the MOST specifications as are relevant to the intended use of the material. Where clauses of the specifications provide more than one option, the option which provides the closest grading shall be provided.

5.3 Processed materials

5.3.1 Fly ash: Fly ash to be used in embankment construction shall meet the requirements specified in IRC: SP: 58.

5.3.2 Cement Concrete mixes: Concrete mixes, plain or reinforced, shall be design mixes, designed in accordance with the provisions of IS: 456. Concrete of M20 grade or higher shall be used for the project except for leveling course in foundation and dry lean concrete for Cement concrete pavement where M15 grade concrete shall be used. Specific requirements of the mixes (such as workability, water cement ratio, use of admixtures, grades of cement and steel, minimum and maximum cement content, ratios of 7 and 28 days strengths, etc) shall be a per those provisions of MOST specifications as are relevant to the intended use of the concrete mix.

5.3.3 Bituminous mixes: Bituminous mixes shall be hot mix type and shall be designed in accordance with Asphalt Institute Manual series MS 2 with the ingredients of the mix (such as aggregates, fillers, bitumen, etc) conforming to the provisions of MOST specifications as relevant to the type of mix intended to be used.

5.4 Manufactured materials

5.4.1 Cement: Ordinary Portland cement grades 33, 43 and 53 conforming to IS: 269, IS: 8112, and IS: 12269 respectively shall be used subject to the condition that the design cement content does not exceed 540 kg per cum and the minimum requirement of cement from durability considerations are provided. Use of Portland

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slag cement or Portland pozzolana cement shall not be permissible for any structural concrete. Other grades of cement such as Rapid hardening cement conforming to IS: 8041 and Sulphate resistant cement conforming to IS: 12330 shall be permissible in specific situations subject to the provisions of clause 1000 of MOST specifications.

5.4.2 Bitumen: 60/70 Paving grade bitumen conforming to IS: 73 shall be used. Crumb rubber modified bitumen (CRMB) and Polymer modified bitumen (PMB) conforming to IRC: SP: 53 shall be used.

5.4.3 Steel: High Yield Strength Deformed (HYSD) reinforcing bars of S 415 grade conforming to IS: 1786 and High Tensile Strength pre-stressing tendons conforming to IS: 6006 shall be used.

5.4.4 Sheathing, anchorages, void formers, bearings, expansion joints, geo-textile and geo-grid, metallic strips, bars, grids for reinforced earth, metal beam crash barriers, prefabricated vertical drains, retro-reflective sheetings and road marking paints: These shall meet the relevant provisions of the MOST specifications, recommendations of the system providers, manufacturers' testing and certification, and the designers' design assumptions

5.5 Concessionaire may use other construction materials for example stabilized soil for which a detailed design procedure to be adopted shall be furnished to IE for review and comments.

SECTION -6 : CONSTRUCTION

6.1 General

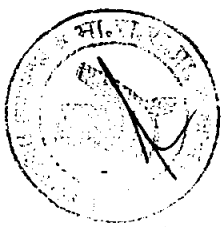
Construction planning, techniques, technologies and equipment shall be planned in a manner not to compromise on the efficiency and safety of the existing highway. Efficient and safe operation of the existing highway without reducing its capacity and safety shall be ensured during construction of the Project Highway. Construction shall meet the environmental safety norms, and ensure safety of temporary and permanent works, safety of traffic, pedestrian (if any) and workman during construction, meet the access needs of the population living close by and shall not cause any damage to their property.

6.2 Construction specifications

Unless not specifically provided for in the MOST specifications, construction of various components of the Project Highway shall be carried out in accordance with these provisions of specifications to the extent they are relevant. For avoidance of doubt, such provisions of the specification as relate to approval from Engineer, refer to contract drawings, provide for measurement for payment and unit rates, etc which are generally applicable to item rate contracts shall not be considered relevant to this agreement. However, provisions relating to material specifications, construction methods, equipment, processing of materials, laying, compaction, testing, quality control/assurance, etc shall be considered relevant to this agreement. The final decision with regard to which provisions are relevant and which are not shall rest with the IE.

Where construction specification for any component of work is not provided for in MOST specifications, construction shall be carried out in accordance with international specification, or best industry practice, or the specifications provided by the manufacturer or provider of the system subject to review by IE. The concessionaire shall remain responsible for construction with regard to its adequacy, safety, and durability regardless of any review and comments by the IE. In case, concessionaire chooses to adopt new material, technology and construction methodology, he shall first sample test the same to demonstrate that the proposed material/technology/methodology can be successfully implemented to achieve the specified performance levels of the Project Highway. These processes shall be subject to the review and comments of the IE.

All the construction equipment shall have the required capacity to meet the output requirements of works under the agreement and shall have mechanical, hydraulic, electronic and other controls, Manual or automatic, as required for meeting the construction requirements.



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6.3 Construction planning

Prior to actual commencement of construction, a construction plan shall be drawn up and submitted to the IE for review and comments. The plan shall be prepared to meet the requirements of this section of the Manual and contain, *inter alia*, the following:

(1) Sequence of construction activities to be undertaken with time line on a PERT chart

(2) At each construction site, the areas to be cordoned off for construction and logistics of movement of construction equipment.

(3) Arrangement for movement of main line traffic near construction sites and assessment of capacity and safety of the alternative arrangement. If capacity augmentation is necessary as per the assessment, suggested measures to restore the original capacity of the main highway on the alternative arrangement.

(4) If construction activities affect the access to properties or movement of cross traffic, alternative arrangements during construction.

(5) A detailed plan for safe and efficient movement of existing traffic through the construction zones along with required signs and markings for cautions and guidance.

6.4 Base Camp for Construction

The concessionaire shall establish base camp(s) for the construction of Project Highway at the location from where construction sequences and processes can be efficiently performed. The land for the base camp shall be acquired by the concessionaire at his cost and risk and its size shall be such that it accommodates the plants, equipments, materials, laboratories, offices, residences and space for movement/circulation of construction vehicles/machinery. The space should also have space for recreation and sporting facilities for the staff and workers.

6.5 Traffic diversion

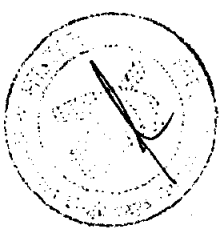
Where it is necessary to close the traffic on the existing highway for construction and divert the traffic on to an alternative route, such diversion shall have the width equal to the width of the road closed. The diversion road shall have fluent geometry and maintained in traffic worthy condition such that traffic can safely negotiate.

6.6 Access to private property

If existing access to private property is to be closed due to construction, alternative access shall be provided before construction is undertaken.

6.7 Cross road Traffic

If existing cross road is to be closed due to construction, alternative approach and crossing facility shall be provided before construction is undertaken.



6.8 Temporary work

Temporary work shall not be erected on the main highway if traffic is allowed to ply on it while construction is to progress. Similarly, erection equipment for erection of temporary or permanent work shall not be allowed on the main highway if the portion of the highway remains under use of the main line traffic.

The concessionaire shall be responsible for safe, workable design and methodology for all temporary forms, staging and centering required for construction of structures in accordance with IRC: 87.

6.9 Traffic management during construction

In order to ensure that the construction activities do not disrupt the movement of the existing traffic, comprehensive traffic management plan shall be drawn up by the concessionaire. Wherever construction shall be undertaken, it shall be declared a construction zone. The length of the construction zone shall be reasonable, neither too short which will put the traffic to frequent inconvenience nor too long, which is difficult to manage. A reasonable length of the road could be the length between two successive entry ramps.

Traffic in construction zones shall be managed in accordance with the provisions of IRC SP 55. All transitions, ingress/ egress to and from the main highway, shall have proper and smooth geometry and traffic shall be guided by road signs, markings, delineation and other appropriate means as required for safe and efficient operation.

After construction is completed in a particular zone, it shall be opened for normal operation. Prior to the beginning of normal operation, those parts of the diversions as will not eventually form part of the Project Highway shall be closed to prevent any movements not permitted under the normal operation of the Project Highway.

6.10 Improvement and maintenance of roads other than Project Highway

The concessionaire shall be responsible for improvement of all roads to be used for carrying construction material and/or machinery for construction of the Project Highway. The level of improvement shall be commensurate to the requirements for carrying the expected traffic during construction period. These roads shall also to be maintained by the concessionaire up to the level of improvement carried out throughout the construction period and until commissioning of the Project Highway.

6.11 Social disruption

The concessionaire shall take all measures to mitigate any disruptive effects of construction such as noise and dust pollution, closure of local accesses, intrusion to the lives and business activities of the people, threat to their property, or any other disruption. These measures shall be taken after due consultation with the local people, local administration and authority's local establishment.

SECTION -7 : QUALITY ASSURANCE

7.1 At least 2 weeks prior to commencement of the work, the Concessionaire shall draw up a Quality Assurance Manual (QAM) covering the Quality System (QS), Quality Assurance Plan (QAP) and documentation for all aspects of the bridge and road works as per IRC: SP 47 and IRC: SP: 57 respectively and furnish to the IE for review and comments. The quality assurance plan shall duly provide therein for conducting tests on the quality of materials, construction of temporary and permanent works, and the finished works. He shall enable the IE to inspect the Quality Assurance Plan, the test results, and witness the conduct of such tests. The IE shall, in his inspection report in compliance with the provisions of clause 13.2 of the Concession Agreement, bring out the non-conformities in the tests and quality procedures in his inspection report.

7.2 The quality of materials and work shall meet the requirement of Clause 900 of MOST specifications to the extent relevant and applicable. The decision with regard to the relevance and applicability of the Clause shall rest with the IE. The quality of materials and work that are not relevant to the MOST specifications shall meet the requirements of other relevant standards that are followed for the work. Always provided that manufacturer's testing and certification shall be essential for the manufactured materials.

7.3 Remedying the defects and deficiencies required as per Clause 13.2 of the Concession Agreement shall be carried out in the following manner:

(1) Improving, modifying, changing the Quality Assurance Plan and its implementation

(2) Replacing the non-conforming material by materials conforming to the standards by changing the material source, material processing, construction equipment or technique before incorporation of the material in work.

(3) In case a nonconforming material has been incorporated in the work, by removing the work to the extent of non-conformities and replacing it by a work meeting the requirements of the quality.

(4) In case a work or any of its component exceeds the limits of tolerances specified in the quality standards, by rectifying the work and bringing it within the limits of tolerance.

List of IRC Codes / Standards / Acts for Road/Bridge Works

IRC:	2	-1968	Route Marker Signs for National Highways (First Revision)
IRC:	3	-1983	Dimensions and weight of Road Design vehicles. (First Revision)
IRC:	5	-1998	Standard Specification & Code of Practice for Road Bridges, Section I – General Features of Design (7th Revision)
IRC:	6	-2000	Standard Specifications & Code of Practice for Road Bridges, Section II – Loads and Stresses (Fourth Revision)
IRC:	7	-1971	Recommended Practice for Numbering Bridges and Culverts (First Revision)
IRC:	8	-1980	Type Designs for Highway Kilometre Stones (Second Revision)
IRC:	9	-1972	Traffic Census on non urban roads (First Revision)
IRC:	10	-1961	Recommended Practice for Borrow pits for Road Embankments Constructed by Manual Operation
IRC:	15	-2002	Standard Specifications & Code of Practice for Construction of Concrete Roads (Third Revision)
IRC:	16	-1989	Specification for Priming of Base Course with Bituminous Primers (First Revision)
IRC:	18	-2000	Design Criteria for Prestressed Concrete Road Bridges (Post-Tensioned Concrete) (Third Revision)
IRC:	20	-1966	Recommended Practice for Bituminous Penetration Macadam (Full Grout)
IRC:	21	-2000	Standard Specifications and Code of Practice for Road Bridges. Section-III Cement Concrete (Plain and reinforced) (Third revision)
IRC:	22	-1986	Standard Specifications and Code of Practice for Road Bridges. Section-VI Composite Construction (First Revision).
IRC:	24	-2001	Standard Specifications and Code of Practice for Road Bridges. Section-V Steel Road Bridges (First Revision)
IRC:	26	-1967	Type Design for 200-Metre Stones
IRC:	30	-1968	Standard Letters and Numerals of Different Heights for Use on Highway Signs
IRC:	32	-1969	Standard for Vertical and Horizontal Clearances of Overhead Electric Power and Telecommunication Lines as Related to Roads
IRC:	33	-1969	Standard procedure for evaluation and condition surveys of stabilised soil roads.
IRC:	34	-1970	Recommendations for road construction in waterlogged area.
IRC:	35	-1997	Code of Practice for Road Markings (with Paints) (First Revision)
IRC:	36	-1970	Recommended Practice for Construction of Earth Embankments for Road Works

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List of IRC Codes / Standards / Acts for Road/Bridge Works

IRC:	37 -2001	Guidelines for the Design of Flexible Pavements (Second Revision)
IRC:	38 -1988	Guidelines for Design of Horizontal Curves for Highways and Design Tables (First Revision)
IRC:	40 -2002	Standard Specifications and Code of Practice for Road Bridges, Section IV - Brick, Stone and Block Masonry (Second Revision)
IRC:	41 -1997	Type designs for check barriers (First Revision)
IRC:	42 -1972	Proforma for record of test values of locally available pavement construction materials.
IRC:	45 -1972	Recommendations for Estimating the Resistance of Soil Below the Maximum Scour Level in the Design of Well Foundations of Bridges
IRC:	52 -2001	Recommendation about the alignment survey and geometric design of hill roads. (Second Revision)
IRC:	54 -1974	Vertical Clearances at Underpasses for Vehicular Traffic.
IRC:	56 -1974	Recommended Practice for Treatment of Embankment Slopes for Erosion Control
IRC:	57 -1974	Recommended Practice for Sealing of Joints in Concrete Pavements
IRC:	58 -2002	Guidelines for the design of plain jointed Rigid pavements for highways (Second Revision)
IRC:	59 -1976	Tentative Guidelines for the design of gap graded cement concrete mixes for road pavements.
IRC:	61 -1976	Tentative Guidelines for the construction of Cement Concrete Pavements in Hot Weather
IRC:	65 -1976	Recommended practice for traffic rotaries.
IRC:	67 -2001	Code of Practice for Road Signs (First Revision)
IRC:	69 -1977	Space Standards for Roads in Urban Areas
IRC:	70 -1977	Guidelines on regulations and control of mixed traffic in urban areas.
IRC:	71 -1977	Recommended practice for preparation of notations.
IRC:	73 -1980	Geometric Design Standards for Rural (Non-Urban) Highways
IRC:	75 -1979	Guidelines for the Design of High Embankments
IRC:	78 -2000	Standard Specifications and Code of Practice for Road Bridges. Section-VII Foundations & Sub-structure (Second Revision).
IRC:	79 -1981	Recommended Practice for Road Delineators
IRC:	80 -1981	Type Designs for Pick-up Bus Stops on Rural (i.e., Non-Urban) Highways
IRC:	81 -1997	Tentative Guidelines for Strengthening of Flexible Road Pavement Using

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Benkelman Beam Deflection Technique (First Revision)

IRC:	83 -1999	Standard Specifications and Code of Practice for Road Bridges. Section-IX Bearings, Part-I: Metallic Bearings.
IRC:	83 -1987	Standard Specifications and Code of Practice for Road Bridges, (Part-II) Section-IX Bearings, Part-II : Electrometric Bearings
IRC:	83 -2002	Standard Specifications and Code of Practice for Road Bridges, (Part-II) Section-IX Bearings, Part-III : POT POT-CUM-PTFE, PIN AND METALLIC GUIDE BEARINGS
IRC:	84 -1983	Code of Practice for Curing of Cement Concrete Pavement
IRC:	85 -1983	Recommended practice for accelerated strength testing and evaluation of concrete for Road and Airfield Constructions.
IRC:	86 -1983	Geometric Design Standards for Urban Roads in Plains
IRC:	87 -1984	Guidelines for the design and erection of false work for road bridges.
IRC:	88 -1984	Recommended practice for lime fly ash stabilised soil base/ sub base in pavement construction.
IRC:	89 -1997	Guidelines for Design & Construction of River Training & Control Works for Road Bridges (First Revision)
IRC:	91 -1985	Tentative guidelines for construction of cement concrete pavement in cold weather.
IRC:	92 -1985	Guidelines for the Design of Interchanges in Urban Areas
IRC:	93 -1985	Guidelines on Design and Installation of Road Traffic Signals
IRC:	98 -1997	Guidelines on Accommodation of Underground Utility Services Along and Across Roads in Urban Area (First Revision)
IRC:	101 -1988	Guidelines for design of continuously reinforced concrete pavement with elastic joints.
IRC:	102 -1988	Traffic studies for planning bypasses around towns.
IRC:	103 -1988	Guidelines for Pedestrian Facilities
IRC:	104 -1988	Guidelines for Environmental impact assessment of Highway projects.

IRC:	SP:	11 -1988	Handbook of Quality Control for Construction of Roads and Runways (Second Revision)
IRC:	SP:	13 -2004	Guidelines for the Design of Small Bridges and Culverts.
IRC:	SP:	14 -1973	A Manual for the Application of the Critical Path Method to Highway Project in India
IRC:	SP:	15 -1996	Ribbon Development Along Highways and its Prevention

A 08

IRC:	SP:	16	-2004	Guidelines for surface evenness of Highways Pavements (First Revision)
IRC:	SP:	17	-1977	Recommendations About Overlays on Cement Concrete Pavements
IRC:	SP:	18	-1978	Manual for Highway Bridge Maintenance Inspection.
IRC:	SP:	19	-2001	Manual for Survey, Investigation and Preparation of Road Projects (First Revision)
IRC:	SP:	21	-1979	Landscaping of Road
IRC:	SP:	22	-1980	Recommendations for the Sizes for each Type of Road Making Machinery to Cater to the General Demand of Road Works
IRC:	SP:	23	-1983	Vertical Curves for Highways
IRC:	SP:	25	-1984	Gopi and his Road Roller-Guidelines on Maintenance of Road Roller
IRC:	SP:	27	-1984	Report Containing Recommendations of IRC Regional Workshops on Highway Safety
IRC:	SP:	32	-1988	Road Safety for Children (5-12 Years Old)
IRC:	SP:	33	-1989	Guidelines on Supplemental Measures for Design, Detailing & Durability of Important Bridge Structures.
IRC:	SP:	34	-1989	General Guidelines About the Equipment for
IRC:	SP:	35	-1990	Inspection and Maintenance of Bridge.
IRC:	SP:	37	-1991	Guidelines for Evaluation of Load Carrying Capacity of Bridges
IRC:	SP:	39	-1992	Guidelines on Bulk Bitumen Transportation & Storage Equipment
IRC:	SP:	40	-1993	Guidelines on techniques for strengthening and rehabilitation of bridges.
IRC:	SP:	41	-1994	Guidelines on Design of At-Grade Intersections in Rural & Urban Areas
IRC:	SP:	42	-1994	Guidelines on Road Drainage
IRC:	SP:	44	-1994	Highway Safety Code
IRC:	SP:	46	-1997	Steel Fibre Reinforced Concrete For Pavements
IRC:	SP:	47	-1998	Guidelines on Quality System for Road Bridges (Plain, Reinforced, Prestressed and Composite Concrete).
IRC:	SP:	48	-1998	Hill Road Manual
IRC:	SP:	50	-1999	Guidelines on Urban Drainage
IRC:	SP:	51	-1999	Guidelines for Load Testing of Bridges
IRC:	SP:	52	-1999	Bridge Inspector's Reference Manual
IRC:	SP:	53	-2002	Guidelines on Use of Polymer and rubber Modified Bitumen in Road Construction (First Revision)
IRC:	SP:	54	-1999	Project Preparation Manual for Bridges

IRC: SP: 55 -2001 Guidelines for Safety in Construction Zones

IRC: SP: 56 -2000 Guidelines for Steel Pedestrian Bridges

IRC: SP: 57 -2001 Guidelines for Quality Systems for Road Construction

IRC: SP: 58 -2001 Guidelines for Use of Fly ash in Road Embankments

IRC: SP: 59 -2002 Guidelines for Use of Geotextiles in Road Pavements and Associated Works

IRC: SP: 60 -2002 An Approach Document for Assessment of Remaining Life of Concrete Bridges

III Ministry of Surface Transport Publications

MORT&H Pocketbook for Bridge Engineers, 2000 (First Revision)

MORT&H Pocketbook for Highway Engineers, 2002 (Second Revision)

MORT&H Specifications for Road and Bridge Works, 2001 (Fourth Revision)

MOST Standard Plans for 3.0 m Span Reinforced Cement Concrete Solid Slab Superstructure with and without Footpaths for Highways, 1991

MOST Standard Plans for Highways Bridges R.C.C. T-Beam & Slab Superstructure - Span from 10 m to 24 m with 12 m width, 1991

MOST Standard Plans for Highway Bridges PSC Girder and RC Slab Composite Superstructure for 30 m Span with and without Footpaths, 35 m Span with Footpaths and 40 m Span without Footpaths, 1991

MOST Standard Drawings for Road Bridges - R.C.C. Solid Slab Superstructure (15* & 30* SKEW Span 4.0 m to 10.0 m (with and without Footpaths), 1992

MOST Type Designs for Intersections on National Highways, 1992

MOST Computer Aided Design System for High Embankment Problems, 1993

MOST Addendum to Ministry's Technical Circulars and Directives on National Highways and Centrally Sponsored Road & Bridge Projects (Aug. 88 to Dec. 92), 1993

MOST Standard Drawing for Road Bridges R.C.C. Solid Slab Superstructure (22.5* SKEW) R.E. Span 4M to 10M (with and without Footpath), 1996

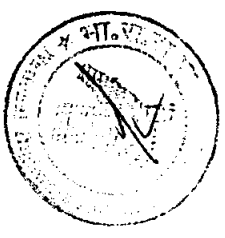
MOST Addendum to Ministry's Technical Circulars and Directives on National Highways and Centrally Sponsored Road & Bridge Projects (Jan. 93 to Dec. 94), 1996

Standard Plan for Highway Bridges - Prestressed Concrete Beam & RCC Slab Type Superstructure - Volume –II

MOST Addendum to Technical Circulars & Directives on National Highways & Centrally Sponsored Road & Bridge Works Projects (Jan. 1995 to Dec. 1997)

MOST Standard Plans for Single, Double and Triple Cell Box Culverts with and without Earth Cushion

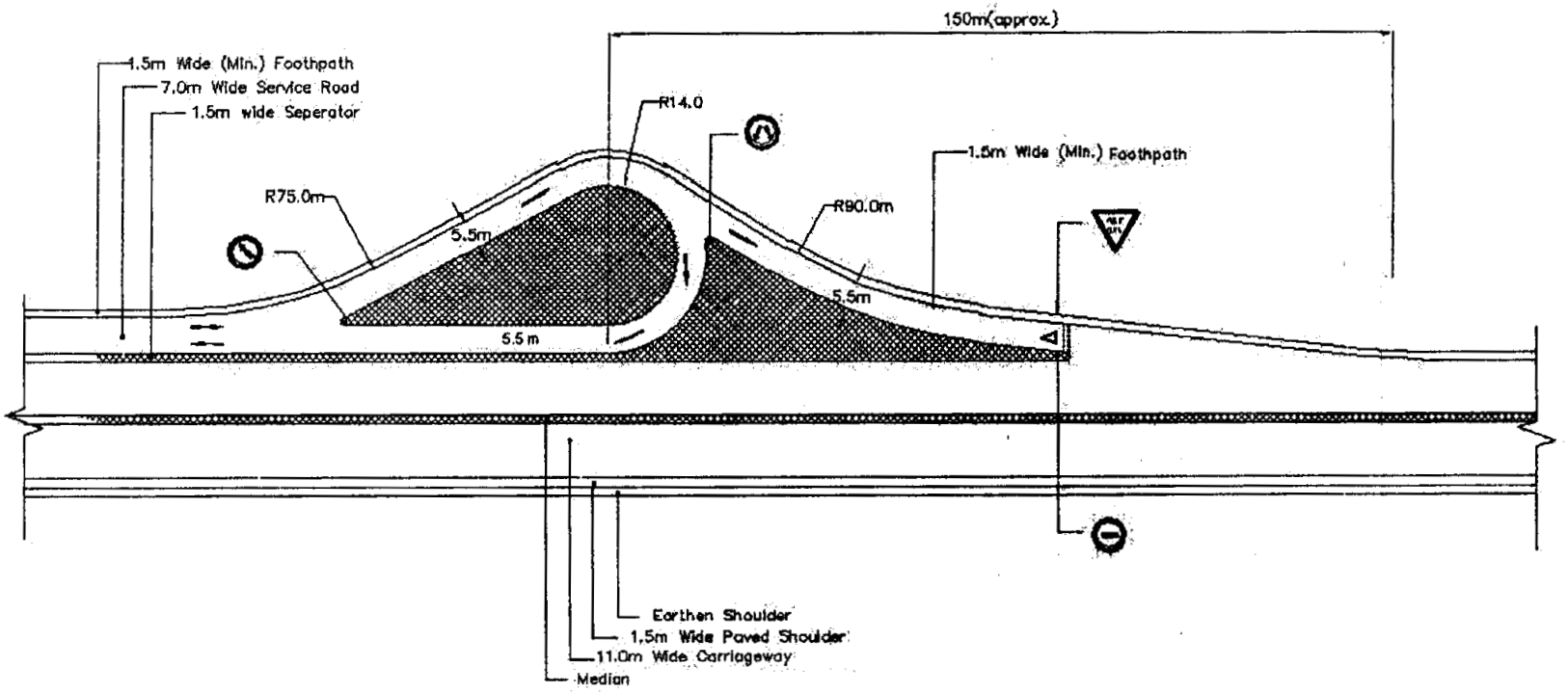
Manual for Safety in Road Design



BIS PUBLICATIONS

IS: 1944 (Part-I & II) 1970	Code of Practice for lighting of Public thoroughfare: Parts Land 2 For Main and secondary roads (Group-A and B) (First revision) (Amendments No. 1 and 2) Parts – I and 2 in one volume) (Amendments-2).
IS: 1944 (Part-V) 1981	Code of Practice for Lighting of Public Thoroughfares: Parts 5 Lighting for Grade separated junctions, Bridges and Elevated roads (Group – D).
IS: 1944 (Part-VI) 1981	Code of Practice for lighting of Public thoroughfare: Part-6 Lighting for Towns and city centres and areas of civic Importance (Group-E).
IS/ISO: 9000	Standards for quality management systems.
IS: 10748 – 1995	Hot rolled steel for welded tubes and pipes (First Revision)
NBC	National Building Code
Part-III, NBC:	Development Control rules and general building requirements.
Part-IV, NBC:	Fire Protection
Part-VI, NBC:	Structural Design
Part-VIII, NBC:	Building Services
Part-IX, NBC:	Plumbing Services

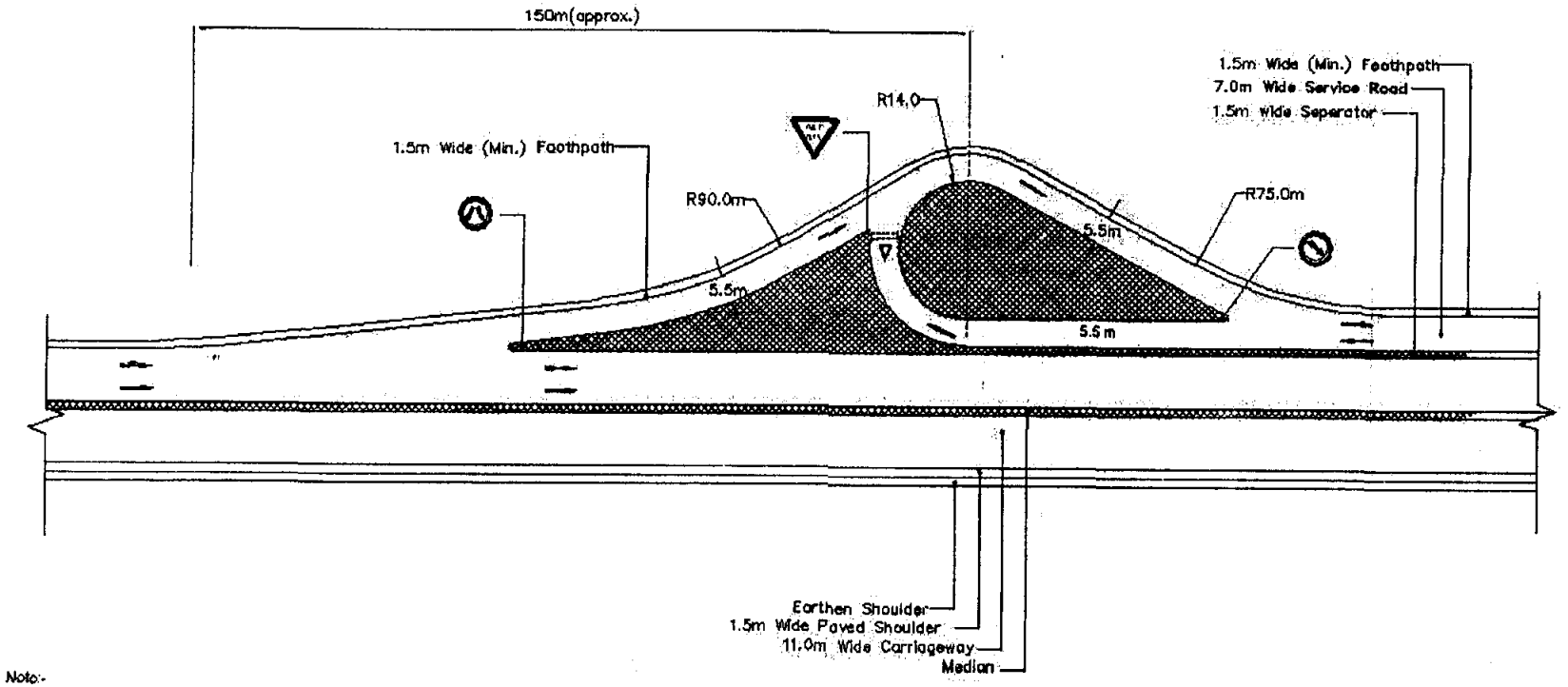
A.1



Note:-

1. Detailed system of Road Markings as per IRC:35
2. Detailed system of Road Signs as per IRC:67

MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS	DRAWING TITLE: Suggestive Layout for entry ramp to highway
	Figure: 2.1A
	SCALE:- Not to Scale

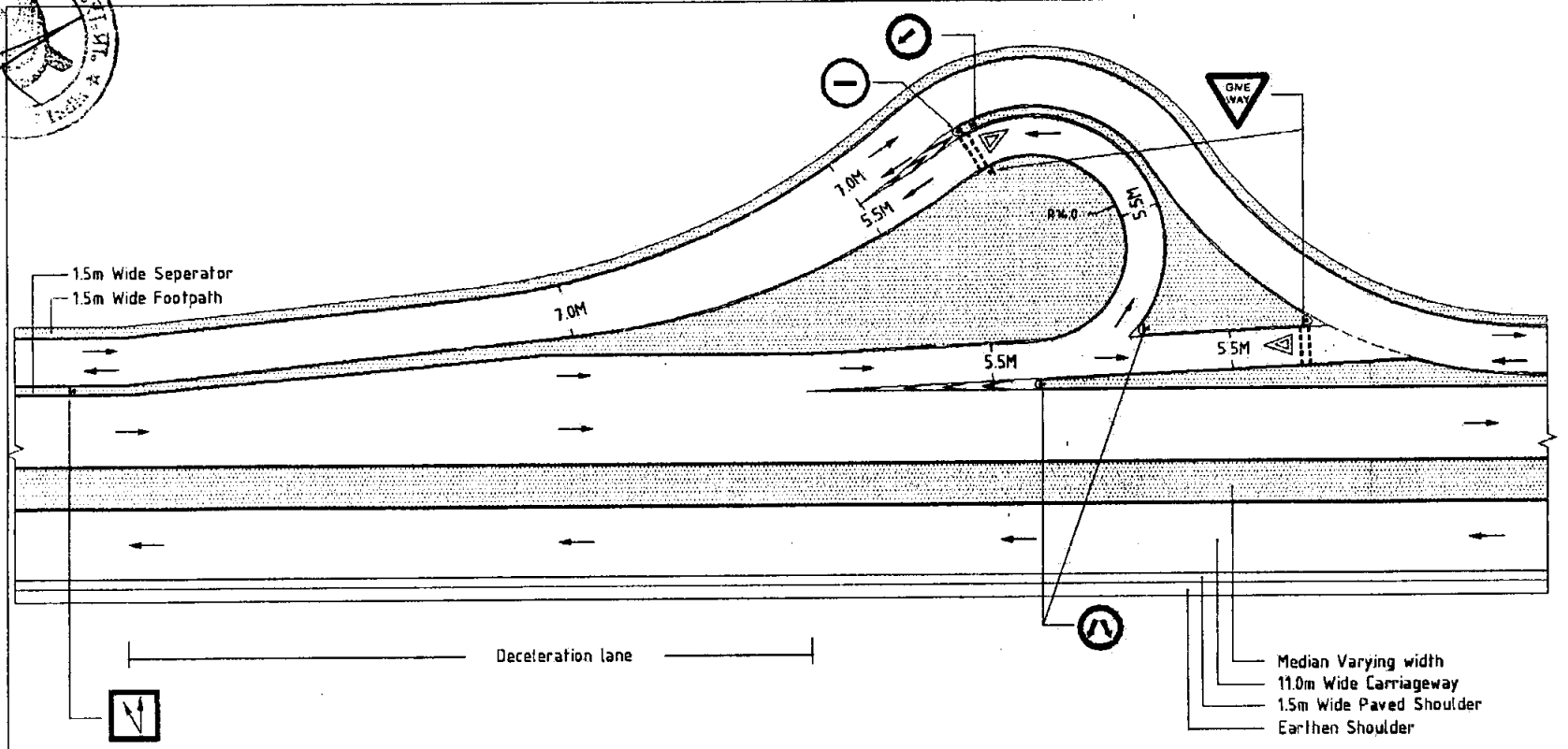


Note:-
1. Detailed system of Road Markings as per IRC:35
2. Detailed system of Road Signs as per IRC:67

MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS
DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS

Suggestive Layout for exit ramp from highway

Figure: 2.1B
SCALE:- Not to Scale



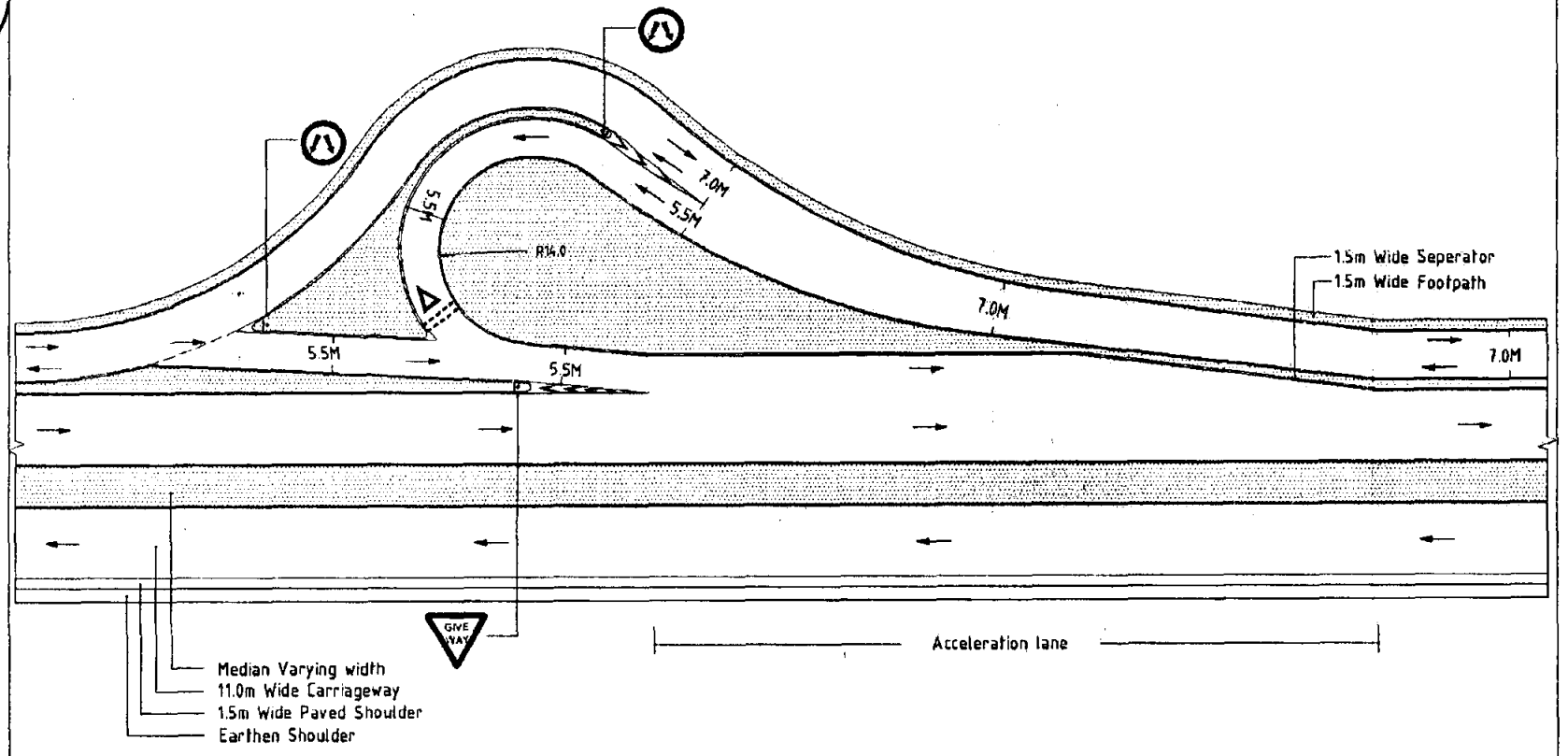
Note -

1. Detailed system of Road Markings as per IRC:35
2. Detailed system of Road Signs as per IRC:67

MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS
DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS

DRAWING TITLE
Suggestive Layout for Exit Ramp from Highway

Figure: 2.1C
SCALE:- Not to Scale



Nots.-

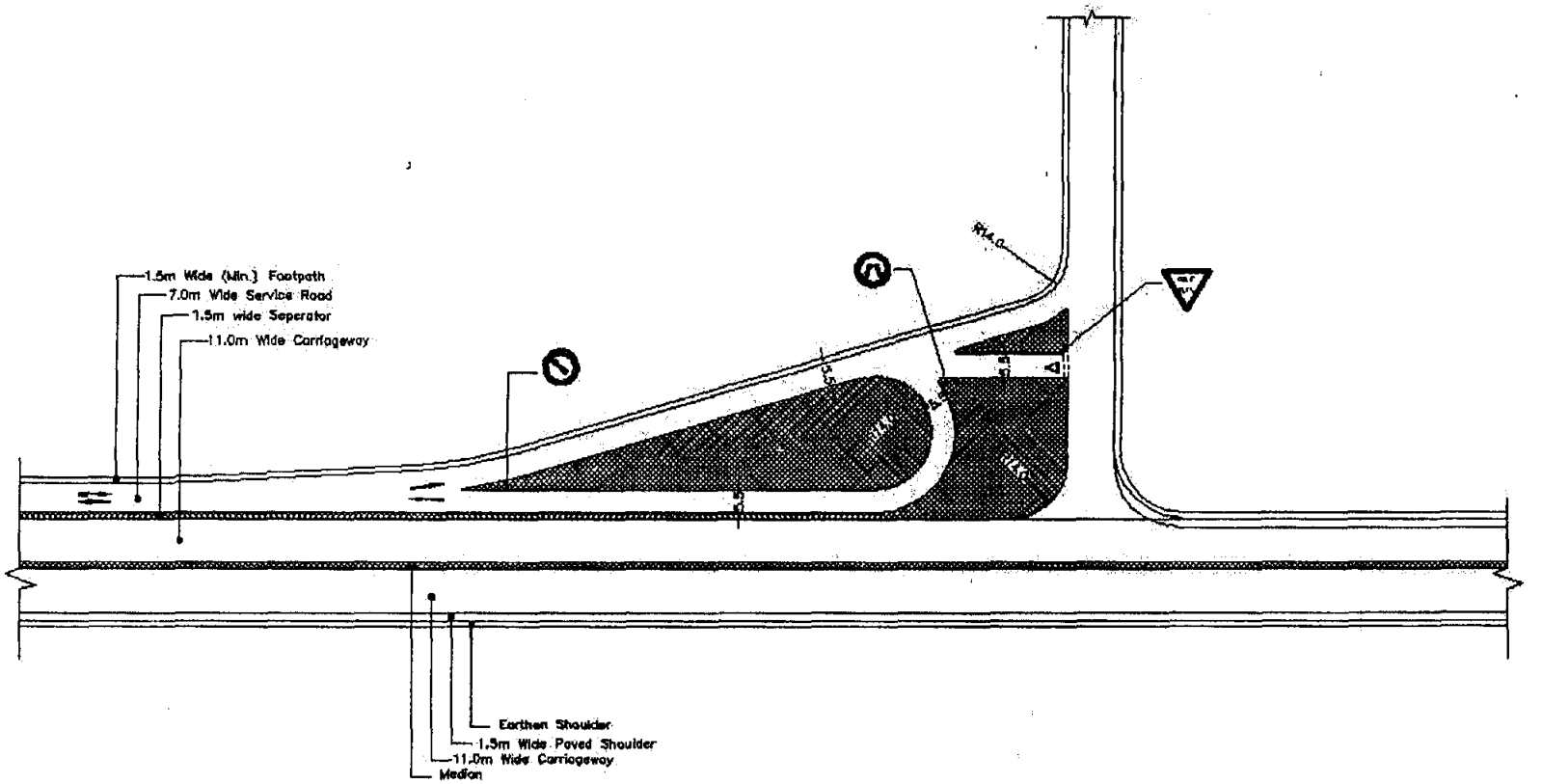
1. Detailed system of Road Markings as per IRC:35
2. Detailed system of Road Signs as per IRC:67

MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS
DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS

DRAWING TITLE
Suggestive Layout for Entry Ramp to Highway

Figure: 2.1D

SCALE:- Not to Scale



Note:-

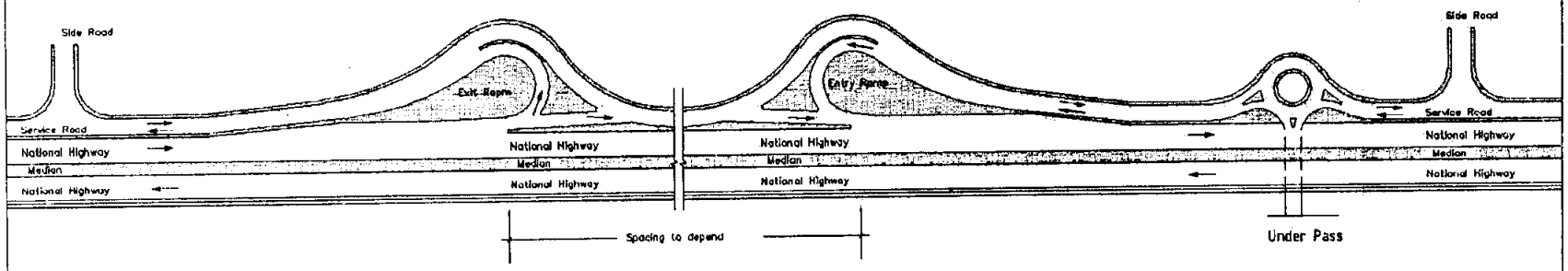
1. This suggestive layout shows meeting of service road with a cross road. The movements from cross road on to the main highway shall be dealt in accordance with Section 2.2.1 (3).
2. The other End of Service Road Shall be Provided with the End treatment as per Figure no. 2.1B.
3. Detailed system of Road Markings as per IRC:35
4. Detailed system of Road Signs as per IRC:67

MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS
DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS

Suggestive Layout of Service Road Ending at a junction with Cross Road

Figure: 2.2

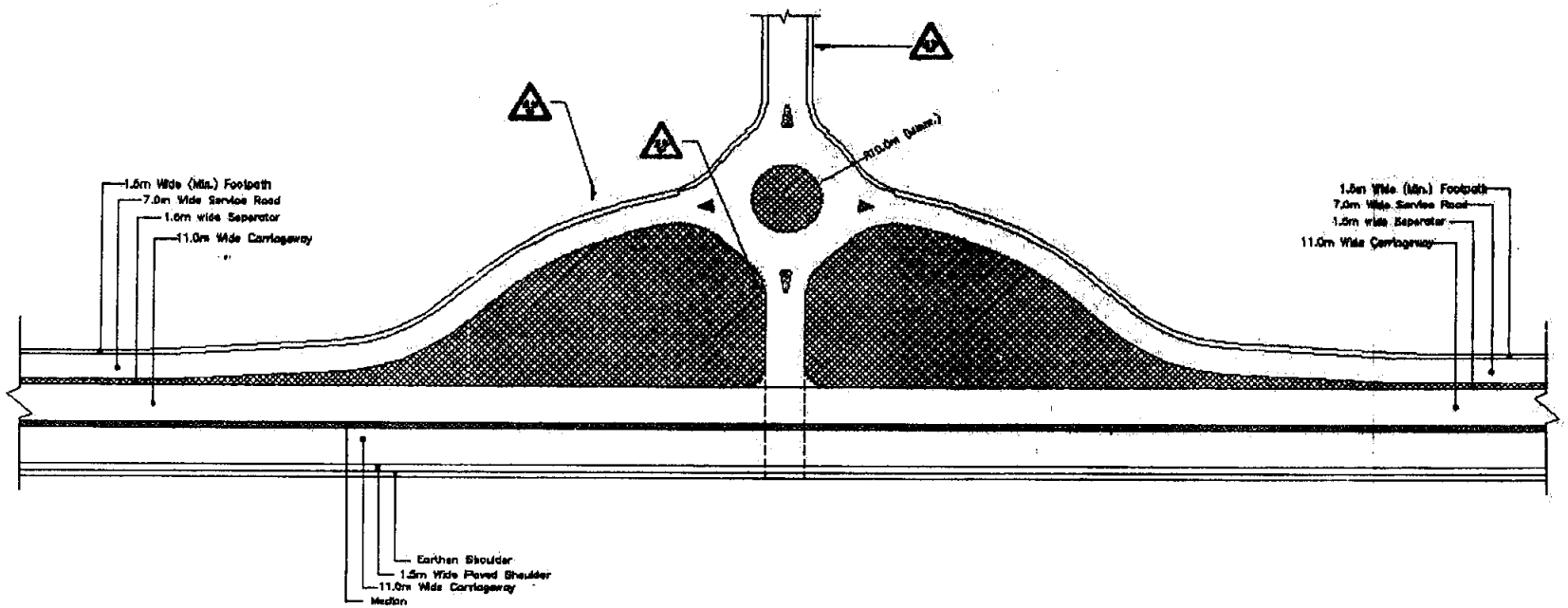
SCALE:- Not to Scale



Note:-

1. Detailed system of Road Markings as per IRC:35
2. Detailed system of Road Signs as per IRC:67

MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS	DRAWING TITLE Suggestive Layout showing configuration of service road, entry/exit ramps, side road and underpass
	Figure: 2.3
	SCALE:- Not to Scale



Note:-

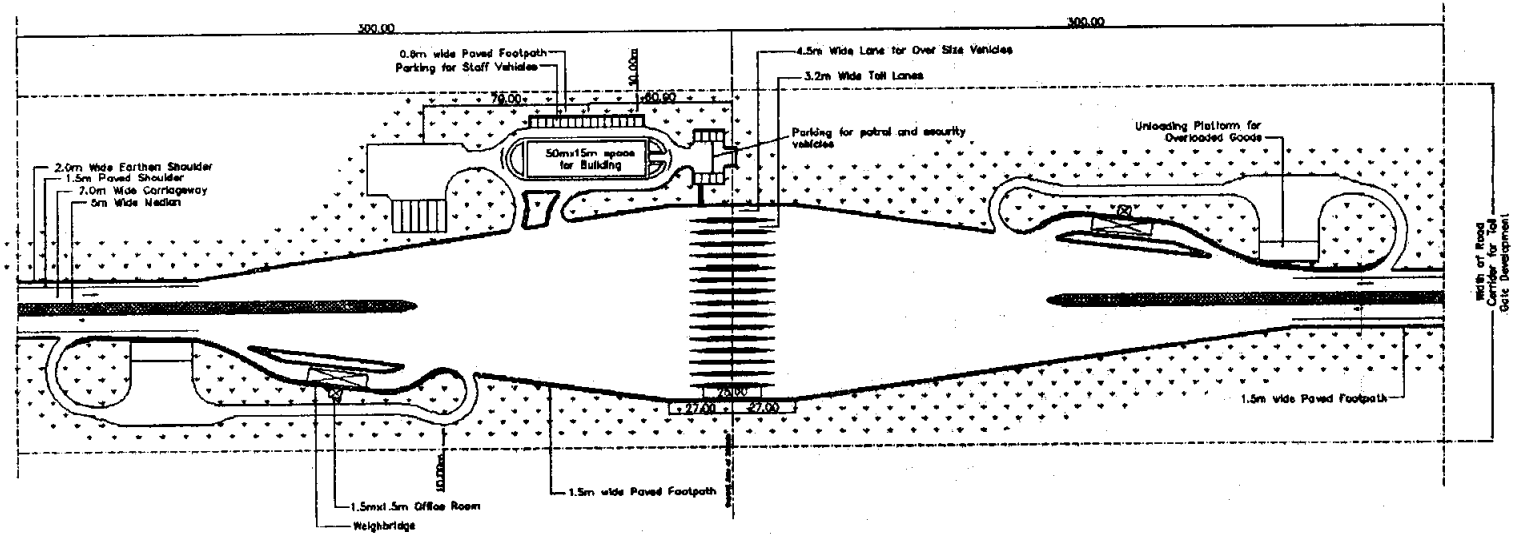
1. This suggestive layout shows meeting of service road with a cross road. The movements from cross road on to the main highway shall be dealt in accordance with Section 2.2.1 (3).
2. The other End of Service Road Shall be Provided with the End treatment as per Figure no. 2.1B.
3. Detailed system of Road Markings as per IRC:35
3. Detailed system of Road Signs as per IRC: 67

MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS
DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS

DRAWING TITLE:
Suggestive Layout of Service Road Continuing at Intersection

Figure: 2.4

SCALE:- Not to Scale



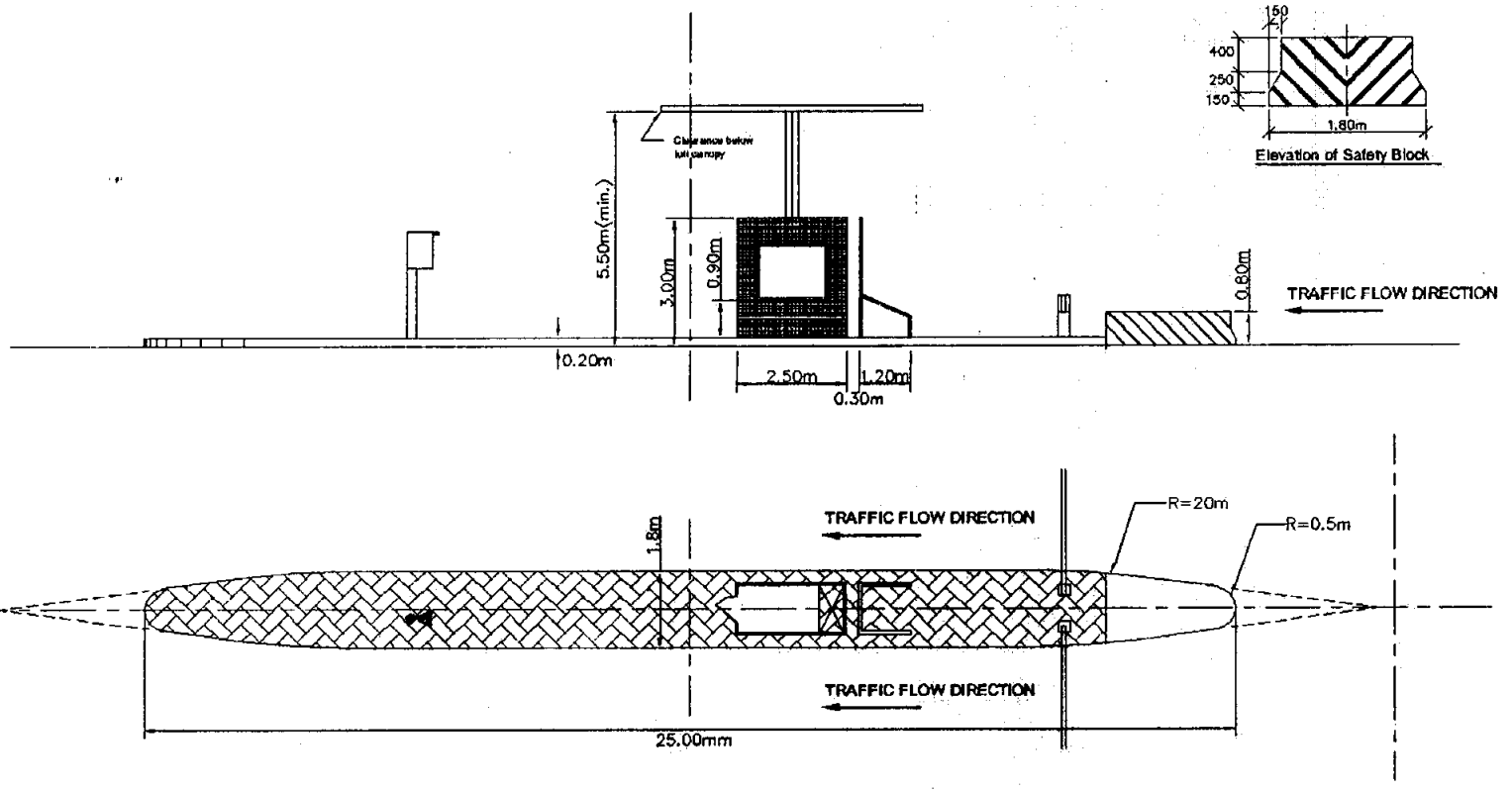
Note:-
Detailed system of Road Markings as per IRC:35

MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS
DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS

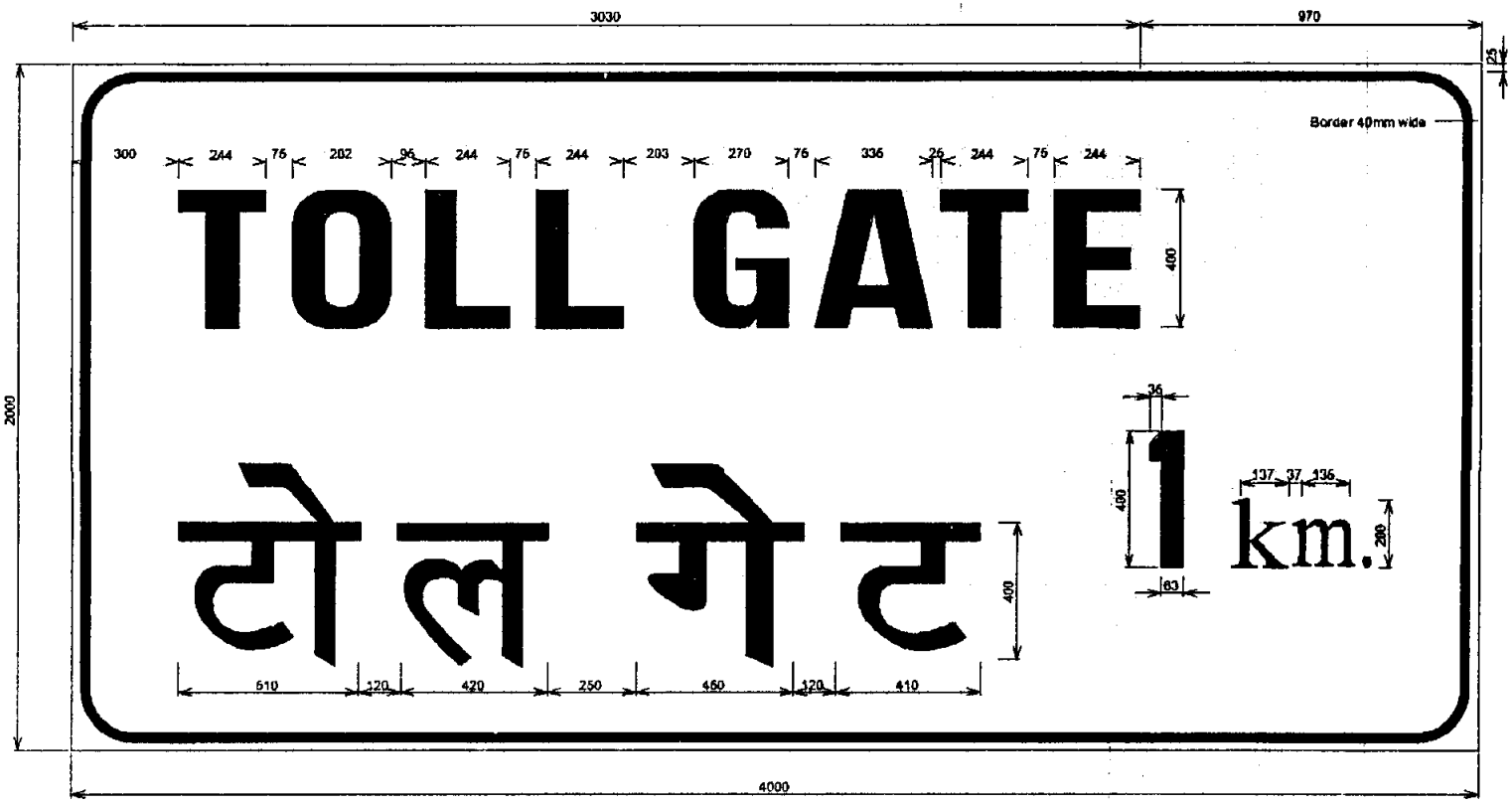
DRAWING TITLE:-
Suggestive Layout for a Toll Plaza

Figure: 4.1A

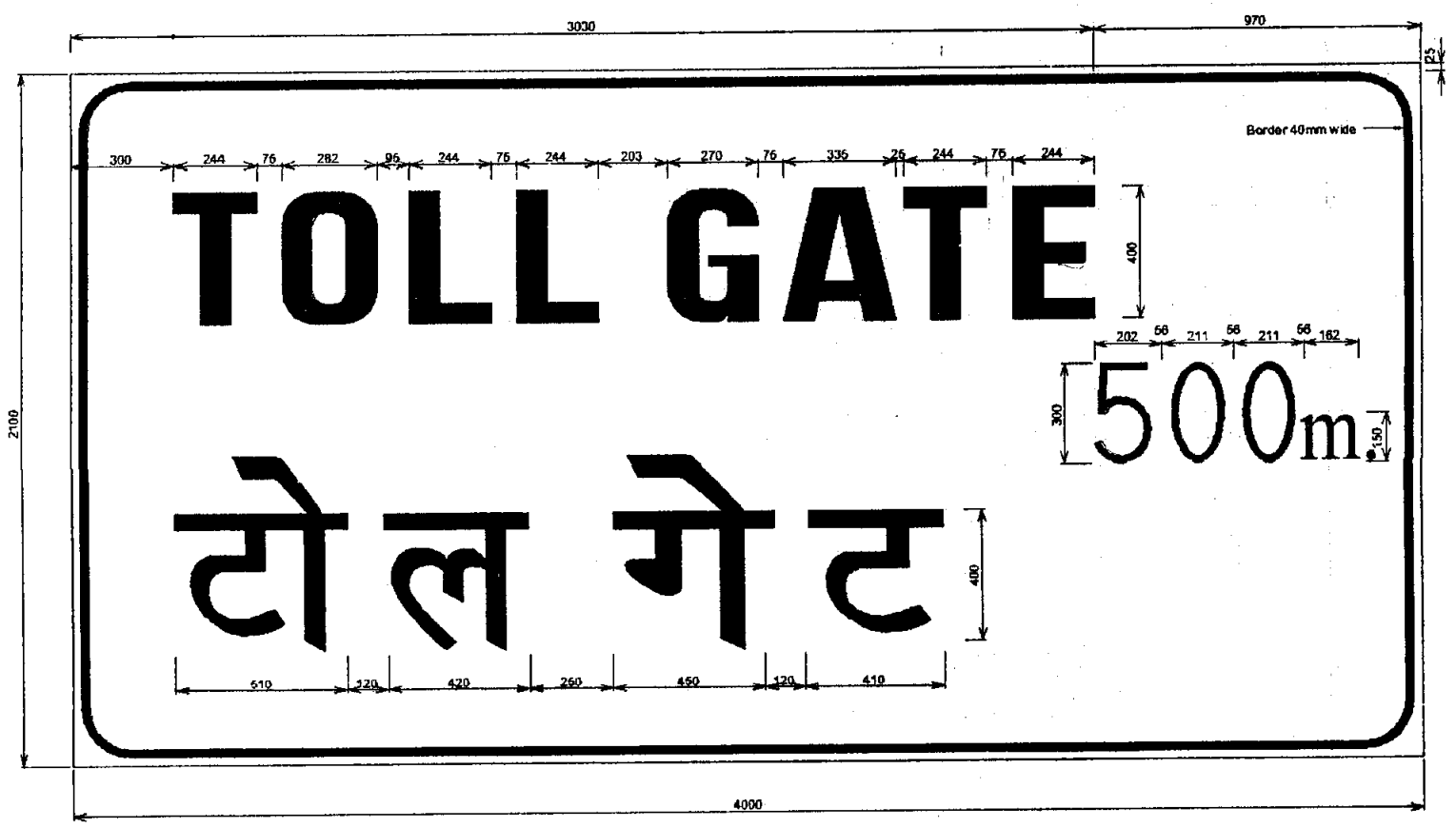
SCALE:- Not to Scale



MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS	DRAWING TITLE: Suggestive Layout for Traffic Island with Toll Booth
	Figure: 4.1B
	SCALE:- Not to Scale



MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS	DRAWING TITLE: Sign Panel for Toll Gate at 1 Km
	Figure: 4.2A
	SCALE:- Not to Scale



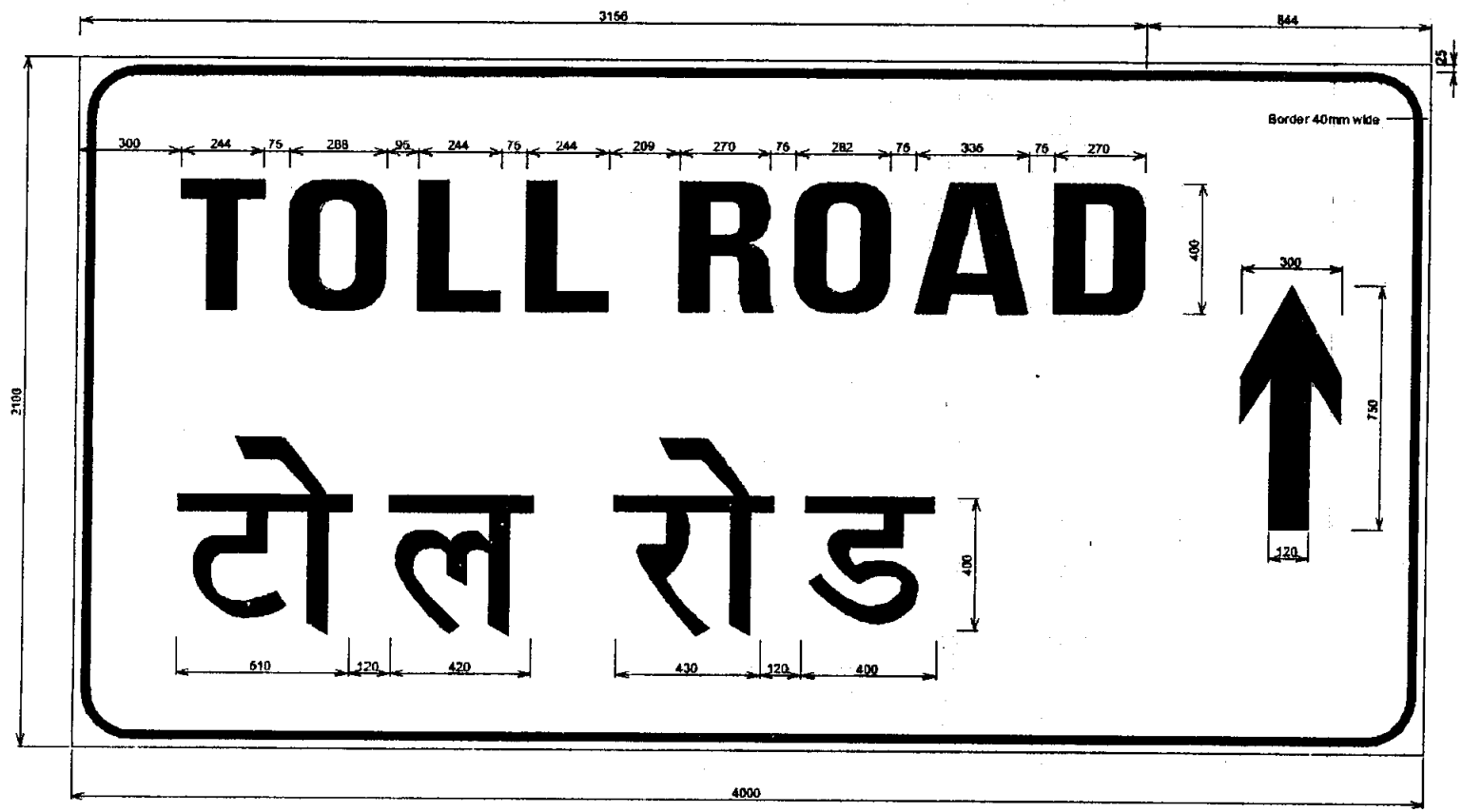
Note:-
Local language instead of Hindi shall be used if the local language in other than Hindi

MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS
DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS

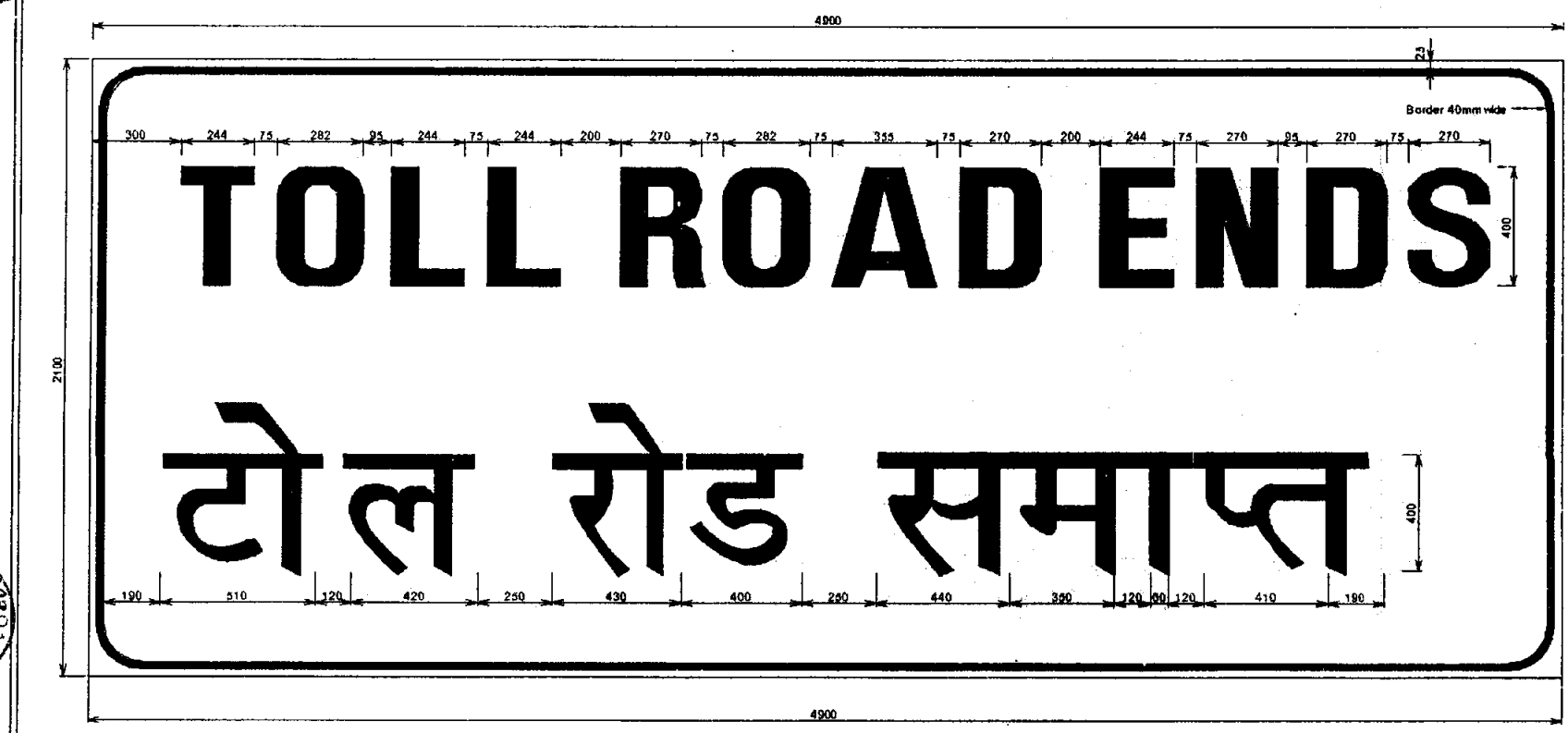
DRAWING TITLE:
Sign Panel for Toll Gate at 500 m

Figure: 4.2B

SCALE:- Not to Scale

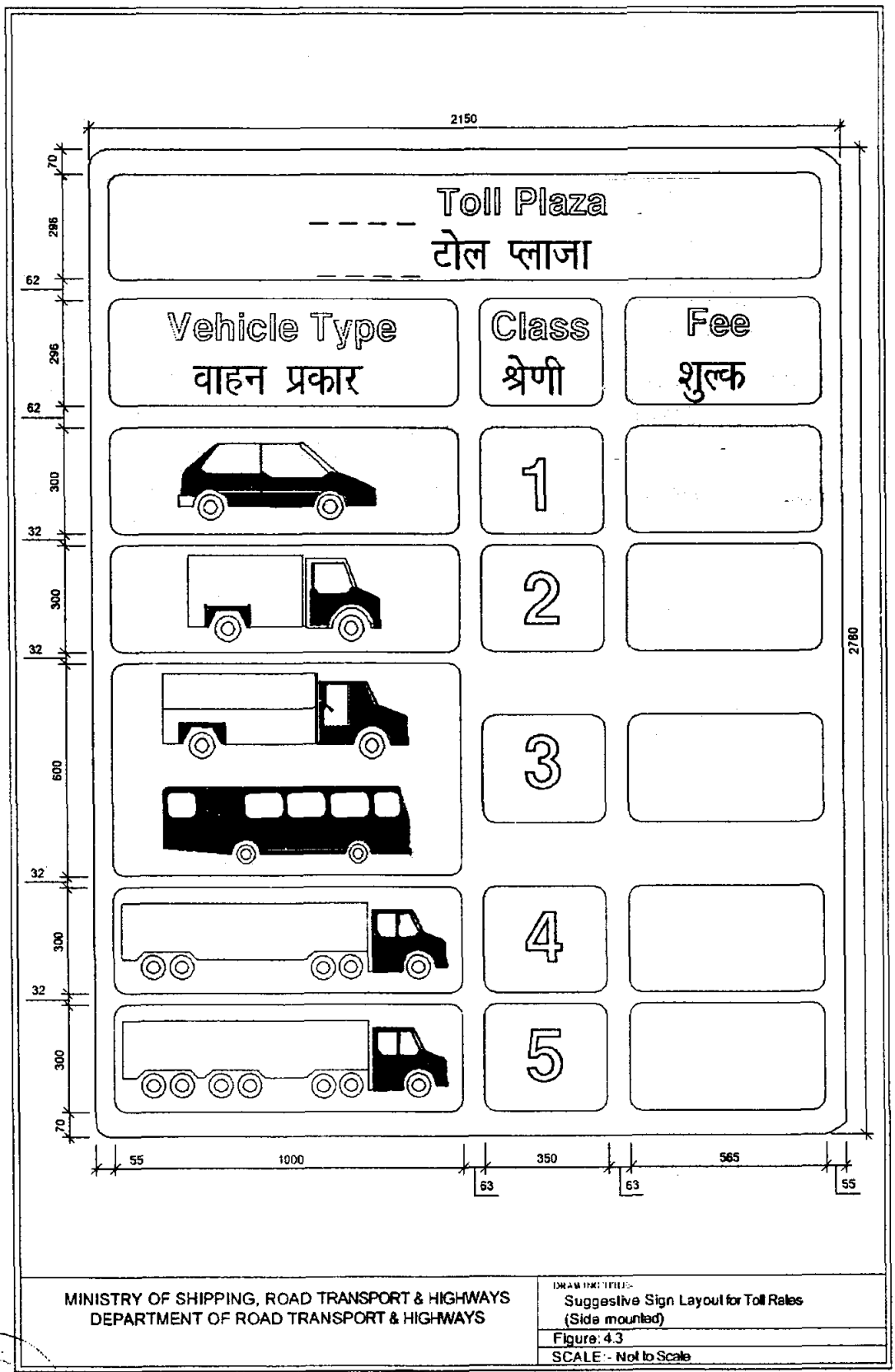


MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS	DRAWING TITLE: Sign Panel for Start of Toll Road
	Figure: 4.2C
	SCALE:- Not to Scale



MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS	DRAWING TITLE: Sign Panel for End of Toll Road Figure: 4.2D SCALE:- Not to Scale

A-3A

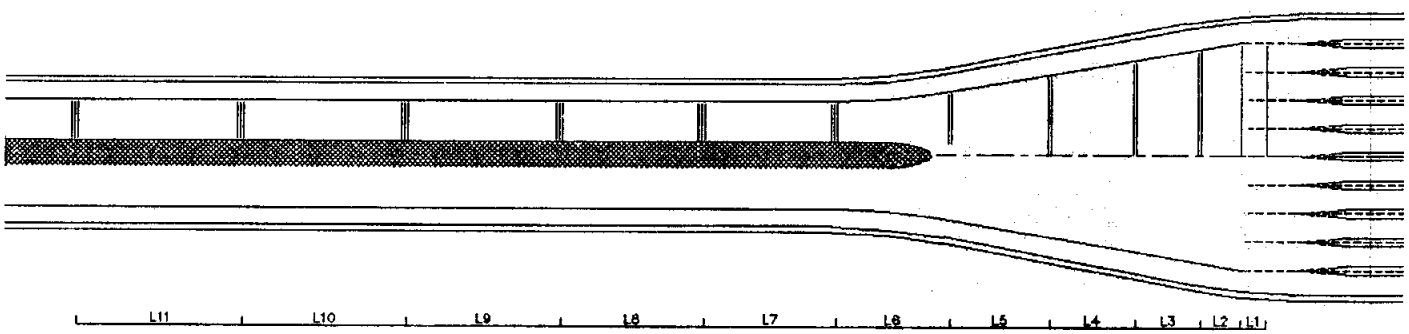


MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS
DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS

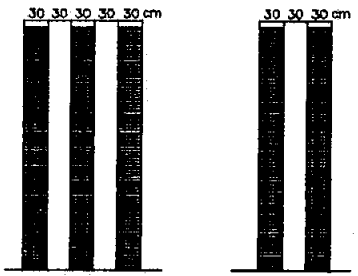
DRAWING TITLE:
Suggestive Sign Layout for Toll Rates
(Side mounted)

Figure: 4.3

SCALE :- Not to Scale



Distance from Previous Bar Marking (M)	No of Bar Markings
L1 = 5	1
L2 = 9	1
L3 = 13	2
L4 = 17	2
L5 = 20	2
L6 = 23	2
L7 = 26	3
L8 = 28	3
L9 = 30	3
L10 = 32	3
L11 = 32	3



WHITE TRANSVERSE BAR MARKING

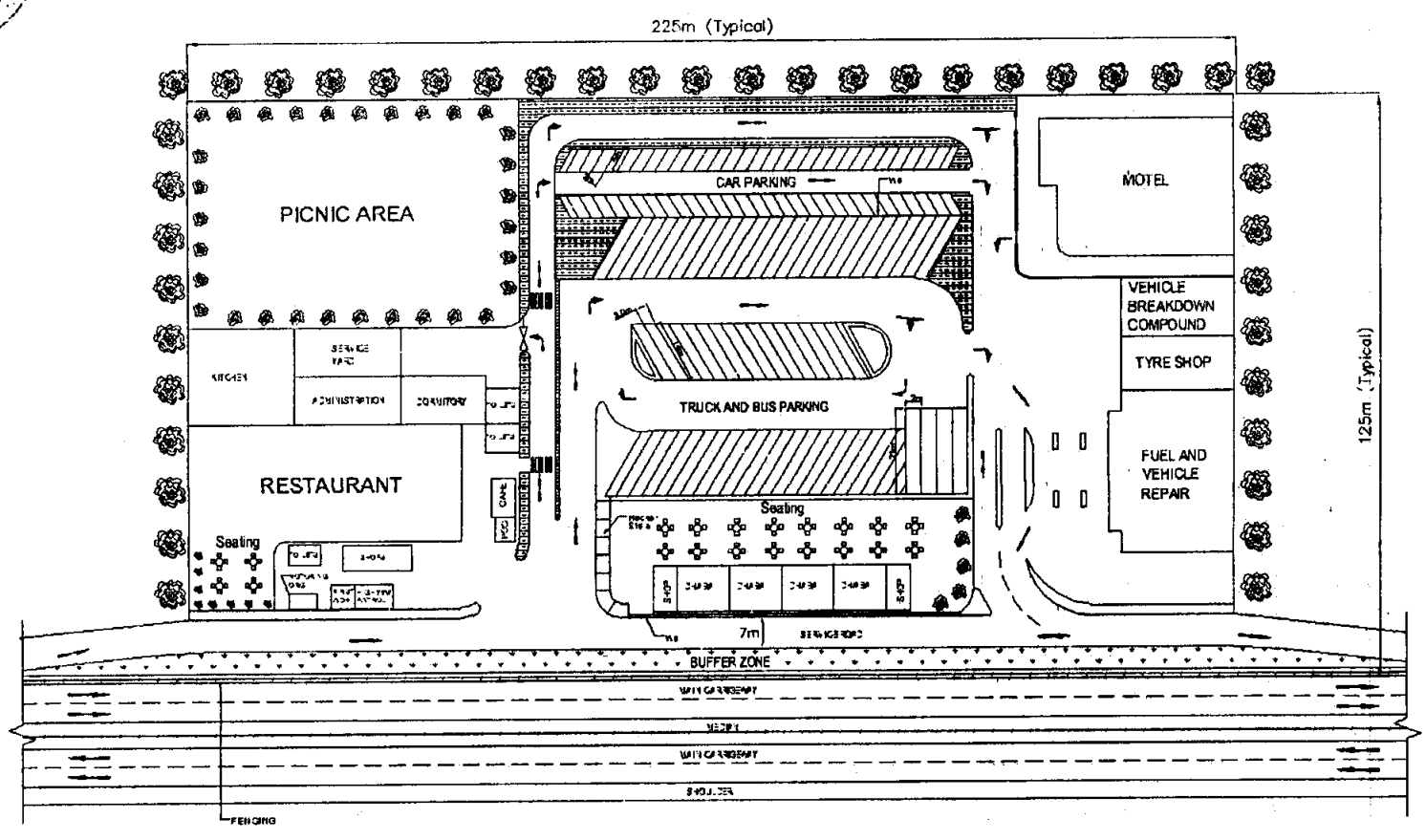
Note:-
Detailed system of Road Markings as per IRC:35

MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS
DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS

DRAWING TITLE:-
Details of Suggestive Transverse Bar Markings for Speed Control at Toll Plaza

Figure: 4.4

SCALE:- Not to Scale



MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS
DEPARTMENT OF ROAD. TRANSPORT & HIGHWAYS

DRAWING TITLE:-
Suggestive Layout for Service Area

Figure: 4.5

SCALE:- Not to Scale

SCHEDULE –E
(See Clause 4.1.3)

APPLICABLE PERMITS

1 Applicable Permits

1.1 The Concessionaire shall obtain, as required under the Applicable Laws, the following Applicable Permits on or before the Appointed Date, save and except to the extent of a waiver granted by the Authority in accordance with Clause 4.1.3 of the Agreement:

(a) Permission of the State Government for extraction of boulders from quarry;

(b) Permission of Village Panchayat and Pollution Control Board for installation of crushers;

(c) Licence for use of explosives;

(d) Permission of the State Government for drawing water from river/reservoir;

(e) Licence from Inspector of factories or other competent authority for setting up Batching Plant;

(f) Clearance of Pollution Control Board for setting up Batching Plant;

(g) Clearance of Village Panchayats and Pollution Control Board for Asphalt Plant;

(h) Permission of Village Panchayat and State Government for borrow earth;

(i) Permission of State Government for cutting of trees; and

(j) Any other permits or clearances required under Applicable Laws.

1.2 Applicable Permits, as required, relating to environmental protection and conservation shall have been procured by the Authority as a Condition Precedent.

SCHEDULE –F
(See Clause 9.1)

PERFORMANCE SECURITY

The Chairman,
National Highways Authority of India
New Delhi

WHEREAS:

(A) M/s KM Toll Road Private Limited (the "**Concessionaire**") and the Chairman, National Highways Authority of India (the "**Authority**") have entered into a Concession Agreement dated ..... (the "**Agreement**") whereby the Authority has agreed to the Concessionaire undertaking Four-Laning of the Gandhidham (Kandla) – Mundra Port section of National Highway No. 8A Extesnion on design, build, finance, operate and transfer ("**DBFOT**") basis, subject to and in accordance with the provisions of the Agreement.

(B) The Agreement requires the Concessionaire to furnish a Performance Security to the Authority in a sum of Rs. 47.69 cr. (Rupees Forty Seven crore and Sixty Nine Lakhs) (the "**Guarantee Amount**") as security for due and faithful performance of its obligations, under and in accordance with the Agreement, during the Construction Period (as defined in the Agreement).

(C) We, ... through our Branch at ..... (the "**Bank**") have agreed to furnish this Bank Guarantee by way of Performance Security.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Concessionaire's obligations during the Construction Period, under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Concessionaire, such sum or sums upto an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.

2. A letter from the Authority, under the hand of an Officer not below the rank of General Manager in the National Highways Authority of India, that the Concessionaire has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Concessionaire is in default in due and faithful performance of its obligations during the

Construction Period under the Agreement and its decision that the Concessionaire is in default shall be final, and binding on the Bank, notwithstanding any differences between the Authority and the Concessionaire, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Concessionaire for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Concessionaire and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.

4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Concessionaire before presenting to the Bank its demand under this Guarantee.

5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfilment and/ or performance of all or any of the obligations of the Concessionaire contained in the Agreement or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Concessionaire, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Concessionaire or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Agreement or for the fulfilment, compliance and/or performance of all or any of the obligations of the Concessionaire under the Agreement.

7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force until the earlier of the 1st (first) anniversary of the Appointed Date or compliance of the conditions specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee, no later than 6 (six) months from the date of expiry of this Guarantee, all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

8. The Performance Security shall cease to be in force and effect when the

Concessionaire shall have expended on Project construction an aggregate sum not less than 20% (twenty per cent) of the Total Project Cost which is deemed to be Rs.190.78 cr. (Rupees One Hundred and Ninety crore and Seventy Eight Lakhs) for the purposes of this Guarantee, and provided the Concessionaire is not in breach of this Agreement. Upon request made by the Concessionaire for release of the Performance Security alongwith the particulars required hereunder, duly certified by a statutory auditor of the Concessionaire, the Authority shall release the Performance Security forthwith.

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred Branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for a period of one year and six months or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

Signed and sealed this ..... day of ....., 20..... at .....

SIGNED, SEALED AND DELIVERED
For and on behalf of
the BANK by:

KM TOLL ROAD PVT. LTD.

(Signature)
(Name)
(Designation)
(Code Number)
(Address)

NOTES:

(i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.

(ii) The address, telephone number and other details of the Head Office of the

Bank as well as of issuing Branch should be mentioned on the covering letter of issuing Branch.

KM TOLL ROAD PVT LTD

SCHEDULE –G
(See Clause 12.1)

PROJECT COMPLETION SCHEDULE

1 **Project Completion Schedule**

During Construction Period, the Concessionaire shall comply with the requirements set forth in this Schedule-G for each of the Project Milestones and the Scheduled Four-Laning Date (the "**Project Completion Schedule**"). Within 15 (fifteen) days of the date of each Project Milestone, the Concessionaire shall notify the Authority of such compliance alongwith necessary particulars thereof.

2 **Project Milestone-I**

2.1 Project Milestone-I shall occur on the date falling on the 180th (one hundred and eightieth) day from the Appointed Date (the "**Project Milestone-I**").

2.2 Prior to the occurrence of Project Milestone-I, the Concessionaire shall have commenced construction of the Project Highway and expended not less than 10% (ten per cent) of the total capital cost set forth in the Financial Package.

3 **Project Milestone-II**

3.1 Project Milestone-II shall occur on the date falling on the 400th (four hundredth) day from the Appointed Date (the "**Project Milestone-II**").

3.2 Prior to the occurrence of Project Milestone-II, the Concessionaire shall have commenced construction of all bridges and expended not less than 35% (thirty five per cent) of the total capital cost set forth in the Financial Package.

4 **Project Milestone-III**

4.1 Project Milestone-III shall occur on the date falling on the 650th (six hundred and fiftieth) day from the Appointed Date (the "**Project Milestone-III**").

4.2 Prior to the occurrence of Project Milestone-III, the Concessionaire shall have commenced construction of all Project Facilities and expended not less than 70% (Seventy per cent) of the total capital cost set forth in the Financial Package.

5 **Scheduled Four-Laning Date**

5.1 The Scheduled Four-Laning Date shall occur on the 910th (nine hundred and tenth) day from the Appointed Date.

5.2 On or before the Scheduled Four-Laning Date, the Concessionaire shall have completed Four-Laning in accordance with this Agreement.

6 Extension of period

Upon extension of any or all of the aforesaid Project Milestones or the Scheduled Four-Laning Date, as the case may be, under and in accordance with the provisions of this Agreement, the Project Completion Schedule shall be deemed to have been amended accordingly.

SCHEDULE –H
(See Clause 12.3)

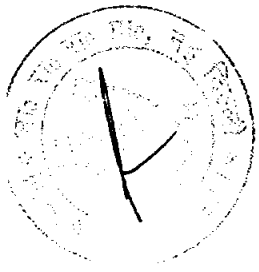
DRAWINGS

1 Drawings

In compliance of the obligations set forth in Clause 12.3 of this Agreement, the Concessionaire shall furnish to the Independent Engineer, free of cost, all Drawings listed in Annex-I of this Schedule-H.

2 Additional drawings

If the Independent Engineer determines that for discharging its duties and functions under this Agreement, it requires any drawings other than those listed in Annex-I, it may by notice require the Concessionaire to prepare and furnish such drawings forthwith. Upon receiving a requisition to this effect, the Concessionaire shall promptly prepare and furnish such drawings to the Independent Engineer, as if such drawings formed part of Annex-I of this Schedule-H.



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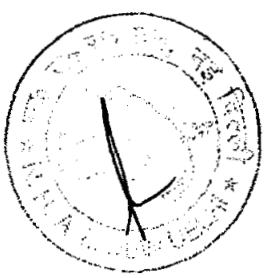
Annex - I
(Schedule-H)

List of Drawings

Note: The Authority shall describe in this Annex-I, all the Drawings that the Concessionaire is required to furnish under Clause 12.3. The list shall be in two parts, namely, Part-A specifying the Drawings for Four-Laning and Part-B specifying the Drawings for Six-Laning.



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SCHEDULE –I
(See Clause 14.1.2)

TESTS

1 Schedule for Tests

1.1 The Concessionaire shall, no later than 30 (thirty) days prior to the likely completion of Four-Laning, notify the Independent Engineer and the Authority of its intent to subject the Project Highway to Tests, and no later than 7 (seven) days prior to the actual date of Tests, furnish to the Independent Engineer and the Authority detailed inventory and particulars of all works and equipment forming part of Four-Laning.

1.2 The Concessionaire shall notify the Independent Engineer of its readiness to subject the Project Highway to Tests at any time after 7 (seven) days from the date of such notice, and upon receipt of such notice, the Independent Engineer shall, in consultation with the Concessionaire, determine the date and time for each Test and notify the same to the Authority who may designate its representative to witness the Tests. The Independent Engineer shall thereupon conduct the Tests itself or cause any of the Tests to be conducted in accordance with Article 14 and this Schedule-I.

2 Tests

2.1 Visual and physical Test: The Independent Engineer shall conduct a visual and physical check of Four-Laning to determine that all works and equipment forming part thereof conform to the provisions of this Agreement.

2.2 Test drive: The Independent Engineer shall undertake a test drive of the Project Highway by a Car and by a fully loaded Truck to determine that the quality of service conforms to the provisions of the Agreement.

2.3 Riding quality Test: Riding quality of each lane of the carriageway shall be checked with the help of a calibrated bump integrator and the maximum permissible roughness for purposes of this Test shall be 1,800 (one thousand and eight hundred) mm for each kilometre.

2.4 Pavement Composition Test: The thickness and composition of the pavement structure shall be checked on a sample basis by digging pits to determine conformity of such pavement structure with Specifications and Standards. The sample shall consist of one pit in each direction of travel to be chosen at random in each stretch of 5 (five) kilometres of the Project Highway. The first pit for the sample shall be selected by the Independent Engineer through an open draw of lots and every fifth kilometre from such first pit shall form part of the sample for this pavement quality Test.

2.5 Cross-section Test: The cross-sections of the Project Highway shall be checked on a sample basis through physical measurement of their dimensions for determining the conformity thereof with Specifications and

Standards. For the road portion, the sample shall consist of one spot to be selected at random in each stretch of 1 (one) kilometre of the Project Highway. The first spot for the sample shall be selected by the Independent Engineer through an open draw of lots and the spots located at every one kilometre from such first spot shall form part of the sample. For the bridge portion, one spot shall be selected at random by the Independent Engineer in each span of the bridge.

2.6 Structural Test for bridges: All major and minor bridges constructed by the Concessionaire shall be subjected to the Rebound Hammer and Ultrasonic Pulse Velocity tests, to be conducted in accordance with the procedure described in Special Report No. 17: 1996 of the IRC Highway Research Board on Non-destructive Testing Techniques, at two spots in every span, to be chosen at random by the Independent Engineer. Bridges with a span of 15 (fifteen) metres or more shall also be subjected to load testing.

2.7 Other Tests: The Independent Engineer may require the Concessionaire to carry out or cause to be carried additional Tests, in accordance with Good Industry Practice, for determining the compliance of the Project Highway with Specifications and Standards.

2.8 Environmental audit: The Independent Engineer shall carry out a check to determine conformity of the Project Highway with the environmental requirements set forth in Applicable Laws and Applicable Permits.

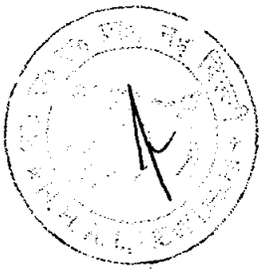
2.9 Safety review: Safety audit of the Project Highway shall have been undertaken by the Safety Consultant as set forth in Schedule-L, and on the basis of such audit, the Independent Engineer shall determine conformity of the Project Highway with the provisions of this Agreement.

3 Agency for conducting Tests

All Tests set forth in this Schedule-I shall be conducted by the Independent Engineer or such other agency or person as it may specify in consultation with the Authority.

4 Completion/Provisional Certificate

Upon successful completion of Tests, the Independent Engineer shall issue the Completion Certificate or the Provisional Certificate, as the case may be, in accordance with the provisions of Article 14.



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SCHEDULE –J
(See Clauses 14.2 & 14.3)

COMPLETION CERTIFICATE

1 I, ... (Name of the Independent Engineer), acting as Independent Engineer, under and in accordance with the Concession Agreement dated ..... (the "**Agreement**"), for Four-Laning and subsequent Six-Laning of the Gandhidham (Kandla) – Mundra Port section (km 0.00 to Km. 71.40) of National Highway No. 8A Extension (the "**Project Highway**") on design, build, finance, operate and transfer (DBFOT) basis, through M/s KM Toll Road Private Limited, hereby certify that the Tests specified in Article 14 and Schedule-I of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement, and I am satisfied that the Project Highway can be safely and reliably placed in commercial service of the Users thereof.

2 It is certified that, in terms of the aforesaid Agreement, all works forming part of Four-Laning have been completed, and the Project Highway is hereby declared fit for entry into commercial operation on this the ..... day of ..... 20.....

SIGNED, SEALED AND DELIVERED
For and on behalf of
the INDEPENDENT ENGINEER by:

(Signature)
(Name)
(Designation)
(Address)

PROVISIONAL CERTIFICATE

1 I, ... (Name of the Independent Engineer), acting as Independent Engineer, under and in accordance with the Concession Agreement dated ..... (the **"Agreement"**), for Four-Laning and subsequent Six-Laning of the Gandhidham (Kandla) – Mundra Port section (km 0.00 to Km. 71.40) of National Highway No. 8A Extension (the **"Project Highway"**) on design, build, finance, operate and transfer (DBFOT) basis through M/s KM Toll Road Private Limited, hereby certify that the Tests specified in Article 14 and Schedule-I of the Agreement have been undertaken to determine compliance of the Project Highway with the provisions of the Agreement.

2 Construction Works that were found to be incomplete and/or deficient have been specified in the Punch List appended hereto, and the Concessionaire has agreed and accepted that it shall complete and/or rectify all such works in the time and manner set forth in the Agreement. (Some of the incomplete works have been delayed as a result of reasons attributable to the Authority or due to Force Majeure and the Provisional Certificate cannot be withheld on this account. Though the remaining incomplete works have been delayed as a result of reasons attributable to the Concessionaire,)@ I am satisfied that having regard to the nature and extent of such incomplete works, it would not be prudent to withhold commercial operation of the Project Highway, pending completion thereof.

3 In view of the foregoing, I am satisfied that the Project Highway can be safely and reliably placed in commercial service of the Users thereof, and in terms of the Agreement, the Project Highway is hereby provisionally declared fit for entry into commercial operation on this the ..... day of ..... 20.....

ACCEPTED, SIGNED, SEALED AND DELIVERED For and on behalf of CONCESSIONAIRE by: by:	SIGNED, SEALED AND DELIVERED For and on behalf of INDEPENDENT ENGINEER
(Signature) (Name and Designation) (Address)	(Signature) (Name and Designation) (Address)

@ Strike out if not applicable.

SCHEDULE –K
(See Clause 17.2)

MAINTENANCE REQUIREMENTS

1 Maintenance Requirements

1.1 The Concessionaire shall, at all times, operate and maintain the Project Highway in accordance with the provisions of the Agreement, Applicable Laws and Applicable Permits. In particular, the Concessionaire shall, at all times during the Operation Period, conform to the maintenance requirements set forth in this Schedule-K (the "**Maintenance Requirements**").

1.2 The Concessionaire shall repair or rectify any defect or deficiency set forth in Paragraph 2 of this Schedule-K within the time limit specified therein and any failure in this behalf shall constitute a breach of the Agreement. Upon occurrence of any breach hereunder, the Authority shall be entitled to recover Damages as set forth in Clause 17.8 of the Agreement, without prejudice to the rights of the Authority under the Agreement, including Termination thereof.

2 Repair/rectification of defects and deficiencies

The obligations of the Concessionaire in respect of Maintenance Requirements shall include repair and rectification of the defects and deficiencies specified in Annex - I of this Schedule - K within the time limit set forth therein.

3 Other defects and deficiencies

3.1 In respect of any defect or deficiency not specified in Annex - I of this Schedule-K, the Concessionaire shall undertake repair or rectification in accordance with Good Industry Practice.

3.2 In respect of any defect or deficiency not specified in Annex - I of this Schedule-K, the Independent Engineer may, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards, and any deviation or deterioration beyond the permissible limit shall be repaired or rectified by the Concessionaire within the time limit specified by the Independent Engineer.

4 Extension of time limit

Notwithstanding anything to the contrary specified in this Schedule-K, if the nature and extent of any defect or deficiency justifies more time for its repair or rectification than the time specified herein, the Concessionaire shall be entitled to additional time in conformity with Good Industry Practice. Such additional time shall be determined by the Independent Engineer and conveyed to the Concessionaire and the Authority with reasons thereof.

5 Emergency repairs/restoration

Notwithstanding anything to the contrary contained in this Schedule-K, if any defect, deficiency or deterioration in the Project Highway poses a hazard to safety or risk of damage to property, the Concessionaire shall promptly take all reasonable measures for eliminating or minimizing such danger.

6 Daily Inspection by the Concessionaire

The Concessionaire shall, through its engineer, undertake a daily visual inspection of the Project Highway and maintain a record thereof in a register to be kept in such form and manner as the Independent Engineer may specify. Such record shall be kept in safe custody of the Concessionaire and shall be open to inspection by the Authority and the Independent Engineer at any time during office hours.

7 Divestment Requirements

All defects and deficiencies specified in this Schedule-K shall be repaired and rectified by the Concessionaire so that the Project Highway conforms to the Maintenance Requirements on the Transfer Date.

8 Display of Schedule - K

The Concessionaire shall display a copy of this Schedule-K at the Toll Plaza along with the Complaint Register stipulated in Article 46.

Annex - I
(Schedule-K)

Repair/Rectification of Defects and Deficiencies

The Concessionaire shall repair and rectify the defects and deficiencies specified in this Annex-I of Schedule-K within the time limit set forth herein.

Nature of defect or deficiency		Time limit for repair/ rectification
ROADS		
(a) Carriageway and paved shoulders		
(i) Breach or blockade	-	Temporary / restoration of traffic within 24 hours; permanent restoration within 15 days
(ii) Roughness value exceeding 2,500 mm in a stretch of 1 km (as measured by a standardised roughometer/bump integrator)	-	180 days
(iii) Pot holes	-	48 hours
(iv) Cracking in more than 5% of road surface in a stretch of 1 km	-	30 days
(v) Rutting exceeding 10 mm in more than 2% of road surface in a stretch of 1 km (measured with 3 m straight edge)	-	30 days
(vi) Bleeding/skidding	-	7 days
(vii) Ravelling/Stripping of bitumen surface exceeding 10 sq m	-	15 days
(viii) Damage to pavement edges exceeding 10 cm	-	15 days
(ix) Removal of debris	-	6 hours
(b) Hard/earth shoulders, side slopes, drains and culverts		
(i) Variation by more than 2% in	-	30 days

	the prescribed slope of camber/cross fall	
(ii)	Edge drop at shoulders exceeding 40 mm	- 7 days
(iii)	Variation by more than 15% in the prescribed side (embankment) slopes	- 30 days
(iv)	Rain cuts/gullies in slope	- 7 days
(v)	Damage to or silting of culverts and side drains during and immediately preceding the rainy season	- 7 days
(vi)	Desilting of drains in urban/semi-urban areas	- 48 hours
(c)	**Road side furniture including road signs and pavement marking**	
(i)	Damage to shape or position; poor visibility or loss of retro-reflectivity	- 48 hours
(d)	**Street lighting and telecom (ATMS)**	
(i)	Any major failure of the system	- 24 hours
(ii)	Faults and minor failures	- 8 hours
(e)	**Trees and plantation**	
(i)	Obstruction in a minimum head-room of 5 m above carriageway or obstruction in visibility of road signs	- 24 hours
(ii)	Deterioration in health of trees and bushes	- Timely watering and treatment
(iii)	Replacement of trees and bushes	- 90 days
(iv)	Removal of vegetation affecting sight line and road structures	- 15 days
(f)	**Rest areas**	
(i)	Cleaning of toilets	- Every 4 hours
(ii)	Defects in electrical, water and sanitary installations	- 24 hours

(g) Toll plaza

(i)	Failure of toll collection equipment or lighting	- 8 hours
(ii)	Damage to toll plaza	- 7 days

(h) Other Project Facilities and Approach roads

(i)	Damage or deterioration in Approach Roads, pedestrian facilities, truck lay-bys, bus-bays, bus-shelters, cattle crossings, Traffic Aid Posts, Medical Aid Posts and other works	- 15 days

BRIDGES

(a) Superstructure of bridges

(i)	Cracks	
	Temporary measures	- within 48 hours
	Permanent measures	- within 45 days
(ii)	Spalling/scaling	- 15 days

(b) Foundations of bridges

(i)	Scouring and/or cavitation	- 15 days

(c) Piers, abutments, return walls and wing walls of bridges

(i)	Cracks and damages including settlement and tilting	- 30 days

(d) Bearings (metallic) of bridges

(i)	Deformation	- 15 days

(e) Joints in bridges

(i)	Loosening and malfunctioning of joints	- 15 days

(f) Other items relating to bridges

(i)	Deforming of pads in elastomeric bearings	- 7 days
(ii)	Gathering of dirt in bearings and joints; or clogging of spouts, weep holes and vent-holes	- 3 days
(iii)	Damage or deterioration in parapets and handrails	- 3 days

(iv)	Rain-cuts or erosion of banks of the side slopes of approaches	-	15 days
(v)	Damage to wearing coat	-	15 days
(vi)	Damage or deterioration in approach slabs, pitching, apron, toes, floor or guide bunds	-	30 days
(vii)	Growth of vegetation affecting the structure or obstructing the waterway	-	15 days

SCHEDULE –L
(See Clause 18.1.1)

SAFETY REQUIREMENTS

1 Guiding principles

1.1 Safety Requirements aim at reduction in injuries, loss of life and damage to property resulting from accidents on the Project Highway, irrespective of the person(s) at fault.

1.2 Users of the Project Highway include motorised and non-motorised vehicles as well as pedestrians and animals involved in, or associated with accidents. Vulnerable Road Users (VRU) include pedestrians as well as riders of motorised two-wheelers, bicycles and other vehicles which do not provide adequate occupant protection.

1.3 Safety Requirements apply to all phases of construction, operation and maintenance with emphasis on identification of factors associated with accidents, consideration of the same, and implementation of appropriate remedial measures.

1.4 Safety Requirements include measures associated with traffic management and regulation such as road signs, pavement marking, traffic control devices, roadside furniture, highway design elements, enforcement and emergency response.

2 Obligations of the Concessionaire

The Concessionaire shall abide by the following insofar as they relate to safety of the Users:

(a) Applicable Laws and Applicable Permits;

(b) Manual for Safety in Road Design, issued by MORTH;

(c) relevant Standards/Guidelines of IRC relating to safety, road geometrics, bridges, culverts, road signs, pavement marking and roadside furniture;

(d) provisions of this Agreement; and

(e) Good Industry Practice.

3 Appointment of Safety Consultant

For carrying out safety audit of the Project Highway under and in accordance

ROAD PVT LTD

with this Schedule-L, the Authority shall appoint from time to time, one or more qualified firms or organisations as its consultants (the "**Safety Consultant**"). The Safety Consultant shall employ a team comprising, without limitation, one road safety expert and one traffic planner to undertake safety audit of the Project Highway.

4 Safety measures during Development Period

4.1 No later than 90 (ninety) days from the date of this Agreement, the Authority shall appoint a Safety Consultant for carrying out safety audit at the design stage of the Project. The Safety Consultant shall collect data on all fatal crashes and other road accidents which occurred on the Project Highway in the preceding two years by obtaining copies of the relevant First Information Reports (FIRs) from the police stations having jurisdiction. The information contained in such FIRs shall be summarised in the form prescribed by IRC/MORTH for this purpose and the data shall be analysed for the type of victims killed or injured, impacting vehicles, location of accidents and other relevant factors.

4.2 The Concessionaire shall provide to the Safety Consultant, in four copies, the relevant drawings containing the design details that have a bearing on safety of Users (the "**Safety Drawings**"). Such design details shall include horizontal and vertical alignments; sightlines; layouts of intersections; interchanges; road cross-section; bridges and culverts; side drains; provision for parked vehicles, slow moving vehicles (tractors, bullock carts, bicycles) and pedestrians; bus bays; truck lay-bys; and other incidental or consequential information. The Safety Consultant shall review the design details and forward three copies of the Safety Drawings with its recommendations, if any, to the Independent Engineer who shall record its comments, if any, and forward one copy each to the Authority and the Concessionaire.

4.3 The accident data and the design details shall be compiled, analysed and used by the Safety Consultant for evolving a package of recommendations consisting of safety related measures for the Project Highway. The safety audit shall be completed in a period of three months and a report thereof (the "**Safety Report**") shall be submitted to the Authority, in five copies. One copy each of the Safety Report shall be forwarded by the Authority to the Concessionaire and the Independent Engineer forthwith.

4.4 The Concessionaire shall endeavour to incorporate the recommendations of the Safety Report in the design of the Project Highway, as may reasonably be required in accordance with Applicable Laws, Applicable Permits, Manuals and Guidelines of MORTH and IRC, Specifications and Standards, and Good Industry Practice. If the Concessionaire does not agree with any or all of such recommendations, it shall state the reasons thereof and convey them to the Authority forthwith. In the event that any or all of the works and services recommended in the Safety Report fall beyond the scope of Schedule-B, Schedule-C or Schedule-D, the Concessionaire shall make a

report thereon and seek the instructions of the Authority for funding such works in accordance with the provisions of Article 18.

4.5 Without prejudice to the provisions of Paragraph 4.4, the Concessionaire and the Independent Engineer shall, within 15 (fifteen) days of receiving the Safety Report, send their respective comments thereon to the Authority, and no later than 15 (fifteen) days of receiving such comments, the Authority shall review the same alongwith the Safety Report and by notice direct the Concessionaire to carry out any or all of the recommendations contained therein with such modifications as the Authority may specify; provided that any works or services required to be undertaken hereunder shall be governed by the provisions of Article 18.

5 Safety measures during Construction Period

5.1 A Safety Consultant shall be appointed by the Authority, no later than 4 (four) months prior to the expected Project Completion Date, for carrying out a safety audit of the completed Construction Works.

5.2 The Safety Consultant shall collect and analyse the accident data for the preceding two years in the manner specified in Paragraph 4.1 of this Schedule-L. It shall study the Safety Report for the Development Period and inspect the Project Highway to assess the adequacy of safety measures. The Safety Consultant shall complete the safety audit within a period of 4 (four) months and submit a Safety Report recommending a package of additional road safety measures, if any, that are considered essential for reducing accident hazards on the Project Highway. Such recommendations shall be processed, *mutatis mutandis*, and acted upon in the manner set forth in Paragraphs 4.3, 4.4 and 4.5 of this Schedule-L.

5.3 The Concessionaire shall make adequate arrangements during the Construction Period for the safety of workers and road Users in accordance with the guidelines of IRC for safety in construction zones, and notify the Authority and the Independent Engineer about such arrangements.

6 Safety measures during Operation Period

6.1 The Concessionaire shall develop, implement and administer a surveillance and safety programme for Users, including correction of safety violations and deficiencies and all other actions necessary to provide a safe environment in accordance with this Agreement.

6.2 The Concessionaire shall establish a Highway Safety Management Unit (the "**HSMU**") to be functional on and after COD, and designate one of its officers to be in-charge of the HSMU. Such officer shall have specialist knowledge and training in road safety and traffic engineering by having attended a course conducted by a reputed organisation on the subject.

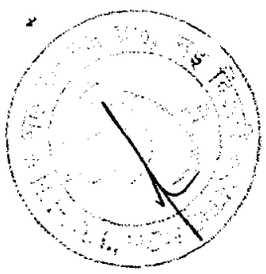
6.3 The Concessionaire shall keep a copy of every FIR recorded by the Police with respect to any accident occurring on the Project Highway. In addition, the Concessionaire shall also collect data for all cases of accidents not recorded by the Police but where a vehicle rolled over or had to be towed away. The information so collected shall be summarised in the form prescribed by IRC/ MORTH for this purpose. The Concessionaire shall also record the exact location of each accident on a road map. The aforesaid data shall be submitted to the Authority at the conclusion of every quarter and to the Safety Consultant as and when appointed.

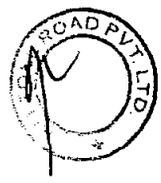
6.4 The Concessionaire shall submit to the Authority before the 31st (thirty first) May of each year, an annual report (in ten copies) containing, without limitation, a detailed listing and analysis of all accidents of the preceding Accounting Year and the measures taken by the Concessionaire pursuant to the provisions of Paragraph 6.1 of this Schedule-L for averting or minimising such accidents in future.

6.5 Once in every Accounting Year, a safety audit shall be carried out by the Safety Consultant to be appointed by the Authority. It shall review and analyse the annual report and accident data of the preceding year, and undertake an inspection of the Project Highway. The Safety Consultant shall complete the safety audit within a period of 1 (one) month and submit a Safety Report recommending specific improvements, if any, required to be made to the road, bridges, culverts, markings, signs, road furniture and Project Facilities, including cattle crossings and pedestrian crossings. Such recommendations shall be processed, *mutatis mutandis*, and acted upon in the manner set forth in Paragraphs 4.3, 4.4 and 4.5 of this Schedule-L.

7 Costs and expenses

Costs and expenses incurred in connection with the Safety Requirements set forth herein, including the provisions of Paragraph 2 of this Schedule, shall be met in accordance with Article 18, and in particular, the remuneration of the Safety Consultant, safety audit, and costs incidental thereto, shall be met out of the Safety Fund.





SCHEDULE –M
(See Clause19.5)

MONTHLY FEE STATEMENT

Project Highway: **Month:**
Gandhidham (Kandla) –
Mundra Port Highway

Type of Vehicle	For corresponding month of previous year		For preceding month		For the month reported upon		
	No. of Vehicles	Fee collected (in lakh Rs.)	No. of Vehicles	Fee collected (in lakh Rs.)	Fee per Vehicle (in Rs.)	No. of Vehicles	Fee collected (in lakh Rs.)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A Car							
B LCV							
C Bus							
D Truck							
E Multi-axle Truck							
F Oversized vehicle							
G **Total**							

Note 1: The above statement does not include Local Users and vehicles travelling on Passes

Note 2: Monthly Fee Statements for Passes have been prepared separately in the above format and are enclosed.

Remarks, if any:

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SCHEDULE –N
(See Clause22.1)

WEEKLY TRAFFIC CENSUS

Project Highway: Gandhidham (Kandla) – Mundra Port Highway **Week ending:**

Type of Vehicle	No. of vehicles using the Project Highway during		
	Corresponding week/last year	Preceding week	Week of report
(1)	(2)	(3)	(4)
A Fee paying Traffic A1 Car			
A2 LCV			
A3 Bus			
A4 Truck			
A5 Multi-axle Truck			
A6 Oversized vehicle			
Total (A)			
B Local Users B1 Car			
Total (B)			
C Exempted Vehicles C1 Motor Cycle			
C2 Car			
C3 LCV			
C4 Bus			
C5 Truck			
C6 Tractor			
Total (C)			
D Total Traffic (A+B-C) D1 Motor Cycle			
D2 Car			
D3 LCV			
D4 Bus			
D5 Truck			
D6 Multi-axle Truck			
D7 Oversized vehicle			
D8 Tractor			
Grand Total (E)			

Remarks, if any:

WEEKLY REPORT FOR WEIGH STATIONS

Project Highway: Gandhidham (Kandla) – Mundra Port **Highway** **Week ending:**

Type of Vehicle	Permitted Gross Vehicle Weight (Tonnes)	No. of Vehicles weighed (Sample size)	No. of Vehicles carrying load:			
			Within permissible limits	Up to 10% in excess	Over 10% and up to 20% in excess	Over 20% in excess
(1)	(2)	(3)	(4)	(5)	(6)	(7)
A LCV						
B Truck						
C Multi-axle Truck						
D **Total**						

Note: Sample size shall not be less than 200 Trucks per week and 20 Trucks per day, and should include a proportionate number of Multi-axle Trucks.

Remarks, if any:

SCHEDULE –O
(See Clause 22.3.1)

TRAFFIC SAMPLING

1 Traffic sampling

The Authority may, in its discretion and at its own cost, undertake traffic sampling, pursuant to Clause 22.3, in order to determine the actual traffic on the Project Highway. Such traffic sampling shall be undertaken through the Independent Engineer in the manner set forth below.

2 Manual traffic count

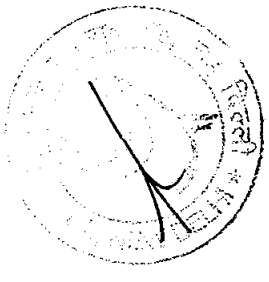
The Independent Engineer shall employ the required number of enumerators who shall count, classify and record all the vehicles as they pass by, and divide the survey into fixed time periods. The count stations shall be located near the Toll Plaza on a straight section of the road with good visibility. The survey shall be conducted continuously for a minimum of 24 (twenty four) hours and maximum of 7 (seven) days at a time. The count period shall be 15 (fifteen) minutes with results summarised hourly.

3 Automatic traffic count

For automatic traffic count to be conducted on intermittent (non-continuous) basis, the Independent Engineer shall use suitable and standardised equipment to classify and record the range of vehicles passing through the Toll Plaza. For this purpose, the counter shall be checked with at least 100 (one hundred) vehicles, including all major vehicle types, over a range of speeds to ensure that all vehicles are being counted and classified correctly.

4 Variation between manual and automatic count

Average Daily Traffic (ADT) for each type of vehicle shall be determined separately by the aforesaid two methods and in the event that the number of vehicles in any category, as counted by the manual method, varies by more than 1% (one per cent) of the number of such vehicles as counted by the automatic method, the manual and automatic count of such category of vehicles shall be repeated, and in the event of any discrepancy between the two counts in the second enumeration, the average thereof shall be deemed to be the actual traffic. For the avoidance of doubt, it is expressly agreed that the Authority may, in consultation with the Concessionaire, adopt modified or alternative processes of traffic sampling for improving the reliability of such sampling.



SCHEDULE –P
(See Clause 23.1)

SELECTION OF INDEPENDENT ENGINEER

1 Selection of Independent Engineer

1.1 The provisions of Part II of the Standard Bidding Documents for Consultancy Assignments: Time Based (Volume V) issued by the Ministry of Finance, GOI in July, 1997 or any substitute thereof shall apply, *mutatis mutandis*, for invitation of bids and evaluation thereof save as otherwise provided herein.

1.2 The Authority shall invite expressions of interest from consulting engineering firms or bodies corporate to undertake and perform the duties and functions set forth in Schedule-Q and thereupon shortlist 10 (ten) qualified firms in accordance with pre-determined criteria. The Authority shall convey the aforesaid list of firms to the Concessionaire for scrutiny and comments, if any. The Concessionaire shall be entitled to scrutinise the relevant records of the Authority to ascertain whether the selection of firms has been undertaken in accordance with the prescribed procedure and it shall send its comments, if any, to the Authority within 15 (fifteen) days of receiving the aforesaid list of firms. Upon receipt of such comments, if any, the Authority shall, after considering all relevant factors, finalise and constitute a panel of 10 (ten) firms (the **"Panel of Firms"**) and convey its decision to the Concessionaire.

1.3 The Authority shall invite the aforesaid firms in the Panel of Firms to submit their respective technical and financial offers, each in a separate sealed cover. All the technical bids so received shall be opened and pursuant to the evaluation thereof, the Authority shall shortlist 3 (three) eligible firms on the basis of their technical scores. The financial bids in respect of such 3 (three) firms shall be opened and the order of priority as among these firms shall be determined on the basis of a weighted evaluation where technical and financial scores shall be assigned respective weights of 80:20.

1.4 In the event that the Authority shall follow the selection process specified in the Model RFP for selection of Technical Consultants, as published by the Ministry of Finance/ Planning Commission, the selection process specified in this Schedule-P shall be deemed to be substituted by the provisions of the said Model RFP and the Concessionaire shall be entitled to scrutinise the relevant records forming part of such selection process.

2 Fee and expenses

2.1 In determining the nature and quantum of duties and services to be performed by the Independent Engineer during the Development Period and Construction Period, the Authority shall endeavour that payments to the Independent Engineer on account of fee and expenses do not exceed 2% (two per cent) of the Total Project Cost. Payments not exceeding such 2%

(two per cent) shall be borne equally by the Authority and the Concessionaire in accordance with the provisions of this Agreement and any payments in excess thereof shall be borne entirely by the Authority.

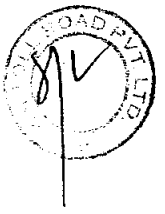
2.2 The nature and quantum of duties and services to be performed by the Independent Engineer during the Operation Period shall be determined by the Authority in conformity with the provisions of this Agreement and with due regard for economy in expenditure. All payments made to the Independent Engineer on account of fee and expenses during the Operation Period, including the construction of Six-Laning, shall be borne equally by the Authority and the Concessionaire.

3 Constitution of fresh panel

No later than 3 (three) years from the date of this Agreement, and every 3 (three) years thereafter, the Authority shall prepare a fresh panel of firms in accordance with the criteria set forth in this Schedule-P; provided that the Authority may, at any time, prepare a fresh panel with prior written consent of the Concessionaire.

4 Appointment of government entity as Independent Engineer

Notwithstanding anything to the contrary contained in this Schedule, the Authority may in its discretion appoint a government-owned entity as the Independent Engineer; provided that such entity shall be a body corporate having as one of its primary function the provision of consulting, advisory and supervisory services for engineering projects; provided further that a government-owned entity which is owned or controlled by the Authority and/or MORTH shall not be eligible for appointment as Independent Engineer.



SCHEDULE –Q
(See Clause 23.2.1)

TERMS OF REFERENCE FOR INDEPENDENT ENGINEER

1 Scope

1.1 These Terms of Reference for the Independent Engineer (the "**TOR**") are being specified pursuant to the Concession Agreement dated..... (the "**Agreement**"), which has been entered into between the Authority and M/s KM Toll Road Private Limited (the "**Concessionaire**") for Four-Laning and subsequent Six-Laning of the Gandhidham (Kandla) – Mundra Port section (km 0.00 to Km. 71.40) of National Highway No. 8A Extension in the State of Gujarat on design, build, finance, operate and transfer (DBFOT) basis, and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.

1.2 This TOR shall apply to construction, operation and maintenance of the Four-Lane Project Highway, and shall apply, *mutatis mutandis*, to Six-Laning thereof.

2 Definitions and interpretation

2.1 The words and expressions beginning with or in capital letters used in this TOR and not defined herein but defined in the Agreement shall have, unless repugnant to the context, the meaning respectively assigned to them in the Agreement.

2.2 References to Articles, Clauses and Schedules in this TOR shall, except where the context otherwise requires, be deemed to be references to the Articles, Clauses and Schedules of the Agreement, and references to Paragraphs shall be deemed to be references to Paragraphs of this TOR.

2.3 The rules of interpretation stated in Clauses 1.2, 1.3 and 1.4 of the Agreement shall apply, *mutatis mutandis*, to this TOR.

3 Role and functions of the Independent Engineer

3.1 The role and functions of the Independent Engineer shall include the following:

(i) review of the Drawings and Documents as set forth in Paragraph 4;

(ii) review, inspection and monitoring of Construction Works as set forth in Paragraph 5;

(iii) conducting Tests on completion of construction and issuing Completion/ Provisional Certificate as set forth in Paragraph 5;

(iv) review, inspection and monitoring of O&M as set forth in Paragraph 6;

(v) review, inspection and monitoring of Divestment Requirements as set forth in Paragraph 7;

(vi) determining, as required under the Agreement, the costs of any works or services and/or their reasonableness;

(vii) determining, as required under the Agreement, the period or any extension thereof, for performing any duty or obligation;

(viii) assisting the Parties in resolution of disputes as set forth in Paragraph 9; and

(ix) undertaking all other duties and functions in accordance with the Agreement.

3.2 The Independent Engineer shall discharge its duties in a fair, impartial and efficient manner, consistent with the highest standards of professional integrity and Good Industry Practice.

4 Development Period

4.1 During the Development Period, the Independent Engineer shall undertake a detailed review of the Drawings to be furnished by the Concessionaire along with supporting data, including the geo-technical and hydrological investigations, characteristics of materials from borrow areas and quarry sites, topographical surveys and traffic surveys. The Independent Engineer shall complete such review and send its comments/observations to the Authority and the Concessionaire within 15 (fifteen) days of receipt of such Drawings. In particular, such comments shall specify the conformity or otherwise of such Drawings with the Scope of the Project and Specifications and Standards.

4.2 The Independent Engineer shall review any modified Drawings or supporting Documents sent to it by the Concessionaire and furnish its comments within 7 (seven) days of receiving such Drawings or Documents.

4.3 The Independent Engineer shall review the Drawings sent to it by the Safety Consultant in accordance with Schedule-L and furnish its comments thereon to the Authority and the Concessionaire within 7 (seven) days of receiving such Drawings. The Independent Engineer shall also review the Safety Report and furnish its comments thereon to the Authority within 15 (fifteen) days of receiving such report.

4.4 The Independent Engineer shall review the detailed design, construction methodology, quality assurance procedures and the procurement, engineering and construction time schedule sent to it by the Concessionaire and furnish its comments within 15 (fifteen) days of receipt thereof.

4.5 Upon reference by the Authority, the Independent Engineer shall review and comment on the EPC Contract or any other contract for construction, operation and maintenance of the Project Highway, and furnish its comments

within 7 (seven) days from receipt of such reference from the Authority.

5 Construction Period

5.1 In respect of the Drawings, Documents and Safety Report received by the Independent Engineer for its review and comments during the Construction Period, the provisions of Paragraph 4 shall apply, *mutatis mutandis*.

5.2 The Independent Engineer shall review the monthly progress report furnished by the Concessionaire and send its comments thereon to the Authority and the Concessionaire within 7 (seven) days of receipt of such report.

5.3 The Independent Engineer shall inspect the Construction Works and the Project Highway once every month, preferably after receipt of the monthly progress report from the Concessionaire, but before the 20th (twentieth) day of each month in any case, and make out a report of such inspection (the "**Inspection Report**") setting forth an overview of the status, progress, quality and safety of construction, including the work methodology adopted, the materials used and their sources, and conformity of Construction Works with the Scope of the Project and the Specifications and Standards. In a separate section of the Inspection Report, the Independent Engineer shall describe in reasonable detail the lapses, defects or deficiencies observed by it in the construction of the Project Highway. The Inspection Report shall also contain a review of the maintenance of the existing lanes in conformity with the provisions of the Agreement. The Independent Engineer shall send a copy of its Inspection Report to the Authority and the Concessionaire within 7 (seven) days of the inspection.

5.4 The Independent Engineer may inspect the Project Highway more than once in a month if any lapses, defects or deficiencies require such inspections.

5.5 For determining that the Construction Works conform to Specifications and Standards, the Independent Engineer shall require the Concessionaire to carry out, or cause to be carried out, tests on a sample basis, to be specified by the Independent Engineer in accordance with Good Industry Practice for quality assurance. For purposes of this Paragraph 5.5, the tests specified in the IRC Special Publication-11 (Handbook of Quality Control for Construction of Roads and Runways) and the Specifications for Road and Bridge Works issued by MORTH (the "**Quality Control Manuals**") or any modification/substitution thereof shall be deemed to be tests conforming to Good Industry Practice for quality assurance. The Independent Engineer shall issue necessary directions to the Concessionaire for ensuring that the tests are conducted in a fair and efficient manner, and shall monitor and review the results thereof.

5.6 The sample size of the tests, to be specified by the Independent Engineer under Paragraph 5.5, shall comprise 10% (ten per cent) of the quantity or number of tests prescribed for each category or type of tests in the Quality Control Manuals; provided that the Independent Engineer may, for reasons to be recorded in writing, increase the aforesaid sample size by up to 10%

(ten per cent) for certain categories or types of tests.

5.7 The timing of tests referred to in Paragraph 5.5, and the criteria for acceptance/ rejection of their results shall be determined by the Independent Engineer in accordance with the Quality Control Manuals. The tests shall be undertaken on a random sample basis and shall be in addition to, and independent of, the tests that may be carried out by the Concessionaire for its own quality assurance in accordance with Good Industry Practice.

5.8 In the event that the Concessionaire carries out any remedial works for removal or rectification of any defects or deficiencies, the Independent Engineer shall require the Concessionaire to carry out, or cause to be carried out, tests to determine that such remedial works have brought the Construction Works into conformity with the Specifications and Standards, and the provisions of this Paragraph 5 shall apply to such tests.

5.9 In the event that the Concessionaire fails to achieve any of the Project Milestones, the Independent Engineer shall undertake a review of the progress of construction and identify potential delays, if any. If the Independent Engineer shall determine that completion of the Project Highway is not feasible within the time specified in the Agreement, it shall require the Concessionaire to indicate within 15 (fifteen) days the steps proposed to be taken to expedite progress, and the period within which the Project Completion Date shall be achieved. Upon receipt of a report from the Concessionaire, the Independent Engineer shall review the same and send its comments to the Authority and the Concessionaire forthwith.

5.10 If at any time during the Construction Period, the Independent Engineer determines that the Concessionaire has not made adequate arrangements for the safety of workers and Users in the zone of construction or that any work is being carried out in a manner that threatens the safety of the workers and the Users, it shall make a recommendation to the Authority forthwith, identifying the whole or part of the Construction Works that should be suspended for ensuring safety in respect thereof.

5.11 In the event that the Concessionaire carries out any remedial measures to secure the safety of suspended works and Users, it may, by notice in writing, require the Independent Engineer to inspect such works, and within 3 (three) days of receiving such notice, the Independent Engineer shall inspect the suspended works and make a report to the Authority forthwith, recommending whether or not such suspension may be revoked by the Authority.

5.12 If suspension of Construction Works is for reasons not attributable to the Concessionaire, the Independent Engineer shall determine the extension of dates set forth in the Project Completion Schedule, to which the Concessionaire is reasonably entitled, and shall notify the Authority and the Concessionaire of the same.

5.13 The Independent Engineer shall carry out, or cause to be carried out, all the Tests specified in Schedule-I and issue a Completion Certificate or

Provisional Certificate, as the case may be. For carrying out its functions under this Paragraph 5.13 and all matters incidental thereto, the Independent Engineer shall act under and in accordance with the provisions of Article 14 and Schedule-I.

5.14 Upon reference from the Authority, the Independent Engineer shall make a fair and reasonable assessment of the costs of providing information, works and services as set forth in Article 16 and certify the reasonableness of such costs for payment by the Authority to the Concessionaire.

5.15 The Independent Engineer shall aid and advise the Concessionaire in preparing the Maintenance Manual.

6 Operation Period

6.1 In respect of the Drawings, Documents and Safety Report received by the Independent Engineer for its review and comments during the Operation Period, the provisions of Paragraph 4 shall apply, *mutatis mutandis*.

6.2 The Independent Engineer shall review the annual Maintenance Programme furnished by the Concessionaire and send its comments thereon to the Authority and the Concessionaire within 15 (fifteen) days of receipt of the Maintenance Programme.

6.3 The Independent Engineer shall review the monthly status report furnished by the Concessionaire and send its comments thereon to the Authority and the Concessionaire within 7 (seven) days of receipt of such report.

6.4 The Independent Engineer shall inspect the Project Highway once every month, preferably after receipt of the monthly status report from the Concessionaire, but before the 20th (twentieth) day of each month in any case, and make out an O&M Inspection Report setting forth an overview of the status, quality and safety of O&M including its conformity with the Maintenance Requirements and Safety Requirements. In a separate section of the O&M Inspection Report, the Independent Engineer shall describe in reasonable detail the lapses, defects or deficiencies observed by it in O&M of the Project Highway. The Independent Engineer shall send a copy of its O&M Inspection Report to the Authority and the Concessionaire within 7 (seven) days of the inspection.

6.5 The Independent Engineer may inspect the Project Highway more than once in a month, if any lapses, defects or deficiencies require such inspections.

6.6 The Independent Engineer shall in its O&M Inspection Report specify the tests, if any, that the Concessionaire shall carry out, or cause to be carried out, for the purpose of determining that the Project Highway is in conformity with the Maintenance Requirements. It shall monitor and review the results of such tests and the remedial measures, if any, taken by the Concessionaire in this behalf.

6.7 In respect of any defect or deficiency referred to in Paragraph 3 of Schedule-

K, the Independent Engineer shall, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards and shall also specify the time limit for repair or rectification of any deviation or deterioration beyond the permissible limit.

6.8 The Independent Engineer shall determine if any delay has occurred in completion of repair or remedial works in accordance with the Agreement, and shall also determine the Damages, if any, payable by the Concessionaire to the Authority for such delay.

6.9 The Independent Engineer shall examine the request of the Concessionaire for closure of any lane(s) of the carriageway for undertaking maintenance/repair thereof, keeping in view the need to minimise disruption in traffic and the time required for completing such maintenance/repair in accordance with Good Industry Practice. It shall grant permission with such modifications, as it may deem necessary, within 3 (three) days of receiving a request from the Concessionaire. Upon expiry of the permitted period of closure, the Independent Engineer shall monitor the re-opening of such lane(s), and in case of delay, determine the Damages payable by the Concessionaire to the Authority under Clause 17.7.

6.10 The Independent Engineer shall monitor and review the curing of defects and deficiencies by the Concessionaire as set forth in Clause 19.4.

6.11 In the event that the Concessionaire notifies the Independent Engineer of any modifications that it proposes to make to the Project Highway, the Independent Engineer shall review the same and send its comments to the Authority and the Concessionaire within 15 (fifteen) days of receiving the proposal.

6.12 The Independent Engineer shall undertake traffic sampling, as and when required by the Authority, under and in accordance with Article 22 and Schedule-O.

7 Termination

7.1 At any time, not earlier than 90 (ninety) days prior to Termination but not later than 15 (fifteen) days prior to such Termination, the Independent Engineer shall, in the presence of a representative of the Concessionaire, inspect the Project Highway for determining compliance by the Concessionaire with the Divestment Requirements set forth in Clause 38.1 and, if required, cause tests to be carried out at the Concessionaire's cost for determining such compliance. If the Independent Engineer determines that the status of the Project Highway is such that its repair and rectification would require a larger amount than the sum set forth in Clause 39.2, it shall recommend retention of the required amount in the Escrow Account and the period of retention thereof.

7.2 The Independent Engineer shall inspect the Project Highway once in every 15(fifteen) days during a period of 90 (ninety) days after Termination for

determining the liability of the Concessionaire under Article 39, in respect of the defects or deficiencies specified therein. If any such defect or deficiency is found by the Independent Engineer, it shall make a report in reasonable detail and send it forthwith to the Authority and the Concessionaire.

8 Determination of costs and time

8.1 The Independent Engineer shall determine the costs, and/or their reasonableness, that are required to be determined by it under the Agreement.

8.2 The Independent Engineer shall determine the period, or any extension thereof, that is required to be determined by it under the Agreement.

9 Assistance in Dispute resolution

9.1 When called upon by either Party in the event of any Dispute, the Independent Engineer shall mediate and assist the Parties in arriving at an amicable settlement.

9.2 In the event of any disagreement between the Parties regarding the meaning, scope and nature of Good Industry Practice, as set forth in any provision of the Agreement, the Independent Engineer shall specify such meaning, scope and nature by issuing a reasoned written statement relying on good industry practice and authentic literature.

10 Other duties and functions

The Independent Engineer shall perform all other duties and functions specified in the Agreement.

11 Miscellaneous

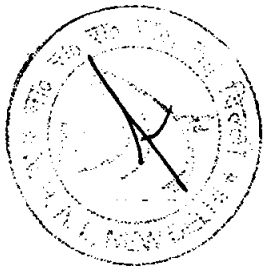
11.1 The Independent Engineer shall notify its programme of inspection to the Authority and to the Concessionaire, who may, in their discretion, depute their respective representatives to be present during the inspection.

11.2 A copy of all communications, comments, instructions, Drawings or Documents sent by the Independent Engineer to the Concessionaire pursuant to this TOR, and a copy of all the test results with comments of the Independent Engineer thereon shall be furnished by the Independent Engineer to the Authority forthwith.

11.3 The Independent Engineer shall obtain, and the Concessionaire shall furnish in two copies thereof, all communications and reports required to be submitted, under this Agreement, by the Concessionaire to the Independent Engineer, whereupon the Independent Engineer shall send one of the copies to the Authority along with its comments thereon.

11.4 The Independent Engineer shall retain at least one copy each of all Drawings and Documents received by it, including 'as-built' Drawings, and keep them in its safe custody.

11.5 Upon completion of its assignment hereunder, the Independent Engineer shall duly classify and list all Drawings, Documents, results of tests and other relevant records, and hand them over to the Authority or such other person as the Authority may specify, and obtain written receipt thereof. Two copies of the said documents shall also be furnished in micro film form or in such other medium as may be acceptable to the Authority.



SCHEDULE –R
(See Clause 27.1.1)

FEE NOTIFICATION

MINISTRY OF ROAD TRANSPORT AND HIGHWAYS

(Department of Road Transport and Highways)

NOTIFICATION

New Delhi, the ..... 20...

S.O. ..... Whereas, by the notification of the Government of India in the Ministry of Road Transport and Highways, number ***** dated the *****, issued under section 11 of the National Highways Authority of India Act, 1988 (68 of 1988), the Central Government has entrusted the section of National Highway from Km 0.00 to Km 71.40 (Gandhidham (Kandla) – Mundra Port Section) of National Highway No. 8A Extension in the state of Gujarat to the National Highways Authority of India (hereinafter referred to as the "Authority");

And Whereas, pursuant to the provisions of section 14 of the said Act, the Authority has entered into an agreement with M/s KM Toll Road Private Limited, having its Registered Office at H Block, 1st Floor, Dhirubhai Ambani Knowledge City, Navi Mumbai-400710 (hereinafter referred to as "Concessionaire") for the development of the Gandhidham (Kandla) – Mundra Port section from Km 0.00 to Km 71.40 (hereinafter referred to as the said section) of the National Highway No. 8A Extension on Design, Build, Finance, Operate and Transfer (DBFOT) basis;

Now, therefore, in exercise of the powers conferred by section 8A of the National Highways Act, 1956 (48 of 1956), read with Rule 3 of the National Highways Fee (Determination of Rates and Collection) Rules, 2008, the Central Government, having regard to the expenditure involved in building, maintenance, management and operation of the said section of the said national highway, interest on the capital invested, reasonable return, the volume of traffic and the period of said agreement between the Authority and the Concessionaire, hereby notifies that there shall be levied and collected fees on mechanical vehicles for the use of the section from Km 0.00 to Km. 71.40 (Gandhidham (Kandla) – Mundra Port) of National Highway No. 8A Extension, including the permanent bridge/ bypass/ tunnel having an estimated cost of Rs. 84.09 Crores (Rupees Eighty Four Crores and Nine Lakhs), in the State of Gujarat at the rates specified in the aforesaid Rules and

authorises the said Concessionaire to collect and retain the said fees on and from the date of commercial operation of the said section of national highway, subject to and in accordance with the said Rules and the provisions of the aforesaid agreement.

The fee levied and collected hereunder shall be due and payable at the following Toll Plaza for the distance specified for each such Toll Plaza:

S. No.	Location of Toll Plaza (chainage)	Length (in km) for which Fee is payable
1	At Km 46.50 in the State of Gujarat	62.50 Km (excluding 8.90 km length of Anjar bypass)

In addition to the above, the fee levied and collected hereunder for the permanent bridge, bypass and tunnel, as the case may be, costing Rs. 50 cr. (Rupees fifty crore) or more as specified below shall be due and payable at the following Toll Plaza(s):

S. No.	Location of Toll Plaza (chainage)	Nature of Structure	Cost (in Rs. crore)
1	At Km 46.50 in the State of Gujarat	Anjar bypass of 8.90 km length	84.09

F.No. RW/NH-.....

(Name)

Deputy Secretary

Government of India

SCHEDULE –S
(See Clause 31.1.2)

ESCROW AGREEMENT

THIS ESCROW AGREEMENT is entered into on this the ..... day of ..... 20....

AMONGST

1 M/s KM TOLL ROAD PRIVATE LIMITED, a company incorporated under the provisions of the Companies Act, 1956 and having its registered office at H Block, 1st Floor, Dhirubhai Ambani Knowledge City, Navi Mumbai-400710 (hereinafter referred to as the "**Concessionaire**" which expression shall, unless repugnant to the context or meaning thereof, include its successors, permitted assigns and substitutes);

2 .....name and particulars of Lenders' Representative and having its registered office at .....acting for and on behalf of the Senior Lenders as their duly authorised agent with regard to matters arising out of or in relation to this Agreement (hereinafter referred to as the "**Lenders' Representative**" which expression shall, unless repugnant to the context or meaning thereof, include its successors and substitutes);

3 .....name and particulars of the Escrow Bank and having its registered office at .....(hereinafter referred to as the "**Escrow Bank**" which expression shall, unless repugnant to the context or meaning thereof, include its successors and substitutes); and

4 The National Highways Authority of India, established under the National Highways Authority Act 1988, represented by its Chairman and having its principal offices at G-5 & 6, Sector 10, Dwarka, New Delhi-110075 (hereinafter referred to as the "**Authority**" which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns).

WHEREAS:

(A) The Authority has entered into a Concession Agreement dated ..... with the Concessionaire (the "**Concession Agreement**") for Four-Laning and subsequent Six-Laning of the Gandhidham (Kandla) – Mundra Port section (km 0.00 to km. 71.40) of National Highway No. 8A Extension in the State of Gujarat on design, build, finance, operate and transfer (DBFOT) basis, and a copy of which is annexed hereto and marked as Annex-A to form part of this Agreement.

(B) Senior Lenders have agreed to finance the Project in accordance with the terms and conditions set forth in the Financing Agreements.

(C) The Concession Agreement requires the Concessionaire to establish an Escrow Account, *inter alia*, on the terms and conditions stated therein.

NOW, THEREFORE, in consideration of the foregoing and the respective covenants and agreements set forth in this Agreement, the receipt and sufficiency of which is hereby acknowledged, and intending to be legally bound hereby, the Parties agree as follows:

1 DEFINITIONS AND INTERPRETATION

1.1 Definitions

In this Agreement, the following words and expressions shall, unless repugnant to the context or meaning thereof, have the meaning hereinafter respectively assigned to them:

"**Agreement**" means this Escrow Agreement and any amendment thereto made in accordance with the provisions contained herein;

"**Concession Agreement**" means the Concession Agreement referred to in Recital (A) above and annexed hereto as Annex-A, and shall include all of its Recitals and Schedules and any amendments made thereto in accordance with the provisions contained in this behalf therein;

"**Cure Period**" means the period specified in this Agreement for curing any breach or default of any provision of this Agreement by the Concessionaire, and shall commence from the date on which a notice is delivered by the Authority or the Lenders' Representative, as the case may be, to the Concessionaire asking the latter to cure the breach or default specified in such notice;

"**Escrow Account**" means an escrow account established in terms of and under this Agreement, and shall include the Sub-Accounts;

"**Escrow Default**" shall have the meaning ascribed thereto in Clause 6.1;

"**Lenders' Representative**" means the person referred to as the Lenders' Representative in the foregoing Recitals;

"**Parties**" means the parties to this Agreement collectively and "Party" shall mean any of the Parties to this Agreement individually;

"**Payment Date**" means, in relation to any payment specified in Clause 4.1, the date(s) specified for such payment; and

"**Sub-Accounts**" means the respective Sub-Accounts of the Escrow Account, into which the monies specified in Clause 4.1 would be credited every month and paid out if due, and if not due in a month then appropriated proportionately in such month and retained in the respective Sub Accounts and paid out therefrom on the Payment Date(s).

1.2 Interpretation

1.2.1 References to Lenders' Representative shall, unless repugnant to the context or meaning thereof, mean references to the Lenders' Representative, acting

for and on behalf of Senior Lenders.

1.2.2 The words and expressions beginning with capital letters and defined in this Agreement shall have the meaning ascribed thereto herein, and the words and expressions used in this Agreement and not defined herein but defined in the Concession Agreement shall, unless repugnant to the context, have the meaning ascribed thereto in the Concession Agreement.

1.2.3 References to Clauses are, unless stated otherwise, references to Clauses of this Agreement.

1.2.4 The rules of interpretation stated in Clauses 1.2, 1.3 and 1.4 of the Concession Agreement shall apply, *mutatis mutandis*, to this Agreement.

2 ESCROW ACCOUNT

2.1 Escrow Bank to act as trustee

2.1.1 The Concessionaire hereby appoints the Escrow Bank to act as trustee for the Authority, the Lenders' Representative and the Concessionaire in connection herewith and authorises the Escrow Bank to exercise such rights, powers, authorities and discretion as are specifically delegated to the Escrow Bank by the terms hereof together with all such rights, powers, authorities and discretion as are reasonably incidental hereto, and the Escrow Bank accepts such appointment pursuant to the terms hereof.

2.1.2 The Concessionaire hereby declares that all rights, title and interest in and to the Escrow Account shall be vested in the Escrow Bank and held in trust for the Authority, the Lenders' Representative and the Concessionaire, and applied in accordance with the terms of this Agreement. No person other than the Authority, the Lenders' Representative and the Concessionaire shall have any rights hereunder as the beneficiaries of, or as third party beneficiaries under this Agreement.

2.2 Acceptance of Escrow Bank

The Escrow Bank hereby agrees to act as such and to accept all payments and other amounts to be delivered to and held by the Escrow Bank pursuant to the provisions of this Agreement. The Escrow Bank shall hold and safeguard the Escrow Account during the term of this Agreement and shall treat the amount in the Escrow Account as monies deposited by the Concessionaire, Senior Lenders or the Authority with the Escrow Bank. In performing its functions and duties under this Agreement, the Escrow Bank shall act in trust for the benefit of, and as agent for, the Authority, the Lenders' Representative and the Concessionaire or their nominees, successors or assigns, in accordance with the provisions of this Agreement.

2.3 Establishment and operation of Escrow Account

2.3.1 Within 30 (thirty) days from the date of this Agreement, and in any case prior to the Appointed Date, the Concessionaire shall open and establish the

Escrow Account with the ..... (name of Branch) Branch of the Escrow Bank. The Escrow Account shall be denominated in Rupees.

2.3.2 The Escrow Bank shall maintain the Escrow Account in accordance with the terms of this Agreement and its usual practices and applicable regulations, and pay the maximum rate of interest payable to similar customers on the balance in the said account from time to time.

2.3.3 The Escrow Bank and the Concessionaire shall, after consultation with the Lenders' Representative, agree on the detailed mandates, terms and conditions, and operating procedures for the Escrow Account, but in the event of any conflict or inconsistency between this Agreement and such mandates, terms and conditions, or procedures, this Agreement shall prevail.

2.4 Escrow Bank's fee

The Escrow Bank shall be entitled to receive its fee and expenses in an amount, and at such times, as may be agreed between the Escrow Bank and the Concessionaire. For the avoidance of doubt, such fee and expenses shall form part of the O&M Expenses and shall be appropriated from the Escrow Account in accordance with Clause 4.1.

2.5 Rights of the parties

The rights of the Authority, the Lenders' Representative and the Concessionaire in the monies held in the Escrow Account are set forth in their entirety in this Agreement and the Authority, the Lenders' Representative and the Concessionaire shall have no other rights against or to the monies in the Escrow Account.

2.6 Substitution of the Concessionaire

The Parties hereto acknowledge and agree that upon substitution of the Concessionaire with the Nominated Company, pursuant to the Substitution Agreement, it shall be deemed for the purposes of this Agreement that the Nominated Company is a Party hereto and the Nominated Company shall accordingly be deemed to have succeeded to the rights and obligations of the Concessionaire under this Agreement on and with effect from the date of substitution of the Concessionaire with the Nominated Company.

3 DEPOSITS INTO ESCROW ACCOUNT

3.1 Deposits by the Concessionaire

3.1.1 The Concessionaire agrees and undertakes that it shall deposit into and/or credit the Escrow Account with:

(a) all monies received in relation to the Project from any source, including the Senior Lenders, lenders of Subordinated Debt and the Authority;

(b) all funds received by the Concessionaire from its share-holders, in

any manner or form;

(c) all Fee levied and collected by the Concessionaire;

(d) any other revenues, rentals, deposits or capital receipts, as the case may be, from or in respect of the Project Highway; and

(e) all proceeds received pursuant to any insurance claims.

3.1.2 The Concessionaire may at any time make deposits of its other funds into the Escrow Account, provided that the provisions of this Agreement shall apply to such deposits.

3.2 Deposits by the Authority

The Authority agrees and undertakes that, as and when due and payable, it shall deposit into and/or credit the Escrow Account with:

(a) any other monies disbursed by the Authority to the Concessionaire;

(b) Revenue Shortfall Loan;

(c) all Fee collected by the Authority in exercise of its rights under the Concession Agreement; and

(d) Termination Payments:

Provided that, notwithstanding the provisions of Clause 4.1.1, the Authority shall be entitled to appropriate from the aforesaid amounts, any Concession Fee due and payable to it by the Concessionaire, and the balance remaining shall be deposited into the Escrow Account.

3.3 Deposits by Senior Lenders

The Lenders' Representative agrees, confirms and undertakes that the Senior Lenders shall deposit into and/or credit the Escrow Account with all disbursements made by them in relation to or in respect of the Project; provided that notwithstanding anything to the contrary contained in this Agreement, the Senior Lenders shall be entitled to make direct payments to the EPC Contractor under and in accordance with the express provisions contained in this behalf in the Financing Agreements.

3.4 Interest on deposits

The Escrow Bank agrees and undertakes that all interest accruing on the balances of the Escrow Account shall be credited to the Escrow Account; provided that the Escrow Bank shall be entitled to appropriate therefrom the fee and expenses due to it from the Concessionaire in relation to the Escrow Account and credit the balance remaining to the Escrow Account.

4 WITHDRAWALS FROM ESCROW ACCOUNT

4.1 Withdrawals during Concession Period

4.1.1 At the beginning of every month, or at such shorter intervals as the Lenders' Representative and the Concessionaire may by written instructions determine, the Escrow Bank shall withdraw amounts from the Escrow Account and appropriate them in the following order by depositing such amounts in the relevant Sub-Accounts for making due payments, and if such payments are not due in any month, then retain such monies in such Sub-Accounts and pay out therefrom on the Payment Date(s):

(a) all taxes due and payable by the Concessionaire for and in respect of the Project Highway;

(b) all payments relating to construction of the Project Highway, subject to and in accordance with the conditions, if any, set forth in the Financing Agreements;

(c) O&M Expenses, subject to the ceiling, if any, set forth in the Financing Agreements;

(d) O&M Expenses incurred by the Authority, provided it certifies to the Escrow Bank that it had incurred such expenses in accordance with the provisions of the Concession Agreement and that the amounts claimed are due to it from the Concessionaire;

(e) Concession Fee due and payable to the Authority;

(f) monthly proportionate provision of Debt Service due in an Accounting Year;

(g) Premium due and payable to the Authority;

(h) all payments and Damages certified by the Authority as due and payable to it by the Concessionaire pursuant to the Concession Agreement, including repayment of Revenue Shortfall Loan;

(i) monthly proportionate provision of debt service payments due in an Accounting Year in respect of Subordinated Debt;

(j) any reserve requirements set forth in the Financing Agreements; and

(k) balance, if any, in accordance with the instructions of the Concessionaire.

4.1.2 No later than 60 (sixty) days prior to the commencement of each Accounting Year, the Concessionaire shall provide to the Escrow Bank, with prior written approval of the Lenders' Representative, details of the amounts likely to be required for each of the payment obligations set forth in this Clause 4.1; provided that such amounts may be subsequently modified, with prior written approval of the Lenders' Representative, if fresh information received during the course of the year makes such modification necessary.

4.2 Withdrawals upon Termination

Upon Termination of the Concession Agreement, all amounts standing to the credit of the Escrow Account shall, notwithstanding anything in this Agreement, be appropriated and dealt with in the following order:

(a) all taxes due and payable by the Concessionaire for and in respect of the Project Highway;

(b) 90% (ninety per cent) of Debt Due excluding Subordinated Debt;

(c) outstanding Concession Fee;

(d) all payments and Damages certified by the Authority as due and payable to it by the Concessionaire pursuant to the Concession Agreement, including Premium, repayment of Revenue Shortfall Loan and any claims in connection with or arising out of Termination;

(e) retention and payments arising out of, or in relation to, liability for defects and deficiencies set forth in Article 39 of the Concession Agreement;

(f) outstanding Debt Service including the balance of Debt Due;

(g) outstanding Subordinated Debt;

(h) incurred or accrued O&M Expenses;

(i) any other payments required to be made under the Concession Agreement; and

(j) balance, if any, in accordance with the instructions of the Concessionaire:

Provided that the disbursements specified in Sub-clause (j) of this Clause 4.2 shall be undertaken only after the Vesting Certificate has been issued by the Authority.

4.3 Application of insufficient funds

Funds in the Escrow Account shall be applied in the serial order of priority set forth in Clauses 4.1 and 4.2, as the case may be. If the funds available are not sufficient to meet all the requirements, the Escrow Bank shall apply such funds in the serial order of priority until exhaustion thereof.

4.4 Application of insurance proceeds

Notwithstanding anything in this Agreement, the proceeds from all insurance claims, except life and injury, shall be deposited into and/or credited to the Escrow Account and utilised for any necessary repair, reconstruction, reinstatement, replacement, improvement, delivery or installation of the

Project Highway, and the balance remaining, if any, shall be applied in accordance with the provisions contained in this behalf in the Financing Agreements.

4.5 Withdrawals during Suspension

Notwithstanding anything to the contrary contained in this Agreement, the Authority may exercise all or any of the rights of the Concessionaire during the period of Suspension under Article 36 of the Concession Agreement. Any instructions given by the Authority to the Escrow Bank during such period shall be complied with as if such instructions were given by the Concessionaire under this Agreement and all actions of the Authority hereunder shall be deemed to have been taken for and on behalf of the Concessionaire.

5 OBLIGATIONS OF THE ESCROW BANK

5.1 Segregation of funds

Monies and other property received by the Escrow Bank under this Agreement shall, until used or applied in accordance with this Agreement, be held by the Escrow Bank in trust for the purposes for which they were received, and shall be segregated from other funds and property of the Escrow Bank.

5.2 Notification of balances

7 (seven) business days prior to each Payment Date (and for this purpose the Escrow Bank shall be entitled to rely on an affirmation by the Concessionaire and/or the Lenders' Representative as to the relevant Payment Dates), the Escrow Bank shall notify the Lenders' Representative of the balances in the Escrow Account and Sub-Accounts as at the close of business on the immediately preceding business day.

5.3 Communications and notices

In discharge of its duties and obligations hereunder, the Escrow Bank:

(a) may, in the absence of bad faith or gross negligence on its part, rely as to any matters of fact which might reasonably be expected to be within the knowledge of the Concessionaire upon a certificate signed by or on behalf of the Concessionaire;

(b) may, in the absence of bad faith or gross negligence on its part, rely upon the authenticity of any communication or document believed by it to be authentic;

(c) shall, within 5 (five) business days after receipt, deliver a copy to the Lenders' Representative of any notice or document received by it in its capacity as the Escrow Bank from the Concessionaire or any other person hereunder or in connection herewith; and

(d) shall, within 5 (five) business days after receipt, deliver a copy to the Concessionaire of any notice or document received by it from the Lenders' Representative in connection herewith.

5.4 No set off

The Escrow Bank agrees not to claim or exercise any right of set off, banker's lien or other right or remedy with respect to amounts standing to the credit of the Escrow Account. For the avoidance of doubt, it is hereby acknowledged and agreed by the Escrow Bank that the monies and properties held by the Escrow Bank in the Escrow Account shall not be considered as part of the assets of the Escrow Bank and being trust property, shall in the case of bankruptcy or liquidation of the Escrow Bank, be wholly excluded from the assets of the Escrow Bank in such bankruptcy or liquidation.

5.5 Regulatory approvals

The Escrow Bank shall use its best efforts to procure, and thereafter maintain and comply with, all regulatory approvals required for it to establish and operate the Escrow Account. The Escrow Bank represents and warrants that it is not aware of any reason why such regulatory approvals will not ordinarily be granted to the Escrow Bank.

6 ESCROW DEFAULT

6.1 Escrow Default

6.1.1 Following events shall constitute an event of default by the Concessionaire (an"Escrow Default") unless such event of default has occurred as a result of Force Majeure or any act or omission of the Authority or the Lenders' Representative:

(a) the Concessionaire commits breach of this Agreement by failing to deposit any receipts into the Escrow Account as provided herein and fails to cure such breach by depositing the same into the Escrow Account within a Cure Period of 5 (five) business days;

(b) the Concessionaire causes the Escrow Bank to transfer funds to any account of the Concessionaire in breach of the terms of this Agreement and fails to cure such breach by depositing the relevant funds into the Escrow Account or any Sub-Account in which such transfer should have been made, within a Cure Period of 5 (five) business days; or

(c) the Concessionaire commits or causes any other breach of the provisions of this Agreement and fails to cure the same within a Cure Period of 5 (five) business days.

6.1.2 Upon occurrence of an Escrow Default, the consequences thereof shall be dealt with under and in accordance with the provisions of the Concession

Agreement.

7 TERMINATION OF ESCROW AGREEMENT

7.1 Duration of the Escrow Agreement

This Agreement shall remain in full force and effect so long as any sum remains to be advanced or is outstanding from the Concessionaire in respect of the debt, guarantee or financial assistance received by it from the Senior Lenders, or any of its obligations to the Authority remain to be discharged, unless terminated earlier by consent of all the Parties or otherwise in accordance with the provisions of this Agreement.

7.2 Substitution of Escrow Bank

The Concessionaire may, by not less than 45 (forty five) days prior notice to the Escrow Bank, the Authority and the Lenders' Representative, terminate this Agreement and appoint a new Escrow Bank, provided that the new Escrow Bank is acceptable to the Lenders' Representative and arrangements are made satisfactory to the Lenders' Representative for transfer of amounts deposited in the Escrow Account to a new Escrow Account established with the successor Escrow Bank. The termination of this Agreement shall take effect only upon coming into force of an Escrow Agreement with the substitute Escrow Bank.

7.3 Closure of Escrow Account

The Escrow Bank shall, at the request of the Concessionaire and the Lenders' Representative made on or after the payment by the Concessionaire of all outstanding amounts under the Concession Agreement and the Financing Agreements including the payments specified in Clause 4.2, and upon confirmation of receipt of such payments, close the Escrow Account and Sub-Accounts and pay any amount standing to the credit thereof to the Concessionaire. Upon closure of the Escrow Account hereunder, the Escrow Agreement shall be deemed to be terminated.

8 SUPPLEMENTARY ESCROW AGREEMENT

8.1 Supplementary escrow agreement

The Lenders' Representative and the Concessionaire shall be entitled to enter into a supplementary escrow agreement with the Escrow Bank providing, inter alia, for detailed procedures and documentation for withdrawals from Sub-Accounts pursuant to Clause 4.1.1 and for matters not covered under this Agreement such as the rights and obligations of Senior Lenders and lenders of Subordinated Debt, investment of surplus funds, restrictions on withdrawals by the Concessionaire in the event of breach of this Agreement or upon occurrence of an Escrow Default, procedures relating to operation of the Escrow Account and withdrawal therefrom, reporting requirements and any matters incidental thereto; provided that such supplementary escrow agreement shall not contain any provision which is inconsistent with this

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Agreement and in the event of any conflict or inconsistency between provisions of this Agreement and such supplementary escrow agreement, the provisions of this Agreement shall prevail.

9 INDEMNITY

9.1 General indemnity

9.1.1 The Concessionaire will indemnify, defend and hold the Authority, Escrow Bank and the Senior Lenders, acting through the Lenders' Representative, harmless against any and all proceedings, actions and third party claims for any loss, damage, cost and expense arising out of any breach by the Concessionaire of any of its obligations under this Agreement or on account of failure of the Concessionaire to comply with Applicable Laws and Applicable Permits.

9.1.2 The Authority will indemnify, defend and hold the Concessionaire harmless against any and all proceedings, actions and third party claims for any loss, damage, cost and expense arising out of failure of the Authority to fulfil any of its obligations under this Agreement materially and adversely affecting the performance of the Concessionaire's obligations under the Concession Agreement or this Agreement other than any loss, damage, cost and expense arising out of acts done in discharge of their lawful functions by the Authority, its officers, servants and agents.

9.1.3 The Escrow Bank will indemnify, defend and hold the Concessionaire harmless against any and all proceedings, actions and third party claims for any loss, damage, cost and expense arising out of failure of the Escrow Bank to fulfil its obligations under this Agreement materially and adversely affecting the performance of the Concessionaire's obligations under the Concession Agreement other than any loss, damage, cost and expense, arising out of acts done in discharge of their lawful functions by the Escrow Bank, its officers, servants and agents.

9.2 Notice and contest of claims

In the event that any Party hereto receives a claim from a third party in respect of which it is entitled to the benefit of an indemnity under Clause 9.1 or in respect of which it is entitled to reimbursement (the "**Indemnified Party**"), it shall notify the other Party responsible for indemnifying such claim hereunder (the "**Indemnifying Party**") within 15 (fifteen) days of receipt of the claim and shall not settle or pay the claim without the prior approval of the Indemnifying Party, which approval shall not be unreasonably withheld or delayed. In the event that the Indemnifying Party wishes to contest or dispute the claim, it may conduct the proceedings in the name of the Indemnified Party and shall bear all costs involved in contesting the same. The Indemnified Party shall provide all cooperation and assistance in contesting any claim and shall sign all such writings and documents as the Indemnifying Party may reasonably require.

10 DISPUTE RESOLUTION

10.1 Dispute resolution

10.1.1 Any dispute, difference or claim arising out of or in connection with this Agreement, which is not resolved amicably, shall be decided finally by reference to arbitration to a Board of Arbitrators comprising one nominee of each Party to the dispute, and where the number of such nominees is an even number, the nominees shall elect another person to such Board. Such arbitration shall be held in accordance with the Rules of Arbitration of the International Centre for Alternative Dispute Resolution, New Delhi (the "Rules") or such other rules as may be mutually agreed by the Parties, and shall be subject to the provisions of the Arbitration and Conciliation Act, 1996.

10.1.2 The Arbitrators shall issue a reasoned award and such award shall be final and binding on the Parties. The venue of arbitration shall be Delhi and the language of arbitration shall be English.

11 MISCELLANEOUS PROVISIONS

11.1 Governing law and jurisdiction

This Agreement shall be construed and interpreted in accordance with and governed by the laws of India, and the Courts at Delhi shall have jurisdiction over all matters arising out of or relating to this Agreement.

11.2 Waiver of sovereign immunity

The Authority unconditionally and irrevocably:

(a) agrees that the execution, delivery and performance by it of this Agreement constitute commercial acts done and performed for commercial purpose;

(b) agrees that, should any proceedings be brought against it or its assets, property or revenues in any jurisdiction in relation to this Agreement or any transaction contemplated by this Agreement, no immunity (whether by reason of sovereignty or otherwise) from such proceedings shall be claimed by or on behalf of the Authority with respect to its assets;

(c) waives any right of immunity which it or its assets, property or revenues now has, may acquire in the future or which may be attributed to it in any jurisdiction; and

(d) consents generally in respect of the enforcement of any judgement or award against it in any such proceedings to the giving of any relief or the issue of any process in any jurisdiction in connection with such proceedings (including the making, enforcement or execution against it or in respect of any assets, property or revenues whatsoever irrespective of their use or intended use of any order or judgement that may be made or given in connection therewith).

11.3 Priority of agreements

In the event of any conflict between the Concession Agreement and this Agreement, the provisions contained in the Concession Agreement shall prevail over this Agreement.

11.4 Alteration of terms

All additions, amendments, modifications and variations to this Agreement shall be effectual and binding only if in writing and signed by the duly authorised representatives of the Parties.

11.5 Waiver

11.5.1 Waiver by any Party of a default by another Party in the observance and performance of any provision of or obligations under this Agreement:

(a) shall not operate or be construed as a waiver of any other or subsequent default hereof or of other provisions of or obligations under this Agreement;

(b) shall not be effective unless it is in writing and executed by a duly authorised representative of the Party; and

(c) shall not affect the validity or enforceability of this Agreement in any manner.

11.5.2 Neither the failure by any Party to insist on any occasion upon the performance of the terms, conditions and provisions of this Agreement or any obligation thereunder nor time or other indulgence granted by any Party to another Party shall be treated or deemed as waiver of such breach or acceptance of any variation or the relinquishment of any such right hereunder.

11.6 No third party beneficiaries

This Agreement is solely for the benefit of the Parties and no other person or entity shall have any rights hereunder.

11.7 Survival

11.7.1 Termination of this Agreement:

(a) shall not relieve the Parties of any obligations hereunder which expressly or by implication survive termination hereof; and

(b) except as otherwise provided in any provision of this Agreement expressly limiting the liability of either Party, shall not relieve either Party of any obligations or liabilities for loss or damage to the other Party arising out of, or caused by, acts or omissions of such Party prior to the effectiveness of such termination or arising out of such termination.

11.7.2 All obligations surviving the cancellation, expiration or termination of this Agreement shall only survive for a period of 3 (three) years following the date of such termination or expiry of this Agreement.

11.8 Severability

If for any reason whatever any provision of this Agreement is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner, and the Parties will negotiate in good faith with a view to agreeing to one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable to such invalid, illegal or unenforceable provision. Failure to agree upon any such provisions shall not be subject to dispute resolution under Clause 10.1 of this Agreement or otherwise.

11.9 Successors and assigns

This Agreement shall be binding on and shall inure to the benefit of the Parties and their respective successors and permitted assigns.

11.10 Notices

All notices or other communications to be given or made under this Agreement shall be in writing and shall either be delivered personally or sent by courier or registered post with an additional copy to be sent by facsimile or e-mail. The address for service of each Party, its facsimile number or e-mail are set out under its name on the signing pages hereto. A notice shall be effective upon actual receipt thereof, save that where it is received after 5.30 (five thirty) p.m. on a business day, or on a day that is not a business day, the notice shall be deemed to be received on the first business day following the date of actual receipt. Without prejudice to the foregoing, a Party giving or making a notice or communication by facsimile or e-mail shall promptly deliver a copy thereof personally, or send it by courier or registered post to the addressee of such notice or communication. It is hereby agreed and acknowledged that any Party may by notice change the address to which such notices and communications to it are to be delivered or mailed. Such change shall be effective when all the Parties have notice of it.

11.11 Language

All notices, certificates, correspondence and proceedings under or in connection with this Agreement shall be in English.

11.12 Authorised representatives

Each of the Parties shall, by notice in writing, designate their respective authorised representatives through whom only all communications shall be made. A Party hereto shall be entitled to remove and/or substitute or make fresh appointment of such authorised representative by similar notice.

11.13 Original Document

This Agreement may be executed in four counterparts, each of which when executed and delivered shall constitute an original of this Agreement.

IN WITNESS WHEREOF THE PARTIES HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

THE COMMON SEAL OF CONCESSIONAIRE has been affixed pursuant to the resolution passed by the Board of Directors of the Concessionaire at its meeting held on the ..... day of 20..... hereunto affixed in the presence of ....., Director, who has signed these presents in token thereof and ....., Company Secretary / Authorised Officer who has countersigned the same in token thereof:

SIGNED, SEALED AND DELIVERED
For and on behalf of
SENIOR LENDERS by the Lenders' Representative:

(Signature)
(Name)
(Designation)
(Address)
(Fax No.)
(e-mail address)

SIGNED, SEALED AND DELIVERED
For and on behalf of
ESCROW BANK by:

(Signature)
(Name)
(Designatio
(Address)
(Fax No.)
(e-mail address)

SIGNED, SEALED AND DELIVERED
For and on behalf of
NATIONAL HIGHWAYS AUTHORITY OF INDIA by:

(Signature)
(Name)
(Designation)
(Address)
(Fax No.)
(e-mail address)

In the presence of:

1.

2.

SCHEDULE –T
(See Clause 33.2.1)

PANEL OF CHARTERED ACCOUNTANTS

1 Panel of Chartered Accountants

Pursuant to the provisions of Clause 33.2.1 of the Agreement, the Authority and the Concessionaire shall prepare a mutually agreed panel of 10 (ten) reputable firms of Chartered Accountants having their registered offices in India (the "**Panel of Chartered Accountants**"). The criteria for preparing such Panel and the procedure to be adopted in this behalf shall be as set forth in this Schedule-T.

2 Invitation for empanelment

2.1 The Authority shall invite offers from all reputable firms of Chartered Accountants who fulfil the following eligibility criteria, namely:

(a) the firm should have conducted statutory audit of the annual accounts of at least one hundred companies registered under the Companies Act, 1956, of which at least ten should have been public sector undertakings;

(b) the firm should have at least 5 (five) practising Chartered Accountants on its rolls, each with a minimum experience of ten years in the profession;

(c) the firm or any of its partners should not have been disqualified or black-listed by the Comptroller and Auditor General of India or the Authority; and

(d) the firm should have an office in the State or in an adjacent State with at least 2 (two) practising Chartered Accountants on its rolls in such State.

2.2 Interested firms meeting the eligibility criteria shall be required to submit a statement of their capability including the bio-data of all the practising Chartered Accountants on its rolls. In particular, each firm shall be required to furnish year- wise information relating to the names of all the companies with an annual turnover exceeding Rs. 100,00,00,000 (Rs. one hundred crore) whose annual accounts were audited by such firm in any of the preceding 5 (five) Accounting Years.

3 Evaluation and selection

3.1 The information furnished by each firm shall be scrutinised and evaluated by the Authority and 1 (one) point shall be awarded for each annual audit of the companies specified in Paragraph 2.2 above. (For the avoidance of doubt, a firm which has conducted audit of the annual accounts of any such company for five years shall be awarded five points).

3.2 The Authority shall prepare a list of all the eligible firms along with the points scored by each such firm and 10 (ten) firms scoring the highest points shall be identified and included in the draft Panel of Chartered Accountants.

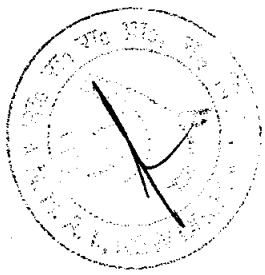
4 Consultation with the Concessionaire

The Authority shall convey the aforesaid panel of firms to the Concessionaire for scrutiny and comments, if any. The Concessionaire shall be entitled to scrutinise the relevant records of the Authority to ascertain whether the selection of firms has been undertaken in accordance with the prescribed procedure and it shall send its comments, if any, to the Authority within 15 (fifteen) days of receiving the aforesaid panel.

5 Mutually agreed panel

5.1 The Authority shall, after considering all relevant factors including the comments, if any, of the Concessionaire, finalise and constitute a panel of 10 (ten) firms which shall be deemed to be the mutually agreed Panel of Chartered Accountants.

5.2 After completion of every five years from the date of preparing the mutually agreed Panel of Chartered Accountants, or such earlier period as may be agreed between the Authority and the Concessionaire, a new panel shall be prepared in accordance with the provisions of this Schedule - T.



SCHEDULE –U
(See Clause38.4)

VESTING CERTIFICATE

1 The Chairman, National Highways Authority of India (the **"Authority"**) refers to the Concession Agreement dated ..... (the **"Agreement"**) entered into between the Authority and M/s KM Toll Road Private Limited (the **"Concessionaire"**) for Four-Laning and subsequent Six-Laning of the Gandhidham (Kandla) – Mundra Port Section of National Highway No.8A Extension (the **"Project Highway"**) on design, build, finance, operate and transfer (**"DBFOT"**) basis.

2 The Authority hereby acknowledges compliance and fulfilment by the Concessionaire of the Divestment Requirements set forth in Clause 38.1 of the Agreement on the basis that upon issue of this Vesting Certificate, the Authority shall be deemed to have acquired, and all title and interest of the Concessionaire in or about the Project Highway shall be deemed to have vested unto the Authority, free from any encumbrances, charges and liens whatsoever.

3 Notwithstanding anything to the contrary contained hereinabove, it shall be a condition of this Vesting Certificate that nothing contained herein shall be construed or interpreted as waiving the obligation of the Concessionaire to rectify and remedy any defect or deficiency in any of the Divestment Requirements and/or relieving the Concessionaire in any manner of the same.

Signed this ..... day of ....., 20..... at Delhi.

AGREED, ACCEPTED AND SIGNED	SIGNED, SEALED AND DELIVERED
For and on behalf of	For and on behalf of
CONCESSIONAIRE by:	NATIONAL HIGHWAYS AUTHORITY OF INDIA by:
(Signature)	(Signature)
(Name)	(Name)
(Designation)	(Designation)
(Address)	(Address)

In the presence of:

1. 2.

SCHEDULE –V
(See Clause 40.3.1)

SUBSTITUTION AGREEMENT

THIS SUBSTITUTION AGREEMENT is entered into on this the ..... day of ..... 20....

AMONGST

1 The National Highways Authority of India, established under the National Highways Authority Act 1988, represented by its Chairman and having its principal offices at G-5 & 6, Sector 10, Dwarka, New Delhi-110075 (hereinafter referred to as the "Authority" which expression shall unless repugnant to the context or meaning thereof include its administrators, successors and assigns);

2 M/s KM TOLL ROAD PRIVATE LIMITED, a company incorporated under the provisions of the Companies Act, 1956 and having its registered office at H Block, 1st Floor, Dhirubhai Ambani Knowledge City, Navi Mumbai-400710, (hereinafter referred to as the "**Concessionaire**" which expression shall unless repugnant to the context or meaning thereof include its successors and permitted assigns and substitutes);

3 .....name and particulars of Lenders' Representative and having its registered office at ....., acting for and on behalf of the Senior Lenders as their duly authorised agent with regard to matters arising out of or in relation to this Agreement (hereinafter referred to as the "**Lenders' Representative**", which expression shall unless repugnant to the context or meaning thereof include its successors and substitutes);

WHEREAS:

(A) The Authority has entered into a Concession Agreement dated ..... with the Concessionaire (the "**Concession Agreement**") for Four-Laning and subsequent Six-Laning of the Gandhidham (Kandla) – Mundra Port section (km 0.00 to Km. 71.40) of National Highway No. 8A Extension in the State of Gujarat on design, build, finance, operate and transfer basis (DBFOT), and a copy of which is annexed hereto and marked as Annex-A to form part of this Agreement.

(B) Senior Lenders have agreed to finance the Project in accordance with the terms and conditions set forth in the Financing Agreements.

(C) Senior Lenders have requested the Authority to enter into this Substitution Agreement for securing their interests through assignment, transfer and

substitution of the Concession to a Nominated Company in accordance with the provisions of this Agreement and the Concession Agreement.

(D) In order to enable implementation of the Project including its financing, construction, operation and maintenance, the Authority has agreed and undertaken to transfer and assign the Concession to a Nominated Company in accordance with the terms and conditions set forth in this Agreement and the Concession Agreement.

NOW, THEREFORE, in consideration of the foregoing and the respective covenants and agreements set forth in this Agreement, the receipt and sufficiency of which is hereby acknowledged, and intending to be legally bound hereby, the Parties agree as follows:

1 DEFINITIONS AND INTERPRETATION

1.1 Definitions

In this Substitution Agreement, the following words and expressions shall, unless repugnant to the context or meaning thereof, have the meaning hereinafter respectively assigned to them:

"**Agreement**" means this Substitution Agreement and any amendment thereto made in accordance with the provisions contained in this Agreement;

"**Financial Default**" means occurrence of a material breach of the terms and conditions of the Financing Agreements or a continuous default in Debt Service by the Concessionaire for a minimum period of 3 (three) months;

"**Lenders' Representative**" means the person referred to as the Lenders' Representative in the foregoing Recitals;

"**Nominated Company**" means a company, incorporated under the provisions of the Companies Act, 1956, selected by the Lenders' Representative, on behalf of Senior Lenders, and proposed to the Authority for assignment/transfer of the Concession as provided in this Agreement;

"**Notice of Financial Default**" shall have the meaning ascribed thereto in Clause 3.2.1; and

"**Parties**" means the parties to this Agreement collectively and "Party" shall mean any of the Parties to this Agreement individually.

1.2 Interpretation

1.2.1 References to Lenders' Representative shall, unless repugnant to the context or meaning thereof, mean references to the Lenders' Representative, acting for and on behalf of Senior Lenders.

1.2.2 References to Clauses are, unless stated otherwise, references to Clauses of this Agreement.

1.2.3 The words and expressions beginning with capital letters and defined in this Agreement shall have the meaning ascribed thereto herein, and the words and expressions used in this Agreement and not defined herein but defined in the Concession Agreement shall, unless repugnant to the context, have the meaning ascribed thereto in the Concession Agreement.

1.2.4 The rules of interpretation stated in Clauses 1.2, 1.3 and 1.4 of the Concession Agreement shall apply, *mutatis mutandis*, to this Agreement.

2 ASSIGNMENT

2.1 Assignment of rights and title

The Concessionaire hereby agrees to assign the rights, title and interest in the Concession to, and in favour of, the Lenders' Representative pursuant to and in accordance with the provisions of this Agreement and the Concession Agreement by way of security in respect of financing by the Senior Lenders under the Financing Agreements.

3 SUBSTITUTION OF THE CONCESSIONAIRE

3.1 Rights of substitution

3.1.1 Pursuant to the rights, title and interest assigned under Clause 2.1, the Lenders' Representative shall be entitled to substitute the Concessionaire by a Nominated Company under and in accordance with the provisions of this Agreement and the Concession Agreement.

3.1.2 The Authority hereby agrees to substitute the Concessionaire by endorsement on the Concession Agreement in favour of the Nominated Company selected by the Lenders' Representative in accordance with this Agreement. (For the avoidance of doubt, the Senior Lenders or the Lenders' Representative shall not be entitled to operate and maintain the Project Highway as Concessionaire either individually or collectively).

3.2 Substitution upon occurrence of Financial Default

3.2.1 Upon occurrence of a Financial Default, the Lenders' Representative may issue a notice to the Concessionaire (the "**Notice of Financial Default**")

along with particulars thereof, and send a copy to the Authority for its information and record. A Notice of Financial Default under this Clause 3 shall be conclusive evidence of such Financial Default and it shall be final and binding upon the Concessionaire for the purposes of this Agreement.

3.2.2 Upon issue of a Notice of Financial Default hereunder, the Lenders' Representative may, without prejudice to any of its rights or remedies under this Agreement or the Financing Agreements, substitute the Concessionaire by a Nominated Company in accordance with the provisions of this Agreement.

3.2.3 At any time after the Lenders' Representative has issued a Notice of Financial Default, it may by notice require the Authority to suspend all the rights of the Concessionaire and undertake the operation and maintenance of the Project Highway in accordance with the provisions of Article 36 of the Concession Agreement, and upon receipt of such notice, the Authority shall undertake Suspension under and in accordance with the provisions of the Concession Agreement. The aforesaid Suspension shall be revoked upon substitution of the Concessionaire by a Nominated Company, and in the event such substitution is not completed within 180 (one hundred and eighty) days from the date of such Suspension, the Authority may terminate the Concession Agreement forthwith by issuing a Termination Notice in accordance with the provisions of the Concession Agreement; provided that upon written request from the Lenders' Representative and the Concessionaire, the Authority may extend the aforesaid period of 180 (one hundred and eighty) days by a period not exceeding 90 (ninety) days. For the avoidance of doubt, the Authority expressly agrees and undertakes to terminate the Concession Agreement forthwith, upon receipt of a written request from the Lenders' Representative at any time after 240 (two hundred and forty) days from the date of Suspension hereunder.

3.3 Substitution upon occurrence of Concessionaire Default

3.3.1 Upon occurrence of a Concessionaire Default, the Authority shall by a notice inform the Lenders' Representative of its intention to issue a Termination Notice and grant 15 (fifteen) days time to the Lenders' Representative to make a representation, stating the intention to substitute the Concessionaire by a Nominated Company.

3.3.2 In the event that the Lenders' Representative makes a representation to the Authority within the period of 15 (fifteen) days specified in Clause 3.3.1, stating that it intends to substitute the Concessionaire by a Nominated Company, the Lenders' Representative shall be entitled to undertake and complete the substitution of the Concessionaire by a Nominated Company in accordance with the provisions of this Agreement within a period of 180 (one hundred and eighty) days from the date of such representation, and the Authority shall either withhold Termination or undertake Suspension for the

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aforesaid period of 180 (one hundred and eighty) days; provided that upon written request from the Lenders' Representative and the Concessionaire, the Authority shall extend the aforesaid period of 180 (one hundred and eighty) days by a period not exceeding 90 (ninety) days.

3.4 Procedure for substitution

3.4.1 The Authority and the Concessionaire hereby agree that on or after the date of Notice of Financial Default or the date of representation to the Authority under Clause 3.3.2, as the case may be, the Lenders' Representative may, without prejudice to any of the other rights or remedies of the Senior Lenders, invite, negotiate and procure offers, either by private negotiations or public auction or tenders for the take over and transfer of the Project Highway including the Concession to the Nominated Company upon such Nominated Company's assumption of the liabilities and obligations of the Concessionaire towards the Authority under the Concession Agreement and towards the Senior Lenders under the Financing Agreements.

3.4.2 To be eligible for substitution in place of the Concessionaire, the Nominated Company shall be required to fulfil the eligibility criteria that were laid down by the Authority for shortlisting the bidders for award of the Concession; provided that the Lenders' Representative may represent to the Authority that all or any of such criteria may be waived in the interest of the Project, and if the Authority determines that such waiver shall not have any material adverse effect on the Project, it may waive all or any of such eligibility criteria.

3.4.3 Upon selection of a Nominated Company, the Lenders' Representative shall request the Authority to:

(a) accede to transfer to the Nominated Company the right to construct, operate and maintain the Project Highway in accordance with the provisions of the Concession Agreement;

(b) endorse and transfer the Concession to the Nominated Company, on the same terms and conditions, for the residual Concession Period; and

(c) enter into a Substitution Agreement with the Lenders' Representative and the Nominated Company on the same terms as are contained in this Agreement.

3.4.4 If the Authority has any objection to the transfer of Concession in favour of the Nominated Company in accordance with this Agreement, it shall within 15 (fifteen) days from the date of proposal made by the Lenders'

Representative, give a reasoned order after hearing the Lenders' Representative. If no such objection is raised by the Authority, the Nominated Company shall be deemed to have been accepted. The Authority thereupon shall transfer and endorse the Concession within 15 (fifteen) days of its acceptance/deemed acceptance of the Nominated Company; provided that in the event of such objection by the Authority, the Lenders' Representative may propose another Nominated Company whereupon the procedure set forth in this Clause 3.4 shall be followed for substitution of such Nominated Company in place of the Concessionaire.

3.5 Selection to be binding

The decision of the Lenders' Representative and the Authority in selection of the Nominated Company shall be final and binding on the Concessionaire. The Concessionaire irrevocably agrees and waives any right to challenge the actions of the Lenders' Representative or the Senior Lenders or the Authority taken pursuant to this Agreement including the transfer/assignment of the Concession in favour of the Nominated Company. The Concessionaire agrees and confirms that it shall not have any right to seek revaluation of assets of the Project or the Concessionaire's shares. It is hereby acknowledged by the Parties that the rights of the Lenders' Representative are irrevocable and shall not be contested in any proceedings before any court or Authority and the Concessionaire shall have no right or remedy to prevent, obstruct or restrain the Authority or the Lenders' Representative from effecting or causing the transfer by substitution and endorsement of the Concession as requested by the Lenders' Representative.

4 PROJECT AGREEMENTS

4.1 Substitution of Nominated Company in Project Agreements

The Concessionaire shall ensure and procure that each Project Agreement contains provisions that entitle the Nominated Company to step into such Project Agreement, in its discretion, in place and substitution of the Concessionaire in the event of such Nominated Company's assumption of the liabilities and obligations of the Concessionaire under the Concession Agreement.

5 TERMINATION OF CONCESSION AGREEMENT

5.1 Termination upon occurrence of Financial Default

At any time after issue of a Notice of Financial Default, the Lenders' Representative may by a notice in writing require the Authority to terminate the Concession Agreement forthwith, and upon receipt of such notice, the

Authority shall undertake Termination under and in accordance with the provisions of Article 37 of the Concession Agreement.

5.2 Termination when no Nominated Company is selected

In the event that no Nominated Company acceptable to the Authority is selected and recommended by the Lenders' Representative within the period of 180 (one hundred and eighty) days or any extension thereof as set forth in Clause 3.3.2, the Authority may terminate the Concession Agreement forthwith in accordance with the provisions thereof.

5.3 Realisation of Debt Due

The Authority and the Concessionaire hereby acknowledge and agree that, without prejudice to their any other right or remedy, the Lenders' Representative is entitled to receive from the Concessionaire, without any further reference to or consent of the Concessionaire, the Debt Due upon Termination of the Concession Agreement. For realisation of the Debt Due, the Lenders' Representative shall be entitled to make its claim from the Escrow Account in accordance with the provisions of the Concession Agreement and the Escrow Agreement.

6 DURATION OF THE AGREEMENT

6.1 Duration of the Agreement

This Agreement shall come into force from the date hereof and shall expire at the earliest to occur of the following events:

(a) Termination of the Agreement; or

(b) no sum remains to be advanced, or is outstanding to the Senior Lenders, under the Financing Agreements.

7 INDEMNITY

7.1 General indemnity

7.1.1 The Concessionaire will indemnify, defend and hold the Authority and the Lenders' Representative harmless against any and all proceedings, actions and third party claims for any loss, damage, cost and expense of whatever kind and nature arising out of any breach by the Concessionaire of any of its obligations under this Agreement or on account of failure of the Concessionaire to comply with Applicable Laws and Applicable Permits.

7.1.2 The Authority will indemnify, defend and hold the Concessionaire harmless

against any and all proceedings, actions and third party claims for any loss, damage, cost and expense arising out of failure of the Authority to fulfil any of its obligations under this Agreement, materially and adversely affecting the performance of the Concessionaire's obligations under the Concession Agreement or this Agreement, other than any loss, damage, cost and expense, arising out of acts done in discharge of their lawful functions by the Authority, its officers, servants and agents.

7.1.3 The Lenders' Representative will indemnify, defend and hold the Concessionaire harmless against any and all proceedings, actions and third party claims for any loss, damage, cost and expense arising out of failure of the Lenders' Representative to fulfil its obligations under this Agreement, materially and adversely affecting the performance of the Concessionaire's obligations under the Concession Agreement, other than any loss, damage, cost and expense, arising out of acts done in discharge of their lawful functions by the Lenders' Representative, its officers, servants and agents.

7.2 Notice and contest of claims

In the event that any Party hereto receives a claim from a third party in respect of which it is entitled to the benefit of an indemnity under Clause 7.1 or in respect of which it is entitled to reimbursement (the "**Indemnified Party**"), it shall notify the other Party responsible for indemnifying such claim hereunder (the "**Indemnifying Party**") within 15 (fifteen) days of receipt of the claim and shall not settle or pay the claim without the prior approval of the Indemnifying Party, such approval not to be unreasonably withheld or delayed. In the event that the Indemnifying Party wishes to contest or dispute the claim, it may conduct the proceedings in the name of the Indemnified Party and shall bear all costs involved in contesting the same. The Indemnified Party shall provide all cooperation and assistance in contesting any claim and shall sign all such writings and documents as the Indemnifying Party may reasonably require.

8 DISPUTE RESOLUTION

8.1 Dispute resolution

8.1.1 Any dispute, difference or claim arising out of or in connection with this Agreement which is not resolved amicably shall be decided by reference to arbitration to a Board of Arbitrators comprising one nominee each of the Authority, Concessionaire and the Lenders' Representative. Such arbitration shall be held in accordance with the Rules of Arbitration of the International Centre for Alternative Dispute Resolution, New Delhi (the "Rules") or such other rules as may be mutually agreed by the Parties, and shall be subject to provisions of the Arbitration and Conciliation Act, 1996.

8.1.2 The Arbitrators shall issue a reasoned award and such award shall be final and binding on the Parties. The venue of arbitration shall be Delhi and the language of arbitration shall be English.

9 MISCELLANEOUS PROVISIONS

9.1 Governing law and jurisdiction

This Agreement shall be construed and interpreted in accordance with and governed by the laws of India, and the Courts at Delhi shall have jurisdiction over all matters arising out of or relating to this Agreement.

9.2 Waiver of sovereign immunity

The Authority unconditionally and irrevocably:

(a) agrees that the execution, delivery and performance by it of this Agreement constitute commercial acts done and performed for commercial purpose;

(b) agrees that, should any proceedings be brought against it or its assets, property or revenues in any jurisdiction in relation to this Agreement or any transaction contemplated by this Agreement, no immunity (whether by reason of sovereignty or otherwise) from such proceedings shall be claimed by or on behalf of the Authority with respect to its assets;

(c) waives any right of immunity which it or its assets, property or revenues now has, may acquire in the future or which may be attributed to it in any jurisdiction; and

(d) consents generally in respect of the enforcement of any judgement or award against it in any such proceedings to the giving of any relief or the issue of any process in any jurisdiction in connection with such proceedings (including the making, enforcement or execution against it or in respect of any assets, property or revenues whatsoever irrespective of their use or intended use of any order or judgement that may be made or given in connection therewith).

9.3 Priority of agreements

In the event of any conflict between the Concession Agreement and this Agreement, the provisions contained in the Concession Agreement shall prevail over this Agreement.

9.4 Alteration of terms

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All additions, amendments, modifications and variations to this Agreement shall be effectual and binding only if in writing and signed by the duly authorised representatives of the Parties.

9.5 Waiver

9.5.1 Waiver by any Party of a default by another Party in the observance and performance of any provision of or obligations under this Agreement:

(a) shall not operate or be construed as a waiver of any other or subsequent default hereof or of other provisions of or obligations under this Agreement;

(b) shall not be effective unless it is in writing and executed by a duly authorised representative of the Party; and

(c) shall not affect the validity or enforceability of this Agreement in any manner.

9.5.2 Neither the failure by either Party to insist on any occasion upon the performance of the terms, conditions and provisions of this Agreement or any obligation thereunder nor time or other indulgence granted by a Party to another Party shall be treated or deemed as waiver of such breach or acceptance of any variation or the relinquishment of any such right hereunder.

9.6 No third party beneficiaries

This Agreement is solely for the benefit of the Parties and no other person or entity shall have any rights hereunder.

9.7 Survival

9.7.1 Termination of this Agreement:

(a) shall not relieve the Parties of any obligations hereunder which expressly or by implication survive termination hereof; and

(b) except as otherwise provided in any provision of this Agreement expressly limiting the liability of either Party, shall not relieve either Party of any obligations or liabilities for loss or damage to the other Party arising out of or caused by acts or omissions of such Party prior to the effectiveness of such termination or arising out of such termination.

9.7.2 All obligations surviving the cancellation, expiration or termination of this

Agreement shall only survive for a period of 3 (three) years following the date of such termination or expiry of this Agreement.

9.8 Severability

If for any reason whatever any provision of this Agreement is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner, and the Parties will negotiate in good faith with a view to agreeing to one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable to such invalid, illegal or unenforceable provision. Failure to agree upon any such provisions shall not be subject to dispute resolution under Clause 8 of this Agreement or otherwise.

9.9 Successors and assigns

This Agreement shall be binding on and shall inure to the benefit of the Parties and their respective successors and permitted assigns.

9.10 Notices

All notices or other communications to be given or made under this Agreement shall be in writing, shall either be delivered personally or sent by courier or registered post with an additional copy to be sent by facsimile or e-mail. The address for service of each Party, its facsimile number and e-mail address are set out under its name on the signing pages hereto. A notice shall be effective upon actual receipt thereof, save that where it is received after 5.30 (five thirty) p.m. on any day, or on a day that is a public holiday, the notice shall be deemed to be received on the first working day following the date of actual receipt. Without prejudice to the foregoing, a Party giving or making a notice or communication by facsimile or e-mail shall promptly deliver a copy thereof personally, or send it by courier or registered post to the addressee of such notice or communication. It is hereby agreed and acknowledged that any Party may by notice change the address to which such notices and communications to it are to be delivered or mailed. Such change shall be effective when all the Parties have notice of it.

9.11 Language

All notices, certificates, correspondence and proceedings under or in connection with this Agreement shall be in English.

9.12 Authorised representatives

Each of the Parties shall by notice in writing designate their respective authorised representatives through whom only all communications shall be made. A Party hereto shall be entitled to remove and/or substitute or make fresh appointment of such authorised representative by similar notice.

9.13 Original Document

This Agreement may be executed in three counterparts, each of which when executed and delivered shall constitute an original of this Agreement.

IN WITNESS WHEREOF THE PARTIES HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

THE COMMON SEAL OF CONCESSIONAIRE has been affixed pursuant to the resolution passed by the Board of Directors of the Concessionaire at its meeting held on the ..... day of 20..... hereunto affixed in the presence of ....., Director, who has signed these presents in token thereof and ....., Company Secretary / Authorised Officer who has countersigned the same in token thereof:

SIGNED, SEALED AND DELIVERED
For and on behalf of
NATIONAL HIGHWAYS
AUTHORITY OF INDIA by:

(Signature)
(Name)
(Designation)
(Address)
(Fax No.)
(e-mail address)

SIGNED, SEALED AND DELIVERED

For and on behalf of

SENIOR LENDERS by the Lenders' Representative:

(Signature)
(Name)
(Designation)
(Address)
(Fax)
(e-mail address)

In the presence of:

1. 2.

Annexure - I

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(पोत परिवहन, सड़क परिवहन और राजमार्ग मंत्रालय)
National Highways Authority of India
(Ministry of Shipping, Road Transport and Highways)
जी-5 एवं 6, सेक्टर-10, द्वारका, नई दिल्ली-110 075
G-5 & 6, Sector-10, Dwarka, New Delhi-110075

दूरभाष / Phone : 91-11-25074100/25074200
फैक्स / Fax : 91-11-25093507 / 25093514
एक्स. / Extn.: 2223 / 2318 / 2468 / 2553

NHAI/BOT/DBFO/11012/11/07/219 Date: 21.08.2009

To

Mr. Sudhir Hoshing
Reliance Infrastructure Limited
E-4 (I), III Floor, MIDC
Opp. MIDC Police Station, Andheri (E)
Mumbai, Maharashtra - 400 093
Fax No. 91-22-30094111
sudhir.r.hoshing@relianceada.com

Sub: **Prequalification of bidders for "4/6 Laning of Gandhidham (Kandla) – Mundra Port section of NH 8A (Extn.) (Approx. length 71.400 Km) in the state of Gujarat under NHDP Phase III through Public-Private/Public sector partnership (PPP) on Design, Build, Finance, Operate and Transfer ("DBFOT") basis"**

Sir,

With reference to RFQ Applications received up to 21.04. 2009 and clarifications received, NHAI hereby announce the list of pre qualified Applicants for above mentioned projects as given below in accordance with clause 1.2.1 of RFQ:

1	Mundra Port and Special Economic Zone Limited - Dinesh Chandra R. Agrawal Ifracon Private Limited JV
2	GMR Infrastructure Limited
3	ERA Infra Engineering Ltd. - OJSC Sibmost JV
4	Oriental Structural Engineers Pvt. Ltd.
5	IRB Infrastructure Developers Ltd
6	Sadbhav Engineering Limited
7	IVRCL Infrastructures & Projects Ltd.
8	KMC Constructions Limited
9	IL & FS Transportation Networks Limited
10	Hindustan Construction Company Ltd. - John Laing Investment Ltd. Consortium
11	BSCPL Infrastructure Ltd. - C&C Construction Ltd. Consortium
12	Shapoorji Pallonji & Co. Ltd.
13	IDFC Projects Limited - Plus Expressways Berhad Consortium
14	Larsen & Toubro Limited
15	Isolux Corsan Concesions SA - Soma Enterprises Ltd. Consortium
16	Reliance Infrastructure Limited
17	GVK Developmental Projects Pvt. Ltd. - Leighton Contractors (I) Pvt. Ltd. Consortium
18	DSC Limited
19	SREI Infrastructure Finance Ltd- JMC Projects (India) Ltd. Consortium
20	Patel Engineering Ltd -KNR Constructions Ltd JV

2. The above short listed Applicants are required to ensure continuing compliance to the provisions of clause 2.2.1 and 2.2.11 of RFQ. Please note that the provisions of the RFQ shall apply mutatis-mutandis to this announcement regarding short listing.

3. You are now eligible for participation in the second stage of the bidding process ("the Bid Stage"). The sale of RFP Vol.-I (Instruction to Bidders), Vol-II (Draft Concession Agreement), Vol – III (Schedules) in this regard shall commence w.e.f. **24.08.2009** for the project with last date of submission of Bid as **09.10.2009** upto **1100** hrs. The Bidding Documents for the Project will be provided to every eligible Bidder on payment (non-refundable) of Rs 2,00,000/- (*Rs. Two Lakhs only*) for the project and therefore the same may be collected from the address given below. The payment shall be received by way of cross Demand Draft drawn in favour of "National Highways Authority of India" payable on any scheduled bank at New Delhi. The Demand Draft must be prepared on or before the last date of sale of the RFP document. The RFP Documents can be obtained from:

(L.P. Padhy)
General Manager (BOT) II
Ph.: +91 11 25074100 (Extn. 1412)
Fax: +91 11 25074100 (Extn. 2457)
Email: lppadhy@nhai.org

Yours faithfully,

(L.P. Padhy)
General Manager (DK/BOT) II

Annexure -II

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन और राजमार्ग मंत्रालय)
National Highways Authority of India
(Ministry of Road Transport and Highways)
जी-5 एवं 6, सेक्टर-10, द्वारका, नई दिल्ली - 110 075
G-5 & 6, Sector-10, Dwarka, New Delhi-110075

दूरभाष / Phone : 91-11-25074100/25074200
फैक्स / Fax : 91-11-25093507 / 25093514
एक्स. / Extn.: 2223 / 2318 / 2468 / 2553

NHAI/BOT/DBFO/11012/11/07/282 Date: 08.10.2009

To

Mr. Sudhir Hoshing
Reliance Infrastructure Limited
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Sub: **Prequalification of bidders for** "4/6 Laning of Gandhidham (Kandla) – Mundra Port section of NH 8A (Extn.) (Approx. length 71.400 Km) in the state of Gujarat under NHDP Phase III through Public-Private/Public sector partnership (PPP) on Design, Build, Finance, Operate and Transfer ("DBFOT") basis"

Sir,

With reference to Pre Bid meeting held on 14.09.2009, please find enclosed the reply to pre bid queries and Addendum No.1 enclosed herewith, for kind information and necessary action.

It may kindly be noted that the Bid due date of the project has been extended upto 30.10.2009.

Yours faithfully,

(L.P. Padhy)
General Manager (BOT) II

Encl: as above

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Four/Six Laning of Gandhidham (Kandla) - Mundra Port Section of NH-8A (Extension) (Approx. Length - 71.400 Km) in the State of Gujarat under NHDP Phase III through PPP on DBFOT basis

ADDENDUM No. 1

Contents

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1	Corrigendum for RFP Volume I (Instructions to Bidders)	1
2	Corrigendum for RFP Volume II (Draft Concession Agreement)	2
3	Corrigendum for RFP Volume III (Schedules)	3

VOLUME - I: INSTRUCTIONS TO BIDDERS

Corrigendum No.1

Clause 1.3 shall be read as given below:

Bid Due Date	*30.10.2009*

Instead of

Bid Due Date	**09.10.2009**

VOLUME - II: DRAFT CONCESSION AGREEMENT

Corrigendum No.2

Clause 21.2 shall be read as given below:

The Concessionaire shall, at its cost and in accordance with the type designs prescribed for such buildings by the State Medical Department (or a substitute thereof to be designated by the Authority), construct an aid post building and 2 (two) residential quarters, and hand them over to the Authority, not later than 30 (thirty) days prior to Scheduled ***Four***-Laning Date. The Medical Aid Post (s) shall be deemed to be part of the Site and shall vest in the Authority.

Instead of

The Concessionaire shall, at its cost and in accordance with the type designs prescribed for such buildings by the State Medical Department (or a substitute thereof to be designated by the Authority), construct an aid post building and 2 (two) residential quarters, and hand them over to the Authority, not later than 30 (thirty) days prior to Scheduled **Six**-Laning Date. The Medical Aid Post (s) shall be deemed to be part of the Site and shall vest in the Authority.

VOLUME - III: SCHEDULES

Corrigendum No.3

Schedule A Annex I Clause 4 page no. A - 2, Shall be read as given below:

4. Major Bridges

The site includes the following Major Bridges:

S. No.	Chainage (in Km)	Type of Structure	No. of Spans	Width (in m)	Remarks
1	*29/500*	*RCC slab*	*11x 7.97*	7.50	
2	*36/946*	*RCC slab*	*10 x 8.32*	7.53	
3	*44/625*	*RCC slab*	*10 x9.96*	7.42	
4	*61/000*	*RCC T beam & slab*	*7 x 18.56*	10.90	
5	*68/150*	*RCC T beam & slab*	*8 x 18.56*	10.90	Existing vented Causeway at km 68/150 is being upgraded as Major Bridge and being executed by PWD, Govt. of Gujarat

Instead of

4. Major Bridges

The site includes the following Major Bridges:

S. No.	Chainage (in Km)	Type of Structure	No. of Spans	Width (in m)
1	*29/500*	*RCC slab*	*11x 7.97*	7.50
2	*36/946*	*RCC slab*	*10 x 8.32*	7.53
3	*44/625*	*RCC slab*	*10 x9.96*	7.42
4	*61/000*	*RCC slab*	*7 x 18.56*	10.90

Corrigendum No 4

Schedule B Annex I Clause 4.8 page no. B-3, Shall be read as given below:

Since the Project Highway is in marine environment, coating of reinforcement bars with Cement Polymer Composite Coating system (CPCC) ***satisfying the codal practice or specification and to the standards as per IRC SP: 80-2008 may be used.***

Instead of

Since the Project Highway is in marine environment, coating of reinforcement bars with Cement Polymer Composite Coating system (CPCC) **developed by CECRI Karaikkudi, Tamilnadu has been proposed.**

Corrigendum No 5

Schedule B Annex I Clause 4.9 page no. B-3, Shall be read as given below:

Since the Project Highway is in marine environment, coating of reinforcement bars with Cement Polymer Composite Coating system (CPCC) ***satisfying the codal practice or specification and to the standards as per IRC SP: 80-2008 may be used.***

Instead of

Since the Project Highway is in marine environment, coating of reinforcement bars with Cement Polymer Composite Coating system (CPCC) **developed by CECRI Karaikkudi, Tamilnadu has been proposed.**

Corrigendum No 6

Schedule B Annex I Clause 4.10 page no. B-3, Shall be read as given below:

Since the Project Highway is in marine environment, coating of reinforcement bars with Cement Polymer Composite Coating system (CPCC) ***satisfying the codal practice or specification and to the standards as per IRC SP: 80-2008 may be used.***

Instead of

Since the Project Highway is in marine environment, coating of reinforcement bars with Cement Polymer Composite Coating system (CPCC) **developed by CECRI Karaikkudi, Tamilnadu has been proposed.**

Corrigendum No 7

Schedule B Annex I Clause 4.12 page no. B-4, Shall be read as given below:

Since the Project Highway is in marine environment, coating of reinforcement bars with Cement Polymer Composite Coating system (CPCC) ***satisfying the codal practice or specification and to the standards as per IRC SP: 80-2008 may be used.***

Instead of

Since the Project Highway is in marine environment, coating of reinforcement bars with Cement Polymer Composite Coating system (CPCC) **developed by CECRI Karaikkudi, Tamilnadu has been proposed.**

Corrigendum No 8

Schedule C Annex-I, page no. C-2 shall be read as given below:

(g) Others

Instead of

(g) Others (to be specified)

Corrigendum No 9
Schedule D Annex I , Page D2 shall be read as given below

Note: An authenticated copy of the Manual is enclosed which is part of part of Bid Document.

Instead of

Note: Manual for Four Laning currently under preparation by IRC. Upon publication, the same shall form part of the Bid Document.

Name of the Project: Four/Six Laning of Gandhidham (Kandla) - Mundra Port Section of NH-8A (Extension) (Approx. Length - 71.400 Km) in the State of Gujarat under NHDP Phase III through Public-Private/Public Sector Partnership (PPP) on Design, Build, Finance, Operate and Transfer (DBFOT) basis

REPLIES TO PRE-BID QUERIES

In the pre-bid meeting held on **14.09.2009**, the queries have been raised on a number of issues in which many of them already stand clarified in the bidding documents including the Draft Concession Agreement. For the purpose of clarity, the following is further clarified in a general manner:

(i) There shall be no change in the Draft Concession Agreement (RFP Volume-II and Volume III) except the Corrigendum/clarification issued herewith.

(ii) In reply to all queries emanating from Feasibility Report, it is stated that the information furnished in the Feasibility Report is only for guidance purpose to the bidders. NHAI does not take any responsibility for the correctness or otherwise all the information given in the Feasibility Report. Bidders may please note that Feasibility Report shall not become part of the concession agreement.

(iii) For the purpose of Clause 2.1.15, the names of the Technical, Financial and Legal advisors to the Authority are as follows:

Technical advisor - M/s RITES Limited
Financial advisor - M/s Credible Management & Consultants Pvt. Ltd.
Legal advisor - M/s M. V. Kini & Company

The specific issues referred to by the bidders in the pre-bid have been identified and replied to as under:

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General Queries:

Sl No.	Clause	Queries	Reply
1	-	Project passes through khedoi reserve forest. Has necessary clearance and approvals obtained from concerned authorities. Please inform the present status	Wherever the Project road traverse near forest, widening/improvement has been proposed on other side area. No forest land acquisition at khedoi reserve forest is envisaged under the project, hence no clearance required.
2	-	Row availability and Land acquisition status. Please inform the present status	Land Acquisition in Process is based on the Land Requirement for the Project Road Development. Please refer Article 10.3 of DCA of "Procurement of Site".
3	-	**Bid due date Extension:** The scope of Concessionaire provides for many things to be achieved .The time available for extensive Traffic Surveys and investigations is not sufficient. Hence it is requested to extend the time for Pre-bid meeting and bid submission. It is suggested that the submission of bid date may be extended by a minimum of 15 days from the receipt of pre-bid query replies.	Please refer Corrigendum No 1
4	-	We presume that the DPR provided along with RFP document is only for reference and all designs including pavement design will be done by concessionaire	Yes, NHAI has completed the Preliminary Design Report for the project road Section. Concessionaire shall design all the project road components and detailed design and drawings of all structure based on Preliminary Design Report.
5	-	As SH is running parallel to this road. Will NHAI take the responsibility of getting State Support agreement for not developing/improving this SH as it can be a competitive road?	NHAI has already signed an umbrella MOU with Govt. of Gujarat whereiby GOG will facilitate pre-construction activities and also sign state support

Sl No.	Clause	Queries	Reply
		Please confirm.	Agreement to enable NHAI to implement the project.
6	-	Ponds /water body located along project stretch will be impacted, whether these are to be restored. Please clarify	As per the Bid Documents and Relevant MOEF directions and guidelines
7	-	Two petroleum pipe line crossing are within the project stretch. Any communication / resolutions on treatment during construction obtained form the concern authorities. Please inform the status.	Necessary correspondence with the concerned authorities has been made. The works to be taken up by the concessionaire as per Clause 11.2 of DCA.

RFP Volume I: Instructions to Bidders:

Sl No.	Clause	Queries	Reply
1	1.1.1	The start and end chainage not specified. Please specify the start and end chainage of the project The Approx length of the project is 71.400 . It is requested that kindly provide exact length of the project or provide us starting chainage and closing chainage of the project as per existing stretch.	The Project Road Starts near junction of NH8A and NH 8A Extn at Gandhidham, by dove tailing the proposed loop and or ramp of Grade Separated Interchange on NH8A Extn and the project road terminates at Siracha Junction (Existing Km 73.4) including junction improvement of Siracha Junction and merging of 4/6 lane with the next road section. Designed Road length between Gandhidham & Siracha = 71.40km.
2	1.2.4, 2.1.7, 2.1.8 , and 2.20.1	The Bid Security Amount is over 2% of the TPC. As a usual practice in NHAI the Bid Security is normally 1 % of TPC (as was the case with all the bids during 2008). The same shall please be reduced and the earlier	As per RFP There is no contradiction in clauses 1.2.4 and 2.1.18 as both the clauses specify the bid security validity

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Sl No.	Clause	Queries	Reply
		practice continued. Validity period of Bid security also needs clarification. Clause 1.2.4 is contradictory with Clause 2.1.8 as the bid security validity period specified in both the clause is 180 days and 120 days respectively. Please Clarify	at 180 days.
3	2.1.14	There may be number of companies that have common investors with at least 5 % equity share. To facilitate investments in the road sector and to improve the bidding process, the shareholding limit could either be removed or raised to 26%.Also, Banks, Financial Institutions, and Mutual Fund Companies and such Non-Banking Financial Companies (NBFCs) should be exempted from this clause.	As per RFP, Further clarification including changes, if any, will be notified prior to bid submission due date.
		More clarity on the type of relationship with another bidder is necessary.	
		Disqualification due to Conflict of Interest should not result in to forfeiture of Bid Security. Kindly remove such provision.	
		As specified under the RFQ document for the Project, request Authority to exclude bank, insurance company, pension fund or public financial institution referred to I n section 4A of the Companies Act 1956 under the common shareholders. Also, In current market situations wherein company are being taken over/acquired one company/ funds controlled by one company is taking equity positions in another company. There is every possibility that one or more bidders have more than 1% common shareholders but do not have any control shareholding. The clause related to conflict of interest should be deleted. Alternatively, the direct/ indirect equity shareholding should be increased to 26% as any company/ fund can have control in the other company only its shareholding is more than or equal to 26%.	

Sl No.	Clause	Queries	Reply
4	2.1.15	The legal, financial or technical adviser of the Authority in relation to the Project may please be disclosed to the bidders during the bid stage to avoid such disqualification.	Legal Adviser: M/s M. V. Kini & Co. Technical Adviser: M/s RITES Ltd. Financial Adviser: M/s Credible Management & Consultants Pvt. Ltd.
5	2.3.2	Disqualification and Forfeiture of Bid Security may pl. be delinked.	As per RFP
6	2.20.7	Sub-clause (a) may please be removed.	As per RFP
7	Appendix-I	We understand that Pt. 16 & 17 of the Appendix-I are applicable in case the consortium is submitting the Financial Proposal. In this regards, request Authority to clarify if the same are to be included in the Letter of Application by entity submitted the Financial Proposal as an individual Entity.	As per RFP

RFP Volume II: Draft Concession Agreement:

Sl No.	Clause	Queries	Reply
1	2.1	We presume that the scope of the work is defined in Schedule B and Schedule C only. Schedule D shall be referred only for the Specifications/ Standards and shall not form part of scope of work.	Schedule B and Schedule C defines the scope of works and Schedule D sets out the Specifications and Standards for carrying out these activities.

Sl No.	Clause	Queries	Reply
		Kindly clarify	
		kindly confirm construction of the project highway shall be as specified in schedule B and schedule B shall supersede any other document in this particular regard.	As per RFP
2	3.1.1 & 12.5.4	In view of the High Traffic Expectations on this corridor and the difficulties encountered for raising funds in case of a reduced Concession Period (12 years), we request NHAI to make the Six-Laning mandatory from the scheduled Six-Laning date and hence maintain the Concession Period to 25 years only.	As per RFP
3	3.2.1	As per clause 3.2.1 it is mentioned that the agreement shall be deemed to be modified as if it were a concession agreement to a restricted four lane project for a concession period 12 years . It is requested that NHAI should consider the project to be of 25 years with 8 laning so that concessionaire plan the project as per six lane provision without deffering to 4 lane work . which shall reduce the cost of project and the concessionaire shall be the same platform for bidding .	As per RFP
4	3.2.2	How would the Authority decide on whether the Project needs to be Six laned or not? Please clarify on the exact methodology for the same. The clause mentions that the Authority can decide on six laning before 8th anniversary of the Appointed Date. We feel that the above decision would be a function of the actual traffic growth on the Project stretch and hence there should be a clearly laid out mechanism on what would trigger or inhibit such a decision. Request you to clarify on the same. 1. Please clarify on the various eventualities under which the Authority may grant a concession for commencing Six Laning before the expiry of the Agreement. 2. Please clarify on the exact terms governing the first right to the	As per RFP

Sl No.	Clause	Queries	Reply
		Concessionaire for such above referred award of concession for commencing six laning.	
5	4.1.2	The Concessionaire can ask the Authority for fulfillment of CPs only after the expiry of 90 days. In earlier projects, this was 15 day period. Please clarify. We request that the condition of execution of the State Support Agreement (in terms of Clause 47.3.) needs to be a condition precedent to be fulfilled by NHAI.	As per RFP
6	4.1.2 (d)	For getting GADs approved, detailed drawings have to be prepared for ROBs. Since the item is a condition precedent for NHAI which has to be satisfied within 30 days (plus additional 60 days) from notice from concessionaire for the same (and the notice can be issued any time after 15 days from CA signing), whose responsibility is to prepare the drawings for the same in a Format acceptable to Railways. Kindly provide us the status of approval from railways regarding ROB /RUB on the project highway.	Approval of GAD from Railways Authority is being obtained by NHAI. Based on the approved GAD the Concessionaire has to design and prepare Detailed Design and Drawing of the ROB and obtain the approval from the Railways Authority.
7	4.1.2 (e)	Kindly provide us the status of applicable permit relating to environmental protection and conservation of site	Clearances from MoE&F is in process
8	4.1.3 (d)	The Applicable Permits listed in Schedule E should be required to be obtained during the course of construction of the Project. Obtaining all Applicable Permits on or before Appointed Date cannot be made mandatory as Condition Precedent.	As per RFP
9	4.1.3 (e)	The Concessionaire is responsible to achieve Financial Closure as a Condition Precedent within the time period of 180 days as stated in clause no. 4.1.3 and 4.3.	As per RFP
10	4.2	Damage for delay in fulfillment of Condition Precedent by authority i.e. 0.1% of performance security for each day of delay is not sufficient	As per RFP

Sl No.	Clause	Queries	Reply
		considering that any delay in commencement of Construction activities have direct bearing on IDC as well as escalation of material which may be huge in comparison to the damage payable by Authority. Authority should compensate the Concessionaire for increase of Project Cost.	
11	4.3	Failure to do so within the time limit shall make the concessionaire liable for Damage Payment of 0.2% of Performance security per day with a maximum of 20%.	As per RFP
		The fulfillment of some of the conditions precedent described in Clause 4.1.3 are dependent on several factors that are not within the control of the Concessionaire (for e.g. procurement of the Applicable Permits). Penalizing the Concessionaire for this is too harsh and accordingly, we request the Authority to re-consider this provision.	As per RFP
		Damage for delay in fulfillment of Condition Precedent by Concessionaire i.e. 0.2% of performance security for each day of delay is more compared to the damage paid by the Authority in case of delay in fulfillment of Condition Precedent. The damages shall either be same as of Authority or less than what Authority is paying.	As per RFP
12	5.1.4 (e)	The measure of "reasonable efforts" may please be defined.	As per RFP
		Request Authority to provide current land acquisition status for the Project Highway	Land Acquisition in Process is based on the Land Requirement for the Project Road Development. Please refer Article 10.3 of DCA of "Procurement of Site".
		Kindly Clarify what is the meant with the reasonable effort to facilitate the land required for the purposed of agreement. Regarding what type of the land the reference is made? Whether it is ROW or land for temporary establishment and approaches.	It is meant for both i.e., the land within proposed ROW as well as the land for temporary establishment and approaches.

Sl No.	Clause	Queries	Reply
13	5.8	The applicable guidelines are vague. Any changes / amendments to the prevailing guidelines after the bid due date shall be compensated / reimbursed by NHAI.	As per RFP
14	6.1	Under this clause, Authority to specifically mention the handing over of unencumbered RoW to Concessionaire within stipulated time period.	As per RFP
15	6.2	The amount of expenses incurred by the Concessionaire for the repair and maintenance of the Project Highway during the development period will be reimbursed to the Concessionaire within 30 days, Please confirm.	As per RFP
		It is the requested that after issue of the LOA to successful concessionaire and acceptance for the same by the concessionaire a jointly survey and videography should be conducted by the authority along with concessionaire to have a detailed record for the cost and expense determination maintenance during the development Period.	As per RFP
16	6.3	We presume the authority or any government instrumentality may construct Competing Road 10 years after Appointed Date. From the definition the Competing Road seems to be an Alternative Route of the Project Highway. This may strongly facilitate the leakage of traffic from the Project Highway. Hence we request to omit such clause or not to give any permission to any government instrumentality and the authority itself should not take up such construction of Competing Road during the Concession of the Project Highway. Please confirm	Please refer Sr. No.5 of general queries.
		Please clarify on the difference between "Competing Road" and "Additional Toll way."	As per RFP
		It is observed that there has been major variation in the traffic volume hence there it is major risk for concessionaire hence it is requested that the clause should be amended or should be eliminated as per present scenario.	Please refer Sr. No.5 of general queries.

Sl No.	Clause	Queries	Reply
17	10.1	1. As per schedule A land required for development of Four lane projects will be acquired by NHAI and for Six laning land will be acquired before 2 years from Six laning development programme. 2. As per proposed C/S widening of Six lanes is towards median, it implies that total ROW 60m including 6 lanes will be acquired at the time of Four lane corridor development. Please Confirm.	The entire land as envisaged for the project highway as given in Schedule B will be procured at one go.
18	10.2.1	Request Authority to allow Concessionaire to carry out design and construction during the Development Period at Concessionaire's cost and expense.	As per RFP
19	10.3.2	Request Authority to provide current land acquisition status for the Project Highway. And, also request Authority to provide balance land delivery schedule for the Project	Land Acquisition along the project road and proposed bypasses/realignments are in process and would be made available to the concessionaire as per DCA
		Request Authority to provide current land acquisition status for the Project Highway. And, also request Authority to provide balance land delivery schedule for the project as it is required to be submitted to the Lender's for the purpose of Financial Close. Also schedule cannot be kept open ended as the same shall have impact on IDC as well as construction cost after schedule completion of work.	Land Acquisition in Process is based on the Land Requirement for the Project Road Development. Please refer Article 10.3 of DCA of "Procurement of Site".
20	10.3.3	Please clarify if the Authority will reimburse all costs and expenses incurred by the Concessionaire in the removal of any pre-existing encroachments (i.e., before the Transfer Date).	As per RFP
21	10.3.4	The compensation committed by the Authority for delay in handing over the residual land (included in the Appendix) is insufficient and shall not compensate the costs incurred by the Concessionaire for mobilizing and maintaining the equipments and manpower required to carry out the construction works.	As per RFP

Sl No.	Clause	Queries	Reply
		Kindly consider an increase in the payments of Liquidated Damages Please confirm...	
		In the event of delay for any reason other than the Force Majeure or breach of this Agreement by the Concessionaire should also be compensated separately. Compensation mentioned is not sufficient enough to meet the losses concessionaire will have to bear, we request you to compensate the same by increase in concession period apart from the compensation as mentioned in the Concession Agreement.	As per RFP
22	10.4	We propose that, easements, privileges, liberties and appurtenances to the Licensed Premises should also be considered as encumbrances. Please confirm.	As per RFP
		The last two lines of the Clause shall be deleted.	As per RFP
23	10.6	We request NHAI to reimburse all additional costs, in actual, incurred by the Concessionaire towards special/temporary right of way for access to the site. Please confirm	As per RFP
		It is proposed temporary ROW required by the concessionaire for purpose of the project highway shall be provided free of cost to the concessionaire.	As per RFP
24	11.1	All costs, including all legal proceeding costs, should be borne by NHAI for acquisition of any ROW for necessary diversions required to maintain all existing roads, right of way or utilities. Please confirm	Article 11.1 and 11.2 are self explanatory.

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Sl No.	Clause	Queries	Reply
		Concessionaire shall assist the agency for construction of such diversion by deploying his resources. However, since such diversion shall be needed for the shifting of utilities. Which is the responsibility of Authority only and as such the cost of diversion/land acquisition including legal proceedings shall be borne by authority.	As per RFP
25	11.2	Please confirm that all Utility Shifting expenses borne by the concessionaire shall be reimbursed to it in actual.....Please confirm NHAI and the Concessionaire are signatories to this Concession agreement and are bound by its conditions. However reimbursement of the cost of utility shifting to the concessionaire may also be the liability of the entity owning such utility/ies within the Project Site. How can such entity, not governed by the Concession agreement, be held liable to the concessionaire, and whether the concessionaire's interests are covered in case the entity owning the utility/ies refrains itself from making the payment in full .....Please clarify.	The clause is self explanatory
		As per clause 11.2 Concessionaire is responsible for shifting of Utilities and the Cost of such shifting shall be borne by the Authority. However the Estimates by the service deptt. For such works are prepared on old SOR's which are generally not workable. Moreover preparation of Estimate by the Deptt, its internal sanction and Approval from the Authority takes a lot of time and is the main reason for delay of any Project and Arbitrations thereon. Smooth and faster Solution is required for this activity which shall be beneficial to the Concessionaire as well as Authority.	As per RFP
		It is requested that authority shall provide site free from all encroachment to the concessionaire along with shifting of utilities in ROW of the project may please be confirmed. Authority should provide detailed drawing for existing charted and uncharted utilities in the road project which are likely to be shifted. The	No change, As per RFP

Sl No.	Clause	Queries	Reply
		authority should be liable to shift the utilities on their own. As if observed that low lension line exist in the stretch authority should take initiative to shift the same of their own.	
26	11.3.1	NHAI shall facilitate payments within 30 days of execution of such works	As per RFP
		Clause is ambiguous, Since there is no agreement between the user (most of the users are Govt. Organizations) and a concessionaire for the particular utilities it is requested that the Authority shall pay the compensation/ damages to the concessionaire. However, the Authority can get it reimburse from the user.	No change, As per RFP
27	11.3.2	It is the requested that cost occurring due to such construction and maintenance should be reimbursed by the authority to the concessionaire.	No change, As per RFP
28	11.4	Authority is in better position to obtain the necessary approval being a Govt. Organization. However Concessionaire can assist the Authority in all possible manners for the same. We presume that the cost of felling of trees shall include disposal of the same and handing over of the trees to forest department/ Authority and cost of the same shall be borne by Authority. Please Clarify.	Clause 11.4 are self explanatory
		It is requested that the cost occurring due to disposal of trees should be borne by authority . The tree should include both trunk and stumps.	
29	12.3 (e)	Concessionaire should not be liable and should not be made responsible for any defect/failure in any part of the road occurring due to changes suggested by the Independent Engineer against the wishes of Concessionaire.	As per RFP
30	12.5.1	Please clarify on whether there is any milestone to trigger the Six Laning of the Project Road.	Article 12.5.1 which is self explanatory

Sl No.	Clause	Queries	Reply
31	12.6	Please clarify on : 1. Whether the failure to achieve six laning before 12th anniversary of the Appointed Date as considered for this clause is only on account of the Concessionaire Event of Default? 2. If Yes, what would be the termination payments payable to Concessionaire? 3. Also, if the failure is not on account of Concessionaire event of default, what provisions would apply?	As per article 12.6 of RFP
32	12.7	DCA clause 12.7 is not matching with Schedule B Clause 4.4. Please Clarify who will construct service road if traffic reaches 60000PCUs	Concessionaire shall construct the Service Road in the selected road section where traffic exceeds 60000 PCUs.
		The Authority has the right to construct service roads, but the obligation of maintaining them and regulating their use lies on the Concessionaire. Does the term 'regulate the use thereof' include the right to charge fees for use of even service roads?	As per RFP
		Authority should delete this clause as the Concessionaire will not have any control over the quality of work undertaken through third party. Alternatively the maintenance of Services Lanes should be paid as per the mutually agreed price by Parties.	As per RFP
		It is requested that the maintenance of service road should not be the liability of the concessionaire if the service road is not constructed by the concessionaire.	No Change As per RFP
33	13.3.1	The cost to be reimbursed by the Authority within 30 days of request. Please confirm.	No Change As per RFP
34	14.1.1	Please confirm whether the likely completion of the Project Highway refers to completion of 4-laning of the Project Highway.	Completion Certificate refers to completion of Four-Laning of Project Highway with project features as given in schedule B and Schedule C.

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Sl No.	Clause	Queries	Reply
35	14.2	Please confirm that Completion Certificate refers to completion of 4-Laning of the Project Highway.	Completion Certificate refers to completion of Four-Laning.
36	16.3.2	We request NHAI to reimburse the entire cost incurred by the Concessionaire due to Change of Scope in actual. Please confirm.	As per RFP
		It is the requested that any change in scope of work of concessionaire not attributable to concessionaire should be reimbursed to the concessionaire by authority and time extension therefore should be granted to the concessionaire	As per RFP
37	16.5.1	This clause needs to be deleted as it is in the interest both the Concessionaire and the Authority to get the works associated with change of scope to be done through the Concessionaire.	No Change As per RFP
38	17.1.1 (d)	Please clarify how is it different from sub-clause (f) which refers to major maintenance such as resurfacing of pavements, repairs to structures, and repairs and refurbishment of tolling system and other equipment. Please clarify.	Please refer article 17.1 of DCA
39	17.1.2	Please specify exact location for depositing debris and material excavated. Kindly Confirm.	As per specification and in consultation with Independent Engineer.
40	17.1.3	Kindly mention length from the ROW or centre line of the project highway for the maintenance of the facilities as mentioned in the clause.	As per RFP
41	17.4.1 (e)	The clause needs to be deleted as the periodic maintenance is required to be undertaken based on the performance standards defined in Schedule K.	No Change As per RFP
42	20 & 21	Authority should provide cap for the recurring expenses on polices	No Change As per RFP

Sl No.	Clause	Queries	Reply
		assistance and Medical assistance. Authority should delete the scope of Round the clock patrolling either for Department of Police or Concessionaire.	
43	21.2	It is the requested the authority to provided us dimensional details building to be provided for medical aid and no of stones to be provided and also provide us the dimensional detail of residential quarter . It is also presumed that the medical aid post is not necessary for the period during schedules 4 lanes date as medical aid post is to be provided no later than 30 days prior to schedules six lane date kindly confirm.	Please refer Corrigendum No 2
44	24.1.1	However, as per clause 24.1.1, failure to achieve Financial Closure within 180 days shall make the concessionaire liable to pay damages of 0.1% of the Performance Security per day for a maximum of 120 days. As both the events are interlinked, we request NHAI to hold the Concessionaire liable in case of Concessionaire's default to only one damage payment. The same may be fixed as per conditions laid down in Clause 24.1.1.	As per RFP
		The penalty amount translates into Rs. 4.88 Lac per day which is very steep. Given the current credit scenario please reduce the penalty Rs. 1 Lac per week. Please confirm	As per RFP
45	25.2.2	Kindly confirm whether the availability of maximum Grant (Equity Support) is as per below mentioned: Lower of- 1. 40% of Total Project Cost 2. Twice the Equity Contribution	Grant to be quoted in terms of Rupees as contained in format of Appendix-I of RFP(Vol I)
		Please clarify that in the absence of the advance information whether the Project would be six laned or not, How would the Bidder consider the	

Sl No.	Clause	Queries	Reply
		Total Project Cost for Grant computation? In other words, Grant needs to be quoted as % of Total Project Cost for 4 laning or Total Project Cost for 6 laning? Please clarify.	
46	26.3	In the RFP document of 4 to 6 laning of Samakhiali to Gandhidham in the first year following the COD 37242 PCUs are given while, in this project of 2 to 4 laning, it is mentioned as 37886PCUs. Expected traffic volume on 2-4 laning projects is more than 4-6 laning project. Kindly clarify what will be the minimum period we can have in this project between 4 laning and 6 laning.	As per RFP, The figures has been mentioned on the basis of survey done by our Technical Consultant.
		The base traffic mentioned in the clause 37886 PCU and as per our assessment this is an over estimation. With the economic slow down the traffic has further fallen. This may be cross checked.	
		Premium (or Revenue share) payable by the Bidder to NHAI is payable in the form of an Additional Concession Fee as a percentage of the Total Realisable Fee during that year. Let's say a Bidder quotes the Premium payable as 2% and 3% of the Total Realisable Fee in year 1 and 2 respectively. Our understanding on the computation of the Total Realisable Fee is as follows: Assume that actual PCUs during the year 1 post COD are 25000. Further assume that these PCUs are distributed as 20% Cars, 30% Trucks and 50% MAVs. Also, NHAI has specified 37886 PCUs as the PCUs in the year 1 post COD. The Bidder needs to consider the higher of 25000 and 37886 in the proportion of Cars (20%), Trucks (30%) and MAVs (50%) to arrive at the year 1 Realisable Fee. The Premium payable as 2% is applied on this Realisable Fee. Also, this Realisable Fee is computed without considering any discounts / waivers available to the Users i.e. the assumed PCUs are assumed to constitute 100% through traffic. For the year 2, assume that the actual PCUs are 27000 distributed in the	As per RFP

Sl No.	Clause	Queries	Reply
		proportion of Cars (30%), Trucks (30%) and MAVs (40%). Also, NHAI assumed PCUs would now stand at 38643 (37886 PCUs growing by 2% annually). Again, the Bidder needs to consider the higher of 27000 and 38643 PCUs in the proportion of Cars (30%), Trucks (30%) and MAVs(50%) to arrive at year 2 Realisable Fee. The Premium of 3% is applied on this Realisable Fee. Also, this Realisable Fee is computed without considering any discounts / waivers available to the Users i.e. the assumed PCUs are assumed to constitute 100% through traffic. Please clarify if this understanding is right.	
		The mode of calculation of the 'Realisable Fee' must be examined from a commercial perspective. In case of damage to the road, etc., due to any force majeure reason, there may be a possibility that the number of PCUs may reduce for a particular period of time. In such case, the application of the formula of higher of actual number or 2% more than the previous year's number should be relaxed	As per RFP
47	27.6, 29.2.3, 29.1.1 & 29.2	We understand from Clause 27.6 and 29.2.3 that the Concessionaire is liable to share the excess Toll Income and undergo Capacity Augmentation, failure of which shall lead to Termination, in case the actual traffic exceeds the Design Capacity / Traffic Cap. We interpret from clause 29.1 and 29.2 that the Concessionaire has to face a reduction or increase in the Concession period in case the actual traffic exceeds or falls short of the Target Traffic on the Target Date respectively. From our above interpretations it seems that the Concessionaire faces multiple risks of reduction in the Concession Period resulting in future Loss of revenue generation. Also, the clauses enforce the Concessionaire to share the Revenue due to higher traffic in addition to the reduction of Concession period. In view of the above concerns, the perceived Business Risks of the Concessionaire seems to be multifold. Therefore we request you to kindly omit the above clauses. Please confirm	As per RFP, The clauses are self explanatory

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Sl No.	Clause	Queries	Reply
48	27.6.1	It is requested that the clause should be amended to the facilitate concessionaire by allowing to retain the revenue if PCU have reached a level equivalent 120% of the designed capacity.	No Change As per RFP
49	28.1.1	It is requested that the loan to concessionaire should be available at concession rate in order to meet the shortfall arising due to shortfall in revenue.	As per RFP
50	29.2.1	The Target Traffic may be increased so that the concessionaire does not suffer reduction in concession period. Kindly confirm	No Change As per RFP
51	34.2 (b)	Kindly Clarify that this should be considered under political event instead of Non political event which is not attributable to be concessionaire.	No Change As per RFP
52	34.9	Kindly Clarify about the reimbursement of premium if given to Authority	As per RFP
53	35.3	Since COD is not a fixed date, it is impossible to assess the period of delay in achieving COD. Therefore the clause may be revised as follows: In the event that a material default or breach of this Agreement set forth in Clause 35.2 causes delay, the Authority shall in addition to payment of compensation under Clause 35.2. extend scheduled four laning date by a suitable time period due to above delay.	No Change As per RFP
54	35.4	Government of Gujarat has plans to widen Gandhidham-Gundala stretch of the State Highway which is parallel to the project Corridor. Please clarify if this will qualify for consideration of competing road in terms of this agreement?	Please refer Sr. No.5 of general queries
55	37.2.1	Authority to include delay in handing over of 100% hindrance free land within 90 days of appointed date under Authority event of default.	Please refer clause 10.3

Sl No.	Clause	Queries	Reply
56	37.3	In case of Premium, whether the Termination Payment to be paid (by the authority to the Concessionaire) comprises of Premium paid by the Concessionaire and TPC determined by the Agreement. Please clarify.	As per RFP
57	37.3.1	Request Authority to provide Termination payment on account of Concessionaire Event of Default during the Construction Period as part or substantial part of the Project Assets shall be created based on the funding provided by the Lenders.	As per RFP
58	39.2.1	The percentage retention may be revised to a fixed value of Rs. xxxxx	No change As per RFP
59	48.1	It may be observed that the Termination payment under this Agreement is capped to the Total Project Cost (TPC). It has been experienced in previous projects that the actual amount expended by the Concessionaire on constructing the Project Highway is significantly higher than the NHAI's TPC estimates. This exposes the Concessionaire to high risks in case of termination which may not be due to the Concessionaire's event of default. This is creating significant problem in achieving the Financial Closure. We request NHAI to set the cap on Termination Payment at the actual amount expended by the Concessionaire on construction of Project Highway (as on COD). Please confirm...	As per RFP
		In case termination happens after the Six Laning date, then what TPC would be considered for termination payment? As of now,TPC only indicates four laning cost , hence calculating termination payment on the basis of 4 Laning cost is not equitable. Please specify.	As per RFP

RFP Volume III: Schedules:

Sl No.	Clause	Queries	Reply

Sl No.	Clause	Queries	Reply
1	Schedule-A	*60 m width of ROW is the minimum width of the ROW along the Project Highway. The width shall increase/vary at various locations (junctions/toll plaza/bus bays etc.) to accommodate the designed features. We presume if we required additional land to accommodate the designed features NHAI will provide the same. Also please confirm the status of land acquisition.	Land Acquisition in Process is based on the Land Requirement for the Project Road Development. Please refer Article 10.3 of DCA for "Procurement of site".
2	Schedule-A	In ITB Page -8, Project Length is given as 71.40 Km, In Sch A Page A-2 Annex I Project Length is given as 73.40 Km, In Sch A Page A-6 Annex II Project Length is given as 71.40 Km Please clarify the exact project length.	Design Length = 71.400 Km Existing Distance from Junction of NH8A & NH8A(Extn) up to Siracha Junction =73.400 Km
3	Schedule-A	The site of the project highway comprises the land described below in tabulation of ROW. Kindly confirm whether ROW shown in the stretch also exist to bypass. If not than what is the status of ROW for bypass.	Land Acquisition along the project road and proposed bypasses/realignments are in process and would be made available to the concessionaire as per DCA.
4	Schedule-A	The width of 60 meter is considered for ROW along Project Highway. It is requested to confirm that fight way available for six lane shall be 60 inerter through out stretch independent of Urban area of village area.	The right of way requirement for six laning along the project road in normal section is 60m. Additional land for junctions, entry and exit loops and ramps will be acquired separately satisfying the project requirement.
5	Schedule-B	In Sch A Existing Major Bridges at chainage km 68+150 is not given but mentioned in sch B for rehabilitation/repair/widening. Please clarify.	Please Refer Corrigendum No.3
6	Schedule-B	In Sch A Major Bridge at chainage km 44+625 is given as existing but in Sch B it is considered in new major bridge. Please clarify.	Existing inadequate major bridge shall be dismantled and reconstructed as 3-Lane structure at the existing location to satisfy the design criteria
7	Schedule-B	It has been mentioned that anti corrosive treatment of HYSD will be done by CECRI Karaikkudi, Tamilnadu. We request you to give concessionaire liberty to adopt any method of anti corrosive treatment of HYSD and concessionaire can directly	Please Refer Corrigendum No. 4, 5, 6 & 7

Sl No.	Clause	Queries	Reply
		procure from any agency.	
8	Schedule-B Cl 4.4	As per Cl.4.4 Schedule B Service road will be developed on both sides through out corridor once the PCU 60000 is achieved. Please confirm, if this construction becomes part of six laning program or independent of six laning program as six laning has to be carried out before 12 tears. "Concessionaire will construct the service road on either side of carriageway in other project stretch at his own cost, when traffic reaches a level of 60000 PCU" Is services required for the entire project stretch or at built up section to be taken when traffic reaches a level of 60000 PCU is the PCU considered is tollable PCU. Please clarify	Concessionaire shall construct the service road on both sides in the selected sections of the project road once the PCU exceeds 60000. However, the additional six laning will be will be done as per clause 12.5 of DCA. For PCU, please refer definition as given at Article 48 of DCA.
9	Schedule-B Cl 4.11	Coating of reinforcement with cement polymer composite coating specified for VUP /Bridges/ ROB, but reinf. Treatment not specified for culverts and grade separator. Can we use reinforcement without CPCC treatment for culverts and grade separtor. Please clarify	Reinforcement to be used in the project road shall be coated with cement polymer composite coating irrespective of type of structure.
10	Schedule-B	Typical Cross Sections Appendix B1 Anjar By Pass Design chainage 11.60 to 20.10 Gundala Realignment Design Chainage 47.45 to 55.35 Bhujpur Realignment Design Chainage 62.30 to 65.30 **Details of Bypass Realignment Appendix BIII** Anjar By Pass Design chainage 11.280 to 19.950 Length 8.90 Km Specified but chainage difference of length is 8.67 Km only Gundala Realignment Design Chainage 47.350 to 51.150 Bhujpur Realignment Design Chainage 62.150 to 65.350 Cross section chainage detail and By pass chainage are not matching. Please Specify the exact chainages to be followed	Appendix B1 details the Type of Typical Cross Section to be followed along the project road length. However, the Appendix B III details the start and end of Bypass and Realignments.

Sl No.	Clause	Queries	Reply
11	Schedule-B	Entry and exit Ramps are proposed in road stretches where service roads are not present , for e.g. Anjar bypass Please clarify	Entry and Exit ramps are proposed at all the underpass locations on Slip road for the purpose of traffic calculation.
12	Schedule-B	Appendix B IX for proposed vehicular underpasses requires proposed structural type as RCC Box structures can any other structural configuration (portal Structures) be provided. Please clarify	The Concessionaire at his option can also submit alternate design with drawing without compromising the basic parameters given in Schedule B & C for approval of IC. The Concessionaire shall be responsible for the efficacy of the design adopted for the construction as per DCA.
13	Schedule-B	Appendix B XI for new major bridge requires proposed structural type as RCC T- Girder Super structure and well foundation can different structural type confirming to codes and performance criteria be provided. Please clarify	
14	Schedule-B	Appendix B XII for new minor bridge requires proposed structural type as RCC Slab & Open foundation , RCC T Beam & Slab Super structure and open foundation and RCC Box cell can any other structural type configuration confirming to codes and performance criteria be provided. Please clarify	
15	Schedule-B	Appendix B XIV for proposed ROB / RUB requires proposed structural type as RCC T- Beam can any other structural configuration be provided . In notes it directs for widening of existing level crossing for it depends upon permission by railways and has it been obtained. Please inform the status	No Change, as GAD is to be got approved from Railways.
16	Schedule-B	Rehabilitation of Bridge at chainage 29+500 river bridge on river khedoi. It is mentioned in Schedule A the width of the existing structure is 7.5 meter and the proposal width is 8.2 where as in improvement proposed no widening is proposed then how is it possible to wide span from 7.5 meter to 8.2 meter kindly rectify the same in schedule B .	The existing bridge is having 7.5m carriageway and a total deck width of 8.2m.
17	Schedule-B	Rehabilitation of Bridge at chainage 36+946 river bridge on river Chandroda.	The existing bridge is having 7.5m carriageway and a total deck width of 8.2m.

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Sl No.	Clause	Queries	Reply
		It is mentioned in Schedule A the width of the existing structure is 7.5 meter and the proposed width is 8.2 where as in improvement proposal no widening is proposed and the bridge may be used as two lane structure , hence kindly confirm that how six lane structure can be made if new proposed structure is only of three lane . Kindly rectify the same in schedule-B.	
18	Schedule-B	Rehabilitation of Bridge at chainage 61+000 river bridge on river Sural. It is mentioned in Schedule A the width of the existing structure is 7.5 meter and the proposed width is 12 where as in improvement proposal no widening is proposed then how is it possible to wide span from 7.5 meter to 8.2 meter kindly rectify the same in schedule B.	The newly constructed existing bridge is having 10.90m carriageway and 12m total deck width. Minor repairs if an including upgradation to unidirectional camber over deck has been proposed.
19	Schedule-B	Rehabilitation of Bridge at chainage 68+150 river bridge on river Nagwati. It is mentioned that minor repair and camber correction is to be done on the major Bridge as per schedule B. But the Bridge is not mentioned in the schedule A. kindly incorporates same in the Schedule A and provides detail of existing major bridge.	The existing causeway at km 68+150 is being upgraded as Major Bridge with crown camber deck and being executed by PWD, Govt. of Gujarat. Minor repairs if an including upgradation to unidirectional camber over deck has been proposed.
20	Schedule-B	The Project Highway shall be widened to four lane dual configuration with paved shoulder with or without service roads. The entire road portion shall be 4 lane wile the bridge and other structures shall be 6 lane. As per sch B Appendix there many structures which are to be constructed of widened but the same does not oater to the six lane structure details hence it is required to improve Sch B for the requirement of six lane structure.	The existing structures which are having 7.5m carriageway and presently in good conditions have been proposed to be retained with rehabilitations upto the stage of capacity augmentation. These structures have been proposed for reconstruction to 3 lanes during 6 laning of Highway
21	Schedule-B	The minor bridge for Reconstruction. It is the requested to clarify whether the reconstruction of bridges shall be done along the existing alignment of new alignment is to considered for reconstruction. It is also requested to provide us the location details for reconstruction of bridges.	Reconstruction of bridges shall be done along the existing alignment only. List for reconstruction of minor bridges has been given in Appendix B – XII Also, Refer Plan & Profile wherein the span arrangement and location is clearly mentioned.

Sl No.	Clause	Queries	Reply
22	Schedule-B	Details proposed ROB/RUB. It is requested to employer to provide us with the actual span arrangement proposed for the ROB, So that there is no variation in span arrangement after the work is awarded.	The Proposed Span arrangement of ROB is 20m+30m+20m, as per the GAD that has been submitted to Railways Authority for necessary approval. Approval of GAD from Railways Authority is the obligation of NHAI as per DCA. The Concessionaire is required to obtain approval of drawings as per DCA.
23	Schedule-B Appendix-BI Cl 4.1	Clause 4.1 of appendix B I of Schedule B Mentions cross section type A/C in the following locations , Design Chainage in KM - Cross section Type From 1.92 To 2.82 A/C, From 4.10 To 5.02 A/C, From 7.78 To 8.63 A/C, From 9.31 To 10.4 C, From 16.4 To 16.95 C, From 19.31 To 19.85 C, From 42.97 To 43.8 C, From 67.11 To 67.81 D, Since the Type C is the Typical cross section for bridge approach and also there is neither major nor minor bridge between the above mentioned location as per schedule B & A , kindly confirm the necessity of provision of cross section type C in the above mentioned location. Kindly modify the Cross section type as appropriate instead of C in the mentioned locations.	As per RFP, cross section C is applicable for approaches to structures and is common for underpasses/ROB
24	Appendix-BXI	New major bridge is proposed at existing chainage 44.625 of the configuration of 2/3 lane, whereas at the same chainage major bridge is existing with two lane configuration. Please confirm whether existing major bridge at chainage 44.635 is to be retained /dismantled.	Reference may please be made to Reply of Sl.no. 6 of RFP Volume III: Schedules

Sl No.	Clause	Queries	Reply
25	Schedule-C	Only high mast at major locations and solar lightings at minor junctions are proposed (ref Schedule -C, Pg-4) whether lighting has to be provided at bridge, entry -exit ramp and under pass locations also. This being DBFO can different lighting configuration be provided in satisfy the performance criteria. Please clarify	As per RFP
26	Schedule-C Annex-I	In project facilities (g) others (to be Specified). Please Specify the requirements as it open ended	Please refer Corrigendum No 8
27	Schedule-C Annex-I	In project facilities Telecom system is mentioned. Please clarify , is the public telephone to be provided at the toll plaza location	SOS systems to be provided along the project road for emergency use at regular interval satisfying the requirement of the manual.
28	Schedule-C Annex-I	Truck Lay -byes tentative locations of truck lay -byes on either side of the road are given below (ch 46+500 existing 44+500 designs), however suitable locations shall be decided in the consultation with NHAI and independent engineer. Truck lay -byes (1 no. on either side) other than the number specified shall be treated as change of scope.	As per RFP
29	Schedule-D Annex-I	4 laning manual: It is requested to provide us with the present manual for four laning and six laning as 4 laning manual under revision.	As per RFP
30	Schedule-D Annex-I Cl 1	The foot note mentioned that manual for four laning currently under publication by IRC and upon publication the same shall form part of bid document. Kindly provide the Schedule D as per the IRC , also give sufficient time for queries to be cleared if any for any discrepancy.	Manual for Four laning is enclosed as Annexure which will form part of Schedule D. Please refer Corrigendum No. 9
31	Schedule-D Annex-II	Please provide the manual of specifications and standards for DBFOT Road projects applicable for this project.	Please refer Corrigendum No. 9

Sl No.	Clause	Queries	Reply
32	Schedule-I Cl 2.3 Schedule-K Cl a (ii)	Maximum permissible roughness is 1800mm/Km In Sch K maintenance requirement also it is specified as 2500 mm/Km Please allow the roughness value as 2500 mm/Km.	As per RFP Schedule-I, and As per RFP Schedule-K
33	Schedule-K Cl (d)	Street lighting and telecom (ATMS). ATMS is not specified and the heading may be changed to street lighting	As per RFP Schedule-K
34	Schedule-R	**Toll Plaza Locations** The schedule specifies the location of Toll Plaza. We suggest that the Concessionaire should be allowed to determine the location of the Toll Plaza for overcoming the issue of Traffic Leakage. Kindly confirm	Location of the Toll Plaza has been designed and provided in consideration to various factors satisfying the project. Also the land acquisition is in progress for the said location. Thus, in normal circumstances it is not possible to change the location of the Toll Plaza.
35	Schedule-R Toll Policy	The Applicable toll Policy Should form part of the Sch R and DCA and hence a copy of the same may be furnished as part of the RFP Document	The Toll Policy "National Highways Fee (Determination of Rates and Collection) Rules, 2008" dated 5th December 2008 will be applicable. The Bidder may refer the same.
36	Typical cross section	All cross Section drawing show W Beam crash barrier on both sides of the median , but foot note in the drawing states "7. For embankment height 3.0 m: Crash barriers to be provided". W beam crash barriers to be provided at those locations only where Embankment height >3.0 m Please clarify.	Foot note is as per the General Guidelines where embankment height more than 3.0m W-Beam crash Barrier to be provided on outer edge of the carriageway. Also, the W-Beam Crash Barrier on the inner side of one carriageway is to be constructed all along the project road as a safety and controlling measure.
37	Typical cross section	Dimensions for foot path, drain and service duct not mentioned. Please clarify	The Dimensions are 2500 to 4000 mm (Varying)
38	Cl 4.8, 4.9, 4.10 & 4.12	Since project highway is in marine environment, kindly confirm whether Cement Polymer Coating System (CPCC) developed by CECRI,	Please refer Corrigendum No. 4 , 5,6 & 7

Sl No.	Clause	Queries	Reply
		Karaikudi, Tamil Nadu has been proposed. Kindly confirm whether Cement Polymer Composite Coating System (CPCC) developed by CECRI, Karaikudi, Tamil Nadu Need to be provided for all structures.	
39	Tender Drawings	It is requested to confirm that the chainage mentioned in the Drawings are Designed Chainage.	Yes, these are designed chainage.

General Illustration for calculation of Premium payment:

In case the Bidder quotes number of days after COD, actual payment of Premium shall commence after those numbers of days from the COD at a specified percentage of the Total Realisable Fee and continue till the expiry of the Concession Period. The rate of percentage in such case shall be 2% till the immediate next anniversary of the COD. The rate of percentage shall be increased by 1% at every successive anniversary of the COD.

For example in case the Bidder quotes 250 (two hundred and fifty) days after COD as the day for the start of Premium payment then the Premium payment will start after 250 days from COD and would be 2% of the Total Realisable Fee till the next immediate anniversary of the COD and thereafter this 2% would be increased by 1% at each subsequent anniversary of the COD. Therefore after first anniversary of the COD after start of the Premium payment, the Premium payment would be increased to 3% of the Total Realisable Fee and after second anniversary of the COD the Premium payment would be 4% of the Total Realisable Fee and so on.

In case the Bidder quotes number of days before COD, actual payment of Premium shall commence from the COD at a specified percentage of the Total Realisable Fee and continue till the expiry of the Concession Period. The rate of percentage in such case shall be (2 + the number of days quoted by the Bidder/365) % from COD till the immediate next anniversary of the COD following the COD. The rate of percentage shall be increased by 1% at every successive anniversary of the COD.

For example if the Bidder quotes 250 (two hundred and fifty) days before COD, the Premium payment will start from COD and would be 2.69% of the Total Realisable Fee till the next immediate anniversary of the COD and thereafter this 2.69% rate would be increased by 1% at each subsequent anniversary of the COD. Therefore after first anniversary of the COD, the Premium payment would be increased to 3.69% of the Total Realisable Fee and after second anniversary of the COD the Premium payment would be 4.69% of the Total Realisable Fee and so on.

Annexure - III

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन और राजमार्ग मंत्रालय)
National Highways Authority of India
(Ministry of Road Transport and Highways)
जी-5 एवं 6, सेक्टर-10, द्वारका, नई दिल्ली - 110 075
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दूरभाष / Phone: 91-11-25074100/25074200
फैक्स / Fax: 91-11-25093507 / 25093514
एक्स. / Extn.: 2223 / 2318 / 2468 / 2553

NHAI/BOT/DBFO/11012/11/07/338

Date: 28.10.2009

To

Mr. Sudhir Hoshing
Reliance Infrastructure Limited
E-4 (I), III Floor, MIDC
Opp. MIDC Police Station, Andheri (E)
Mumbai, Maharashtra - 400 093
Fax No. 91-22-30094111
sudhir.r.hoshing@relianceada.com

Sub: "4/6 Laning of Gandhidham (Kandla) – Mundra Port section of NH 8A (Extn.) (Approx. length 71.400 Km) in the state of Gujarat under NHDP Phase III through Public-Private/Public sector partnership (PPP) on Design, Build, Finance, Operate and Transfer ("DBFOT") basis"

Sir,

This is with reference to the offer letter No. NHAI/BOT/DBFO/11012/11/07/282 dated 08.10.2009 whereby the last date of submission of bid was informed as 30.10.2009.

In this regard, it is informed that the Bid submission due date is hereby extended upto 06.11.2009 (1100 hrs).

Yours faithfully,

(L.P. Padhy)
GM(Guj&Raj)

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Addendum No. 2

Four/Six Laning of Gandhidham (Kandla) - Mundra Port Section of NH-8A (Extension) (Approx. Length - 71.400 Km) in the State of Gujarat under NHDP Phase III through PPP on DBFOT basis

The bid due date of the project is extended upto **06.11.2009 (upto 1100 hrs)**

Annexure -IV

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन और राजमार्ग मंत्रालय)
National Highways Authority of India
(Ministry of Road Transport and Highways)
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NHAI/BOT/DBFO/11012/11/07/339 Date: 29.10.2009

To

Mr. Sudhir Hoshing
Reliance Infrastructure Limited
E-4 (I), III Floor, MIDC
Opp. MIDC Police Station, Andheri (E)
Mumbai, Maharashtra - 400 093
Fax No. 91-22-30094111
sudhir.r.hoshing@relianceada.com

Sub: 4/6 Laning of Gandhidham (Kandla) – Mundra Port section of NH 8A (Extn.) (Approx. length 71.400 Km) in the state of Gujarat under NHDP Phase III through Public-Private/Public sector partnership (PPP) on Design, Build, Finance, Operate and Transfer ("DBFOT") basis"

Sir,

In continuation to Pre Bid reply sent vide our letter no NHAI/BOT/DBFO/11012/11/07/282 dated 08.10.2009, please find enclosed the replies to additional queries for kind information and necessary action.

It may kindly be noted that the Bid due date of the project has been extended upto 06.11.2009 (1100 hrs).

Yours faithfully,

(L.P. Padhy)
GM(Guj&Raj)

Enclosure: as above

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Four/Six Laning of Gandhidham (Kandla) - Mundra Port Section of NH-8A (Extension) (Approx. Length - 71.400 Km) in the State of Gujarat under NHDP Phase III through PPP on DBFOT basis

Reply to queries- II

Queries	Reply
The following clause to be put in along with the format for bank Guarantee *i. Our liability under the Bank Guarantee shall not exceed Rs.------ ----- Crores (in words)* *ii. The Bank Guarantee shall be valid upto (date), 200-* *iii. Unless claimed or a demand in writing is made upon us on or before ----------all our liability under this agreement shall cease*	The following clause can be put in along with the format at the end for bank Guarantee, Appendix -II of RFP *Notwithstanding anything contained hereinabove,* *i. Our liability under the Bank Guarantee shall not exceed Rs.---------- Crores (in words)* *ii. The Bank Guarantee shall be valid upto (date), 200* iii. *We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or before----.*

Annexure-V

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन और राजमार्ग मंत्रालय)
National Highways Authority of India
(Ministry of Road Transport and Highways)
जी-5 एवं 6, सेक्टर-10, द्वारका, नई दिल्ली - 110 075
G-5 & 6, Sector-10, Dwarka, New Delhi-110075

दूरभाष / Phone : 91-11-25074100/25 07420
फैक्स / Fax : 91-11-25093507 / 2509351
एक्स. / Extn.: 2223 / 2318 / 2468 / 255

NHAI/BOT/DBFO/11012/11/07/344

Date: 3.11.2009

To

Mr. Sudhir Hoshing
Reliance Infrastructure Limited
E-4 (I), III Floor, MIDC
Opp. MIDC Police Station, Andheri (E)
Mumbai, Maharashtra - 400 093
Fax No. 91-22-30094111
sudhir.r.hoshing@relianceada.com

Sub: 4/6 Laning of Gandhidham (Kandla) – Mundra Port section of NH 8A (Extn.) (Approx. length 71.400 Km) in the state of Gujarat under NHDP Phase III through Public-Private/Public sector partnership (PPP) on Design, Build, Finance, Operate and Transfer ("DBFOT") basis"

Sir,

In continuation to letter No. NHAI/BOT/DBFO/11012/11/07/339 dated 29.10.2009 whereby the last date of submission of bid was informed as 06.11.2009.

It may kindly be noted that the Bid due date of the project has been extended upto 13.11.2009 (1100 hrs).

Yours faithfully,

(L.P. Padhy)
GM(Guj&Raj)

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भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन और राजमार्ग मंत्रालय)
National Highways Authority of India
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जी-5 एवं 6, सेक्टर-10, द्वारका, नई दिल्ली - 110 075
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दूरभाष /Phone: 91-11-25074100/25074200
फैक्स / Fax: 91-11-25093507 / 25093514
एक्स. /Extn.: 2223 / 2318 / 2468 / 2553

NHAI/BOT/DBFO/11012/11/07/349 Date: 10.11.2009

To

Reliance Infrastructure Limited
Road Projects Division
623, 6th Floor, Chintamani Plaza
Mohan Studio Compound, Chakala
Andheri-East, Mumbai-400 099
Board 91-22-30096999/30765311
Fax No. /91-22-30765323/30094111
sudhir.r.hoshing@relianceada.com

Sub: 4/6 Laning of Gandhidham (Kandla) – Mundra Port section of NH 8A (Extn.) (Approx. length 71.400 Km) in the state of Gujarat under NHDP Phase III through Public-Private/Public sector partnership (PPP) on Design, Build, Finance, Operate and Transfer ("DBFOT") basis"

Sir,

In continuation to letter No. NHAI/BOT/DBFO/11012/11/07/344 dated 3.11.2009 whereby the last date of submission of bid was informed as 13.11.2009.

It may kindly be noted that the Bid due date of the project has been extended upto 26.11.2009 (1100 hrs).

Yours faithfully,

(L.P. Padhy)
GM(Guj&Raj)

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Annexure - VI

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(पोत परिवहन, सड़क परिवहन और राजमार्ग मंत्रालय)
National Highways Authority of India
(Ministry of Shipping, Road Transport and Highways)
जी-5 एवं 6, सेक्टर-10, द्वारका, नई दिल्ली-110 075
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फैक्स / Fax : 91-11-25093507 / 25093514
एक्स. / Extn. : 2223 / 2318 / 2468 / 2553

NHAI/BOT/DBFO/11012/11/07/354

Date: 16.11.2009

To

Reliance Infrastructure Limited
Road Projects Division
623, 6th Floor, Chintamani Plaza
Mohan Studio Compound, Chakala
Andheri-East, Mumbai-400 099
Board 91-22-30096999/30765311
Fax No. /91-22-30765323/30094111
sudhir.r.hoshing@relianceada.com

Sub: 4/6 Laning of Gandhidham (Kandla) – Mundra Port section of NH 8A (Extn.) (Approx. length 71.400 Km) in the state of Gujarat under NHDP Phase III through Public-Private/Public sector partnership (PPP) on Design, Build, Finance, Operate and Transfer ("DBFOT") basis"

Sir,

With respect to bid of the subject project, please find enclosed addendum no. III in Request for Proposal (RFP) Volume II and Draft Concession Agreement (DCA) as well as clarification on clause 2.1.14(V) of RFP for kind necessary action.

It may kindly be noted that the Bid due date of the project has been extended upto 26.11.2009 (1100 hrs).

Yours faithfully

(L.P. Padhy)
GM(Guj&Raj)

Enclosure: as above

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Four/Six Laning of Gandhidham (Kandla) - Mundra Port Section of NH-8A (Extension) (Approx. Length - 71.400 Km) in the State of Gujarat under NHDP Phase III through PPP on DBFOT basis

ADDENDUM No. 3

Contents

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Amendments in Draft Concession Agreement

Clause/ Art.	Description	In place of	To be read as
Clause 29.2.3	**Modification in the Concession Period**	Notwithstanding anything to the contrary contained in this Agreement, if the average daily traffic of PCUs in any Accounting Year shall exceed the designed capacity of the Project Highway and shall continue to exceed the designed capacity for 3 (three) Accounting Years following thereafter, an Indirect Political Event shall be deemed to have occurred and the Authority may in its discretion terminate this Agreement by issuing a Termination Notice and making a Termination Payment under and in accordance with the provisions of Clause 34.9.2; provided that before issuing the Termination Notice, the Authority shall inform the Concessionaire of its intention to issue such Termination Notice and grant a period of 180 (one hundred and eighty) days for making a representation, and may, after the expiry of such period, whether or not it has received such representation, in its sole discretion issue the Termination Notice. For the avoidance of doubt, the Parties agree that an average daily traffic of 60000 PCUs and 120000 PCUs shall be deemed to be the designed capacity of the Four-Lane Project Highway and Six-Lane Project Highway respectively.	Notwithstanding anything to the contrary contained in this agreement, if the average daily traffic of PCU's in any accounting year shall exceed the designed capacity of the project highway, the Authority at it's option may cause preparation of a detailed project report (DPR). The said DPR, inter-alia will assess the cost as may have to be incurred for augmenting the capacity of the project highway such that its capacity shall have increased sufficiently for carrying the then current traffic in accordance with the corresponding provisions of the Indian Roads Congress publication no. IRC:64-1990 or any substitute thereof and extension of concession period, if any, that may be required to yield the concessionaire a post-tax return on equity (Equity IRR) of 16% per annum, such assessment being made at an assumed debt equity ration of 70:30; such assessment being made at assumed debt: equity ratio of 70:30; such extension of concession period shall be however limited to 5 (five) years. For avoidance of doubt it is stated that there shall be no reduction in the concession period as originally accepted. The Authority may thereafter, at their sole option, issue a notice to the Concessionaire, (to be responded within a period of three months from the date of such notice), to undertake within six months of such notice, augmentation so determined by the Authority. On refusal or non-acceptance by the Concessionaire to undertake such augmentation, either absolutely or on such extension of concession period as assessed under

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Clause/ Art.	Description	In place of	To be read as
			the DPR, or on the failure of the Concessionaire to undertake such augmentation on the due date so intimated by the Authority, an Indirect Political Event shall be deemed to have occurred and the Authority may in It's discretion Terminate this Agreement by issuing a Termination Notice and making a Termination Payment under and in accordance with the provisions of Clause 34.9.2; without the Authority being liable to issue any further notice under this provision. For the avoidance of doubt, the Parties agree that an average daily traffic of 60000 PCUs and 120000 PCUs shall be deemed to be the designed capacity of the Four-Lane Project Highway and Six-Lane Project Highway respectively.
Clause 17.8.1	**Damages for breach of maintenance obligations**	In the event that the Concessionaire fails to repair or rectify any defect or deficiency set forth in the Maintenance Requirements within the period specified therein, it shall be deemed to be in breach of this Agreement and the Authority shall be entitled to recover Damages, to be calculated and paid for each day of delay until the breach is cured, at the higher of (a) 0.5% (zero point five per cent) of Average Daily Fee, and (b) 0.1% (zero point one per cent) of the cost of such repair or rectification as estimated by the Independent Engineer. Recovery of such Damages shall be without prejudice to the rights of the Authority under this Agreement, including the right of Termination thereof.	In the event that the Concessionaire fails to repair or rectify any defect or deficiency set forth in the Maintenance Requirements within the period specified therein, it shall be deemed to be in breach of this Agreement and the Authority shall be entitled to recover Damages, to be calculated and paid for each day of delay until the breach is cured, at the higher of (a) 0.5% (zero point five per cent) of Average Daily Fee, and (b) 0.1% (zero point one per cent) of the cost of such repair or rectification as estimated by the Independent Engineer. Notwithstanding anything contained in this Agreement, should the actual traffic exceed the design capacity, during any year or part thereof and the Concessionaire fails to repair or rectify any defect or deficiency set forth in the Maintenance Requirements within the period specified therein, it shall be deemed to be in breach of this Agreement and the Authority shall be

Clause/ Art.	Description	In place of	To be read as
			entitled, from such date, to recover Damages, to be calculated and paid for each day of delay until the breach is cured, at the higher of (a) 5% (five per cent) of Average Daily Fee, and (b) 1% (one per cent) of the cost of such repair or rectification as estimated by the Independent Engineer, for the balance period of the concession. Recovery of such Damages shall be without prejudice to the rights of the Authority under this Agreement, including the right of Termination thereof.
Art. 48	**"Change in Ownership"**	"Change in Ownership" means a transfer of the direct and/or indirect legal or beneficial ownership of any shares, or securities convertible into shares, that causes the aggregate holding of the {selected bidder/ Consortium Members}, together with {its/their} Associates, in the total Equity to decline below (i) 51% (fifty one per cent) thereof during Construction Period, (ii) 33% (thirty three per cent) thereof during a period of 3 (three) years following COD, and (iii) 26% (twenty six per cent) thereof, or such lower proportion as may be permitted by the Authority during the remaining Concession Period; provided that any material variation (as compared to the representations made by the Concessionaire during the bidding process for the purposes of meeting the minimum conditions of eligibility or for evaluation of its application or Bid, as the case may be,) in the proportion of the equity holding of {the selected bidder/ any Consortium Member} to the total Equity, if it occurs prior to COD, shall constitute Change in Ownership;	**"Change in Ownership"** means a transfer of the direct and/or indirect legal or beneficial ownership of any shares, or securities convertible into shares, that causes the aggregate holding of the {selected bidder/ Consortium Members}, together with {its/their} Associates, in the total Equity to decline below 51% (fifty one per cent) thereof during Construction Period and two years thereafter, provided that any material variation (as compared to the representations made by the Concessionaire during the bidding process for the purposes of meeting the minimum conditions of eligibility or for evaluation of its application or Bid, as the case may be,) in the proportion of the equity holding of {the selected bidder/ any Consortium Member} to the total Equity, if it occurs prior to completion of a period two years after COD, shall constitute Change in Ownership;
Clause 7.1(k)	**Representations and Warranties**	it shall at no time undertake or permit any Change in Ownership except in accordance with the provisions of	it shall at no time undertake or permit any Change in Ownership except in accordance with the provisions of

Clause/ Art.	Description	In place of	To be read as
	of the Concessionaire	Clause 5.3 and that the {selected bidder/ Consortium Members}, together with {its/ their} Associates, hold not less than 51% (fifty-one percent) of its issued and paid up Equity as on the date of this Agreement; and that no member of the Consortium whose technical and financial capacity was evaluated for the purposes of pre-qualification and short-listing in response to the Request for Qualification shall hold less than 26% (twenty six per cent) of such Equity during the Construction Period;	Clause 5.3 and that the {selected bidder/ Consortium Members}, together with {its/ their} Associates, hold not less than 51% (fifty-one percent) of its issued and paid up Equity as on the date of this Agreement; and that each member of the Consortium whose technical and financial capacity was evaluated for the purposes of pre-qualification and short-listing in response to the Request for Qualification shall hold at least 26% (twenty six per cent) of Equity during the Construction Period and two years thereafter along with its Associates. Provided further that any such request made under Clause 7.1(k) and/or Art 48, at the option of the Authority, may be required to be accompanied by a suitable no objection letter from lenders".
Clause 40.2(b)	**Permitted assignment and charges**	mortgages/pledges/hypothecation of goods/assets other than Project Assets and their related documents of title, arising or created in the ordinary course of business of the Project Highway, and as security only for indebtedness to the Senior Lenders under the Financing Agreements and/or for working capital arrangements for the Project Highway;	mortgages/pledges/hypothecation of goods/assets other than Project Assets and their related documents of title, a charge on the Escrow Account, arising or created in the ordinary course of business of the Project Highway, and as security only for indebtedness to the Senior Lenders under the Financing Agreements and/or for working capital arrangements for the Project Highway;
Clause 26.2.1	**Additional Concession Fee**	Without prejudice to the provisions of Clause 26.1, the Concessionaire agrees to pay to the Authority {for the .....th (.....th)[ss] year of the Concession Period, but commencing from the day falling after ..... (.....) days from COD}, a Premium in	Without prejudice to the provisions of Clause 26.1, the Concessionaire agrees to pay to the Authority on the COD date, a Premium in the form of an additional Concession Fee equal to Rs..... (in words) as due to the Authority during that year, due and payable for

Clause/ Art.	Description	In place of	To be read as
		the form of an additional Concession Fee equal to {2% (two per cent)} of the total Realisable Fee during that year, due and payable on a pro rata basis for the period remaining in that year; and for each subsequent year of the Concession Period, the Premium shall be determined by increasing the proportion of Premium to the total Realisable Fee in the respective year by an additional 1% (one percent) as compared to the immediately preceding year. For the avoidance of doubt and by way of illustration, the Premium for the .....th (.....th) and .....th (.....th) years shall be equal to {3% (three per cent) and 4% (four per cent)} respectively of the total Realisable Fee for the respective years.	the period remaining in that year; and for each subsequent year of the Concession Period, the Premium shall be determined by increasing the amount of Premium in the respective year by an additional 5% (five per cent) as compared to the immediately preceding year. For the avoidance of doubt, the Premium for all the subsequent years shall be determined by increasing the amount of Premium by 5% as compare to the immediately preceding year.
Art. 25	**Grant**		

Amendments in Request for Proposal Vol 1

Clause	Description	In place of	To be read as
2.1.14	General terms of Bidding	2.1.14 : A Bidder shall not have a conflict of interest (the "**Conflict of Interest**") that affects the Bidding Process. Any Bidder found to have a Conflict of Interest shall be disqualified. In the event of disqualification, the Authority shall forfeit and appropriate the Bid Security or Performance Security, as the case may be, as mutually agreed genuine pre-estimated compensation and damages payable to the Authority for, inter alia, the time, cost and effort of the Authority, including consideration of such Bidder's proposal, without prejudice to any other right or remedy that may be available to the Authority hereunder or otherwise. Without limiting the generality of the above, a Bidder shall be considered to have a Conflict of Interest that affects the Bidding Process, if: (i) such Bidder (or any constituent thereof) and any other Bidder (or any constituent thereof) have common controlling shareholders or other ownership interest; provided that this qualification shall not apply in cases where the direct or indirect shareholding in a Bidder or a constituent thereof in the other Bidder(s) (or any of its constituents) is less than 5% of its paid up and subscribed capital; or (ii)	2.1.14: A Bidder shall not have a conflict of interest (the "**Conflict of Interest**") that affects the Bidding Process. Any Bidder found to have a Conflict of Interest shall be disqualified. In the event of disqualification, the Authority shall forfeit and appropriate 5% of the value of the Bid Security or Performance Security, as the case may be, as mutually agreed genuine pre-estimated compensation and damages payable to the Authority for, inter alia, the time, cost and effort of the Authority, including consideration of such Bidder's proposal, without prejudice to any other right or remedy that may be available to the Authority hereunder or otherwise. Without limiting the generality of the above, a Bidder shall be considered to have a Conflict of Interest that affects the Bidding Process, if: (i) such Bidder (or any constituent thereof) and any other Bidder (or any constituent thereof) have common controlling shareholders or other ownership interest; provided that this qualification shall not apply in cases where the direct or indirect shareholding in a Bidder or a constituent thereof in the other Bidder(s) (or any of its constituents) is not more than 25%(twenty five per cent) of its paid up and subscribed capital; or (ii) .....

Clause	Description	In place of	To be read as
		(iii) ..... (iv)..... (v) ..... (vi) such Bidder has participated as a consultant to the Authority in the preparation of any documents, design or technical specifications of the Project.	(iii) ..... (iv)..... (v) ..... (vi)such Bidder has participated as a consultant to the Authority in the preparation of any documents, design or technical specifications of the Project. Notwithstanding anything stated herein a conflict of interest situation arising at the pre-qualification stage will be deemed to subsist only, as between such applicants attracting conflict of interest provisions on account of shareholdings, submit bids under this document.
2.20.7	**Bid Security**	2.20.7 The Bid Security shall be forfeited and appropriated by the Authority as mutually agreed genuine pre-estimated compensation and damages payable to the Authority for, inter alia, time, cost and effort of the Authority without prejudice to any other right or remedy that may be available to the Authority hereunder or otherwise, under the following conditions: a) If a Bidder submits a non-responsive Bid;	2.20.7 The Bid Security shall be forfeited and appropriated by the Authority as mutually agreed genuine pre-estimated compensation and damages payable to the Authority for, inter alia, time, cost and effort of the Authority without prejudice to any other right or remedy that may be available to the Authority hereunder or otherwise, under the following conditions: a) If a Bidder submits a non-responsive Bid; Subject however that in the event of encashment of bid security occurring due to operation of para 2.20.7 (a), the damage so claimed by the Authority shall be restricted to 5% of the value of the Bid security.

Clause	Description	In place of	To be read as
Appendix-I	**Letter comprising the Bid**	Para 26 I/We hereby submit our Bid and offer a Premium in the form of ____ per cent (in words) of the gross revenues of the Project as share of the Authority / require a Grant of Rs. ..... (Rupees .....only) (Strike out whichever is not applicable)] for undertaking the aforesaid Project in accordance with the Bidding Documents and the Concession Agreement.	Para 26 I/We hereby submit our Bid and [offer a Premium in the form Rs..... (in words) out of the gross revenues of the Project as share of the Authority/require a Grant of Rs..... (Rupees..... only), (Strike out whichever is not applicable)] for undertaking the aforesaid Project in accordance with the Bidding Documents and the Concession Agreement.

ADDITIONAL CLARIFICATION TO PRE-BID / SUBSEQUENT QUERIES

Clause No:	Clarifications required by the applicant	Reply from NHAI
	There may be number of companies that have common investors with at least 5 % equity share. To facilitate investments in the road sector and to improve the bidding process, the shareholding limit could either be removed or raised to 26%.Also, Banks, Financial Institutions, and Mutual Fund Companies and such Non-Banking Financial Companies (NBFCs) should be exempted from this clause.	(i) The relationship(s) through JVs and SPVs will not come under purview of "Conflict of Interest" under sub-clause (v) of clause 2.1.14 of RFP (ii) Please refer addendum No.III with respect to clause 2.1.14 of RFP
	More clarity on the type of relationship with another bidder is necessary.	
	Disqualification due to Conflict of Interest should not result in to forfeiture of Bid Security. Kindly remove such provision.	
2.1.14	As specified under the RFQ document for the Project, request Authority to exclude bank, insurance company, pension fund or public financial institution referred to I n section 4A of the Companies Act 1956 under the common shareholders. Also, In current market situations wherein companies are being taken over/acquired one company/ funds controlled by one company is taking equity positions in another company. There is every possibility that one or more bidders have more than 1% common shareholders but do not have any control shareholding. The clause related to conflict of interest should be deleted. Alternatively, the direct/ indirect equity shareholding should be increased to 26% as any company/ fund can have control in the other company only its shareholding is more than or equal to 26%. M/s Oriental informed that they have incorporated 2 SPVs, namely. M/s Oriental Pathways (Indore) Pvt. Ltd and Oriental Pathways (Agra) Pvt Ltd. for undertaking, development, operation and maintenance of only two aforesaid projects and they are not required to carry on with any other business other than the projects. M/s Oriental has further informed that as on date M/s Oriental Structural Engineers Pvt. Ltd and M/s Leighton Contractors (I) Pvt. Ltd. holds more than 5% equity share each in paid up and subscribe capital in aforesaid two SPVs while outlining that the two companies i.e. M/s Oriental structural Engineers Pvt Ltd and M/s. Leighton Contractors (I) Pvt. Ltd. having share holding as mentioned above are not the bidders for the projects under consideration under provisions of Clause 2.1.14 of RFP	

Annexure - VII

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन और राजमार्ग मंत्रालय)
National Highways Authority of India
(Ministry of Road Transport and Highways)
जी-5 एवं 6, सेक्टर-10, द्वारका, नई दिल्ली - 110 075
G-5 & 6, Sector-10, Dwarka, New Delhi-110075

दूरभाष / Phone: 91-11-25074100/25074200
फैक्स / Fax: 91-11-25093507 / 25093514
एक्स. / Extn.: 2223 / 2318 / 2468 / 2553

NHAI/BOT/DBFO/11012/11/07/359 Date: 21.11.2009

To

Reliance Infrastructure Limited
Road Projects Division
623, 6th Floor, Chintamani Plaza
Mohan Studio Compound, Chakala
Andheri-East, Mumbai-400 099
Board 91-22-30096999/30765311
Fax No. /91-22-30765323/30094111
sudhir.r.hoshing@relianceada.com

Sub: 4/6 Laning of Gandhidham (Kandla) – Mundra Port section of NH 8A (Extn.) (Approx. length 71.400 Km) in the state of Gujarat under NHDP Phase III through Public-Private/Public sector partnership (PPP) on Design, Build, Finance, Operate and Transfer ("DBFOT") basis"

Sir,

With respect to bid of the subject project, please find enclosed addendum no. 4 in Draft Concession Agreement (DCA), as well as additional clarifications to queries for kind necessary action.

It may kindly be noted that the Bid due date of the project has been extended upto 26.11.2009 (1100 hrs).

Yours faithfully

(L.P. Padhy)
GM(Guj&Raj)

Enclosure: as above

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Four/Six Laning of Gandhidham (Kandla) - Mundra Port Section of NH-8A (Extension) (Approx. Length - 71.400 Km) in the State of Gujarat under NHDP Phase III through PPP on DBFOT basis

ADDENDUM No. 4

Contents

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1	Corrigendum for RFP Volume II (Draft Concession Agreement)	2-7

Amendments in Draft Concession Agreement

Clause/ Art.	Description	In place of	To be read as
Clause 26.2.1	Additional Concession Fee	Without prejudice to the provisions of Clause 26.1, the Concessionaire agrees to pay to the Authority on the COD date, a Premium in the form of an additional Concession Fee equal to Rs..... (in words) as due to the Authority during that year, due and payable for the period remaining in that year; and for each subsequent year of the Concession Period, the Premium shall be determined by increasing the amount of Premium in the respective year by an additional 5% (five per cent) as compared to the immediately preceding year. For the avoidance of doubt, the Premium for all the subsequent years shall be determined by increasing the amount of Premium by 5% as compare to the immediately preceding year.	"Without prejudice to the provisions of Clause 26.1, the Concessionaire agrees to pay to the Authority, on the COD date*, a Premium in the form of an additional Concession Fee equal to Rs._____(in words) as due to the authority during that year, due and payable for the period remaining in that year; and for each subsequent year of the Concession Period, the Premium shall be determined by increasing the amount of Premium in the respective year by an additional 5 % (five percent) as compared to the immediately preceding year. For the avoidance of doubt, the Premium for all subsequent years shall be determined by increasing the amount of premium by 5 % as compared to the immediately preceding year. For avoidance of doubt it is clarified that the term 'Premium' as referred in para above shall be as applicable for one financial year. In accordance with and in

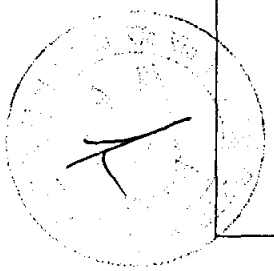
			compliance with the terms of this agreement, If payment of such 'Premium' is due and payable only for part of such financial year, then only pro-rata payments @ 1/12 th of such Premium shall be payable for each month of such part financial year for which such Premium payments is due as payable. For the purpose of assessing the amount due for payment on such payment of Premium, part of a month shall be deemed to be a full month. In such circumstances the subsequent year as referred to in para above, for the purpose of 5% annual escalation, shall fall to commence on 1st of April of the immediately succeeding financial year."
26.3	Determination of Concession Fee	Notwithstanding anything to the contrary contained in this Agreement, the Concessionaire agrees and undertakes that the total Realisable Fee for the purposes of computing the Concession Fee under this Article 26 shall be determined on the express understanding that the number of PCUs in the first year following the COD shall be deemed to be the higher of (a) the actual PCUs and (b) 37886 PCUs; and that the number of PCUs for computing the Concession Fee for each subsequent year shall be deemed to be the higher of (a) the actual PCUs and (b) 2% (two percent) greater than the number of	This clause stands deleted.

		PCUs reckoned hereunder in the immediately preceding year. For the avoidance of doubt, the Parties hereto agree that for the purposes of computing the Concession Fee hereunder, the proportion of cars, buses, trucks and other vehicles to the total number of PCUs shall always be based on the actual proportion thereof in the relevant year. The Parties further agree that for purposes hereof, Realisable Fee shall be computed with reference to the Fee due and payable by Users and any discounts, concessions or waivers granted by the Concessionaire to any or all Users shall not be reckoned for computing the Realisable Fee hereunder. The Parties also agree that computation of PCUs hereunder shall be based on the traffic at the Toll Plaza, and in the event the Project Highway has 2 (two) or more Toll Plazas, the average traffic thereof shall be computed for purposes hereof.	
26.4	Payment of Concession Fee	The Concession Fee payable under the provisions of this Article 26 shall be due and payable in monthly instalments. Within 7 (seven) days of the close of each month, the Concessionaire shall pay to the Authority against the Concession Fee, a provisional amount calculated on the basis of total Realisable Fee of the immediately preceding month, and final settlement thereof, based on audited accounts of the Concessionaire, shall be made within 120 (one hundred and twenty) days of	The Concession fee payable under the provision of this Art 26 shall be due and payable in monthly installments, within 7 days of the close of each month.

		completion of the respective Accounting Year.	
Clause 29.2.3	Modification in the Concession Period	Notwithstanding anything to the contrary contained in this agreement, if the average daily traffic of PCU's in any accounting year shall exceed the designed capacity of the project highway, the Authority at it's option may cause preparation of a detailed project report (DPR). The said DPR, inter-alia will assess the cost as may have to be incurred for augmenting the capacity of the project highway such that its capacity shall have increased sufficiently for carrying the then current traffic in accordance with the corresponding provisions of the Indian Roads Congress publication no. IRC:64-1990 or any substitute thereof and extension of concession period, if any, that may be required to yield the concessionaire a post-tax return on equity (Equity IRR) of 16% per annum, such assessment being made at an assumed debt equity ration of 70:30; such assessment being made at assumed debt: equity ratio of 70:30; such extension of concession period shall be however limited to 5 (five) years. For avoidance of doubt it is stated that there shall be no reduction in the concession period as originally accepted. The Authority may thereafter, at their sole option, issue a notice to the Concessionaire, (to be responded within a period of three months from the date of such notice), to undertake within six months of such notice, augmentation so determined by the Authority. On	Notwithstanding anything to the contrary contained in this agreement, if the average daily traffic of PCU's in any accounting year shall exceed the designed capacity of the project highway, the authority at it's option may cause preparation of a detailed project report (DPR). The said DPR, inter-alia will assess the cost as may have to be incurred for augmenting the capacity of the project highway such that its capacity shall have increased sufficiently for carrying the then current traffic in accordance with the corresponding provisions of the Indian roads congress publication no. IRC -64, 1990 or any substitute thereof and extension of concession period, if any, that may be required to yield the concessionaire a post-tax return on equity (Equity IRR) of 16% per annum, such assessment being made at an assumed debt:equity ratio of 70:30. Such extension of Concession period shall be however limited to 5 (five) years. For avoidance of doubt it is stated that there shall be no reduction in the concession period as originally

		refusal or non-acceptance by the Concessionaire to undertake such augmentation, either absolutely or on such extension of concession period as assessed under the DPR, or on the failure of the Concessionaire to undertake such augmentation on the due date so intimated by the Authority, an Indirect Political Event shall be deemed to have occurred and the Authority may in It's discretion Terminate this Agreement by issuing a Termination Notice and making a Termination Payment under and in accordance with the provisions of Clause 34.9.2; without the Authority being liable to issue any further notice under this provision. For the avoidance of doubt, the Parties agree that an average daily traffic of 60000 PCUs and 120000 PCUs shall be deemed to be the designed capacity of the Four-Lane Project Highway and Six-Lane Project Highway respectively.	accepted. The authority may thereafter, at their sole option, issue a notice to the Concessionaire, (to be responded within a period of three months from the date of such notice), to undertake within six months of such notice, augmentation so determined by the authority. For this purpose, all realizable fees that shall accrue from three months from the date of issuance of the aforesaid notice by the Authority, requiring the Concessionaire to procure capacity augmentation under this clause, shall be included in the assessment of revenue generated against the capacity augmentation and the equity IRR calculations as aforesaid shall be so based on such revenues. On refusal or non-acceptance by the Concessionaire to undertake such augmentation, either absolutely or on such extension of concession period as assessed under the DPR, or on the failure of the Concessionaire to undertake such augmentation on the due date so intimated by the authority, an indirect political event shall be deemed to have occurred and the authority may in It's discretion terminate this agreement by issuing a termination notice and making a termination payment under and in

			accordance with the provisions of clause 34.9.2; without the authority being liable to issue any further notice under this provision. For the avoidance of doubt, the Parties agree that an average daily traffic of 60000 PCUs and 120000 PCUs shall be deemed to be the designed capacity of the Four-Lane Project Highway and Six-Lane Project Highway respectively.



Name of the Project: Four/Six Laning of Gandhidham (Kandla) - Mundra Port Section of NH-8A (Extension) (Approx. Length - 71.400 Km) in the State of Gujarat under NHDP Phase III through Public-Private/Public Sector Partnership (PPP) on Design, Build, Finance, Operate and Transfer (DBFOT) basis

ADDITIONAL CLARIFICATIONS TO THE QUERIES

S No.	Clause	Revised Clause	Queries	NHAI Reply
1.	Appendix I – Para 26	I/We hereby submit our Bid and [offer a Premium in the form Rs..... (in words) out of the gross revenues of the Project as share of the Authority/require a Grant of Rs..... (Rupees..... *only*), (Strike out whichever is not applicable)] for undertaking the aforesaid Project in accordance with the Bidding Documents and the Concession Agreement.	Please Clarify whether the amount of premium to be quoted here shall be the additional concessional fee payable on COD for the year or it shall be the total amount of the Concession fee payable during the Concession Period. Further, in case the COD is pre-poned or extended, how the amount of premium shall be adjusted and paid, please clarify with reference to modified Clause 26.2.1.	Please Refer Addendum 4
2.	26.2.1	Without prejudice to the provisions of Clause 26.1, the Concessionaire agrees to pay to the Authority on the COD date, a Premium in the form of an additional Concession Fee equal to Rs..... (in words) as due to the Authority during that year, due and payable for the period remaining in that year; and for each subsequent year of the Concession Period, the Premium shall be determined by increasing the amount of Premium in the respective year by an additional 5% (five per cent) as compared to the immediately	It has been shown that the payment of the premium shall start from COD date. In this regard, we wish to state that as on COD, the Concessionaire has to pay a lot of payments to the Bankers *in lieu of repayment of loan and interest thereof* and during the initial period after COD the Cash Flows remain negative. The Payment of the Premium at that time shall be additional burden. Therefore, it is requested that the payment of the Premium to the authority should start from the minimum 10 years after COD.	Please Refer Addendum 4
3.			Additional Concession Fee Kindly confirm if the premium to be paid on the Appointed date would be pro rata for the year.	

S No.	Clause	Revised Clause	Queries	NHAI Reply
		preceding year. For the avoidance of doubt, the Premium for all the subsequent years shall be determined by increasing the amount of Premium by 5% as compare to the immediately preceding year.		
4.	29.2.3	Notwithstanding anything to the contrary contained in this agreement, if the average daily traffic of PCU's in any accounting year shall exceed the designed capacity of the project highway, the Authority at it's option may cause preparation of a detailed project report (DPR). The said DPR, inter-alia will assess the cost as may have to be incurred for augmenting the capacity of the project highway such that its capacity shall have increased sufficiently for carrying the then current traffic in accordance with the corresponding provisions of the Indian Roads Congress publication no. IRC:64-1990 or any substitute thereof and extension of concession period, if any, that may be required to yield the concessionaire a post-tax return on equity (Equity IRR) of 16% per annum, such assessment being made at an assumed debt equity ration of 70:30; such assessment being made at assumed debt: equity ratio of 70:30; such extension of concession period shall be however limited to 5 (five) years. For avoidance of doubt it is stated that there shall be no reduction in the concession period as originally accepted. The Authority	Kindly Clarify the modification in the Concession Period would happen if the following scenario occurs: Scenario If the original concession period ends on 31st March 2030 and the design capacity of 1,20, 000 PCUs for Six Lane reaches on 31st March 2028 and the Concessionaire agrees to undertake the capacity augmentation as per the Concession Agreement , then, will the concession period be extended beyond 31st March 2030 to 31st March 2035 (Original Concession End Date i.e., 31st March 2030 + 5 years) or to 31st March 2033 (Date of reaching Design Capacity 31st March 2028 + 5 years)	Please Refer Addendum 4
5.		Kindly Clarify if the said 16% post tax return on equity is on : a) The entire equity invested by the concessionaire right from the start of the Concession Period, OR b) Only on the additional equity that the concessionaire will need to invest for undertaking the capacity augmentation as per DPR.		
6.		If the above 16 % post tax return on equity is only on the		

S No.	Clause	Revised Clause	Queries	NHAI Reply
		may thereafter, at their sole option, issue a notice to the Concessionaire, (to be responded within a period of three months from the date of such notice), to undertake within six months of such notice, Augmentation so determined by the Authority. On refusal or non-acceptance by the Concessionaire to undertake such augmentation, either absolutely or on such extension of concession period as assessed under the DPR, or on the failure of the Concessionaire to undertake such augmentation on the due date so intimated by the Authority, an Indirect Political Event shall be deemed to have occurred and the Authority may in It's discretion Terminate this Agreement by issuing a Termination Notice and making a Termination Payment under and in accordance with the provisions of Clause 34.9.2; without the Authority being liable to issue any further notice under this provision. For the avoidance of doubt, the Parties agree that an average daily traffic of 60000 PCUs and 120000 PCUs shall be deemed to be the designed capacity of the Four- Lane Project Highway and Six-Lane Project Highway respectively.	additional equity investment for undertaking capacity augmentation, then for computing such IRR only revenue arising out of traffic over and above the threshold designed capacity (prior to capacity augmentation) should be considered. Kindly Clarify.	
7.			The additional equity will be required for funding the costs for capacity augmentation as described in the Addendum. Please confirm, if the capacity augmentation costs will be as mentioned in the DPR or actual costs incurred by the Concessionaire and duly approved by the independent consultant for undertaking such capacity augmentation.	Please Refer Addendum 4
8.			In case of average traffic count exceeding the designed capacity, the capacity augmentation is required to be done for the entire project corridor or only on those segments of the project corridor where the actual traffic count has exceeded the designed capacity. Kindly Clarify.	
9.			The traffic volumes vary from segment to segment in the project corridor. And the actual traffic in different segments shall exceed the designed capacity at different points in time. Please clarify if the capacity augmentation in the various segments can be undertaken as and when it is due.	

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S No.	Clause	Revised Clause	Queries	NHAI Reply
10.			a. It has been stated in line 2, that if the Average Daily Traffic of PCU's in any accounting year shall exceed the design capacity of the project, the authority at its option may cause preparation of a detailed project report. Any one accounting year, may not be reflecting the actual increase in PCUs. The Authority may cause preparation of a detailed project report if the average daily traffic of PCUs in any accounting year shall exceed the designed capacity of the project highway and shall continue to exceed the designed capacity for three (3) accounting years following immediately thereafter. May please be modified accordingly. b. It has been observed in the recent past that there have been major differences in cost and revenue projection between DPRs and contractor/ concessionaires. Therefore, it is requested that the Equity IRR of 16% shall be calculated based on mutually agreed cost and revenue between NHAI and Concessionaire. May please be confirmed. c. Extension of concession period shall be limited to 5 years. In case Equity IRR of 16% could not be achieved up to the extension of 5 years in concession period, how this clause shall be operative? Please Clarify. d. As per original clause 29.2.1, clause 29.2.2 , the concession period shall be modified based on the target traffic on target date. Please clarify whether clause 29.2.1, clause 29.2.2 and clause 29.2.3 (modified) shall be operative concurrently. Further, the	

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S No.	Clause	Revised Clause	Queries	NHAI Reply
			extension in concession period of 5 years shall be applicable for original concession period or modified concession period, modified as per clause 29.2.1 and clause 29.2.2.	
11.	29.2.3		Kindly Clarify that the cost of the DPR at that time shall be borne by NHAI. The modified clause does not mention to what extent the capacity should be augmented. It only says that the capacity shall have increased sufficiently for carrying the then current traffic in accordance with the provisions of the Indian Roads Congress publication No. IRC: 64-1990. Please confirm if the capacity has to be augmented to Eight Lane. Kindly Clarify that- "augmenting the capacity of the project highway such that its capacity shall have increased sufficiently for carrying the then current traffic..." increased sufficiently would mean augmenting to Eight Lane. Also, Please Clarify how the maximum extension period of 5 years was arrived at. The earlier clause was effective if the designed capacity was exceeded continuously for a period of 4 Accounting Years. This has now changed to "If the average daily traffic of PCU's in any accounting years shall exceed its designed capacity, the authority may at its option cause preparation of a Detailed Project Report (DPR). Kindly Clarify that the cut off is only 1 year as compared to the earlier 4 years.	Please Refer Addendum 4

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S No.	Clause	Revised Clause	Queries	NHAI Reply
12.	Article 48	"Change in Ownership" means a transfer of the direct and/or indirect legal or beneficial ownership of any shares, or securities convertible into shares, that causes the aggregate holding of the {selected bidder/ Consortium Members}, together with {its/their} Associates, in the total Equity to decline below 51% (fifty one per cent) thereof during Construction Period and two years thereafter, provided that any material variation (as compared to the representations made by the Concessionaire during the bidding process for the purposes of meeting the minimum conditions of eligibility or for evaluation of its application or Bid, as the case may be,) in the proportion of the equity holding of {the selected bidder/ any Consortium Member} to the total Equity, if it occurs prior to completion of a period two years after COD, shall constitute Change in Ownership;	Change in Ownership Please Clarify that the consortium members can divest their holding after a period of 2 years after the construction period as per the B K Chaturvedi Report.	The clause is self explanatory
13.		General	Extend the date of bid submission	The bid submission due date remains unchanged.

S No.	Clause	Revised Clause	Queries	NHAI Reply
14.		General	We strongly propose to have another Pre-Bid Meeting between NHAI high level Officials and bidders to understand the criticality and the gravity of the amendments which are raising serious concerns regarding the project viability in years to come.	A pre bid meeting was held for project "six laning of Pune Satara" in which the same issues were discussed. Hence no separate pre-bid meeting is envisaged

Annexure - VIII

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन और राजमार्ग मंत्रालय)
National Highways Authority of India
(Ministry of Road Transport and Highways)
जी-5 एवं 6, सेक्टर-10, द्वारका, नई दिल्ली - 110 075
G-5 & 6, Sector-10, Dwarka, New Delhi-110075

दूरभाष / Phone : 91-11-25074100/25074200
फैक्स / Fax : 91-11-25093507 / 25093514
एक्स. / Extn.: 2223 / 2318 / 2468 / 2553

NHAI/BOT/DBFO/11012/11/07/364

Date: 25.11.2009

To
Reliance Infrastructure Limited
Road Projects Division
623, 6th Floor, Chintamani Plaza
Mohan Studio Compound, Chakala
Andheri-East, Mumbai-400 099
Board 91-22-30096999/30765311
Fax No. /91-22-30765323/30094111
sudhir.r.hoshing@relianceada.com

Sub: 4/6 Laning of Gandhidham (Kandla) – Mundra Port section of NH 8A (Extn.) (Approx. length 71.400 Km) in the state of Gujarat under NHDP Phase III through Public-Private/Public sector partnership (PPP) on Design, Build, Finance, Operate and Transfer ("DBFOT") basis"

Sir,

It may kindly be noted that the Bid due date of the project has been extended upto 3.12.2009 (1100 hrs).

Yours faithfully,

(L.P. Padhy)
GM(Guj&Raj)

RELIANCE Infrastructure
Anil Dhirubhai Ambani Group

Annexure-IX

Reliance Infrastructure Limited
Road Projects Division
6th Floor, 623, Chintamani Plaza
Mohan Studio Compound,
Chakala, Andheri-Kurla Road,
Andheri (E), Mumbai 400 099, India

Tel: +91 22 3076 5311
Fax: +91 22 3076 5323
www.rinfra.com

4/6

Ref No.RInfra/RPD/BD/ 184 /2009

To,

Shri L P Padhy
General Manager
National Highways Authority of India
G-5& G-6, Sector 10, Dwarka
New Delhi – 110 075
Phone: +91 11 25074100 (Extn. 1412)
Fax: +91 11 25074100 (Extn.2457)

Dated: 23.11.2009

Sub: Bid four/Six laning of Gandhidham(Kandla)-Mundra Port section of NH-8A (Extension) (approx .length 71.400 km) in the State of Gujarat under NHDP Phase III through Public-Private /Public Sector partnership (PPP) on Design, Build, Finance, Operate and Tranfer ("DBFOT") basis.

Dear Sir,

This is in response to the Request for Proposal tendered by National Highways Authority of India for the subject work.

"Reliance Infrastructure Limited" (formerly **Reliance Energy Ltd.**:- Please refer to the copy of Name change certificate issued by ROC attached herewith) a group company of Reliance Anil Dhirubhai Ambani Group (RADAG) is pleased to submit the proposal for the same.

We are submitting our proposal in the following mode:

1. Envelope 1: BID
2. Envelope 2: ENCLOSURES OF THE BID
3. Envelope 3: COPY OF THE DOCUMENTS

Looking forward to associate with you on the above Project.

Thanking You.

For and On behalf of
Reliance Infrastructure Ltd.

Sudhir Hoshing
Authorised Signatory

भारत सरकार-कॉर्पोरेट कार्य मंत्रालय
कम्पनी रजिस्ट्रार कार्यालय, महाराष्ट्र, मुंबई

नाम परिवर्तन के पश्चात नया निगमन प्रमाण-पत्र

कॉर्पोरेट पहचान संख्या : L99999MH1929PLC001530

मैसर्स RELIANCE ENERGY LIMITED

के मामले में, मैं एतद्द्वारा सत्यापित करता हूँ कि मैसर्स
RELIANCE ENERGY LIMITED

जो मूल रूप में दिनांक एक अक्तूबर उन्नीस सौ उनतीस को कम्पनी अधिनियम 1956 की धारा 3 के अंतर्गत एक विधमान कम्पनी है और
Bombay Suburban Electric Supply Limited

के रूप में निगमित की गई थी, ने कम्पनी अधिनियम, 1956 की धारा 21 की शर्तों के अनुसार विधिवत आवश्यक विनिश्चय पारित करके तथा लिखित रूप में यह सूचित करके की पूर्वे भारत का अ_ प्रेसे . कम्पनी 24.6.1985 956 की धारा A36338883 ेत, भारत सरकार, कम्पनी कार्य विभाग, नई दिल्ली की अधिसूचना सं. सा.का.नि 507 अ दिनांक एल.आर.एन. दिनांक 28/04/2008 के द्वारा
RELIANCE INFRASTRUCTURE LIMITED

हो गया है और यह प्रमाण-पत्र, कथित अधिनियम की धारा 23(1) के अनुसरण में जारी किया जाता है।

यह प्रमाण-पत्र, मेरे हस्ताक्षर द्वारा मुंबई में आज दिनांक अठाईस अप्रेल दो हजार आठ को जारी किया जाता है।

GOVERNMENT OF INDIA - MINISTRY OF CORPORATE AFFAIRS
Registrar of Companies, Maharashtra, Mumbai

Fresh Certificate of Incorporation Consequent upon Change of Name

Corporate Identity Number : L99999MH1929PLC001530

In the matter of M/s RELIANCE ENERGY LIMITED

I hereby certify that RELIANCE ENERGY LIMITED which was originally incorporated on First day of October Nineteen Hundred Twenty Nine being an existing company as per Section 3 of the Companies Act, 1956 as Bombay Suburban Electric Supply Limited having duly passed the necessary resolution in terms of Section 21 of the Companies Act, 1956 and the approval of the Central Government signified in writing having been accorded thereto under Section 21 of the Companies Act, 1956, read with Government of India, Department of Company Affairs, New Delhi, Notification No. G.S.R 507 (E) dated 24/06/1985 vide SRN A36338883 dated 28/04/2008 the name of the said company is this day changed to RELIANCE INFRASTRUCTURE LIMITED and this Certificate is issued pursuant to Section 23(1) of the said Act.

Given under my hand at Mumbai this Twenty Eighth day of April Two Thousand Eight.

(SHRIRAM MOTIRAM SAINDANE)
उप कम्पनी रजिस्ट्रार / Deputy Registrar of Companies
महाराष्ट्र, मुंबई
Maharashtra, Mumbai

कम्पनी रजिस्ट्रार के कार्यालय अभिलेख में उपलब्ध पत्राचार का पता :
Mailing Address as per record available in Registrar of Companies office:

RELIANCE INFRASTRUCTURE LIMITED
RELIANCE ENERGYCENTRE, SANTACRUZ (E),
MUMBAI - 400055,
Maharashtra, INDIA

Reliance Infrastructure Ltd

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RELIANCE Infrastructure
Anil Dhirubhai Ambani Group

Reliance Infrastructure Limited
Road Projects Division
6th Floor, 623, Chintamani Plaza
Mohan Studio Compound,
Chakala, Andheri-Kurla Road,
Andheri (E), Mumbai 400 099, India

Tel: +91 22 3076 5311
Fax: +91 22 3076 5323
www.rinfra.com

APPENDIX – I

Letter comprising the Bid

Dated: 23.11.2009

To,

Mr. L P Padhy
General Manager (BOT - II)
National Highways Authority of India
G-5& G-6, Sector 10, Dwarka
New Delhi – 110 075
Phone: +91 11 25074100 (Extn. 1412)
Fax: +91 11 25074100 (Extn. 2457)

Sub: Bid for Four/Six laning of Gandhidham (Kandla) – Mundra Port section of NH-8A (Extension) (approx. length 71.400 km) in the State of Gujarat under NHDP Phase III through Public-Private/Public Sector partnership (PPP) on Design, Build, Finance, Operate and Transfer ("DBFOT") basis.

Dear Sir,

With reference to your RFP document dated 26/08/2009, I/we, having examined the Bidding Documents and understood their contents, hereby submit my/our Bid for the aforesaid Project. The Bid is unconditional and unqualified.

2. All information provided in the Bid and in the Appendices is true and correct.

3. This statement is made for the express purpose of qualifying as a Bidder for the development, construction, operation and maintenance of the aforesaid Project.

4. I/ We shall make available to the Authority any additional information it may find necessary or require to supplement or authenticate the Bid.

Reliance Infrastructure Ltd

Registered Office Reliance Energy Centre, Santa Cruz (E), Mumbai 400 055

5. I/ We acknowledge the right of the Authority to reject our Bid without assigning any reason or otherwise and hereby waive our right to challenge the same on any account whatsoever.

6. We certify that in the last three years, we/ any of the Consortium Members have neither failed to perform on any contract, as evidenced by imposition of a penalty or a judicial pronouncement or arbitration award, nor been expelled from any project or contract nor have had any contract terminated for breach on our part.

7. I/ We declare that:

(a) I/ We have examined and have no reservations to the Bidding Documents, including any Addendum issued by the Authority.

(b) I/ We do not have any conflict of interest in accordance with Clauses 2.1.14 and 2.1.15 of the RFP document;

(c) I/We have not directly or indirectly or through an agent engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, as defined in Clause 4.3 of the RFP document, in respect of any tender or request for proposal issued by or any agreement entered into with the Authority or any other public sector enterprise or any government, Central or State; and

(d) I/ We hereby certify that we have taken steps to ensure that in conformity with the provisions of Clause 4 of the RFP, no person acting for us or on our behalf has engaged or will engage in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice.

8. I/ We understand that you may cancel the Bidding Process at any time and that you are neither bound to accept any Bid that you may receive nor to invite the Bidders to Bid for the Project, without incurring any liability to the Bidders, in accordance with Clause 2.6 of the RFP document.

9. I/ We believe that we/ our Consortium/ proposed Consortium satisfy(ies) the Net Worth criteria and meet(s) the requirements as specified in the RFQ document and are/ is qualified to submit a Bid in accordance with the guidelines for qualification of bidders seeking to acquire stakes in Public Sector Enterprises through the process of disinvestment issued by the GOI vide

Reliance Infrastructure Ltd

Department of Disinvestment OM No. 6/4/2001- DD-II dated 13th July, 2001 which guidelines apply mutatis mutandis to the Bidding Process.

10. I/ We declare that we/ any Member of the Consortium, are/ is not a Member of a/ any other Consortium submitting a Bid for the Project.

11. I/ We certify that in regard to matters other than security and integrity of the country, we have not been convicted by a Court of Law or indicted or adverse orders passed by a regulatory authority which could cast a doubt on our ability to undertake the Project or which relates to a grave offence that outrages the moral sense of the community.

12. I/ We further certify that in regard to matters relating to security and integrity of the country, we have not been charge-sheeted by any agency of the Government or convicted by a Court of Law for any offence committed by us or by any of our Associates.

13. I/ We further certify that no investigation by a regulatory authority is pending either against us or against our Associates or against our CEO or any of our Directors/ Managers/ employees.

14. I/ We further certify that we are not disqualified in terms of the additional criteria specified by the Department of Disinvestment in their OM No. 6/4/2001-DD-II dated July 13, 2001, a copy of which forms part of the RFP at Appendix-V thereof.

15. I/ We undertake that in case due to any change in facts or circumstances during the Bidding Process, we are attracted by the provisions of disqualification in terms of the guidelines referred to above, we shall intimate the Authority of the same immediately.

16. We acknowledge that our Consortium/ proposed Consortium was pre-qualified and shortlisted on the basis of Technical Capacity and Financial Capacity of those of its Members who will own at least 26% of the equity of the Concessionaire and undertake that each of such Consortium Members shall continue to hold at least 26% of the equity of the Concessionaire until the Commercial Operation Date of the Project is achieved under and in accordance with the provisions of the Concession Agreement. We further agree and acknowledge that the aforesaid obligation shall be in addition to the obligations contained in the Concession Agreement in respect of Change in Ownership.

Reliance Infrastructure Ltd.

17. I/We acknowledge and agree that in the event of a change in control of an Associate whose Technical Capacity and/ or Financial Capacity was taken into consideration for the purposes of short-listing and pre-qualification under and in accordance with the RFQ, I/We shall inform the Authority forthwith along with all relevant particulars and the Authority may, in its sole discretion, disqualify our Consortium or withdraw the Letter of Award, as the case may be. I/We further acknowledge and agree that in the event such change in control occurs after signing of the Concession Agreement but prior to Financial Close of the Project, it would, notwithstanding anything to the contrary contained in the Agreement, be deemed a breach thereof, and the Concession Agreement shall be liable to be terminated without the Authority being liable to us in any manner whatsoever.

18. I/ We understand that the Selected Bidder shall either be an existing Company incorporated under the Indian Companies Act, 1956, or shall incorporate itself as such prior to execution of the Concession Agreement.

19. I/We hereby irrevocably waive any right which we may have at any stage at law or howsoever otherwise arising to challenge or question any decision taken by the Authority in connection with the selection of the Bidder, or in connection with the Bidding Process itself, in respect of the above mentioned Project and the terms and implementation thereof.

20. In the event of my/ our being declared as the Selected Bidder, I/We agree to enter into a Concession Agreement in accordance with the draft that has been provided to me/us prior to the Bid Due Date. We agree not to seek any changes in the aforesaid draft and agree to abide by the same.

21. I/We have studied all the Bidding Documents carefully and also surveyed the project highway and the traffic. We understand that except to the extent as expressly set forth in the Concession Agreement, we shall have no claim, right or title arising out of any documents or information provided to us by the Authority or in respect of any matter arising out of or concerning or relating to the Bidding Process including the award of Concession.

22. The Premium / Grant has been quoted by me/us after taking into consideration all the terms and conditions stated in the RFP, draft Concession Agreement, our own estimates of costs and traffic and after a careful assessment of the site and all the conditions that may affect the Bid.

Reliance Infrastructure Ltd

23. I/We offer a Bid Security of Rs 19.07 Crores (Rupees Nineteen Crores and Seven Lacs only) to the Authority in accordance with the RFP Document.

24. The Bid Security in the form of a ~~Demand Draft~~/ Bank Guarantee (strike out whichever is not applicable) is attached.

25. The document accompanying the Bid, as specified in clause 2.11.2 of the RFP, have been submitted in separate envelope and marked as "Enclosure of the Bid". 26. I/We agree and understand that the Bid is subject to the provisions of the Bidding Documents. In no case, I/We shall have any claim or right of whatsoever nature if theProject / Concession is not awarded to me/us or our Bid is not opened.

27. I/We hereby submit our Bid and offer a Premium in the form Rs. 42.00 Crores (Rupees Fourty two Crores only) out of the gross revenues of the Project as share of the Authority/~~require a Grant of Rs. Rupees only~~), (Strike out whichever is not applicable)] for undertaking the aforesaid Project in accordance with the Bidding Documents and the Concession Agreement.

28. I/We agree to keep this offer valid for 120 (one hundred and twenty) days from the Bid Due Date specified in the RFP.

29. I/We agree and undertake to abide by all the terms and conditions of the RFP document. In witness thereof, I/we submit this Bid under and in accordance with the terms of the RFP document.

Yours faithfully,

Reliance Infrastructure Ltd.

Date: 23.11.2009

Place: Mumbai

Sudhir Hoshing
Vice President
Business Development
Reliance Infrastructure Limited

573

7

Annexure-X

4/6

31-OCT-09

NATIONAL HIGHWAYS AUTHORITY
OF INDIA,
G-5 AND G-6, SECTOR 10
DWARKA, NEW DELHI 110 075

OUR REFERENCE	:	003GM07093040001
ISSUE DATE	:	31-OCT-09
APPLICANT	:	RELIANCE ENERGY LIMITED
GUARANTEE AMOUNT	:	INR190,700,000.00
AMOUNT IN WORDS	:	INDIAN RUPEES ONE HUNDRED NINETY MILLION SEVEN HUNDRED THOUSAND
EXPIRY DATE	:	31-MAY-2010
CLAIM DATE	:	31-MAY-2010

DEAR SIRS,

PLEASE FIND ENCLOSED THE CAPTIONED GUARANTEE DULY ISSUED BY US.

THE BENEFICIARY OF THIS GUARANTEE IS ENTITLED TO CONFIRM THE AUTHENTICITY OF THIS GUARANTEE DIRECTLY BY CONTACTING THE ISSUING BRANCH OR THE CONTROLLING OFFICE AT THE FOLLOWING ADDRESS:

YES BANK LTD - CHANAKYA PURI BRANCH
48, NYAYA MARG, CHANAKYA PURI
NEW DELHI
DELHI - 110021.

THIS GUARANTEE IS TO BE RETURNED TO US WITHIN 15 DAYS FROM THE DATE IT CEASES TO BE IN FORCE. IF THE GUARANTEE IS NOT RECIEVED BACK BY US WITHIN THE DUE DATE (AS MENTIONED ABOVE), IT SHALL BE DEEMED TO BE AUTOMATICALLY CANCELLED.

THIS LETTER IS AN INTEGRAL PART OF THE GUARANTEE.

IT IS CONFIRMED THAT

1) MR. MANINDRA SAXENA

2) MR. VIVEK GOYAL

WHO HAVE SIGNED THE ABOVE GUARANTEE/ EXTENSION, HAVE GOT REQUISITE POWER TO SIGN ON BEHALF OF BANK.

FOR YES BANK LTD

Siddhiyan
A-7816

(AUTHORISED SIGNATORIES)

DATE : 31-OCT-09
PLACE : YES BANK LTD - CHANAKYA PURI BRANCH

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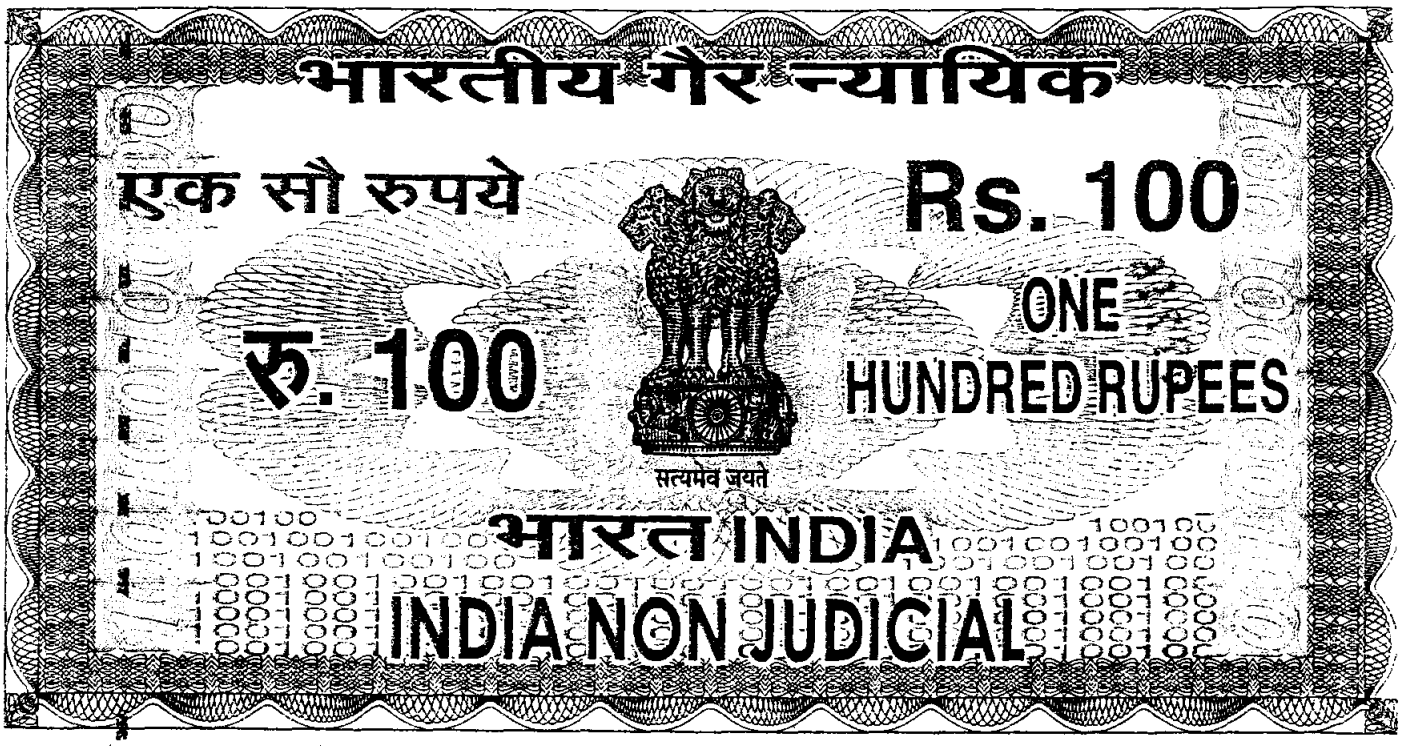
YES BANK
EXPERIENCE OUR EXPERTISE

Delhi Branch: 48, Nyaya Marg, Chanakyapuri, New Delhi 110021, India.
Tel: +91 (11) 6669 9000 Fax: +91 (11) 41680144
Corporate & Registered Office: Nehru Centre, 9th floor, Discovery of India, Dr. A. B. Road, Worli, Mumbai - 400 018, India. Tel: +91 (22) 6669 9000 Fax: +91 (22) 6669 9010 Website: www.yesbank.in



दिल्ली DELHI

H 813725

Bank Guarantee for Bid Security

B.G.No:003GM07093040001 Dated: 31st October 2009

1. In consideration of, the National Highways Authority of India (herein after called "NHAI" which expression shall include any entity which NHAI may designate for the purpose), having its office at G-5 & G-6,Sectot-10, Dwarka, New Delhi-110075 (hereinafter referred to as the "Authority", which expression shall unless it be repugnant to the subject or context thereof include its, successors and assigns) having agreed to receive the Bid of **M/s Reliance Infrastructure Limited** (Member of the Consortium) a Company registered under provision of the Companies Act, 1956 and having its registered office at Reliance Energy Centre, Santacruz (E), Mumbai 400 055 and acting on behalf of its Consortium (hereinafter referred to as the "Bidder" which expression shall unless it be repugnant to the subject or context thereof include its/their executors administrators, successors and assigns), for the **Four/Six laning of Gandhidham(Kandla) - Mundra Port section of NH-8A (Extension) (appox. Length 71.400 km) in the State of Gujarat under NHDP Phase III through Private/Public Sector partnership (PPP) on Design,Build,Finance,Operate and Transfer ("DBFOT") basis** (hereinafter referred to as "the Project") pursuant to the RFP Document dated 26/08/2009 issued in respect of the Project and other related documents (hereinafter collectively referred to as "Bidding Documents"), we Yes Bank Limited, having our registered office at 9th Floor, Nehru Centre, Discovery of India, Dr. A B Road, Worli,

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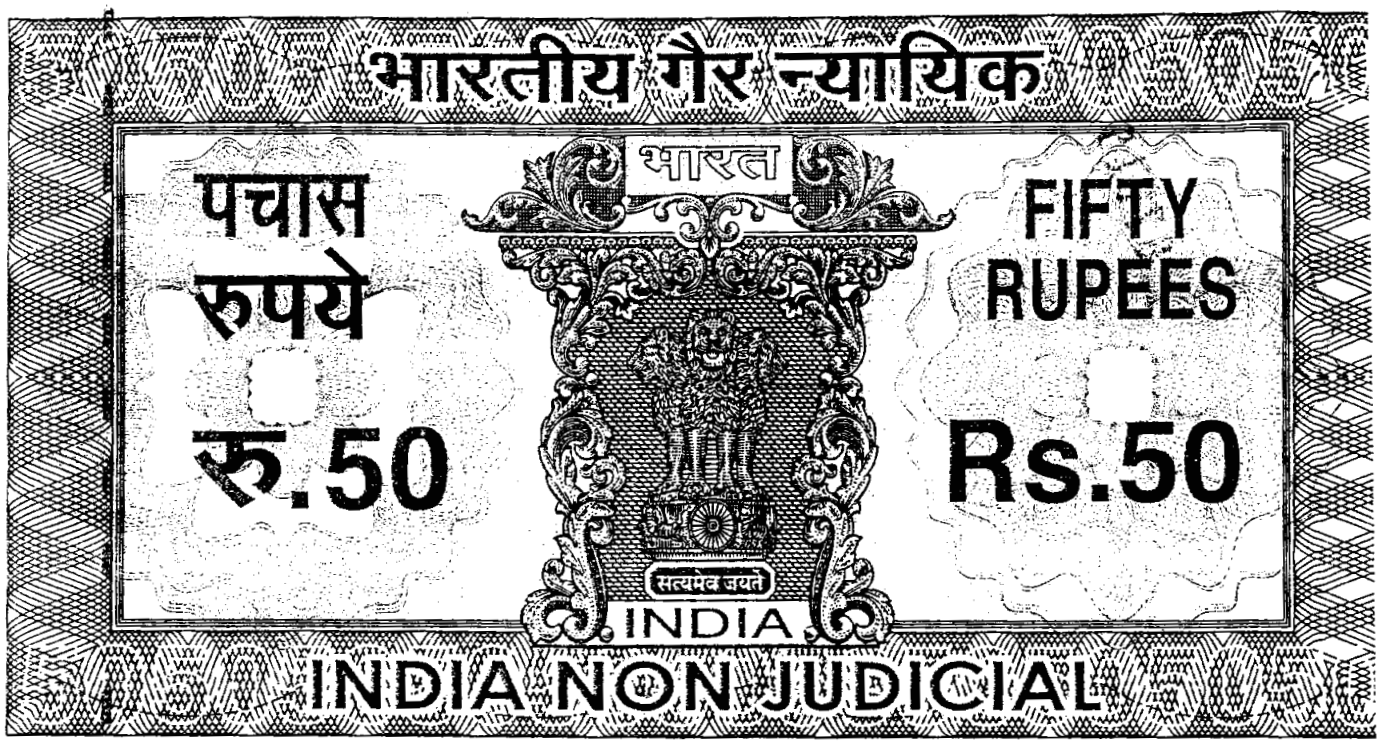

दिल्ली DELHI

S 147147

B.G.No:003GM07093040001 Dated: 31st October 2009

Mumbai 400 018 and one of its branches at 48, Nyaya Marg, Chanakyapuri, New Delhi 110 021 (hereinafter referred to as the "Bank"), at the request of the Bidder, do hereby in terms of Clause 2.1.7 read with Clause 2.1.8 of the RFP Document, irrevocably, unconditionally and without reservation guarantee the due and faithful fulfilment and compliance of the terms and conditions of the Bidding Documents (including the RFP Document) by the said Bidder and unconditionally and irrevocably undertake to pay forthwith to the Authority an amount of **Rs. 19.07 Crores (Rupees Nineteen Crores and Seven Lacs only)** as bid security (hereinafter referred to as the "Bid Security") as our primary obligation without any demur, reservation, recourse, contest or protest and without reference to the Bidder if the Bidder shall fail to fulfil or comply with all or any of the terms and conditions contained in the said Bidding Documents.

2. Any such written demand made by the Authority stating that the Bidder is in default of the due and faithful fulfilment and compliance with the terms and conditions contained in the Bidding Documents shall be final, conclusive and binding on the Bank.

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B.G.No:003GM07093040001 Dated: 31st October 2009

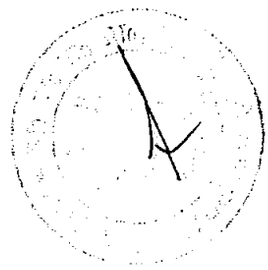
We, the Bank, do hereby unconditionally undertake to pay the amounts due and payable under this Guarantee without any demur, reservation, recourse, contest or protest and without any reference to the Bidder or any other person and irrespective of whether the claim of the Authority is disputed by the Bidder or not merely on the first demand from the Authority stating that the amount claimed is due to the Authority by reason of failure of the Bidder to fulfil and comply with the terms and conditions contained in the Bidding Documents including failure of the said Bidder to keep its Bid open during the Bid validity period as setforth in the said Bidding Documents for any reason whatsoever. Any such demand made on the Bank shall be conclusive as regards amount due and payable by the Bank under this Guarantee. However, our liability under this Guarantee shall be restricted to an amount not exceeding **Rs. 19.07 Crores (Rupees Nineteen Crores and Seven Lacs only)**.

3. This Guarantee shall be irrevocable and remain in full force for a period of 180 (one hundred and eighty) days from the Bid Due Date inclusive of a claim period of 60 (sixty) days i.e 31st May 2010 or for such extended period as may be mutually agreed between the Authority and the Bidder, and agreed to by the Bank, and shall continue to be enforceable till all amounts under this Guarantee have been paid.

4. We, the Bank, further agree that the Authority shall be the sole judge to decide as to whether the Bidder is in default of due and faithful fulfilment and compliance with the terms and conditions contained in the Bidding Documents including, inter alia, the failure of the Bidder to keep its Bid open during the Bid validity period set forth in the said Bidding Documents, and the decision of the Authority that the Bidder is in default as aforesaid shall be final and binding on us, notwithstanding any differences between the Authority and the Bidder or any dispute pending before any Court, Tribunal, Arbitrator or any other Authority.

5. The Guarantee shall not be affected by any change in the constitution or winding up of the Bidder or the Bank or any absorption, merger or amalgamation of the Bidder or the Bank with any other person.

6. In order to give full effect to this Guarantee, the Authority shall be entitled to treat the Bank as the principal debtor. The Authority shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee from time to time to vary any of the terms and conditions contained in the said Bidding Documents or to extend time for submission of the Bids or the Bid validity period or the period for conveying acceptance of Letter of Award by the Bidder or the period for fulfillment and compliance with all or any of the terms and conditions contained in the said Bidding Documents by the said Bidder or to postpone for any time and from time to time any of the powers exercisable by it against the said Bidder and either to enforce or forbear from enforcing any of the terms and conditions contained in the said Bidding Documents or the securities available to the Authority, and the Bank shall not be released from its liability under these presents by any exercise by the Authority of the liberty with reference to the



matters aforesaid or by reason of time being given to the said Bidder or any other forbearance, act or omission on the part of the Authority or any indulgence by the Authority to the said Bidder or by any change in the constitution of the Authority or its absorption, merger or amalgamation with any other person or any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of releasing the Bank from its such liability.

7. Any notice by way of request, demand or otherwise hereunder shall be sufficiently given or made if addressed to the Bank and sent by courier or by registered mail to the Bank at the address set forth herein.

8. We undertake to make the payment on receipt of your notice of claim on us addressed to Yes Bank Limited, 48, Nyaya Marg, Chanakyapuri, New Delhi 110 021 and delivered at our above branch who shall be deemed to have been duly authorized to receive the said notice of claim.

9. It shall not be necessary for the Authority to proceed against the said Bidder before proceeding against the Bank and the guarantee herein contained shall be enforceable against the Bank, notwithstanding any other security which the Authority may have obtained from the said Bidder or any other person and which shall, at the time when proceedings are taken against the Bank hereunder, be outstanding or unrealized.

10. We, the Bank, further undertake not to revoke this Guarantee during its currency except with the previous express consent of the Authority in writing.

11. The Bank declares that it has power to issue this Guarantee and discharge the obligations contemplated herein, the undersigned is duly authorized and has full power to execute this Guarantee for and on behalf of the Bank.

Notwithstanding anything contained hereinabove,

i. Our liability under the Bank Guarantee shall not exceed Rs.19,07,00,000/- (Indian Rupees Nineteen Crores and Seven Lacs Only)

ii. The Bank Guarantee shall be valid upto 31st May 2010

iii. We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or before 31st May 2010.

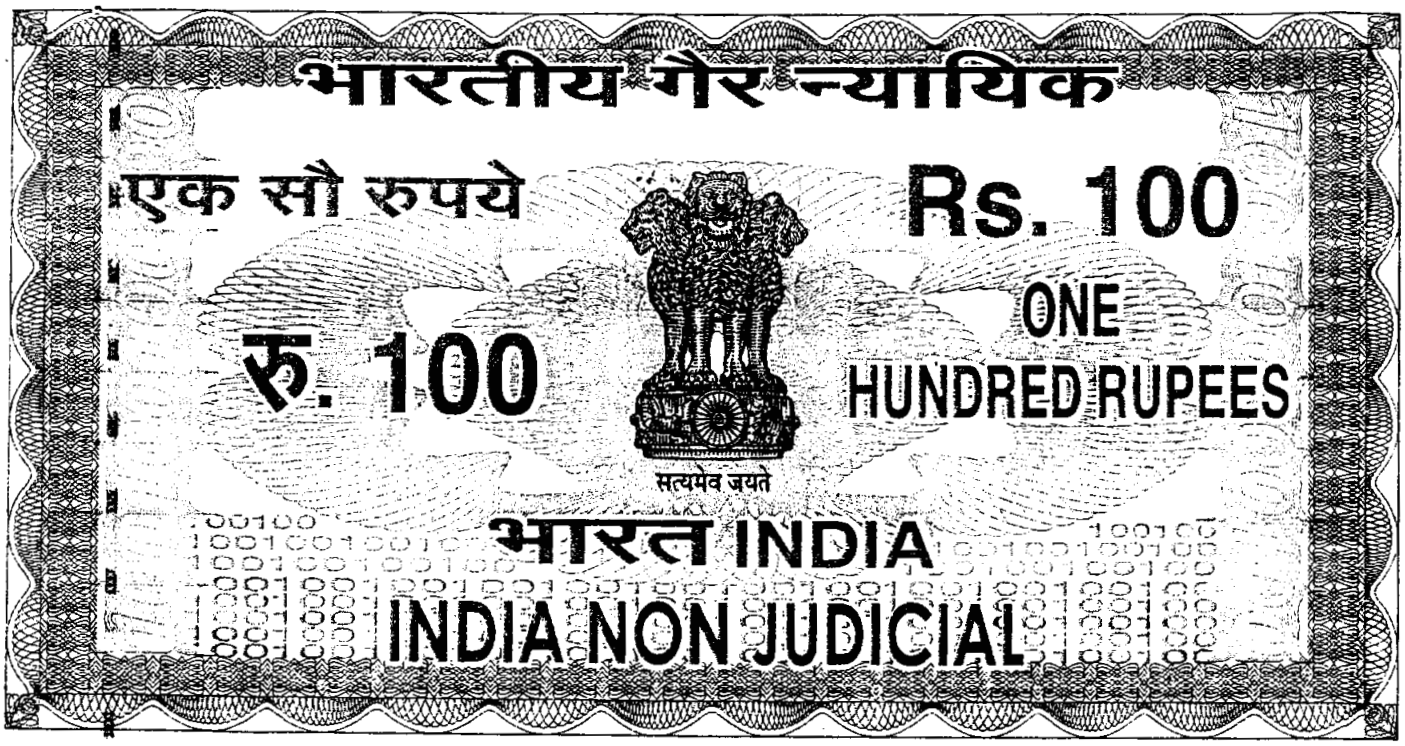
Signed and Delivered by Yes Bank Limited,
By the hand of Mr. Manindra Saxena and Mr. Vivek Goyal its Senior Vice President and Senior Manager, authorized officials

For YES Bank Limited

Authorized Signatory
Date 31 Oct 2009
Place: New Delhi
Name: VIVEK GOYAL
Designation: Sr. Manager

For YES Bank Limited

Authorized Signatory
Date: 31 Oct 2009
Place: New Delhi
Name: MANINDRA SAXENA
Designation: Sr. VICE PRESIDENT-TBG



दिल्ली DELHI

H 979556

LETTER OF AMENDMENT

DATE : 27-NOV-2009

NATIONAL HIGHWAYS AUTHORITY
OF INDIA,
G-5 AND G-6, SECTOR 10
DWARKA, NEW DELHI 110 075

BANK GUARANTEE NO	: 003GM07093040001
DATED	: 31-OCT-2009
AMOUNT	: INR190,700,000.00
AMOUNT IN WORDS	: INDIAN RUPEES ONE HUNDRED NINETY MILLION SEVEN HUNDRED THOUSAND ONLY
AMENDMENT NO	: 1
AMENDMENT DATE	: 27-NOV-2009

WE YES BANK LIMITED, AT THE REQUEST OF APPLICANT RELIANCE ENERGY LIMITED DO HEREBY AMEND OUR ABOVE MENTIONED BANK GURANTEE AS FOLLOWS:
AMENDMENT CLAUSES ARE
->1) GUARANTEE EXPIRY DATE & CLAIM EXPIRY DATE ARE EXTENDED UPTO 30-JUN-2010 INSTEAD OF EXISTING.

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ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED.

THIS LETTER WILL FORM AN INTEGRAL PART OF GUARANTEE NUMBER 003GM07093040001 DATED 31-OCT-2009 AND ATTACHED THERETO

NOTWITHSTANDING ANYTHING CONTAINED HEREIN ABOVE;

1.OUR LIABILITY UNDER THIS GUARANTEE SHALL NOT EXCEED INR190,700,000.00 INDIAN RUPEES ONE HUNDRED NINETY MILLION SEVEN HUNDRED THOUSAND
2.THIS BANK GUARANTEE SHALL BE VALID UP TO 30-JUN-2010
AND
3.WE ARE LIABLE TO PAY THE GUARANTEED AMOUNT OR ANY PART THEREOF UNDER THIS BANK GUARANTEE ONLY AND ONLY IF YOU SERVE UPON US A WRITTEN CLAIM OR DEMAND,ON OR BEFORE 30-JUN-2010 AT:

YES BANK LIMITED
48, NYAYA MARG, CHANAKYA PURI
NEW DELHI
DELHI - 110021.

FOR YES BANK LIMITED

AUTHORIZED SIGNATORY

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भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सडक परिवहन और राजमार्ग मंत्रालय, भारत सरकार)
सर्वे नं ६३, डि पॉइंट न. एनएच ४ बी, चिंचपाडा कळंबोली बायपास रोड, पनवेल - ४१० २०६. फोन : ०२२ - २७८७ ९४०४
वेबसाईट : pune http:\\www.nhai.org ईमेल : pune1@nhai.org

National Highways Authority of India
(Ministry of Road Transport & Highways, Govt. of India)
Survey No. 63 "D" Point on NH4B, Chinchpada - Kalamboli Byepass Road, Panvel - 410 206 Ph.: 022 - 2787 9404
Website : pune http:\\www.nhai.org Email : pune1@nhai.org

NHAI/PIU/PANVEL/2010/BG/Confirm/0951 **Date: 09.01.2010**

To,

Shri. Manoj Kumar Shukla,
DGM (Guj),
National Highways Authority of India,
G - 5 & 6, Sector - 10,
Dwarka, New Delhi – 110 075.

Sub : Confirmation of the Bank Guarantee.

Ref. : Your Letter No. NHAI/BOT/DBFO-II11019/02/2007/395 dt. 21.12.2009.

Sir,

Please find enclosed herewith the **Original Confirmation** letter received from Yes Bank Ltd.,Nehru Centre, 9th Floor, Discovery of India, Dr. A. B. Road, Worli, Mumbai – 400 018 in response to our letter for the following Bank Guarantee :

Contractor	BG No. and Date	Amount	Validity upto
M/s. Reliance Infrastructure Ltd.	003GM07093040001 dated 19.10.2009	INR 190,700,000/-	31.05.2010

The above confirmation has been confirmed by this office and verified.

This is for your information and necessary action please.

Thanking you,

Yours faithfully,

General Manager (Tech) & PD
PIU – Panvel

Encl: As above.

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YES BANK

CONFIRMATION LETTER ON GUARANTEE ISSUANCE

08-JAN-10

NATIONAL HIGHWAYS AUTHORITY OF INDIA,
G-5 AND G-6, SECTOR 10
DWARKA, NEW DELHI 110 075

DEAR SIR/MADAM,

THIS IS IN REFERENCE TO YOUR LETTER NO NHAI/PIU/PANVEL/BG/Confirm/6895 DATED 26 Dec 2009; WE HEREBY CONFIRM THAT WE HAVE ISSUED THE BANK GUARANTEE TENOR AS PER FOLLOWING DETAILS

BANK GUARANTEE NO	: 003GM07093040001
ISSUE DATE	: 31-OCT-09
CLAIM DATE	: 31-MAY-2010
EXPIRY DATE	: 31-MAY-2010
APPLICANT	: RELIANCE ENERGY LIMITED
GUARANTEE AMOUNT	: INR190,700,000.00
AMOUNT IN WORDS	: INDIAN RUPEES ONE HUNDRED NINETY MILLION SEVEN HUNDREDTHOUSAND

IT IS CONFIRMED THAT

1) MR.MANNDRA SAXENA

2) MR.VIVEK GOYAL

WHO HAVE SIGNED THE ABOVE GUARANTEE/ EXTENSION, HAVE GOT REQUISITE POWER TO SIGN ON BEHALF OF BANK.

FOR YES BANK LTD

(AUTHORISED SIGNATORIES)

DATE : 08-JAN-10
PLACE : YES BANK LTD - CHANAKYA PURI BRANCH

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Annexure -XI

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन और राजमार्ग मंत्रालय)
National Highways Authority of India
(Ministry of Road Transport and Highways)
जी-5 एवं 6, सेक्टर-10, द्वारका, नई दिल्ली - 110 075
G-5 & 6, Sector-10, Dwarka, New Delhi-110075

दूरभाष / Phone: 91-11-25074100/25074200
फैक्स / Fax: 91-11-25093507 / 25093514
एक्स. / Extn.: 2223 / 2318 / 2468 / 2553

NHAI/BOT/DBFO/11012/11/07/403 12th January, 2010

To

Reliance Infrastructure Limited
Road Projects Division
623, 6th Floor, Chintamani Plaza
Mohan Studio Compound, Chakala
Andheri-East, Mumbai-400 099
Board 91-22-30096999/30765311
Fax No. /91-22-30765323/30094111
sudhir.r.hoshing@relianceada.com

Sub: 4/6 Laning of Gandhidham (Kandla) – Mundra Port section of NH 8A (Extn.) (Approx. length 71.400 Km) in the state of Gujarat under NHDP Phase III through Public Private partnership (PPP) on Design, Build, Finance, Operate and Transfer ("DBFOT") basis – **Letter of Award (LOA).**

Ref: This office letters No

1. NHAI/BOT/DBFO/11012/11/07/219 dated 21.08.2009
2. NHAI/BOT/DBFO/11012/11/07/282 dated 08.10.2009
3. NHAI/BOT/DBFO/11012/11/07/338 dated 28.10.2009
4. NHAI/BOT/DBFO/11012/11/07/339 dated 29.10.2009
5. NHAI/BOT/DBFO/11012/11/07/344 dated 03.11.2009
6. NHAI/BOT/DBFO/11012/11/07/349 dated 10.11.2009
7. NHAI/BOT/DBFO/11012/11/07/354 dated 16.11.2009
8. NHAI/BOT/DBFO/11012/11/07/359 dated 21.11.2009
9. NHAI/BOT/DBFO/11012/11/07/364 dated 25.11.2009
10. Your Bid submitted on 3.12.2009

Sir,

Consequent upon NHAI's letter mentioned at reference no. 1, wherein you were informed of having been qualified in terms of the requirements of the Request for Qualification (RFQ) document and eligible to submit the Request for Proposal (RFP) in respect of the Project of "**4/6 Laning of Gandhidham (Kandla) –Mundra Port section of NH 8A (Extn.) (Approx. length 71.400 Km) in the state of Gujarat under NHDP Phase III through Public Private partnership (PPP) on Design, Build, Finance, Operate and Transfer ("DBFOT") basis**" and considering your proposal in this regard submitted on 03.12.2009 vide ref 10 above, NHAI hereby accepts your proposal quoting premium of Rs, 42.00 crore (Rs. Forty two crores only) as included in Appendix-I of your Bid Document (i.e. Price Bid) and declare you as the "Selected

Bidder" as per provision of RFP Documents. Please note that the amount of Grant payable to you by the Authority shall be in accordance with the provisions of RFP Documents. The Concession Period is **25 (Twenty five) years** including Construction Period of **910 (Nine Hundred and Ten) days** from the "Appointed Date".

2. In accordance with the clause 3.3.5 of the RFP document (Volume-I), you are requested to sign the duplicate copy of the LOA and return the same as your acknowledgment within 7(seven) days of receipt of LOA. Thereafter, you are required to execute the Concession Agreement within 45 (Forty Five) days from the date of issue of LOA as specified in Clause 1.3 of RFP (Volume-1).

3. Further, as per RFP documents, you are required to incorporate a Special Purpose Vehicle solely for the purpose of domiciling the project (the "Concessionaire"). The Concessionaire for due and faithful performance of its obligations during the Construction Period shall furnish a Performance security by way of an irrevocable and unconditional Bank Guarantee of Rs. 47.69 Crores (Rupees Forty seven Crores and Sixty nine lakhs only) within the period expiring on the 180th day from the date of signing of the Concession Agreement. Till the time the Concessionaire provides NHAI with the Performance Security, the Bid Security shall remain in full force and effect (refer Clause 4.1.2 and Clauses of Articale-9 of RFP-Vol - II).

4. You are required to comply with all the terms and conditions set forth in the RFQ and the RFP documents. In case of any default on your part, you shall be liable for action as stated in the RFP Document.

Yours faithfully,

(L P Padhy)
General Manager (Guj&Raj)

Annexure -XII

RELIANCE Infrastructure
Anil Dhirubhai Ambani Group

Reliance Infrastructure Limited,
Roads Project Division,
6th Floor, 623, Chintamani Plaza,
Mohan Studio Compound,
Chakala, Andheri-Kurla Road,
Andheri (E), Mumbai: 400 099

Tel Ph: +91 22 3076 5311
Fax: +91 22 3076 5323

Ref: RInfra /RPD/BD/ KM-001 /20

To,
General Manager (BOT- Rajasthan – Gujarat)
National Highways Authority of India,
G-5 & 6, Sector-10, Dwarka,
New Delhi: 110075

Date: 15th January 2010

Kind Attn: Mr. L.P. Padhy

Project: Four/Six laning of Gandhidham (Kandla) – Mundra Port section of NH-8A (Extension) (approx. length 71.400 km) in the State of Gujarat under NHDP Phase III through Public-Private/Public Sector partnership (PPP) on Design, Build, Finance, Operate and Transfer ("DBFOT") basis.

Sub: Acknowledgement and acceptance of LOA

Ref:
1. Our Bid submitted on 03.12.2009
2. LOA vide your letter No. NHAI/BOT/DBFO/11012/11/07/403 dated 12th January 2010

Sir,

At the out set we express our sincere thanks for awarding the subject project to our Consortium lead by us for implementation. We acknowledge herewith the receipt of LOA for the subject project in Original and Duplicate. In accordance with the clause no.3.3.5 of RFP document (Volume-I) we are returning herewith the Duplicate copy of the LOA duly signed by the Authorised Signatory.

Thanking you.

Yours faithfully,
For Reliance Infrastructure Limited

Authorised Signatory
Sudhir R. Hoshing

Received
15 JAN 2010

Reliance Infrastructure Ltd

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Annexure - 1

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन और राजमार्ग मंत्रालय)
National Highways Authority of India
(Ministry of Road Transport and Highways)
जी-5 एवं 6, सेक्टर-10, द्वारका, नई दिल्ली - 110 075
G-5 & 6, Sector-10, Dwarka, New Delhi-110075

दूरभाष / Phone : 91-11-25074100/25074200
फैक्स / Fax : 91-11-25093507 / 25093514
एक्स. / Extn.: 2223 / 2318 / 2468 / 2553

Duplicate

NHAI/BOT/DBFO/11012/11/07/403 12th January, 2010

To

Reliance Infrastructure Limited
Road Projects Division
623, 6th Floor, Chintamani Plaza
Mohan Studio Compound, Chakala
Andheri-East, Mumbai-400 099
Board 91-22-30096999/30765311
Fax No. /91-22-30765323/30094111
sudhir.r.hoshing@relianceada.com

Sub: 4/6 Laning of Gandhidham (Kandla) – Mundra Port section of NH 8A (Extn.) (Approx. length 71.400 Km) in the state of Gujarat under NHDP Phase III through Public Private partnership (PPP) on Design, Build, Finance, Operate and Transfer ("DBFOT") basis – Letter of Award (LOA).

Ref: This office letters No

1. NHAI/BOT/DBFO/11012/11/07/219 dated 21.08.2009
2. NHAI/BOT/DBFO/11012/11/07/282 dated 08.10.2009
3. NHAI/BOT/DBFO/11012/11/07/338 dated 28.10.2009
4. NHAI/BOT/DBFO/11012/11/07/339 dated 29.10.2009
5. NHAI/BOT/DBFO/11012/11/07/344 dated 03.11.2009
6. NHAI/BOT/DBFO/11012/11/07/349 dated 10.11.2009
7. NHAI/BOT/DBFO/11012/11/07/354 dated 16.11.2009
8. NHAI/BOT/DBFO/11012/11/07/359 dated 21.11.2009
9. NHAI/BOT/DBFO/11012/11/07/364 dated 25.11.2009
10. Your Bid submitted on 3.12.2009

Sir,

Consequent upon NHAI's letter mentioned at reference no. 1, wherein you were informed of having been qualified in terms of the requirements of the Request for Qualification (RFQ) document and eligible to submit the Request for Proposal (RFP) in respect of the Project of "4/6 Laning of Gandhidham (Kandla) –Mundra Port section of NH 8A (Extn.) (Approx. length 71.400 Km) in the state of Gujarat under NHDP Phase III through Public Private partnership (PPP) on Design, Build, Finance, Operate and Transfer ("DBFOT") basis" and considering your proposal in this regard submitted on 03.12.2009 vide ref 10 above, NHAI hereby accepts your proposal quoting premium of Rs. 42.00 crore (Rs. Forty two crores only) as included in Appendix-I of your Bid Document (i.e. Price Bid) and declare you as the "Selected

Reliance Infrastructure Ltd

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Bidder" as per provision of RFP Documents. Please note that the amount of Grant payable to you by the Authority shall be in accordance with the provisions of RFP Documents. The Concession Period is **25 (Twenty five) years** including Construction Period of **910 (Nine Hundred and Ten) days** from the "Appointed Date".

2. In accordance with the clause 3.3.5 of the RFP document (Volume-I), you are requested to sign the duplicate copy of the LOA and return the same as your acknowledgment within 7(seven) days of receipt of LOA. Thereafter, you are required to execute the Concession Agreement within 45 (Forty Five) days from the date of issue of LOA as specified in Clause 1.3 of RFP (Volume-1).

3. Further, as per RFP documents, you are required to incorporate a Special Purpose Vehicle solely for the purpose of domiciling the project (the "Concessionaire"). The Concessionaire for due and faithful performance of its obligations during the Construction Period shall furnish a Performance security by way of an irrevocable and unconditional Bank Guarantee of Rs. 47.69 Crores (Rupees Forty seven Crores and Sixty nine lakhs only) within the period expiring on the 180th day from the date of signing of the Concession Agreement. Till the time the Concessionaire provides NHAI with the Performance Security, the Bid Security shall remain in full force and effect (refer Clause 4.1.2 and Clauses of Articale-9 of RFP-Vol - II).

4. You are required to comply with all the terms and conditions set forth in the RFQ and the RFP documents. In case of any default on your part, you shall be liable for action as stated in the RFP Document.

Yours faithfully,

(L P Padhy)
General Manager (Guj&Raj)

Reliance Infrastructure Ltd

Reliance Infrastructure Ltd

RELIANCE Infrastructure
Anil Dhirubhai Ambani Group

Reliance Infrastructure Limited,
Roads Project Division,
6th Floor, 623, Chintamani Plaza,
Mohan Studio Compound,
Chakala, Andheri-Kurla Road,
Andheri (E), Mumbai: 400 099

Tel Ph: +91 22 3076 5311
Fax: +91 22 3076 5323

Ref: RInfra/RPD/BD-KM-001/2009

Date: 12 February 2010

To,
General Manager (DK/BOT-II)
National Highways Authority of India,
G-5 & 6, Sector-10, Dwarka,
New Delhi: 110075

Kind Attn: Mr. L.P. Padhy

Project: **Four/Six Laning of Gandhidham (Kandla) - Mundra Port Section of NH-8A (Extn.) (Approximate Length of 71.400 Km) in the State of Gujarat under NHDP Phase-III through Public-Private Partnership (PPP) on Design, Build Finance, Operate and Transfer (DBFOT) Basis: Introduction of SPV and Submission of Details of SPV**

Ref: 1. Our Bid submission on 03.12.2009
2. LOA vide your letter No. NHAI/BOT/DBFO/11012/11/07/403 dated 12/01/2010

Sir,

At the outset we express our sincere thanks for selecting and awarding us the subject project vide your Letter of Award dated 12/01/2010 cited above.

We are pleased to inform you that we have formed and incorporated a Special Purpose Vehicle (SPV) **"KM Toll Road Private Limited"** exclusively constituted for the sole purpose of undertaking the said project and submitting herewith the following documents annexed to this letter for your records and further action in the matter:

Sr. No	Description	Annexure No
1	Copy of NHAI's Letter of Award duly accepted by the selected Bidder.	Annexure-1

RELIANCE Infrastructure
Anil Dhirubhai Ambani Group

Reliance Infrastructure Limited,
Roads Project Division,
6th Floor, 623, Chintamani Plaza,
Mohan Studio Compound,
Chakala, Andheri-Kurla Road,
Andheri (E), Mumbai: 400 099

Tel Ph: +91 22 3076 5311
Fax: +91 22 3076 5323

Sr. No	Description	Annexure No
2	Board Resolution of the selected Bidder (Reliance Infrastructure Limited) authorizing the Company to invest in the SPV and at all times maintain the equity participation in the SPV as per the terms of RFP Document:	Annexure-2
3	Details of Incorporation of SPV:	
(i)	Certification of Incorporation of SPV	Annexure-3a
(ii)	Certificate of Commencement of Business - **Not applicable since Toll Road Company is a Private Limited Company.**	---
(iii)	Memorandum of Association and Article of Association of SPV	Annexure-3b
4	Introduction Letter from Authorized Signatory of the Bidder introducing SPV to the Authority.	Refer cover letter
5	Letter from the Authorized Signatory of the SPV to the Authority stating that the SPV has been incorporated by the selected Bidder (Reliance Infra) for the purpose of carrying out the project and is willing to enter in to Concession Agreement with the Authority.	Annexure-4
6	Board Resolution of SPV	Annexure-5
7	Legal Opinion from Legal Counsel of the SPV. (In Original)	Annexure-6

RELIANCE Infrastructure
Anil Dhirubhai Ambani Group

Reliance Infrastructure Limited,
Roads Project Division,
6th Floor, 623, Chintamani Plaza,
Mohan Studio Compound,
Chakala, Andheri-Kurla Road,
Andheri (E), Mumbai: 400 099

Tel Ph: +91 22 3076 5311
Fax: +91 22 3076 5323

We request you to kindly confirm a convenient date for signing of the Concession Agreement. Further, we propose that 2 (two) sets of the Agreement be signed in Original, so that each Party can retain one Original set.

Thanking you.

Yours faithfully,
For Reliance Infrastructure Limited

Director/Authorised Signatory
Sudhir R. Moshing

Encl: a/a

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RELIANCE Infrastructure
Anil Dhirubhai Ambani Group

Reliance Infrastructure Limited
Reliance Energy Centre
Santa Cruz (E)
Mumbai 400 055, India

Tel: +91 22 3009 9999
Fax: +91 22 3009 9775
www.rinfra.com

Extracts from the minutes of the proceedings of the meeting of Board of Directors of Reliance Infrastructure Limited held on January 29, 2010

Sub: Kandla(Gandhidham) – Mundra Port four/six laning project

RESOLUTION NO.V

"RESOLVED THAT subject to the approval of the Registrar of Companies, Maharashtra, Mumbai, the Company, along with other subscribers, do incorporate a new company as a promoter/subscriber to the Memorandum and Articles of Association of the proposed company in the name of "KM Toll Road Private Limited " or such other name as may be approved by the Registrar of Companies for developing the Kandla-Mundra four/six laning project awarded to the Company by National Highways Authority of India on a build, own and transfer (toll) basis, for concession period of 25 years, including the construction period.

RESOLVED FURTHER THAT the Company do subscribe to and invest in the equity share capital of the proposed company not exceeding Rs.99,900 as a promoter/subscriber to the Memorandum and Articles of the Company.

RESOLVED FURTHER THAT S/Shri S.C.Gupta and Lalit Jalan, Whole-time Directors of the Company and S/Shri Madhukar Moolwani, K.Ramesh Shenoy and Sudhir Hoshing , executives of the Company, be and are hereby severally authorized to do all such acts, deeds and things as may be required for signing of all applications, documents including the documents to be submitted to the Registrar of Companies, Maharashtra, for the purpose of incorporation of the proposed new company and investment up to the limits approved by the Board, in the new Company.

RESOLVED FURTHER THAT the Board authorise investing in securities of KM Toll Road Private Limited or such other name as may be available, that may be issued from time to time, to maintain at all times equity participation in the special purpose vehicle as per the terms of proposed Concession Agreement to be entered into between National Highways Authority of India and the special purpose vehicle as aforesaid."

/// Certified True Copy ///

for Reliance Infrastructure Limited

Ramesh Shenoy
Company Secretary

Annexure- 39

प्रारुप 1
पंजीकरण प्रमाण-पत्र

कॉर्पोरेट पहचान संख्या : U45203MH2010PTC199705 2009 - 2010

मैं एतदद्वारा सत्यापित करता हूँ कि मैसर्स

KM Toll Road Private Limited

का पंजीकरण, कम्पनी अधिनियम 1956 (1956 का 1) के अंतर्गत आज किया जाता है और यह कम्पनी प्राइवेट लिमिटेड है।

यह निगमन-पत्र आज दिनांक चार फरवरी दो हजार दस को मेरे हस्ताक्षर से मुंबई में जारी किया जाता है।

Form 1
Certificate of Incorporation

Corporate Identity Number : U45203MH2010PTC199705 2009 - 2010

I hereby certify that KM Toll Road Private Limited is this day incorporated under the Companies Act, 1956 (No. 1 of 1956) and that the company is private limited.

Given under my hand at Mumbai this Fourth day of February Two Thousand Ten .

(VIJAYA NAGORAO KHANDARE)

सहायक कम्पनी रजिस्ट्रार / Assistant Registrar of Companies

महाराष्ट्र, मुंबई

Maharashtra, Mumbai

कम्पनी रजिस्ट्रार के कार्यालय अभिलेख में उपलब्ध पत्राचार का पता :

Mailing Address as per record available in Registrar of Companies office:

KM Toll Road Private Limited

H BLOCK, 1ST FLOOR, DHIRUBHAI AMBANI KNOWLEDGE CITY,

NAVI MUMBAI - 400710,

Maharashtra, INDIA

KM TOLL ROAD PVT LTD.

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Annexure - 3b

For KM TOLL ROAD PVT. LTD

Director

Memorandum

and

Articles of Association

of

KM Toll Road Private Limited

THE COMPANIES ACT, 1956

COMPANY LIMITED BY SHARES

MEMORANDUM OF ASSOCIATION

OF

KM TOLL ROAD PRIVATE LIMITED

I. The name of the Company is **KM TOLL ROAD PRIVATE LIMITED**

II. The Registered Office of the Company will be situated in the State of MAHARASHTRA *i.e within the jurisdiction of Registrar of Companies*, Maharashtra, at Mumbai.

III. The objects for which the Company is established are:

A. MAIN OBJECTS OF THE COMPANY TO BE PURSUED BY THE COMPANY ON ITS INCORPORATION

1. To design, engineer, procure, construct, fabricate, build, improve, strengthen, operate, maintain roads, bridges, culverts, over bridges, underpasses, flyovers, toll plaza, traffic management systems and equipment, buildings and other infrastructures and collect toll, fees, or charges, carry out surveys, investigations, polls and regulate traffic in connection with the project to be taken up by the Company on Design, Build, Operate and Transfer basis for Design, Finance, Engineering, Construction, Operation and Maintenance for 4/6 laning of Gandhidham (Kandla) to Mundra Port section of National Highway -8A in the state of Gujarat.

B. OBJECTS INCIDENTAL OR ANCILLARY TO THE ATTAINENT OF THE MAIN OBJECT.

2. To finance 4/6 laning of Gandhidham (Kandla) to Mundra Port section of National Highway -8A in the state of Gujarat.

3. To acquire equipment by purchase, lease, sale, exchange, sub-lease, rent or otherwise, or sell or let equipment on lease or hire, or otherwise or services in connection therewith, provide arboriculture and landscaping, provide advertising, hoardings, displays, lighting and any other amenities including design, engineer, procure, construct, fabricate, build, operate, maintain rest and recreation structures.

4. To establish, maintain, conduct, provide, procure or make available services of every kind globally including commercial, statistical, financial, accountancy, medical, legal, management, educational, engineering, data processing, communication and other technological or social services.

5. To enter into any arrangement with the Government of India or with any State Government or with other authorities / commissions, local bodies or public sector or

KM TOLL ROAD PVT. LTD.

private sector undertakings, Financial Institutions, Banks, International Funding Agencies and obtain such charters, subsidies, loans, advances or other money, grants, contracts, rights, sanctions, privileges, licenses or concessions whatsoever (whether statutory or otherwise) which the Company may think it desirable to obtain for carrying its activities in furthering the interests of the Company or its members.

6. To buy building or buildings comprising of flats, shops, sheds, galas, for allotment to the members of the company for their authorised use and to sell, improve, manage, develop, exchange, lease, rent, mortgage, enfranchise, abandon, dispose of turn to account or otherwise deal with all or any part of the property and right of the Company.

7. To build, construct, acquire, erect, install, own, purchase, hire, sell, exchange, operate, maintain, develop, promote, mange, repair, administer, provide communication infrastructure facilities for the purpose of business of the Company.

8. To establish, provide, encourage, maintain, conduct, do research and development activities including multimensional activities and such other tests, studies, thesis, investigations, inventions and improvements or information technology which is likely to assist any business of the company and for industrial use in general.

9. To purchase, take on lease or otherwise, acquire all or any part of the business or undertaking or property and assets of any other such person, firm, company or corporation carrying on similar business and agree to discharge their liabilities and to conduct, carry on or liquidate all or any of such business.

10. To establish branches or appoint in or outside India for or in connection with any of the objects of the Company and in particular in relation to the investment of money the sale of property and the collection and receipt of money.

11. To discount bills, advance money on the security of goods lying with or under the control of the company, to receive goods for sale and to do all other such acts that may be usual or necessary in order to market the same in connection with the business of the Company.

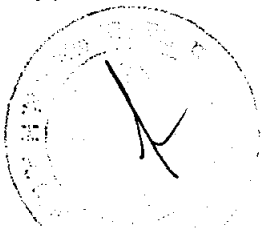
12. To enter into any arrangements with any Government or authorities supreme, municipal, local or otherwise, or any person or company that may seem conducive to the Company's Objects or any of them to obtain from any such Government, authorities, person or company any rights, privileges, charters, contracts, licenses and concessions which the Company may think it desirable to obtain, and to carry out, exercise and comply with any such arrangements, rights, privileges, charters, contracts, licenses and concessions.

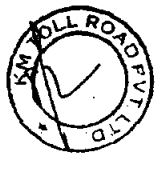
13. To take part in the management, supervision and control of the business or operations of any company or undertaking having similar objects and for that purpose to appoint and remunerate any directors, trustees, accountants or other experts.

14. To pay all preliminary expenses of any company promoted by the Company or any Company in which this company is or may contemplate being interested including in such preliminary expenses all or any part of the cost and expenses of owners of business or property acquired by the Company.

15. To procure the Company to be registered or recognised in any foreign country or place and to procure incorporation, registration or other recognition of the Company in any country, state or place outside India, and to establish and maintain local registers of any branch, places of business in any part of the world.

16. To enter into negotiations with and enter into arrangements and contracts and conclude the same with foreign and/or Indian parties and other persons for obtaining by grant, licence and/or on other terms, formulate and other rights and benefits, and to obtain technical and engineering information, assistance, and service, know-how, and expert advice for installation of plant and machinery, production and manufacture of any products.





17. To pay for technical know-how, technical engineering assistance and information and/or service rights or privileges acquired by the Company either in shares of the Company or partly in shares or partly in cash or otherwise.

18. To pay to promoters such remuneration and fees and otherwise remunerate them for their time and for the services rendered by them.

19. To amalgamate or enter into any arrangement for sharing of profits or entering into partnership, union of interest, co-operation, reciprocal concession, lease, license or otherwise with any person carrying on or transaction which the Company is authorised to carry on or engage in for sharing or funding of profits in a cooperative or joint venture subject to compliance of existing law in force.

20. To provide generally for the administration and management of the buildings or any other property in which the company may at any time have an interest of whatever nature, or which may be under its control, in such manner as may be deemed expedient or proper.

21. To secure, promote, organise, manage or enter into joint venture agreement, collaboration, agreement in all its branches with any person, firm, company, corporation, authority, body or other entity in India or abroad for any purpose whatsoever.

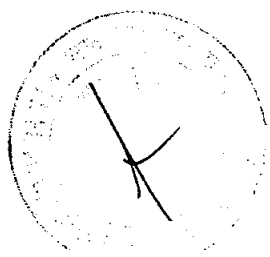
22. To Invest surplus funds of the Company in all kinds of securities, shares, stocks, debentures, debenture-stocks, bonds and to finance industrial enterprises.

23. Subject to the provisions of the Companies Act, 1956, to borrow or raise with or with out interest or secure the payment of money for any of the purposes of the Company and at such time and from time to time and in such manner as may be thought fit and in particular by the issue of debenture, or debenture-stocks convertible into shares of any other company or perpetual annuities and as security for any such money so borrowed, raised or received for any such debentures or debenture stock so issued to mortgage, pledge or change the whole or any part of the property, assets or revenue and profit of the Company present or future including its uncalled capital by special assignments or otherwise or to transfer or convey the same absolutely or in trust and to give the lender powers of sale and other powers as may seem expedient and to purchase, redeem, or pay-off any such securities, and also by a similar mortgage, charge or lien to secure and guarantee the performance by the Company or any other person or company as the case may be provided that the Company shall not carry on banking business as defined in the Banking Regulation Act. 1949.

24. To form, constitute, float, lend money to assist and control similar companies, associations or undertaking whatsoever.

25. To establish, provide, maintain, improve, work or aid in and conduct or otherwise, subsidise, assist research and developments, laboratories, design institute, pilot plants and experiments, and undertake and carry on all scientific and technical, experiments and tests of all kinds and to promote studies and research both scientific and technical investigations and inventions by providing subsidising endowing or assisting laboratories, workshops, libraries, lectures, meetings and conferences and by providing the remuneration of scientific or technical professors or teachers and by providing for the award or exhibitions, scholarships, prises and grants to students of independent studies or otherwise and to encourage, promote and reward studies, researches, investigations, experiments, tests and inventions of any kind of the business which Company is authorised to carry on.

26. To establish, promote or concur in establishing or promoting any company or companies for the purposes of acquiring all or any of the Properties, rights and liabilities of the company and the to place or guarantee the placing of, subscribe for or otherwise acquire all or any part of the shares.



27. To pay for any properties, rights or privileges acquired by the Company either in shares of the Company or partly in shares and partly in cash or otherwise

28. To insure with any other company or person against losses, damages, risks and liabilities of all kinds which may affect the company and to insure the whole or any part of the property of the company either fully or partially to protect and indemnify the company from liability or loss in any respect either fully or partially and also to insure and to protect and indemnify and part of portions thereof either on mutual principle or otherwise.

29. To form, promote, subsidise and assist companies, and partnerships of all kinds in any manner as may be thought fit in connection with any of the objects of the Company.

30. To search for and to apply for, purchase, protect, prolong, renew or otherwise acquire from any Government, State or authority any patents, brevets, d'nvention, protection, licenses, concessions, grants, decrees, rights, powers and privileges whatsoever which may seem to the Company capable of being turned to account to work, develop, carry out, exercise and turn to account the same.

31. To apply for, promote and obtain any act of parliament or legislature, charter, privilege, concession, licenses or authorisation of Government, state or Municipality provisional order or license of the Board of Trade or other authority for enabling the company to carry any of the object into effect or for extending any of the powers of the company or for any other purpose which may seem calculated, directly or indirectly to prejudice the interests of the company and to apply for purchase or otherwise acquire any patents, brevets, d'invention, licenses, concessions and the like conferring an exclusive on not-exclusive or limited right to use any secret or other information as to any investing which may seem capable of being used for any of the purposes of the Company or the acquisitions of which may seem calculated directly or in directly to benefit the Company and to use, exercise, develop, grant licenses in respect of otherwise turn to account the property, rights and information so acquired.

32. To sell, mortgage or otherwise to deal with or dispose of the property, assets or undertaking of the Company or any part thereof, in such manner and upon such terms and conditions in all respects, for such consideration as the Company may think fit and in particular for securities, shares, stocks, debentures and other securities of any other company whether or not having objects altogether or in part similar to those of the Company.

33. To enter into partnership or into any arrangements for sharing of profits, amalgamation, merger, demerger, arrangement, reconstruction; union of interest, reciprocal concession or co-operation with any person, partnership, entity, body or company and to promote and aid in promoting constituting, forming and organising companies or partnerships of all kinds for the purpose of acquiring and undertaking any property and liabilities of the Company or of advancing directly or indirectly the objects thereof for any other purpose which this company may think expedient. And also to pay for any properties, rights or privileges acquired by this Company either in shares of the Company or partly in shares and partly in cash or otherwise and to give shares or stock of this Company in exchange for shares of stock of any other company.

34. To lend, invest or otherwise employ or deal with money belonging to or entrusted to the Company in securities and shares or other movable or immovable property or with or without security upon such terms and in such manner as may be thought proper and from time to time to vary such transactions and investments in such manner as the Directors may think fit subject to the provisions of the Companies Act, 1956.

35. To pay, or satisfy the consideration for any property rights, shares, securities or assets whatsoever which the company is authorised to purchase or otherwise acquire either by payment in cash or by the issue of shares, or other securities of the Company or in such other manner as the Company may agree or partly in one mode and partly in another or others.

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36. To draw, make, accept, endorse, discount, execute, issue, negotiate, assign and otherwise deal with cheques, drafts, bills of exchange, promissory notes, hundies, debentures, notes, bonds, bills of lading, railway receipts, warrants and all other negotiable or transferable instruments.

37. To open account or accounts with any firm or with any bank or banks or bankers or shroffs and to pay into and to withdraw money for such accounts.

38. To apply for tender, purchase or otherwise acquire any contracts, sub-contracts, licences and concessions for or in relation to the objects or business herein mentioned or any of them, and to undertake, execute, carry out, dispose of or otherwise turn to account the same.

39. To employ experts to investigate and examine into the conditions, prospects, value, charter and circumstances of any business concerns and undertakings and of any assets, property or rights.

40. To carry on business or branch of a business which this company is authorised to carry on by means or through the agency of any subsidiary company or companies and to enter into any arrangement with such subsidiary company for taking the profits and bearing the losses of any business branch so carried on, or for financing any such subsidiary company or guaranteeing its liabilities, or to make any other arrangement which may seem desirable with reference to any business or branch so carried on including power at any time and either temporarily or permanently to close any such branch or business.

41. To make and/or receive donations, gifts or income to or from such persons, institutions or Trusts and in such cases and whether of cash or any other assets as may be thought to benefit the Company or any other objects of the Company or otherwise expedient and also to remunerate any person or corporation introducing or assisting, in any manner the business of the Company.

42. To establish and support or aid in the establishment of and support associations, institutions, companies, societies, funds, trusts and conveniences for the benefit of the employees or ex-employees or of persons having dealings with the Company or the dependents, relatives or connections of such persons and in particular friendly or other benefit societies and to grant pensions, allowances, gratuities and bonuses either by way of annual payments or by way of lump sum and to make payments towards insurance and to form and contribute to provident and benefit funds, to or such persons.

43. To form, subscribe or contribute to or otherwise to assist, aid donate, or guarantee money to public, charitable, benevolent, religious, scientific, national or other institutions, funds, objects or purposes and to any other institutions, funds, objects or purposes which in the opinion of the Board of Directors are likely to promote the interests or the business of the Company and/or to further its objects and/or to any other institutions, funds, objects or purposes whatsoever directly relating to the business of the Company.

44. To create any depreciation fund, reserve fund, sinking fund, insurance fund, educational fund or any other special fund or reserves whether for depreciation or for repairing, improving, extending or maintaining any of the properties of the Company or for redemption of debentures or redeemable preference shares or for any other purposes conducive to the interest of the Company.

45. In the event of winding up to distribute any of the property of the Company amongst the members in specie or kind subject to the provisions of the Companies Act, 1956.

46. To place, to reserve or to distribute as bonus shares among the members or otherwise to apply as the Company may from time to time think fit, any money received by way of premium on shares or debentures issued at a premium by the Company and any money received in respect of forfeited shares and moneys arising

KM TOLL ROAD PVT. LTD.

from the sale by the Company or forfeited shares, subject to Section 78 of the Companies Act, 1956.

47. To accumulate capital from the profits of the Company for any of the purposes of the Company and to use and appropriate the same or any of the Company's assets either conditionally or unconditionally to specific purposes.

48. To pay out of the funds of the Company all costs, charges and expenses of and incidental to the promotion, formation, registration, advertisement and establishment of this Company and the issue and the subscription of the shares or loan capital including brokerage and/or commission for obtaining applications for placing or guaranteeing the placing of shares or any debentures, debenture-stock and other securities of this company and also all expenses attending the issue of any circular or notice and the printing, stamping and circulating of proxies and forms to be filled up by the members of the Company and to remunerate by cash or allotment of fully or partly paid shares to any person, firm or company for services rendered in introducing any property or business to the Company or in placing, assisting to place shares, debentures, debenture-stock or other securities of the Company or in or about the formation of the Company or the acquisition of property by the Company or the conduct of its business or for any other reason which the Company may, think proper.

49. To provide for the welfare of Directors or employees of the Company or its predecessors in business and the wives, widows and families or the dependents or connections of such persons by building or contributing to the building or houses or dwellings or quarters or by grants of money, pensions, gratuities, allowances, bonuses, profit sharing bonuses or benefits or any other payments or by creating and from time to time subscribing or contributing towards places or instruction, recreation, hospitals and dispensaries, medical and other attendance and assistance as the Company shall think fit.

50. To establish and maintain or procure the establishment and maintenance of any contributory or non-contributory pension or superannuation funds for the benefit of, and give or procure the giving of donations, gratuities, pensions, allowances, or emoluments to any persons who are or were at any time in the employment or service of the Company or of any company which is subsidiary of the company or its allied to or associated with the Company or with any such subsidiary company or who are or were at any time Directors or officers of the Company or of any such other company as aforesaid and the wives, widows, families and dependents of any such persons, and also to establish and subsidies and subscribe to any institutions, associations, clubs or funds calculated to be for the benefit of or to advance the interests and well being of the company or of any such other company as aforesaid and make payments to or towards the insurance of any such person as aforesaid and do any matters aforesaid either alone or in conjunction with any such other company as aforesaid.

51. To subscribe, for, take or otherwise acquire and hold shares, stocks, debentures or other securities of any other company having objects altogether or in part similar to those of the Company and to acquire and undertake all or any part of the business property and liabilities of any person or company carrying on or proposing to carry on any business which the company is authorised to carry on or which can be carried or in conjunction therewith and to subsidise or assist any such persons or company financially or otherwise and in particular by subscribing for shares, stock, debentures, debenture-stock or other securities of such company.

52. To undertake and execute any trust, the undertaking of which may seem to the company desirable and either gratuitously or otherwise and to vest any movable or immovable property, rights or interests acquired by or belonging to the Company in any person or company and with or without any declared trust in favour of the Company, subject to the provisions of the Act.

53. In relation with the business of the Company to guarantee the payment of money secured or unsecured by or payable under or in respect of promissory notes, bonds, debentures, debenture-stocks, contracts, mortgages, charges, obligations, instrument and securities of any company or any authority, supreme, municipal, local or

otherwise or of any person howsoever, whether incorporated or not incorporated and generally to guarantee or become sureties for the performance of any contracts or obligations.

54. To advance, deposit or lend money, securities and properties or to give credit to such persons or companies, bodies corporate, firms or associations and on such terms as may seem expedient and in particular to customers and others having dealings with the Company and to guarantee the performance of any contract or obligation and the payment of money of or any such person or companies bodies corporate, firms or associations and generally to give guarantee and indemnities.

55. To deal in stone, sand, lime, brick, timber and hardware, cement and other building requisites, tile and tera-cotta makers, job masters, carriers.

56. To aid, pecuniarilly or otherwise, any association, body or movement having for an object, the solution, settlement, or labour problems or troubles or the promotion of industry or trade.

57. To undertake and execute any contracts for work involving the supply or use of any machinery and to carry out any ancillary or other works comprised in such contracts.

58. To borrow or raise money other than public deposits or to receive money from persons, bodies corporate, financial institutions, banks and such other lenders and in security of any such money so borrowed raised or received to mortgage, pledge or charge the whole or any part of the property assets or revenue of the company present or future by special assignment or otherwise or to transfer or convey the same absolutely or in trust and to give the lenders powers of sale and other powers as may seem expedient, by executing negotiable or transferable instrument and deal with all documents mercantile or otherwise, in the ordinary course of business subject to the provisions of Section 58A and directive of the Reserve Bank of India.

59. To establish agencies in India and abroad for sale and purchase and regulate and discontinue the same and to act as agents, principals, contractors, brokers, trustees or otherwise and to undertake and perform sub-contracts and also to act in any of the business of the company through or by means of agents, principals, contractors, brokers, trustees, sub-contractors or others either alone or in conjunction with others.

C OTHER OBJECTS:

60. To establish, maintain develop, conduct, procure, buy, sell, import, export, trade, or otherwise deal in, or to act as service providers of every kind in the fields of engineering, technology, technical know how, chemical, mechanical, electrical, electronics, civil, industrial, commercial, statistical, financial, accountancy, medical, legal, educational, production, marketing, distribution, materials, personnel, planning, computers, software and software solutions of all kinds, system integration,, data processing, multi media services, direct to home services, entertainment media, cable television services, interactive television services, content for various uses, electronic media, Cellular Mobile Telephone Services (CMTS), National Long Distance Operator Services (NLDO), Fixed Telephone Services (FTS), Cable Service Provider, Basic Telephone Services (BTS) with or without the use of Wireless Local Loop (WLL) Technology, VSAT Services, Internet Service Provision (ISP), Global Mobile Personal Communications by Satellite (GMPCS), wireline and wireless systems and other value added services including paging services, Radio Paging Service Providers, Public Mobile Radio Trunking Service Provider, DTM communication methods, telecommunication, basic and cellular telephone, voice mail, internet, electronic mail, data communication services, intranet, internet connectivity, internet telephoning, interconnect and intraface services applications like tele-banking, tele-medicine, tele-education, tele-trading, e-commerce, e-governance, e-business and system design, kiosks, management information systems and other types of management including spectrum management, social or other value added services like providing and to end integrated solutions, netserv solutions, network connectivity solutions, cost effective solutions, other allied solutions for data transfer, administrative and effective communication".

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61. To build, construct, acquire, erect, install, operate, maintain, develop, promote, manage, repair, administer, provide, infrastructural facilities for ports, jetties, wharfs, piers, docks, embankments, bulk, break bulk, dry bulk cargo, multipurpose and specialized cargo berths, stackyard and rail infrastructure, terminals, general terminals, marine terminals, cargo terminals, container terminals, transport systems, clearing and handling systems, cargo handling, berths, shorecrains, ship manifolds, fork lifts, bunkers, cargo hoses, navigational channels, depth maintenance, navigation marks, dredging, dry docking, tunnels, canals, work shops, shipways, hangers, derricks, pipe lines for supply of water, oil, fuel, sewage, petrochemicals, chemicals, warehouses, cold storages, godowns, ship stores, sheds, container freight stations and services, port crafts and equipment, tank farms, tugs, pilotage and carnage services, container handling facilities, floating dry dock and vessel repair facilities, setting up of captive power plant, installation of equipment, handling equipment, loading equipment and supporting infrastructure, to acquire marine related technology and undertake underwater work on ports, docks, tugs, terminals, jetties and ship repairs, establish and maintain work lines of power, fuel, steam, aerial communications between ports, ships and other transports and to act as marine consultants, marine engineers and advisors.

* 62. To design, build, erect, construct, operate on construction contract, EPC contract, Build-Operate-Transfer (BOT), Build-Own-Operate-Transfer (BOOT), Built-Own-Lease-Transfer (BOLT), Design, Build, Finance, Operate and Transfer ("DBFOT") basis, basis or any such variants thereof, repair, execute, develop infrastructure facility project including roadways, bridges, road over-bridges, underpasses, canals or any kind of work for and on behalf of government, NGOs or bodies corporate or individual.

IV The liability of the members of the Company is limited.

V (a) The Authorised Share Capital of the Company is Rs.1,00,000 (Rupees one lakh) divided into 10,000 (Ten thousand) Equity Shares of Rs. 10 each.

(b) The minimum paid up capital of the Company shall be Rs. 1,00,000 (Rupees One Lakh only).

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KM TOLL ROAD PVT. LTD.

* Amended vide Special Resolution passed at EGM held on 05.02.2010

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We, the several persons whose names, addresses and descriptions are subscribed, are desirous of being formed into a Company in pursuance of this Memorandum of Association and we respectively agree to take the number of shares in the Capital of the Company set opposite to our respective names:

Sr. No.	Name, address, description and occupation of each Subscriber	Number of Equity Shares taken by each subscriber	Signature of Subscriber	Signature of witness and his name, address, description and occupation
1.	Reliance Infrastructure Limited 3rd Floor,Reliance Energy Centre, Santa Cruz (E), Mumbai 400 055 Through Shri Ramesh Shenoy vide Board Resolution dated 31/10/2009 Occupation: Business	9999 (Nine Thousand Nine Hundred Ninety Nine)	Sd/-	Witness for 1 to 4 Sd/- Shri Prakash Khedekar S/o Shri Pandurang Khedekar H Block, 1st Floor, Dhirubhai Ambani Knowledge City, Navi Mumbai 400 710 Occupation: Service
2	Shri Ramesh Shenoy S/o Late Shri Ganpati Shenoy E 115, Bussa Apartments B M Bhargav Marg Santa Cruz (West) Mumbai 400 054 Occupation: Service	1 (One)	Sd/-	
	Total	10,000 (Ten Thousand)		

Date : 29.01.2010

Place : Mumbai

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For KM TOLL ROAD PVT. LTD.

Director

THE COMPANIES ACT, 1956

COMPANY LIMITED BY SHARES

ARTICLES OF ASSOCIATION

OF

KM TOLL ROAD PRIVATE LIMITED

1. The Regulations contained in Table 'A' in the First Schedule to the Companies Act, 1956, shall apply so far as they are applicable to a Private Limited Company and so far only as they are not inconsistent with any of the provisions contained in these Regulations. *Provisions of Table "A" applicable*

2. Clause Nos. 2, 5, 18, 66, 71, 84 and 99 of Table 'A' shall not apply to this Company. The provisions of Section 171 to 175, of the Act shall not apply to this Company. *Certain clauses of Table "A" not applicable.*

PRIVATE COMPANY

3. The Company is a Private Company within the meaning of Section 3 (1) (iii) of Companies Act, 1956 and accordingly: *Company to be a private company.*

   (a) The right to transfer shares of the Company is restricted in the manner hereinafter provided.

(b) The number of members of the Company (exclusive of persons who are in the employment of the Company, and persons, who having been formerly in the employment of the Company were members of the Company while in that employment and have continued to be members after the employment ceased) shall be limited to Fifty. Provided that where two or more persons hold one or more shares in the Company jointly, they shall for the purpose of this Article be treated as a single member.

(c) No invitation shall be issued to the public to subscribe for any shares in, or debentures of the Company.

(d) The Company shall not invite or accept deposits from persons other than its Members, Directors or their relatives.

SHARES

4. (a) Subject to the provisions of Section 80 of the Act, the Company shall have the power to issue preference shares which, are liable to be redeemed and the redemption of preference shares may be effected in accordance with the terms and conditions of their issue and failing that in such manner as the directors may think fit. *Issue and Redemption of Preference Shares*

(b) Whensoever the Company has, with the previous approval of the members, issued any securities entitling the holders thereof to apply for shares in the capital of the Company, the members of the Company shall be bound to ensure that the share capital of the Company will be adequate to absorb the increase in the capital that would arise consequent to such holders exercising their right to apply for and be allotted shares in the Company. For this purpose, the members of the Company are bound to cause the authorised capital of the Company to be suitably increased and shall exercise their voting rights to vote unanimously in favour of the resolution to be passed by the Company in general meeting for increasing its authorised capital, such resolution to be passed prior to the date on which (or the period during which) such option is exercisable by the holders of such instruments. Towards that objective, the members acknowledge that any votes cast by a member against such a resolution shall be disregarded and be deemed to be invalid. *Issue of Convertible Instrument*

(c) Subject to the provisions of section 86 of the Act the Company shall have power to issue Share Capital with differential voting rights as to dividend or voting and the resolution authorising such issue shall prescribe the manner, terms and conditions of issue. *Issue of Shares with differential voting rights*

(d) The Company shall be entitled to treat the person whose name appears on the Register of Members as the holder of any share or whose name appears as the beneficial owner of shares in the records of the Depository, as the absolute owner thereof and accordingly shall not (except as ordered by a court of competent jurisdiction or as by law required) be bound to recognize any benami trust or equity or equitable, contingent or other claim or interest in such share on the part of any other person whether or not it shall have express or implied notice thereof. *Issue of shares in Demat form*

(e) The Board – *Payment of interest on advance call money*

a. May, if it thinks fit, receive from any member willing to advance the same, all or any part of the moneys uncalled and unpaid upon any shares held by him; and
b. Upon all or any if the moneys so advanced, may (until the same would, but for such advance, become presently payable) pay interest at such rate as may be decided by the Board of Directors from time to time.

(f) The Authorised Share Capital of the Company shall be as per clause V of the Memorandum of Association of the Company

The minimum paid up capital of the Company shall be Rs. 1,00,000 (Rupees One Lakh only).

5 The Company shall have power to buy-back its own shares or other securities subject to the provisions of Section 77A, 77AA and 77B of the Act and the guidelines as may be laid down in this regard, from time to time. *Buy-back of shares*

TRANSFER AND TRANSMISSION OF SHARES

6. The Board may decline to register any transfer of shares and shall not be bound to give any reason for such refusal. This Article shall also apply in the case of a transferee who is already a shareholder. *Right to decline registration of transfer*

7. Without prejudice to the generality of the aforesaid Power, the Board may refuse to register any transfer of shares:- *Directors' power to refuse to register in cases mentioned in this regulation.*

(a) where the Directors are of the opinion that the proposed transferee (not being already a member) is not a desirable person to admit to membership, or

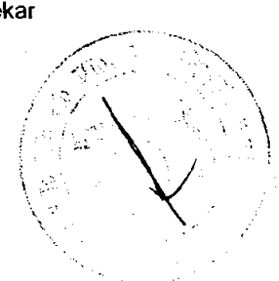
(b) where the result of such registration would be to make the number of members exceed the limit fixed by Article 3 above.

8. The provisions of these Articles shall, *mutatis mutandis*, apply to the transfer of or the transmission by operation of law of the right to all securities of the Company. *Transfer of Securities*

DIRECTORS

9. Unless otherwise determined by the Company in the General Meeting, the number of Directors shall not be less than 2 (two) and not more than such number as may be stipulated by the Act for the time being in force. *Number of directors*

The first Directors of the Company are :
1. Shri Sudhir Rao Hoshing
2. Shri Suresh Surana
3. Shri Prakash Khedekar



10. (a) If it is provided by any trust deed or other document securing or otherwise in connection with any issue of debentures or other borrowings of the Company that any person(s) shall have power to nominate a Director of the Company then in case of any and every such issue of debentures or borrowings as the case may be the person(s) having such power may exercise such power from time to time and appoint Director(s) accordingly. Such Director(s) may be removed from office at any time by the person(s) in whom for the time being is the power vested under which he was appointed. *Nominee Directors*

(b) The Company shall, subject to the provisions of the Act, be entitled to agree with any person, firm, body corporate, corporation, government or authority that he or it shall have the right to appoint his or its nominee(s) on the Board of Directors of the Company upon such terms and conditions as the Directors may deem fit. Such nominee(s) and their successors if appointed under this Article shall be called Special Director(s). Special Director(s) shall be entitled to hold office until requested to retire by the authority, which nominate him/them and he/they will not be bound to retire by rotation. As and whenever a Special Director(s) vacate(s) office, whether upon request as aforesaid or by death, resignation or otherwise, the person, firm, body corporate, corporation, government or authority who appointed such Special Director(s) may if the agreement(s) so provides, appoint another Director in his/their place. *Special Director*

(c) The Board of Directors of the Company may appoint an alternate director to act for a director (hereinafter in this Article called "the original director") during his absence for a period of not less than three months from the state in which the meetings of the Board are ordinarily held. An alternate director appointed under this Article shall not hold office as such for a period longer than that permissible to the original director in whose place he has been appointed and shall vacate office if and when the original director returns to the state in which the meetings of the Board are ordinarily held. *Alternate Director*

11. The Directors shall not be required to hold any qualification share(s). *Share qualification.*

12. Subject to provisions of the Act and these Articles, the Board shall have power to appoint from time to time any of its members as Managing Director(s) and / or Whole time Director(s) and / or Special Director(s) like Technical Director(s), Finance Director(s) etc. of the Company and upon such terms and conditions as Board think fit, and the board may by resolution vest in Managing Director(s), Whole time Director(s), Special Director(s), Technical Director(s), Finance Director(s) such of the power hereby vested in the Board generally as it thinks fit, and such power may be made exercisable for such period(s) and upon such condition(s) and subject to such restriction(s) as it may determine. The remuneration of such Director(s) may be by way of monthly remuneration and / or fee for each meeting and / or participation in profit or by any or all of those modes, or of any other mode not expressly provided by the Act. *Managing Director*

SEAL

13. The Directors shall provide a Common Seal for the purpose of the Company and shall have power from time to time to destroy the same and substitute a new Seal in lieu thereof and the Directors shall provide for the safe custody of the Seal for the time being and the Seal shall never be used except by or under the authority of the Directors or a Committee of Directors previously given and every deed or other instrument to which the Seal of the Company is required to be affixed shall, be affixed in the presence of any one Director or the Manager or the Secretary or such other person as the Board/Committee of the Board may appoint for the purpose, who shall sign every instrument to which the Seal is so affixed in his presence; Provided that the certificates of shares or debentures shall be sealed in the manner and in conformity with the provisions of the Companies (Issue of Share Certificates) Rules, 1960 or any statutory modification thereof for the time being in force. *Seal*

MEETINGS

14. One day notice to be given for meeting of the members of the Company specifying the day, date place, time and hour of the meeting and the general nature of the business to be transacted thereat, shall be given to such persons entitled to receive notice from the Company. The provisions of Section 173 of the Act shall not apply with respect of meeting of the members (including an Annual General Meeting) of the Company. *Proceedings at general meetings.*

15. The Board may, if the circumstances so require, meet by means of telephone, television or through any other audio-visual links. The provisions relating to notice, agenda, quorum and minutes stated herein shall *mutatis mutandis* apply to the meetings held through such audio-visual media. *Proceedings of the Board*

INDEMNITY

16 (a) Every Director, Managing Director, Whole-time Director, Manager, Secretary or Officer of the Company or any person (whether an officer of the Company or not) employed by the Company and any person appointed by the Company as Auditors shall be indemnified out of the assets of the Company against all liabilities incurred by him as such Director, Managing Director, Whole-time director, Manger, Secretary, Officer or Auditor in defending any proceedings, whether civil or criminal, in which judgment is given in his favour or in which he is acquitted or in connection with any application under Section 633 of the Act in which relief is granted to him by the Court. *Indemnity*

KM TOLL ROAD PVT. LTD.

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(b) Subject to the provisions of the Companies Act, no Director, Auditor or other officer of the Company shall be liable for the Acts, receipts, neglects or defaults of any other Director or Officer or for joining in any receipt or other act for conformity or for any loss or expenses happening to the Company through the insufficiency or deficiency of title to any property acquired by order of the Directors or on behalf of the Company or for the insufficiency or deficiency of any security in or upon which any of the moneys of the Company shall be invested or for any loss or damage arising from the bankruptcy, insolvency or tortious act of any person, firm or company to or with whom any moneys, securities, or effects shall be entrusted or deposited or for any loss occasioned by any error of judgment, omission, default or oversight on his part or for any other loss, damage or misfortune whatsoever, which shall happen in the execution of the duties of his Office or in relation thereto unless the same shall happen through his own dishonesty.

Individual responsibility of Directors

SECRECY

17 (a) No member shall be entitled to visit or inspect any works of the Company without the permission of the Directors or any other person authorised on that behalf by the Director to require discovery of or any information respecting any details of the Company's trading or any matter which is or may be in the nature of a trade secret, mystery of trade secret process or of any other matter which may relate to the conduct of the business of the Company which in the opinion of Directors, would be inexpedient in the interest of the Company to disclose.

Secrecy

(b) Every Director, Manager, Auditor, Treasurer, Trustee, Member of Committee, Officer, Servant Agent, Accountant or other persons employed in the business of the Company shall if so required by the Directors, before entering upon his duties sign a declaration pledging himself to observe a strict secrecy respecting all transactions and affairs of the Company, with the customers and the state of accounts with individuals and in matters relating thereto and shall by such declaration pledge himself not to reveal any of the matters which may come to his knowledge in the discharge of his duties except when required to do so by the Board or by law or by the person to whom such matters relate, except so far as may be necessary in order to comply with any provisions of these presents contained.

GENERAL AUTHORITY

18. Wherever in the Companies Act, 1956, it has been provided that any Company shall have any right, privilege or authority or that any Company cannot carry out any transaction unless it is so authorised by its Articles, then and in that case this Article hereby authorises and empowers this Company to have such right, privilege or authority and to carry out such transaction as have been permitted by the Companies Act, 1956, without there being any other specific Article in that behalf herein provided.

General Authority

KM TOLL ROAD PVT. LTD.

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We, the several persons whose names, addresses and descriptions are subscribed, are desirous of being formed into a Company in pursuance of this Articles of Association

Sr. No.	Name, address, description and occupation of each Subscriber	Signature of Subscriber	Signature of witness and his name, address, description and occupation
1.	Reliance Infrastructure Limited 3rd Floor,Reliance Energy Centre, Santa Cruz (E), Mumbai 400 055 Through Shri Ramesh Shenoy vide Board Resolution dated 31/10/2009 Occupation: Business	Sd/-	Witness for 1 to 4 Sd/- Shri Prakash Khedekar S/o Shri Pandurang Khedekar H Block, 1st Floor, Dhirubhai Ambani Knowledge City, Navi Mumbai 400 710 Occupation: Service
2	Shri Ramesh Shenoy S/o Late Shri Ganpati Shenoy E 115, Bussa Apartments B M Bhargav Marg Santa Cruz (West) Mumbai 400 054 Occupation: Service	Sd/-	

Date : 29.01.2010
Place : Mumbai

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KM Toll Road Private Limited

Registered Office: H Block, 1st Floor, Dhirubhai Ambani Knowledge City, Navi Mumbai 400 710

Ref: KMTRL/NHAI/1001/09-10/001

Date: 12th February 2010

To,
General Manager (Gujarat & Rajasthan),
National Highways Authority of India,
G-5 & 6, Sector-10, Dwarka,
New Delhi: 110075

Kind Attn.: Mr. L.P. Padhy

Subject: **Four/Six Laning of Gandhidham (Kandla) - Mundra Port Section of NH-8A (Extn.) (Approximate Length of 71.400 Km) in the State of Gujarat under NHDP Phase-III through Public-Private Partnership (PPP) on Design, Build Finance, Operate and Transfer (DBFOT) Basis: Introduction Letter from Authorized Signatory of the SPV.**

Ref: LOA vide your letter No. NHAI/BOT/DBFO/11012/11/07/403 dated 12/01/2010

Sir,

We have the pleasure to inform you that the selected Bidder M/s. Reliance Infrastructure Limited has formed and incorporated the SPV, in the name & style of **"KM Toll Road Private Limited"** a company registered and incorporated under the Companies Act, 1956, having its registered office at **H-Block, 1st Floor , Dhirubhai Ambani Knowledge City, Navi Mumbai: 400710, Maharashtra, India** (hereinafter referred to as the **"Concessionaire"** or **"Company"**) specifically to domicile and carry on the business of developing and managing the subject project in the State of Gujarat on DBFOT (Toll) basis in conformity with the Request for Proposal Document. The SPV was incorporated on 4th February 2010 and the Certificate of incorporation issued by ROC (Registrar of Companies) is enclosed for your needful.

We request the authority to recognize and accept the SPV, **KM Toll Road Private Limited as "Concessionaire"** for the said Project Highway which shall undertake and perform the

obligations and exercise the rights of the selected bidder including the obligation to enter into Concession Agreement pursuant to the LOA.

I, Mr. Sudhir. R. Hoshing son of Late Shri. Balaram Rao Hoshing, is authorized by the Board of SPV to execute the Concession Agreement with the Authority in terms of LOA and the Board's Resolution to that effect is enclosed under Annexure-6.

Further the Concessionaire represents and warrants all that is provided in clause 7.1 interalia including the following,

KM Toll Road Private Limited

Registered Office: H Block, 1st Floor, Dhirubhai Ambani Knowledge City, Navi Mumbai 400 710

1. The Concessionaire do not undertake or permit any change in the Ownership except in accordance with the provisions of Clause 5.3 and the individual shareholdings of this Company is being transferred in such a manner that it shall have equity share holding of not less than 51% (fifty-one percent) by the members of the Company; and no member of the Company whose technical and financial capacity was evaluated for the purpose of pre-qualification shall hold less than 26% (twenty-six percent) of such Equity during the Construction Period.
2. The members of the Company and its Associates have the financial standing and resources to fund the required Equity and to raise the debt necessary for undertaking and implementing the Project.
3. The Concessionaire is duly organized and validly existing under the laws of the jurisdiction of its incorporation.

It is proposed that the qualified Bidder, M/s. Reliance Infrastructure Limited will be holding 100% of equity shares in the "KM Toll Road Pvt Limited"

Now we request you to kindly fix up and confirm suitable date for signing of Concession Agreement. We propose that 2(two) sets of the agreement be signed in original, so that each party can retain one original set.

Communication address for correspondence with the Concessionaire will be,

Reliance Infrastructure Limited,
Roads Project Division,
6th Floor, 623, Chintamani Plaza,
Mohan Studio Compound,
Chakala, Andheri-Kurla Road,
Andheri (E), Mumbai: 400 099
Tel Ph: +91 22 3076 5311
Fax: +91 22 3076 5323

Thanking you,

Yours faithfully,

For KM Toll Road Private Limited

Sudhir R Hoshing
Authorised Signatory

KM TOLL ROAD PVT. LTD.

Annexure- 5

KM Toll Road Private Limited

Registered Office: H Block, 1st Floor, Dhirubhai Ambani Knowledge City, Navi Mumbai 400 710

Extracts of the Minutes of the meeting of Board of Directors of KM Toll Road Private Limited held on February 5, 2010.

Sub.: *Concession agreement*

"**RESOLVED THAT** the company hereby confirms that it has been incorporated by promoter viz. Reliance Infrastructure Limited for the purpose of undertaking the project envisaging Design, Finance, Engineering, Construction, Operation and Maintenance for 4/6 laning of Gandhidham (Kandla) to Mundra Port section of National Highway -8A in the state of Gujarat. as awarded by National Highways Authority of India under NHDP Phase III ("Project") in terms of Letter of Award dated January 12, 2010 on Design, Build, , Finance, Operate and Transfer (DBFOT) basis.

RESOLVED FURTHER THAT any one of Shri Sudhir R. Hoshing, Shri Suresh Surana and Shri Prakash Khedekar Directors, be and are hereby authorised severally to negotiate, finalise, execute, deliver, amend and modify the Concession Agreement, State Support Agreement, Escrow Agreement, EPC Contract/s and any other agreements or contracts or documents as may be required in connection with the implementation of the aforesaid project.

RESOLVED FURTHER THAT the Common Seal of the Company, if required, be affixed on the documents, in the presence of any one of the above directors who shall sign the same in token thereof."

\\\ Certified true copy ///

For KM Toll Road Private Limited

Sudhir R Hoshing
Director

KM TOLL ROAD PVT. LTD.

6.2

KM Toll Road Private Limited

Registered Office: H Block, 1st Floor, Dhirubhai Ambani Knowledge City, Navi Mumbai 400 710

List of Directors as on 5.02.2010

Sr. No.	Name of the Director	Address
1	Shri Sudhir Hoshing	Flat No.604, Tower II, Challenger Tower, Thakur Village, Kandivli (E), Mumbai 400 101
2	Shri Suresh Surana	401, 4th Floor, Mangal Kalyan, Vakola, Kalina, Santa Crus(East), Mumbai 400 029
3	Prakash Khedekar	103 Swaraj Palace, Plot 12/13, Sector 12D, Kopar Khairane, Navi Mumbai 400 709.

For KM Toll Road Private Limited

Director

Annexure-6

E. B. DESAI
D. M. POPAT
E. A. K. FAIZULLABHOY
H. D. NANAVATI
B. H. ANTIA
B. S. BHESANIA (Dr.)
N. N. MULLA
S. J. THACKER
Y. P. DANDIWALA
D. J. KAKALIA
H. S. R. VAKIL
J. N. MISTRY
S. B. JIJINA
H. N. VAKIL
R. H. KHAN (Mrs.)
B. V. PANJUANI

MULLA & MULLA & CRAIGIE BLUNT & CAROE
(REGISTERED)
ESTABLISHED 1895
Advocates, Solicitors and Notaries
MULLA HOUSE, 51 MAHATMA GANDHI ROAD,
FORT, MUMBAI - 400 001.

TELEPHONE
(91-22) 2204 4960
(91-22) 2287 5121
FAX
(91-22) 2204 0246
(91-22) 2204 4717
E - Mail
mullas@vsnl.com

OUR REF.

DJK/ 2413

OPINION

KM TOLL ROAD PRIVATE LIMITED .... QUERIST

Sub: Authority of the Special Purpose Vehicle (SPV) to enter into and fulfill the obligations under the Concession Agreement

1. BACKGROUND:

1.1 KM Toll Road Private Limited (KM Toll/ SPV) is a company incorporated under the Companies Act, 1956 with its registered office at 'H' Block, 1st floor, Dhirubhai Ambani Knowledge City, Navi Mumbai - 400710, Maharashtra.

1.2 The Querist is a Special Purpose Vehicle intended to carry out the work of design, engineering, finance, construction, operation and maintenance of of 4/6 laning of Gandhidham (Kandla) to Mundra Port Section of National Highway -8A (Extn) in the state of Gujarat on Design, Build, Finance, Operate and Transfer (DBFOT) basis ("Project") awarded by the National Highways Authority of India ('NHAI') in terms of the Letter of Award No. NHAI/BOT/11012/11/07/403 dated 12.01.10 (LOA) issued to

NEW DELHI OFFICE : 502, Nilgiri Apartments, 5th Floor, 9 Barakhamba Road, New Delhi - 110 001.
Tel. : (91-11) - 2332 1501 / 04 / 07 / 13 Fax : (91-11) - 2332 1520 E-Mail : mullasdelhi@mullas.net
BANGALORE OFFICE : 209, Regency Enclave, 4 Magrath Road, Bangalore - 560 025
Tel.: (91-80) - 2555 0370, 2559 7704, 2532 3382 Fax: (91-80) - 2559 8549 E-Mail: bangalore@mullaandmulla.com

Reliance Infrastructure Limited **(RInfra).**

2. **FACTS OF THE CASE**:

2.1 In response to 'NHAI' invitation for proposals for upgrading the existing roads between Gandhidham (Kandla) to Mundra section of National Highway -8A in the state of Gujarat, in a Competitive Bidding process, RInfra had submitted a proposal and after due process, the same was accepted and the (LOA) was issued in favour of the RInfra.

2.2 One of the conditions in the Bid documents was that the successful bidder should form a Special Purpose Vehicle to undertake the Project.

2.3 Accordingly a Special Purpose Vehicle in the name of KM Toll Road Private Limited, the Querist herein was incorporated by RInfra.

2.4 In terms of the Bid Documents, the 'SPV' is required to enter into a Concession Agreement with 'NHAI' for execution of the Project.

2.5 One of the conditions precedent as provided by Clause 4.1.3(h) of the draft Concession Agreement for entering into the Concession Agreement is as follows:

"The Concessionaire (KM Toll) shall have delivered to the Authority a legal opinion from the legal counsel of the Concessionaire with respect to authority of the Concessionaire to enter into this (Concession) Agreement and the enforceability of the provisions thereof."

3. **DOCUMENTS PERUSED AND CONSIDERED:**

3.1 Certificate of Incorporation dated 4.2.2010 by the Registrar of Companies, Maharashtra, Mumbai, certifying that KM Toll Road Private Ltd., the Querist herein was incorporated under the Companies Act, 1956 and that the Company is Private Limited.

3.2 Memorandum and Articles of Association of the Querist.

3.3 Letter of Award ('LOA') dated 12th January 2010 issued by the National Highway Authority of India to Reliance Infrastructure Ltd.

3.4 Draft Concession Agreement.

3.5 List of Directors of the Querist.

3.6 Shareholding pattern of the Querist.

3.7 Extracts of the Minutes of the Meeting of the Board of Directors of the Querist held on 5th February 2010, authorizing Shri Sudhir R. Hoshing, Shri Suresh Surana and Shri Prakash Khedekar, Directors of the Querist to negotiate, finalise, execute, deliver, amend and modify inter alia the Concession Agreement as may be required in connection with the implementation of the project.

4 **OPINION SOUGHT:**

Our opinion is sought on the following:

(a) Whether the Querist is validly organized under the Companies Act, 1956?

(b) Whether the Querist is duly authorized to enter into the Concession Agreement and fulfill all its obligations under the Concession Agreement?

(c) Any other relevant issue.

5. **LAW AND ANALYSIS:**

5.1 The Companies Act, 1956 provides that a Company shall carry out such transaction as are authorised by its Memorandum and accordingly the main objects of the Querist and Object Clause No. B. 5 and B. 12 of the Memorandum of Association of the Querist as reproduced below, authorise and empower the Qerist to execute the Project:

A. MAIN OBJECTS OF THE COMPANY TO BE PURSUED BY THE COMPANY ON INCORPORATION:

1. To design, engineer, procure, construct, fabricate, build, improve, strengthen, operate, maintain roads, bridges culverts, over bridges, underpasses, flyovers, toll plaza, traffic management systems and equipment, buildings and other infrastructures and collect toll, fees, or charges, carry out surveys, investigations, polls and regulate traffic in

connection with the project to be taken up by the Company on Design, Build, Operate and transfer basis for Design, Finance, Company on Design, Build, Operate and Transfer basis for Design, Finance, Engineering, Construction, Operation and Maintenance for 4/6 laning of Gandhidham (Kandla) to Mundra Port section of National Highway-8A in the state of Gujarat.

B. OBJECTS INCIDENTAL OR ANCILLARY TO THE ATTAINMENT OF THE MAIN OBJECTS.

B. 5. To enter into any arrangement with the Government of India or with any State Government or with other authorities / commissions, local bodies or public sector or private sector undertakings, Financial Institutions, Banks, International Funding Agencies and obtain such charters, subsidies, loans, advances or other money, grants, contracts, rights, sanctions, privileges, licenses or concessions whatsoever (whether statutory or otherwise) which the Company may think it desirable to obtain for carrying its activities in furthering the interests of the Company or its members.

B. 12. To enter into any arrangements with any Government or authorities supreme, municipal, local or otherwise, or any person or company that may seem conducive to the Company's Objects or any of them to obtain from any such Government, authorities, person or company any rights, privileges, charters, contracts, licenses and concessions which the Company may think it desirable to obtain, and to carry out, exercise and comply with any such arrangements, rights, privileges, charters,

contracts, licenses and concessions.

Article 18 of the Articles of Association of the Querist dealing with the General Authority is relevant and is set out below for ready reference:-

"18. Wherever in the Companies Act, 1956, it has been provided that any Company shall have any right, privilege or authority or that any Company cannot carry out any transaction unless it is so authorized by its Articles, then and in that case this Article hereby authorizes and empowers this Company to have such right, privilege or authority and to carry out such transaction as have been permitted by the Companies Act, 1956, without there being any other specific Article in that behalf herein provided."

5.2 The Querist is a validly constituted SPV formed under the provisions of the Companies Act, 1956 and the Certificate of Incorporation has been issued by the Registrar of Companies, Maharashtra on the 4th day of February, 2009.

5.3 The Querist being a Private Limited Company is required to have atleast 2 Directors on its Board as per provisions of Section 252 (2) of the Companies Act, 1956. The Company has on the date of seeking opinion 3 Directors namely Shri Sudhir Rao Hoshing, Shri Suresh Surana and Shri Prakash Khedekar

5.4 The Querist also complies with all the requisites of a Private Limited

Company as laid down in 3. (1) (iii) of the Companies Act, 1956 namely:

"private company" (means a company which has a minimum Paid up Capital of one lakh pupees or such higher paid-up capital as may be prescribed and by its articles,—

(a) restricts the right to transfer its shares, if any;

(b) limits the number of its members to fifty not including —

(i) persons who are in the employment of the company, and

(ii) persons who having been formerly in the employment of the company, were members of the company while in that employment and have continued to be members after the employment ceased; and

(c) prohibits any invitation to the public to subscribe for any shares in, or debentures of,

the company;

(d) prohibits any invitation or acceptance of deposits form persons other than its

members, directors or their relatives :

Provided that where two or more persons hold one or more shares in a company jointly, they shall, for the purposes of this definition, be treated as a single member.

5.5 Section 46 of the Companies Act, 1956 is relevant and for the purpose of this Opinion and is set out below for ready reference:-

"46. **Form of contracts** – (1) Contracts on behalf of a company may be made as follows:-

(a) a contract which, if made between private persons, would by law be required to be in writing signed by the parties to be charged therewith, may be made on behalf of the company in writing signed by any person acting under its authority, express or implied, and may in the same manner be varied or discharged;

(b) a contract which, if made between private persons, would by law be valid although made by parol only and not reduced into writing, may be made by parol on behalf of the company by any person acting under its authority, express or implied, and may in the same manner be varied or discharged.

(2) A contract made according to this section shall bind the company."

5.6 The effect of this section is to render valid any contract made on behalf of the company if it is made in the manner laid down in the section. A company can as a general rule contract without seal. It is sufficient if the contract is made by some person acting under the express or implied authority of the company. A commercial company may, subject to restrictions specifically imposed upon it by its Memorandum and Articles,

always enter into a contract for the purposes of its business, subject, in the matter of form, to section 46 of the Companies Act, 1956. In all cases, the essential condition for the validity of a contract of a company is that it must be signed or made by a person acting under its authority, which may be express or implied. Usually the articles of a company give the Directors all the powers of the company and consequently authority to enter into contracts. The authority can be exercised in a Board meeting. If the Board approves the contract, the Directors thereat can sign the contract on behalf of the company.

5.7 Section 48 of the Companies Act is also relevant and is set out below for ready reference:-

"48. **Execution of deeds** --- (1) A company may, by writing under its common seal, empower any person, either generally or in respect of any specified matters, as its attorney, to execute deeds on its behalf in any place either in or outside India.

(2) A deed signed by such an attorney on behalf of the company and under his seal where sealing is required, shall bind the company and have the same effect as if it were under its common seal."

5.8 Article 13 of the Articles of Association of the Querist makes provisions regarding affixing the seal of the company which is required to be used under the authority of the Directors or a committee of Directors and is required to be affixed on deed or instrument to which the seal of the company is required to be affixed in the presence of at least one Director

or a Manager or a Secretary or such other person as the Board or the Committee of the Board may appoint for the purpose. In the present case, it is not necessary that the Concession Agreement should be executed under the seal of the company.

6. **OPINION:**

Having regard to the above, we are of the opinion that

(a) KM Toll Road Private Limited, the Querist is a validly incorporated 'SPV' under the provisions of the Companies Act, 1956.

(b) KM Road Toll Private Limited is duly authorized to enter into the Concession Agreement and fulfill its obligations under the Concession Agreement and

(c) We have nothing further to add.

Yours faithfully,
Mulla & Mulla & Craigie Blunt & Caroe

Partner

623

KM Toll Road Private Limited

Registered Office: H Block, 1st Floor, Dhirubhai Ambani Knowledge City, Navi Mumbai 400 710

Extracts of the Minutes of the meeting of Board of Directors of KM Toll Road Private Limited held on March 8, 2010.

Sub.: Concession agreement

"**RESOLVED THAT** in continuation of resolution passed on February 5, 2010, Shri Bipin Gohil being a person specifically authorized in this regard be and is hereby authorized to countersign Concession Agreement and such other documents incidental thereto and forming part of Concession Agreement,

RESOLVED FURTHER THAT the Common Seal of the Company, if required, be affixed on above documents, in the presence of Shri Sudhir R Hoshing, Director of the Company and counter signed by Shri Bipin Gohil, Additional Vice President, being the person specifically authorized in this regard, in token thereof."

\\\ Certified true copy ///

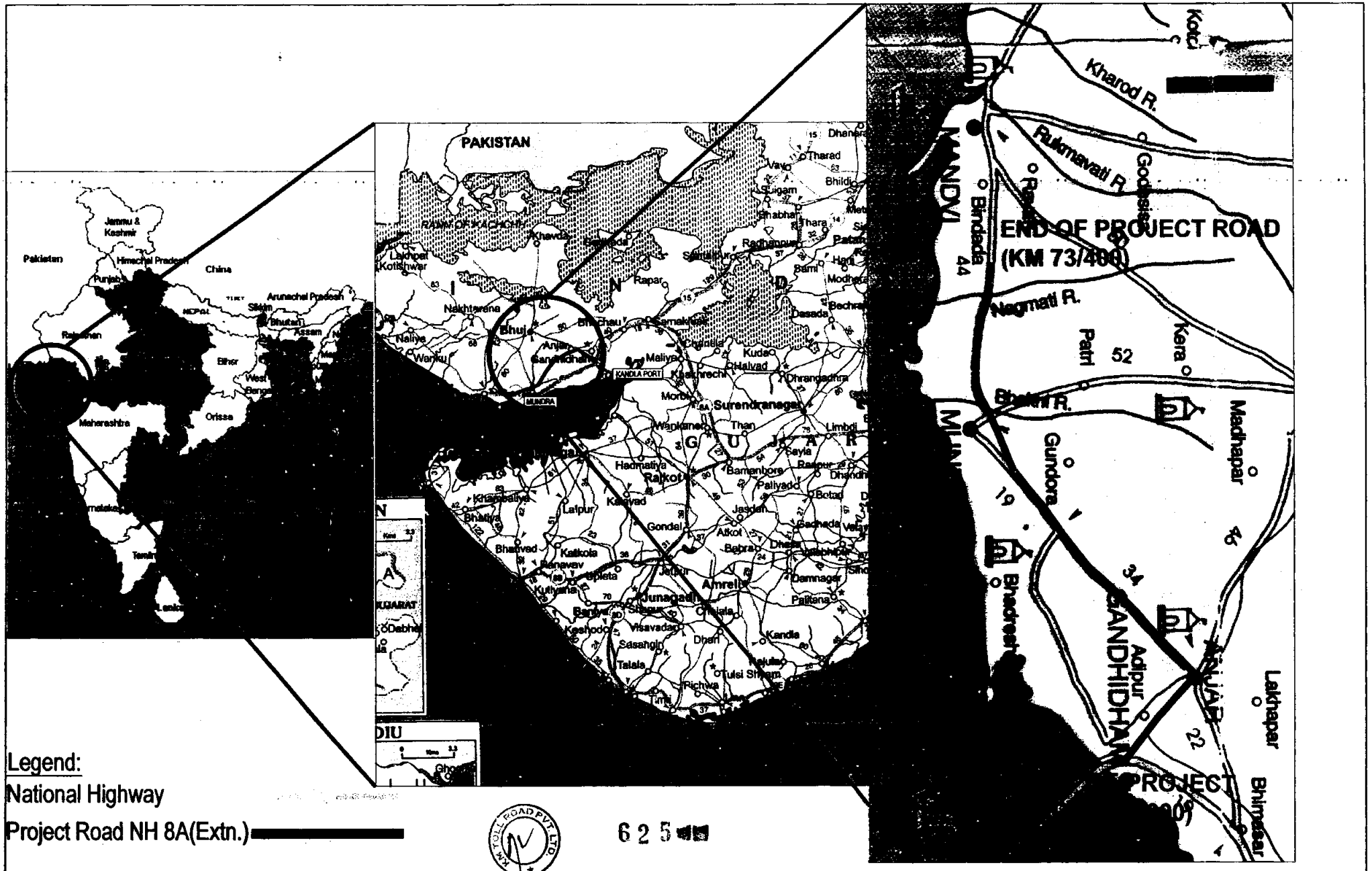
For KM Toll Road Private Limited

Sudhir R Hoshing
Director

KM TOLL ROAD PVT. LTD.

KM TOLL ROAD PVT. LTD.

624



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NATIONAL HIGHWAYS AUTHORITY OF INDIA	Feasibility Study Report for 4/6-Laning of Kandla-Mundra Road Section of NH-8A(E),73km in the State of Gujarat	Drg. No.	RITES/HW/6676/NH-8A/E/KP	Key Plan	RITES THE INFRASTRUCTURE PEOPLE (A Government of India Enterprise)
		SCALE	Not to Scale		

NATIONAL HIGHWAYS AUTHORITY OF INDIA

(Ministry of Shipping,Road Transport & Highways)

Feasibility - Cum- Preliminary Design Report for 4/6 Laning of Kandla - Mundra Port Road NH-8A Extension, Gujarat, BOT (TOLL) on DBFO, NHDP, Phase-III (KM 0/000, Gandhidham to KM 73/400, Siracha Junction)

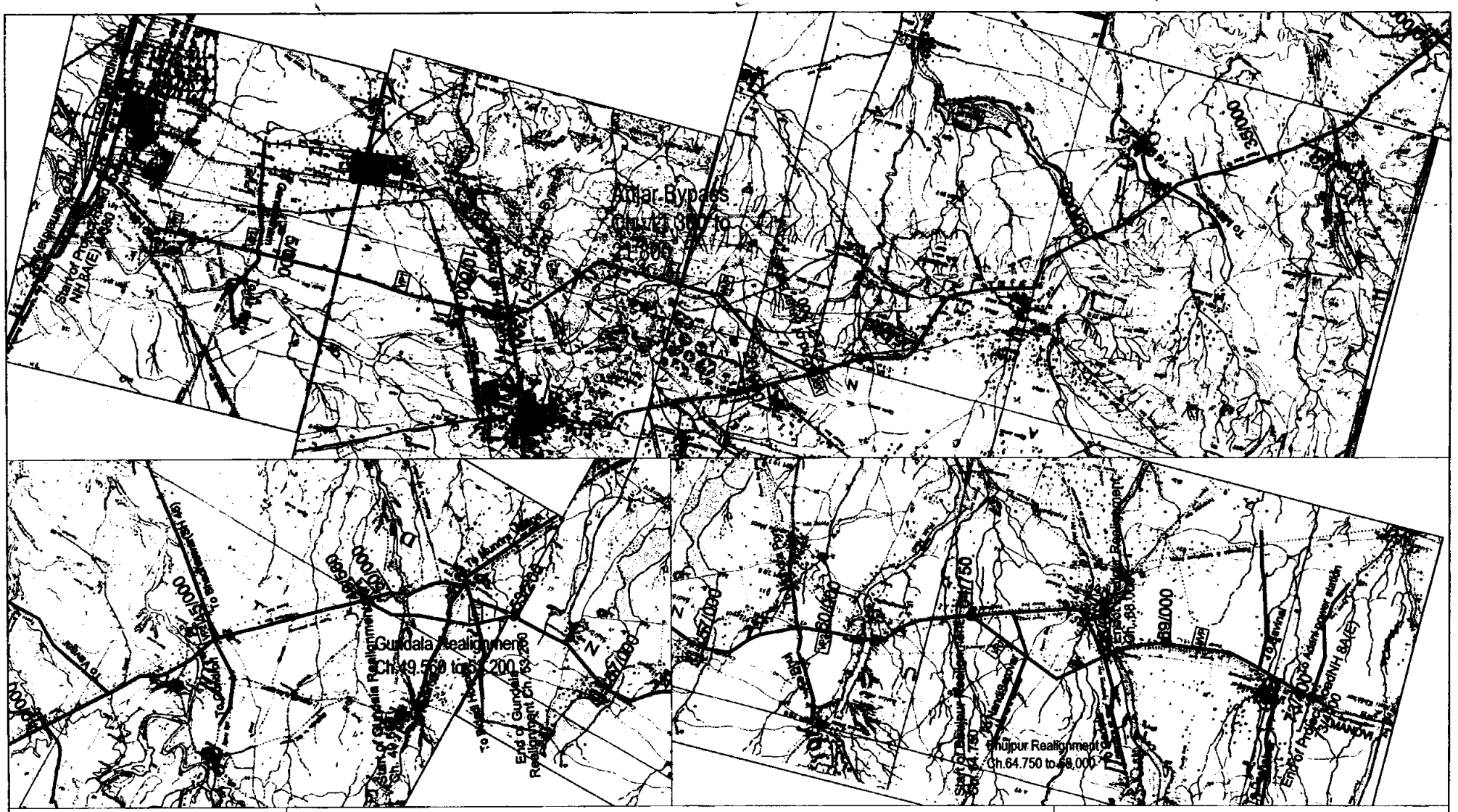
DRAWINGS: PLAN & PROFILE

SEPTEMBER 2009

RITES
THE INFRASTRUCTURE PEOPLE

(A Government of India Enterprise)

RITES BHAWAN
PLOT NO. 1, SECTOR - 29,
Gurgaon - 122001, Haryana, INDIA.



Legend:

- Existing NH-8A(E)
- Proposed Alignment
- Proposed Bypass/ Realignment (Habitation)
- Other Roads

626

Legend Under pass:

VP2	VP2	2x10m (Ht=5.5m) : 5no.
VP1	VP1	1x10m (Ht=5.5m) : 7no.
NVP	NVP	1x10m (Ht=3.5m) : 2no.
ROB	ROB	1x54m (Ht=7.0m) : 1no.

NATIONAL HIGHWAYS AUTHORITY OF INDIA

Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat

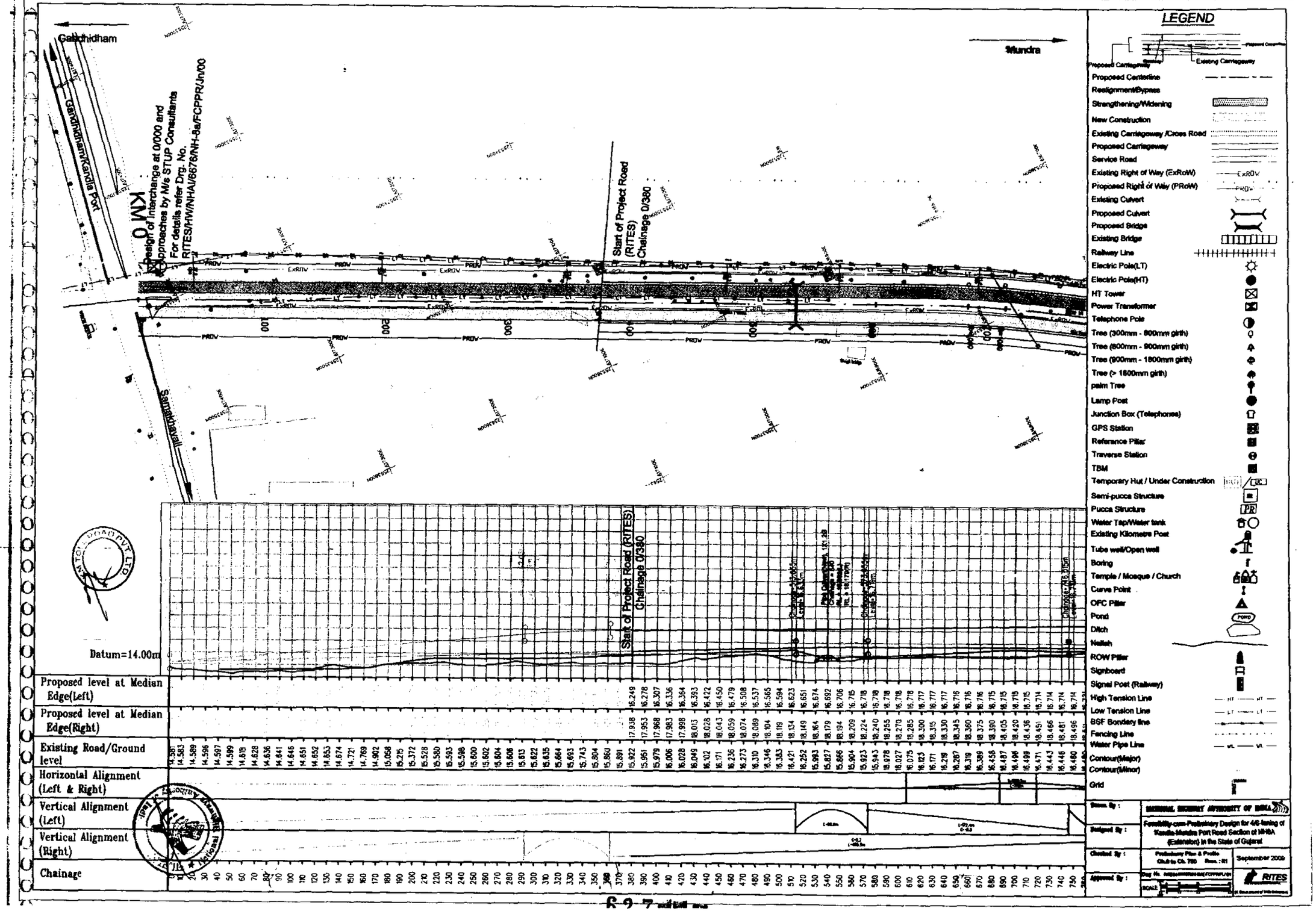
Drg. No.	RITES/HW/NHAI/6676/NH-8AE/FCPPR/LM
	Sheet: 1 of 1
SCALE	Not to Scale

LOCATION MAP

Revision No: R1

Date: September 2009

RITES
THE INFRASTRUCTURE PEOPLE
(A Government of India Enterprise)


Gandhidham
Mundra
Gandhidham/Kandla Port
Design of Interchange at 0/000 and Approaches by M/s STUP Consultants For details refer Drg. No. RITES/HW/NHAI/6676/NH-8a/FCPPR/Jn/00
KM 0
Start of Project Road (RITES) Chainage 0/380
Samakhiyali
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
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Proposed Right of Way (PRoW)
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Proposed Culvert
Proposed Bridge
Existing Bridge
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Electric Pole(HT)
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Reference Pillar
Traverse Station
TBM
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Pucca Structure
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Existing Kilometre Post
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Temple / Mosque / Church
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OFC Pillar
Pond
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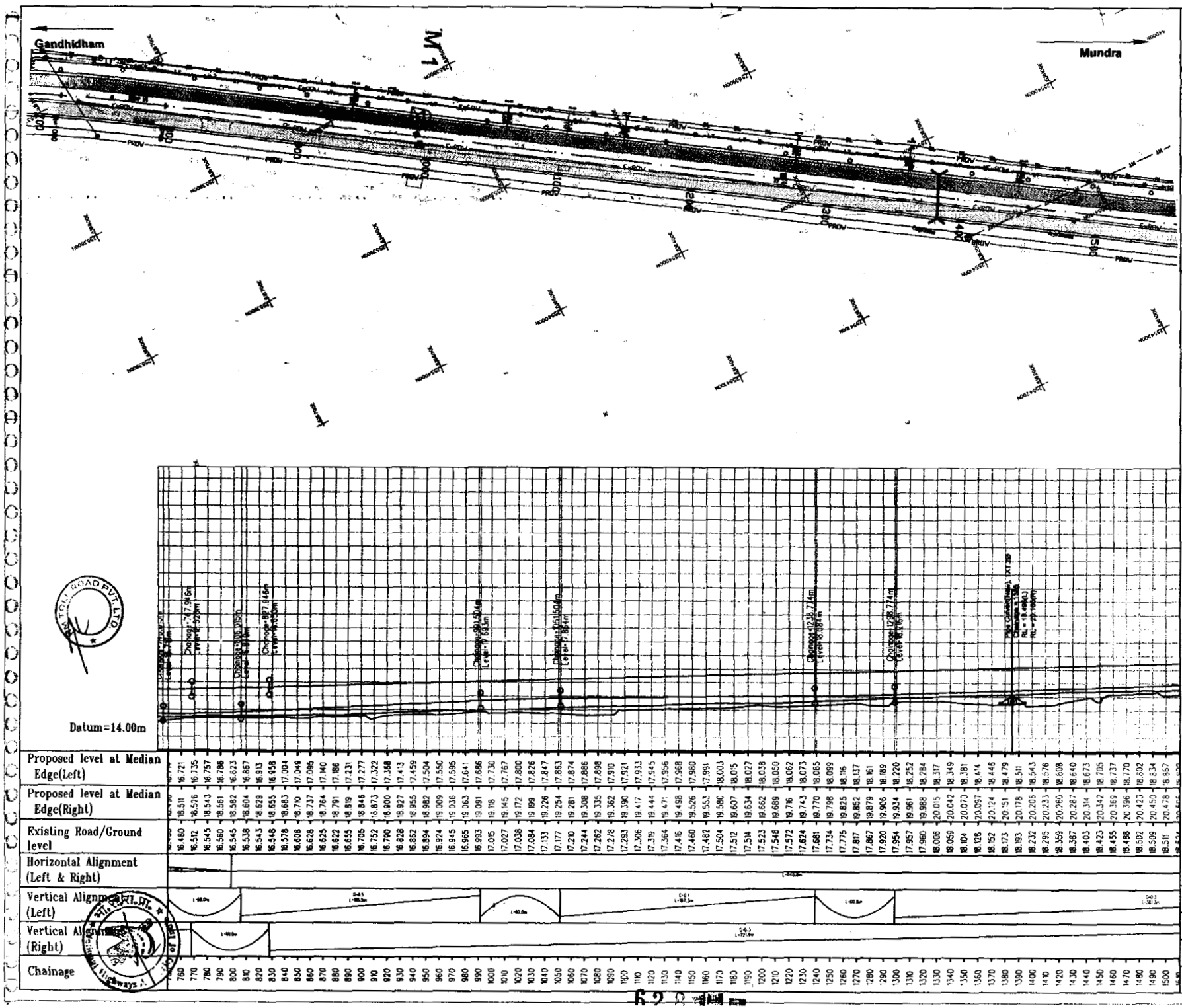
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Boundary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Datum=14.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Preliminary Plan & Profile Ch.0 to Ch. 750
Revn. : R1
September 2009
RITES


Gandhidham
Mundra
NH-8A
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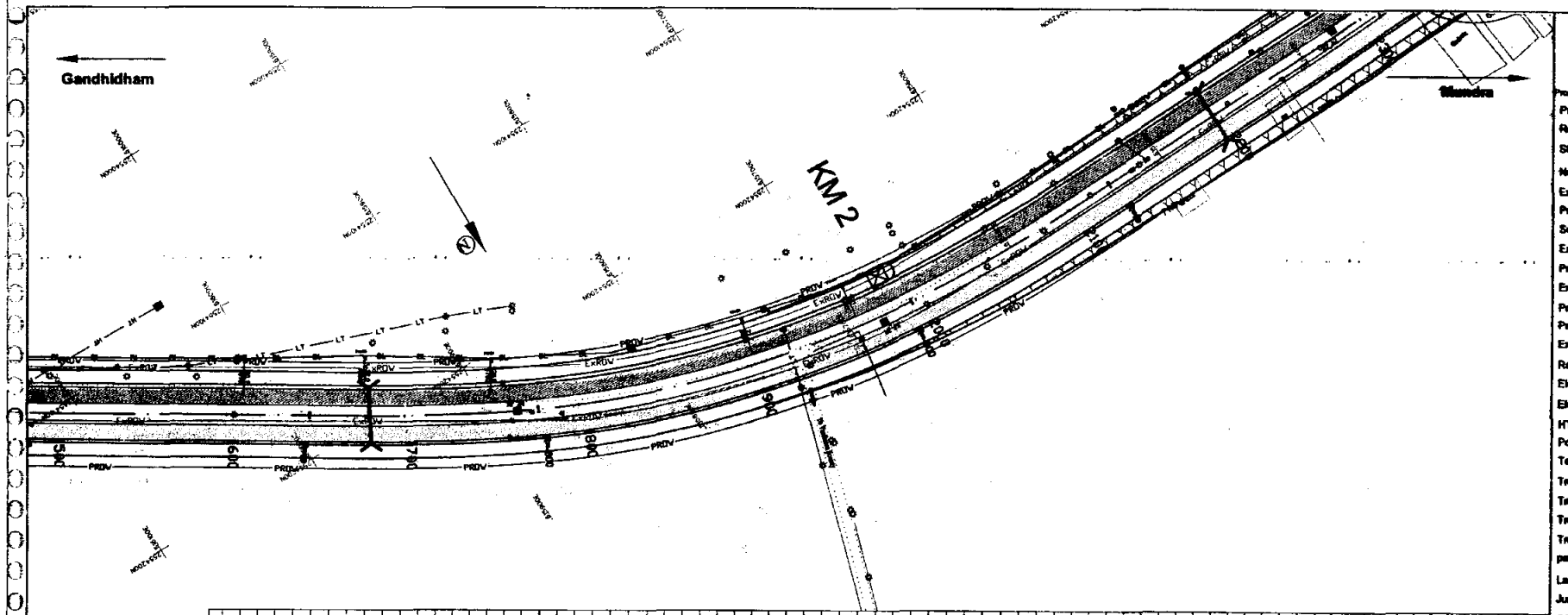
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile Ch.750 to Ch. 1500 Rem. : RH
September 2009
SCALE
RITES



LEGEND

- Proposed Carriageway / Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
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- Proposed Right of Way (PRoW)
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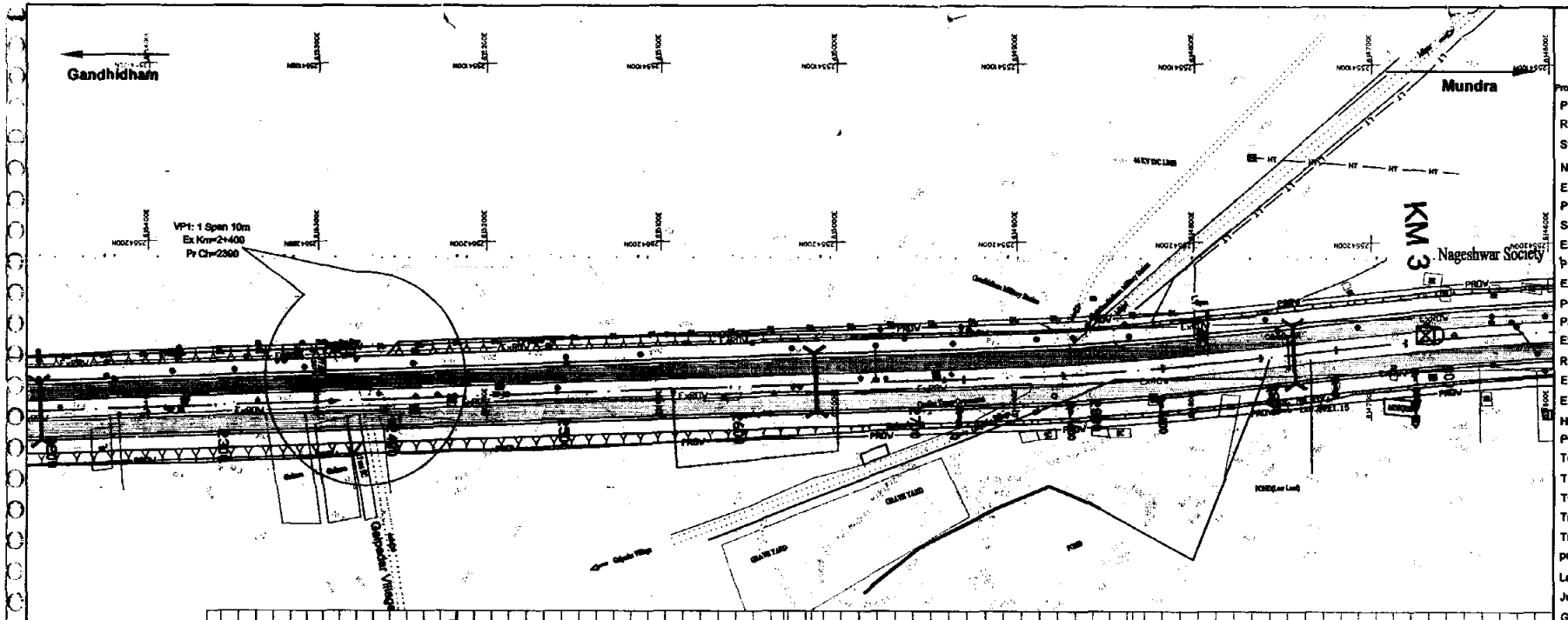
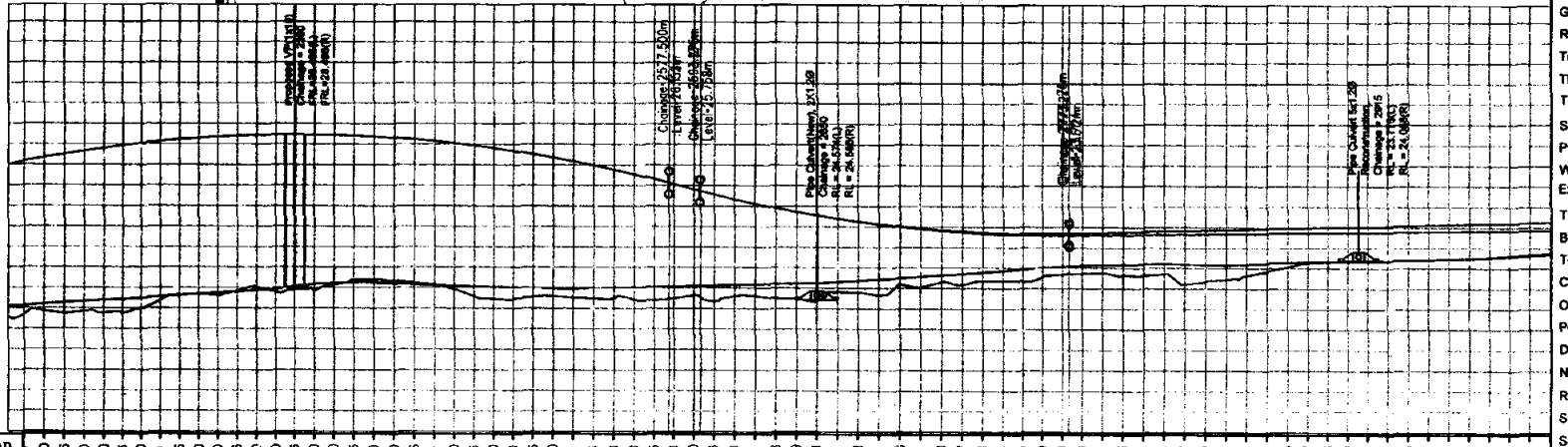
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch. 1600 to Ch. 2200 Rem. : RI — September 2009
Approved By :	Dwg No. feasibilitypreliminary/rites/pp/08 — RITES

KEYSTONE ROAD PVT. LTD.
Consulting Engineers & Highway Consultants





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Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

LEGEND

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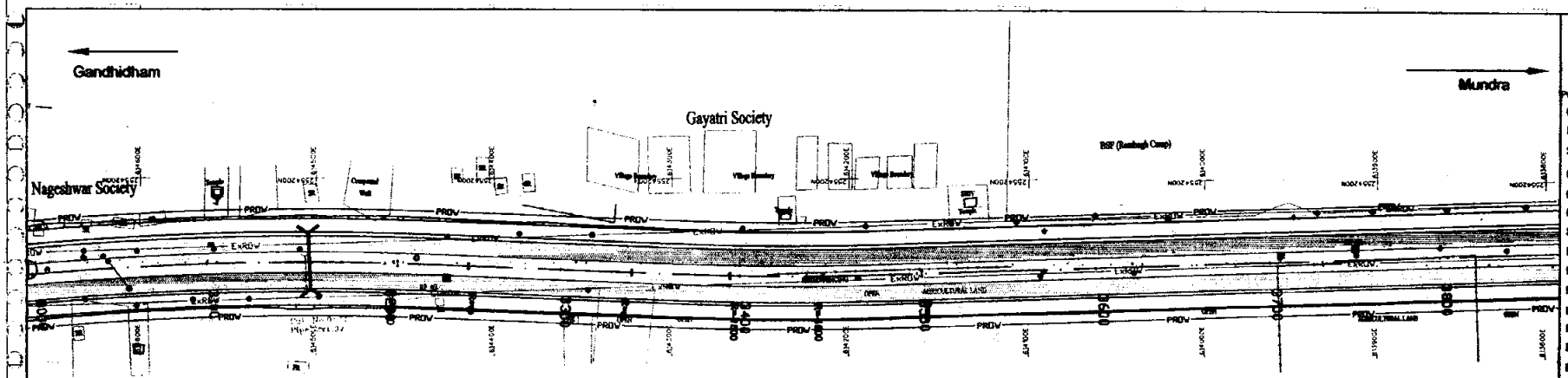
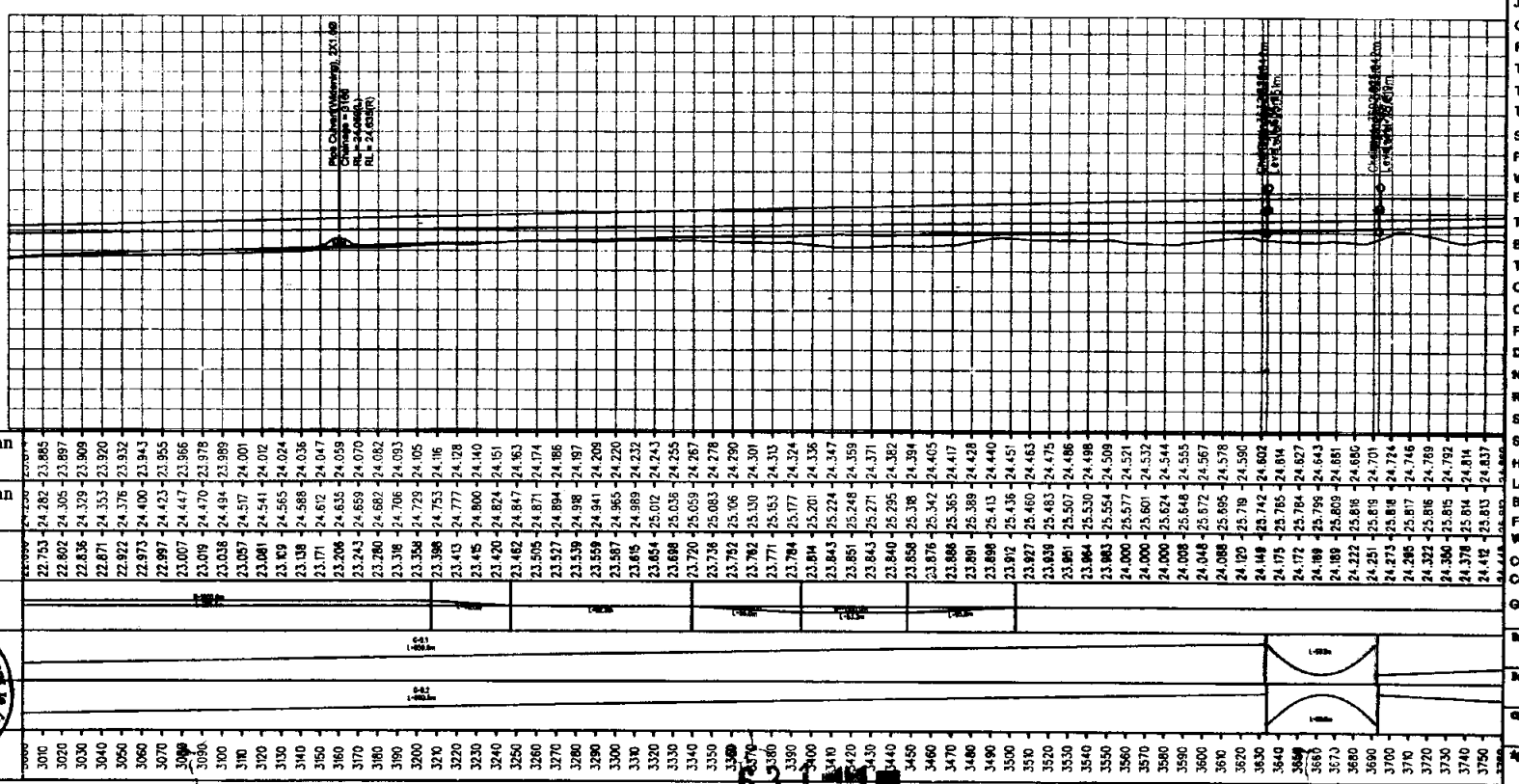
Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.2250 to Ch. 3000 Rmk. : R1 — September 2009
Approved By :	Dwg No. — SCALE — RITES





LEGEND

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- Fencing Line
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Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.3000 to Ch. 3900 Rem. : RH
Approved By :	September 2009
	Dwg No.
	SCALE
	RITES

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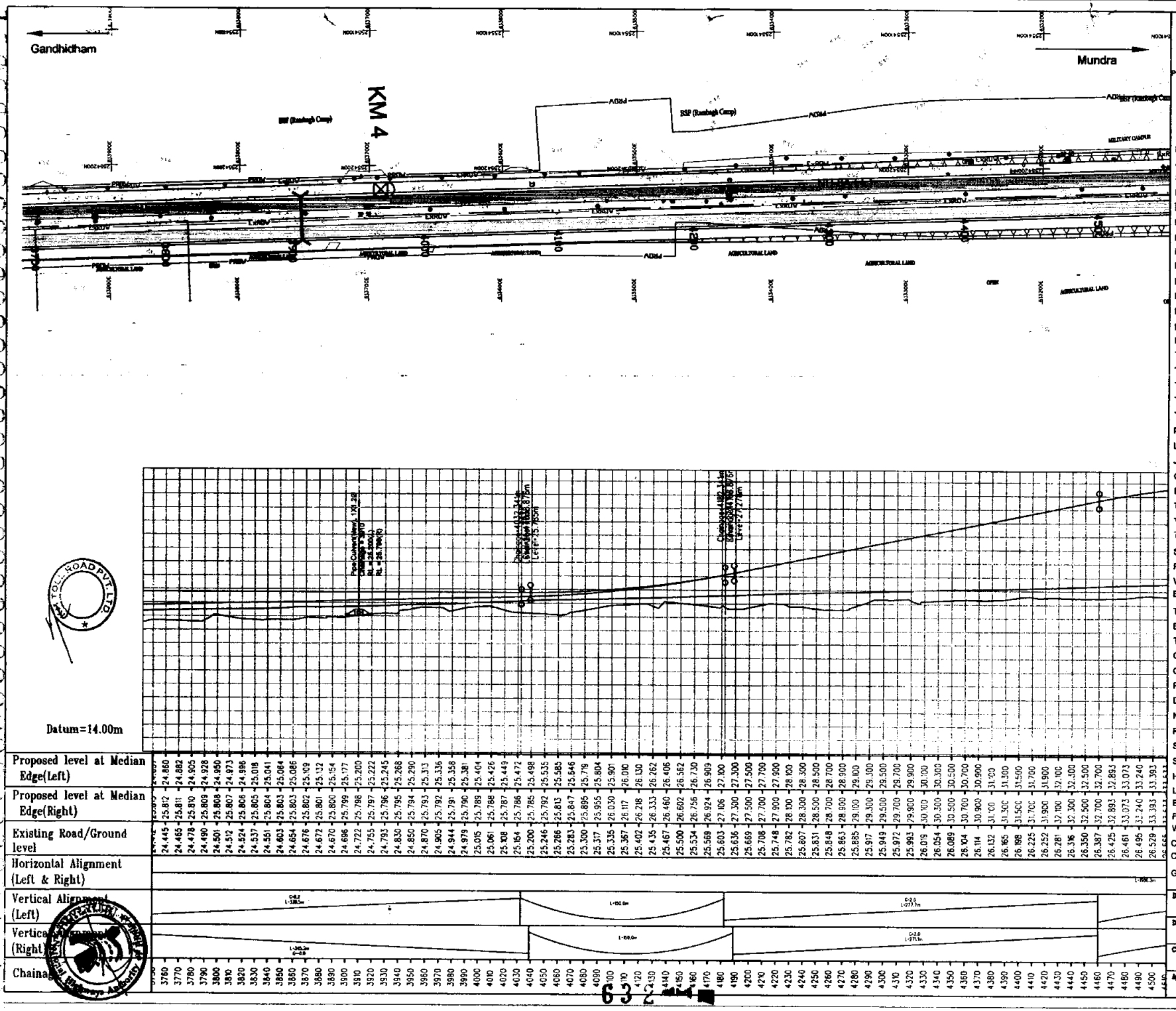
Gandhidham
Mundra
KM 4
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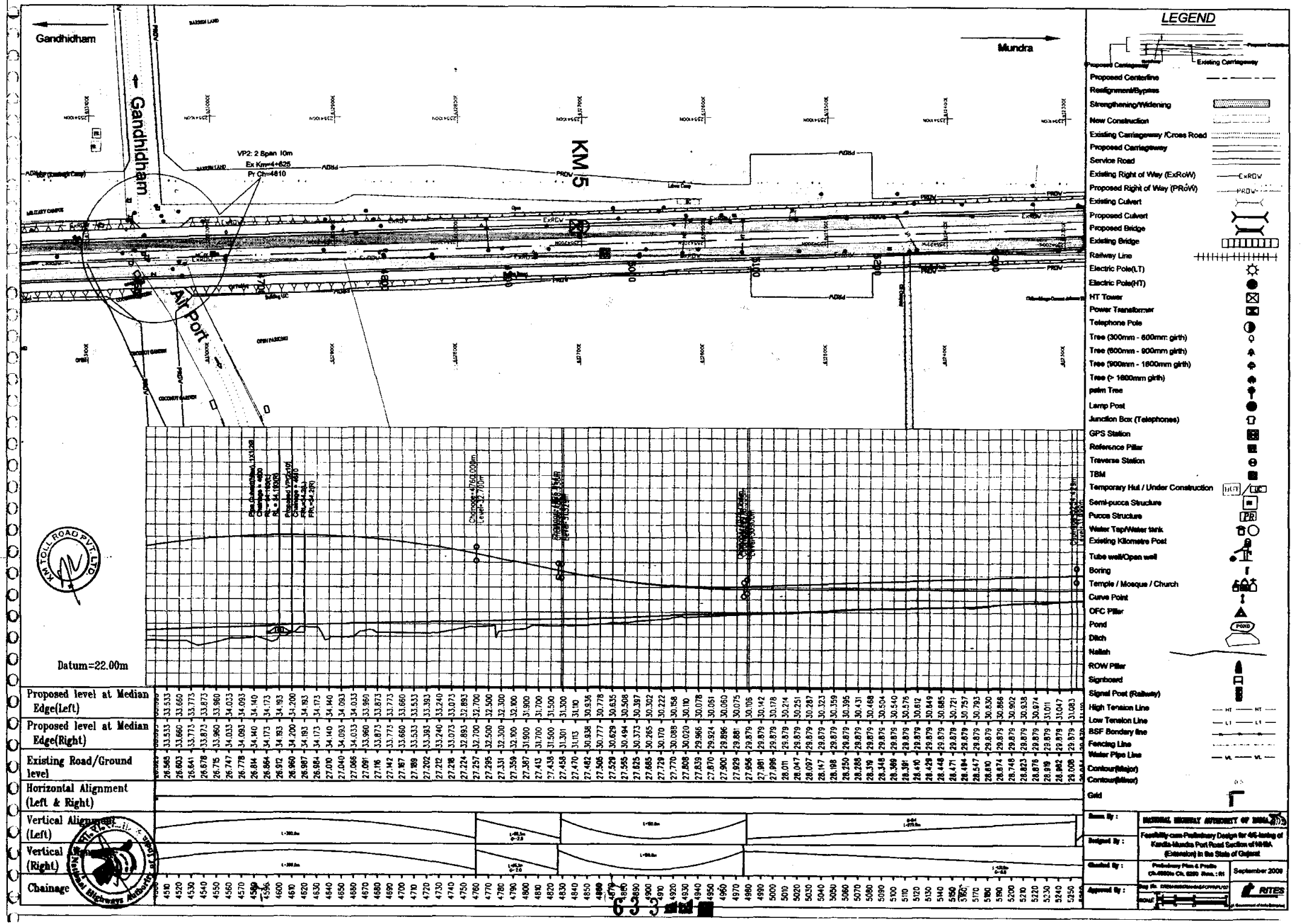
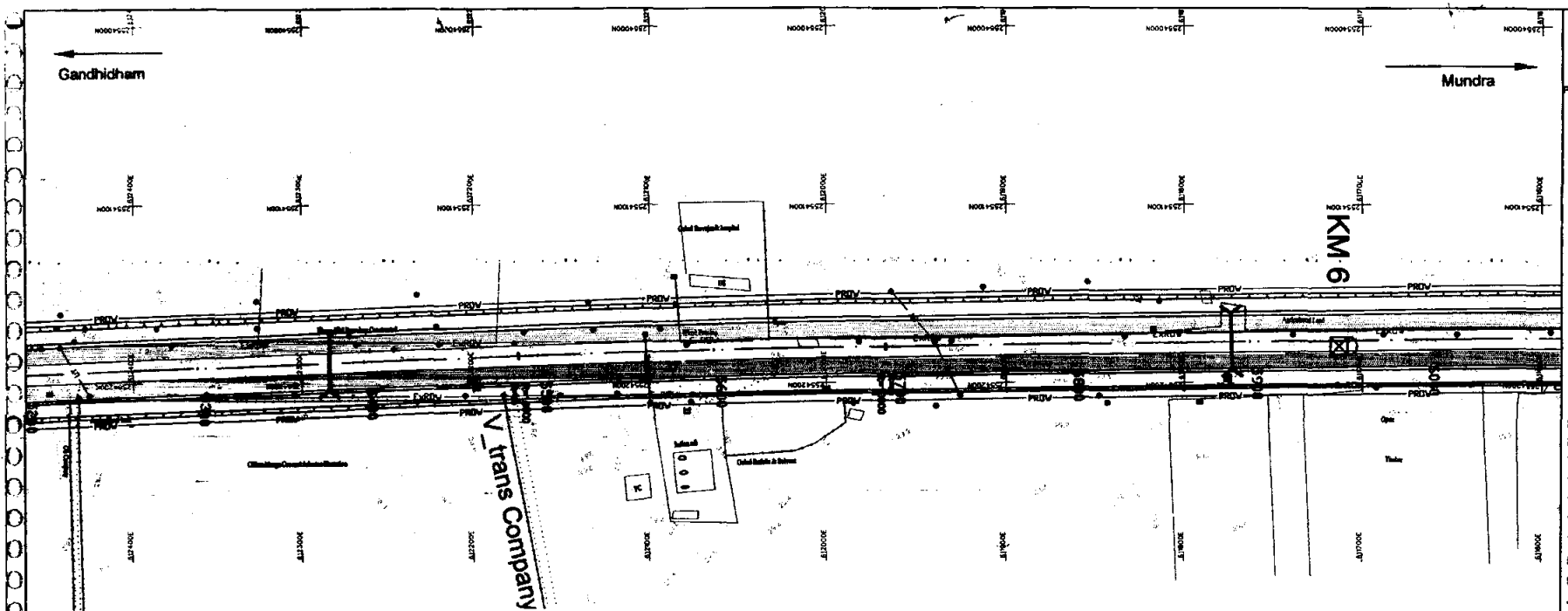
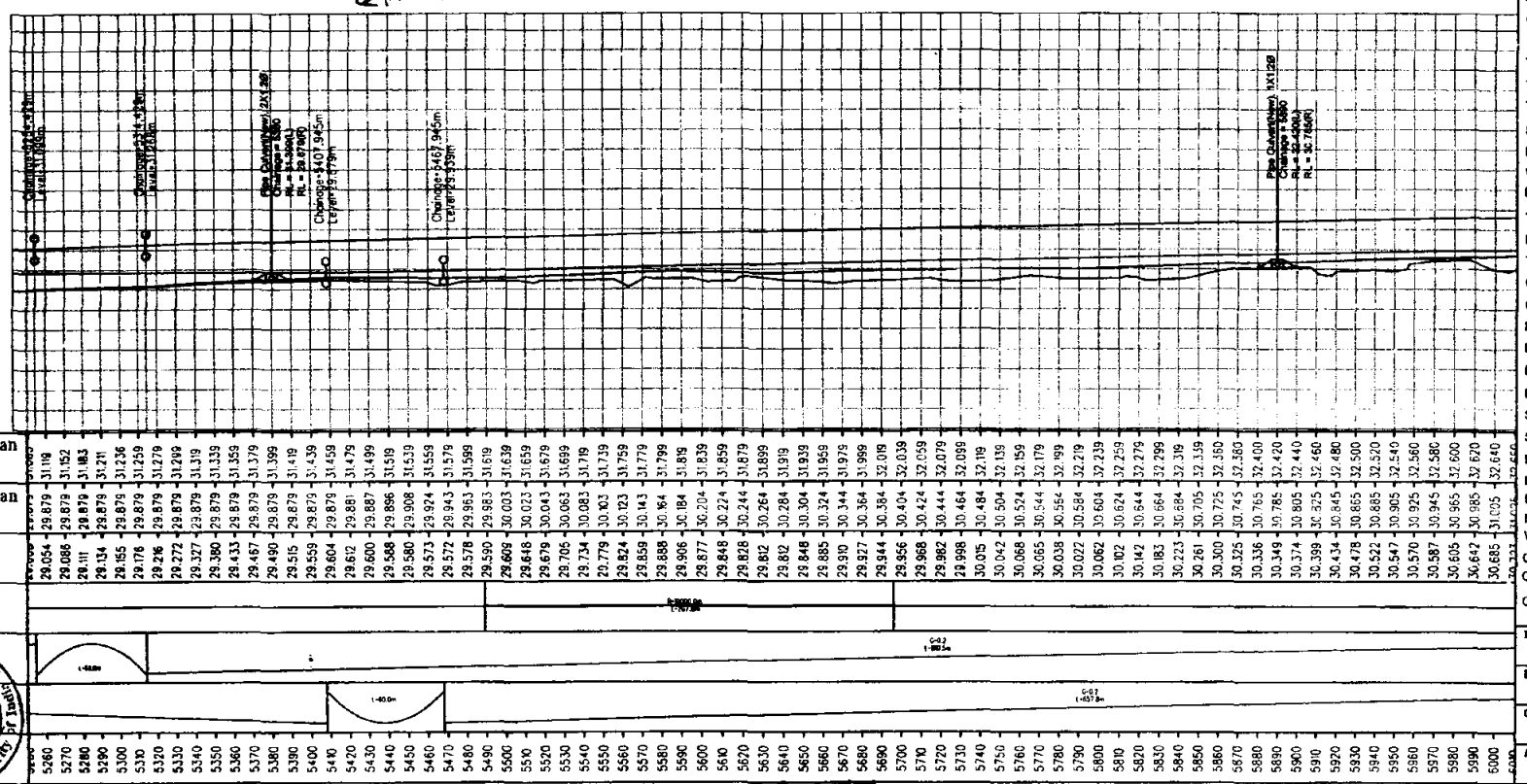
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Preliminary Plan & Profile Ch.3750 to Ch. 4500 Rem : R1
September 2009
RITES


Gandhidham
Mundra
Gandhidham
KM 5
VP2: 2 Span 10m
Ex Km=4+625
Pr Ch=4810
Air Port
Datum=22.00m
KM TOLL ROAD PVT. LTD.
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PROW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Gate
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Preliminary Plan & Profile Ch.4600m to Ch. 6200 Rmk. : R1
September 2009
RITES





Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

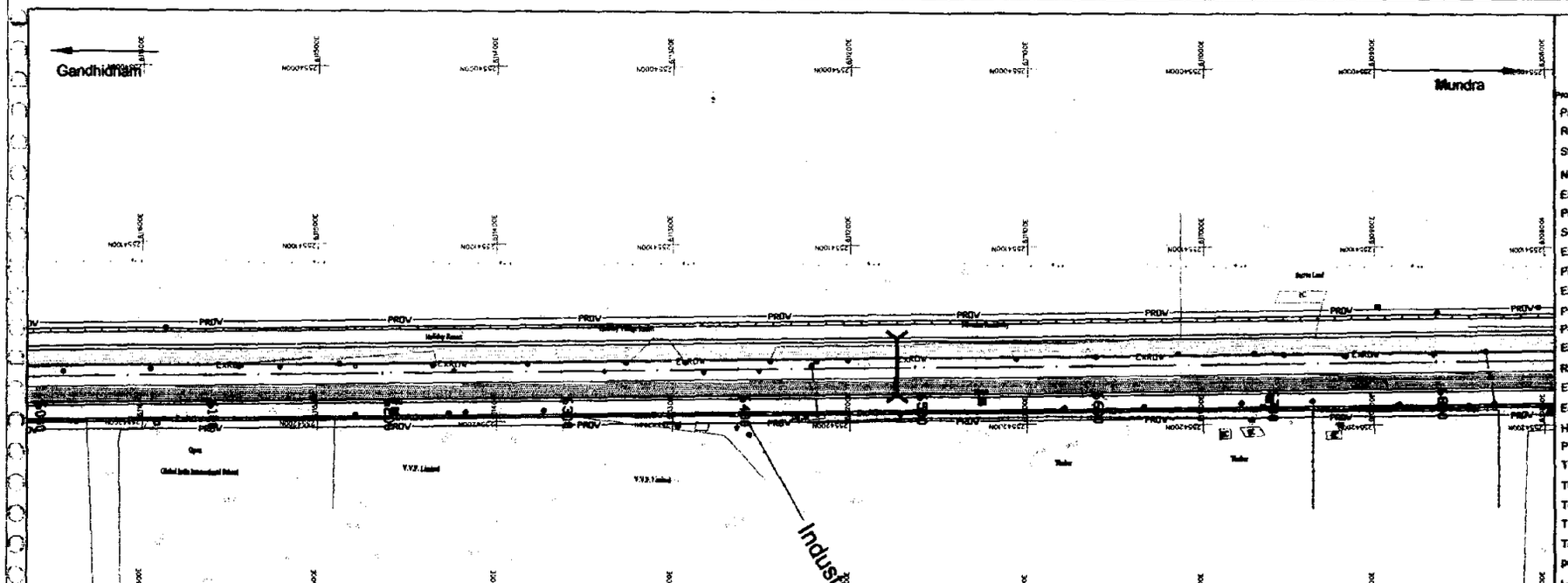
LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction
- Semi-pucca Structure
- Pucca Structure
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.5250m Ch. 8000 Road : R1 — September 2009
Approved By :	Drg No. RITES/NHAI/DPR-GUJ/PP&P/01/01 — SCALE — RITES

KM TOLL ROAD PVT. LTD.

National Highways Authority of India



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction (HUT / UHC)
- Semi-pucca Structure (SP)
- Pucca Structure (PR)
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond (POND)
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line (HT)
- Low Tension Line (LT)
- BSF Bondary line
- Fencing Line
- Water Pipe Line (WL)
- Contour(Major)
- Contour(Minor)
- Grid

Datum=27.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

Drawn By : NATIONAL HIGHWAY AUTHORITY OF INDIA

Designed By :

Checked By :

Approved By :

Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat

Preliminary Plan & Profile
Ch.0000 to Ch. 6750 Rmk : 01

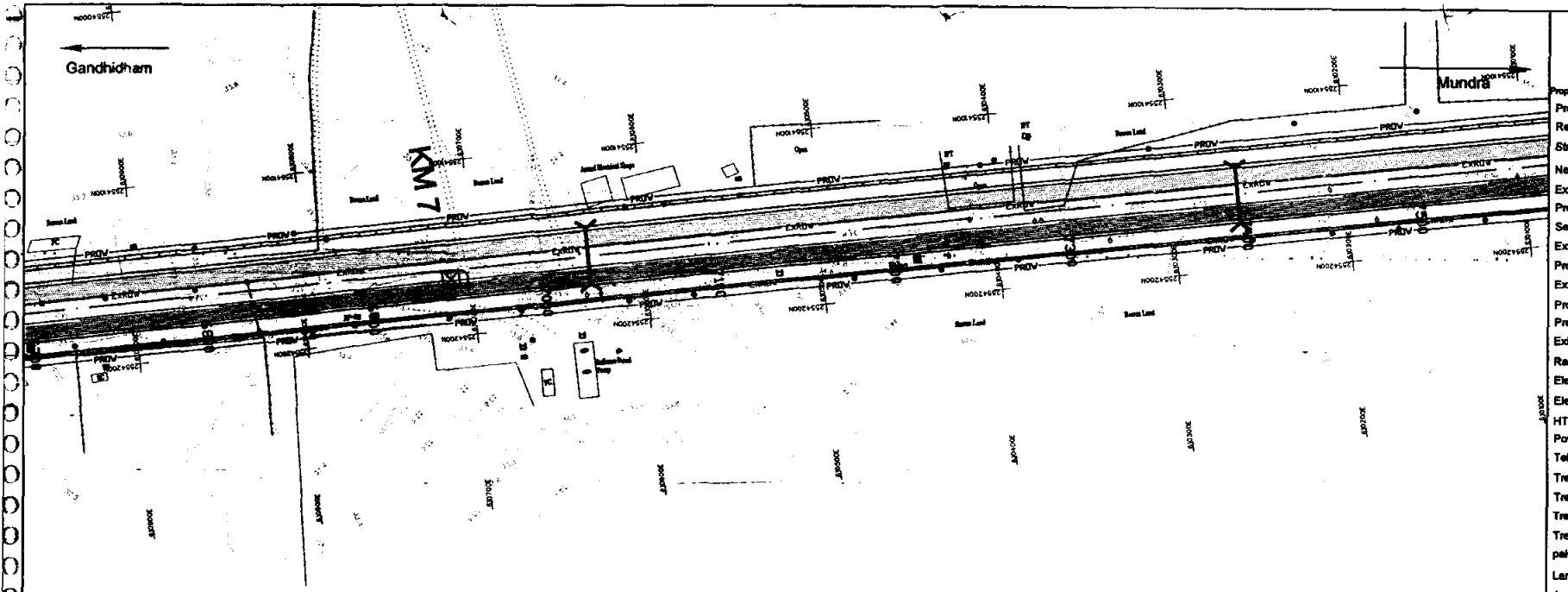
September 2009

Dwg No. RITES/HIGHWAYS/PPP/01

SCALE

RITES

635



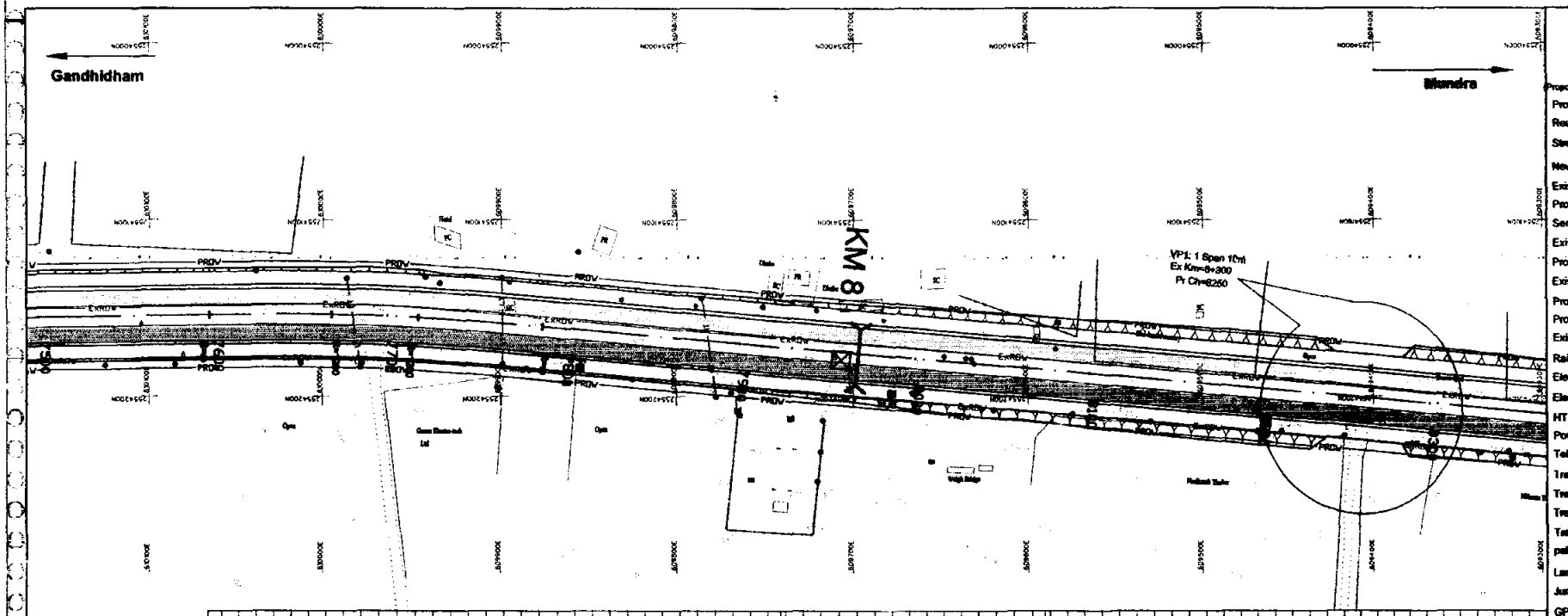
LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction
- Semi-pucca Structure
- Pucca Structure
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Datum=32.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.8750 to Ch. 7500 Rmn. : R1 — September 2009
Approved By :	Dwg No. NHAI/Hwy/8A/GE/CPP/R1/10 — RITES
	SCALE



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction (HUT / UC)
- Semi-pucca Structure (SK)
- Pucca Structure (PR)
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond (POND)
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line (HT)
- Low Tension Line (LT)
- BSF Bondary line
- Fencing Line
- Water Pipe Line (WL)
- Contour(Major)
- Contour(Minor)
- Grid

Datum=34.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

Drawn By :

Designed By :

Checked By :

Approved By :

NATIONAL HIGHWAYS AUTHORITY OF INDIA

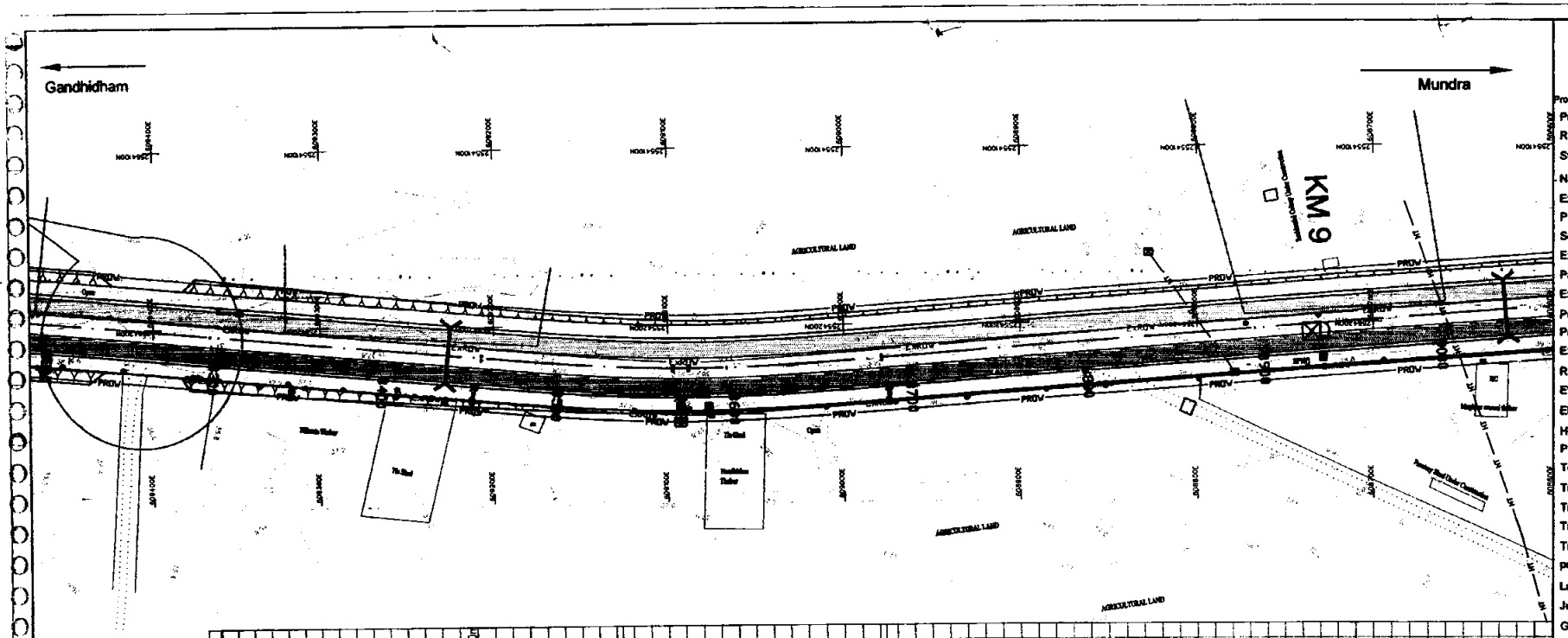
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat

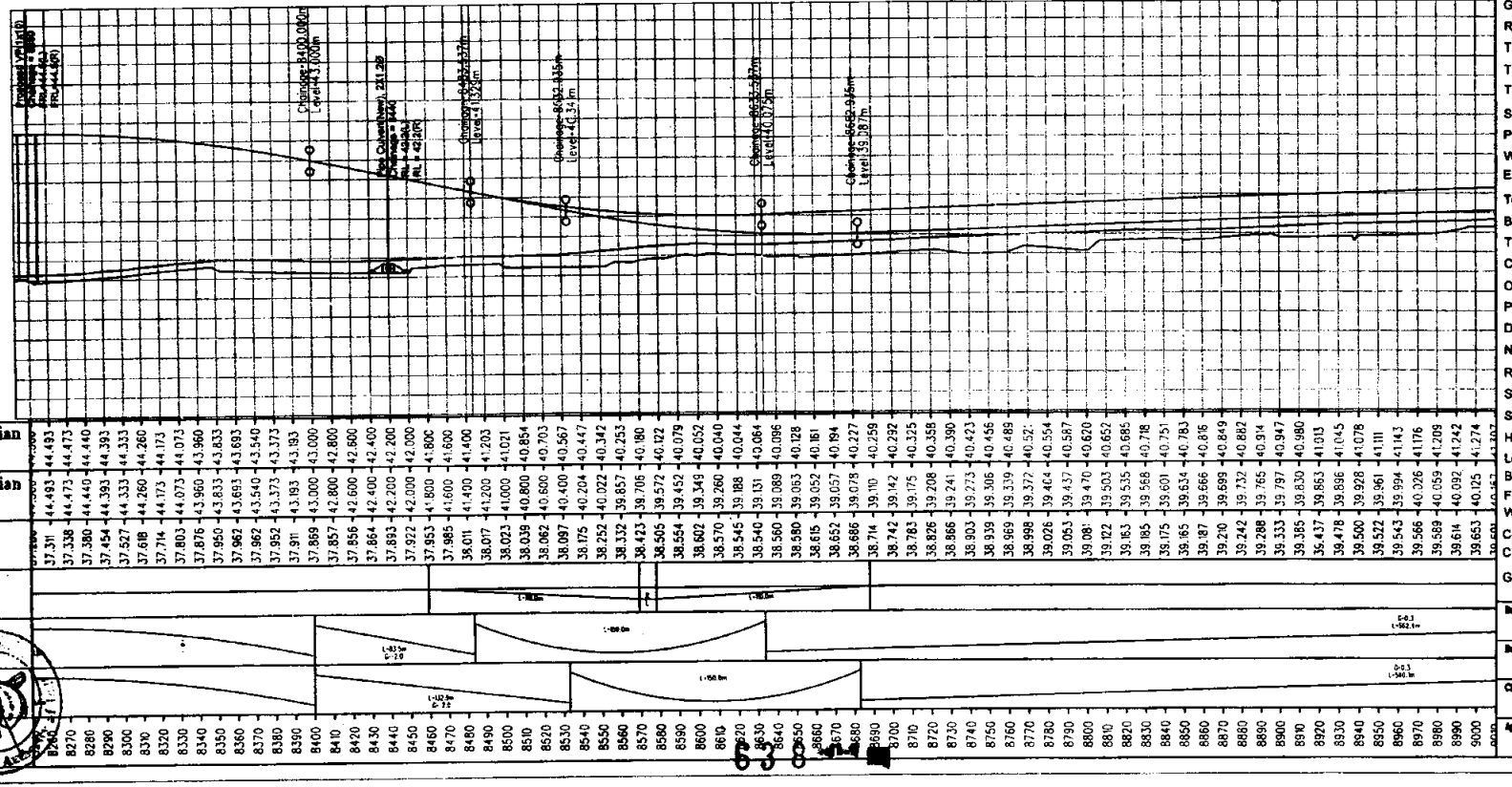
Preliminary Plan & Profile Ch.7500 to Ch. 8250 Rmks : RI

September 2009

RITES

SCALE





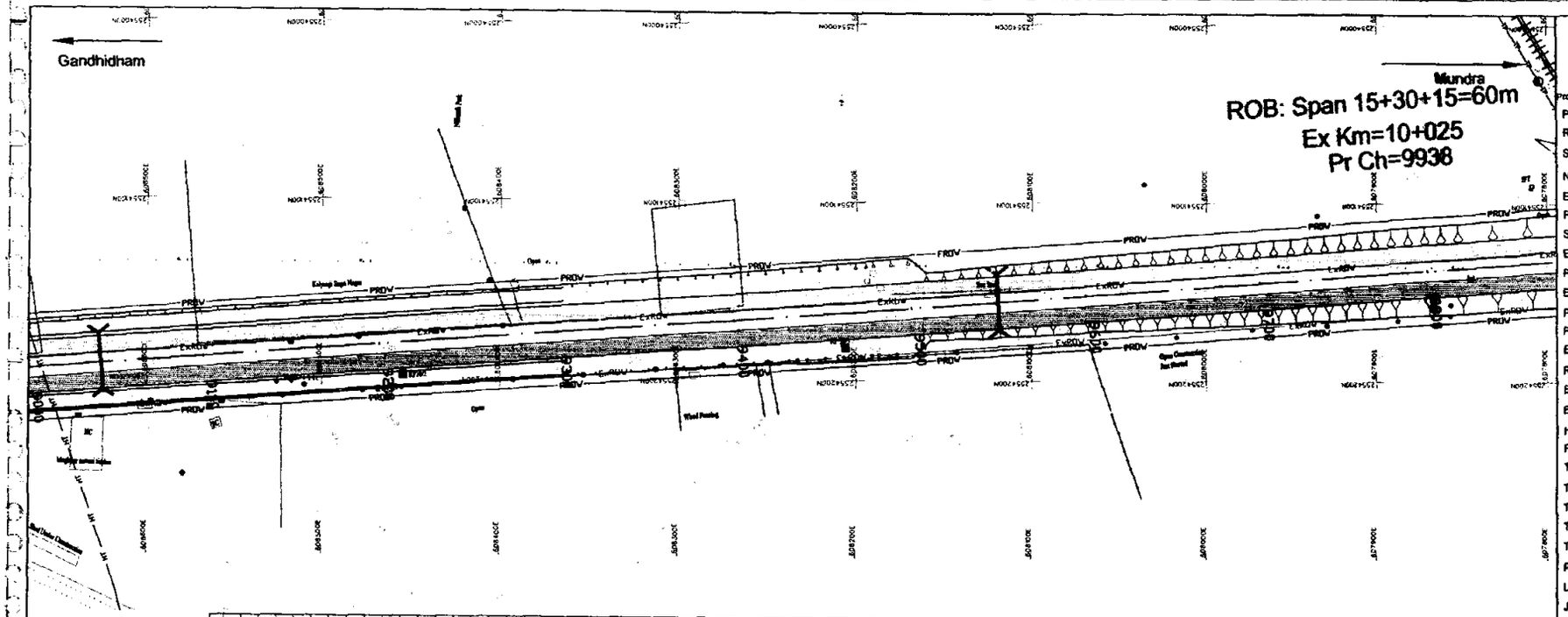
LEGEND

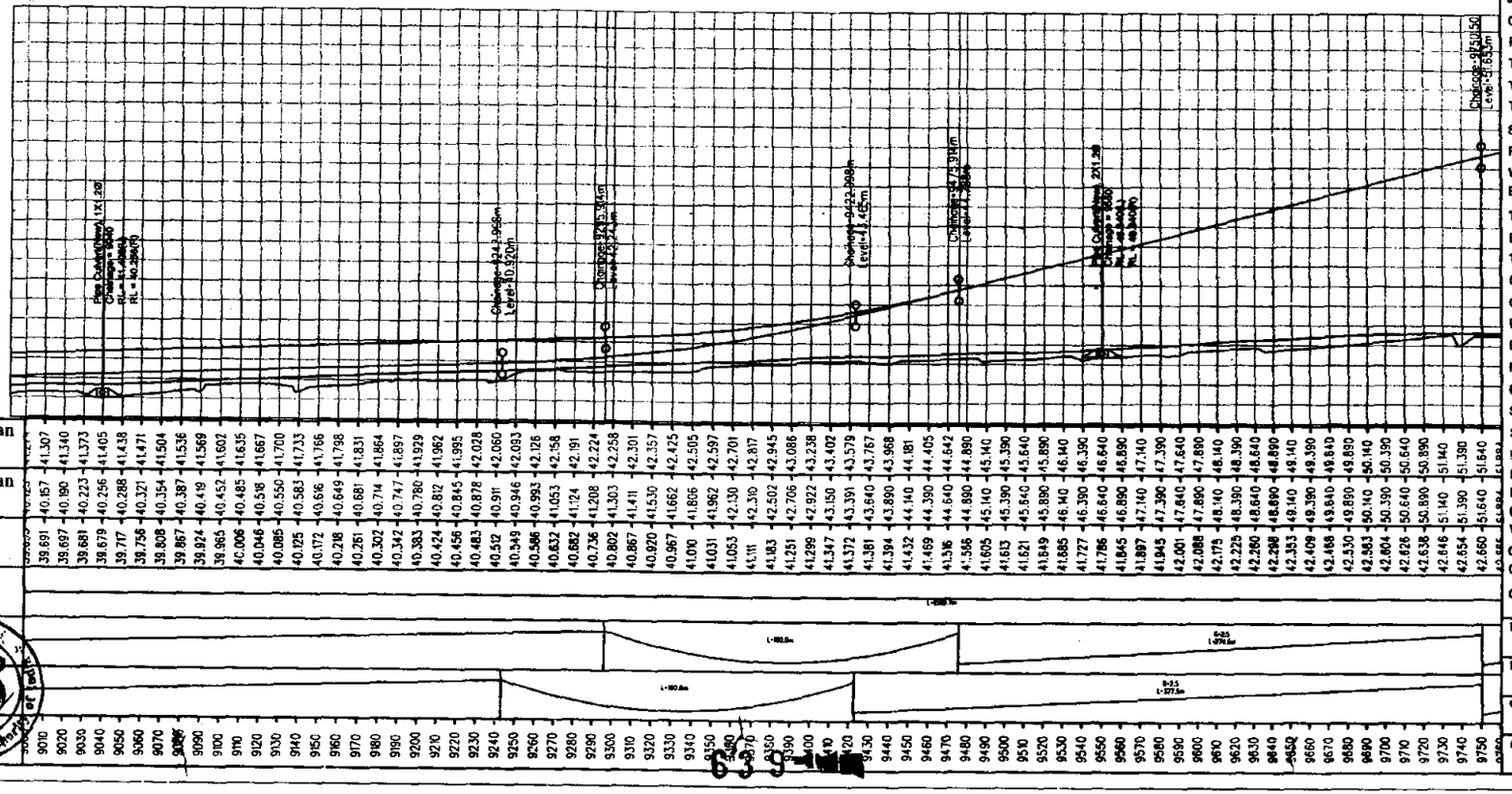
- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW) — ExROV
- Proposed Right of Way (PRoW) — PROV
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction — HUT / UC
- Semi-pucca Structure — SS
- Pucca Structure — PR
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Piller
- Pond — POND
- Ditch
- Nallah
- ROW Piller
- Signboard
- Signal Post (Railway)
- High Tension Line — HT
- Low Tension Line — LT
- BSF Bondary line
- Fencing Line
- Water Pipe Line — WL
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.8250 to Ch. 9000 Rev. : R1 — September 2009
Approved By :	Dwg No. — SCALE — RITES

KMA TOLL ROAD PVT. LTD.

National Highways Authority of India





LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
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- Semi-pucca Structure
- Pucca Structure
- Water Tap/Water tank
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- Tube well/Open well
- Boring
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- Curve Point
- OFC Pillar
- Pond
- Ditch
- Nallah
- ROW Pillar
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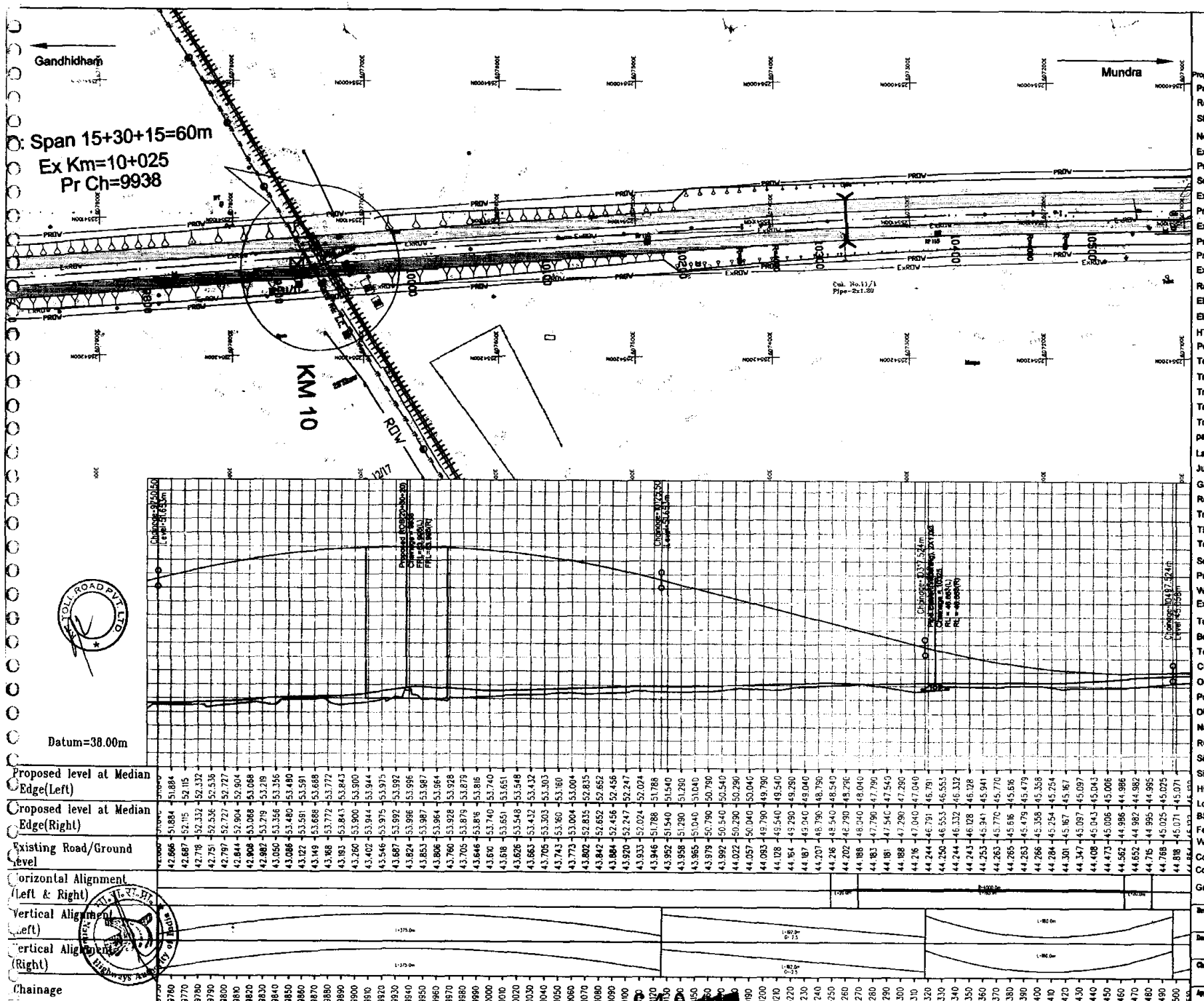
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.9936 to Ch. 9730 Rem. : Rt
Approved By :	September 2009
	Dwg No.
	SCALE
	RITES

IDEAL TOLL ROAD PVT. LTD.

National Highways Authority of India



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
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- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
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- Power Transformer
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- Tree (300mm - 600mm girth)
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- Tree (900mm - 1800mm girth)
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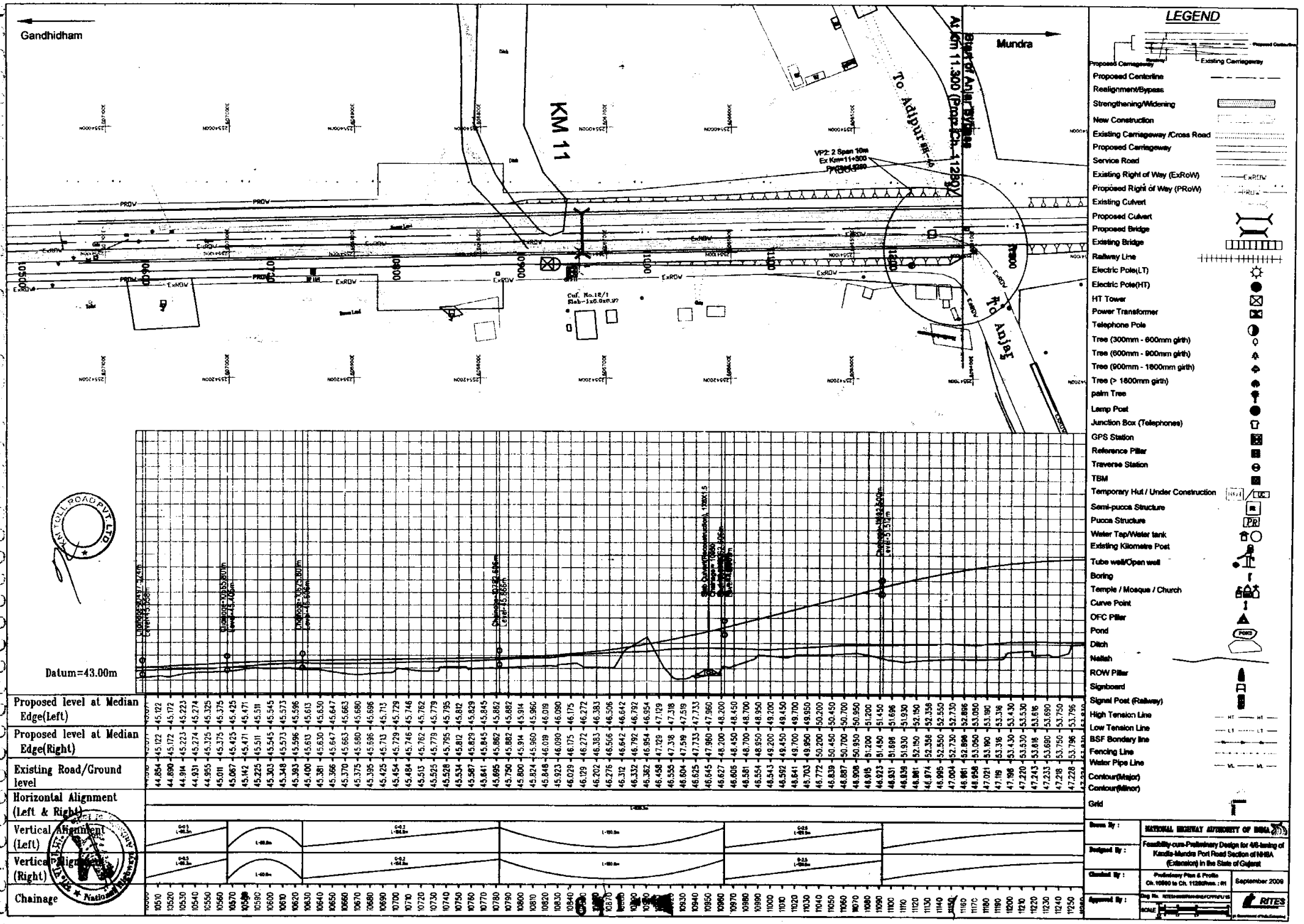
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction (HUT)
- Semi-pucca Structure
- Pucca Structure (PS)
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond (POND)
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line (HT)
- Low Tension Line (LT)
- BSF Bondary line
- Fencing Line
- Water Pipe Line (WL)
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.9750 to Ch. 10500Revs. : R1 — September 2009
Approved By :	Drg No. — SCALE — RITES


Gandhidham
Mundra
KM 11
To Adipur
To Anjar
Bypass Alignment
Datum=43.00m
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
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Junction Box (Telephones)
GPS Station
Reference Pillar
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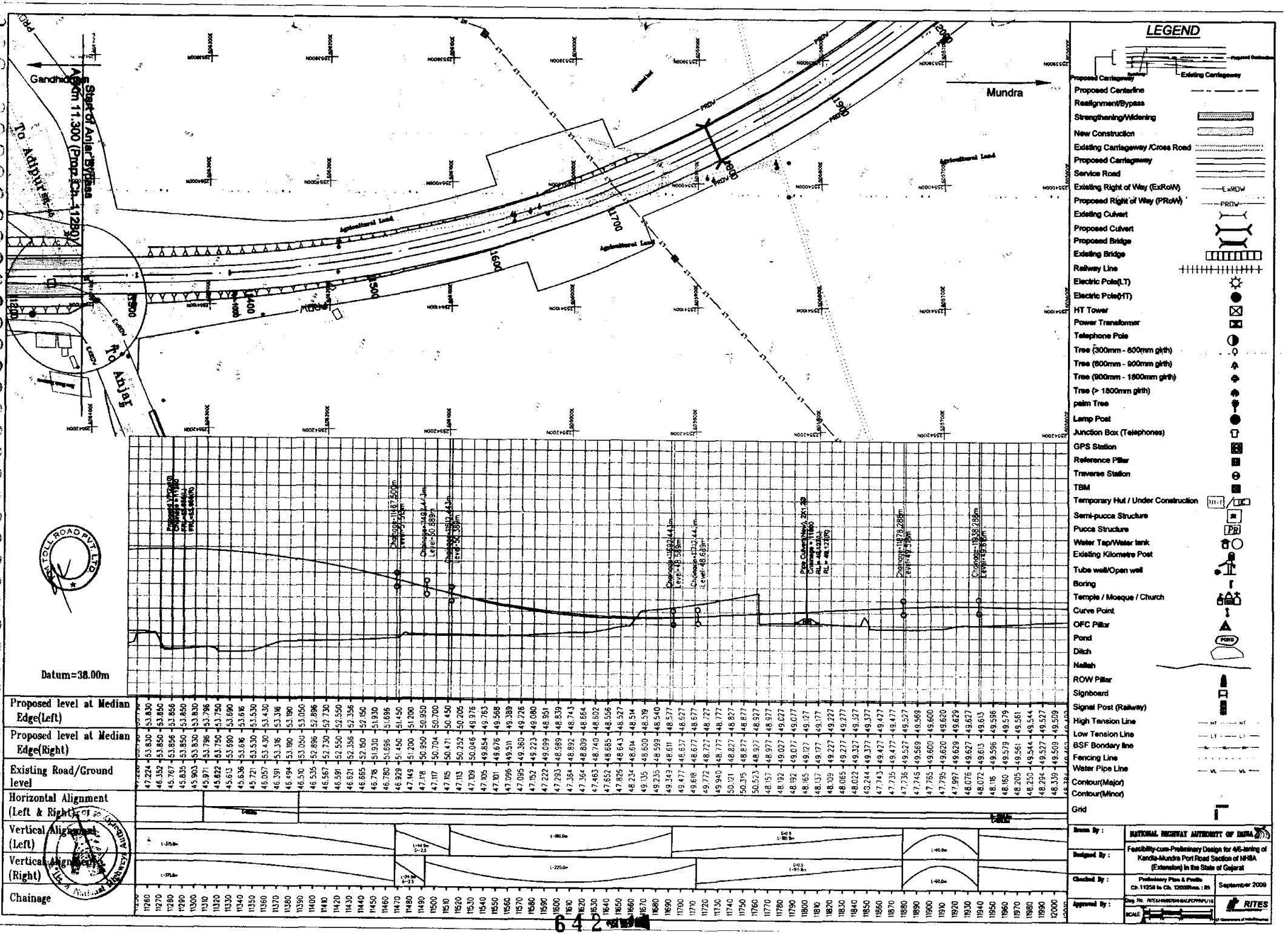
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch. 10560 to Ch. 11280mm : RH
September 2009
RITES
SCALE


Gandhidham
Start of Anjar Bypass
Ach 11.300 (Prop.Ch. 11280)
To Adipur
Mundra
Agricultural Land
PROW
ExROW
Rd
Abiaj
1900
1800
1700
1600
1500
1400
1300
1200
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
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Existing Culvert
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Proposed Bridge
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Railway Line
Electric Pole(LT)
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HT Tower
Power Transformer
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Tree (300mm - 600mm girth)
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Junction Box (Telephones)
GPS Station
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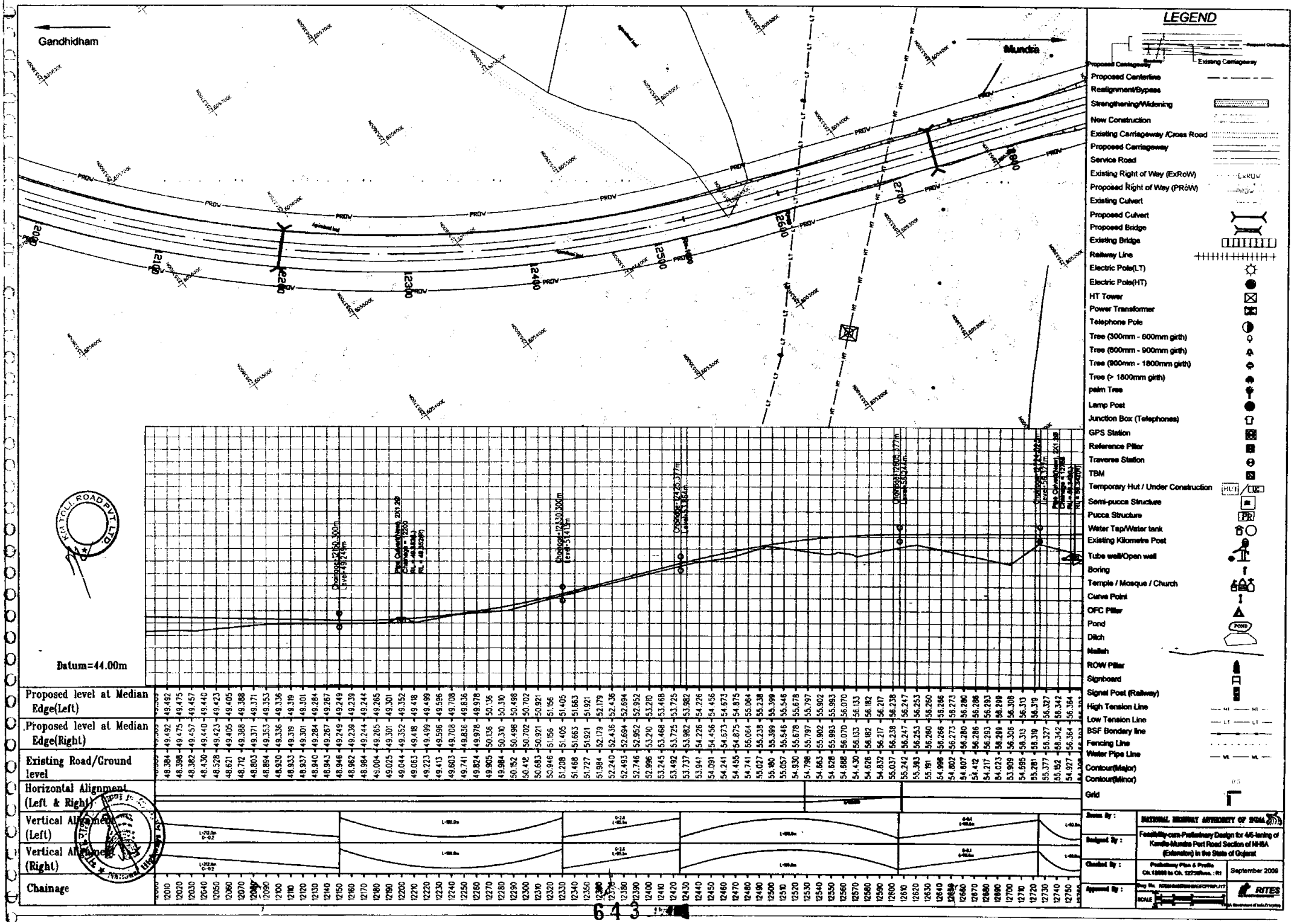
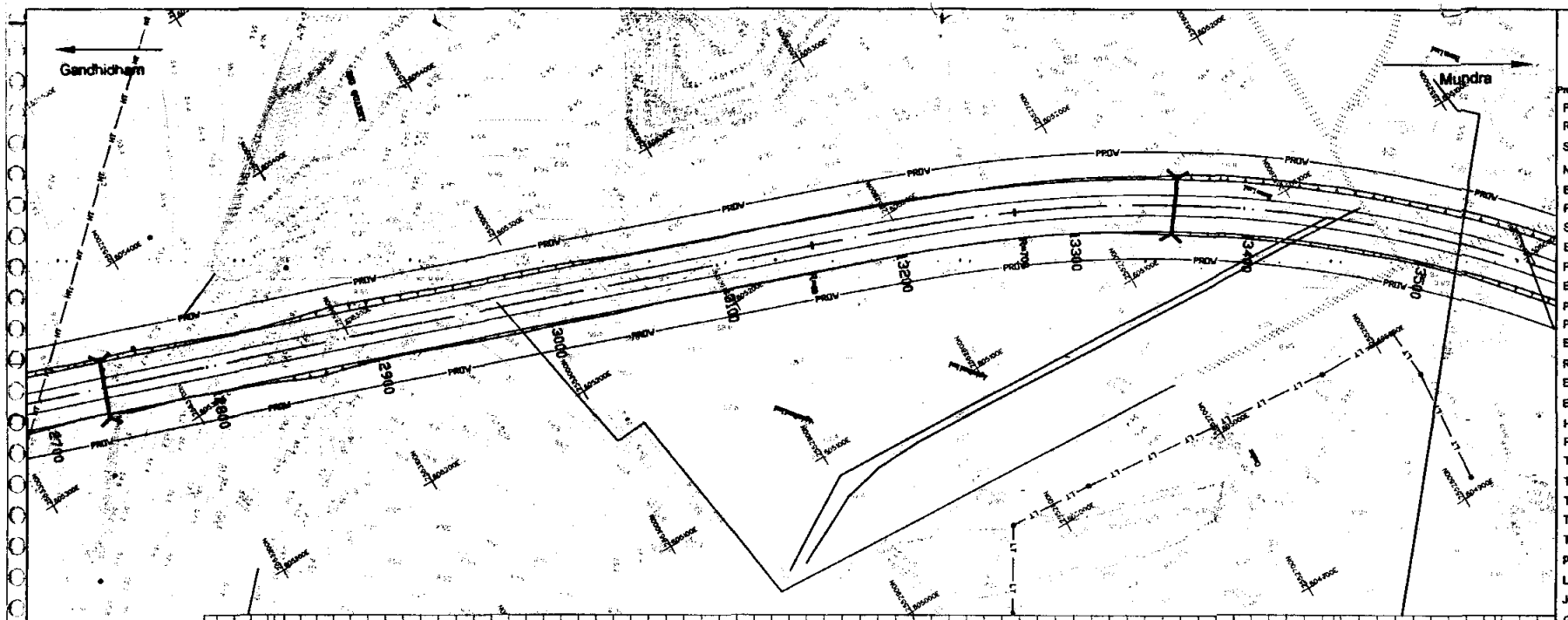
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Datum=38.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile Ch.11250 to Ch. 12600Rmks. : Rt
September 2009
Dwg No.
SCALE
RITES


Gandhidham
Mundra
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Datum=44.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile Ch.12000 to Ch. 12750(Rev. : 01)
September 2009
SCALE
RITES



LEGEND

- Proposed Carriageway / Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PROW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
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- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction (HUT / UC)
- Semi-pucca Structure (PS)
- Pucca Structure (PR)
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond (POND)
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line (HT)
- Low Tension Line (LT)
- BSF Bondary line
- Fencing Line
- Water Pipe Line (WL)
- Contour(Major)
- Contour(Minor)
- Grid

Datum=50.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

Drawn By :

Designed By :

Checked By :

Approved By :

NATIONAL HIGHWAY AUTHORITY OF INDIA

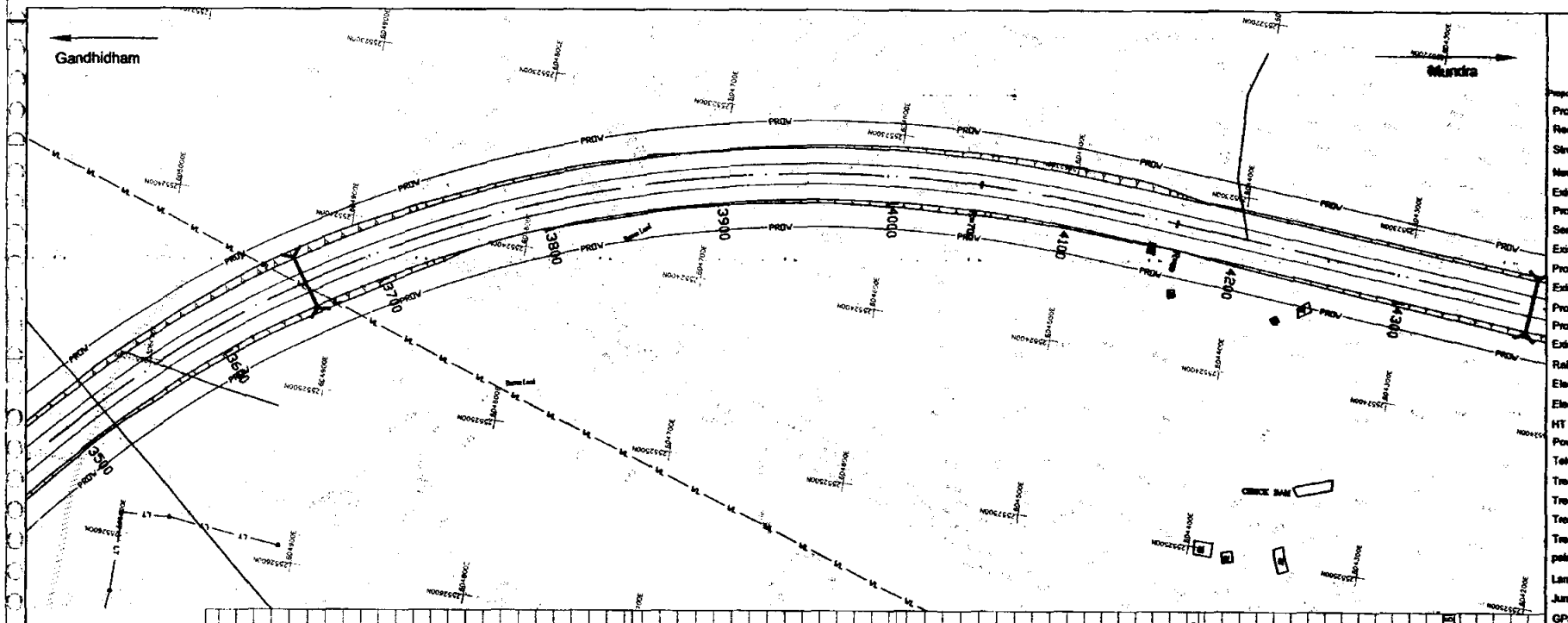
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat

Preliminary Plan & Profile Ch.12750 to Ch. 13500(Km. : 85)

September 2008

SCALE:

RITES



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW) — EXROW
- Proposed Right of Way (PRoW) — PROW
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
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- HT Tower
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- Pond — POND
- Ditch
- Nullah
- ROW Pillar
- Signboard
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- High Tension Line — HT
- Low Tension Line — LT
- BSF Bondary line
- Fencing Line
- Water Pipe Line — WL
- Contour(Major)
- Contour(Minor)
- Grid

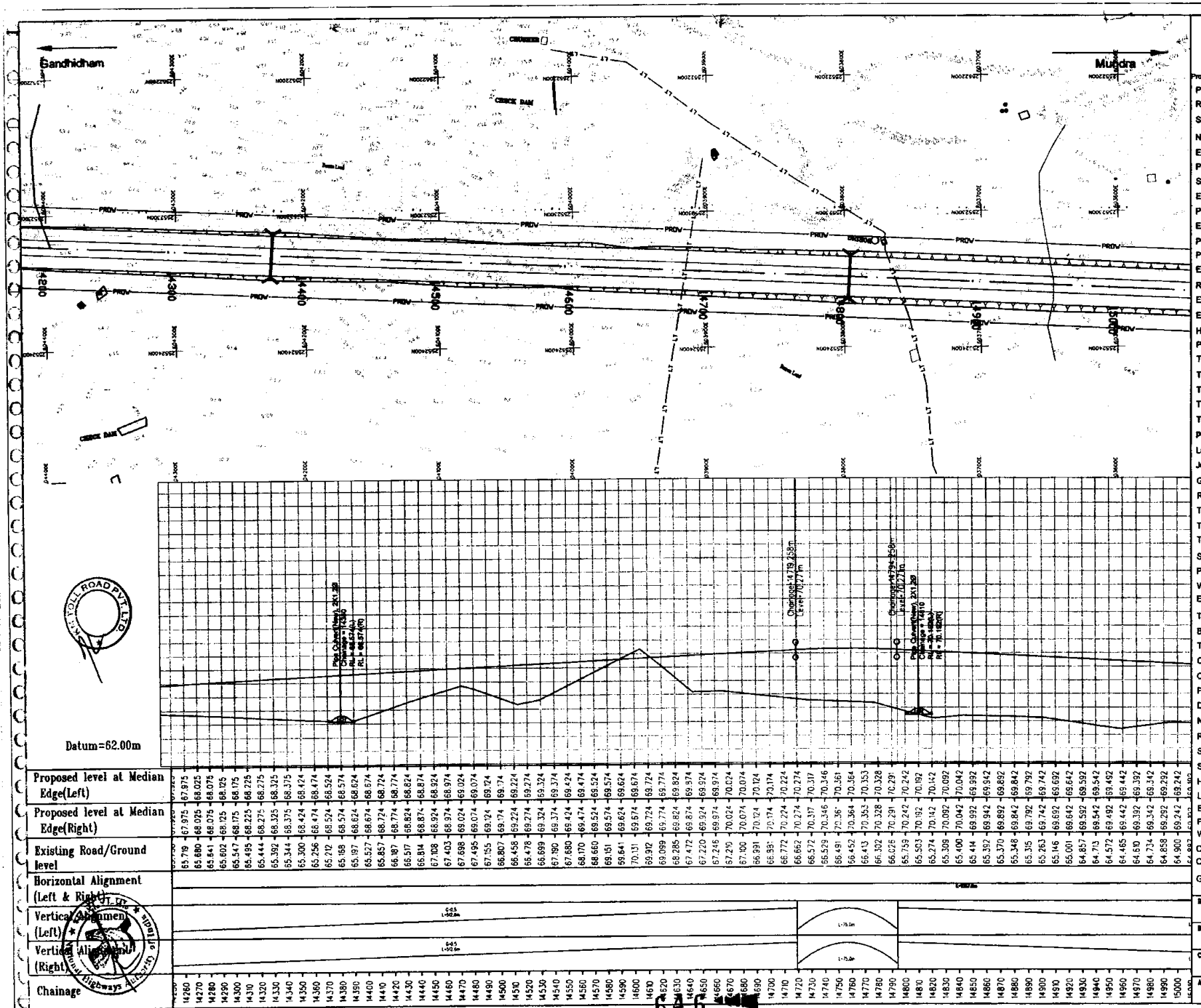
Datum=54.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

KM TOLL ROAD PVT. LTD.

National Highways Authority of India

Drawn By :	GENERAL MANAGER AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch. 13000 to Ch. 14250mts. : Rt — September 2009
Approved By :	Dwg No. [redacted] — RITES



LEGEND

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- Existing Carriageway
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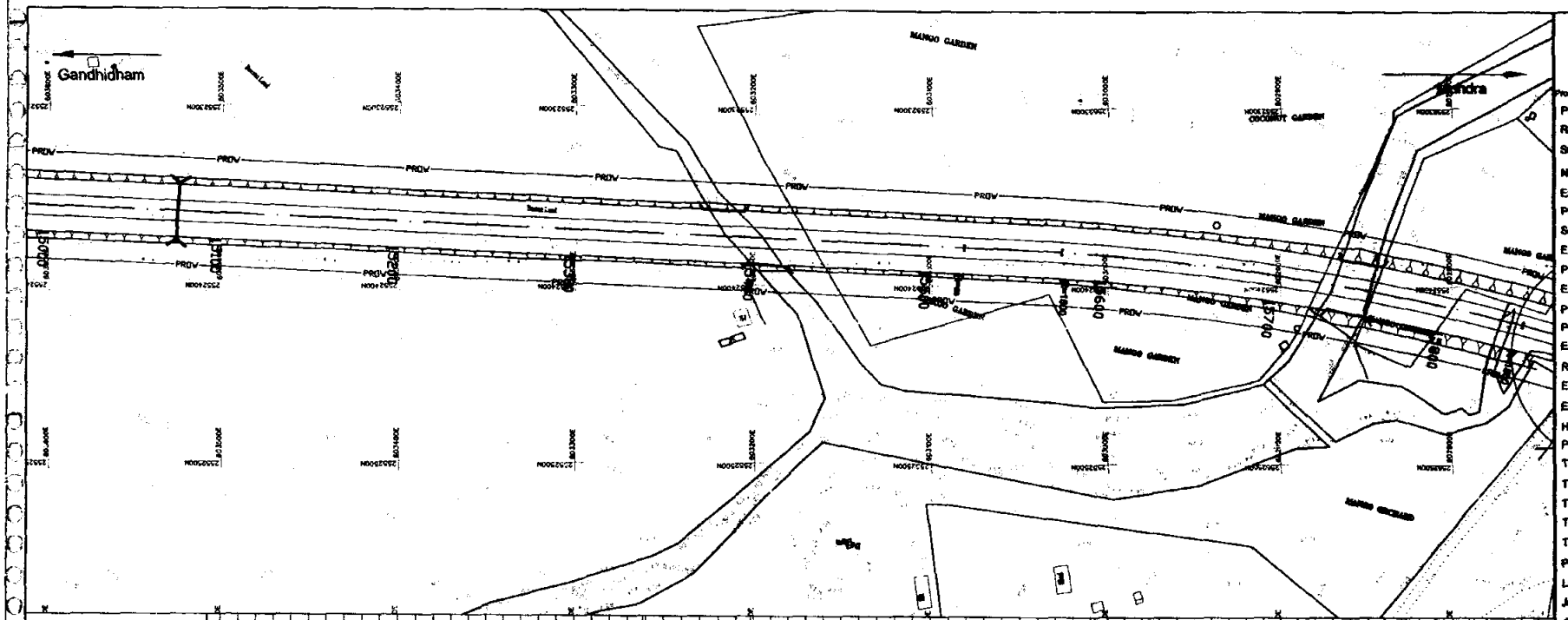
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.14250 to Ch. 15000(Rev. : R1) — September 2009
Approved By :	Drg. No. RITES/NHAI/8A/GDP/PP/L/30 — SCALE — RITES



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW) — ExROW
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- Existing Culvert
- Proposed Culvert
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- Existing Bridge
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- Ditch
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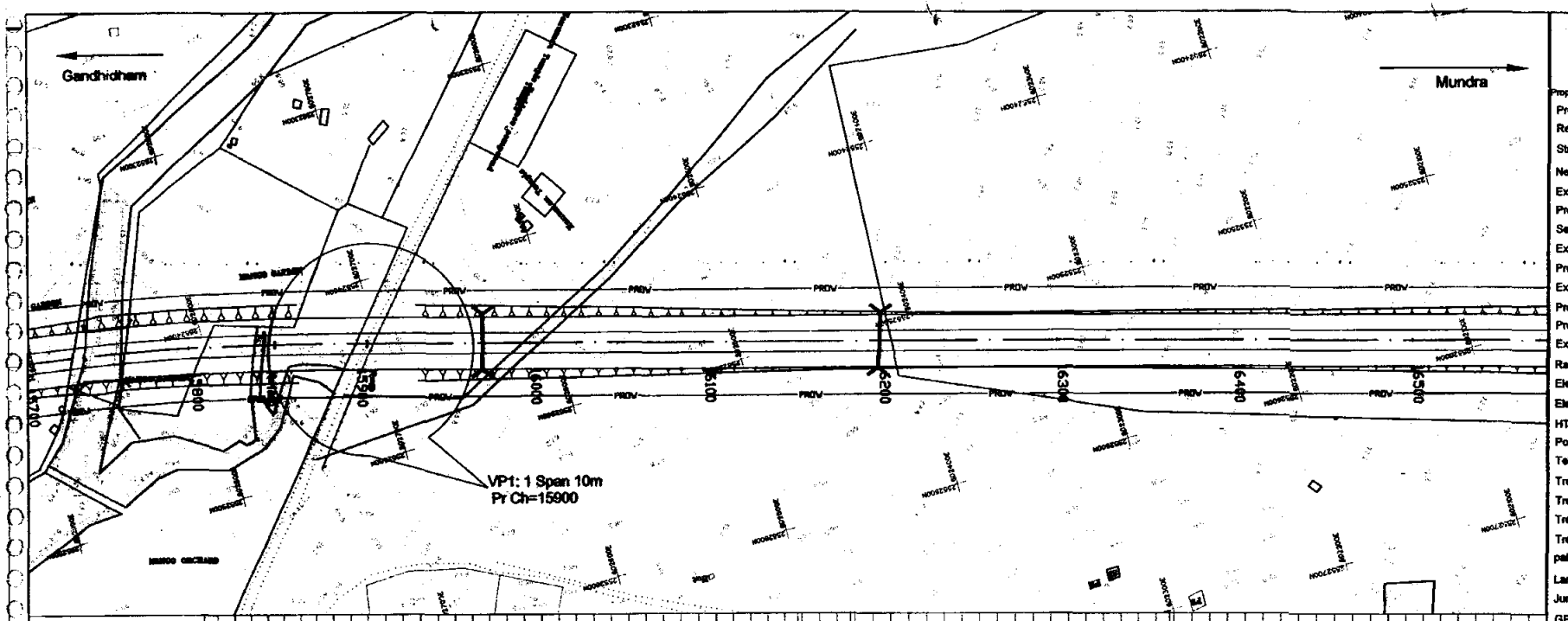
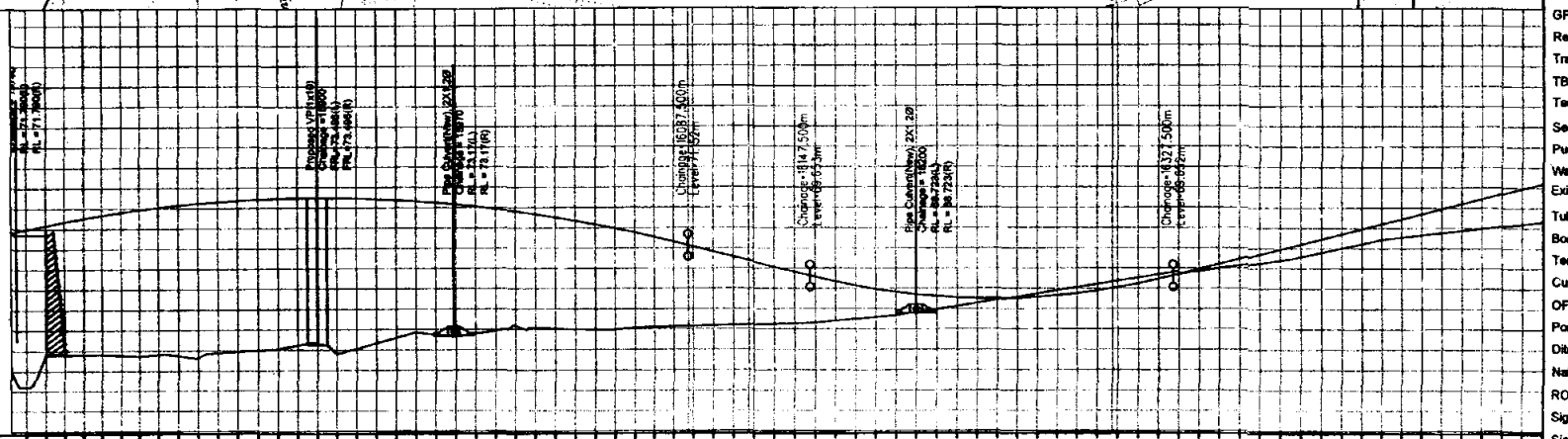
- High Tension Line — HT
- Low Tension Line — LT
- BSF Boundary line
- Fencing Line
- Water Pipe Line — WL
- Contour(Major)
- Contour(Minor)
- Grid

Proposed level at Median Edge(Left)	64.887 69.192 64.874 69.142 64.861 69.092 64.844 69.042 64.804 68.992 64.811 68.942 64.856 68.892 64.887 68.842 64.885 68.792 64.882 68.742 64.879 68.692 64.876 68.642 64.912 68.592 64.992 68.542 65.072 68.492 65.152 68.442 65.232 68.392 65.312 68.342 65.392 68.292 65.465 68.242 65.496 68.192 65.498 68.142 65.383 68.092 65.383 68.042 65.003 67.998 64.823 67.962 64.843 67.934 64.658 67.914 64.804 67.903 64.949 67.900 65.094 67.900 65.239 67.900 65.277 67.900 65.283 67.900 65.244 67.900 65.143 67.900 65.041 67.900 64.939 67.900 64.848 67.900 64.812 67.900 64.675 67.900 64.804 67.900 64.834 67.900 64.863 67.900 64.813 67.900 64.918 67.900 64.954 67.900 64.989 67.900 65.025 67.900 65.060 67.904 65.095 67.922 65.130 67.953 65.166 67.998 65.199 68.057 65.231 68.130 65.264 68.217 65.296 68.318 65.343 68.433 65.531 68.562 65.783 68.704 65.954 68.860 65.806 69.031 65.655 69.215 65.640 69.413 65.650 69.625 65.757 69.851 66.034 70.090 66.119 70.340 66.215 70.590 66.079 70.840 65.943 71.090 65.807 71.338 65.436 71.570 71.790 71.996
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	15010 15020 15030 15040 15050 15060 15070 15080 15090 15100 15110 15120 15130 15140 15150 15160 15170 15180 15190 15200 15210 15220 15230 15240 15250 15260 15270 15280 15290 15300 15310 15320 15330 15340 15350 15360 15370 15380 15390 15400 15410 15420 15430 15440 15450 15460 15470 15480 15490 15500 15510 15520 15530 15540 15550 15560 15570 15580 15590 15600 15610 15620 15630 15640 15650 15660 15670 15680 15690 15700 15710 15720 15730 15740 15750

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.15000 to Ch. 15750 Rev. : R1 — September 2009
Approved By :	Dwg No. NH8A/Extension/Kandla/PP/PP/121 — RITES
	SCALE





Proposed level at Median Edge(Left)	72.190 72.370 72.538 72.690 72.830 72.956 73.070 73.170 73.256 73.330 73.390 73.436 73.470 73.490 73.496 73.490 73.470 73.436 73.390 73.330 73.256 73.170 73.070 72.956 72.830 72.690 72.536 72.370 72.190 71.996 71.790 71.570 71.336 71.090 70.840 70.590 70.340 70.090 69.840 69.591 69.362 69.160 68.987 68.841 68.723 68.633 68.570 68.535 68.528 68.549 68.598 68.674 68.778 68.910 69.070 69.258 69.473 69.715 69.965 70.215 70.465 70.715 70.965 71.215 71.465 71.715 71.965 72.215 72.465 72.715 72.965 73.215 73.465 73.715 73.965 74.215
Proposed level at Median Edge(Right)	72.190 72.370 72.538 72.690 72.830 72.956 73.070 73.170 73.256 73.330 73.390 73.436 73.470 73.490 73.496 73.490 73.470 73.436 73.390 73.330 73.256 73.170 73.070 72.956 72.830 72.690 72.536 72.370 72.190 71.996 71.790 71.570 71.336 71.090 70.840 70.590 70.340 70.090 69.840 69.591 69.362 69.160 68.987 68.841 68.723 68.633 68.570 68.535 68.528 68.549 68.598 68.674 68.778 68.910 69.070 69.258 69.473 69.715 69.965 70.215 70.465 70.715 70.965 71.215 71.465 71.715 71.965 72.215 72.465 72.715 72.965 73.215 73.465 73.715 73.965 74.215
Existing Road/Ground level	65.787 65.800 65.813 65.820 65.777 65.739 65.817 65.751 65.658 65.885 65.953 65.996 66.066 66.227 66.287 65.819 66.053 66.323 66.593 66.863 66.740 66.644 66.786 66.928 67.182 67.078 67.032 66.992 66.977 66.988 67.067 67.115 67.136 67.158 67.179 67.201 67.222 67.251 67.260 67.319 67.406 67.493 67.560 67.671 67.820 67.969 68.122 68.278 68.434 68.591 68.747 68.904 69.060 69.216 69.373 69.529 69.685 69.842 69.852 69.990 70.128 70.266 70.404 70.577 70.790 71.002 71.215 71.428 71.552 71.661 71.771 71.880 71.990 72.099 72.209 72.318
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	15760 15770 15780 15790 15800 15810 15820 15830 15840 15850 15860 15870 15880 15890 15900 15910 15920 15930 15940 15950 15960 15970 15980 15990 16000 16010 16020 16030 16040 16050 16060 16070 16080 16090 16100 16110 16120 16130 16140 16150 16160 16170 16180 16190 16200 16210 16220 16230 16240 16250 16260 16270 16280 16290 16300 16310 16320 16330 16340 16350 16360 16370 16380 16390 16400 16410 16420 16430 16440 16450 16460 16470 16480 16490 16500

LEGEND

- Proposed Carriageway / Existing Carriageway
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- Low Tension Line
- BSF Bondary line
- Fencing Line
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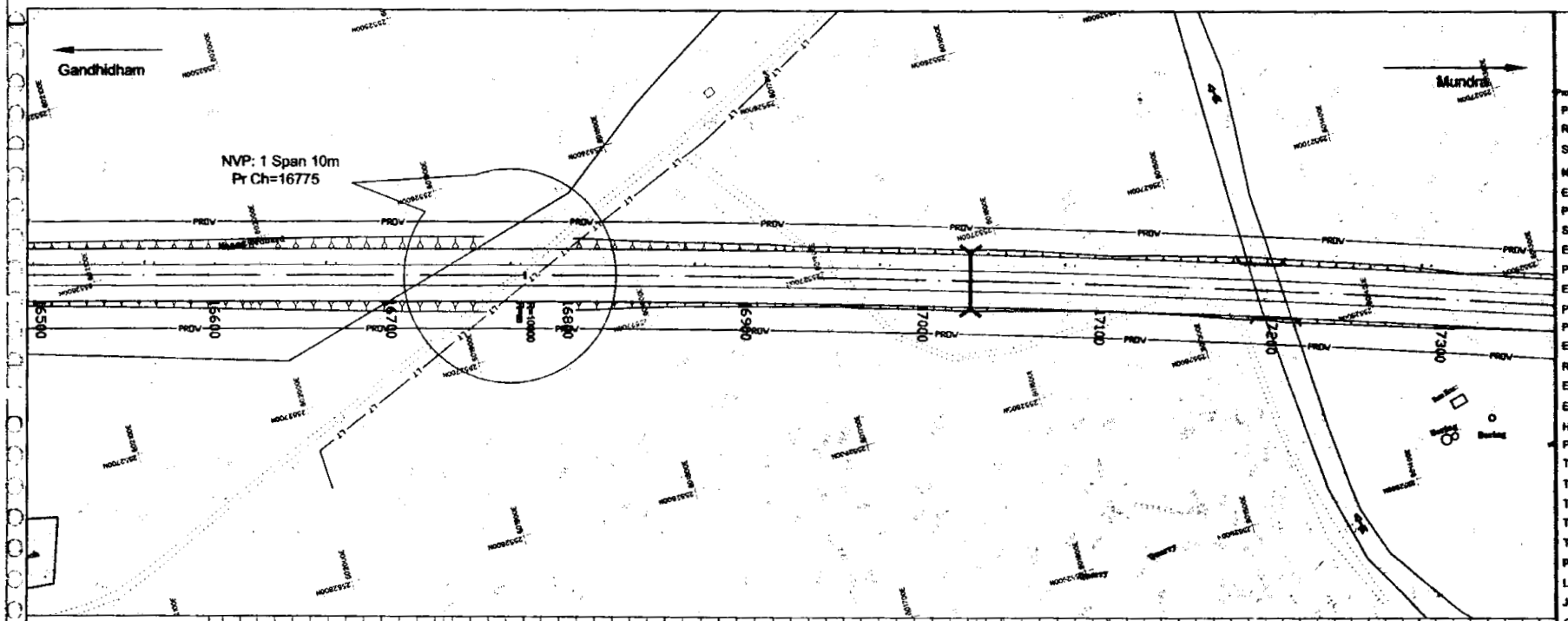
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.15750 to Ch. 16500 Rmm. : R1 — September 2009
Approved By :	Drg No. RITES/NHAI/NH8/PPP&P/1/22 — SCALE — RITES



LEGEND

- Proposed Carriageway / Existing Carriageway
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- Water Pipe Line (WL)
- Contour(Major)
- Contour(Minor)
- Grid

Datum=70.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

Drawn By :

Designed By :

Checked By :

Approved By :

NATIONAL HIGHWAY AUTHORITY OF INDIA

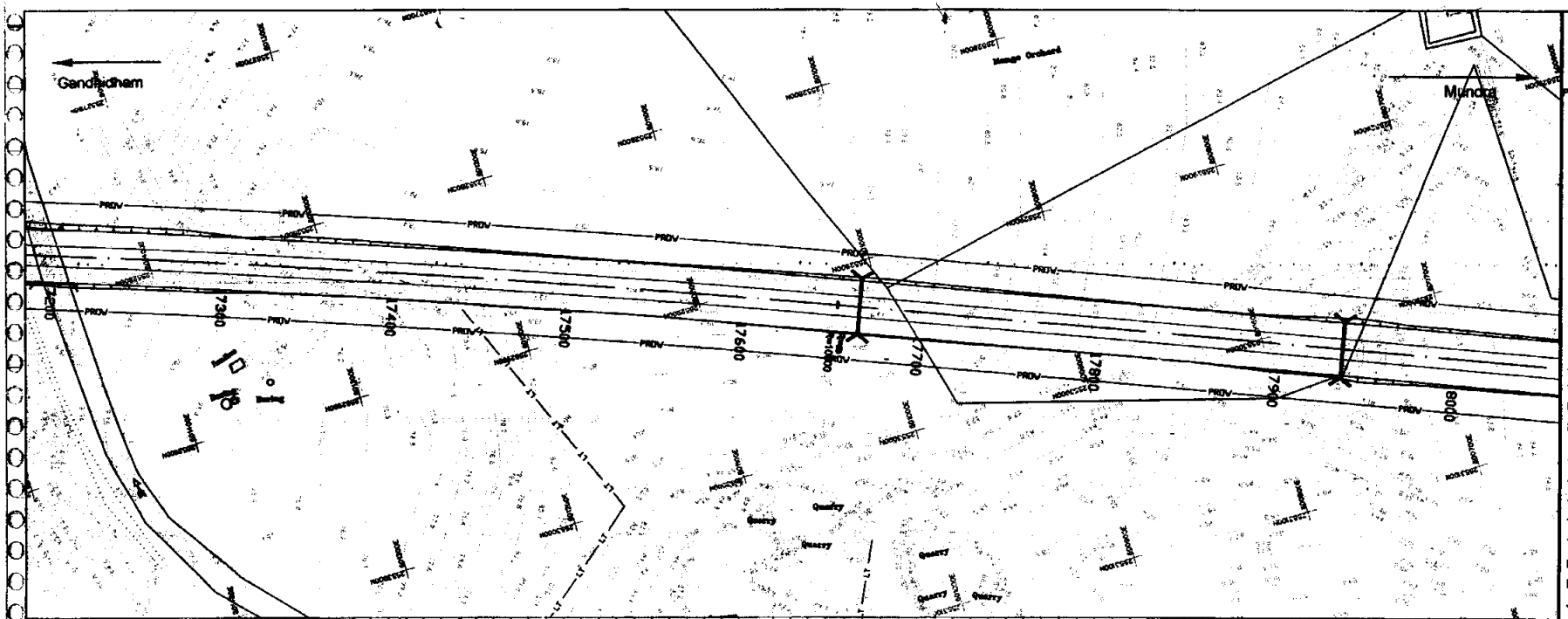
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat

Preliminary Plan & Profile Ch. 16500 to Ch. 17200 Rmn. (RHS)

September 2009

RITES

Government of India Enterprise



LEGEND

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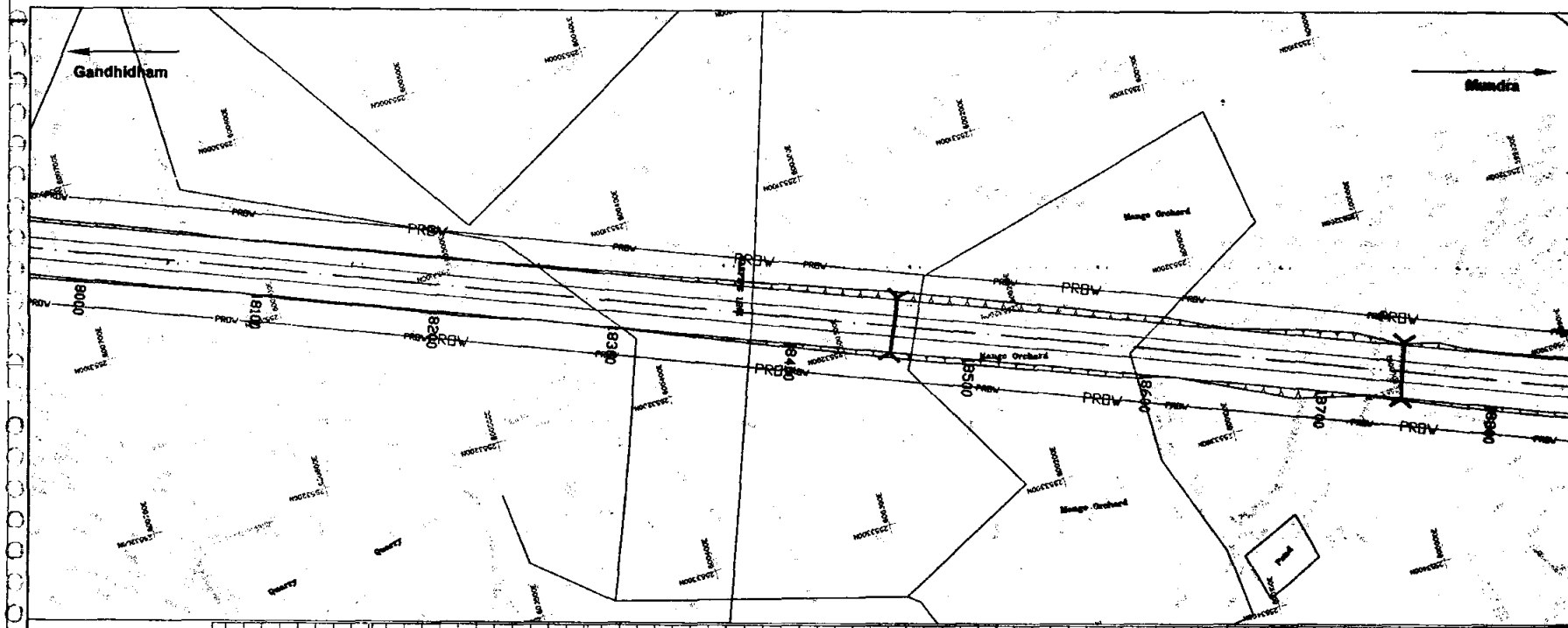
- Contour(Minor)
- Grid

Datum=70.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.17250 to Ch. 18000 Rmk.: R1 — September 2009
Approved By :	Dwg No. RITES/NHAI/Rmk/Ext/PP/PP1/R1 — RITES
	SCALE



LEGEND

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- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Boundary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Datum=78.00m

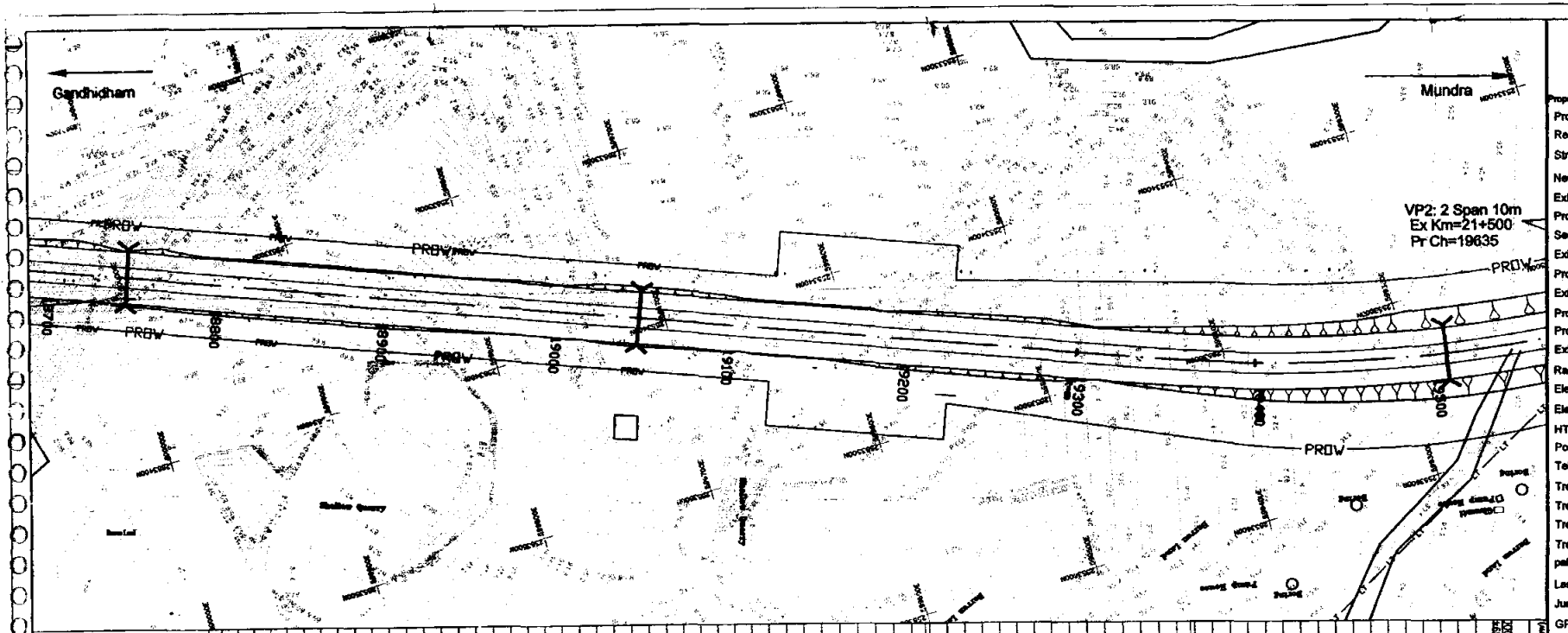
Proposed level at Median Edge(Left)	85.407 85.527 85.648 85.768 85.889 86.010 86.130 86.251 86.370 86.487 86.600 86.710 86.817 86.920 87.021 87.118 87.212 87.303 87.390 87.475 87.557 87.639 87.721 87.803 87.885 87.968 88.050 88.132 88.214 88.296 88.378 88.460 88.542 88.624 88.706 88.788 88.871 88.953 89.035 89.117 89.199 89.281 89.363 89.445 89.527 89.609 89.692 89.774 89.856 89.938 90.020 90.102 90.184 90.266 90.348 90.430 90.512 90.595 90.677 90.759 90.841 90.923 91.005 91.087 91.168 91.251 91.333 91.416 91.498 91.580 91.662 91.744 91.826 91.908 91.990
Proposed level at Median Edge(Right)	
Existing Road/Ground level	83.634 83.841 84.048 84.254 84.511 84.774 85.037 85.302 85.689 86.391 86.929 87.029 87.078 87.128 87.227 87.277 87.327 87.387 87.611 87.835 87.956 88.200 87.721 87.886 87.572 87.377 87.332 87.286 87.241 87.196 87.151 87.087 87.000 86.913 86.826 86.739 86.652 86.565 86.441 86.340 86.247 86.153 86.060 85.966 85.873 85.780 85.686 85.787 85.949 86.111 88.273 86.435 88.597 86.759 86.922 87.084 87.246 87.411 87.602 87.594 88.881 89.788 90.655 91.542 92.428 93.335 94.202 95.069 95.976 96.727 96.002 94.584 93.125 91.687 90.248
Horizontal Alignment (Left & Right)	Plain
Vertical Alignment (Left)	L=00.0m
Vertical Alignment (Right)	L=00.0m
Chainage	18010 18020 18030 18040 18050 18060 18070 18080 18090 18100 18110 18120 18130 18140 18150 18160 18170 18180 18190 18200 18210 18220 18230 18240 18250 18260 18270 18280 18290 18300 18310 18320 18330 18340 18350 18360 18370 18380 18390 18400 18410 18420 18430 18440 18450 18460 18470 18480 18490 18500 18510 18520 18530 18540 18550 18560 18570 18580 18590 18600 18610 18620 18630 18640 18650 18660 18670 18680 18690 18700 18710 18720 18730 18740 18750

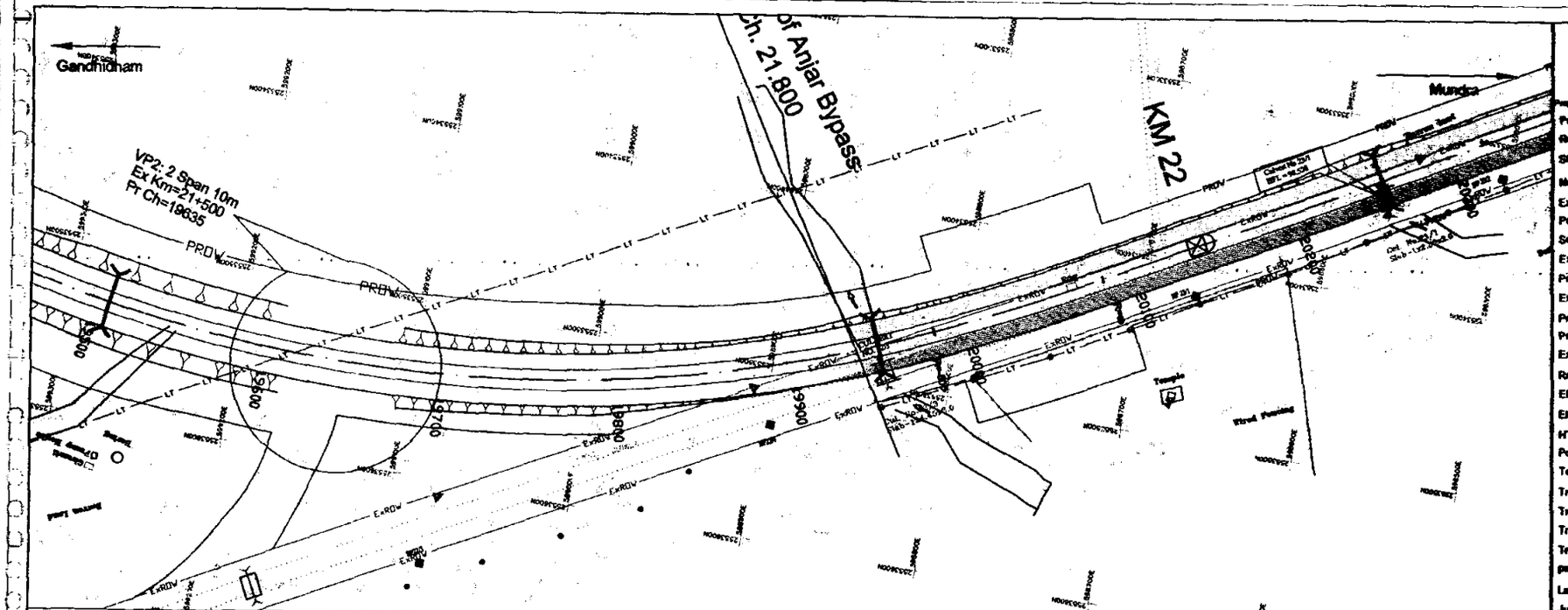
Chainage=18037.264m Level=86.597m
Chainage=18082.264m Level=86.251m
Chainage=18092.264m Level=87.494m
Chainage=18217.264m Level=87.557m
Pipe Culvert(New) 3X1.20 Chainage=18660 RL=88.000(R) RL=88.000(L)
Pipe Culvert(New) 3X1.20 Chainage=18760 RL=91.800(R) RL=91.800(L)

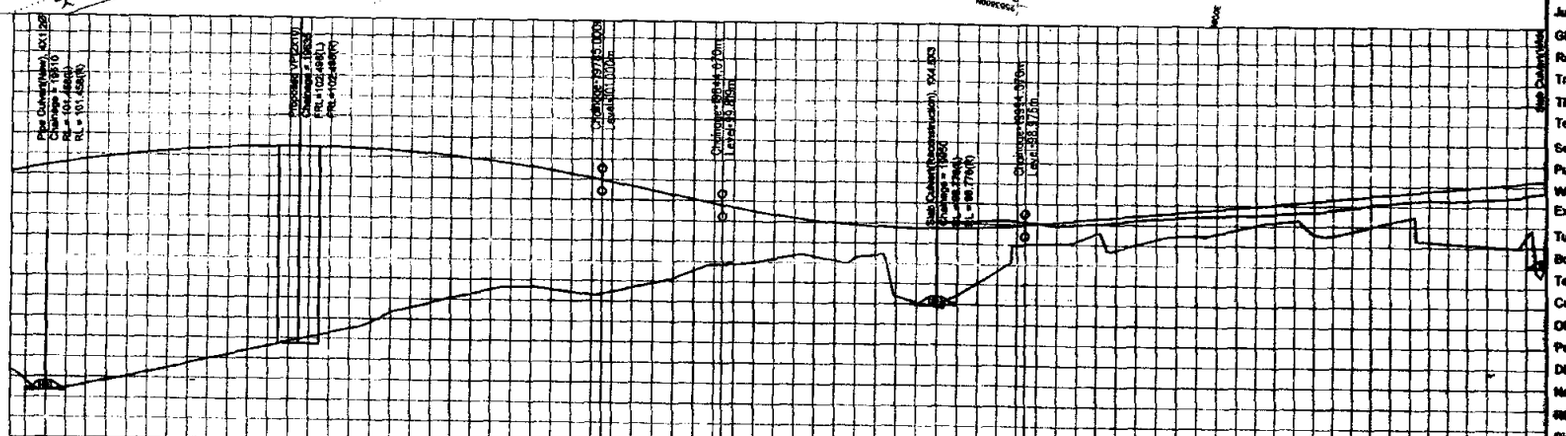
Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch. 18000 to Ch. 18750 Revs. : 01 September 2009
Approved By :	Dwg No. NH/8A/EXT/PP/P/02 SCALE RITES

KANTELL ROAD PVT. LTD.

Authorised Signatory
National Highways Authority of India


Gandhidham
Mundra
VP2: 2 Span 10m
Ex Km=21+500
Pr Ch=19635
PROW
PROW
PROW





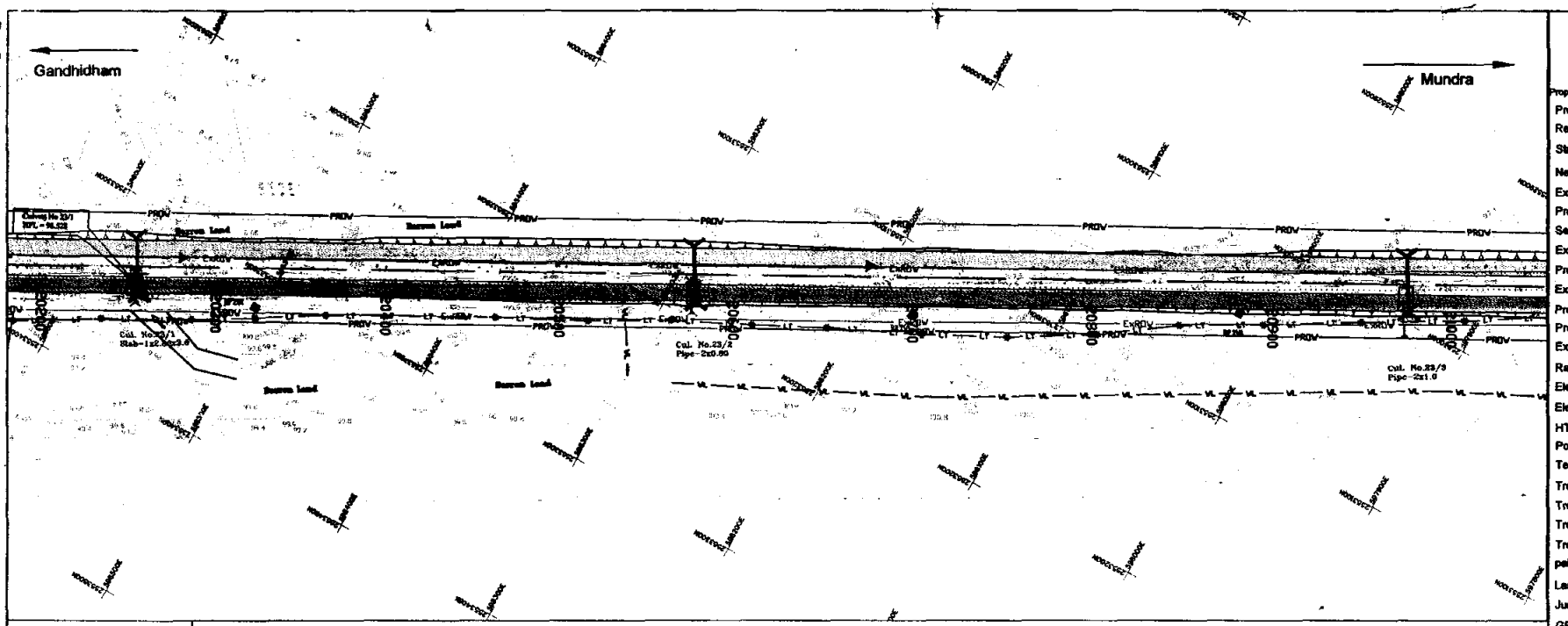
LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction
- Semi-pucca Structure
- Pucca Structure
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

KM TOLL ROAD PVT LTD

National Highways Authority of India

Name By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mandra Port Road Section of NH-8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch. 19560 to Ch. 20800 Pass : RT — September 2009
Approved By :	Drg No. NH/GUJ/KANDLA-MANDRA/PP/RT — RITES
	SCALE



LEGEND

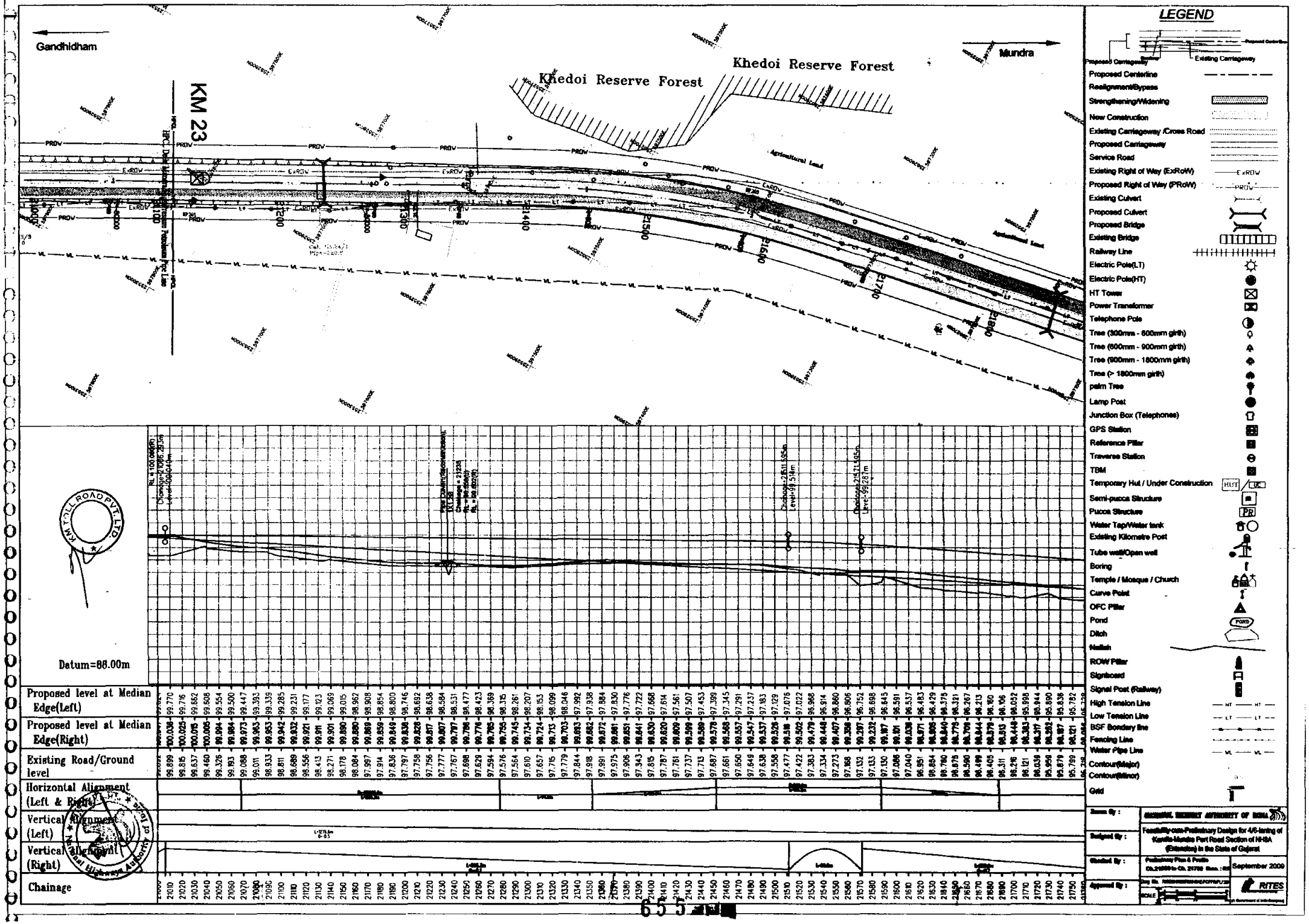
- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction (HUT / UC)
- Semi-pucca Structure
- Pucca Structure (PR)
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond (POND)
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line (HT)
- Low Tension Line (LT)
- BSF Bondary line
- Fencing Line
- Water Pipe Line (WL)
- Contour(Major)
- Contour(Minor)
- Grid

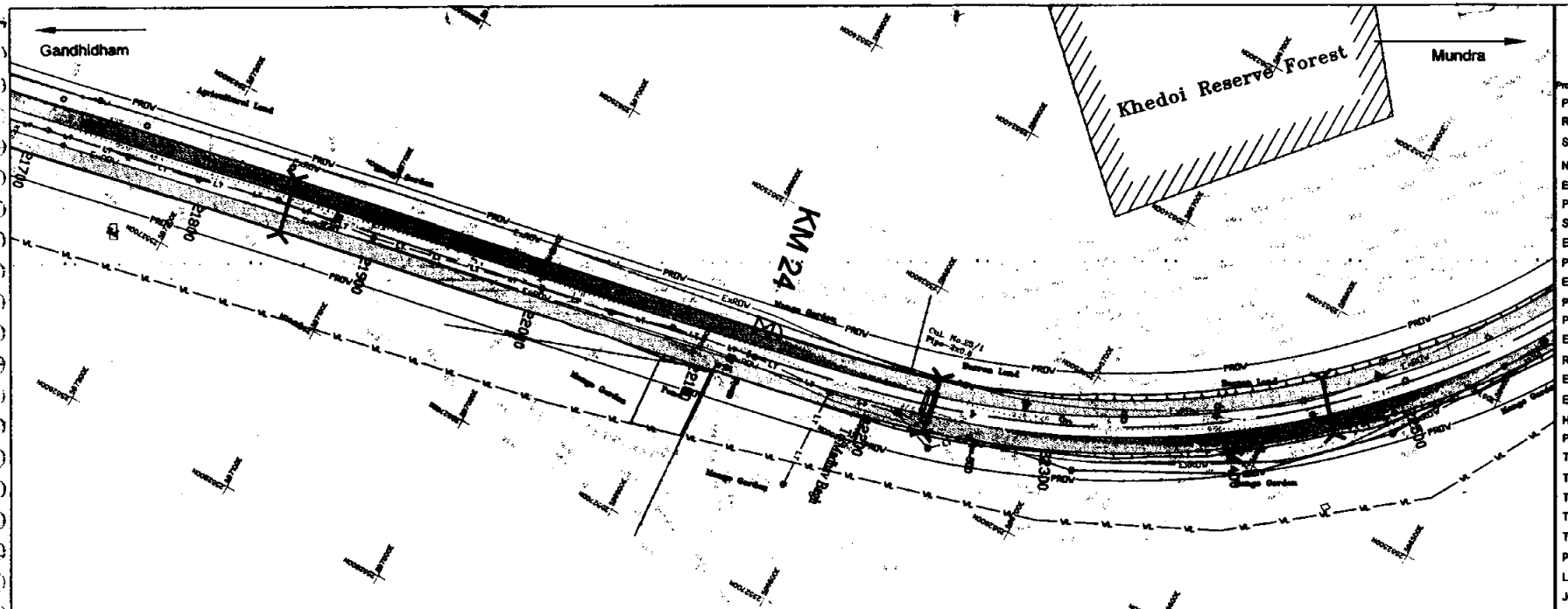
KM TOLL ROAD PVT. LTD.

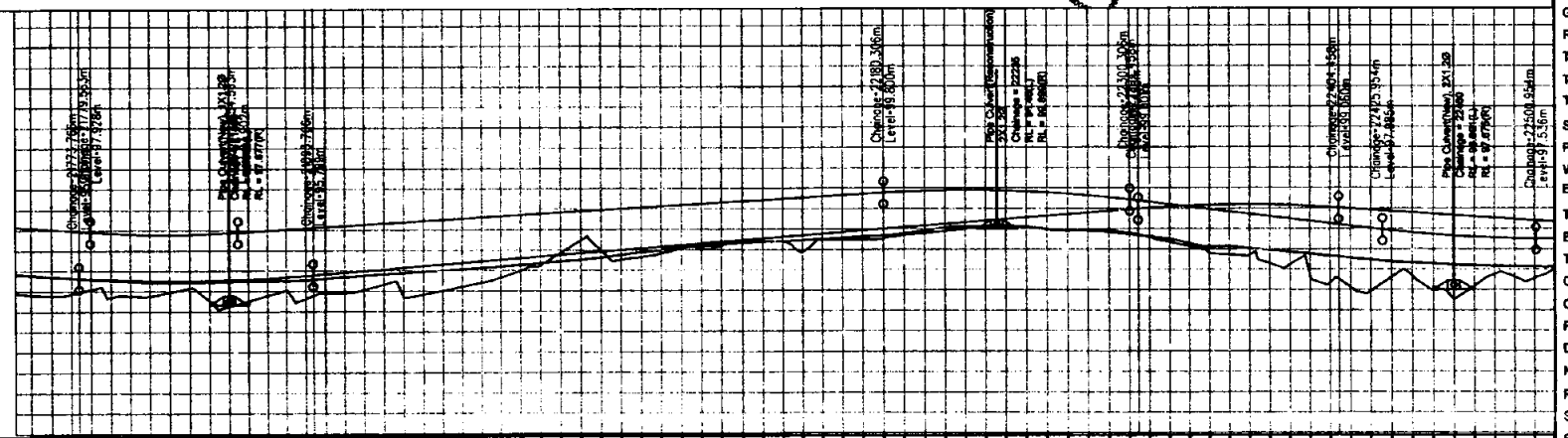
Datum=96.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	20250 20260 20270 20280 20290 20300 20310 20320 20330 20340 20350 20360 20370 20380 20390 20400 20410 20420 20430 20440 20450 20460 20470 20480 20490 20500 20510 20520 20530 20540 20550 20560 20570 20580 20590 20600 20610 20620 20630 20640 20650 20660 20670 20680 20690 20700 20710 20720 20730 20740 20750 20760 20770 20780 20790 20800 20810 20820 20830 20840 20850 20860 20870 20880 20890 20900 20910 20920 20935 20940 20950 20960 20970 20980 20990 21000

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Expansion) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.20250 to Ch. 21000 Sheet : 8/9 — September 2009
Approved By :	Drg No. RITES/NHAI/KANDLA/PP/PPLP/20 — RITES
	SCALE


Gandhidham
Mundra
KM 23
Khedoi Reserve Forest
Khedoi Reserve Forest
Agricultural Land
Agricultural Land
HPCL Delhi Mundra Petroleum Products Pipeline
Datum=88.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
September 2009
RITES
SCALE
KMV TOLL ROAD PVT. LTD.
National Highways Authority of India





Datum=88.00m

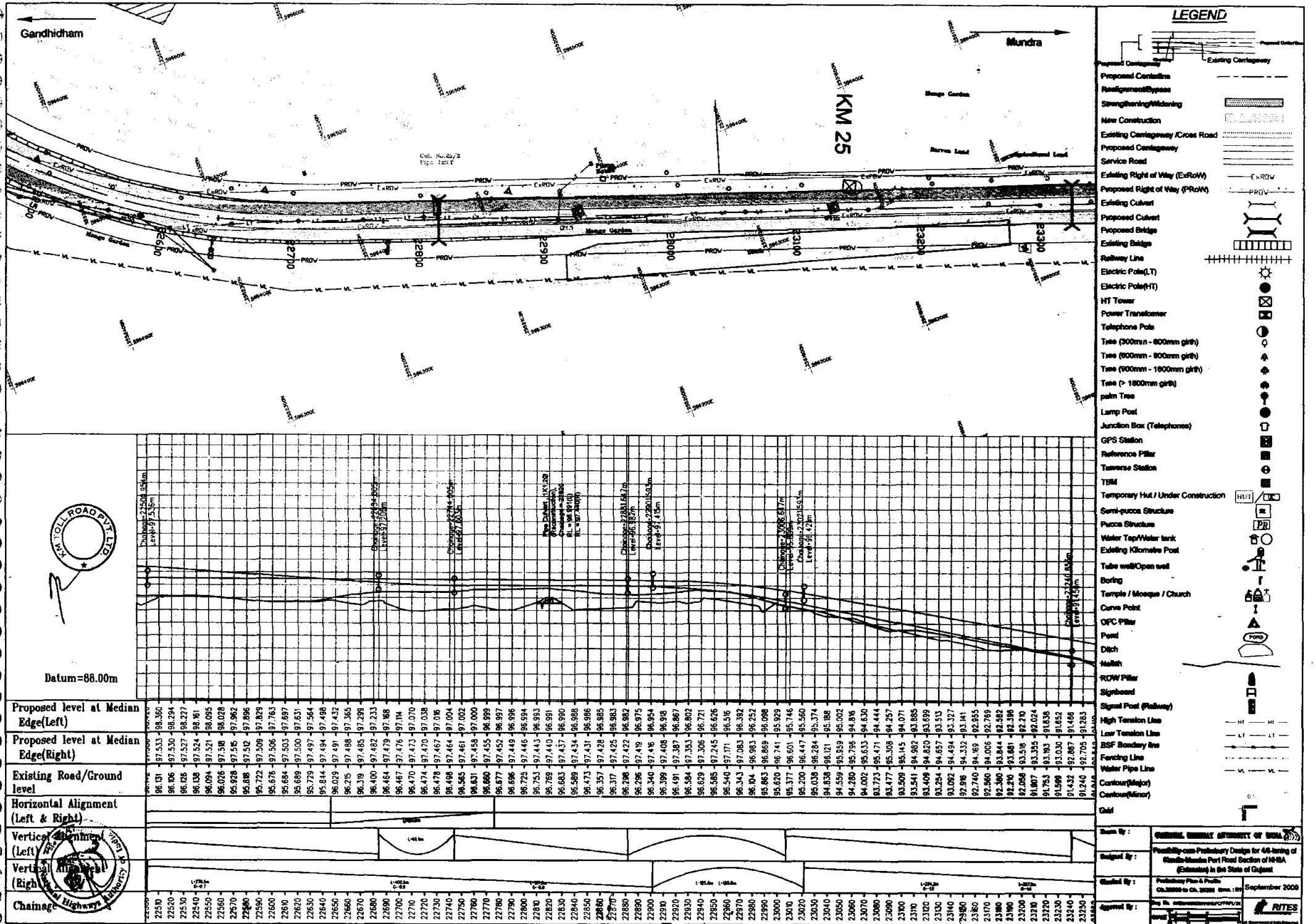
Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

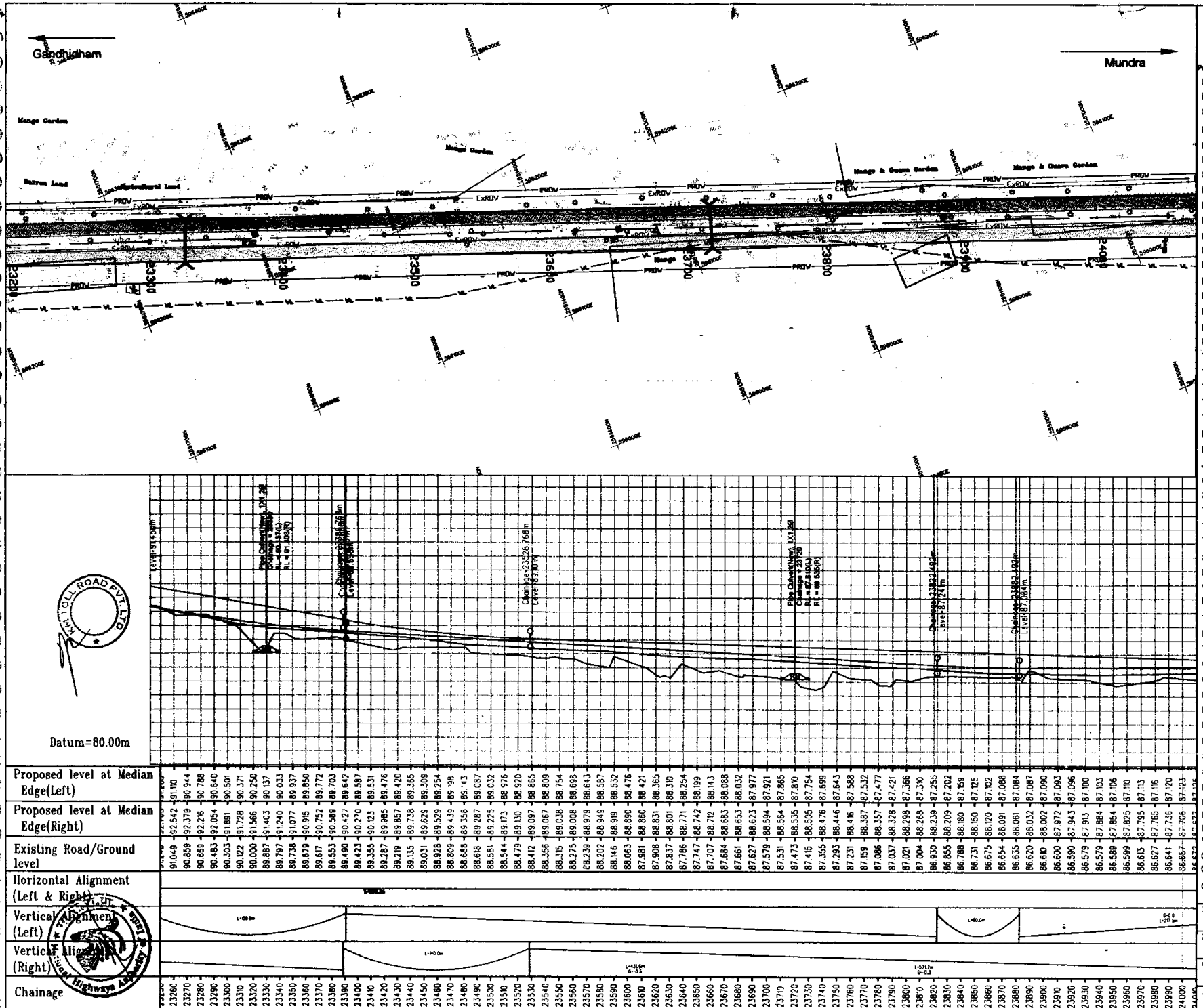
LEGEND

- Proposed Carriageway / Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW) — ExROW
- Proposed Right of Way (PRoW) — PROW
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction — HUT / UC
- Semi-pucca Structure
- Pucca Structure — PR
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond — POND
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line — HT
- Low Tension Line — LT
- BSF Bondary line
- Fencing Line
- Water Pipe Line — WL
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.21750 to Ch. 22500 Rev. : R1 — September 2009
Approved By :	Dwg No. NH8A/Kandla/Mundra/EXT/PP/PL/01 — RITES — SCALE

KANDLA MUNDRA TOLL ROAD PVT. LTD.
Ministry of Highways Authority


Gandhidham
Mundra
KM 25
LEGEND
Existing Carriageway
Proposed Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Boundary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Datum=86.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
Drawn By :
Designed By :
Checked By :
Approved By :
Feasibility-cum-Preliminary Design for 4/6-laning of Gandhi-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
September 2009
RITES



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1500mm girth)
- Tree (> 1500mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction
- Semi-pucca Structure
- Pucca Structure
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
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- Pond
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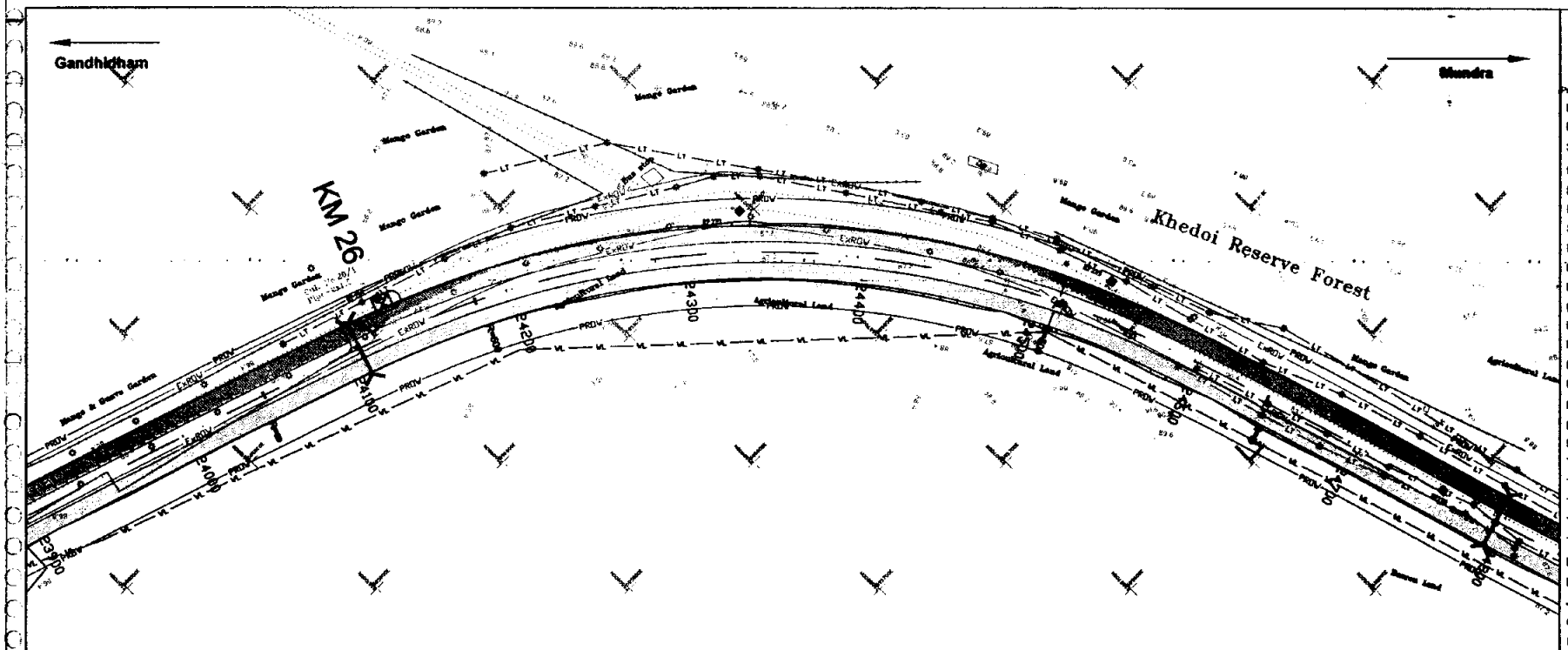
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.23250 to Ch. 24000 Rmrs.: RH — September 2009
Approved By :	Dwg No. NH8A/GUJ/KANDLA-MUNDRA PORT/PP/23250 — SCALE — RITES

National Highways Authority of India



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
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- Tree (> 1800mm girth)
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- Pucca Structure
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
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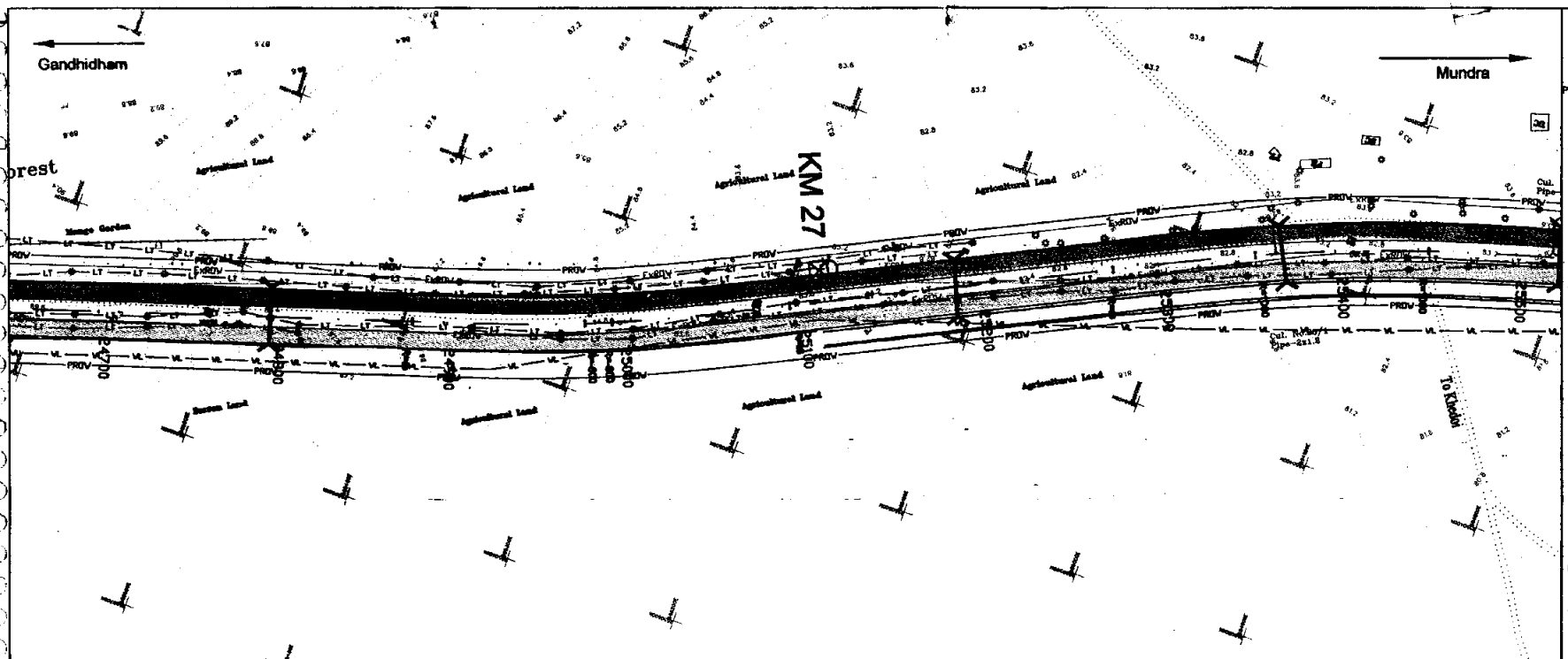
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Issued By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Nanglia-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.24000 to Ch. 24700 Revs. : 01 — September 2009
Approved By :	Dwg No. NH8A/GUJ/PP/PROFILE/01 — RITES — SCALE

TOLL ROAD PVT. LTD.
National Highways Authority of India



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
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- Electric Pole(HT)
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- Power Transformer
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- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
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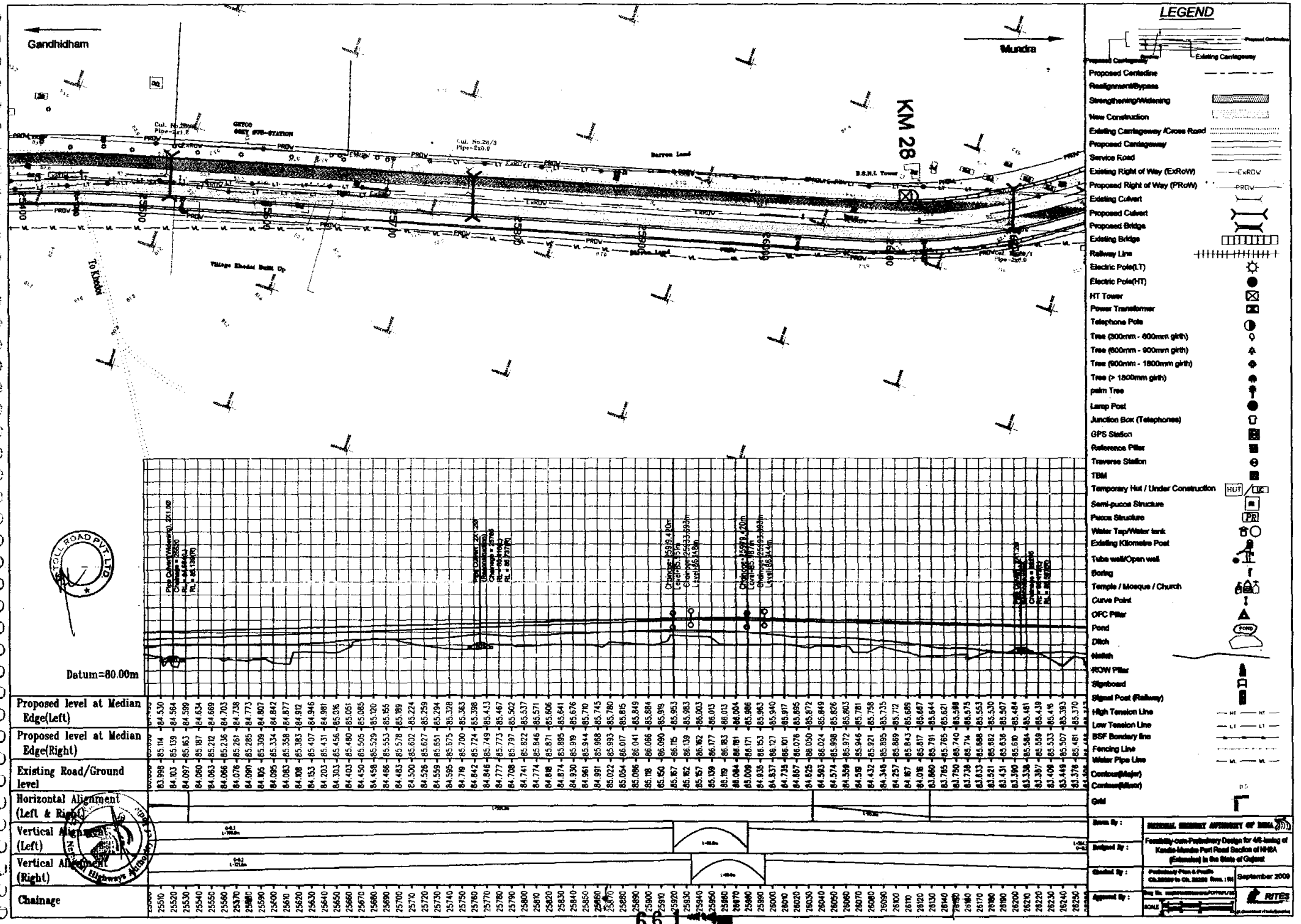
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction
- Semi-pucca Structure
- Pucca Structure
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Datum=80.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.24780 to Ch. 25600 Rem. : 820 — September 2009
Approved By :	Dwg No NH8A/GUJ/PP/PLP/34 — RITES — SCALE


Gandhidham
Mundra
KM 28
To Kandla
Datum=80.00m
LEGEND
Proposed Centreline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
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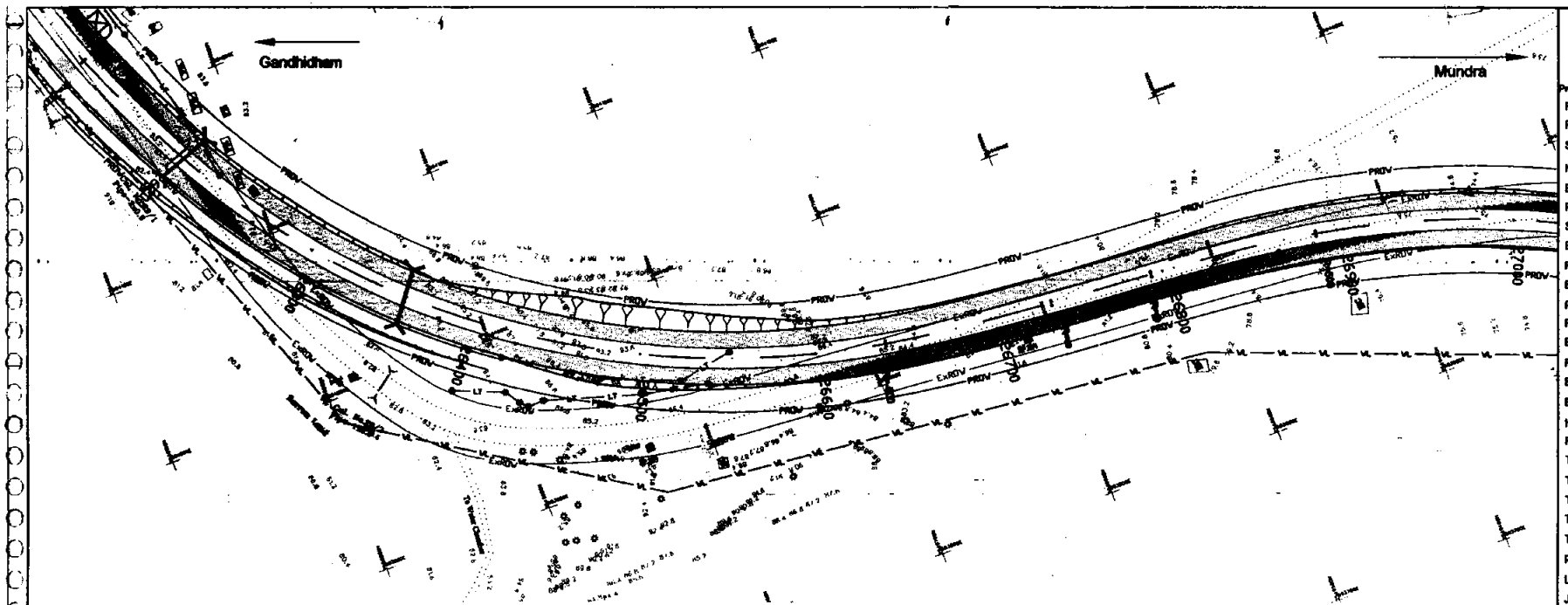
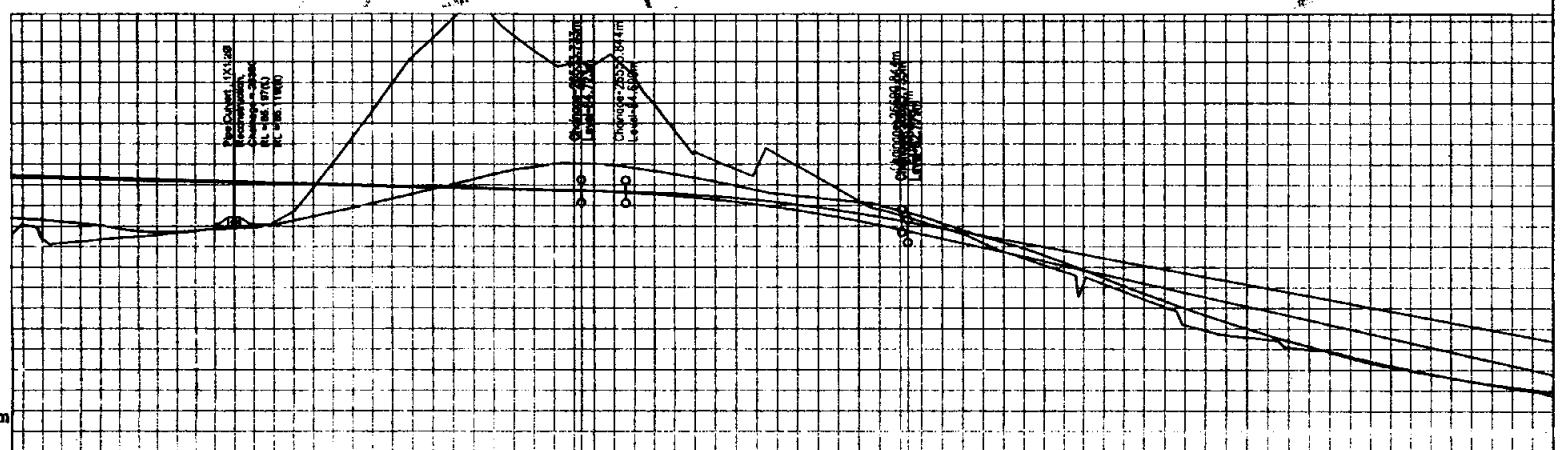
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Boundary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
Drawn By :
Designed By :
Checked By :
Approved By :
Feasibility-cum-Preliminary Design for 4/6 laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
September 2009
RITES
SCALE





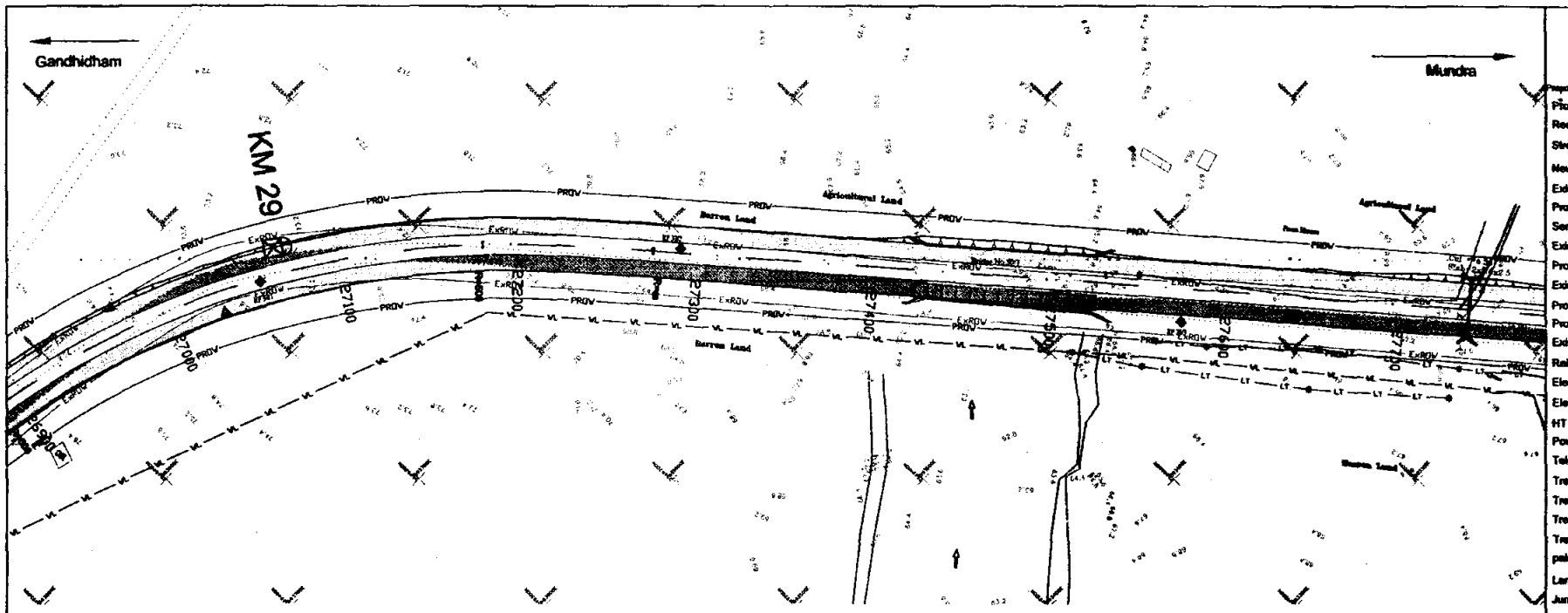
Datum=72.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction
- Semi-pucca Structure
- Pucca Structure
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.26250 to Ch. 27000 Rout. : 8A — September 2009
Approved By :	Dwg No. NH(O)-HW/GUJ/SE/PP/PLP/26 — RITES
	SCALE



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction (HUT / UC)
- Semi-pucca Structure
- Pucca Structure (PR)
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond (POND)
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line (HT)
- Low Tension Line (LT)
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

KMM TOLL ROAD PVT. LTD.

Issued By :

Designed By :

Checked By :

Approved By :

NATIONAL HIGHWAY AUTHORITY OF INDIA

Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat

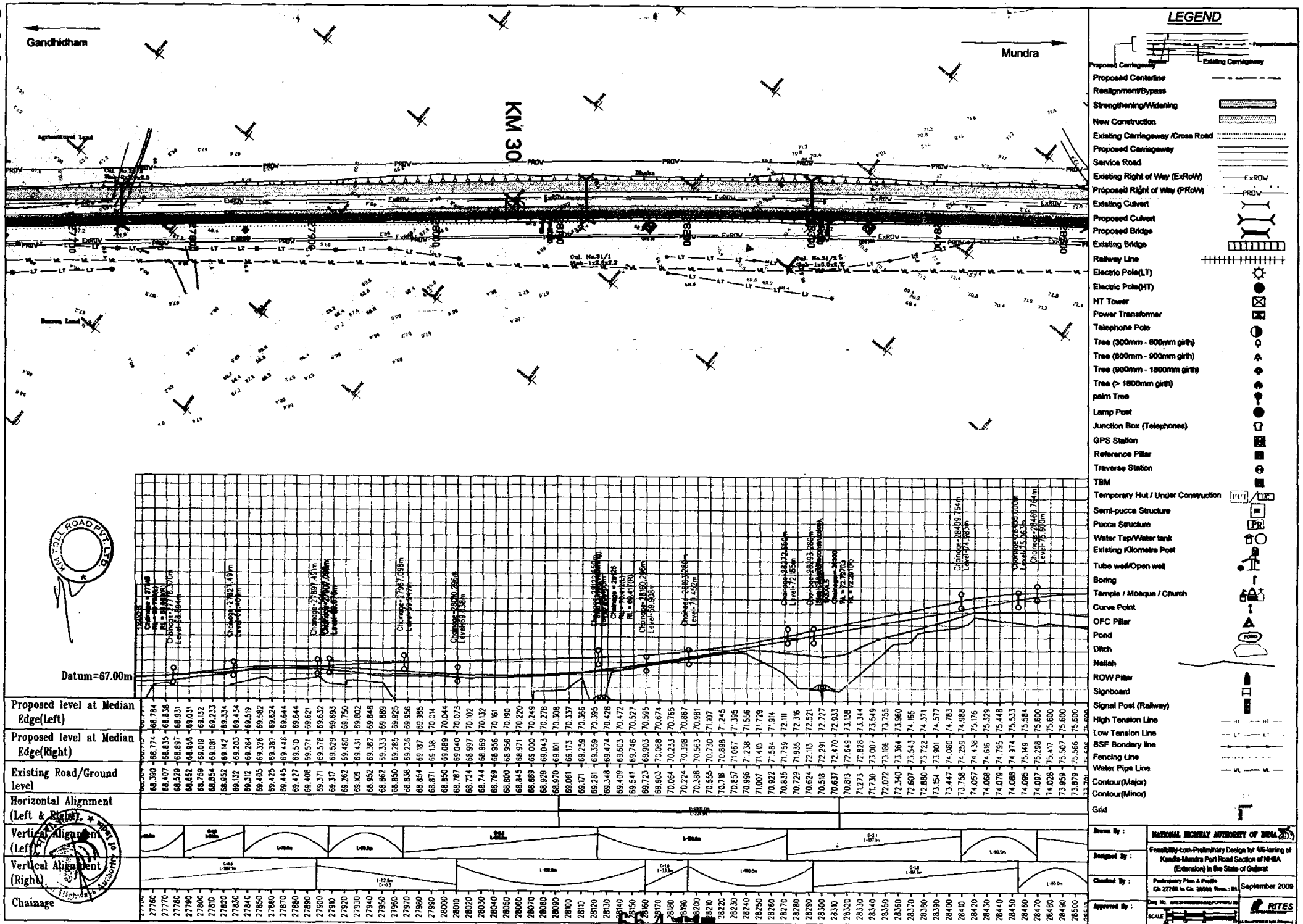
Preliminary Plan & Profile Ch.27700 to Ch. 27750 Dwg. No. 01

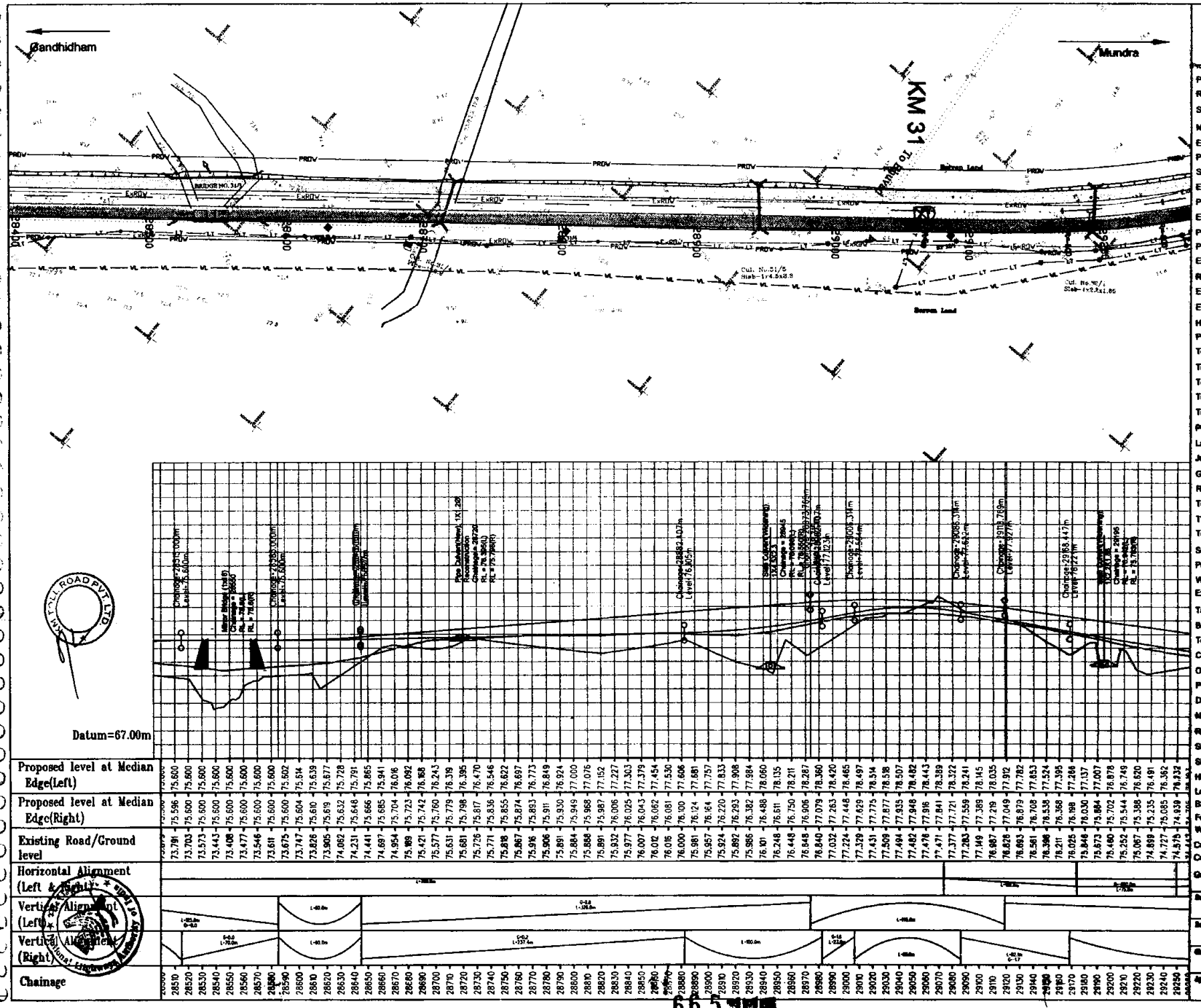
September 2009

NONE

NHAI

NITES

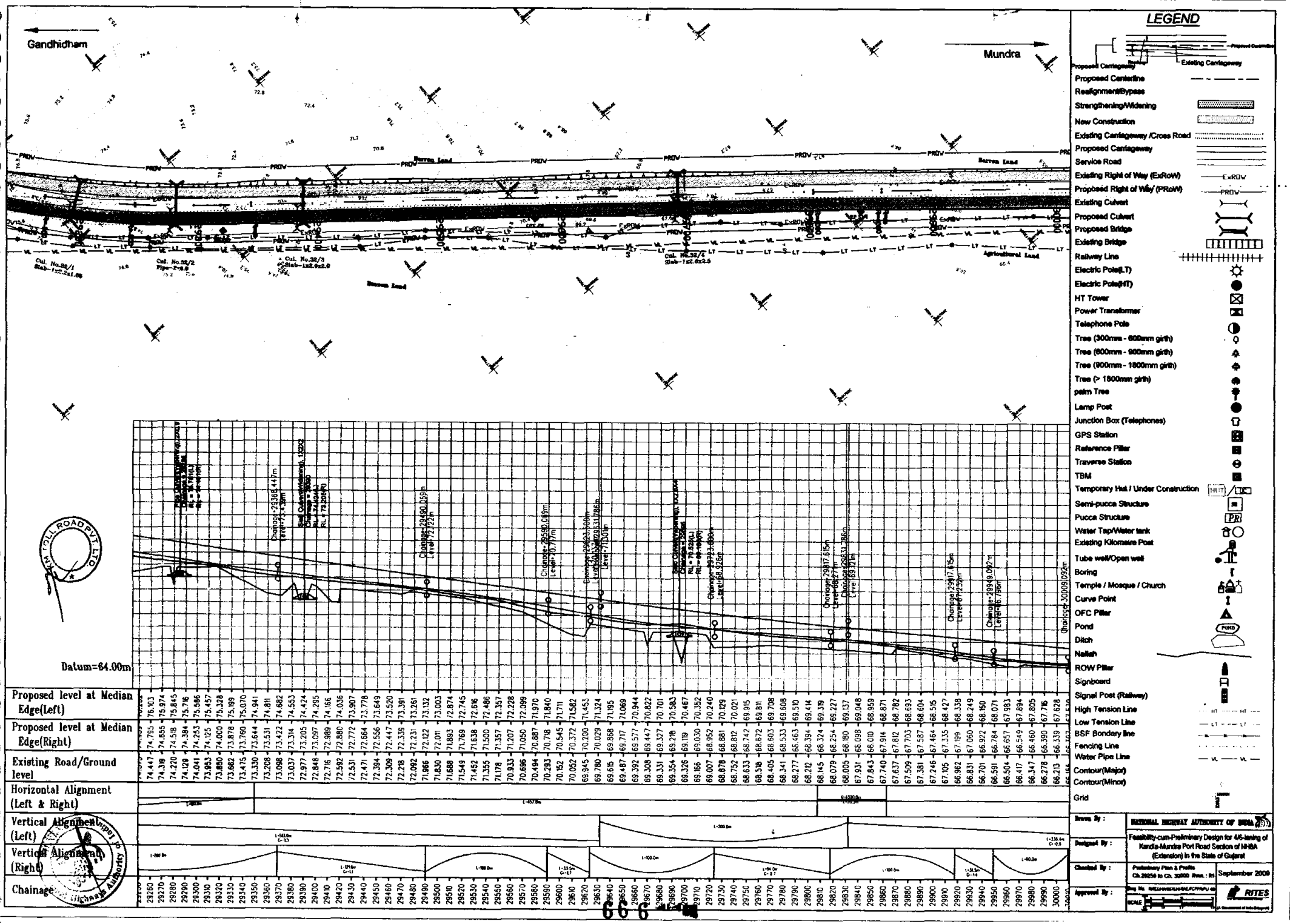

Gandhidham
Mundra
KM 30
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Datum=67.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile Ch.27760 to Ch. 28500 Rev. : 01
September 2009
SCALE
RITES

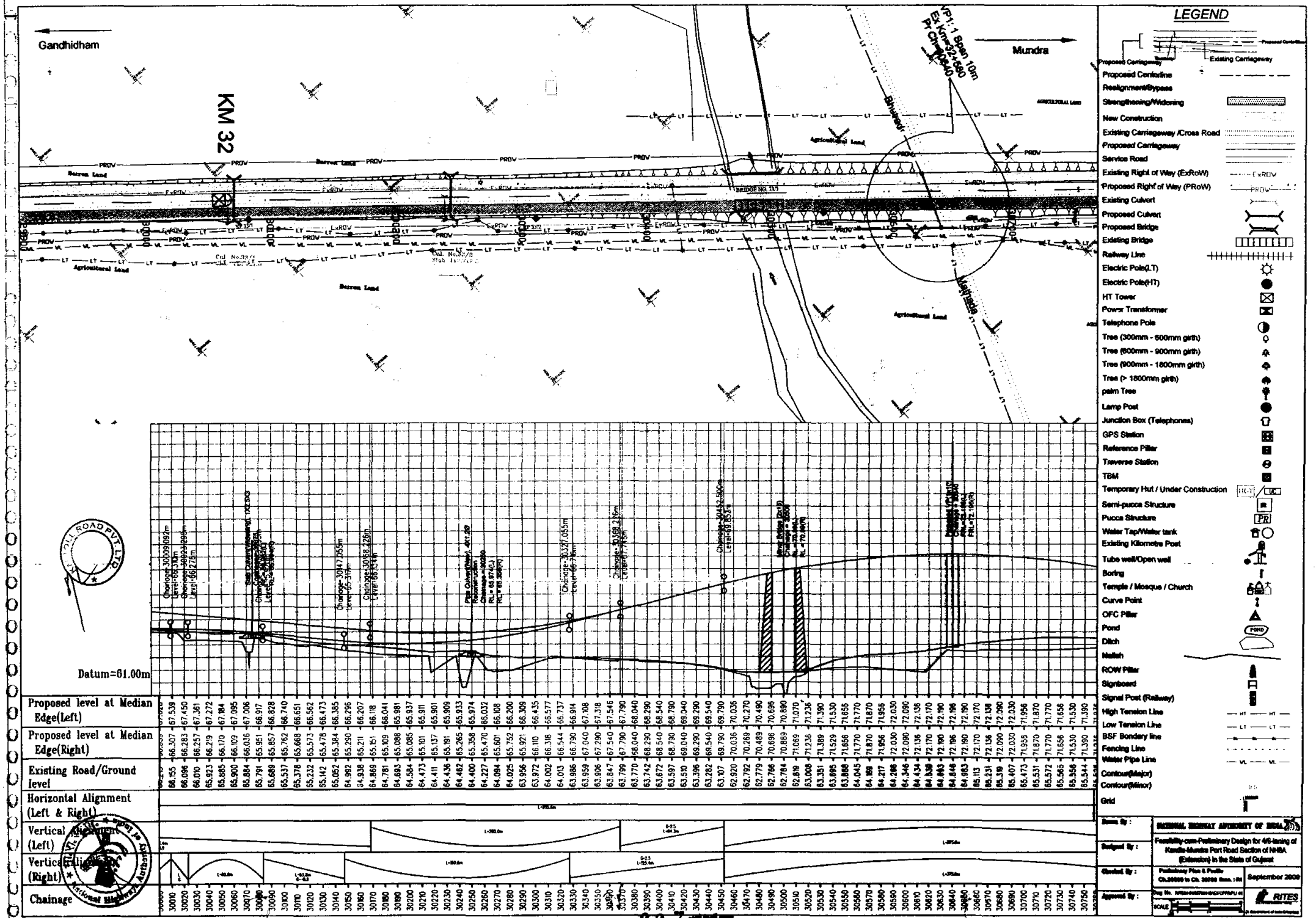


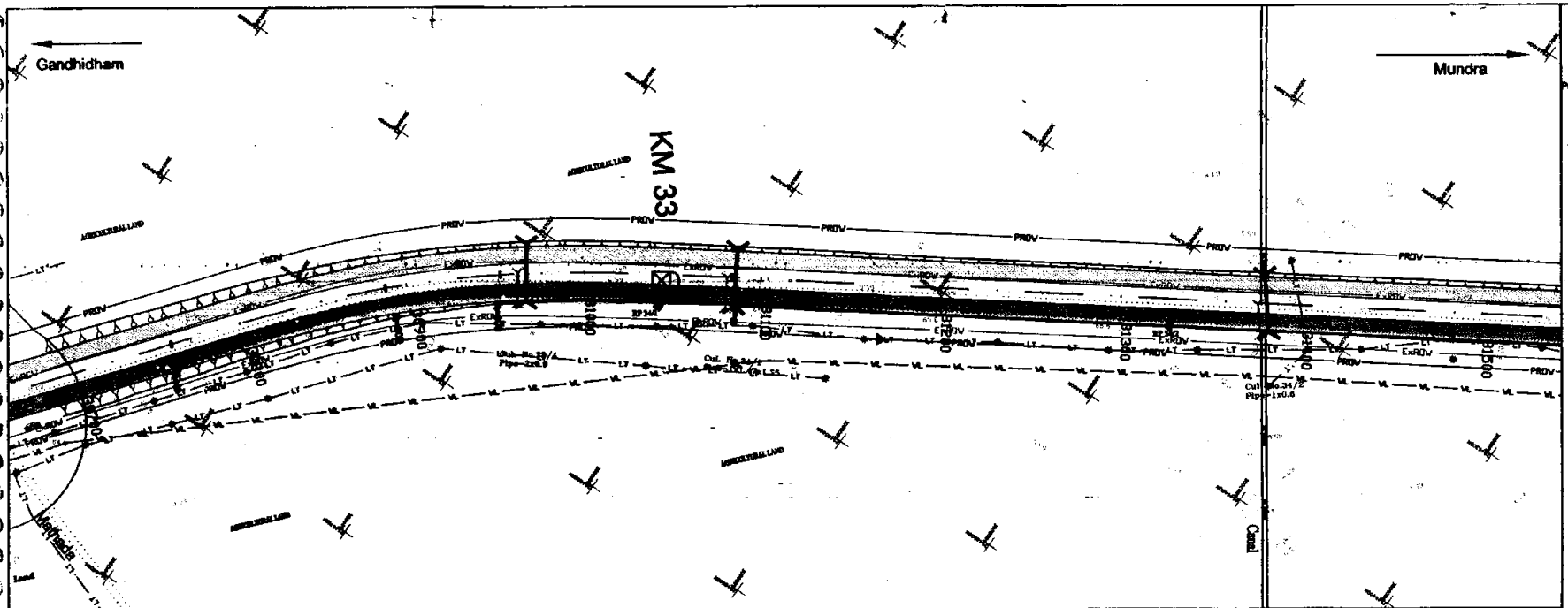
LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction
- Semi-pucca Structure
- Pucca Structure
- Water Tap/Water tank
- Existing Kilometer Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Boundary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.28500 to Ch. 29500 Dwg. : 01 — September 2008
Approved By :	RITES


Gandhidham
Mundra
Datum=64.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile Ch.29250 to Ch. 30000 Rmk. : In
September 2009
RITES
SCALE


Gandhidham
Mundra
KM 32
Barren Land
Agricultural Land
Bhukadi
Nanbhadia
BRIDGE NO. 33/1
Datum=61.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Issued By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch.30000 to Ch. 30750 Scale : 1in
September 2009
RITES
SCALE



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExROW)
- Proposed Right of Way (PROW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction
- Semi-pucca Structure
- Pucca Structure
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Piller
- Pond
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Datum=61.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

KMA TOLL ROAD PVT LTD

Drawn By :

Designed By :

Checked By :

Approved By :

NATIONAL HIGHWAY AUTHORITY OF INDIA

Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat

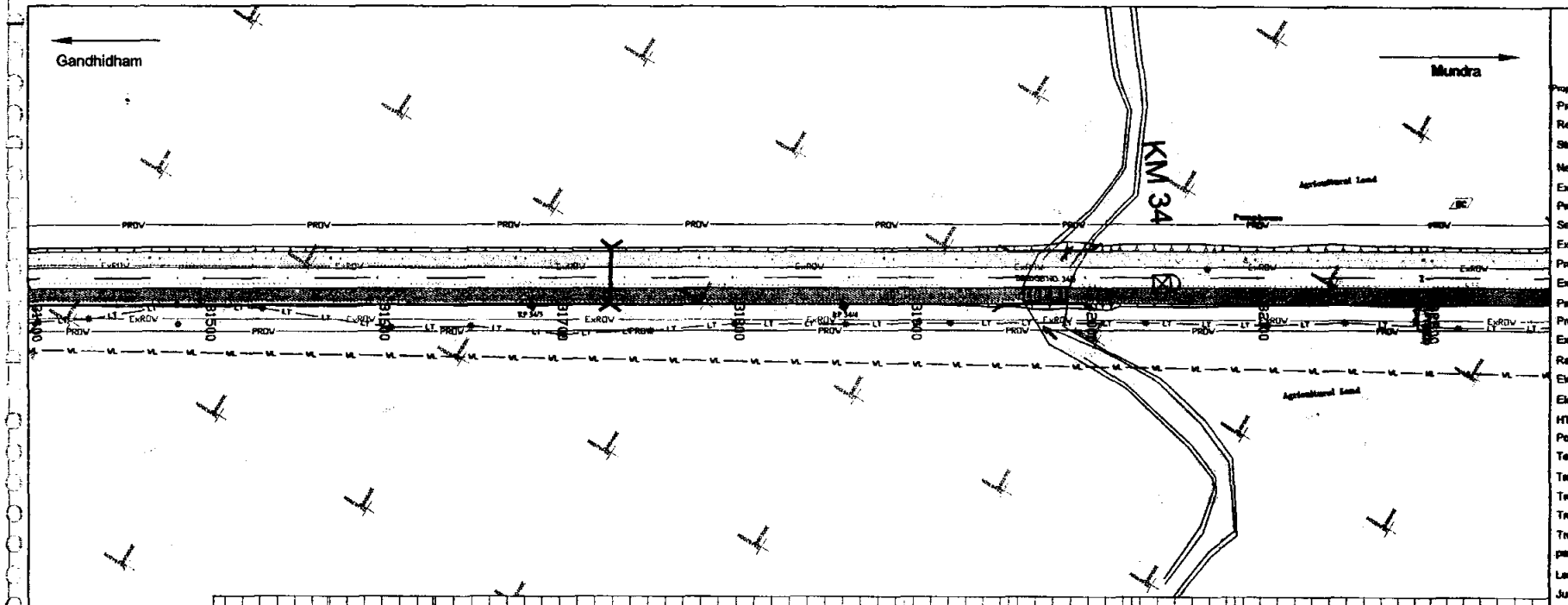
Preliminary Plan & Profile Ch.30750 to Ch. 31500 Rev. : R1

September 2009

Dwg No.

SCALE

RITES



LEGEND

- Proposed Carriageway / Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
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- Tree (300mm - 600mm girth)
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- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction (TH / UC)
- Semi-pucca Structure
- Pucca Structure (PR)
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- Existing Kilometre Post
- Tube well/Open well
- Boring
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- OFC Pillar
- Pond
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line (HT)
- Low Tension Line (LT)
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

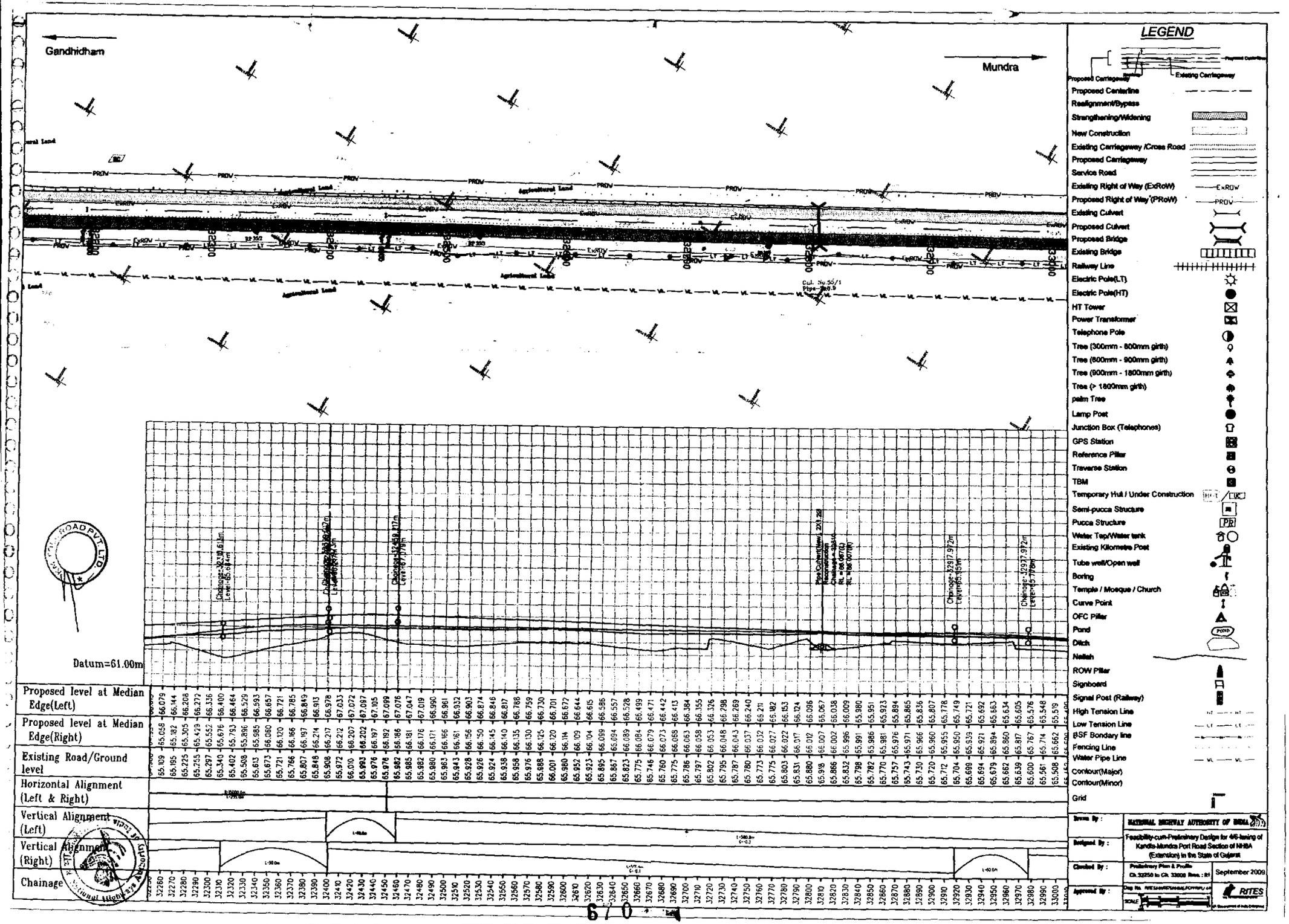
KM TOLL ROAD PVT LTD

Datum=61.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

Drawn By :	GENERAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.31550 to Ch. 32200 Rem. : R1 — September 2009
Approved By :	Dwg No. [redacted] — RITES — SCALE

National Highways Authority of India


Gandhidham
Mundra
Datum=61.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
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Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
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Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
ØSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch.32250 to Ch. 33000 Rmc. : R1
September 2009
RITES
SCALE

LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
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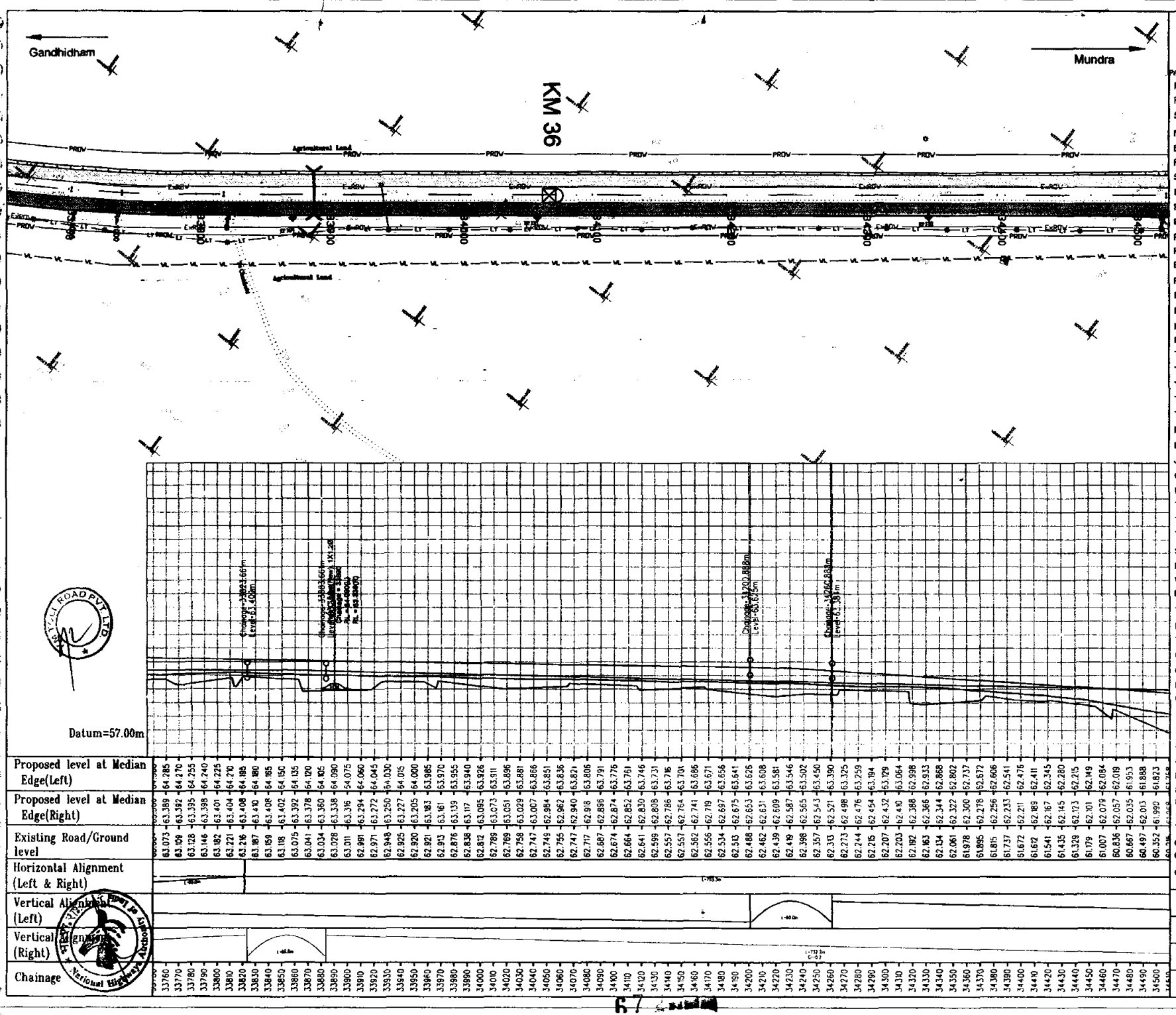
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Boundary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Mundra
Gandhidham
KM 35
Agricultural Land
Datum=61.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility cum Preliminary Design for 4/6-laning of Mundra-Kandla Port Road Section of NH-8A (Extending to the State of Gujarat)
Preliminary Plan & Profile
Ch.33000 to Ch. 40700 (Km. 33 to Km. 40)
September 2006
RITES
ZONE 5


Gandhidham
Mundra
KM 36
Agricultural Land
PROV
ExROV
LT
VL
Datum=57.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
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Electric Pole(HT)
HT Tower
Power Transformer
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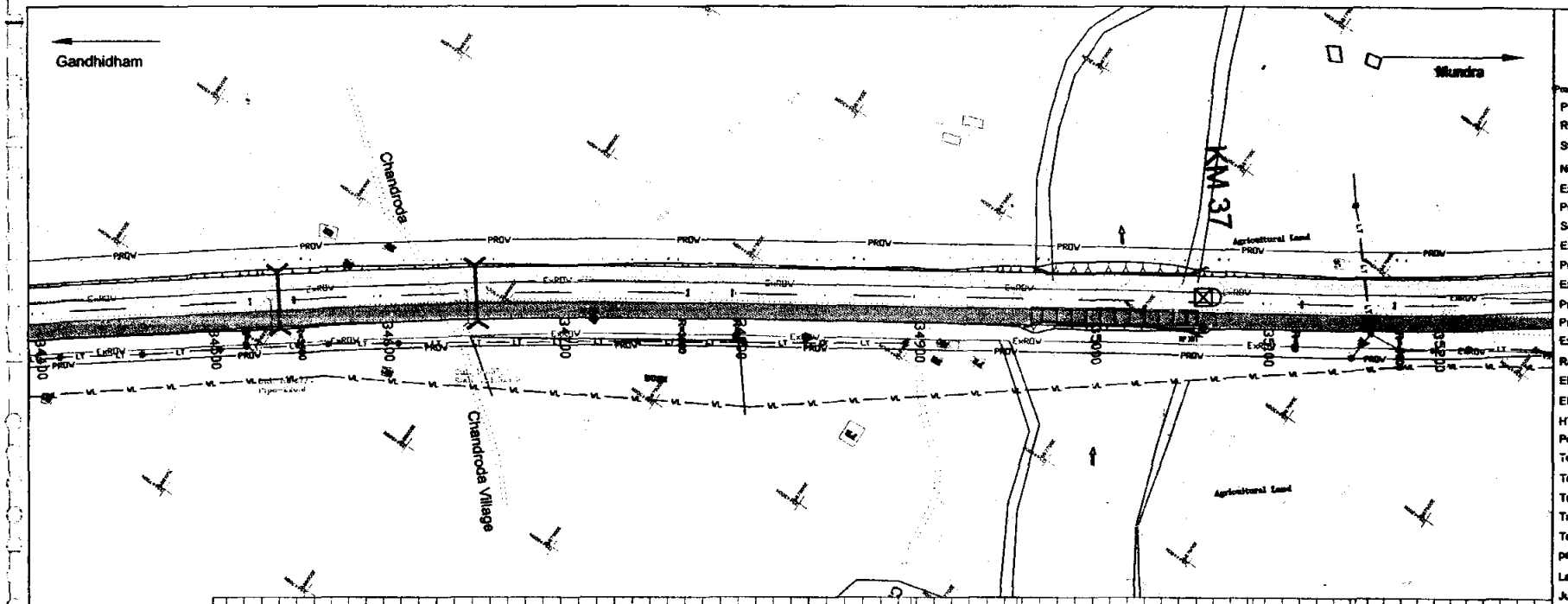
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NHBA (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch.33760 to Ch. 34500 Rmks. : RH
September 2009
RITES
SCALE

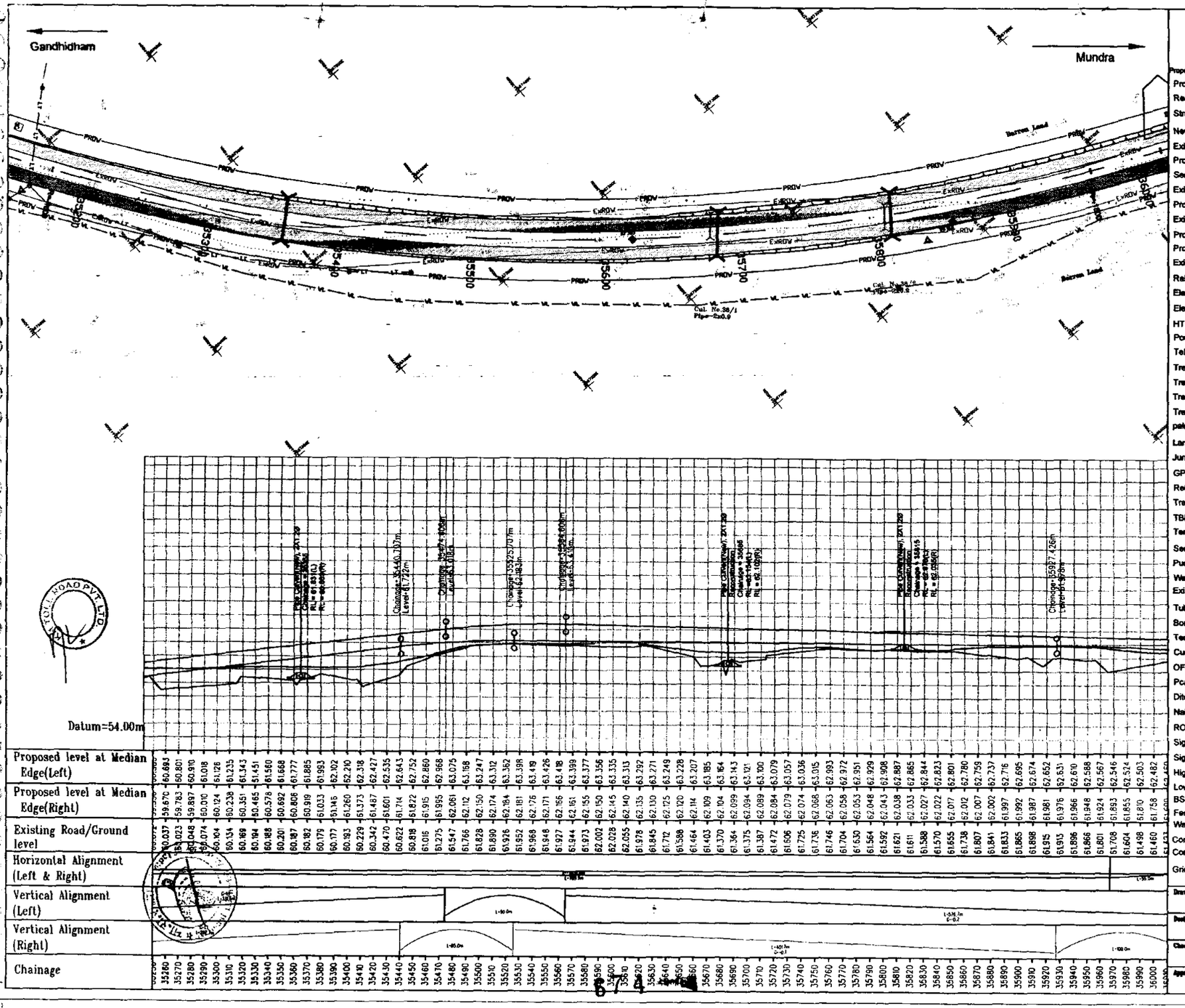


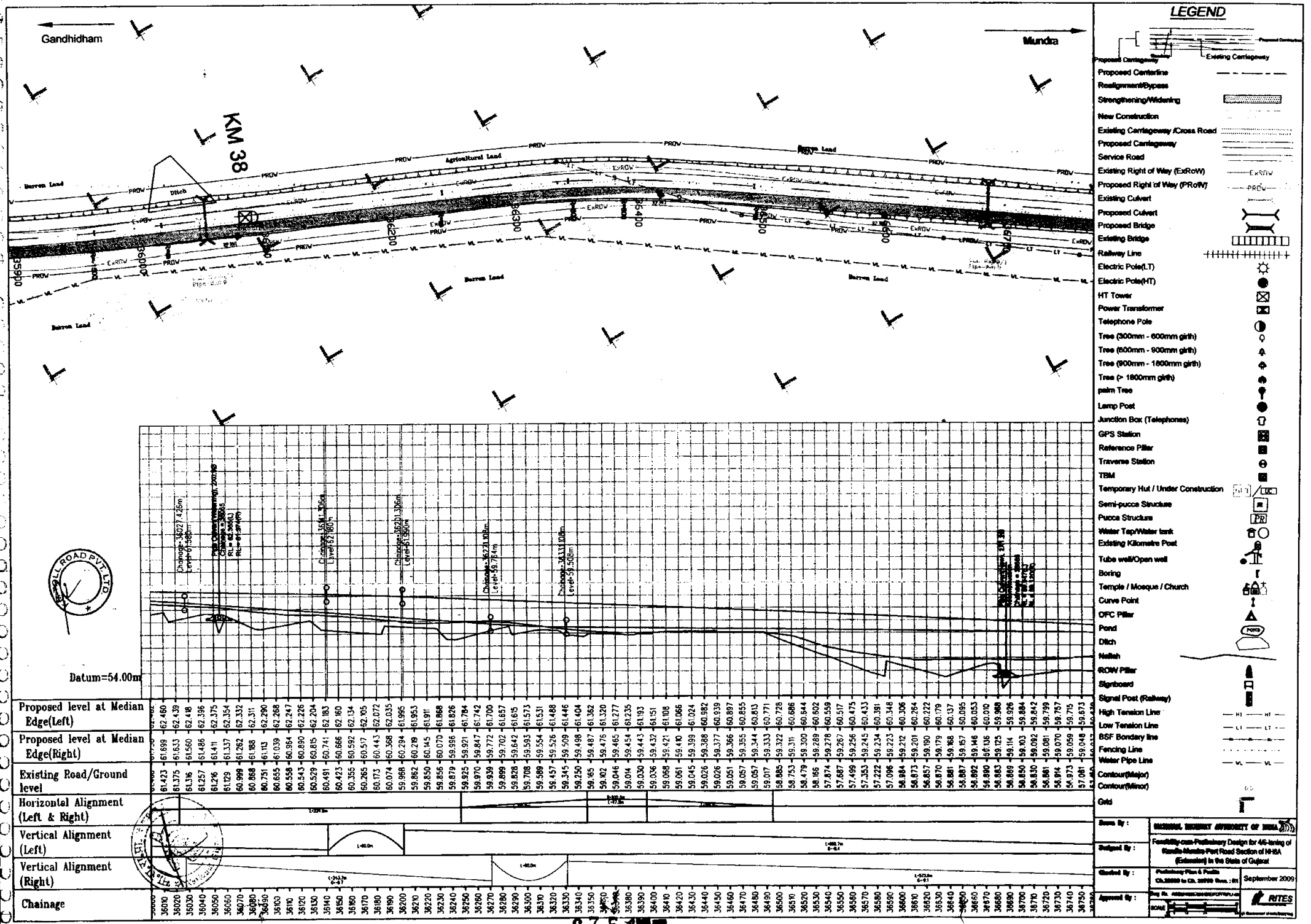
LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction (HUT / UC)
- Semi-pucca Structure
- Pucca Structure (PR)
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond (POND)
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line (HT)
- Low Tension Line (LT)
- BSF Bondary line
- Fencing Line
- Water Pipe Line (VL)
- Contour(Major)
- Contour(Minor)
- Grid

Datum=54.00m

Proposed level at Median Edge(Left)	61.758 61.692 61.627 61.562 61.496 61.431 61.366 61.301 61.235 61.170 61.105 61.039 60.974 60.909 60.843 60.778 60.713 60.648 60.582 60.517 60.452 60.386 60.321 60.256 60.190 60.125 60.060 59.995 59.929 59.864 59.799 59.733 59.668 59.603 59.537 59.472 59.407 59.342 59.277 59.220 59.174 59.167 59.140 59.116 59.103 59.100 59.100 59.100


Gandhidham
Mundra
Datum=54.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch.35250 to Ch.38000 (Km. : 91)
September 2009
RITES


Gandhidham
Mundra
KM 38
Datum=54.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
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Proposed Right of Way (PRoW)
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Proposed Culvert
Proposed Bridge
Existing Bridge
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Electric Pole(HT)
HT Tower
Power Transformer
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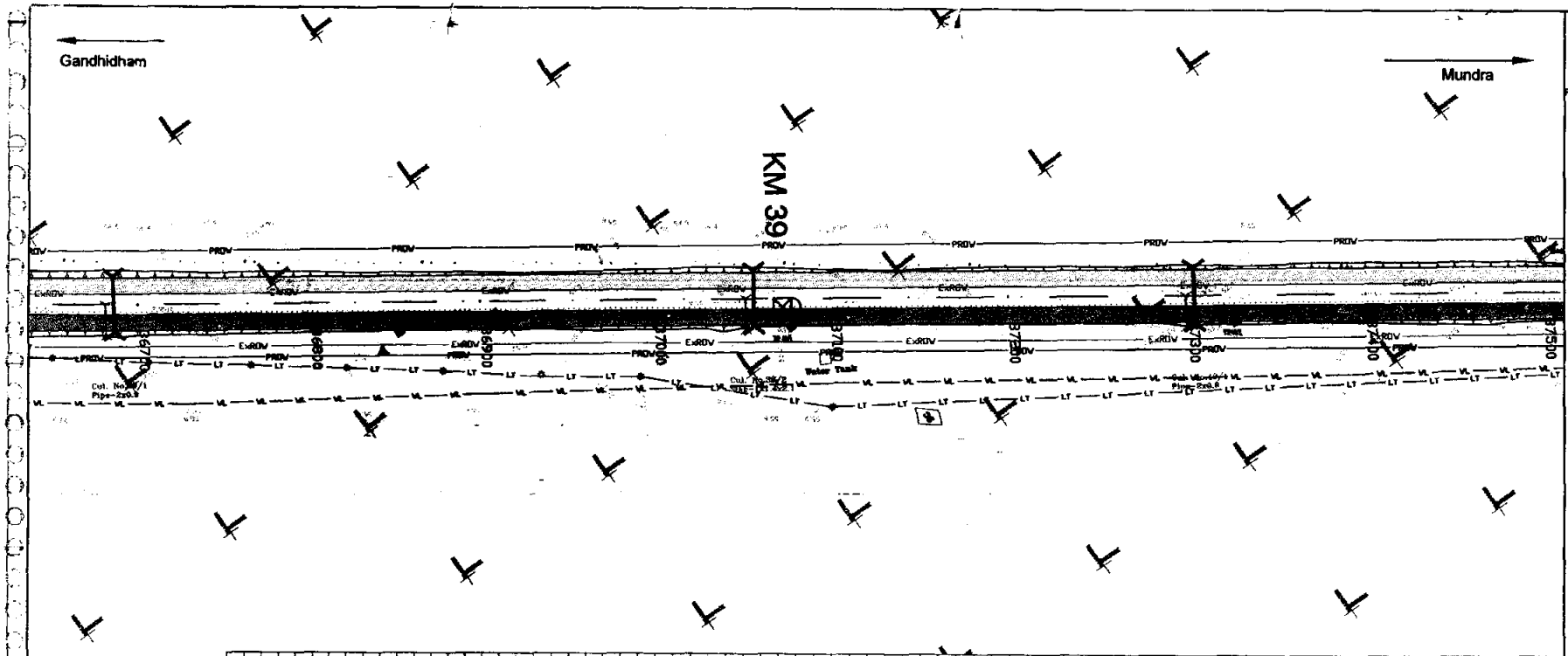
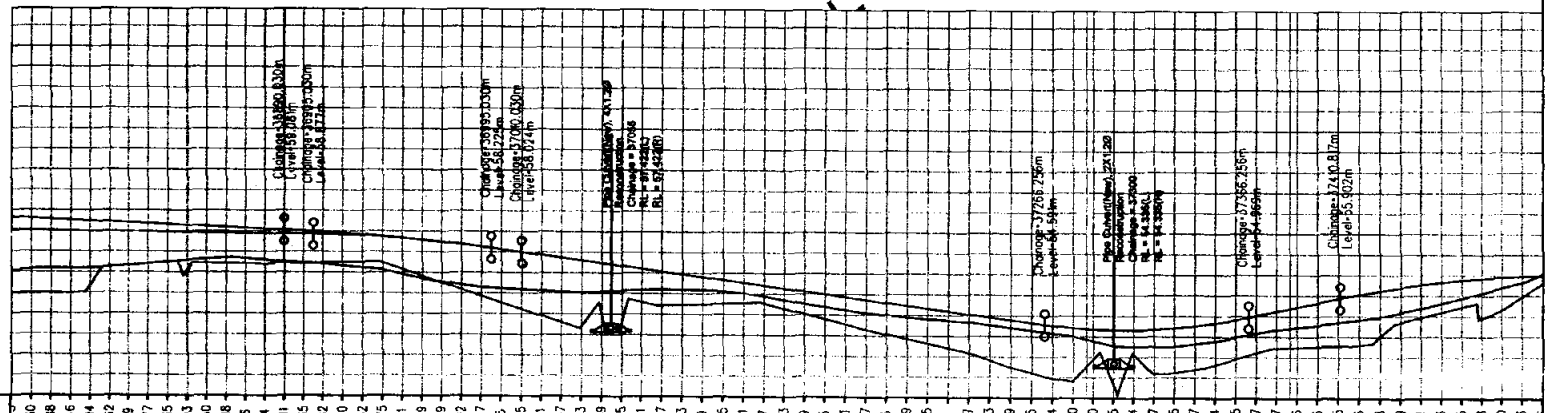
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
Feasibility-cum-Preliminary Design for 4/6-laning of Mundra-Mandvi-Port Road Section of NH8A (Extension) in the State of Gujarat
September 2009
RITES





Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

LEGEND

- Proposed Carriageway / Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
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- Proposed Culvert
- Proposed Bridge
- Existing Bridge
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- TBM
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- Semi-pucca Structure
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- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond
- Ditch
- Nallah
- ROW Pillar
- Signboard
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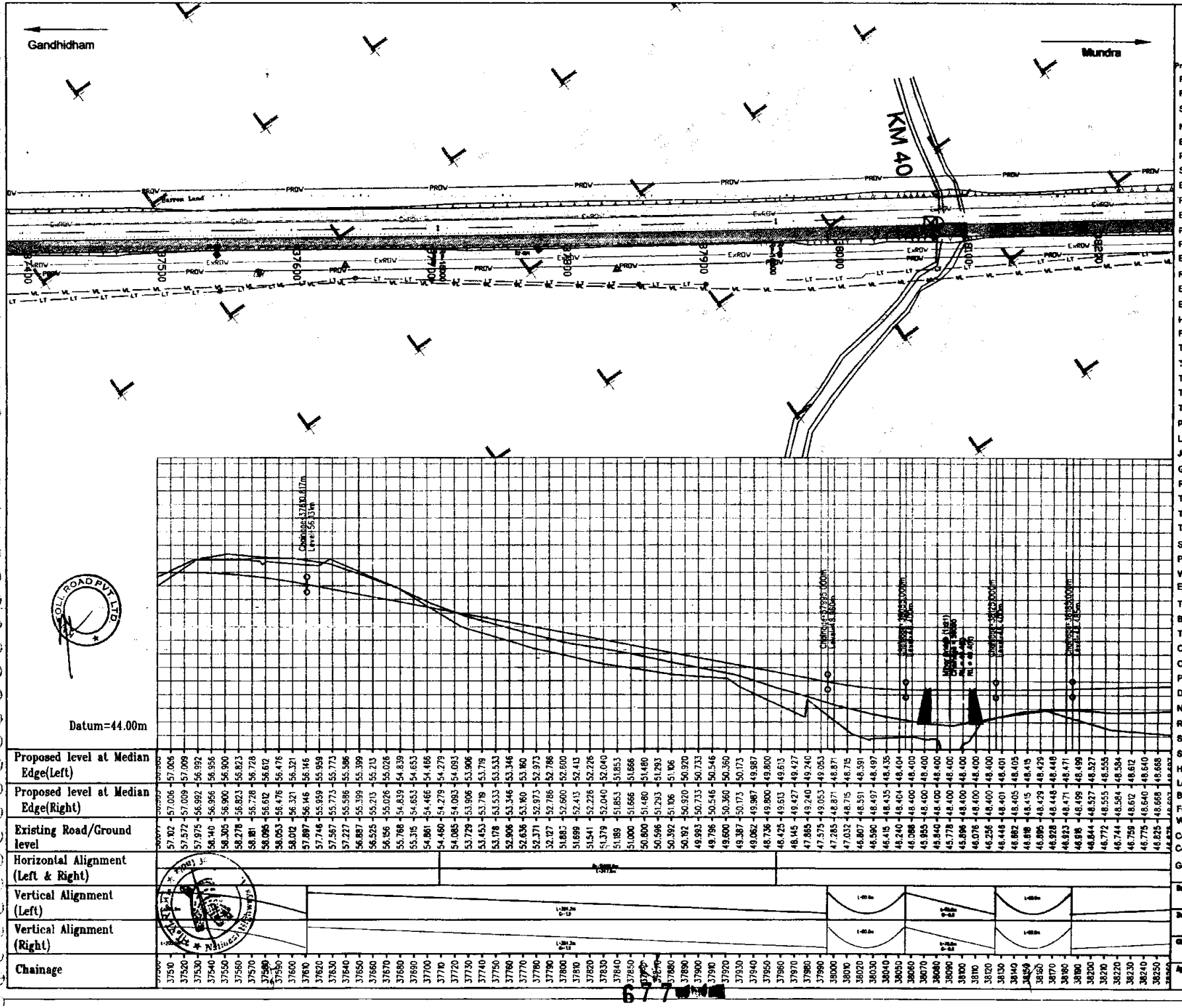
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.36750 to Ch. 37500 Dist. : Rt. — September 2009
Approved By :	Dwg. No. RITES/NHAI/Kandla-Mundra/PP/LP/ — RITES
	SCALE


Gandhidham
Mundra
KM 40
Datum=44.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
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Strengthening/Widening
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Proposed Bridge
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Pucca Structure
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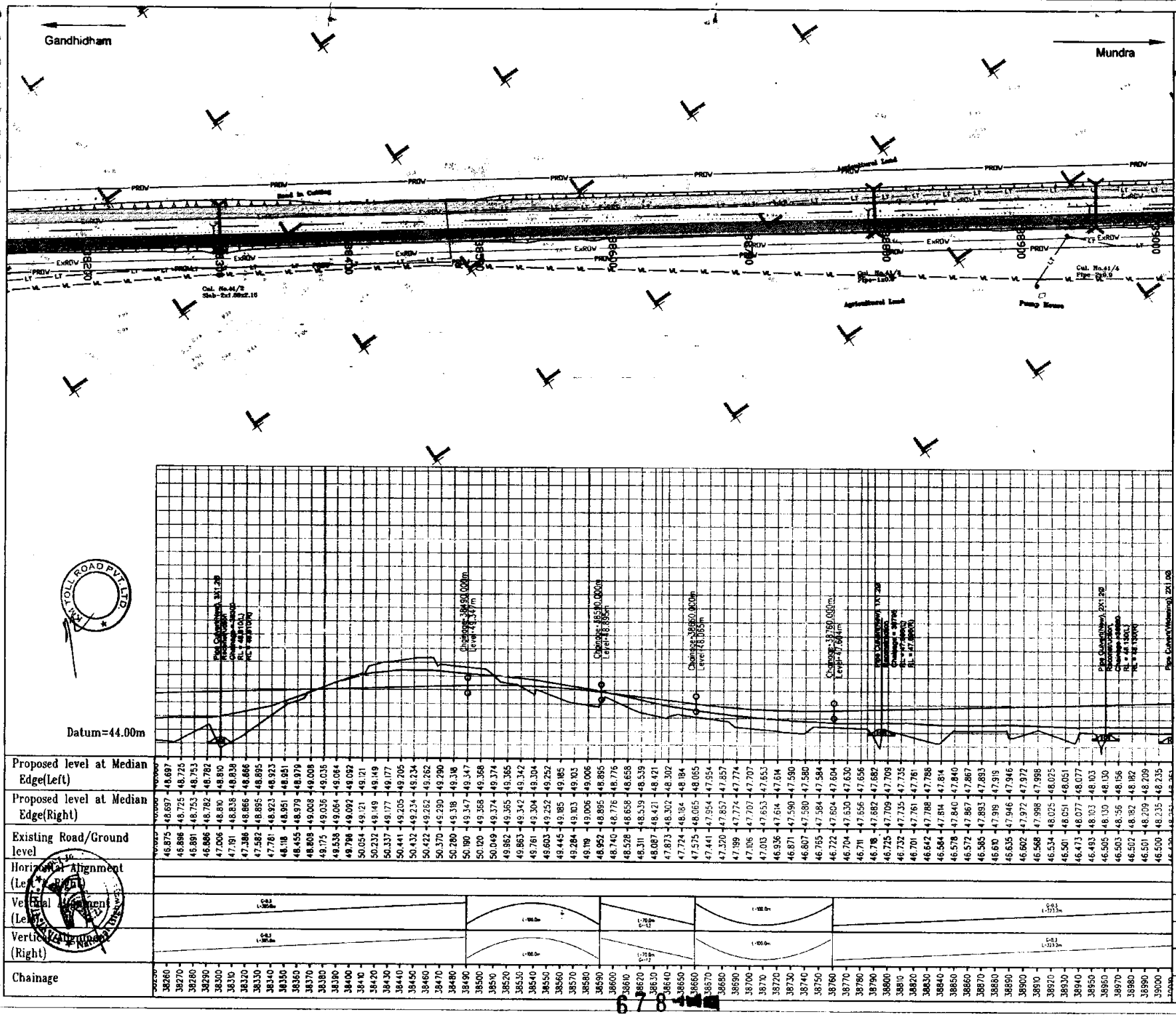
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch.37500 to Ch. 38250 Rem. : Rt
September 2009
RITES
SCALE


Gandhidham
Mundra
Datum=44.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
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ROW Pillar
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Contour(Major)
Contour(Minor)
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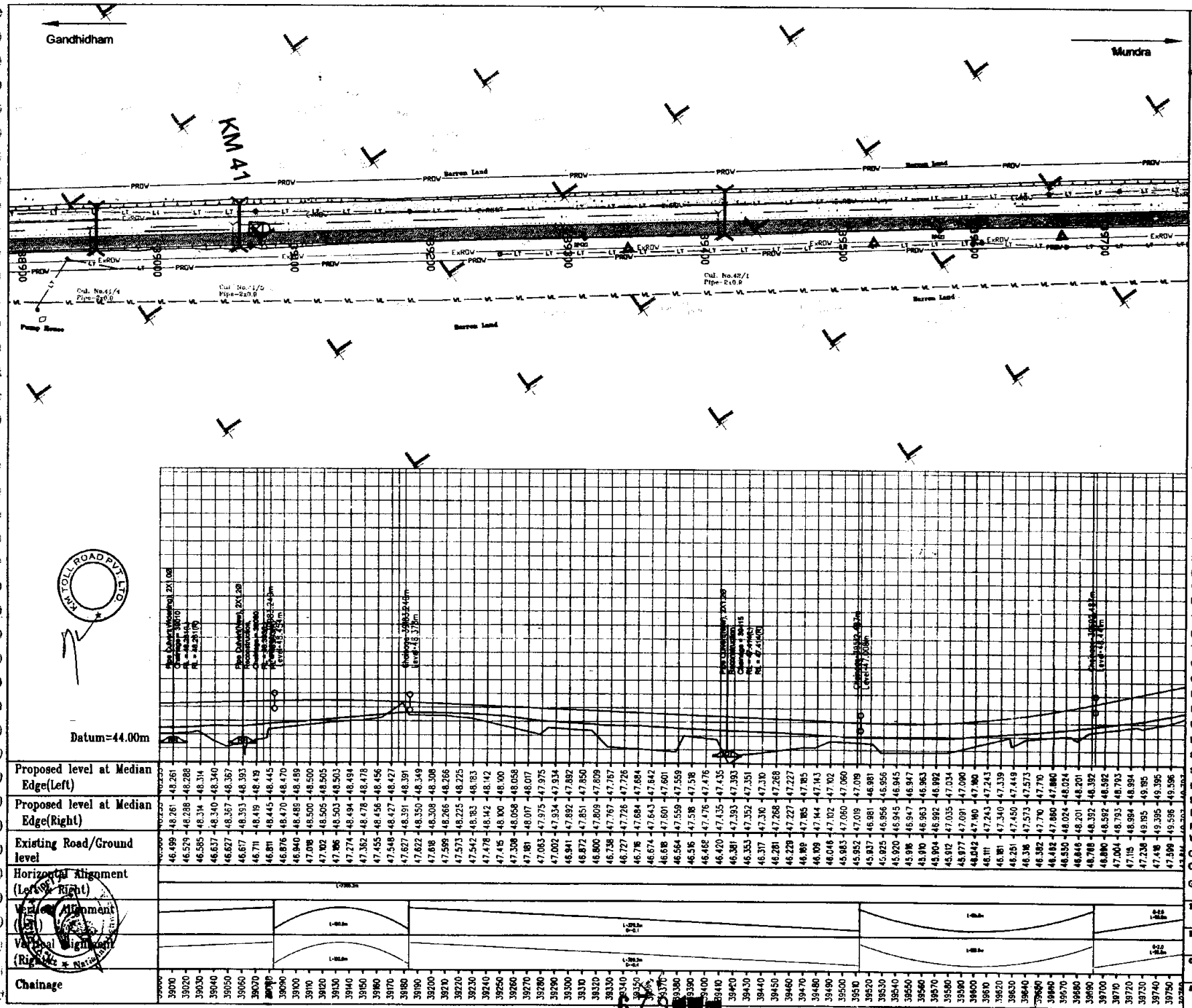
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch 38250 to Ch 39000 Rmk. : R1
September 2009
RITES


Gandhidham
Mundra
KM 41
Barren Land
PROV
ExROV
Datum=44.00m
KM TOLL ROAD PVT LTD
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
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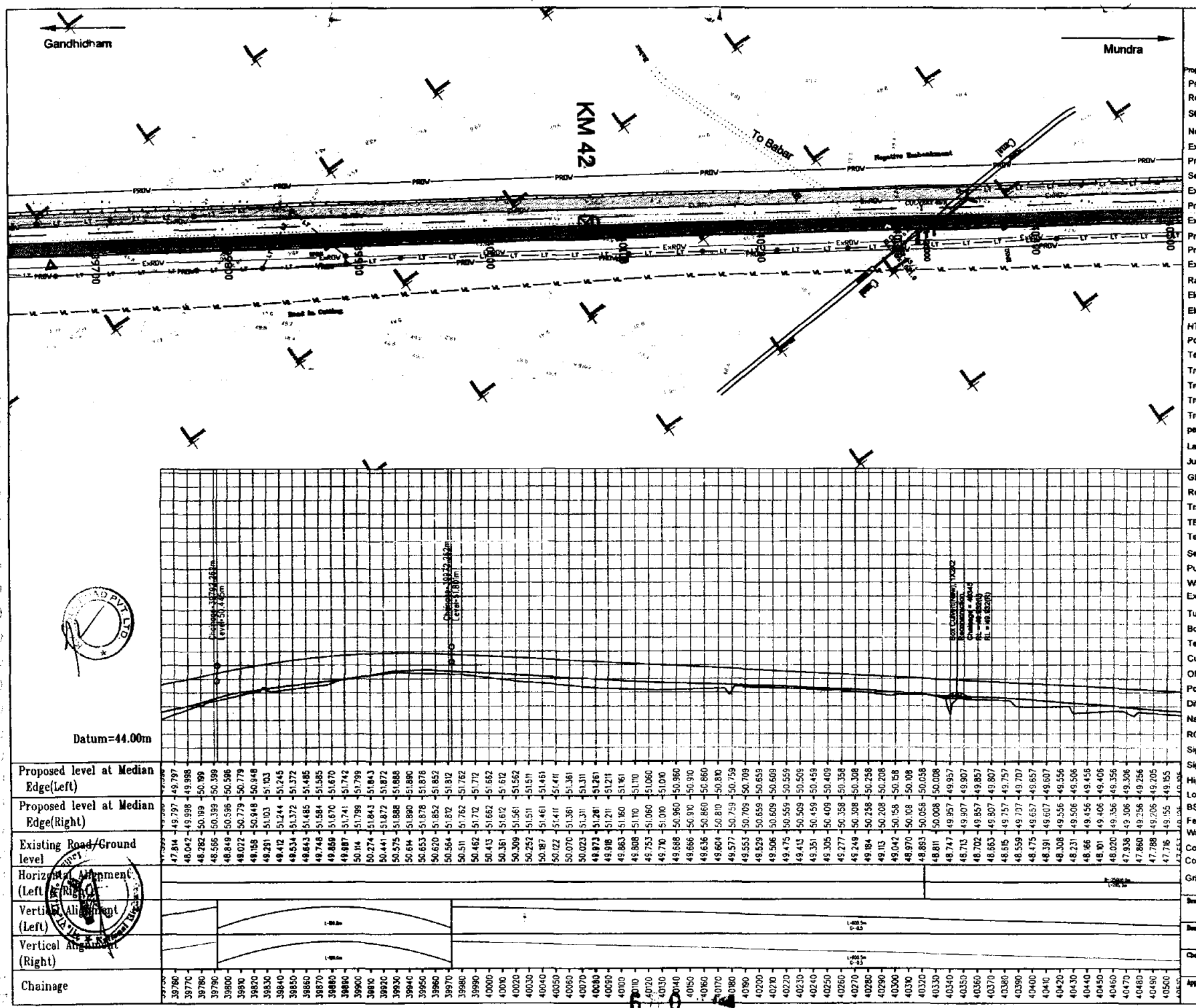
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch.38990 to Ch. 39750 Rem. : RH
September 2009
RITES



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
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- Existing Carriageway /Cross Road
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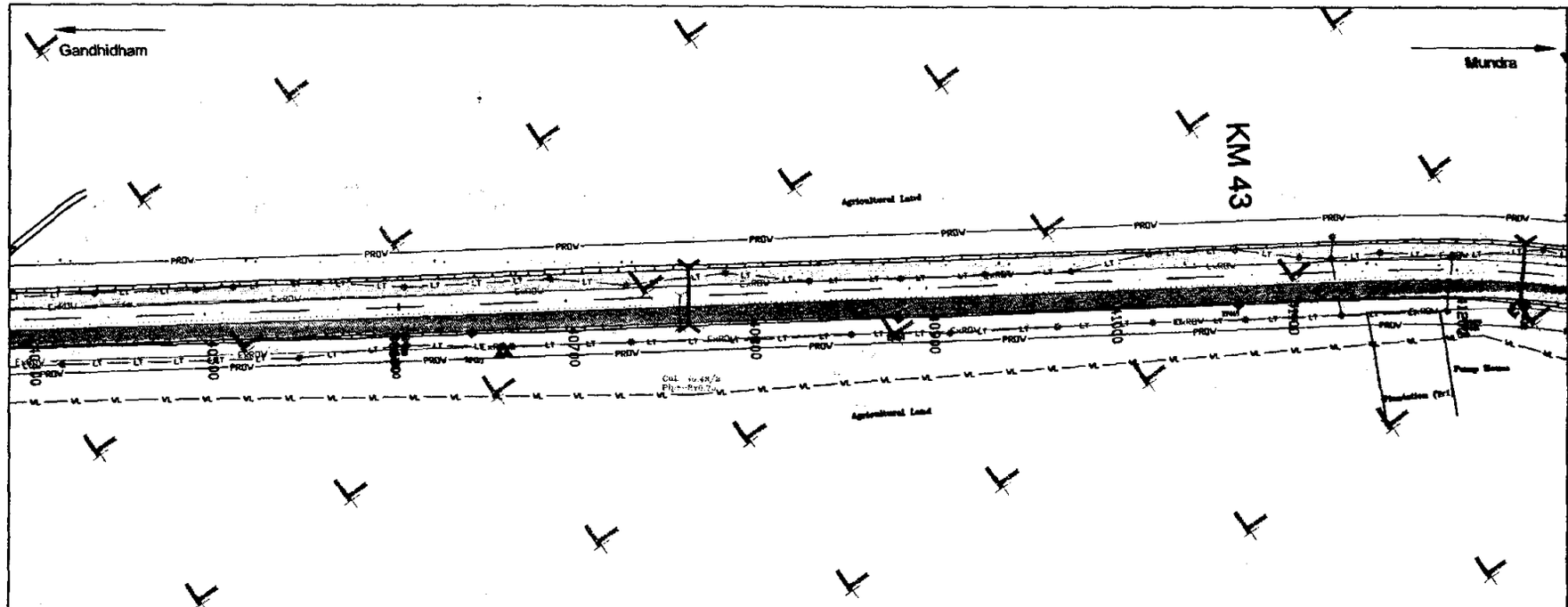
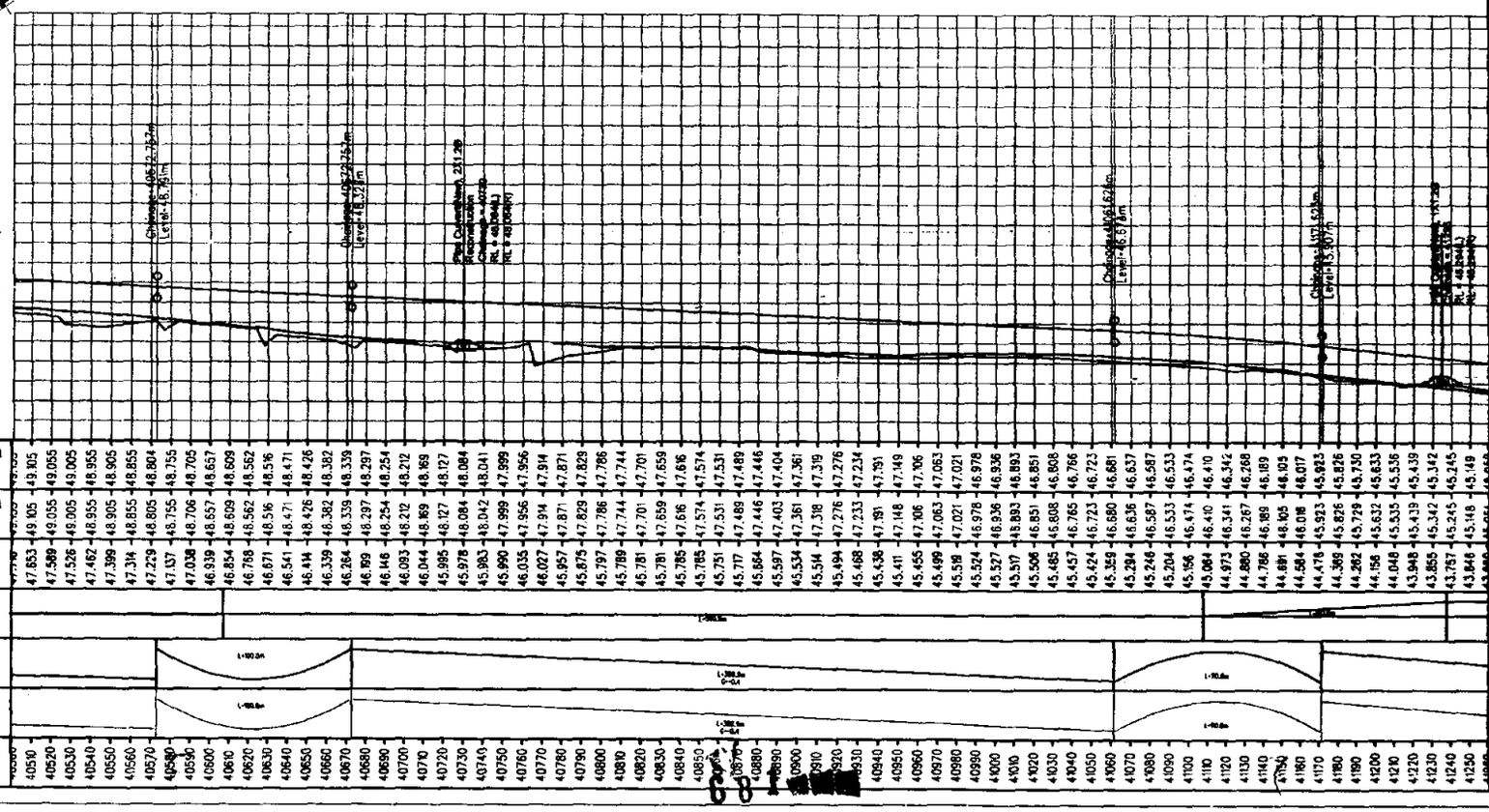
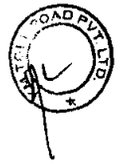
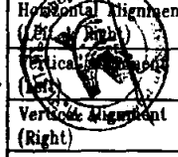
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.38750 to Ch. 40500 Rmm. : 8m — September 2009
Approved By :	Dwg No. RITES/HW/8074/NHAI/PP/PP/01/04 — RITES
	SCALE









LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
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- New Construction
- Existing Carriageway /Cross Road
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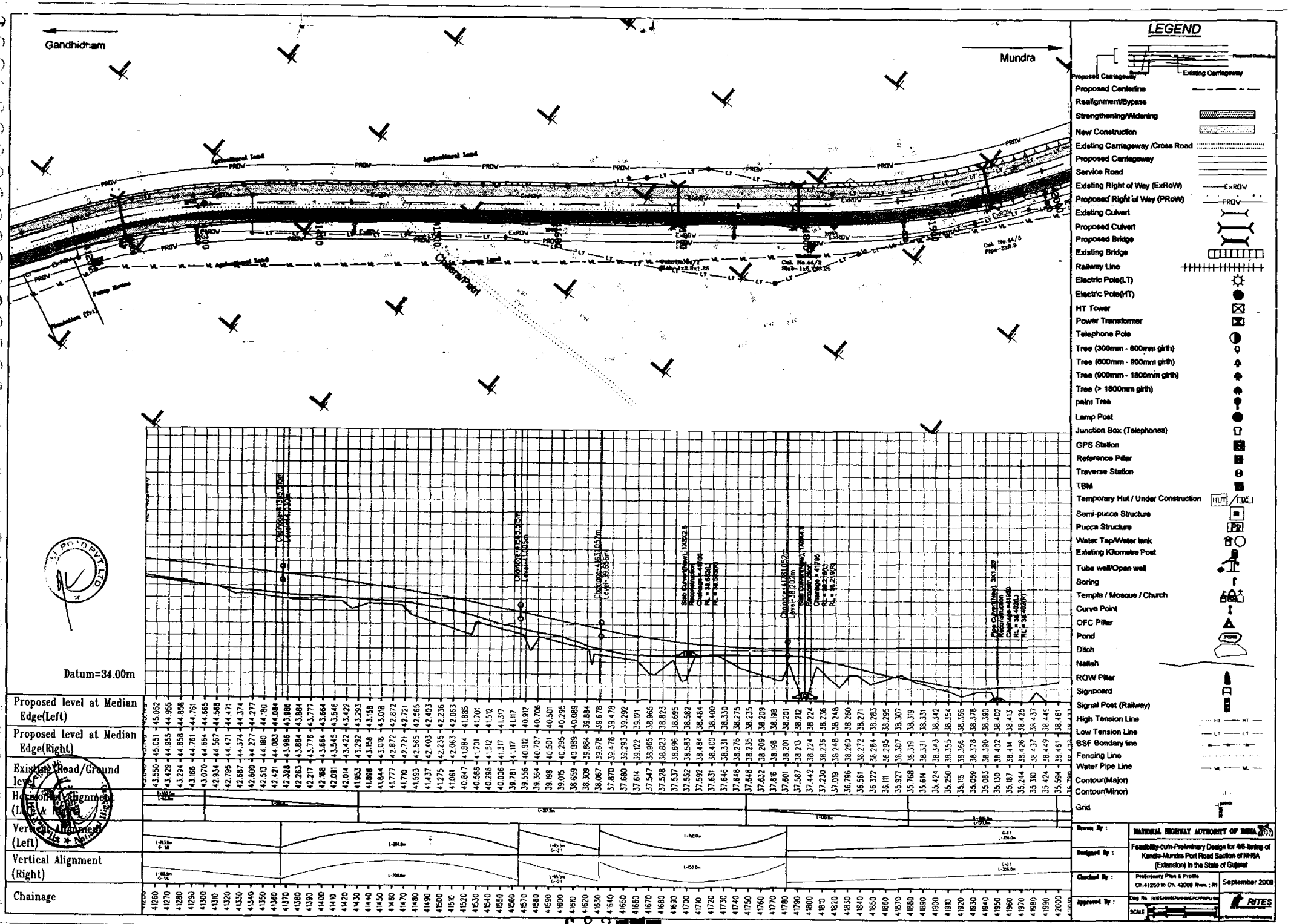
- BSF Boundary line
- Fencing Line
- Water Pipe Line (VL)
- Contour(Major)
- Contour(Minor)
- Grid

Owner By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.41200 to Ch. 41200 Rem. : 0m — September 2009
Approved By :	Drg No. RITES/NHAI/Kandla-Mundra/PP/PAP/01 — SCALE — RITES


Gandhidham
Mundra
Datum=34.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Carriageway
Existing Carriageway
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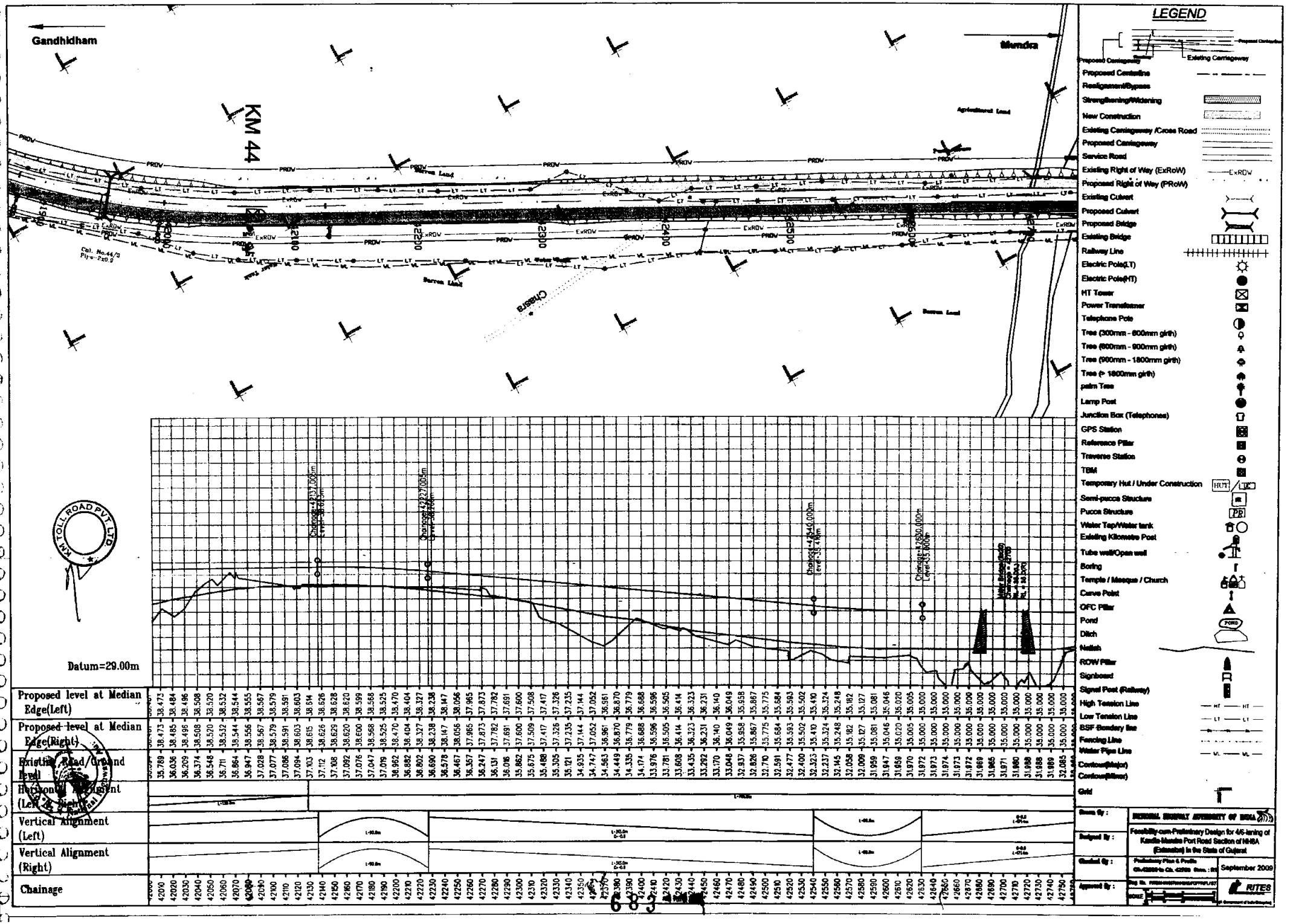
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch.41250 to Ch. 42000 Prem. : RH
September 2009
RITES
SCALE


Gandhidham
Mundra
KM 44
Datum=29.00m
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Service Road
Existing Right of Way (ExRoW)
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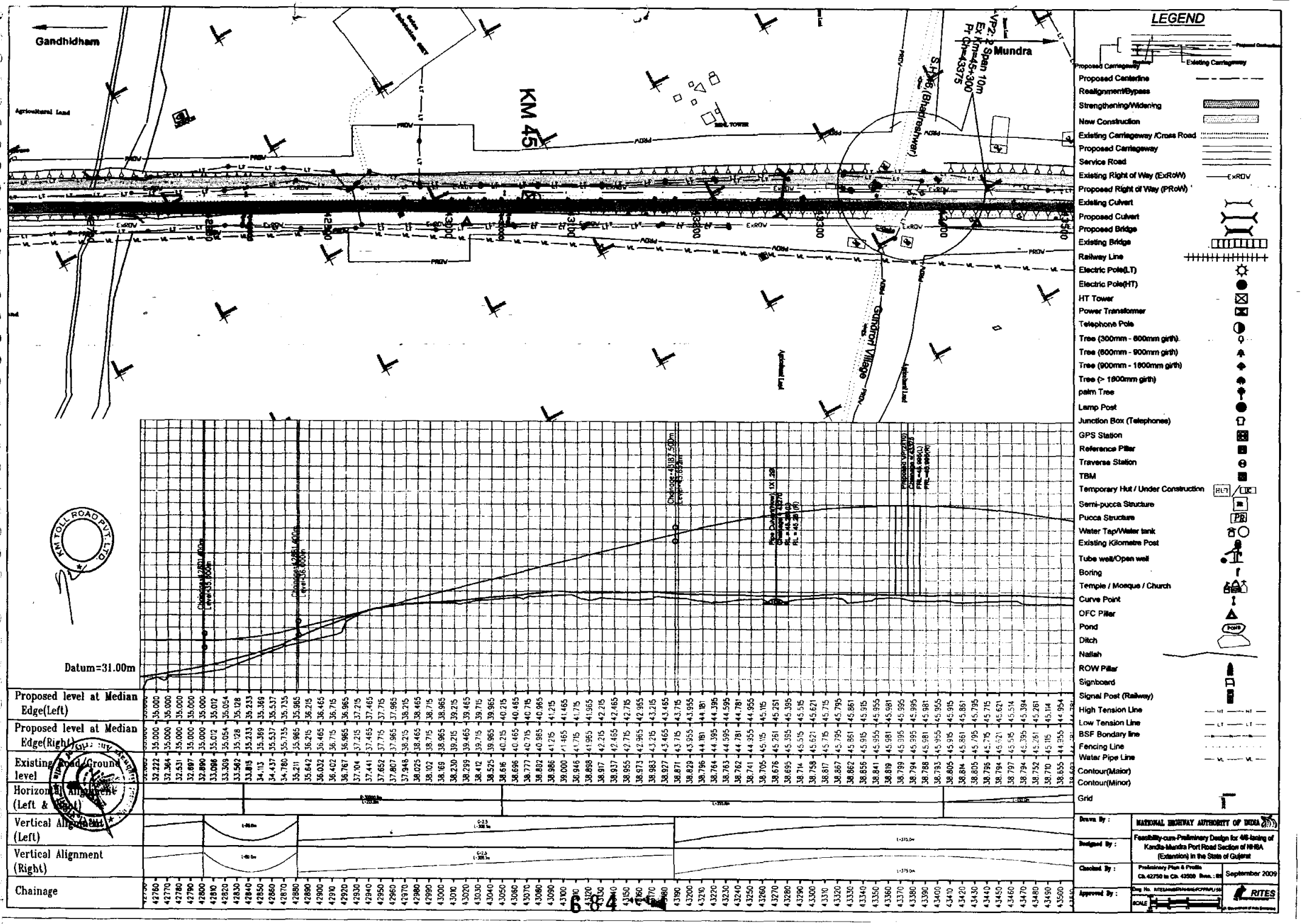
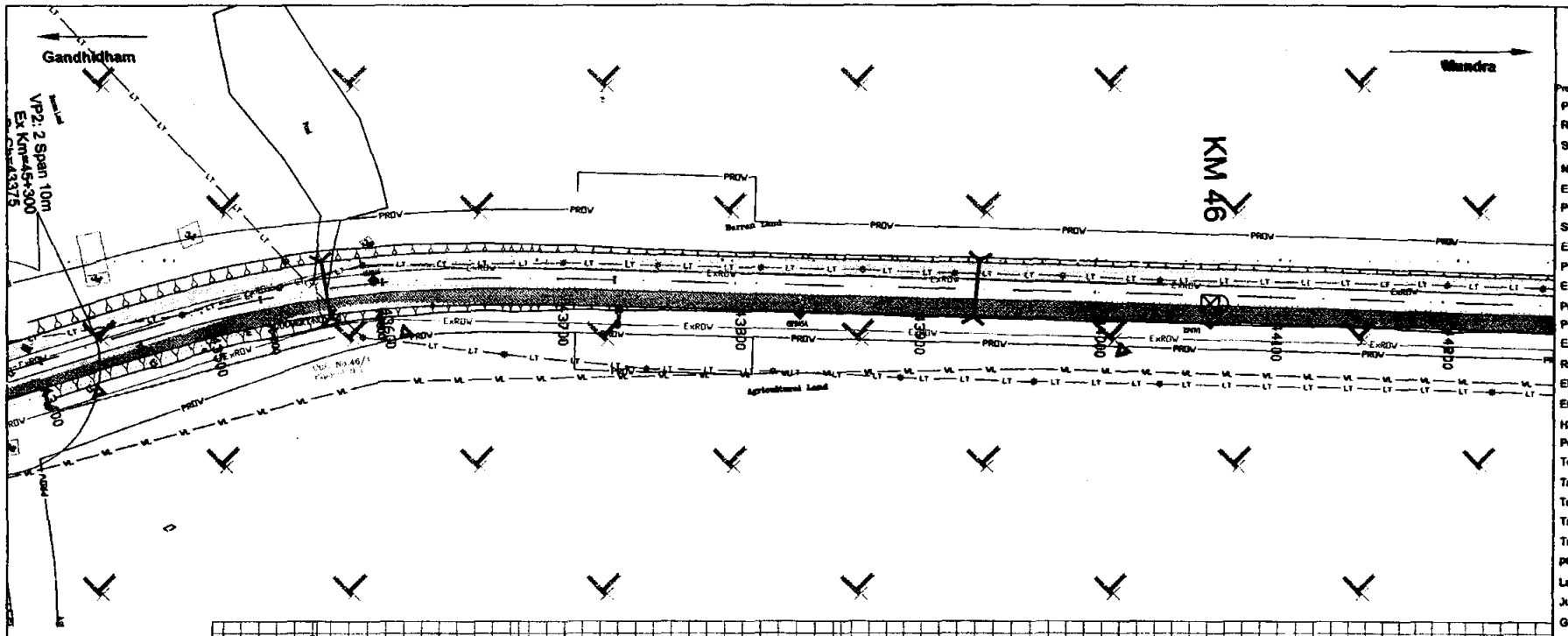
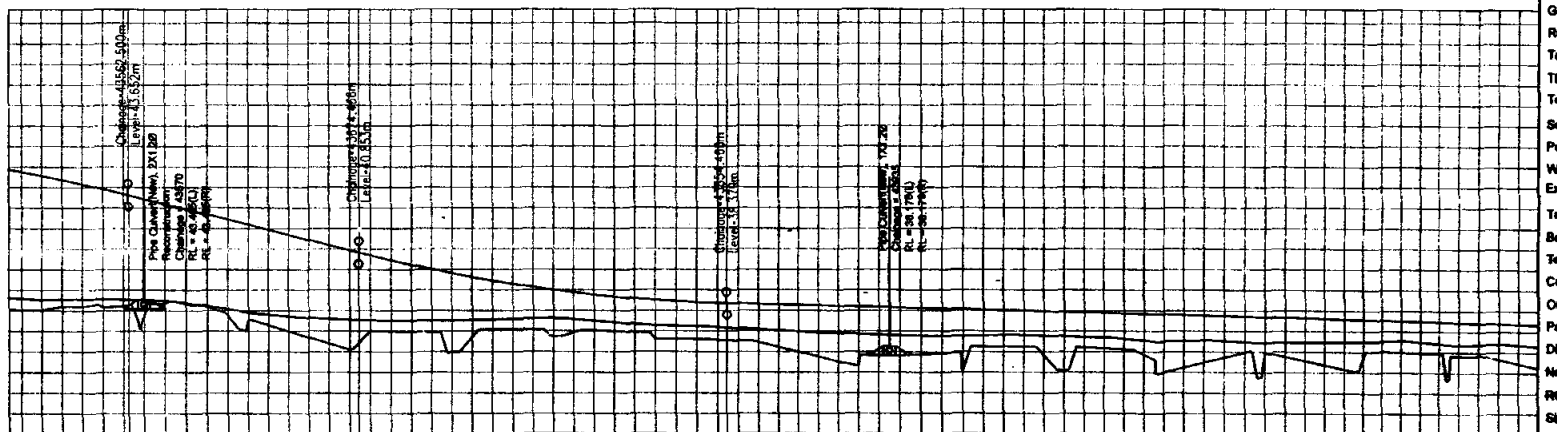
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Boundary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground Level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
September 2009
RITES
SCALE :
683


Gandhidham
Mundra
KM 45
Agricultural Land
Gundrau Village
S.H.36 (Bhadreshwar)
VP2: 3 Span 10m
Ex Km=45+300
Pr Ch=43375
ExROV
PROV
ADRM
Datum=31.00m
KM TOLL ROAD PVT. LTD.
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExROW)
Proposed Right of Way (PROW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Moeque / Church
Curve Point
OFC Piller
Pond
Ditch
Nallah
ROW Piller
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Maior)
Contour(Minor)
Grid
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch.42750 to Ch. 43500 Rev. : 01
September 2009
RITES
SCALE





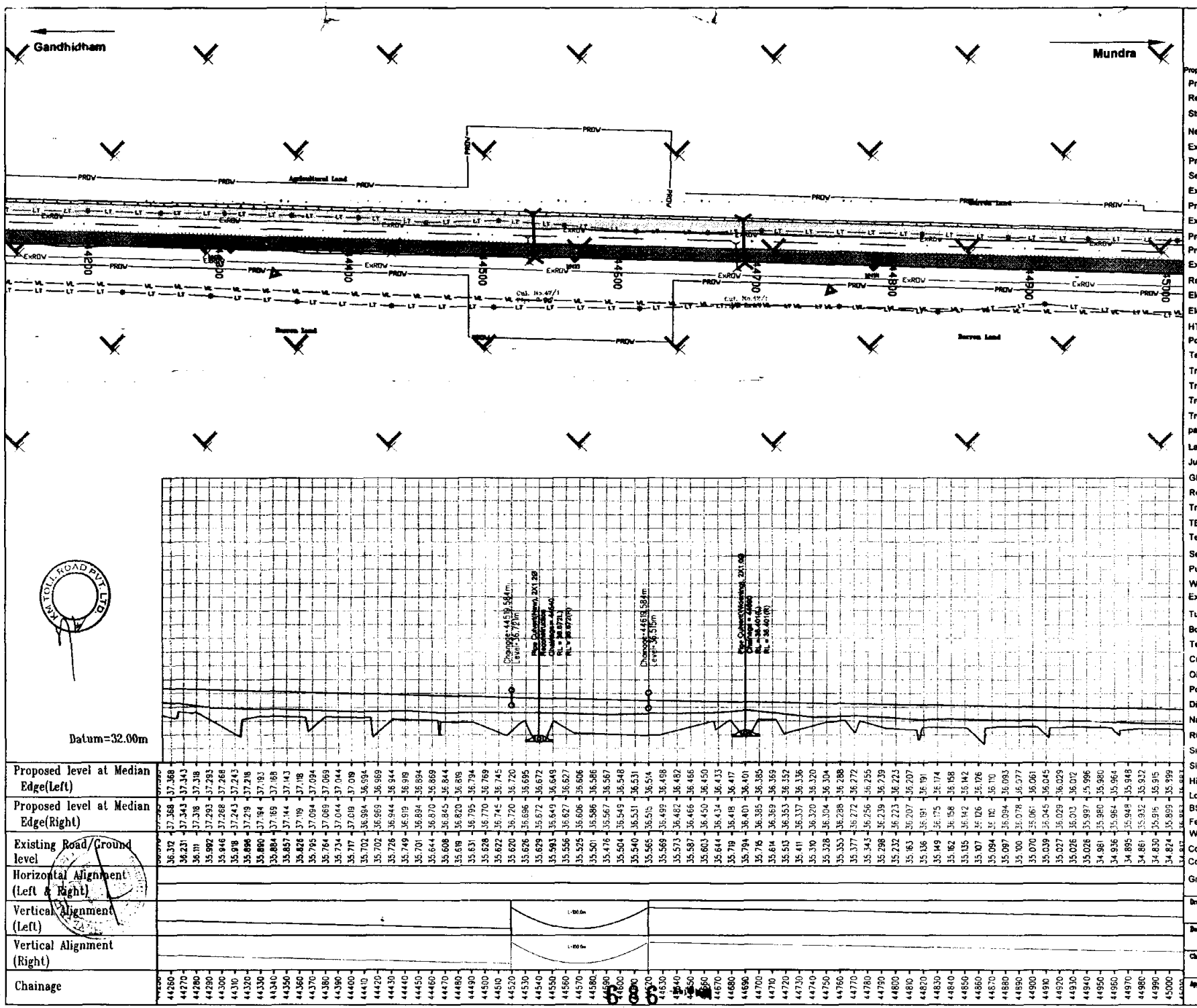
Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction (HUT / UC)
- Semi-pucca Structure (PR)
- Pucca Structure
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond (POND)
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line (HT)
- Low Tension Line (LT)
- BSF Boundary line
- Fencing Line
- Water Pipe Line (WL)
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.44000 to Ch. 46300 Rmts. : RP
Approved By :	September 2009
	Dwg No.
	RITES

KMC TOLL ROAD PVT. LTD.


Gandhidham
Mundra
Datum=32.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
KMTOLL ROAD PVT LTD
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
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HT Tower
Power Transformer
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GPS Station
Reference Pillar
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Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
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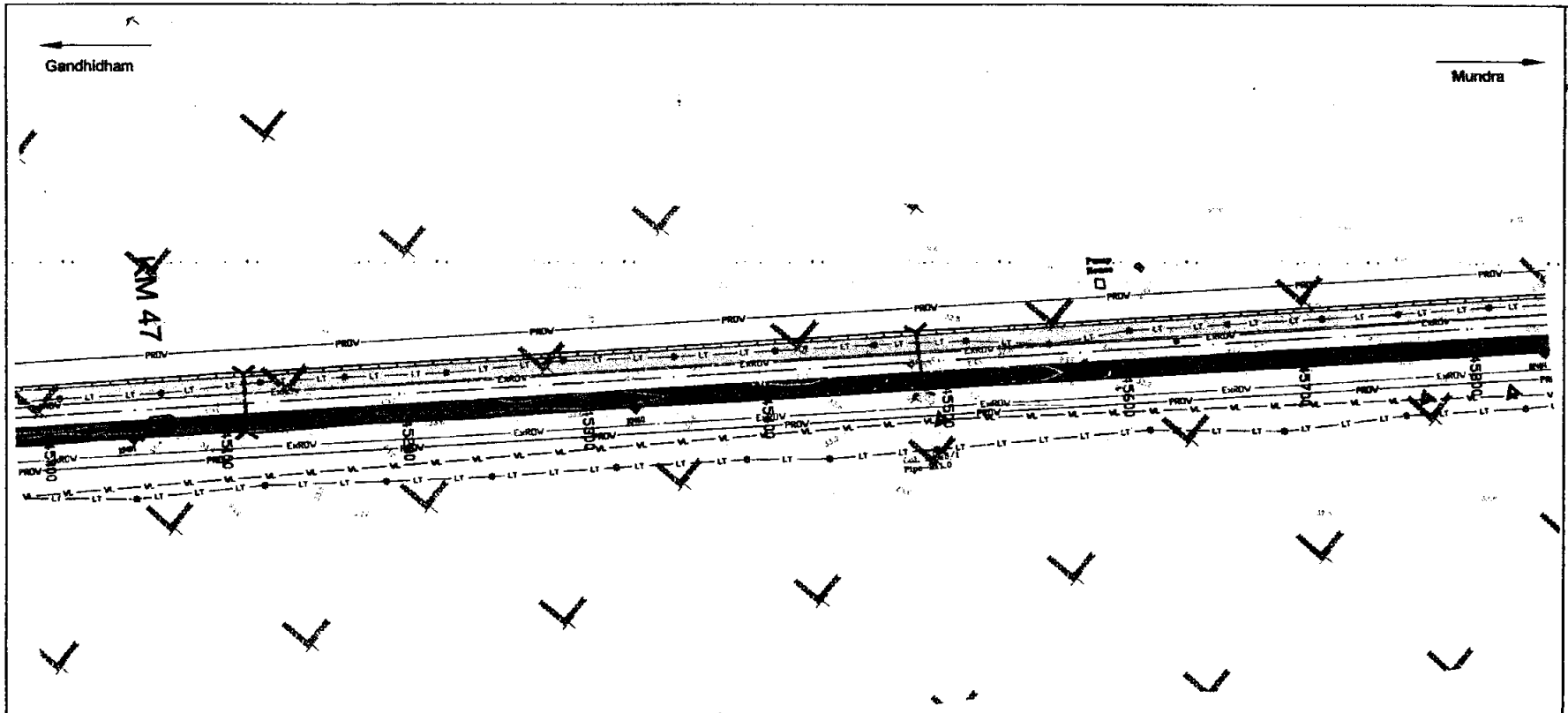
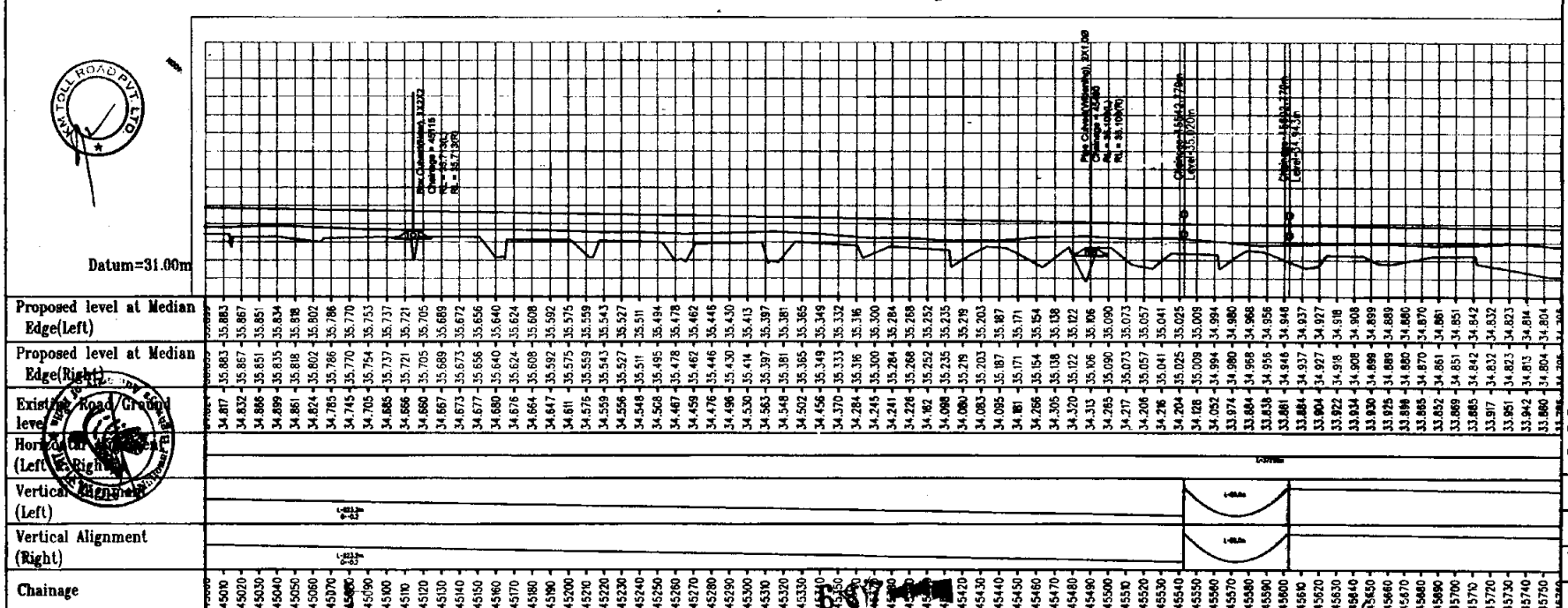
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile Ch.44250 to Ch. 45000 Revs. : RP
September 2009
SCALE
RITES



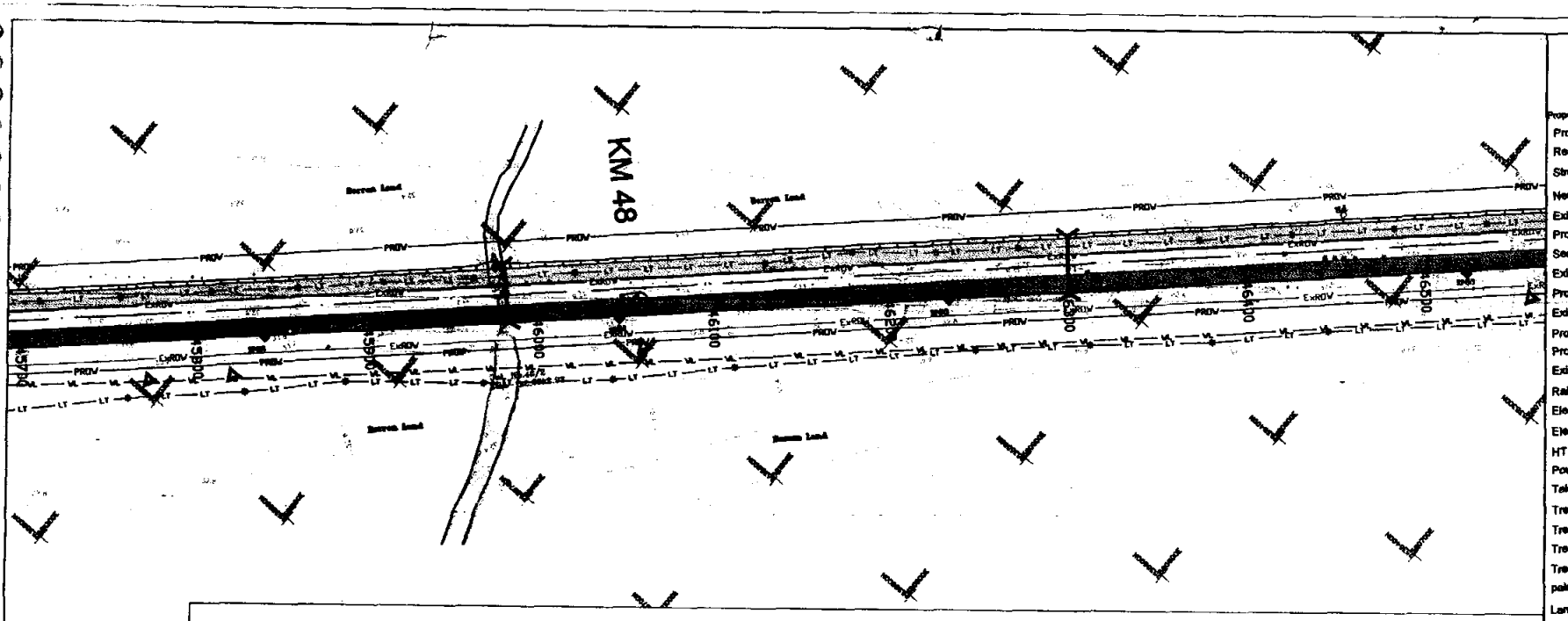


LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW) — ExROW
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction — HUT / U/C
- Semi-pucca Structure — SS
- Pucca Structure — PS
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond — POND
- Ditch
- Nalah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line — HT
- Low Tension Line — LT
- BSF Boundary line
- Fencing Line
- Water Pipe Line — WL
- Contour(Major)
- Contour(Minor) — 0.5
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.45000 to Ch. 45750 Dwg. : 01 — September 2009
Approved By :	Dwg No. NHAI/GUJ/KMPL/01 — SCALE — RITES

KMTOLL ROAD PVT. LTD.



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
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- palm Tree
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- Reference Pillar
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- TBM
- Temporary Hut / Under Construction (HUT / UC)
- Semi-pucca Structure
- Pucca Structure (PR)
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
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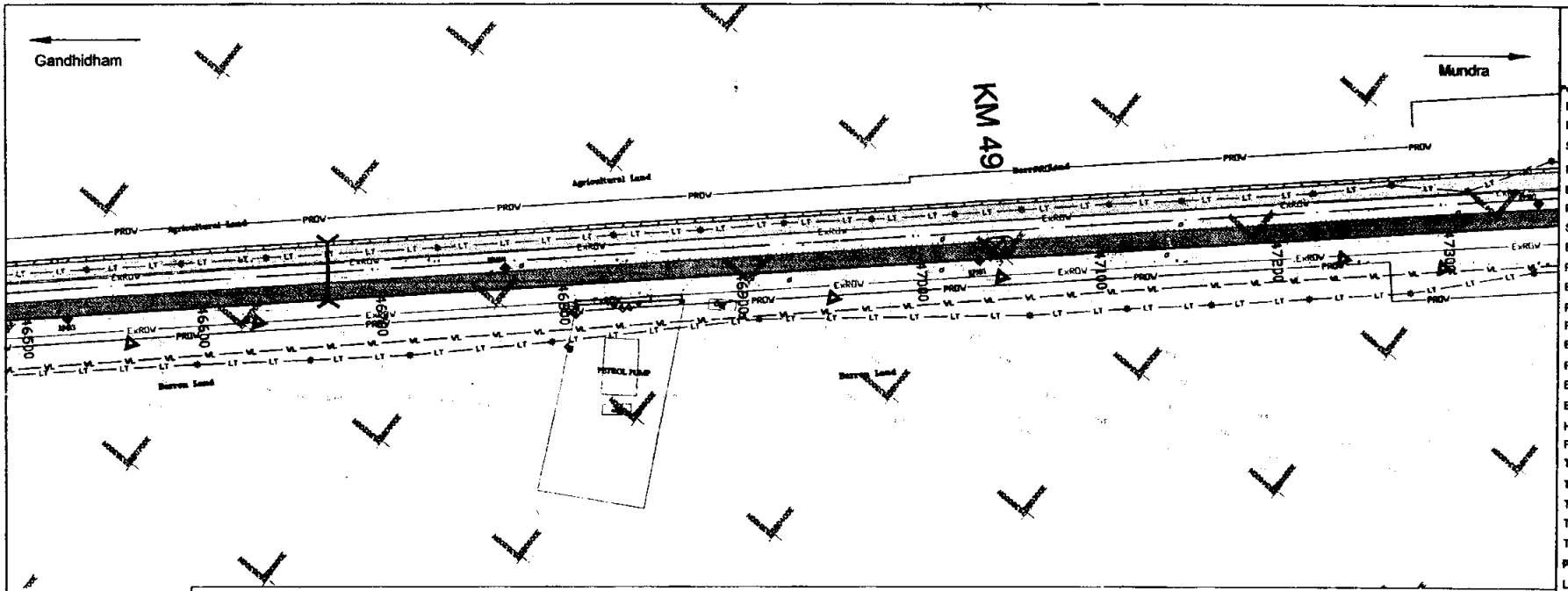
- OFC Pillar
- Pond
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line (HT)
- Low Tension Line (LT)
- BSF Bondary line
- Fencing Line
- Water Pipe Line (WL)
- Contour(Major)
- Contour(Minor)
- Grid

Datum=26.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.45750 to Ch. 48500 Rmk. : Rd. — September 2009
Approved By :	Dwg No. RITES/NH/6/70/14-8A/FDPR/PL/02 — RITES — SCALE



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
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- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
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- Proposed Culvert
- Proposed Bridge
- Existing Bridge
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- HT Tower
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- GPS Station
- Reference Pillar
- Traverse Station
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- Temporary Hut / Under Construction (HUT / UC)
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- Pucca Structure (PR)
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Canve Point
- OFC Pillar
- Pond (POND)
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
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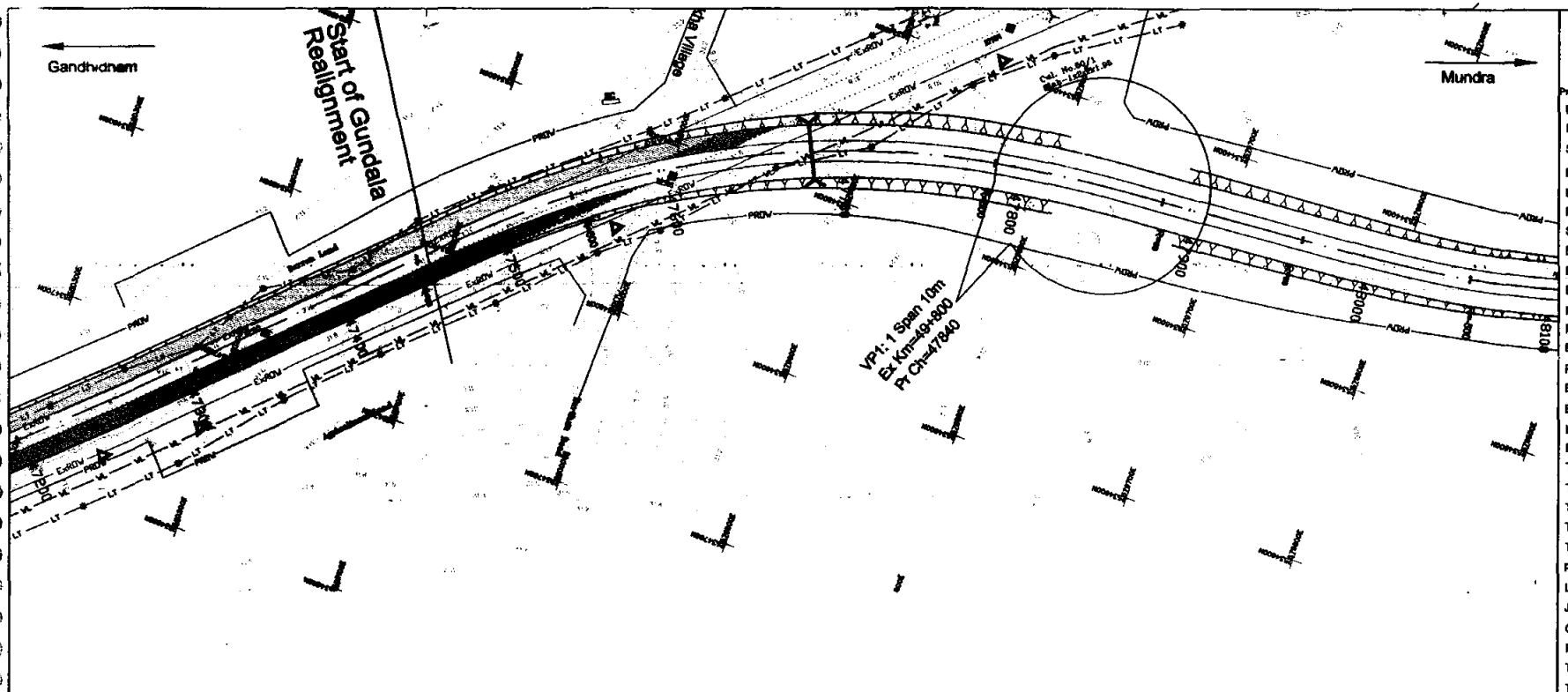
- Low Tension Line (LT)
- BSF Bondary line
- Fencing Line
- Water Pipe Line (WL)
- Contour(Major)
- Contour(Minor)
- Grid

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road /Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

Box Culvert(1 x 3.0m)
Chainage = 46870
RL = 33.92m(L)
RL = 33.92m(R)

KMA TOLL ROAD PVT. LTD.

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.46500 to Ch. 47200 Dwg. : 02 — September 2009
Approved By :	Dwg No. NHAI/GANDHIDHAM-KOPPAR/...-02 — SCALE: — RITES



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
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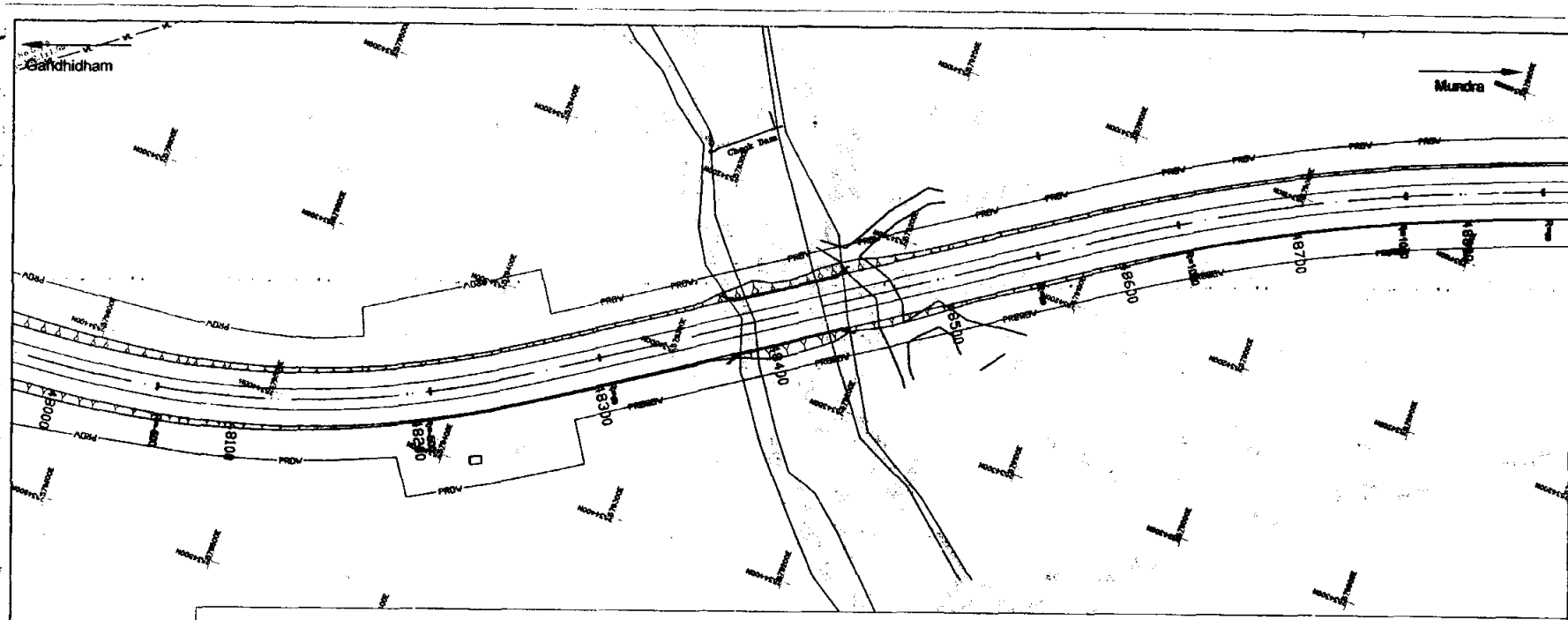
- Curve Point
- OEC Pillar
- Pond (POND)
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line (HT)
- Low Tension Line (LT)
- BSF Bondary line
- Fencing Line
- Water Pipe Line (WL)
- Contour(Major)
- Contour(Minor)
- Grid

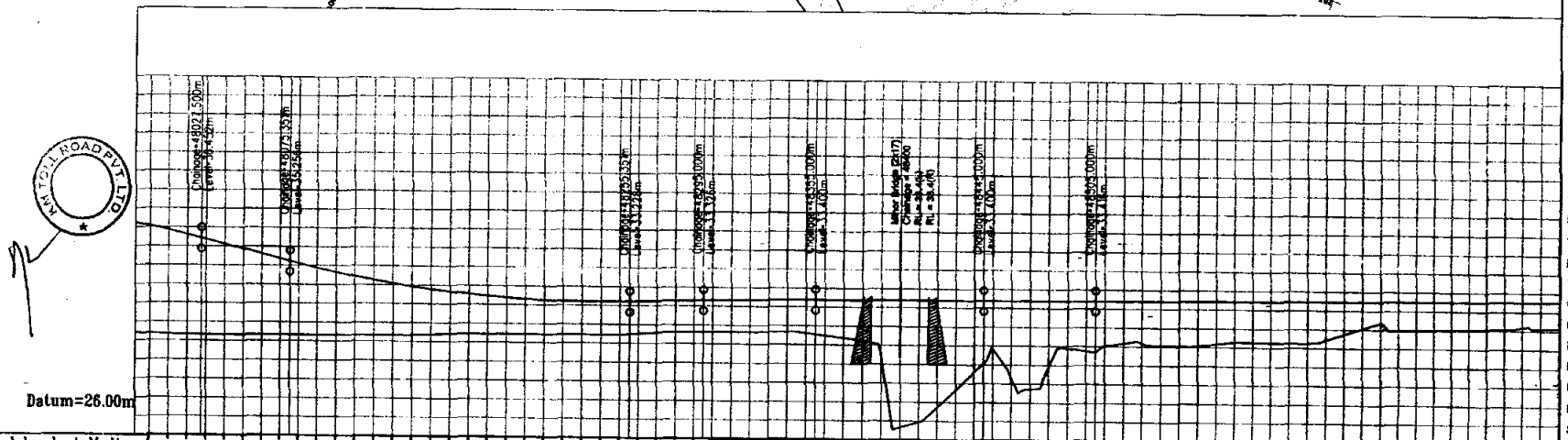
Datum=29.00m

Chainage	Proposed level at Median Edge(Left)	Proposed level at Median Edge(Right)	Existing Road/Ground level	Horizontal Alignment (Left & Right)	Vertical Alignment (Left)	Vertical Alignment (Right)
47240	33.375	33.374	32.248			
47250	33.365	33.365	32.209			
47260	33.356	33.355	32.167			
47270	33.346	33.346	32.119			
47280	33.337	33.336	32.072			
47290	33.327	33.327	32.065			
47300	33.318	33.317	32.066			
47310	33.308	33.308	31.603			
47320	33.299	33.298	31.505			
47330	33.289	33.289	31.373			
47340	33.280	33.280	31.652			
47350	33.271	33.270	31.618			
47360	33.261	33.261	31.598			
47370	33.252	33.251	31.584			
47380	33.242	33.242	31.570			
47390	33.233	33.232	31.753			
47400	33.223	33.223	31.759			
47410	33.214	33.213	31.764			
47420	33.212	33.212	31.770			
47430	33.225	33.225	31.868			
47440	33.252	33.252	31.942			
47450	33.294	33.293	31.454			
47460	33.350	33.349	31.581			
47470	33.420	33.420	31.559			
47480	33.505	33.505	31.541			
47490	33.605	33.604	31.725			
47500	33.718	33.718	31.737			
47510	33.846	33.846	31.752			
47520	33.989	33.989	31.769			
47530	34.146	34.146	31.789			
47540	34.317	34.317	31.842			
47550	34.503	34.503	31.881			
47560	34.703	34.703	31.920			
47570	34.918	34.918	31.957			
47580	35.147	35.147	31.962			
47590	35.390	35.390	31.915			
47600	35.640	35.640	31.848			
47610	35.890	35.890	31.788			
47620	36.140	36.140	31.630			
47630	36.390	36.390	31.217			
47640	36.637	36.636	31.019			
47650	36.870	36.870	30.984			
47660	37.090	37.090	30.957			
47670	37.296	37.296	30.964			
47680	37.490	37.490	30.979			
47690	37.670	37.670	30.935			
47700	37.835	37.835	30.897			
47710	37.990	37.990	30.858			
47720	38.130	38.130	30.827			
47730	38.256	38.256	30.802			
47740	38.370	38.370	30.807			
47750	38.470	38.470	30.933			
47760	38.556	38.556	31.109			
47770	38.630	38.630	31.198			
47780	38.690	38.690	31.277			
47790	38.736	38.736	31.356			
47800	38.770	38.770	31.426			
47810	38.790	38.790	31.474			
47820	38.796	38.796	31.437			
47830	38.790	38.790	31.401			
47840	38.770	38.770	31.357			
47850	38.736	38.736	31.332			
47860	38.690	38.690	31.341			
47870	38.630	38.630	31.356			
47880	38.556	38.556	31.355			
47890	38.470	38.470	31.353			
47900	38.370	38.370	31.356			
47910	38.256	38.256	31.365			
47920	38.130	38.130	31.384			
47930	37.990	37.990	31.399			
47940	37.836	37.836	31.405			
47950	37.669	37.670	31.411			
47960	37.489	37.490	31.404			
47970	37.296	37.296	31.373			
47980	37.089	37.090	31.342			
47990	36.869	36.870	31.312			
48000	36.636	36.636	31.283			

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.47250 to Ch. 48000 Rem. : Nil — September 2009
Approved By :	Dwg. No. : RITES/NHAI/GUJARAT/PDP/PP/Rd/ — SCALE — RITES

KMTR TOLL ROAD PVT. LTD.





Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW) — EXROW
- Proposed Right of Way (PRoW)
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- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
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- Electric Pole(HT)
- HT Tower
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- Telephone Pole
- Tree (300mm - 600mm girth)
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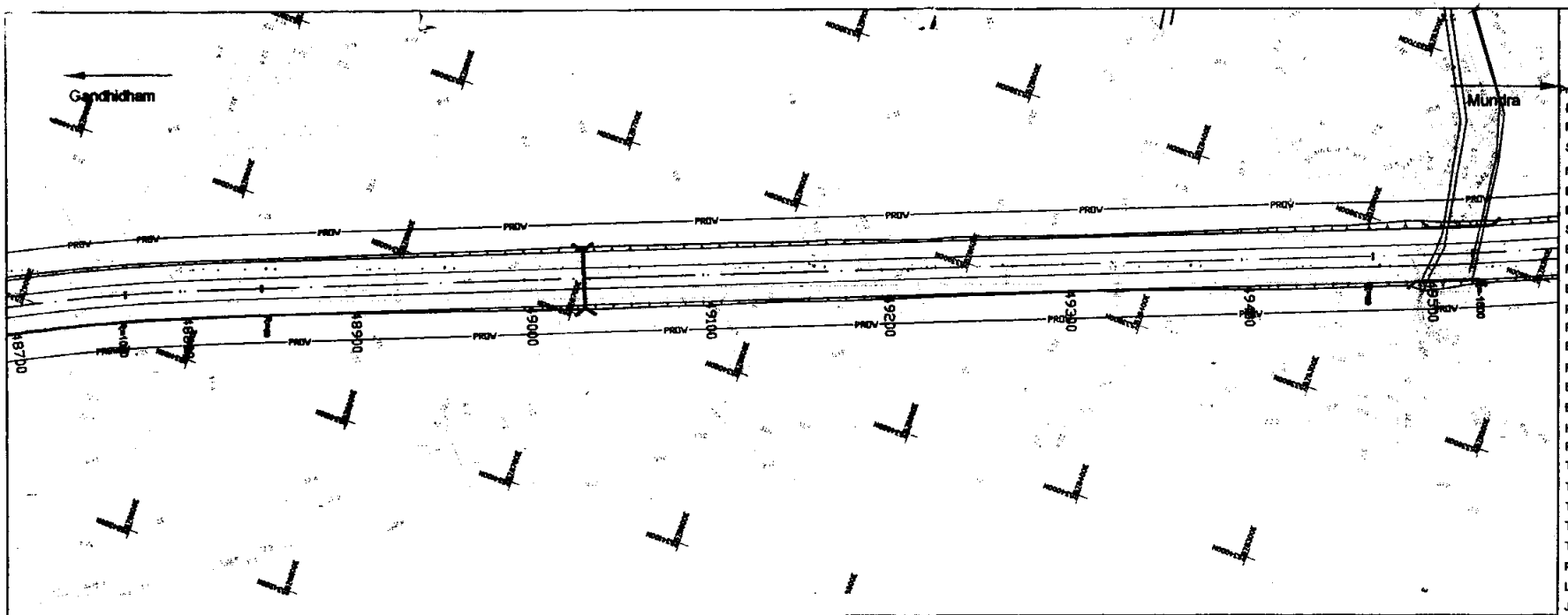
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction — HUT / UC
- Semi-pucca Structure
- Pucca Structure — PR
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond — POND
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line — HT
- Low Tension Line — LT
- BSF Bondary line
- Fencing Line
- Water Pipe Line — WL
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.48000 to Ch. 49000 Rem. : 0
Approved By :	Dwg No: RITES/HW/Mundra/PP/PP1/48
	SCALE
	September 2009
	RITES

AM TOLL ROAD PVT LTD



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW) — ExROW
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction — HUT / U/C
- Semi-pucca Structure
- Pucca Structure — PR
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond — POND
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line — HT
- Low Tension Line — LT
- BSF Bondary line
- Fencing Line
- Water Pipe Line — WL
- Contour(Major)
- Contour(Minor)
- Grid

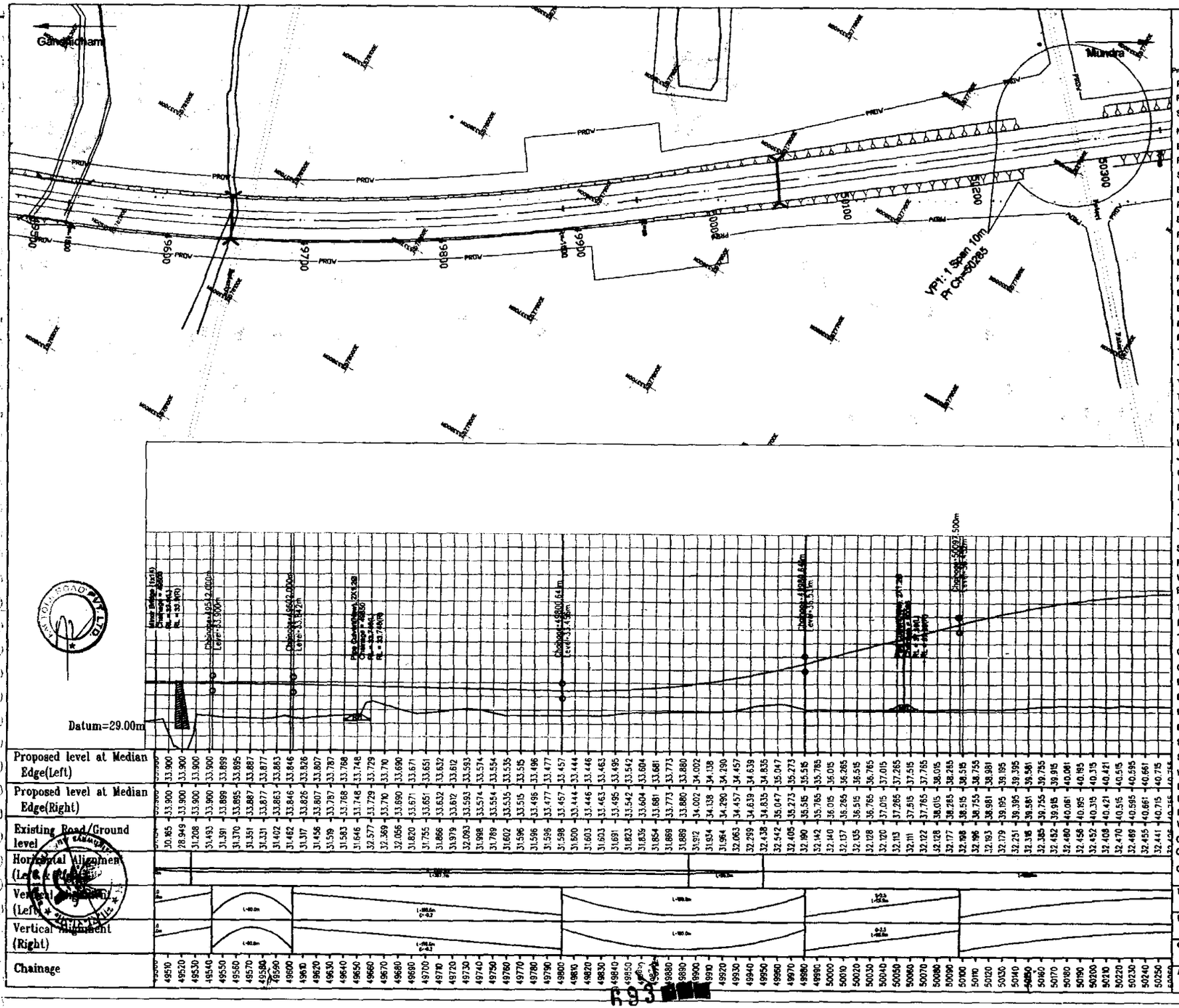
Datum=26.00m

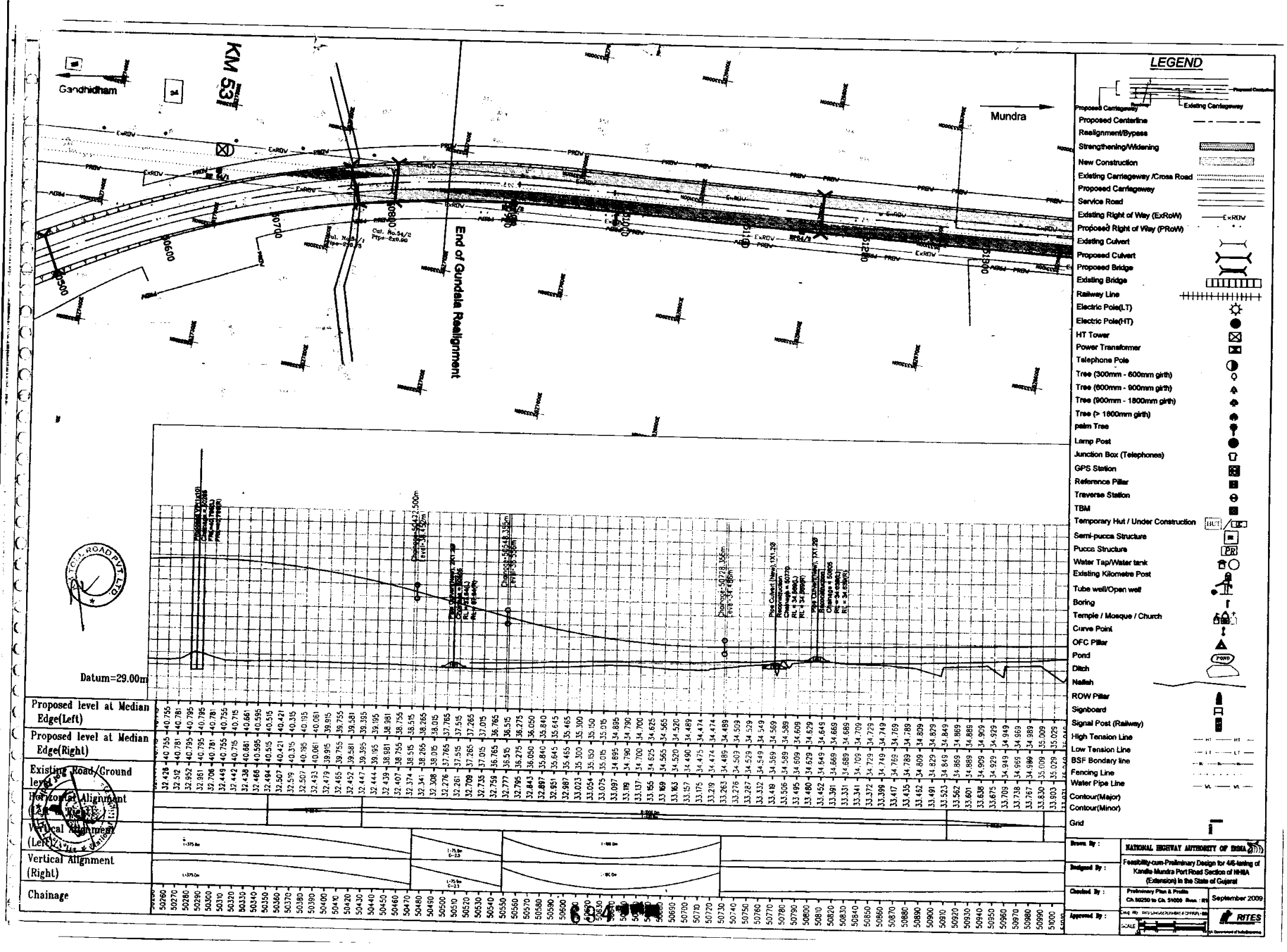
Chainage: 49198.000m, Left=85.164m

Chainage: 49458.000m, Left=85.000m

Minor Bridge (1x14)

Proposed level at Median Edge(Left)	33.550 33.555 33.560 33.565 33.571 33.576 33.581 33.586 33.592 33.597 33.602 33.607 33.612 33.618 33.623 33.628 33.633 33.639 33.644 33.649 33.654 33.660 33.665 33.670 33.675 33.681 33.686 33.691 33.696 33.702 33.707 33.712 33.717 33.723 33.728 33.733 33.738 33.744 33.749 33.754 33.759 33.765 33.770 33.775 33.780 33.786 33.791 33.796 33.801 33.807 33.812 33.817 33.822 33.828 33.833 33.838 33.843 33.849 33.854 33.859 33.864 33.870 33.875 33.880 33.885 33.890 33.894 33.897 33.899 33.900 33.900 33.900


Gandhidham
Mundra
PROV
EXROW
VPI: 1 Span 10m
Pr Ch=50265
Datum=29.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondery line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
September 2009
SCALE
RITES


Gandhidham
KM 531
Mundra
End of Gundala Realignment
Datum=29.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left)
Horizontal Alignment (Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
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Electric Pole(HT)
HT Tower
Power Transformer
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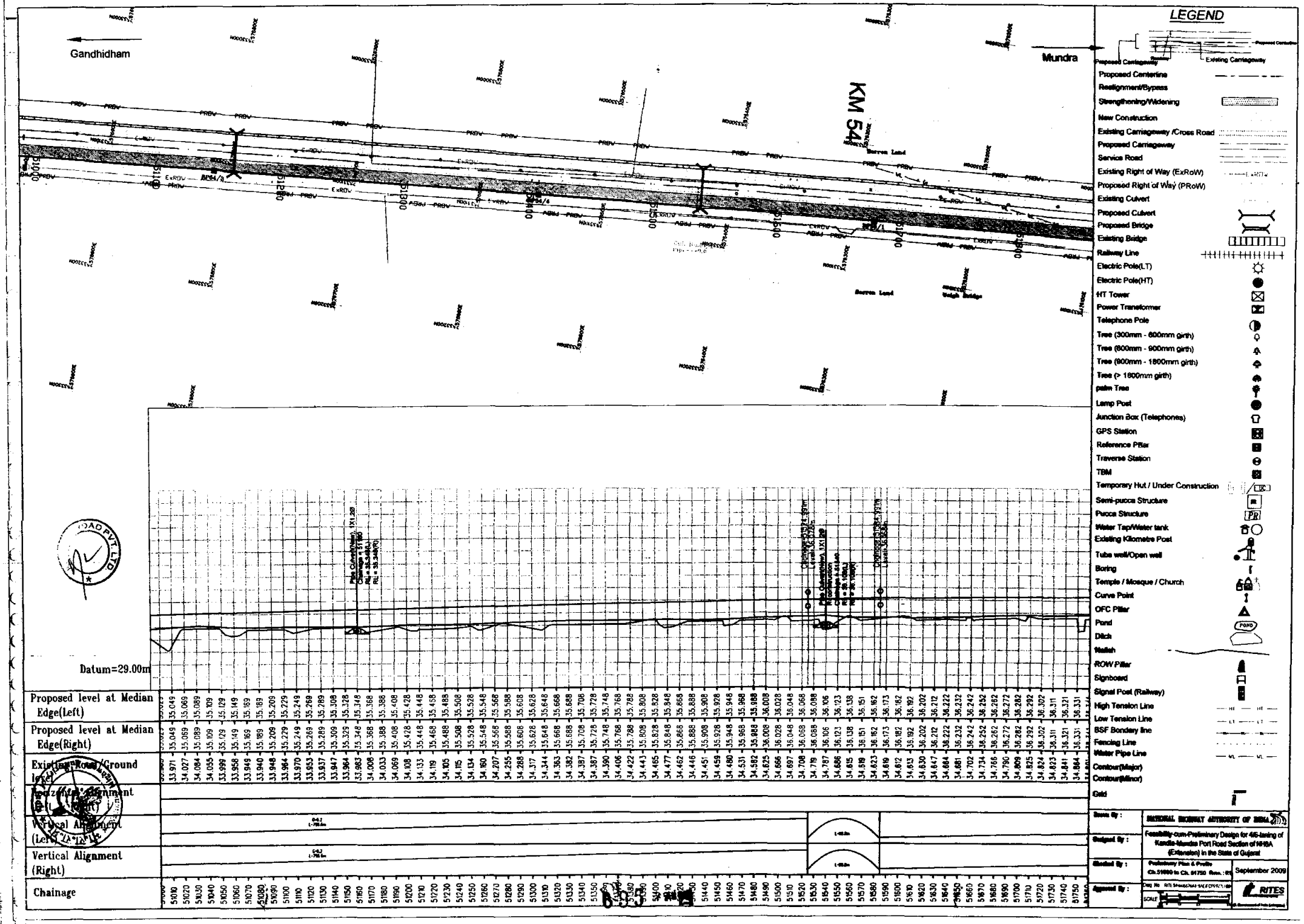
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NHIA (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch.50250 to Ch. 51000
September 2009
RITES


Gandhidham
Mundra
KM 54
Barren Land
Datum=29.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left)
Horizontal Alignment (Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
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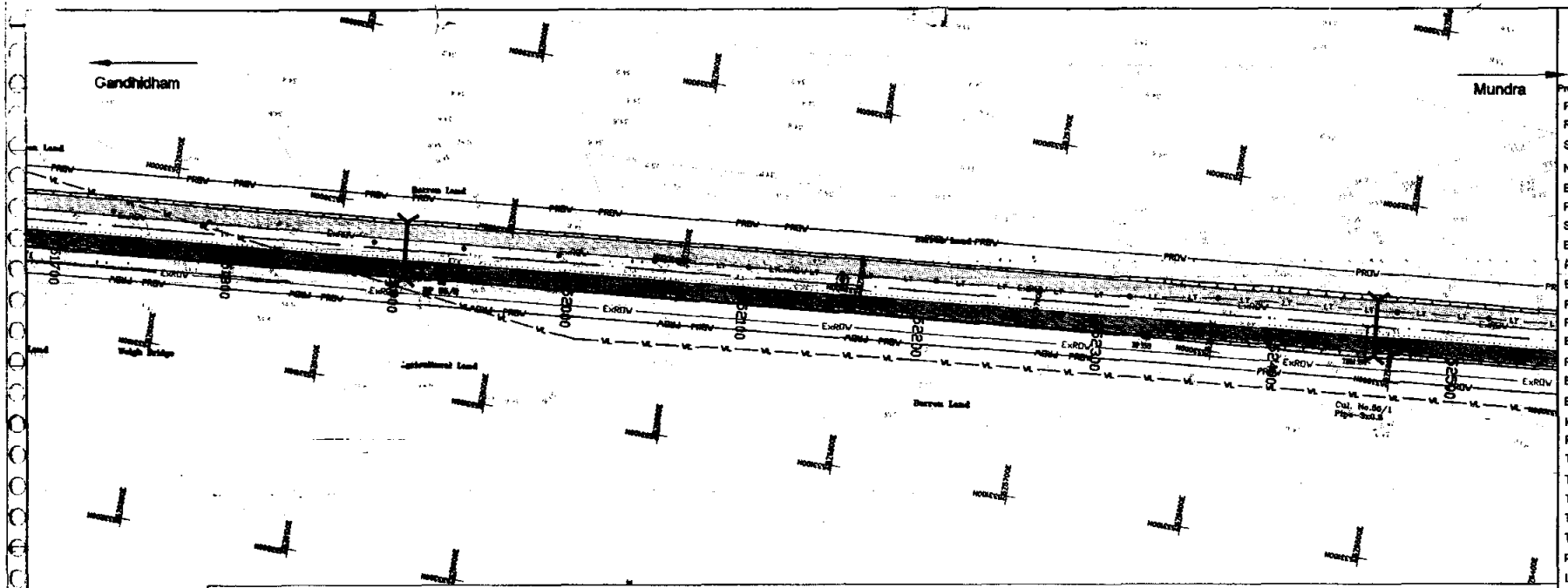
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Gate
Issue By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :
Preliminary Plan & Profile
Ch.51000 to Ch. 61750 (km. : 10.75)
September 2009
Approved By :
Drg. No
SCALE
RITES



LEGEND

- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Propoded Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Propoded Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Piller
- Traverse Station
- TBM
- Temporary Hut / Under Construction
- Semi-pucca Structure
- Pucca Structure
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Piller
- Pond
- Ditch
- Nallah
- ROW Piller
- Signboard
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Datum=29.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

Drawn By :

Designed By :

Checked By :

Approved By :

NATIONAL HIGHWAY AUTHORITY OF INDIA

Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extention) in the State of Gujarat

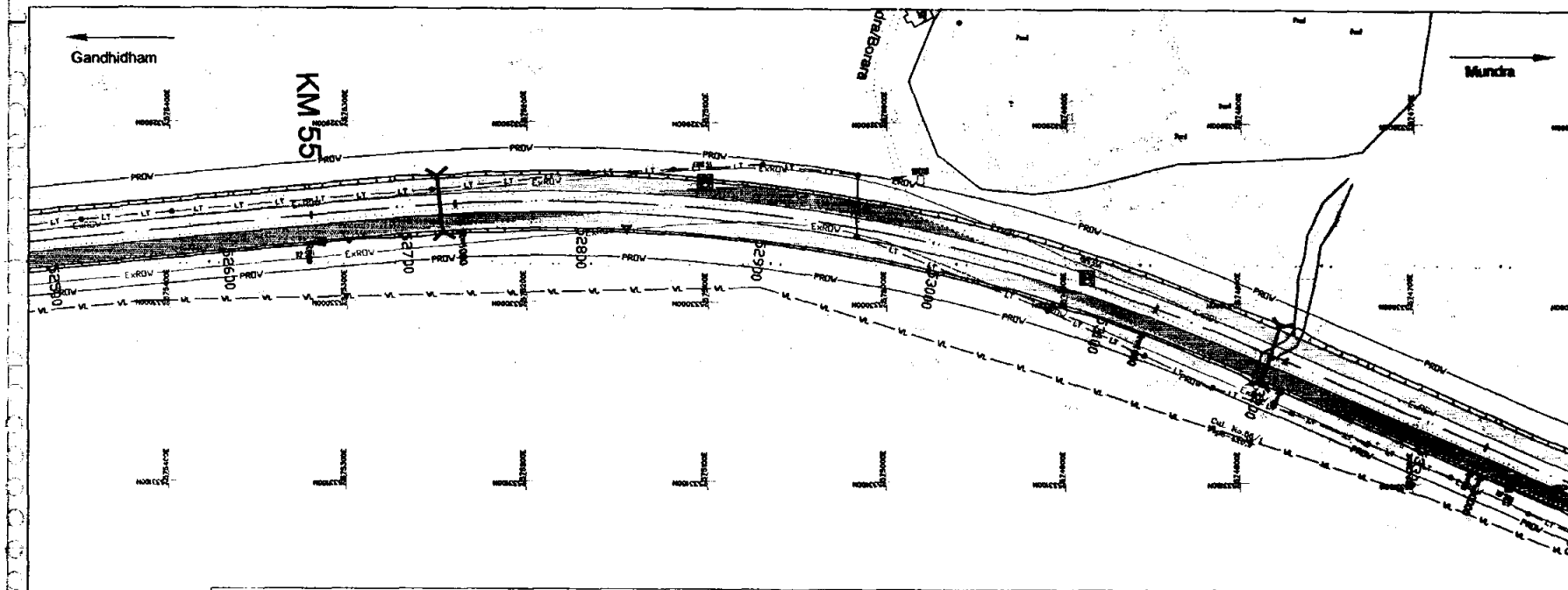
Preliminary Plan & Profile
Ch.51750 to Ch. 52500 Rvsn. : R0

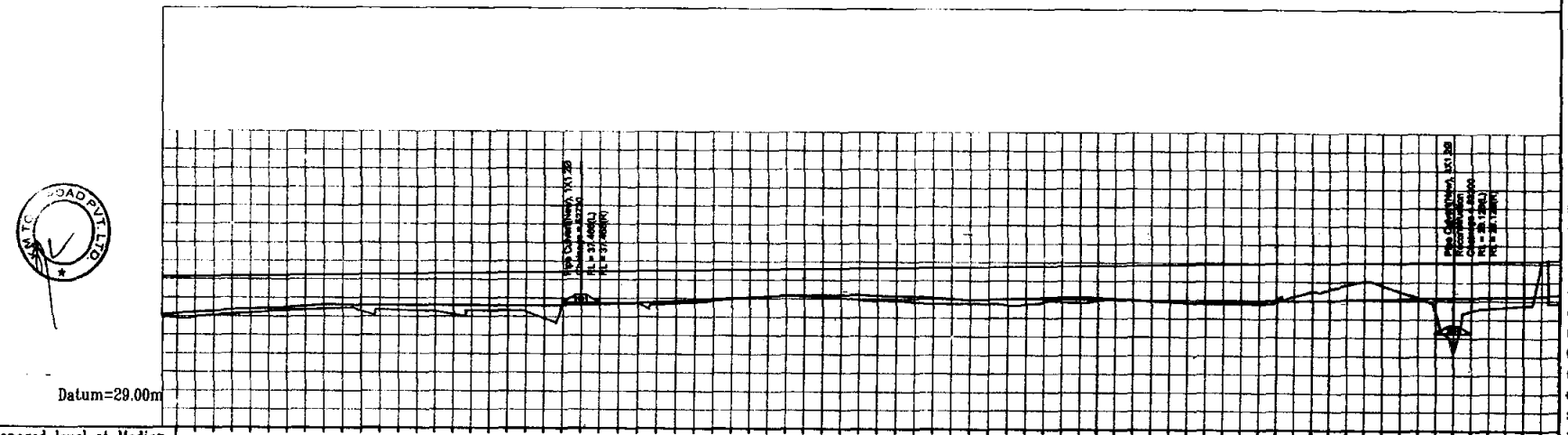
September 2009

Dwg No : PDP/SHA/05/MANDAVI-KOTHARA/ 3b

SCALE

RITES





Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

LEGEND

- Proposed Carriageway / Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
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- Existing Carriageway /Cross Road
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- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction (HUT) (UC)
- Semi-pucca Structure
- Pucca Structure (PS)
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond (POND)
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line (HT)
- Low Tension Line (LT)
- BSF Bondery line
- Fencing Line
- Water Pipe Line (VL)
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.52000 to Ch. 53250 Rev. : R0 — September 2009
Approved By :	Dwg No. R0ES-5400B/Detailed/CPP/P/7R — SCALE — RITES

Gandhidham
Mundra
KM 56
Agricultural Land
Datum=29.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
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New Construction
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Proposed Carriageway
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Reference Pillar
Traverse Station
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Pucca Structure
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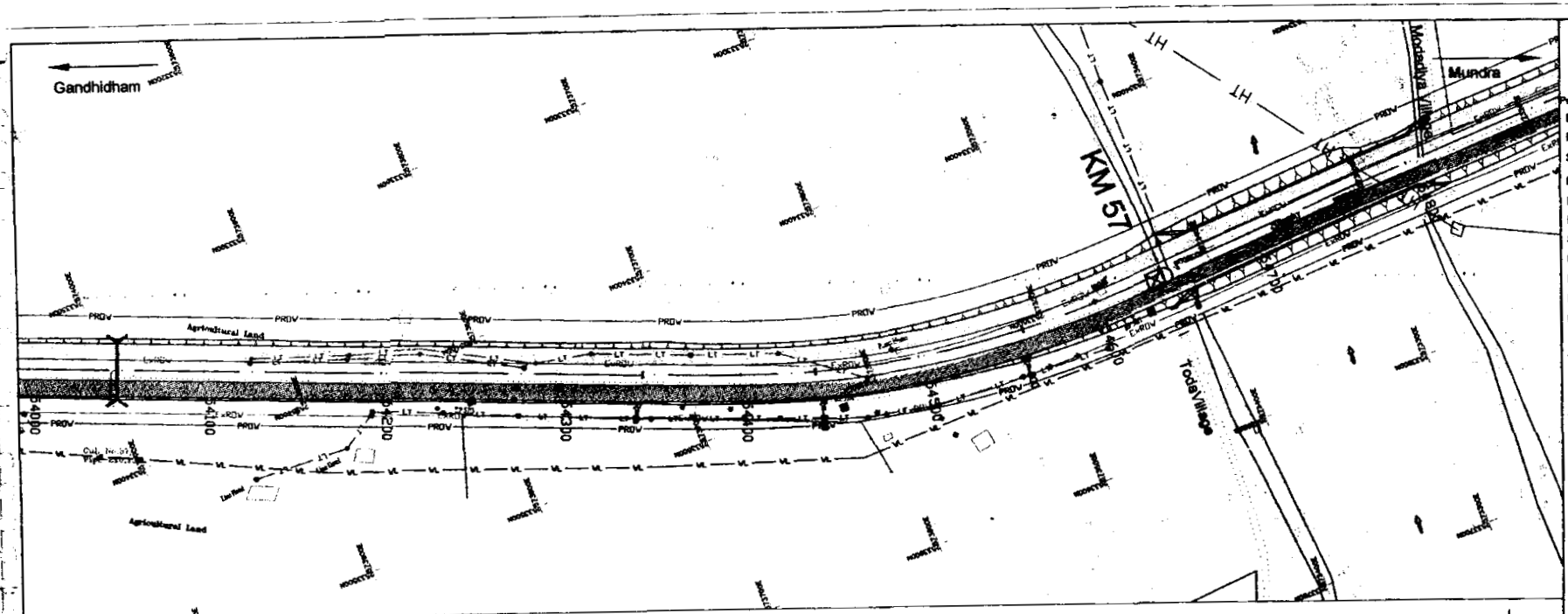
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch.53250 to Ch. 54000 Rem. : RP
September 2009
RITES
SCALE



LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
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- Pond
- Ditch
- Nallah
- ROW Pillar
- Signboard
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- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Datum=29.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

Drawn By :

Designed By :

Checked By :

Approved By :

NATIONAL HIGHWAY AUTHORITY OF INDIA

Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat

Preliminary Plan & Profile
Ch.54000 to Ch. 64750 Rmn. : 0

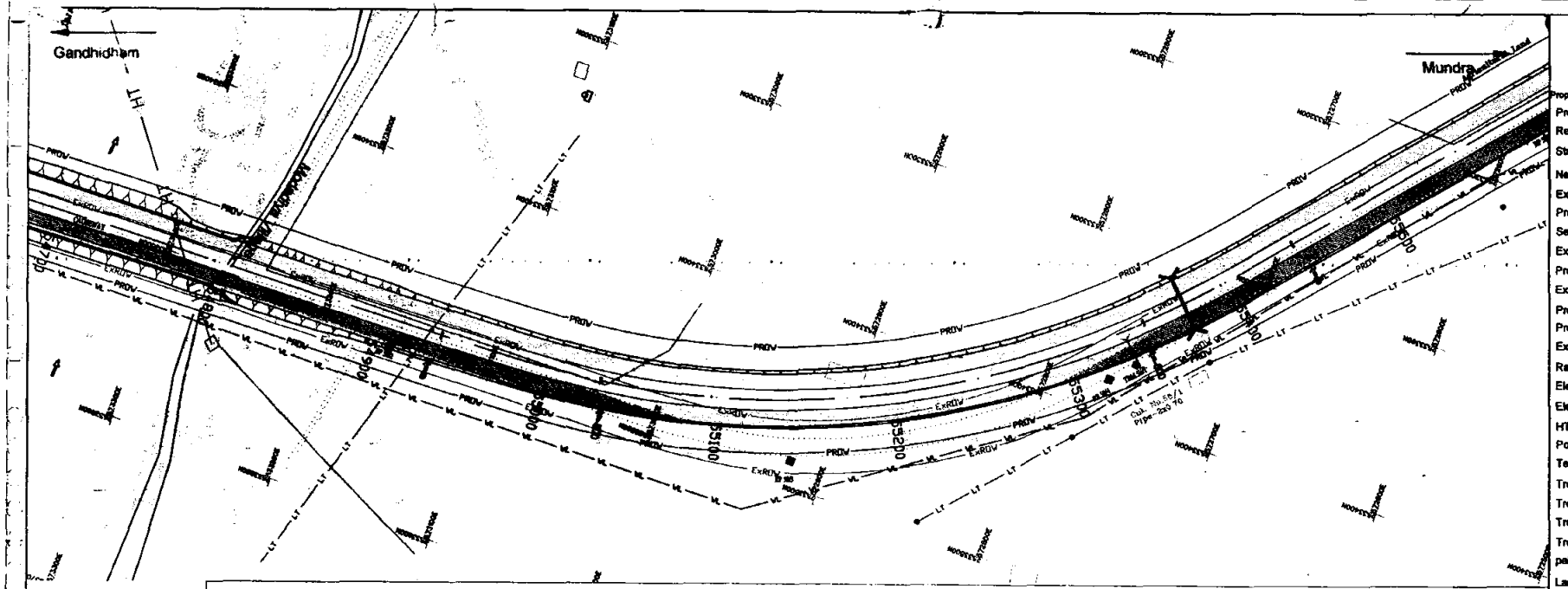
September 2009

Dwg No

SCALE

RITES

TOLL ROAD PVT LTD



LEGEND

- Proposed Carriageway
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- Contour(Minor)
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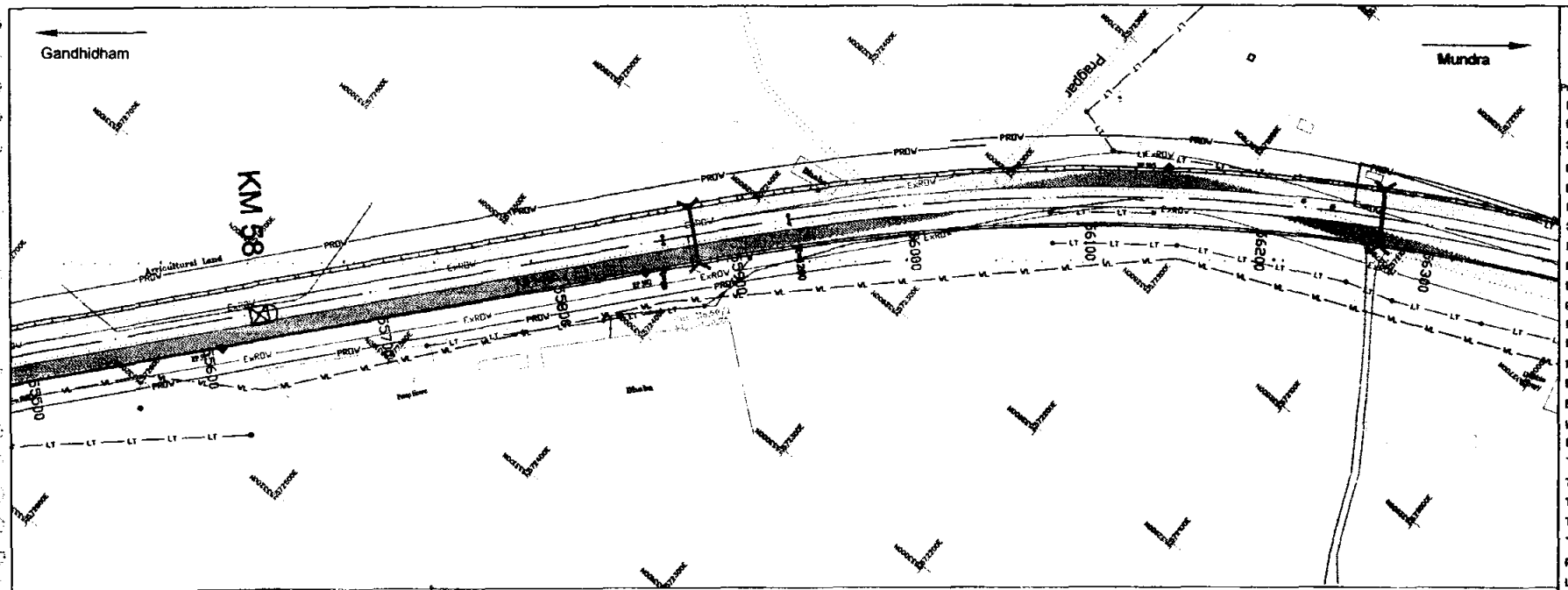
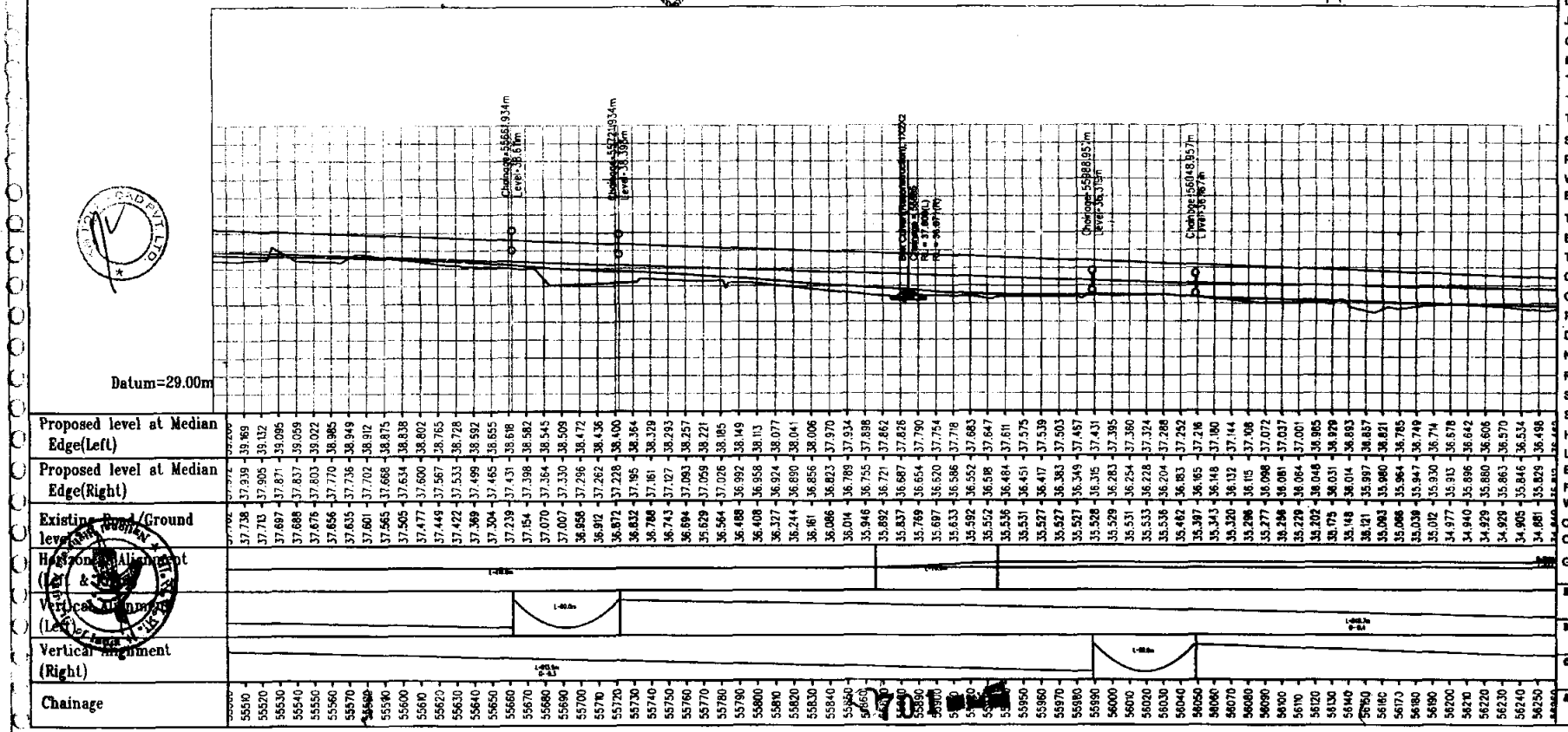
Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.54750 to Ch. 55500 From : To : September 2009
Approved By :	SCALE : RITES





LEGEND

- Proposed Carriageway
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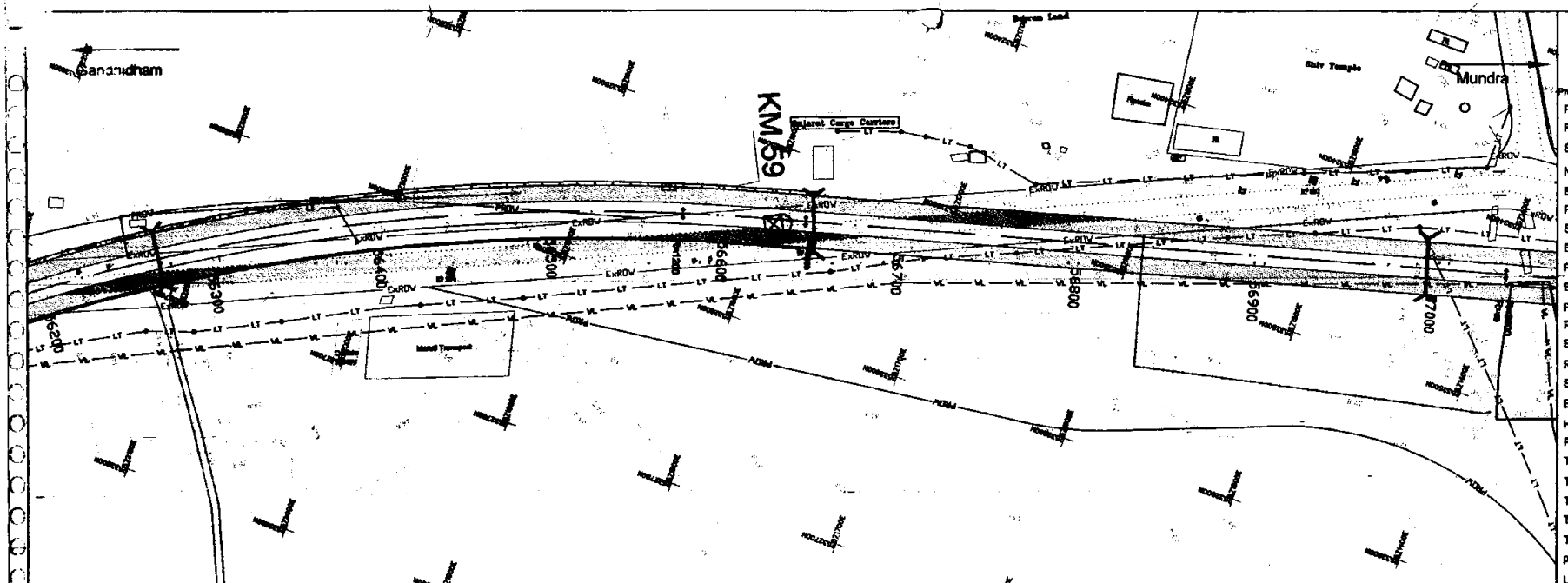
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.56000 to Ch. 66250 Rev. : R1 — September 2009
Approved By :	Dwg. No. — SCALE — RITES



LEGEND

- Proposed Carriageway / Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
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- New Construction
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- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond (POND)
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line (HT)
- Low Tension Line (LT)
- BSF Bondary line
- Fencing Line
- Water Pipe Line (WL)
- Contour(Major)
- Contour(Minor)
- Grid

Datum=29.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

Drawn By :

Designed By :

Checked By :

Approved By :

NATIONAL HIGHWAY AUTHORITY OF INDIA

Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat

Preliminary Plan & Profile
Ch. 56250 to Ch. 57000 Rev. : R1

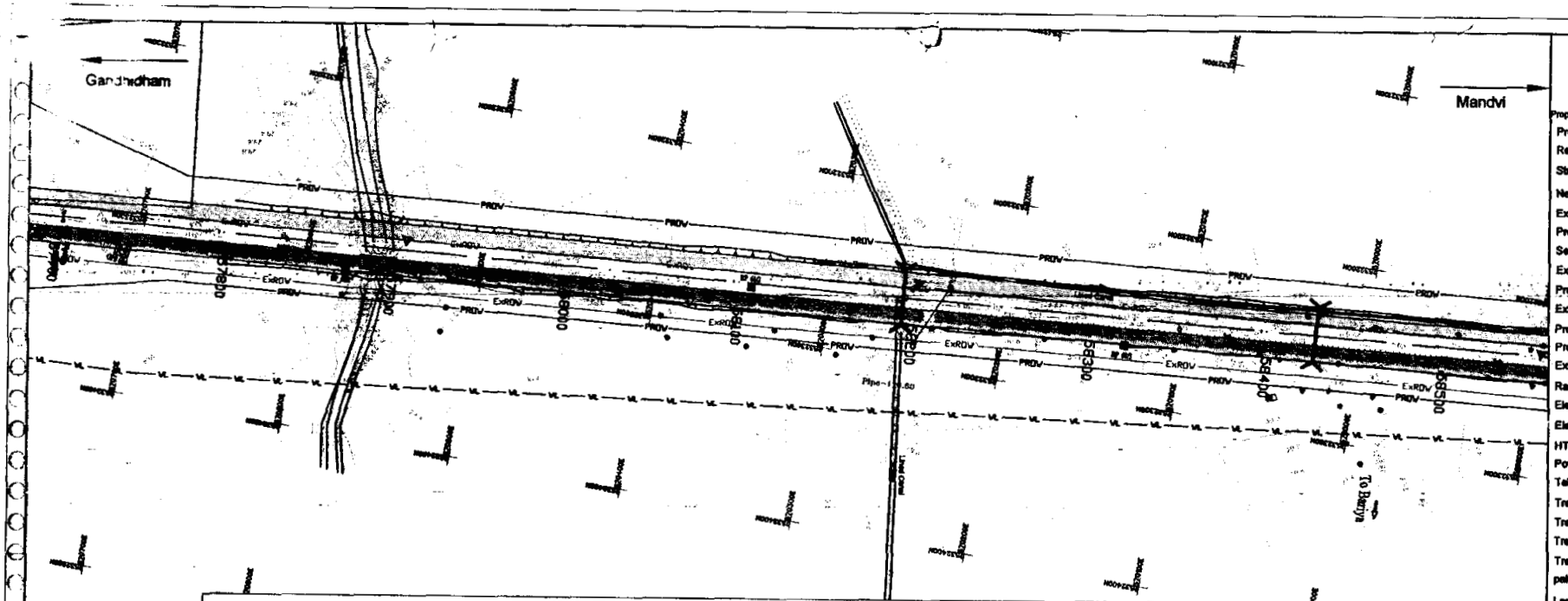
September 2009

Drg. No.

SCALE

RITES

LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway (Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExROW)
Proposed Right of Way (PROW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Transverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Canvas Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Boundary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Mandvi
Gandhidham
To Bhuj
KM 60
VP2: 2 Span 10m
Ex Km=59+660
Pr Ch=57285
57800
57700
57600
57500
57400
57300
57200
57100
57000
Datum=29.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
September 2009
RITES
Drawn By :
Designed By :
Checked By :
Approved By :



LEGEND

- Proposed Carriageway / Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction (HUT / UC)
- Semi-pucca Structure
- Pucca Structure (PR)
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond (POND)
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line (HT)
- Low Tension Line (LT)
- BSF Bondary line
- Fencing Line
- Water Pipe Line (WL)
- Contour(Major)
- Contour(Minor)
- Grid

Datum=24.00m

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

Drawn By :

Designed By :

Checked By :

Approved By :

NATIONAL HIGHWAY AUTHORITY OF INDIA

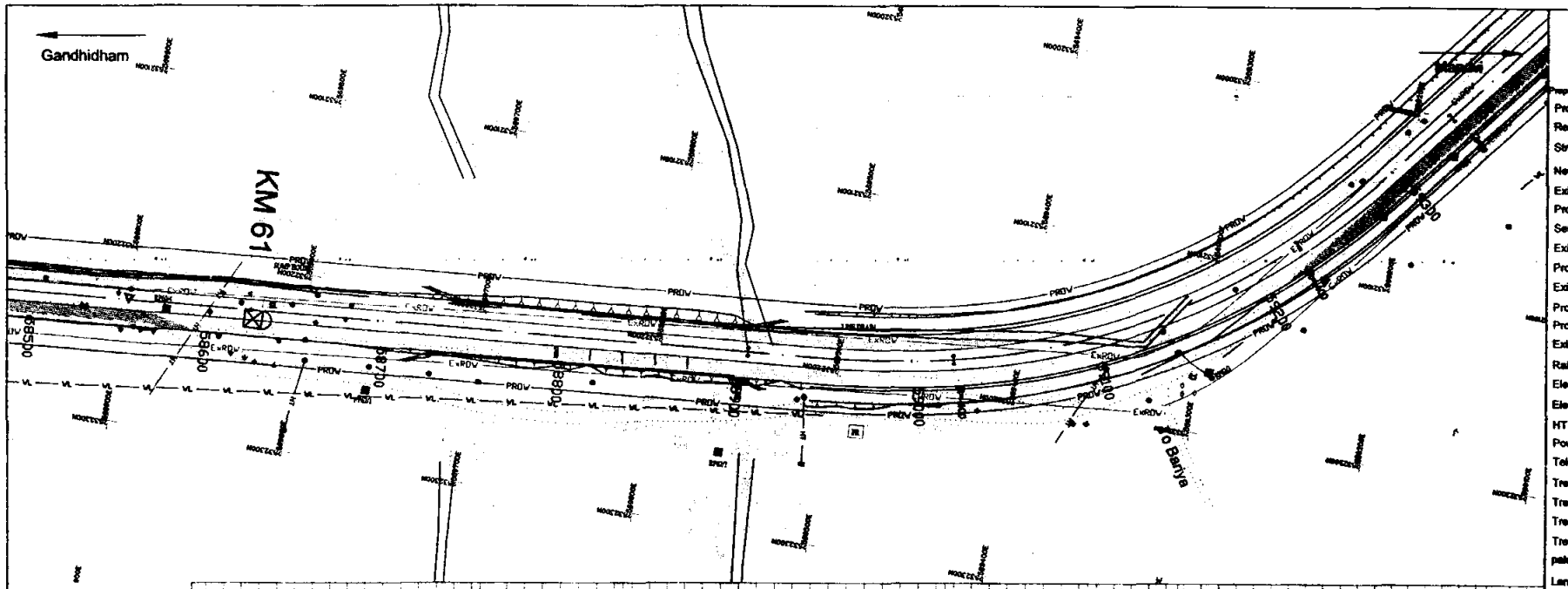
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat

Preliminary Plan & Profile Ch.57750 to Ch. 58000 Rem.: 8H

September 2009

SCALE

RITES

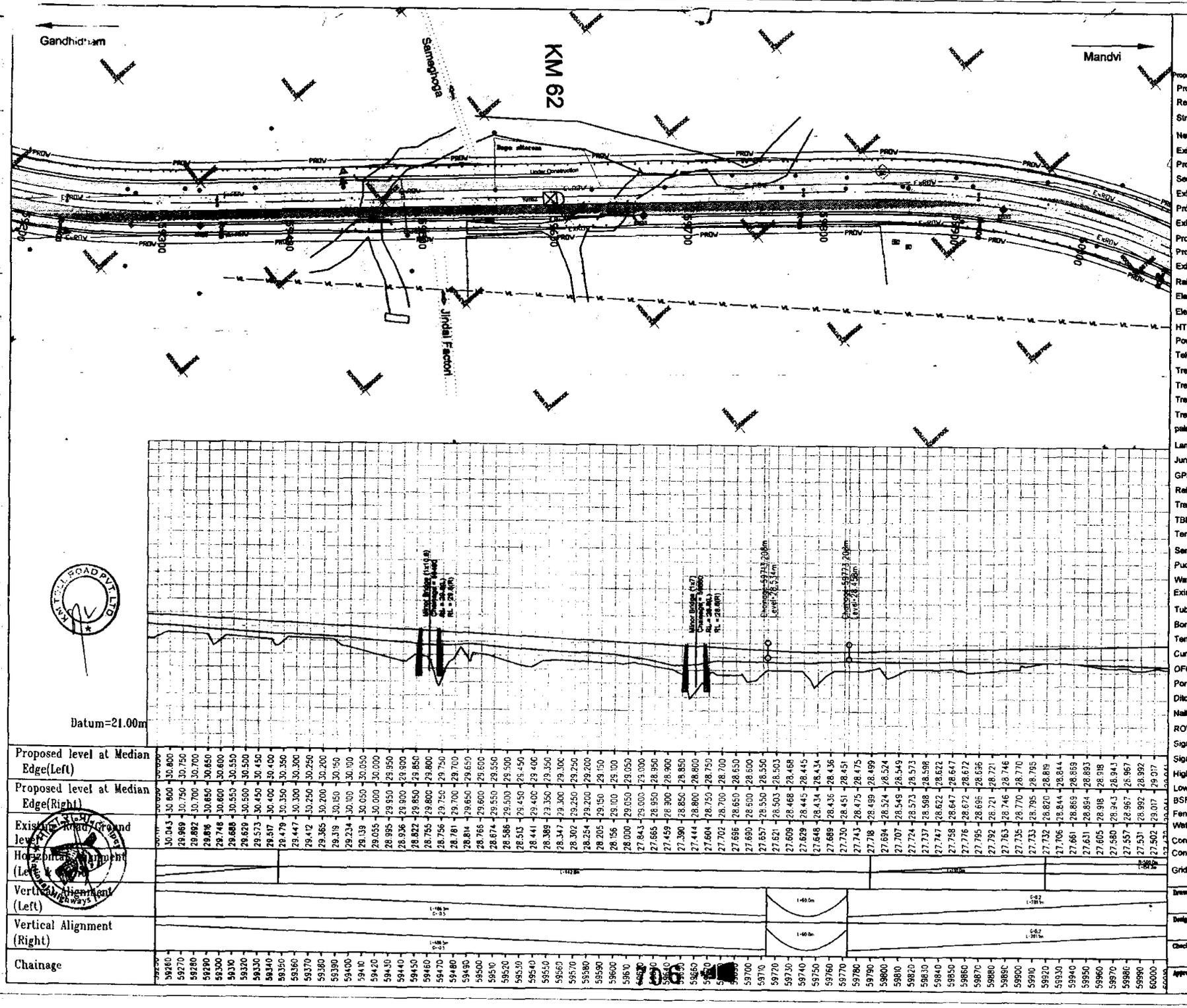


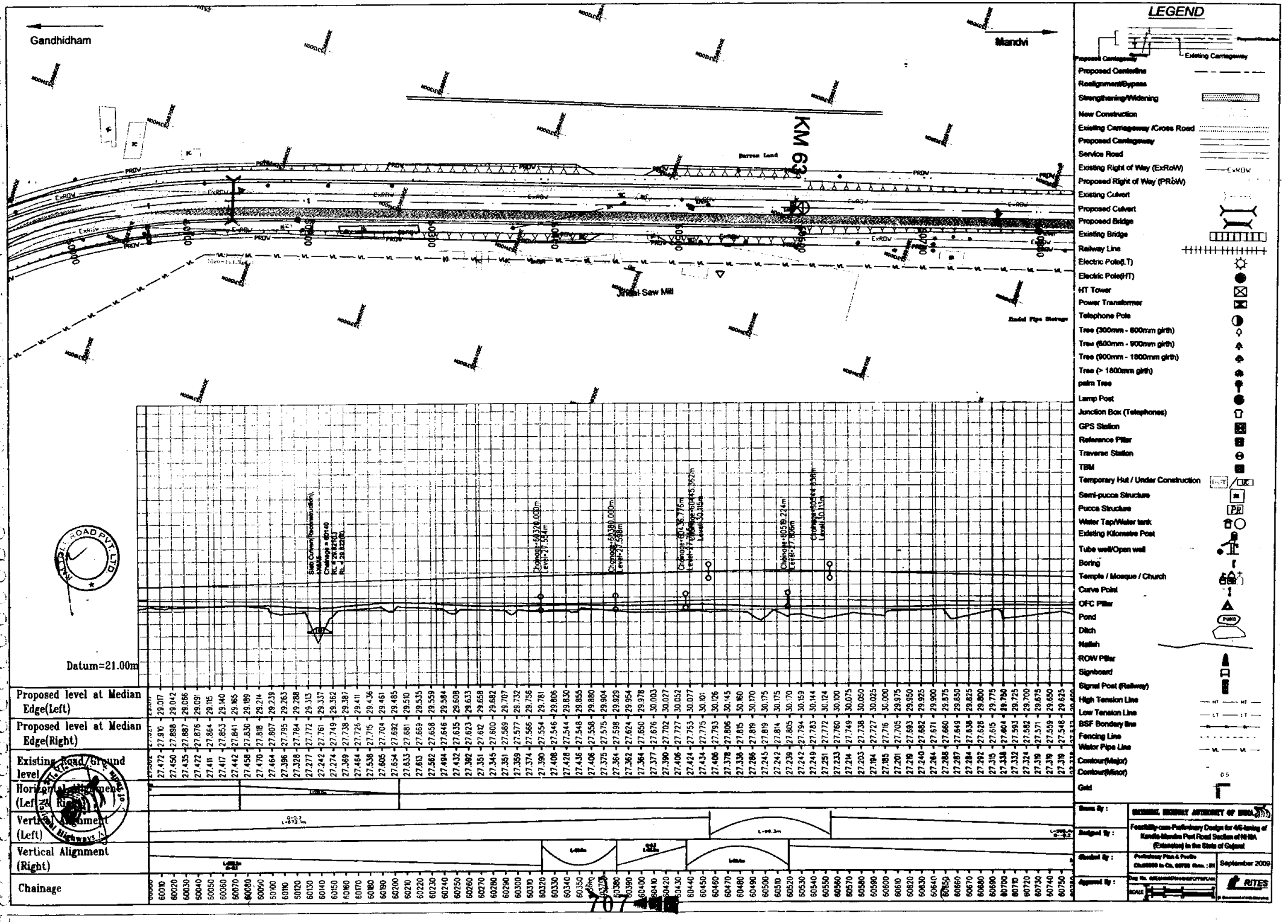
LEGEND

- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction
- Semi-pucca Structure
- Pucca Structure
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road / Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	58500 58510 58520 58530 58540 58550 58560 58570 58580 58590 58600 58610 58620 58630 58640 58650 58660 58670 58680 58690 58700 58710 58720 58730 58740 58750 58760 58770 58780 58790 58800 58810 58820 58830 58840 58850 58860 58870 58880 58890 58900 58910 58920 58930 58940 58950 58960 58970 58980 58990 59000 59010 59020 59030 59040 59050 59060 59070 59080 59090 59100 59110 59120 59130 59140 59150 59160 59170 59180 59190 59200 59210 59220 59230 59240 59250 59260

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.58500 to Ch. 59500 Rmk. : RT
Approved By :	September 2009
	Dwg No.
	SCALE
	RITES


Gandhidham
Mandvi
KM 62
Samaghoga
Jindiali Faction
Datum=21.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch.59250 to Ch. 60000 Rea. : Rt
September 2009
RITES


Gandhidham
Mandvi
KM 63
Barren Land
Jindal Saw Mill
Jindal Pipe Storage
Datum=21.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Existing Carriageway
Proposed Centreline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PROW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
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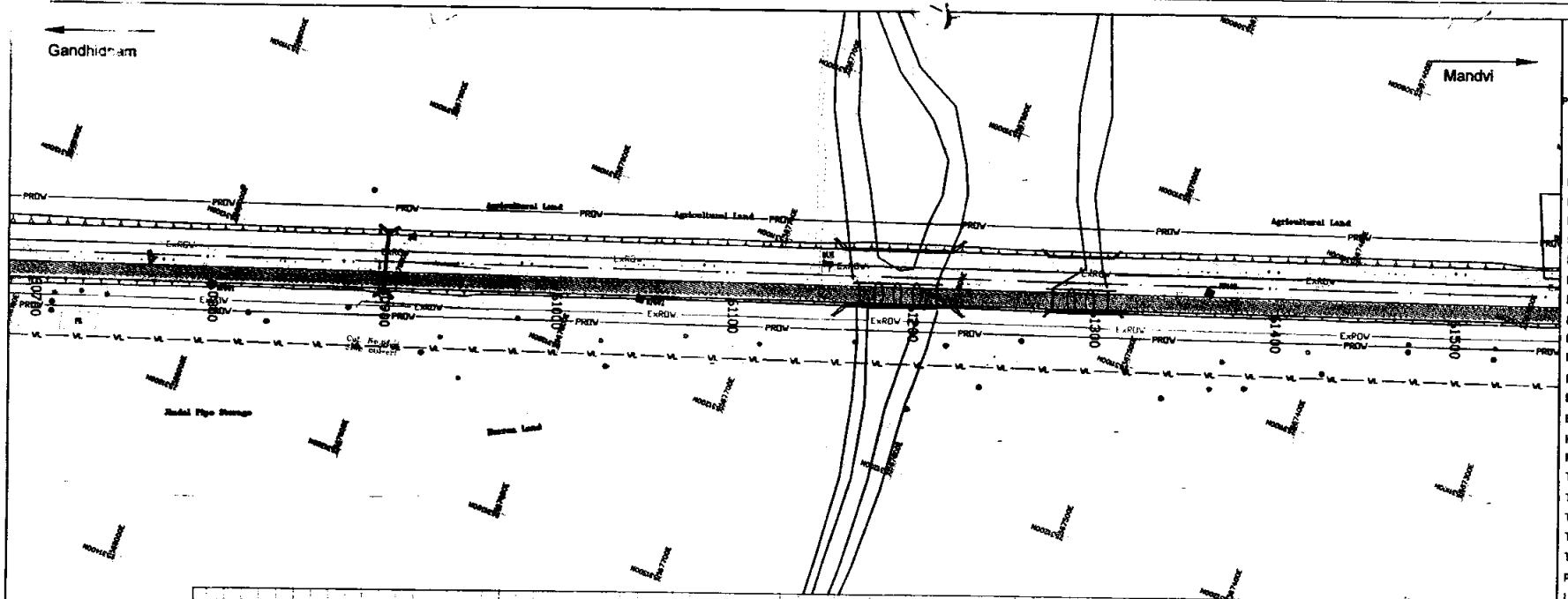
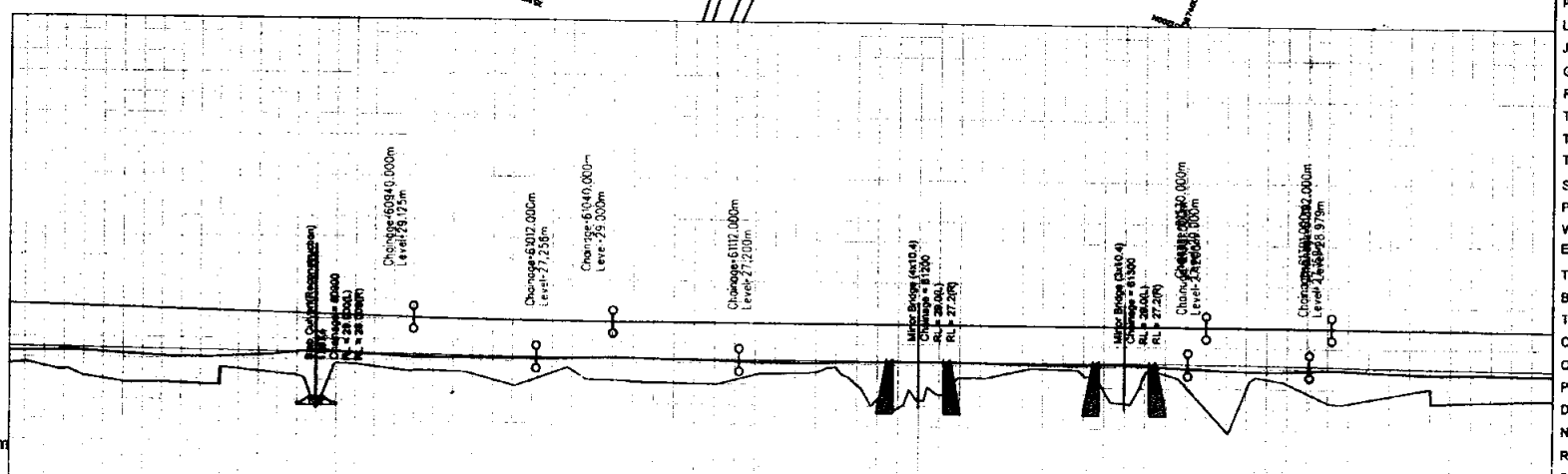
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
September 2009
SCALE
RITES
707





LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
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- Electric Pole(HT)
- HT Tower
- Power Transformer
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- Tree (300mm - 600mm girth)
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- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
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- Tube well/Open well
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- Temple / Mosque / Church
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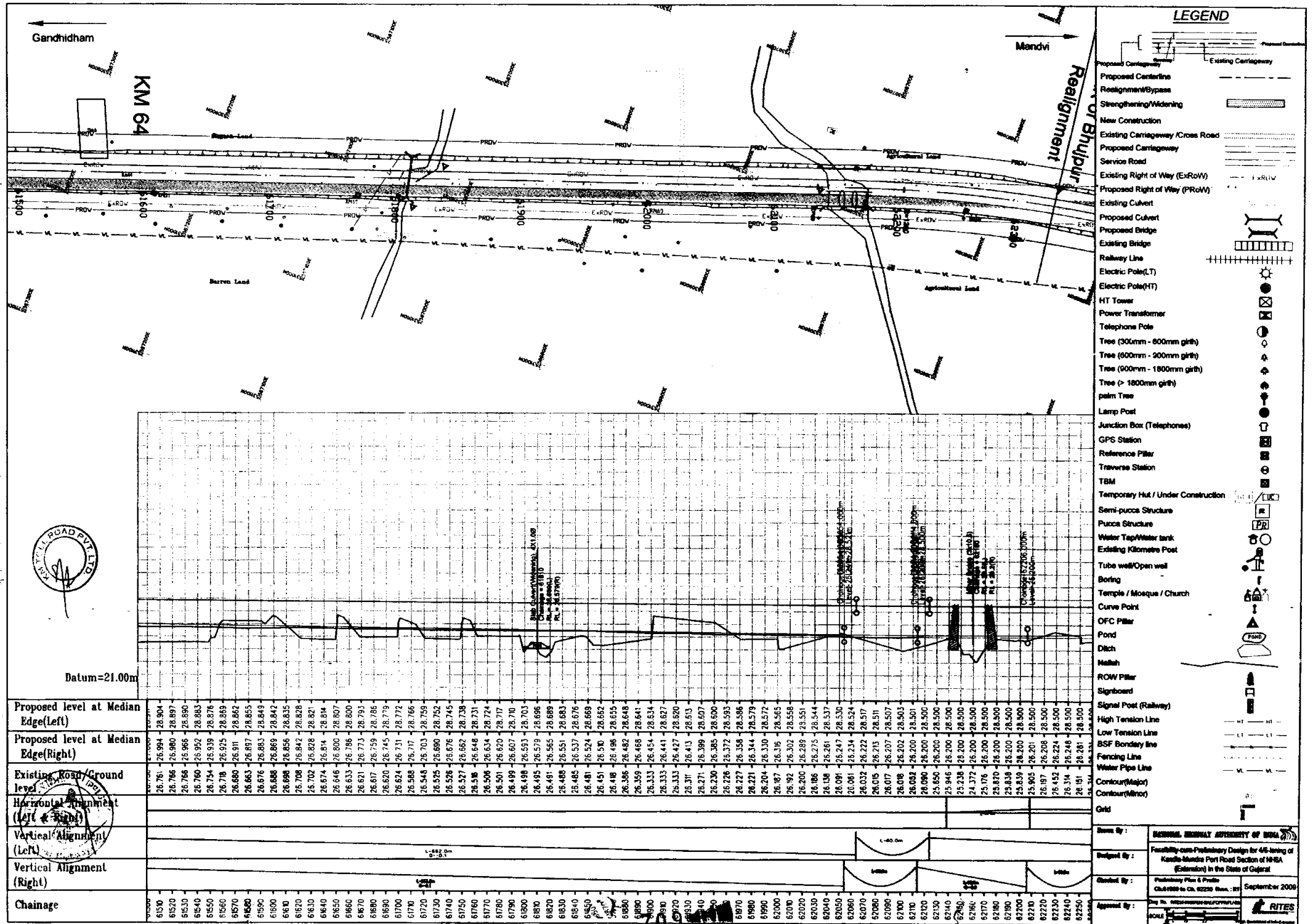
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NHBA (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch 60750 to Ch 61500 Rmn. : 8m — September 2009
Approved By :	Dwg No. RITES/NHAI/KANDLA/PP/PP/02 — RITES — SCALE


Gandhidham
Mandvi
KM 64
Realignment for Bhujpur
Barren Land
Agricultural Land
Datum=21.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
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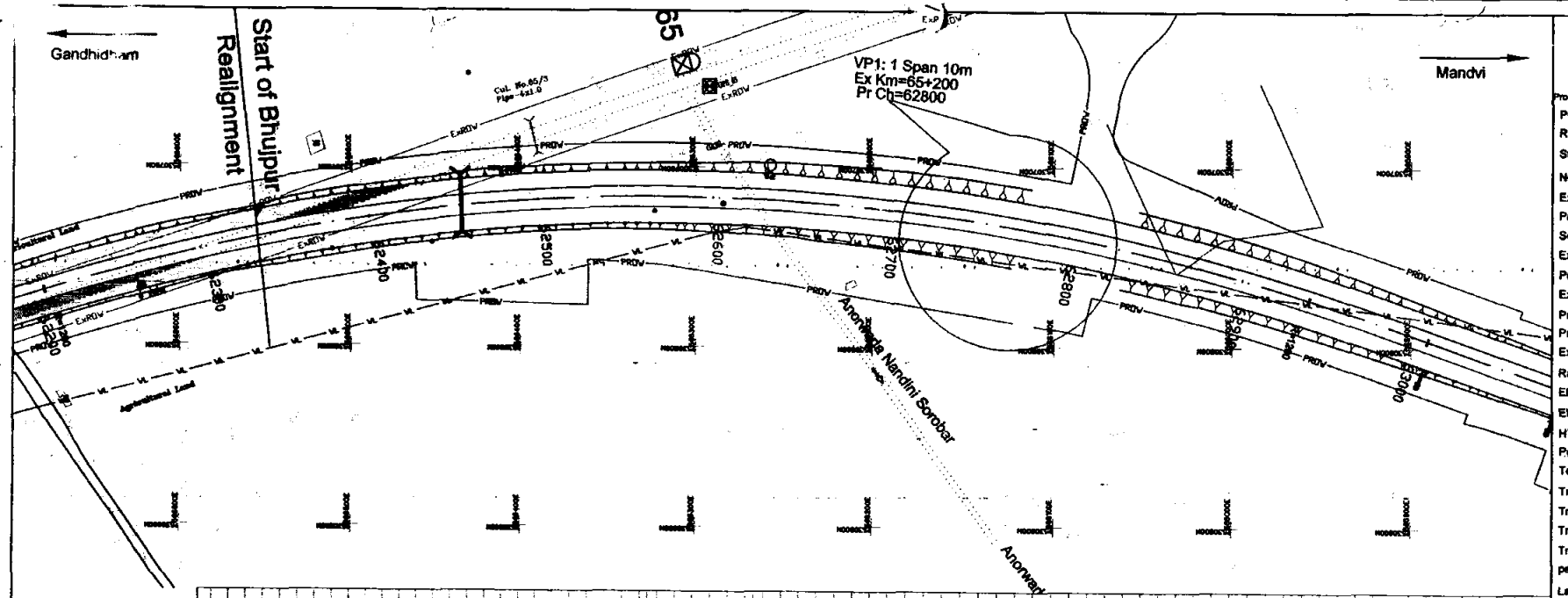
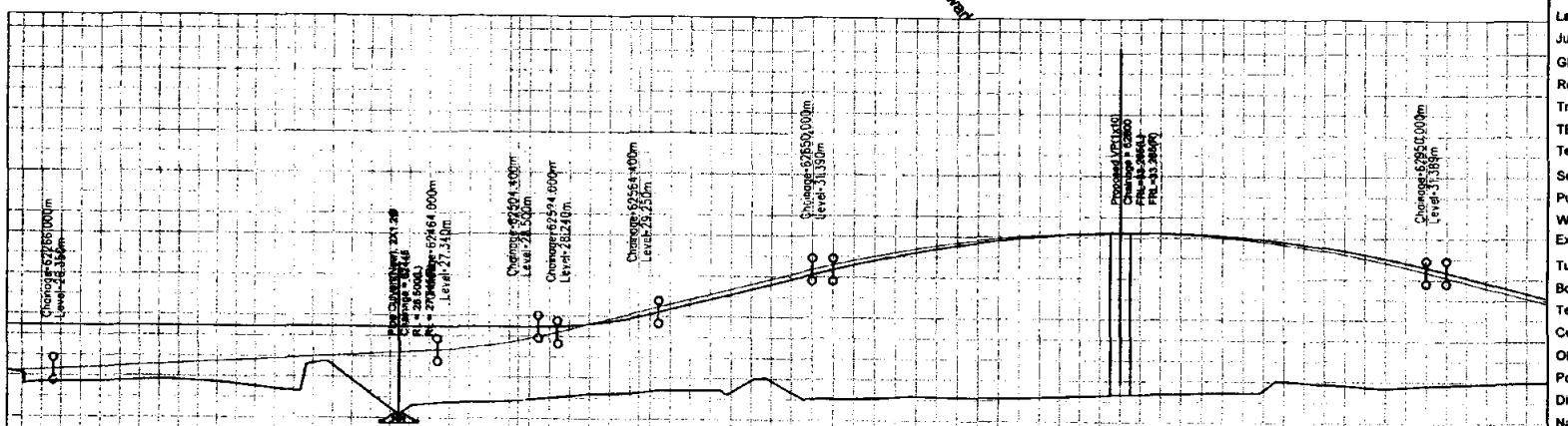
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch.61600 to Ch. 62250 Rem. : RH
September 2009
RITES
SCALE





Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
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- Existing Bridge
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- Pucca Structure
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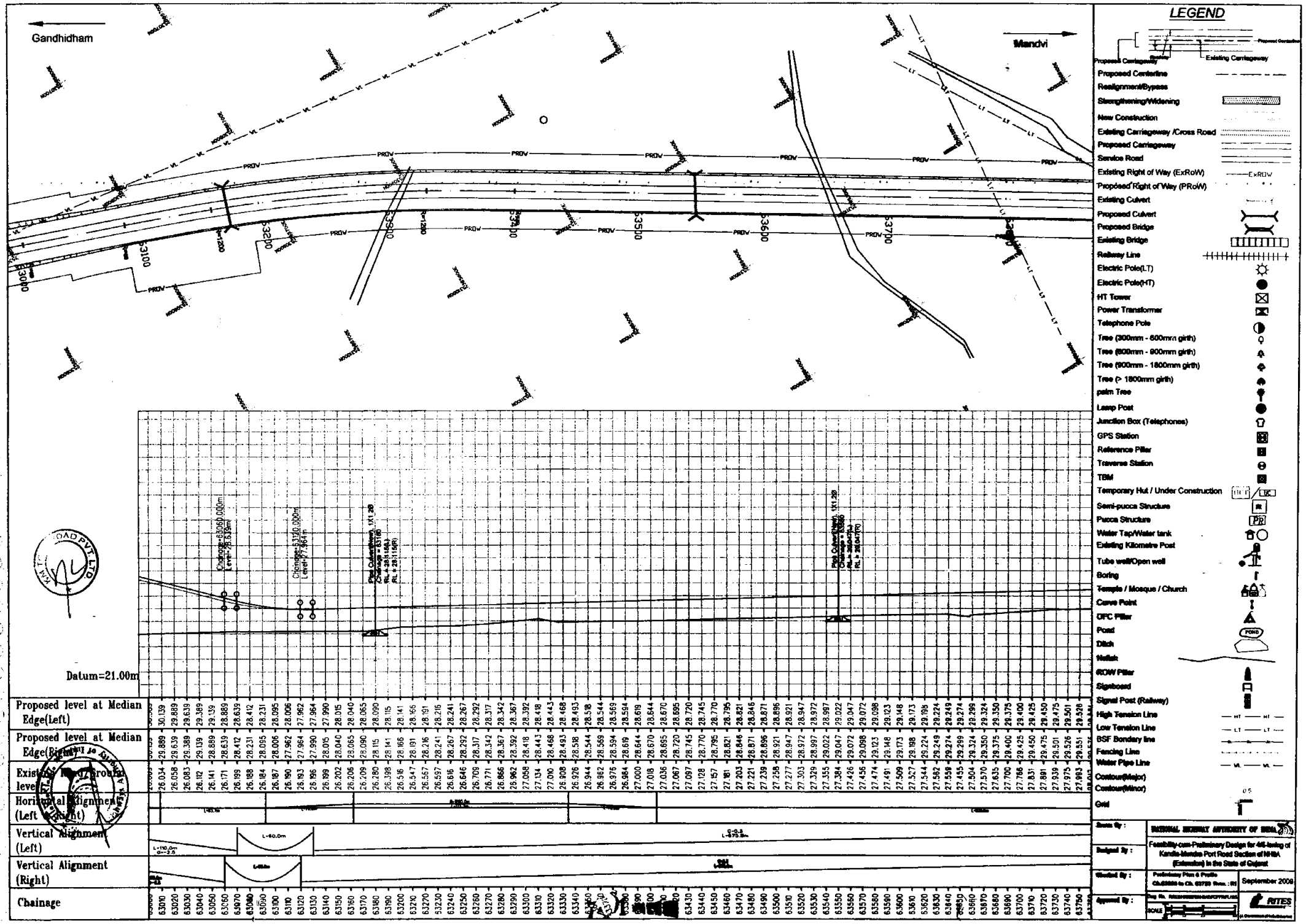
- Pond
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch 62250 to Ch. 63000 Revs.: 01 — September 2009
Approved By :	Dwg No. RITES/NHAI/Gandhidham/KPPR/01/04 — SCALE — RITES


Gandhidham
Mandvi
Datum=21.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing level at ground level
Horizontal Alignment (Left / Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
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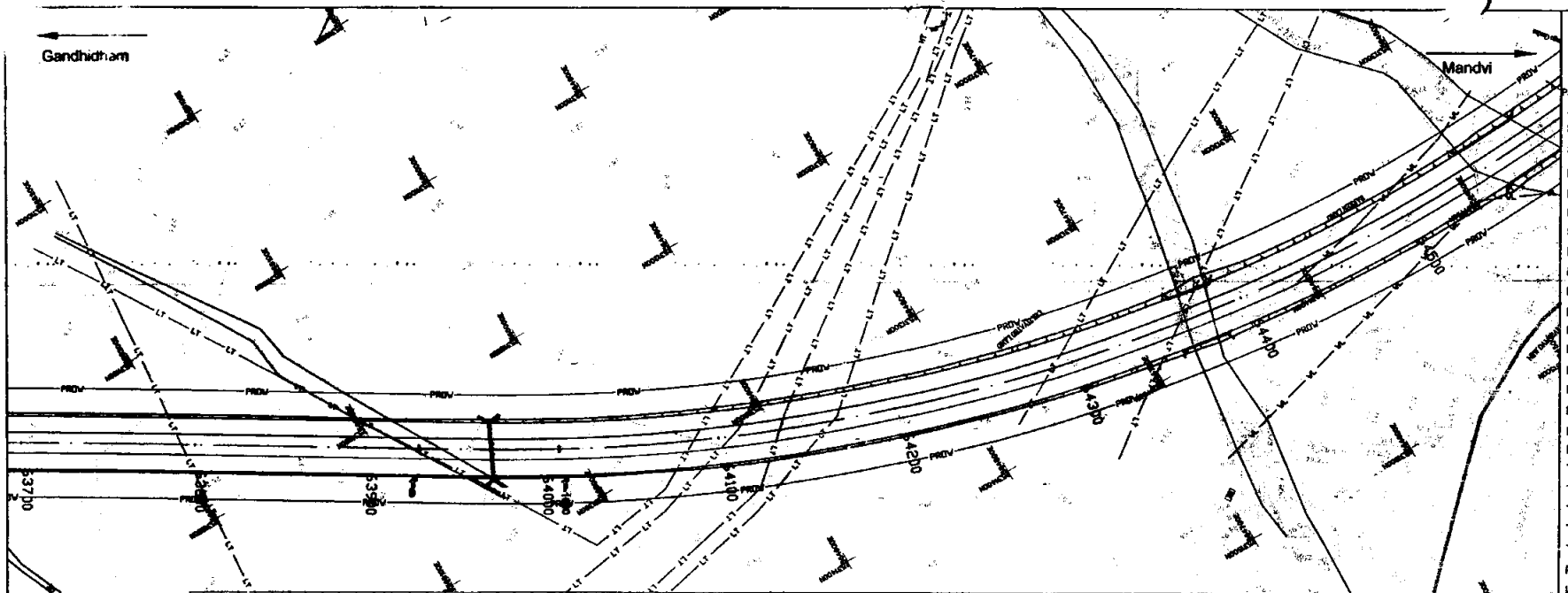
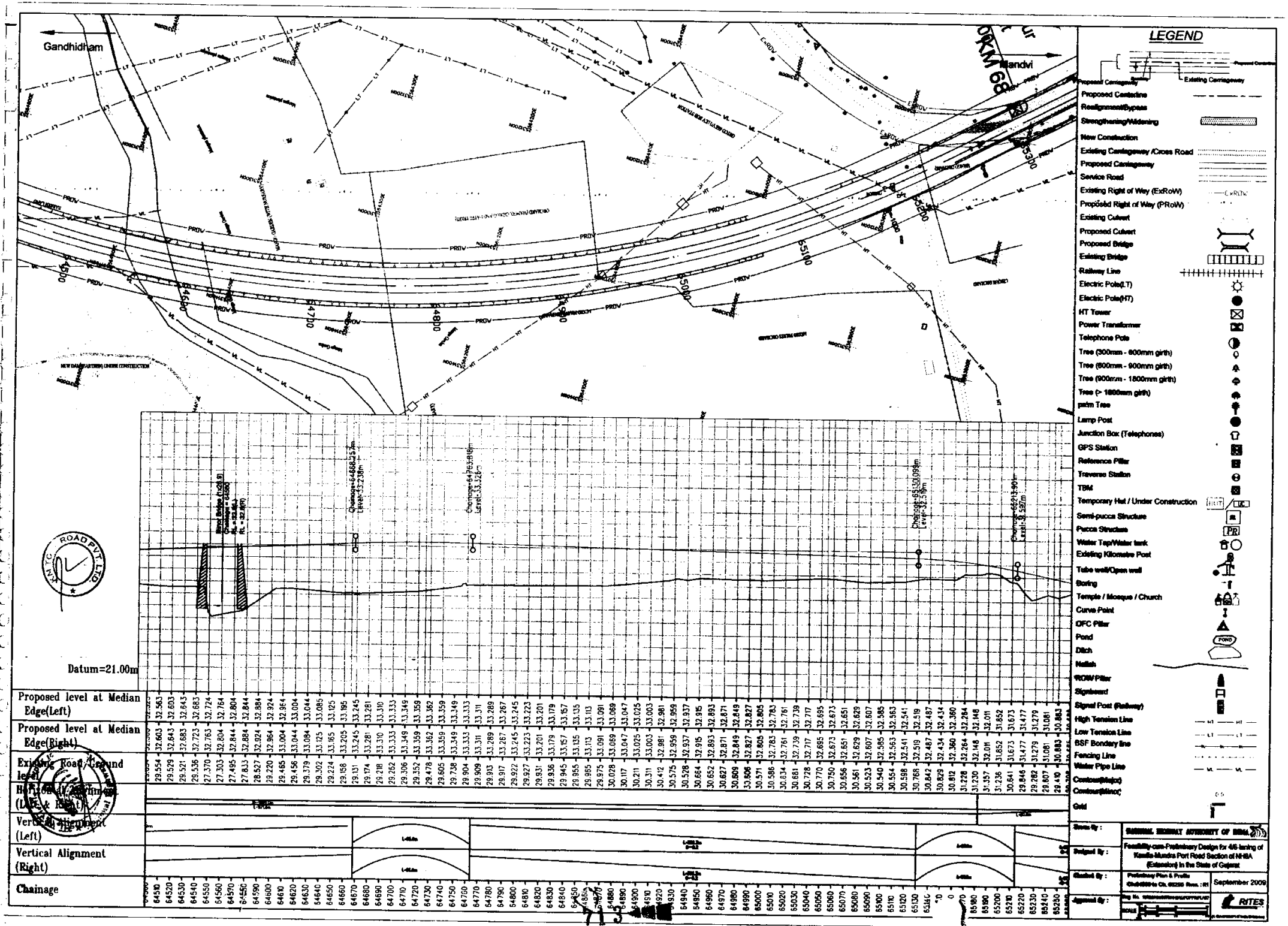
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Cave Point
OFC Pillar
Post
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
September 2009
RITES



Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.63750 to Ch. 64500 Rem. : RH — September 2009
Approved By :	Dwg. No. NHAI/NH8/KMPR/EXT/PP/PLP/05 — RITES
	SCALE: H: 1:2000, V: 1:200


Gandhidham
Mandvi
LEGEND
Existing Carriageway
Proposed Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
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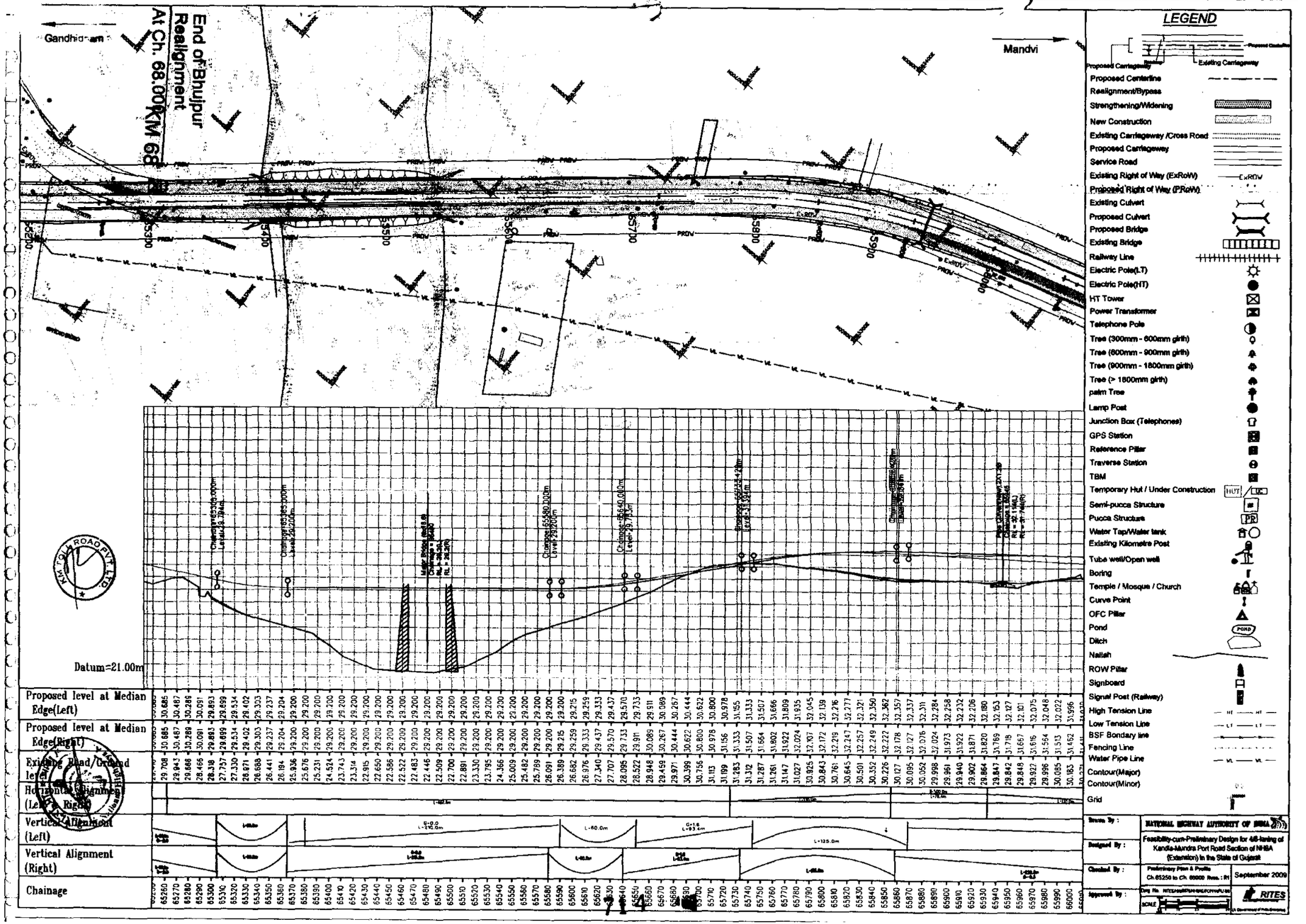
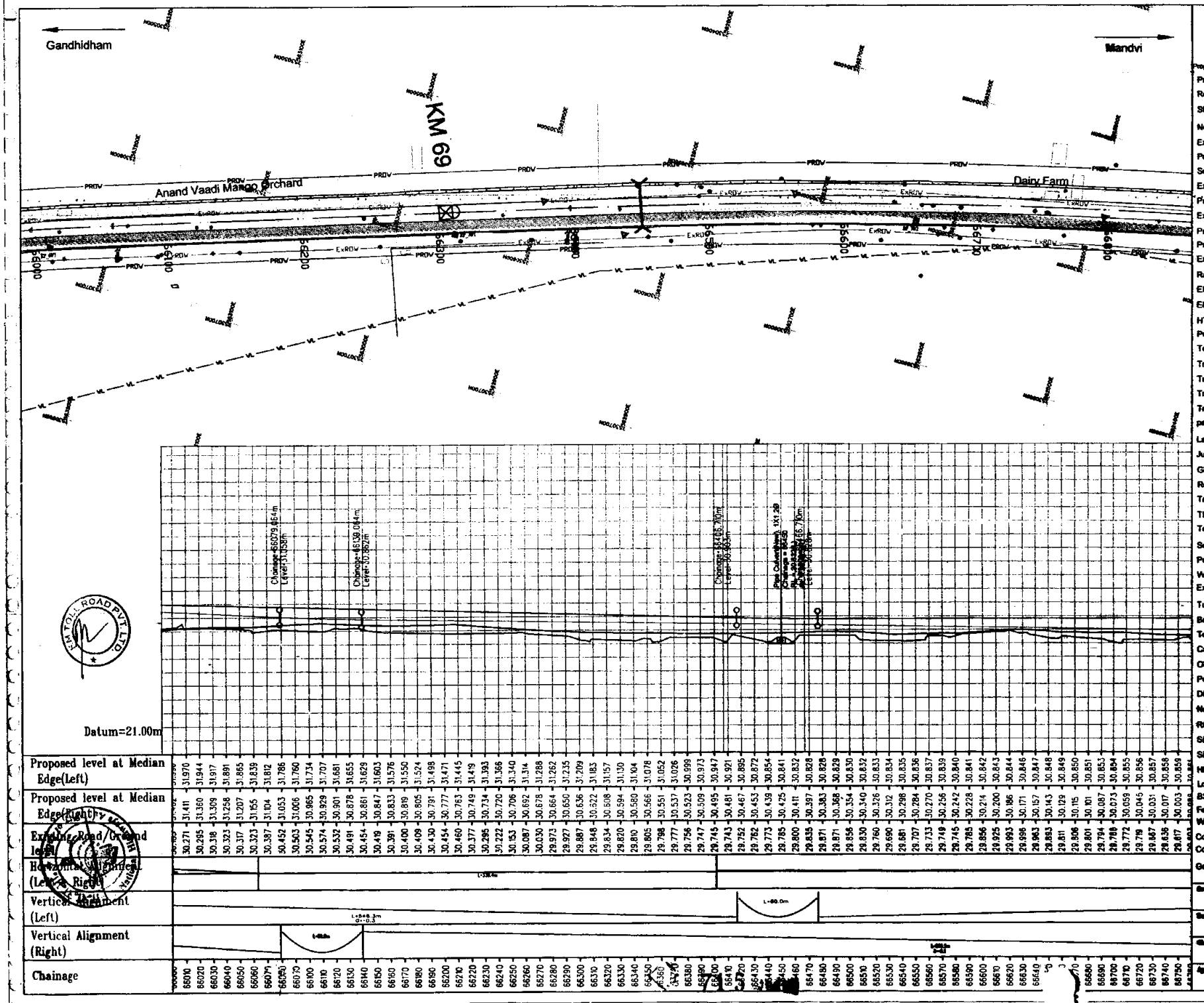
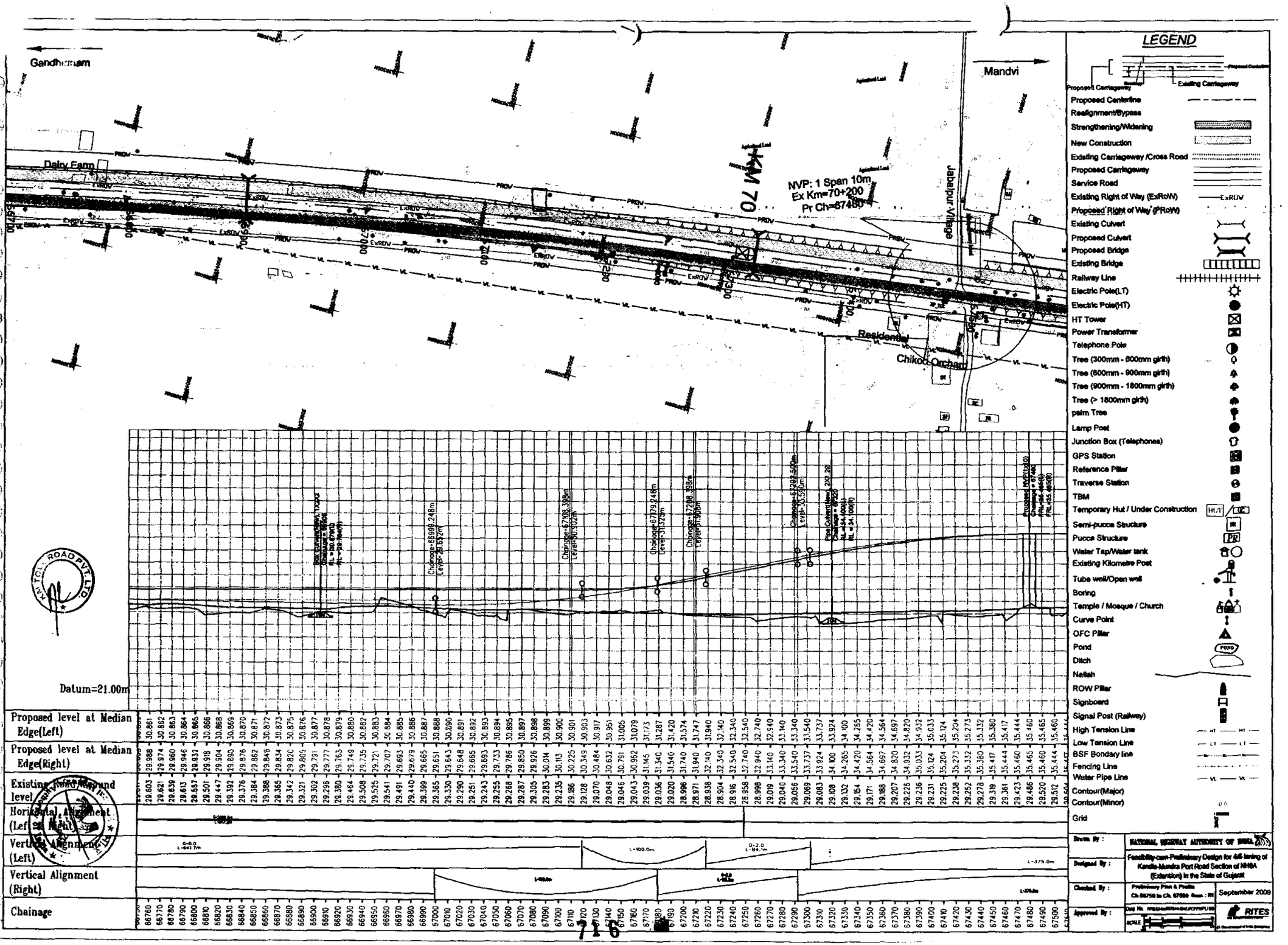
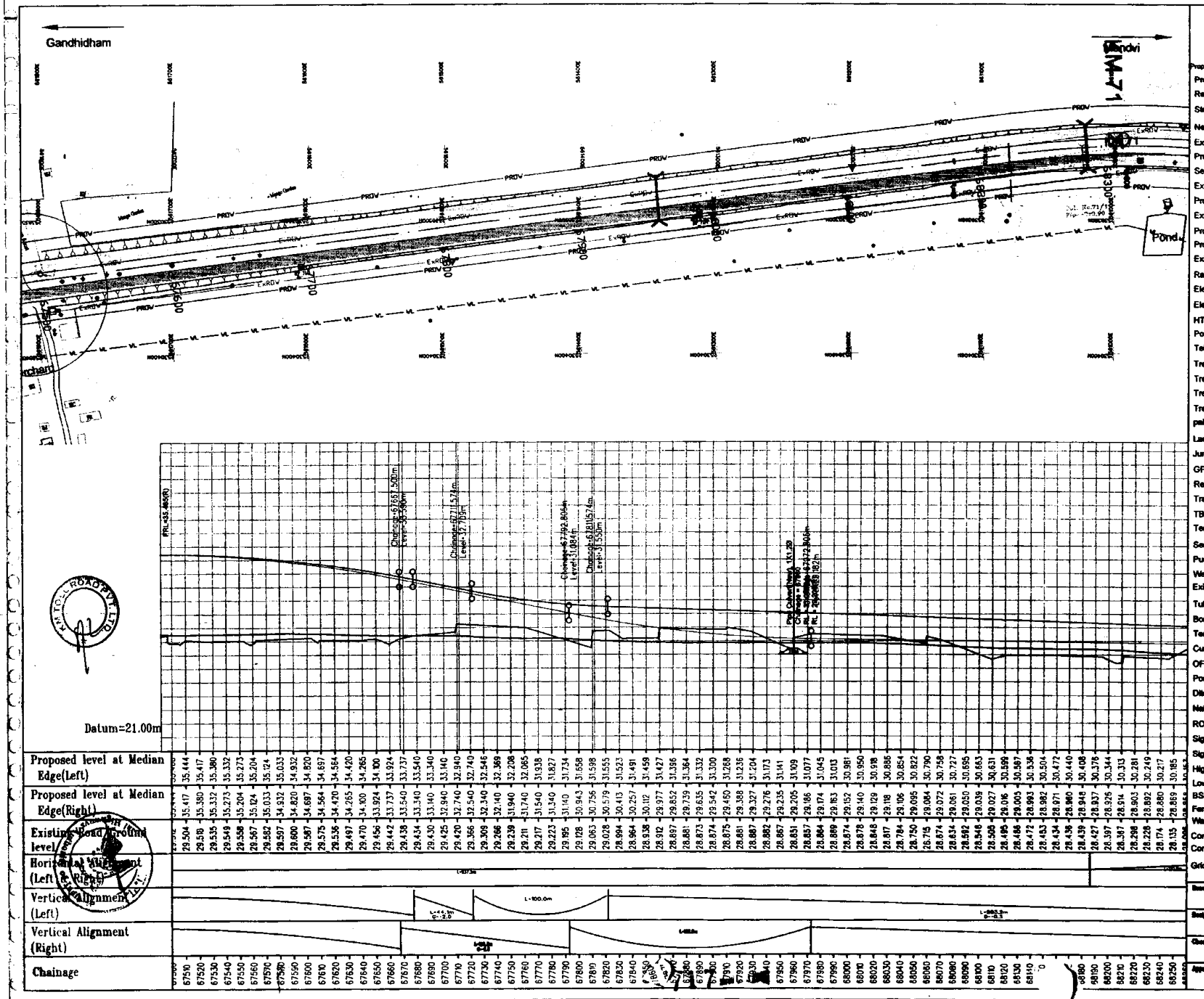
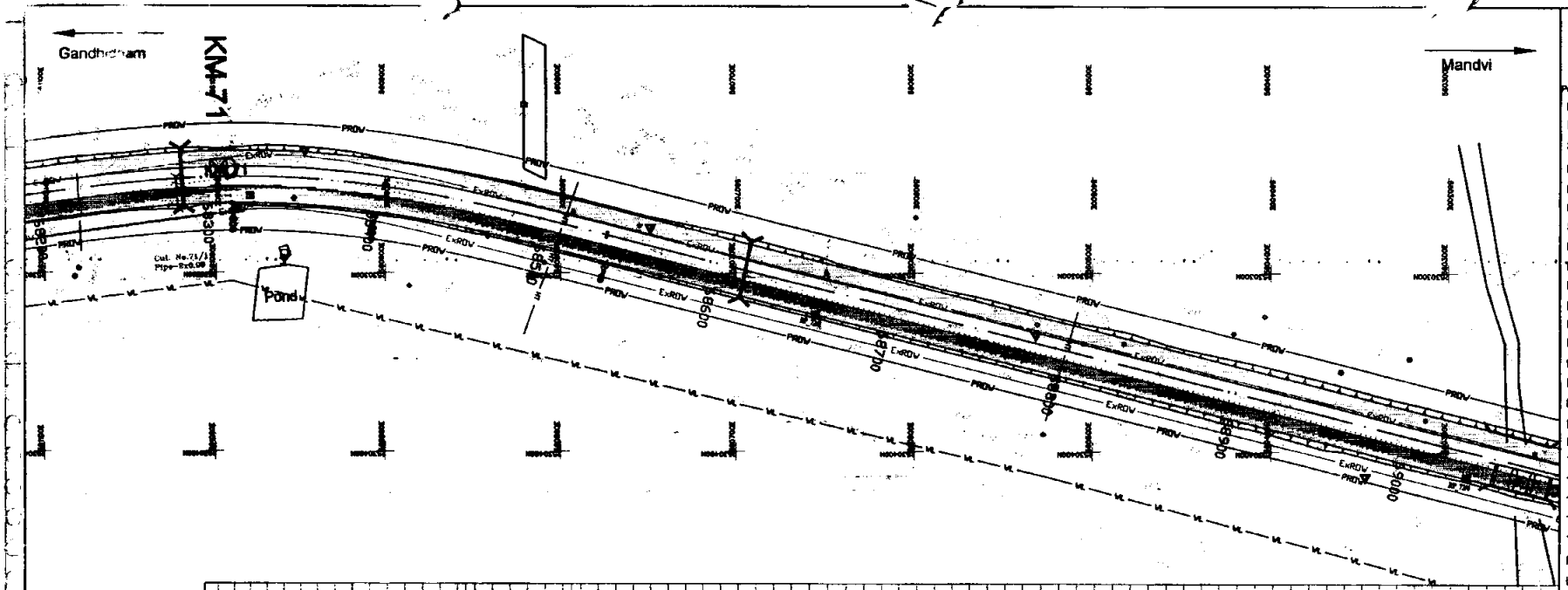
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Datum=21.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
Bridge Bridge (1x24.0)
Chainage=64668.25m
Level=33.228m
RL = 32.804
RL = 32.804
Chainage=64763.816m
Level=33.526m
Chainage=65100.099m
Level=32.519m
Chainage=65213.901m
Level=31.397m
Issue By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Checked By :
Preliminary Plan & Profile
September 2009
Approved By :
RITES

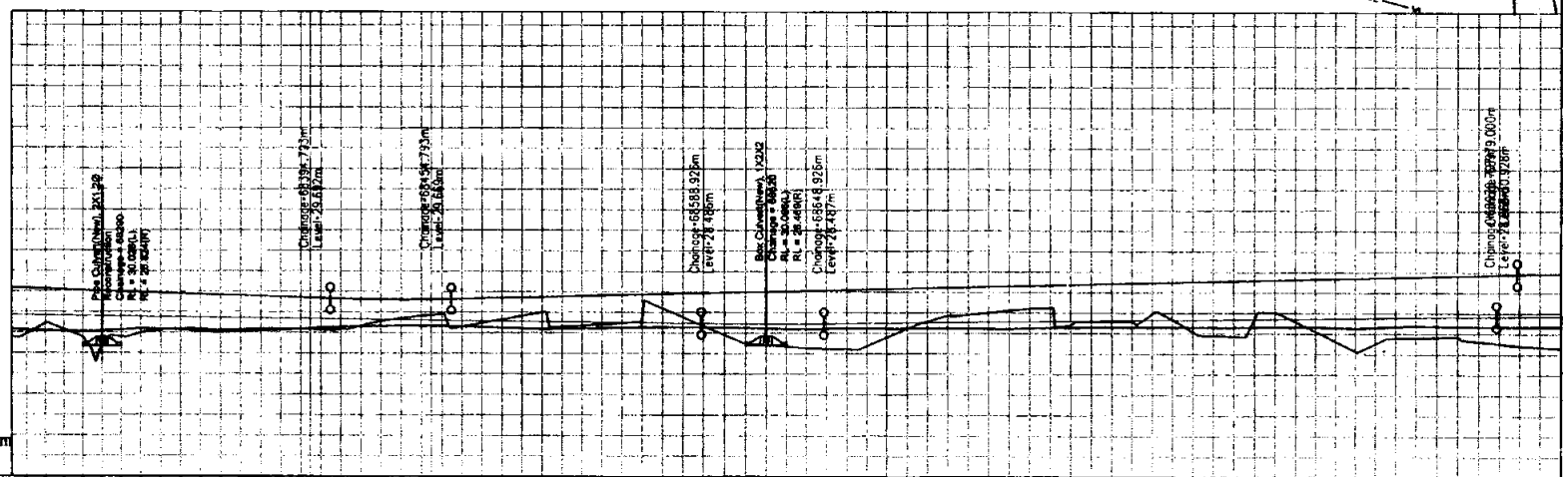

End of Bhujpur Realignment At Ch. 68.000 KM
Gandhidham
Mandvi
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Datum=21.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mandra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch.65250 to Ch. 66000 Res. : R1
September 2009
RITES


Gandhidham
Mandvi
KM 69
Anand Vaadi Mango Orchard
Dairy Farm
PROV
ExROW
Datum=21.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road/Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Existing Carriageway
Proposed Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
GENERAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
September 2009
RITES


Gandhidham
Mandvi
Dairy Farm
Jebalpur Village
Residential
Chikoo Orchard
NVP: 1 Span 10m
Ex Km=70+200
Pr Ch=67480
KM 70
Datum=21.00m
LEGEND
Proposed Carriageway
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch.66750 to Ch. 67980 Rem : RH
September 2009
RITES
SCALE


Gandhidham
Bhachau
Bhuj
Pond
Datum=21.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat
Preliminary Plan & Profile
Ch.67500 to Ch. 68250 Sheet : 01
September 2009
RITES





Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

LEGEND

- Proposed Centerline
- Reelignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW)
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 600mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1600mm girth)
- Tree (> 1600mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction
- Semi-pucca Structure
- Pucca Structure
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :

Designed By :

Checked By :

Approved By :

NATIONAL HIGHWAY AUTHORITY OF INDIA

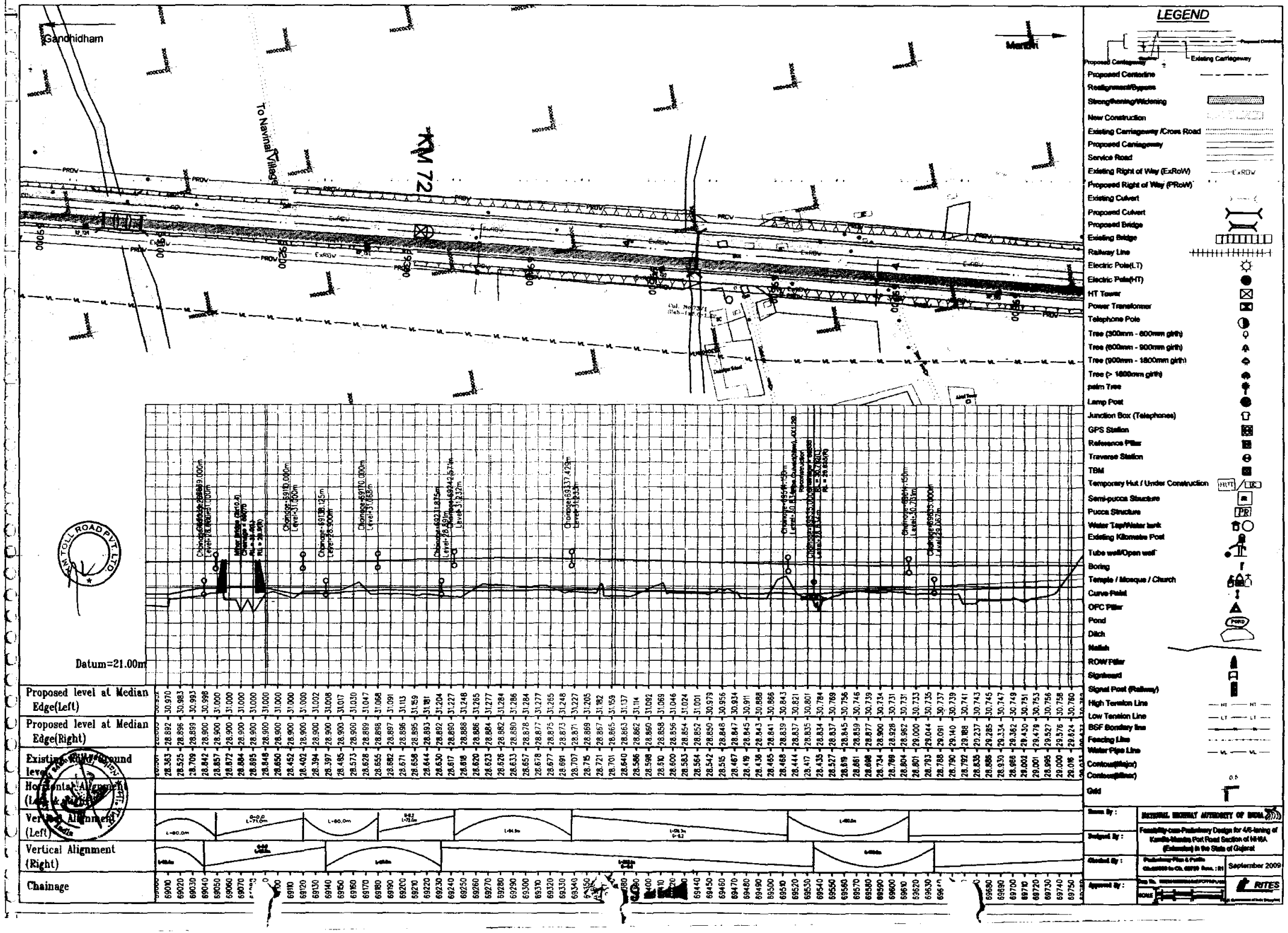
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH8A (Extension) in the State of Gujarat

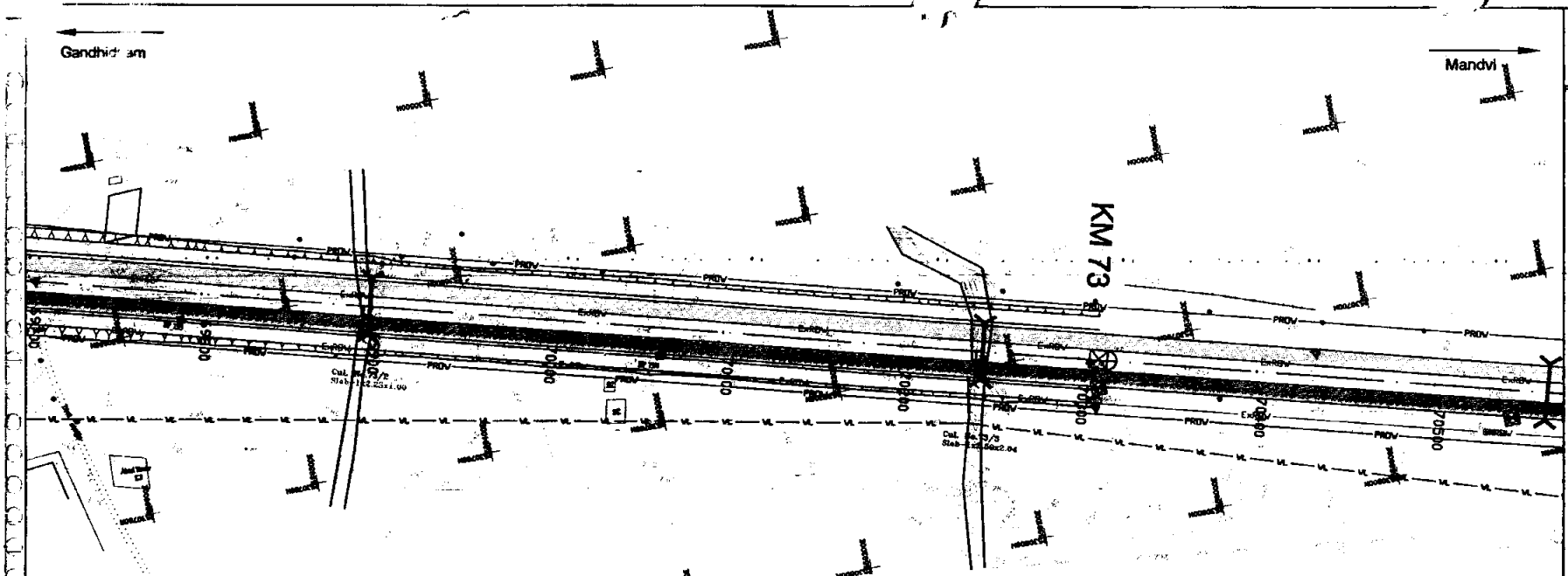
Preliminary Plan & Profile Ch. 68250 to Ch. 69000 Revn. : R1

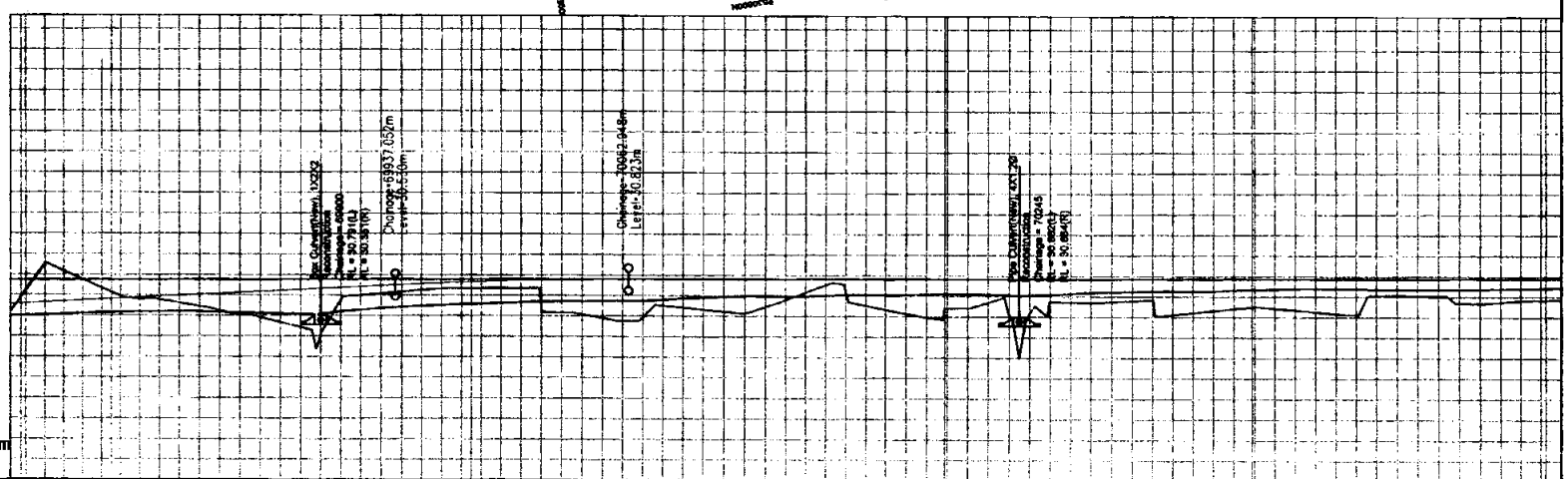
September 2009

RITES

SCALE


Gandhidham
To Navinal Village
KM 72
Mundra
Datum=21.00m
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
LEGEND
Existing Carriageway
Proposed Centerline
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Proposed Carriageway
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
Tree (> 1800mm girth)
palm Tree
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Boundary line
Fencing Line
Water Pipe Line
Contours(Major)
Contours(Minor)
Grid
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
September 2009
RITES



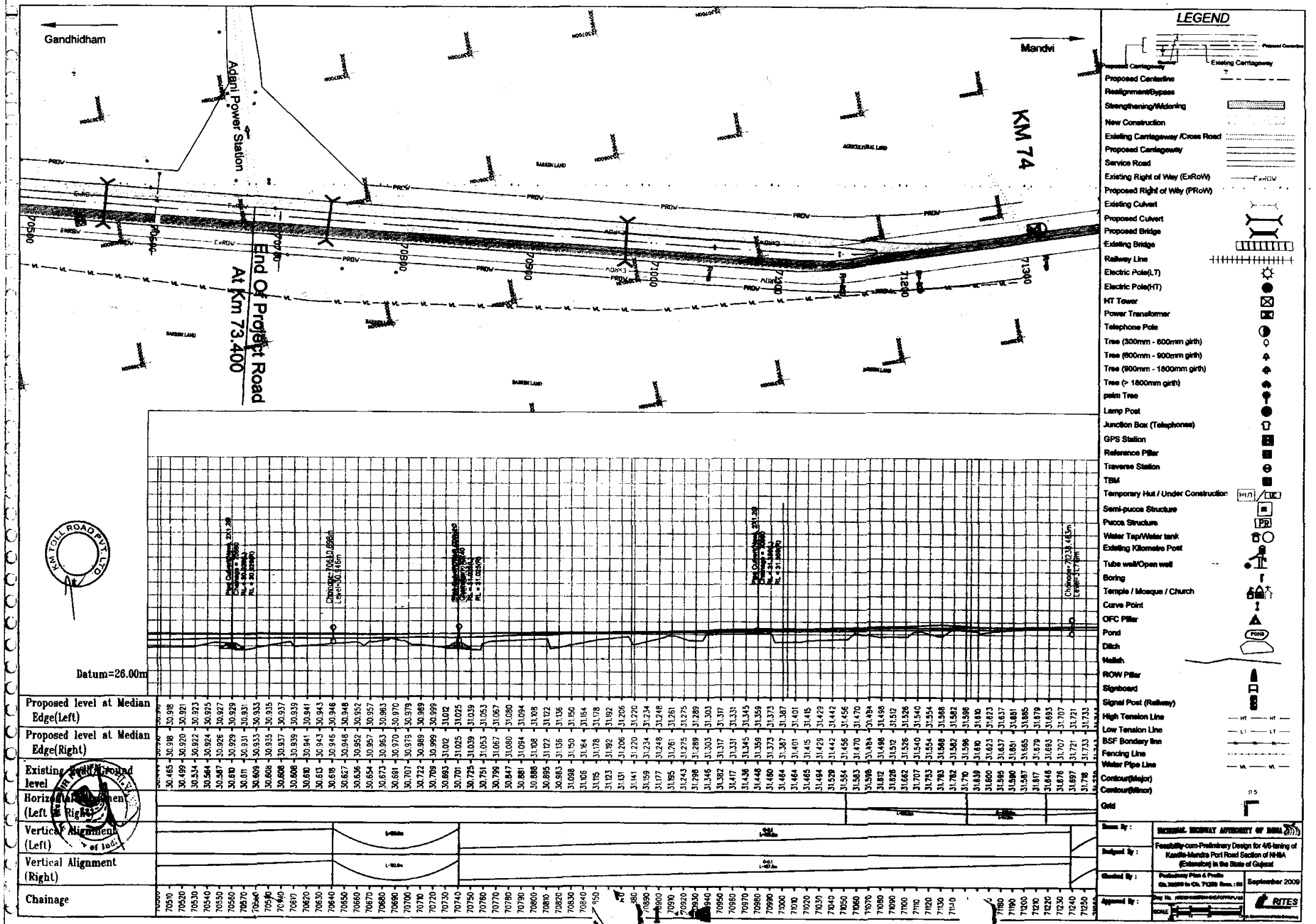


Proposed level at Median Edge(Left)	
Proposed level at Median Edge(Right)	
Existing Road/Ground level	
Horizontal Alignment (Left & Right)	
Vertical Alignment (Left)	
Vertical Alignment (Right)	
Chainage	

LEGEND

- Proposed Carriageway
- Existing Carriageway
- Proposed Centerline
- Realignment/Bypass
- Strengthening/Widening
- New Construction
- Existing Carriageway /Cross Road
- Proposed Carriageway
- Service Road
- Existing Right of Way (ExRoW) — ExROW
- Proposed Right of Way (PRoW)
- Existing Culvert
- Proposed Culvert
- Proposed Bridge
- Existing Bridge
- Railway Line
- Electric Pole(LT)
- Electric Pole(HT)
- HT Tower
- Power Transformer
- Telephone Pole
- Tree (300mm - 900mm girth)
- Tree (600mm - 900mm girth)
- Tree (900mm - 1800mm girth)
- Tree (> 1800mm girth)
- palm Tree
- Lamp Post
- Junction Box (Telephones)
- GPS Station
- Reference Pillar
- Traverse Station
- TBM
- Temporary Hut / Under Construction
- Semi-pucca Structure
- Pucca Structure
- Water Tap/Water tank
- Existing Kilometre Post
- Tube well/Open well
- Boring
- Temple / Mosque / Church
- Curve Point
- OFC Pillar
- Pond
- Ditch
- Nallah
- ROW Pillar
- Signboard
- Signal Post (Railway)
- High Tension Line
- Low Tension Line
- BSF Bondary line
- Fencing Line
- Water Pipe Line
- Contour(Major)
- Contour(Minor)
- Grid

Drawn By :	NATIONAL HIGHWAY AUTHORITY OF INDIA
Designed By :	Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mundra Port Road Section of NH-8A (Extension) in the State of Gujarat
Checked By :	Preliminary Plan & Profile Ch.69750 to Ch. 70500 Sheet : 01 — September 2009
Approved By :	Dwg No. RITES/R&B/SH-08/EC/PPP/04 — SCALE — RITES


Gandhidham
Mandvi
Adani Power Station
End Of Project Road
At Km 73.400
KM 74
Datum=26.00m
KM TOLL ROAD PVT. LTD.
LEGEND
Proposed Centerline
Existing Carriageway
Proposed Carriageway
Realignment/Bypass
Strengthening/Widening
New Construction
Existing Carriageway /Cross Road
Service Road
Existing Right of Way (ExRoW)
Proposed Right of Way (PRoW)
Existing Culvert
Proposed Culvert
Proposed Bridge
Existing Bridge
Railway Line
Electric Pole(LT)
Electric Pole(HT)
HT Tower
Power Transformer
Telephone Pole
Tree (300mm - 600mm girth)
Tree (600mm - 900mm girth)
Tree (900mm - 1800mm girth)
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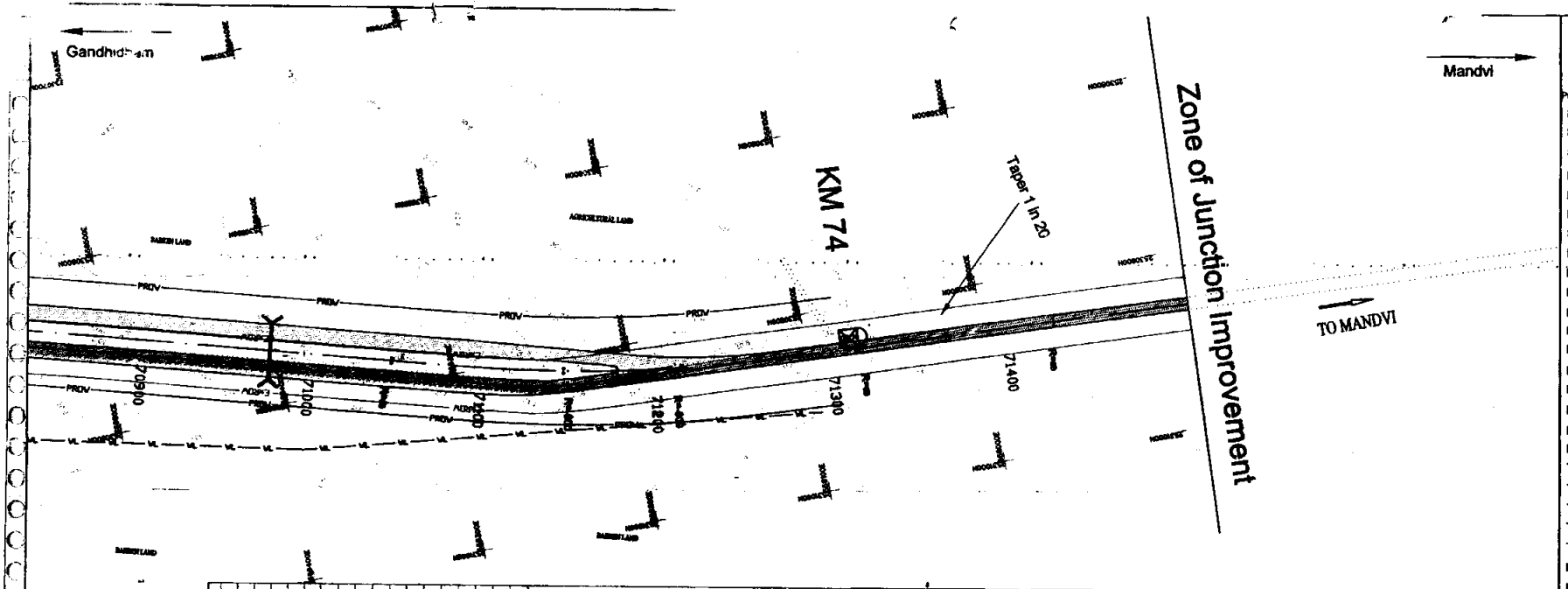
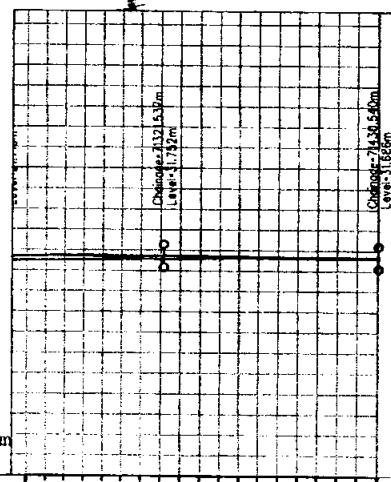
Lamp Post
Junction Box (Telephones)
GPS Station
Reference Pillar
Traverse Station
TBM
Temporary Hut / Under Construction
Semi-pucca Structure
Pucca Structure
Water Tap/Water tank
Existing Kilometre Post
Tube well/Open well
Boring
Temple / Mosque / Church
Curve Point
OFC Pillar
Pond
Ditch
Nallah
ROW Pillar
Signboard
Signal Post (Railway)
High Tension Line
Low Tension Line
BSF Bondary line
Fencing Line
Water Pipe Line
Contour(Major)
Contour(Minor)
Grid
Proposed level at Median Edge(Left)
Proposed level at Median Edge(Right)
Existing Road Ground level
Horizontal Alignment (Left & Right)
Vertical Alignment (Left)
Vertical Alignment (Right)
Chainage
Drawn By :
Designed By :
Checked By :
Approved By :
NATIONAL HIGHWAY AUTHORITY OF INDIA
Feasibility-cum-Preliminary Design for 4/6-laning of Kandla-Mandra Port Road Section of NH-8A (Extension) in the State of Gujarat
September 2009
RITES


Gandhidham
Mandvi
KM 74
Taper 1 in 20
Zone of Junction Improvement
TO MANDVI
71000
71200
71400
71600
71800
71000


Datum=21.00m
Chainage=71315.30m
Level=31.752m
Chainage=71430.540m
Level=31.686m

| | | |