



National Highways Authority of India
(Ministry of Shipping Road, Transport & Highways)

Consultancy Services for preparation of Detailed Project Report for Rehabilitation and Upgradation of Maheshkhunt-Saharsa-Purnea- Section of NH-107 in the State of Bihar Consultancy Package no. DPR/BH/Phase-IV B//2010

REVISED FINAL DETAILED PROJECT REPORT
EXECUTIVE SUMMARY



(PACKAGE - I : KM 0.000 to KM 90.000)

MAR-2017



UPHAM INTERNATIONAL CORPORATION
JV WITH

SA Infrastructure Consultants Pvt. Ltd.

**1101A, 11th Floor, Tower A-II, Corporate park,
Plot No.7A/1, Sector 142, Noida - 201301,(Uttar Pradesh)**

Ph: +91-120-6148000 Tel./Fax +91-120-6148090

E-mail: info@sainfra.com

March-2017



National Highways Authority Of India

Project: Consultancy Services for Preparation of DPR for Rehabilitation and Upgradation of Maheshkhunt – Saharsa – Purnea Section of NH-107 in the State of Bihar on EPC Mode

Package-I (Km 0+000 to Km 90+000)



SA INFRASTRUCTURE
CONSULTANTS PVT. LTD.

CHAPTER 1

EXECUTIVE SUMMARY

1.1 General

The Government of India has decided to take up the development of various road stretches/Corridors in the Northern part of the country to upgrade the road network to meet the growing traffic requirement in this part of the country by augmenting the road capacity for safe and efficient movement of the traffic.

The National Highways Authority of India (NHAI) had been entrusted with the work of preparation of DPR for rehabilitation and upgradation to 2-lane with paved shoulders configuration under NHDP Phase-IVB on BOT Mode of NH-107 under Consultancy Contract package no. DPR/BH/Phase-IVB/2010 signed on 13th June'2011.

Upham International Corporation in Joint venture with SA Infrastructure Consultant Pvt. Ltd. 101-102, CS-II Gyan Khand-II, Indirapuram, Ghaziabad, UP has been appointed as consultant to carry out Consultancy Services for Preparation of DPR for Rehabilitation and Upgradation of Maheshkhunt – Saharsa – Purnea Section of NH-107 in the State of Bihar on BOT basis.

Project stretch falls in the state of Bihar which is situated in Northern Zone of India. Bihar is land-locked on all sides. Project stretch borders Nepal on northern side, Uttar Pradesh on the western side and West Bengal on the eastern side. On southern side is the state of Jharkhand. The climate of the region is sub-humid. River Ganges flows west to east through the middle of the State, dividing Bihar state into two parts, namely; northern and southern Bihar. The project stretch is located in northern Bihar. The total area of Bihar is 94163 sq. km. It mostly contains plain terrain. Forest area is approximately of 6.87%. The State has 26 nos. of National Highways with aggregate length 3526 kms. Two prestigious NHDP projects, namely; East- West Corridor 513.30 km. and Golden Quadrilateral (GQ) of 205.70 km are in various stages of completion. The present project stretch falls under Phase-IV B of NHDP being undertaken by National Highways Authority of India for 2 laning with paved shoulder of NH-107 in the State of Bihar on EPC mode.

The complete project stretch is Starting from Ch. 0+000 takes off from Ch. 287+248 of NH-31 near Maheshkhunt in Khagaria Districts traversing through Districts of Saharsa



National Highways Authority Of India

Project: Consultancy Services for Preparation of DPR for Rehabilitation and Upgradation of Maheshkhunt – Saharsa – Purnea Section of NH-107 in the State of Bihar on EPC Mode

Package-I (Km 0+000 to Km 90+000)



& Madhepura terminates at Ch. 179+400 at Maranga Chowk meeting with NH-31 at Ch. 399+900 in Purnea town. NH-57 and SH-60 are also converging in Purnea town nearby. The total length of project road is 179.400 km as per TOR. The existing alignment of the project is broadly straight expecting a few locations where geometrics need improvement and at some built up locations where bypasses / re-alignment has been considered.

The project corridor forms one of the important arterial highways in the National Highway network of Bihar. The project road is located in northern-east part of Bihar state. The project road connects two district headquarters, Purnea and Beghusarai passing through Khagaria, Saharsa, Madhepura and Purnea districts.

Two packages for the procurement purposes are proposed. These are as below:

Package I: Design. Ch. 0.000 to Ch. 90.000

Package II: Design Ch. 90.000 to Ch. 177.960

A Final Details Project Report for the above 2 packages were submitted to GM(T) BH NHAI HQ New Delhi vide Consultant letter no. UIC-SAICPL/DPR/BH/NH-107/11/MG/2256 dated 04-07-2014 with copy endorsed to PD PIU NHAI Begusarai. The Final DPR was based on SOR April'2013 RCD Bihar. The Final DPR submitted for Package-I & II consisted of the following volumes.

Sr. no.	Details	Volume no.
1	Main Report	Vol-I
2	Design Report	Vol-II
3	Material Report	Vol-III
4	EIA/EMP/RAP (for both package)	Vol-IV
5	Rate Analysis	Vol-VI
6	Cost Estimate	Vol-VII
7	Drawings (Highways)	Vol-IXA
8	Drawings (Structure)	Vol-IXB
9	EPC & Schedule	Vol-X

The Cost Estimate based on SOR April'2013 have been as detailed below;



National Highways Authority Of India

Project: Consultancy Services for Preparation of DPR for Rehabilitation and Upgradation of Maheshkhunt – Saharsa – Purnea Section of NH-107 in the State of Bihar on EPC Mode

Package-I (Km 0+000 to Km 90+000)



SA
INFRASTRUCTURE
CONSULTANTS PVT. LTD

Cost Estimate in Cr.	
Package-I	Package-II
402.88	470.62

Thereafter GM (T)- BH NHA HQ New Delhi vide its letter no. NHAI/11012/BH/IV/2011/5/67598 dated 12-06-2015 directed the consultant to update the above Final DPR on latest prevailing SOR RCD Bihar of 2015-16 (w.e.f. 01-04-2015). Accordingly the effected volumes for both was revised and was submitted to GM BH NHA HQ New Delhi vide consultant letter no. UIC-SAICPL/DPR/BH/NH-107/11/MG/2470 dated 03-07-2015 with the set of reports endorsed to PD PIU Begusarai. The details of submittals so made have been;

Sr. no.	Description of Submittals Revised	Volume no.
1	Main Report	Vol-I
2	Rate Analysis	Vol-VI
3	Cost Estimate	Vol-VII
4	Schedule (A to D)	Vol-X

The Revised Cost Estimate at SOR RCD Bihar w.e.f. 01-04-2015 had been as below;

Revised Cost Estimate in Cr.	
Package-I	Package-II
455.85	523.71

It is pertinent to mention that the work of the project was taken up by the Consultant since signing of the agreement in June'2011 and rightly the Manual of Standards and Specifications for 2-laning IRC:SP-73-2007 was adopted for preparing the DPR so finally submitted on SOR Bihar 2015-16 as detailed in the preceding para above.

In the background of the above Consultant has already made submittal of DPR twice under the instruction of NHA based on 2-lane Manual IRC:SP-73-2007 which has actually been enforced Manual when the consultancy was awarded and reports submitted.



National Highways Authority Of India

Project: Consultancy Services for Preparation of DPR for Rehabilitation and Upgradation of Maheshkhunt – Saharsa – Purnea Section of NH-107 in the State of Bihar on EPC Mode

Package-I (Km 0+000 to Km 90+000)



SA
INFRASTRUCTURE
CONSULTANTS PVT LTD

Once again PD PIU Begusarai vide its letter no. NHAI/12014/05/BGS/2010/Tech/4639 dated 30-09-2015 quoting reference of NHAI HQs letter no. 11012/BH/IV/2011/5/72118 dated 22-09-2015 has directed the Consultant to revised (update) the DPR both the packages-I & II based on the recently published 2-lane with paved shoulders IRC Manual: SP: 73-2015 on EPC mode.

Since once again revising the DPR based on IRC:SP-73-2015 on EPC mode will be altogether a fresh work which an **Out of Scope Work** as defined under sub clause 2.6 of GCC of the contract. Consultant has, therefore, submitted an Out of Scope Proposal to PIU NHAI Begusarai for formal approval vide letter no. UIC-SAICPL/BH/NH-107/11/MG/2593 dated 20-01-2016. Mean while a progress review meeting has been held on 11/04/2016 at CGM NHAI HQ New Delhi where in it has been opined that the out of scope were earlier submitted is on much higher side. It is also an record that this revision is going to be the third revision being undertaken by us. However to maintain a good cordial relation of client and consultant the claim of the out of scope were has been reconsidered to reduce it to bare minimum and submitted to the Project Director Begusarai vide letter no. UIC-SAICPL/DPR/BH/NH-107/11/MG/2665 dated 12/05/2016 for Rs. 25.00 lacs only.

DPR has been modified/revised based on IRC:SP-73-2015 on EPC mode. Meanwhile the circumstances has so developed that the SOR Bihar 2016-17 (w.e.f. 01-04-2016) has become effective. Therefore, revised analysis of rate based on SOR Bihar 2016-17 has been done which have been applied to compute the cost estimate of the project.

By way of these revisions the Revised Cost Estimates (Modified) at the base year rate of 2016-17 with all required modifications based on IRC:SP-73-2015 on EPC mode had come as Rs. 479.04cr & Rs. 548.21cr respectively for package-I & package-II wherein Earthen shoulder was adopted for Bypass & realignment, on reference from PD PIU Begusarai vide letter no. NHAI/12017/05/BGS/2010/Tech/5534 dt. 02/06/2016, provision of paved shoulder in TCS-IV & VI for Bypasses, realignment in place of earthen shoulder provided earlier has been made. This has led to minor increase in overall cost of the project.

The cost based on Rail + Road lead has been worked out in September 2106. The revised cost has been given below:

Revised Cost Estimate (Modified) in Cr. based on Rail + Road Lead	
Package-I	Package-II
499.86	571.85

The cost based has been worked out to include the four lane section in built-up area and bridges less than 11m has been reconstructed in November 2016. The revised cost has been given below:

Revised Cost Estimate (Modified) in Cr. based on Rail + Road Lead	
Package-I	Package-II
556.12	641.96

The cost has been worked out to include the underpass with NH/SH in January 2017.

The revised cost has been given below:

Revised Cost Estimate (Modified) in Cr. based on Rail + Road Lead	
Package-I	Package-II
573.70	672.89

1.2 Socio Economic Profile

The state of Bihar is bounded by Nepal and Uttar Pradesh in the north and by Jharkhand in the south. The state has area of 94,163 sq. Kms.

- Average annual growth rate of NHDP (for the last 9 years) for Bihar state is 7.8%
- Annual growth of vehicle registration is 9.6%
- Annual growth rate for Bihar economy is 5 to 6%
- Primary sector growth rate has been seen between 3.5 to 4.5%
- The secondary sector has witness it decline in growth rate from 6.59% in 2000-2001 to 4.17% 2004-2005.
- The territory growth rate between 6.5 to 7.5 %

This project road (Package I) is falling in two districts namely; Khagaria, and Saharsa.

Khagaria District

- The latitude of the district is 25°15' to 25°44' N and longitude is 86°17.14' to 86° 52.5'E . The Khagaria district is on an average of 36 m above sea level.
- The average annual rainfall is 1225 mm.



National Highways Authority Of India

Project: Consultancy Services for Preparation of DPR for Rehabilitation and Upgradation of Maheshkhunt – Saharsa – Purnea Section of NH-107 in the State of Bihar on EPC Mode

Package-I (Km 0+000 to Km 90+000)



- The river of the district is Ganga, the Burhi Gandak, the Bagmati, the Kamla and the Ghaghri (the mainstream of Koshi).
- Total population of the district is 12,80,354 out of 6,79,267 are male and 6,01,087 are female. The urban population is 76,327 and rural is 12,04,027 respectively. SC and ST are 185122 and 332 respectively.
- The literacy rate of the district is 41%.

Saharsa District

- The longitude of the district is 86°36'0" E and latitude is 25°52'48" N
- The average annual rainfall is 1287.9 mm.
- The district has an area of 1704.16 Sq Km.
- Total population of the district is 1508182 out of 789432 are male and 718750 are female. The urban population is 125167 and rural is 1383015 respectively. SC and ST are 242612 and 4642 respectively.
- The literacy rate of the district is 39.00% out of which 52.04% are male and 25.31% are female.

1.3 Project Description

- The project road starts at Ch. 0+000 takes off from Ch. 287+248 of NH-31 near Maheshkhunt in Khagaria Districts and end at Ch. 179+400 at Maranga Chowk meeting with NH-31 at Ch. 399+900 in Purnea town. Total length of the project is 179.400Km as per TOR. In this report package I i.e. Km 0+000 to Km 90+000 has been elaborated. Total length of this package I stretch is 90.000 Km.
- The Index map describing the alignment, bypasses and river crossing shown in figure 1.1.

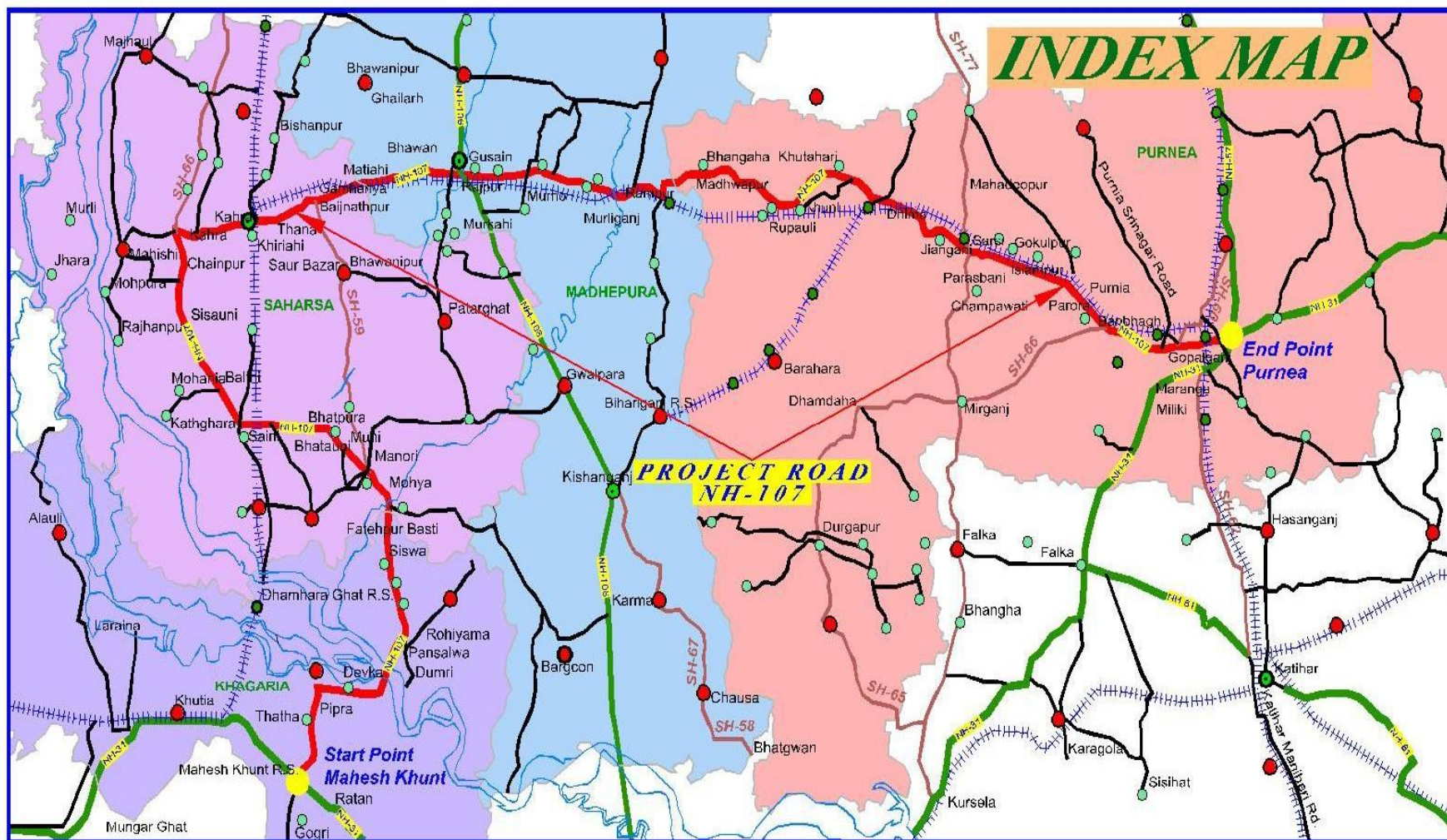


Figure 1.1



National Highways Authority Of India

Project: Consultancy Services for Preparation of DPR for Rehabilitation and Upgradation of Maheshkhunt – Saharsa – Purnea Section of NH-107 in the State of Bihar on EPC Mode

Package-I (Km 0+000 to Km 90+000)



1.3.1 Carriageway Details

Existing & Proposed Carriageway width is given in **Table 1.1 & Table 1.2 respectively.**

Table 1.1: Existing Carriageway Details

Sr. No.	Ex. Carriageway width	Section (Km's)		Length (Km.)	Type of Surface	Condition of Surface
		Ex. Ch. From	Ex. Ch. To			
1	5.5m	0.000	36.000	36.00	BT	Fair to Good
2	5.5m to 7.0m	36.000	49.000	13.00	BT	New Construction
3	3.5m	49.000	66.000	17.00	BT	Fair
4	5.5	66.000	90.000	24.00	BT	Poor to Good
		Total =		90.000		

Table 1.2 Proposed Carriageway/ ROW Details

S. No.	Description	Length (Km)	Proposed ROW Width (m)	Proposed C/W Width (m)
1	Excluding Bypass & Realignment	71.885	24	7
2	Bypass & Realignment	18.115	45	7
	Toll plaza	0.300	45	14
	Bus bays	0.600	36	7
	Truck lay byes	0	50	7
	Total length	90.00 Km		

1.3.2 Alignment Approval

A presentation before Hon'ble Minister was made and there was no adverse comment regarding the proposed alignment as per RO letter no. NHAI/RO/PAT/PIU-BGS/DPR-

APPROVAL/NH-107/2012/1731 dt. 25.01.2012 later on some changes in alignment have been made and NHA vide letter no. NHA/12017/05/BGS/2010/TECH/2602 dt. 21.01.2014 approved the revised alignment including bypasses.

1.3.3 Shoulder Width

The existing shoulders are earthen having width between 1.0 m to 2.0 m. and are in bad condition. Slopes are in bad condition except at few locations. The Proposed Shoulders width are 1.0m Earthen Shoulder and 1.5 m Paved shoulder.

1.3.4 Terrain

The entire project road passes through plain terrain.

1.3.5 R.O.W. Details

R.O.W. broadly of 24 m is available throughout the project road length. In few kms it is of 60 m. ROW details have been established w.r.t. to revenue map and the details are already submitted separately as **Appendix IA** of “Appendix to Main Report” part I (Package I) to Final Feasibility Report. The summary of existing ROW is given in **Table 1.3**.

Table 1.3: Summary of existing ROW of NH-107 (Maheshkhunt-Saharsa Section)

S. No.	Ex. Chainage		ROW (m)
	From (Km)	To (Km)	
1	0+000	13+700	24
2	13+700	15+200	60
3	15+200	16+300	20
4	16+300	18+000	45
5	18+000	19+500	60
6	19+500	23+000	24
7	23+000	25+100	20
8	25+100	34+000	24
9	34+000	35+400	20
10	35+400	47+000	24
11	47+000	48+600	16

S. No.	Ex. Chainage		ROW (m)
	From (Km)	To (Km)	
12	48+600	48+800	7
13	48+800	48+900	18
14	48+900	49+000	22
15	49+000	51+000	30
16	51+000	52+000	34
17	52+000	53+600	30
18	53+600	53+900	28
19	53+900	56+000	30
20	56+000	56+900	26
21	56+900	57+700	32
22	57+700	58+100	30
23	58+100	59+500	28
24	59+500	60+200	22
25	60+200	64+000	18
26	64+000	75+400	20
27	75+400	82+600	24
28	82+600	83+100	30
29	83+100	84+000	16
30	84+000	87+000	24
31	87+000	87+400	30
32	87+400	88+600	16
33	88+600	88+900	30
34	88+900	89+020	24

Note: The existing ROW as above have been based on

- Existing ROW at site and with Public consultation.
- Based on available ROW on village revenue map.
- Land Acquisition Plan obtained from District Land Acquisition Offices.

1.3.6 Road Junction

There are existing 3 major intersections on project road with National highway / State highway / out of which 2 nos. are 4-legged, and 1 no. is T-junction. Besides these major junctions, 101 nos. are minor junctions which crosses roads from adjacent towns

/ villages are also observed. There are Proposed 3 Major Junctions & 40 Minor Junctions which have been detailed in Chapter 6 of this document.

1.3.7 Bus Stop

In Package I, at 12 locations bus stop are proposed as detailed in Chapter-6 of this document.

1.3.8 Toll Plaza

There is Proposed 1 no. of toll Plaza in this Package I.

1.3.9 Bridges, Structures and Culverts

Summary of existing and proposed bridges, structures and culverts are given below;

Table 1.4 Summary of Structures (Existing/ Proposed)

Sr. No.	Structure Type	Existing (Nos.)	Retained (Nos.)	Abandoned (Nos.)	Reconstruction (Nos.)	New Construction (Nos.)	Realigned (Nos.)
1	Major Bridges	06	05	Nil	01	Nil	-
2	Minor Bridges	23	06	03	14	03	-
3	ROB	Nil	-	-	-	03	-
4	Culverts	99	13	-	74	22	12

1.4 Traffic

The objective of classified traffic volume count survey is to estimate traffic intensity on the project road. Classified volume count survey has been carried out at three locations. After analysis, Average Daily Traffic (ADT) comes out for all locations are given in **Table 1.5.**

Table 1.5: Summary of Traffic at all Locations

Ex. Chainage	Km 35.400	Km 67.250	Km 80.000
ADT	6549	7237	11198
PCUs	6367	7043	13384

• VDF

Axle load survey has been conducted at location Km 35.400 and Km 67.250 for the assessment of axle load spectrum along the corridor. The VDF comes out after analyzing data are given in **Table 1.6 and Table 1.7.**

Table 1.6: Summary of VDF on Project at Km 35.400

S.No.	Vehicle Type	VDF
1	2 Axle	3.96
2	3 Axle	4.4
3	MAV	4.6
4	LCV	2.4
5	BUS	2.01

Table 1.7: Summary of VDF on Project at Km 67.25

S.No.	Vehicle Type	VDF
1	2 Axle	4.1
2	3 Axle	3.8
3	MAV	4.8
4	LCV	2.10
5	BUS	1.90

• Turning Movement Count

The intersection volume count survey at major intersection has been carried out during identified peak periods for 24 hours. The category-wise traffic is counted for all direction in a 15 - minute interval. The counts were recorded in the specified survey formats. The survey data have been analyzed to obtain the morning and evening peak

hours with flow of vehicles in each direction. The summary of peak hour traffic flow through intersections is given in **Table 1.8**

Table 1.8: Peak Hour Traffic at Intersection (78+480)

Direction Of Traffic	Peak Hour	Peak hour Flow in PCU	
		Fast Traffic	Slow Traffic
Saharsa to Madhepura	9:00 to 10:00 AM	2057	451
Madhepura to Saharsa	6:00 to 7:00 PM	2044	557
Sonbarsa to Supaul	8:00 to 9:00 AM	681	427
Supaul to Sonbarsa	7:00 to 8:00 PM	1231	525
Saharsa to Supaul	5:00 to 6:00 PM	346	358
Supaul to Saharsa	5:00 to 6:00 PM	273	316
Saharsa to Sonbarsa	5:00 to 6:00 PM	853	341
Sonbarsa to Saharsa	10:00 to 11:00 AM	1006	479
Sonbarsa to Madhepura	6:00 to 7:00 PM	458	285
Madhepura to Sonbarsa	5:00 to 6:00 PM	845	589
Madhepura to Supaul	5:00 to 6:00 PM	285	207
Supaul to Madhepura	5:00 to 6:00 PM	282	154

• Adopted Growth Rate

The various methods specified vide IRC 108: 1996 are taken in to consideration for arriving at reasonable growth rate for traffic in future. The results of such methods along with proposed growth rate for each type of vehicle are presented in **Chapter 7: Traffic Survey and Analysis**. The growth rate of 7.0% is adopted for Homogeneous Section I (Km 0+000 to Km 90+000).

1.5 Pavement Composition

The pavement composition for both the homogeneous sections is given in **Table 1.9**.

Table 1.9 Proposed Pavement Thicknesses

Sections	MSA			BC	DBM	Base	Sub Base
	10 Years	15 Years	20 Years				
Km 0+000 to Km 76+000	Design For 15 Years For 30 MSA (CBR=6%)						
	9.59	17.46	28.48	40	105	250	260

The pavement composition as above is proposed to be provided in the widened portion, realignments and bypasses. For the existing carriageway strengthening by WMM (100mm) shall be laid throughout and as a binding layer, topped throughout by DBM of 105 mm BC of 40 mm.

The pavement is designed for considering CBR 6% and MSA 30 for Package I.

1.6 Bypasses/ Re-alignment

In this project (package I) stretch there are three Bypasses i.e. Bariahi & Saharsa Bypass, Sonbarsa raj bypass, Simri Bakhtiyarpur bypass which have been approved by NHAI vide letter dt.. 21.01.2014 & letter No. NHAI/12017/05/BGS/2010/Tech/2602 and Consultant letter dt.06/09/2013 & letter No. UIC-SAICPL/DPR/BH/NH-107/11/MG/2000. To improve the geometry of the existing road some realignment are also made.

The summary of the Bypasses and realignment is given below in **Table 1.10**.

Table 1.10: Summary of Bypasses and Realignment

1. Bypass

Sr. No.	Bypasses and Realignment	Ext. Start ch.	Ext. End Ch.	Prop. Start Ch.	Prop. End Ch.	Length (Km)	Prop. Bridge	Prop. ROB	Prop. Culvert
1	Sonbarsa Raj bypass	34+050	35+450	33+850	36+550	2.700	Nil	Nil	3 nos.
2	Simri & Bakhtiyarpur bypass	45+900	49+700	47+000	50+500	3.500	1	Nil	3 nos.
3	Bariahi & Saharsa Bypass	63+1000	75+410	65+220	76+200	10.98	2	1	9
Total						17.24			



National Highways Authority Of India

Project: Consultancy Services for Preparation of DPR for Rehabilitation and Upgradation of Maheshkhunt – Saharsa – Purnea Section of NH-107 in the State of Bihar on EPC Mode

Package-I (Km 0+000 to Km 90+000)



SA
INFRASTRUCTURE
CONSULTANTS PVT LTD

2. Realignment

Sr. No.	Bypasses and Realignment	Ext. Start ch.	Ext. End Ch.	Prop. Start Ch.	Prop. End Ch.	Length (Km)	Prop. Bridge	Prop. ROB	Prop. Culvert
1	Realignment of Karua More	7+325	8+400	7+325	8+200	0.875	Nil	Nil	Nil
2	Realignment of ROB at Mathahi Village	84+950	85+400	85+800	86+200	0.4	Nil	1	1 nos.
Total Length						1.275			

1.7 Speed Restriction

As per the IRC: SP: 73-2007 the project highway should be design with 100km/hr ruling speed and minimum speed of 80km/hr. Existing geometry of the project highway has been improved to achieve the minimum design speed of 80km/hr except with following locations which are proposed as “Speed Restriction Zone” and improved with design speed of 65 km/hr to utilize existing bridges and to reduce land acquisitions and R&R in the project. The details of speed restriction zone are given in **Table 1.11**.

Table 1.11: Speed Restriction Details

Sr. No.	Proposed Ch. (m)		Length (m)	Radius	Speed (Km/hr)	Remark
	From	To				
1	32+905.483	32+936.207	30.724	200	65	Sonvarsaraj village (Builtup area)
2	39+430.466	39+461.152	30.686	200	65	Murli village (Builtup area)
3	43+075.326	43+084.501	9.175	200	65	Bhatpura village (Builtup area)
4	55+531.220	55+531.389	0.169	200	65	Bridge on Canal (Sonpura village)
5	55+969.395	55+972.191	2.796	200	65	Chakmaka village



National Highways Authority Of India

Project: Consultancy Services for Preparation of DPR for Rehabilitation and Upgradation of Maheshkhunt – Saharsa – Purnea Section of NH-107 in the State of Bihar on EPC Mode

Package-I (Km 0+000 to Km 90+000)



SA
INFRASTRUCTURE
CONSULTANTS PVT. LTD.

Sr.	Proposed Ch. (m)		Length	Radius	Speed	Remark (Builtup area)
6	56+031.103	56+035.313	4.210	200	65	Chakmaka village (Builtup area)
7	56+219.302	56+221.482	2.180	200	65	Chakmaka village (Builtup area)

1.8 Typical Cross Section

The typical cross sections adopted for different sections are given in **Table 1.12** under and the figures are presented below.

Table 1.12 : Type of Typical Cross Section

Sr. No.	Design Chainage (Km+m)		Length (Km+m)	TCS
1	0+000	2+340	2+340	1B
2	2+340	2+740	0+400	VI
3	2+740	4+240	1+500	1B
4	4+240	4+600	0+360	VI
5	4+600	6+400	1+800	1B
6	6+400	7+325	0+925	III B
7	7+325	8+200	0+875	IV
8	8+200	13+700	5+500	1B
9	13+700	15+240	1+540	III B
10	15+240	16+000	0+760	VI
11	16+000	17+900	1+900	III B
12	17+900	18+200	0+300	1B
13	18+200	19+880	1+680	III B
14	19+880	20+080	0+200	VI
15	20+080	20+260	0+180	III B
16	20+260	20+500	0+240	VI
17	20+500	21+400	0+900	III B
18	21+400	22+100	0+700	1B
19	22+100	23+100	1+000	III B
20	23+100	24+300	1+200	1B
21	24+300	28+600	4+300	III B



National Highways Authority Of India

Project: Consultancy Services for Preparation of DPR for Rehabilitation and Upgradation of Maheshkhunt – Saharsa – Purnea Section of NH-107 in the State of Bihar on EPC Mode

Package-I (Km 0+000 to Km 90+000)



SA
INFRASTRUCTURE
CONSULTANTS PVT. LTD.

Sr. No.	Design Chainage (Km+m)		Length (Km+m)	TCS
22	28+600	29+800	1+200	1B
23	29+800	30+460	0+660	III B
24	30+460	30+700	0+240	VI
25	30+700	31+600	0+900	1B
26	31+600	33+100	1+500	III B
27	33+100	33+850	0+750	1B
28	33+850	36+152	2+302	IV
29	36+152	36849	0+697	V B
30	36849	37+000	0+151	III A
31	37+000	37+160	0+160	VI
32	37+160	38+000	0+840	III A
33	38+000	38+900	0+900	1A
34	38+900	40+700	1+800	III A
35	40+700	41+100	0+400	1A
36	41+100	43+000	1+900	III A
37	43+000	44+000	1+000	1A
38	44+000	44+500	0+500	III A
39	44+500	45+200	0+700	1A
40	45+200	46+400	1+200	III A
41	46+400	47+000	0+600	1A
42	47+000	48+000	1+000	IV
43	48+000	49+000	1+000	V
44	49+000	50+500	1+500	IV
45	50+500	50+540	0+040	VI
46	50+540	50+800	0+260	II A
47	50+800	51+100	0+300	II B
48	51+100	51+200	0+100	VI
49	51+200	52+900	1+700	II B
50	52+900	53+800	0+900	1C
51	53+800	55+380	1+580	II B
52	55+380	55+660	0+280	VI
53	55+660	56+980	1+320	II B
54	56+980	57+220	0+240	VI
55	57+220	60+280	3+060	II B
56	60+280	60+400	0+120	VI
57	60+400	61+600	1+200	II B
58	61+600	62+000	0+400	1C



National Highways Authority Of India

Project: Consultancy Services for Preparation of DPR for Rehabilitation and Upgradation of Maheshkhunt – Saharsa – Purnea Section of NH-107 in the State of Bihar on EPC Mode

Package-I (Km 0+000 to Km 90+000)



SA
INFRASTRUCTURE
CONSULTANTS PVT. LTD.

Sr. No.	Design Chainage (Km+m)		Length (Km+m)	TCS
59	62+000	62+200	0+200	II B
60	62+200	62+700	0+500	1C
61	62+700	62+800	0+100	II B
62	62+800	63+200	0+400	1C
63	63+200	65+220	2+020	II B
64	65+220	71+100	5+880	IV
65	71+100	72+500	1+400	V
66	72+500	76+200	3+700	IV
67	76+200	77+800	1+600	1B
68	77+800	78+500	0+700	III B
69	78+500	78+900	0+400	1B
70	78+900	79+000	0+100	III B
71	79+000	79+641	0+641	V B
72	79+641	81+250	1+609	1B
73	81+250	83+800	2+550	III B
74	83+800	85+500	1+700	1B
75	85+500	86+500	1+000	V
76	86+500	87+500	1+000	1B
77	87+500	89+800	2+300	III B
78	89+800	90+000	0+200	1B

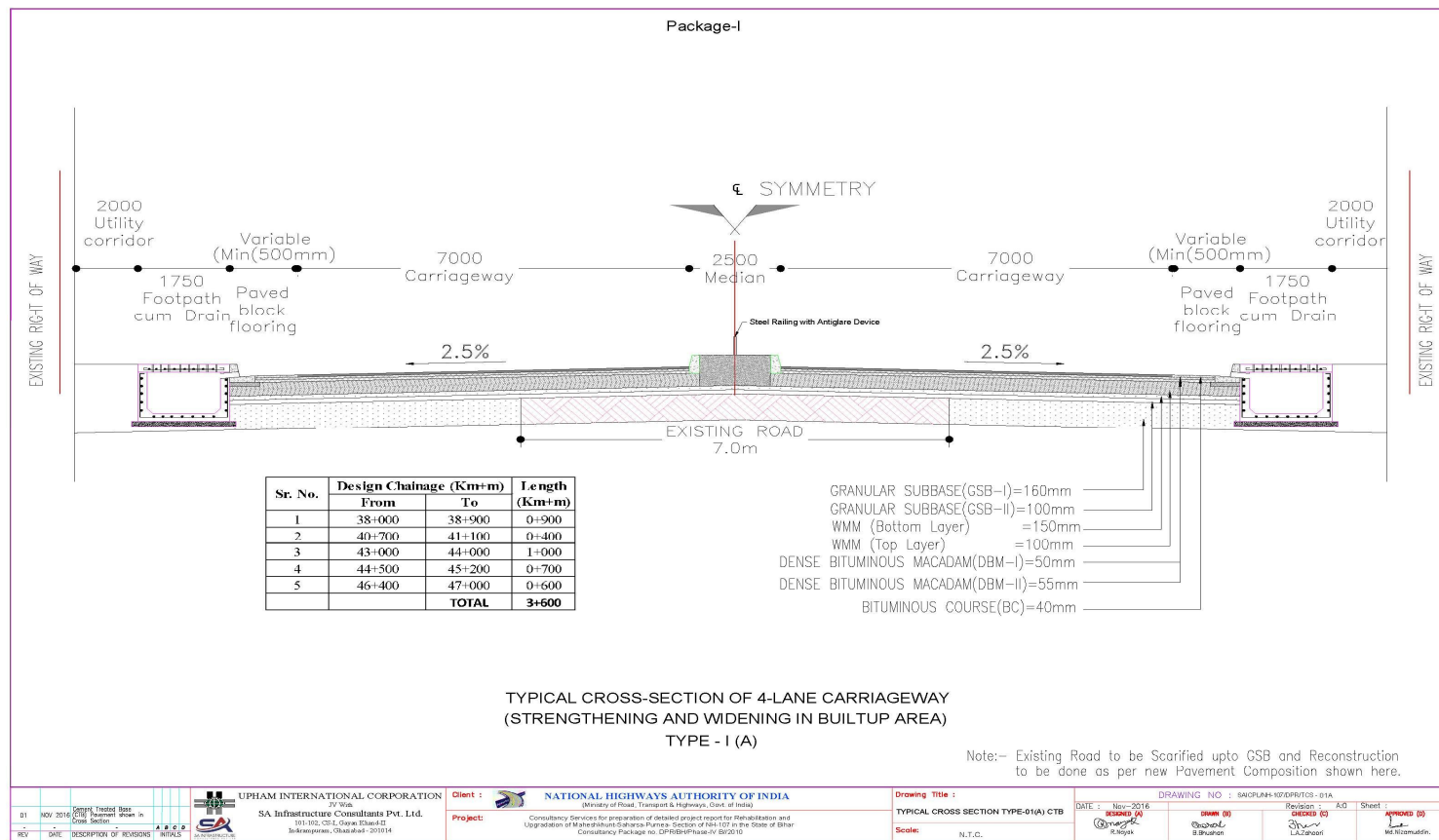


Figure 1.2

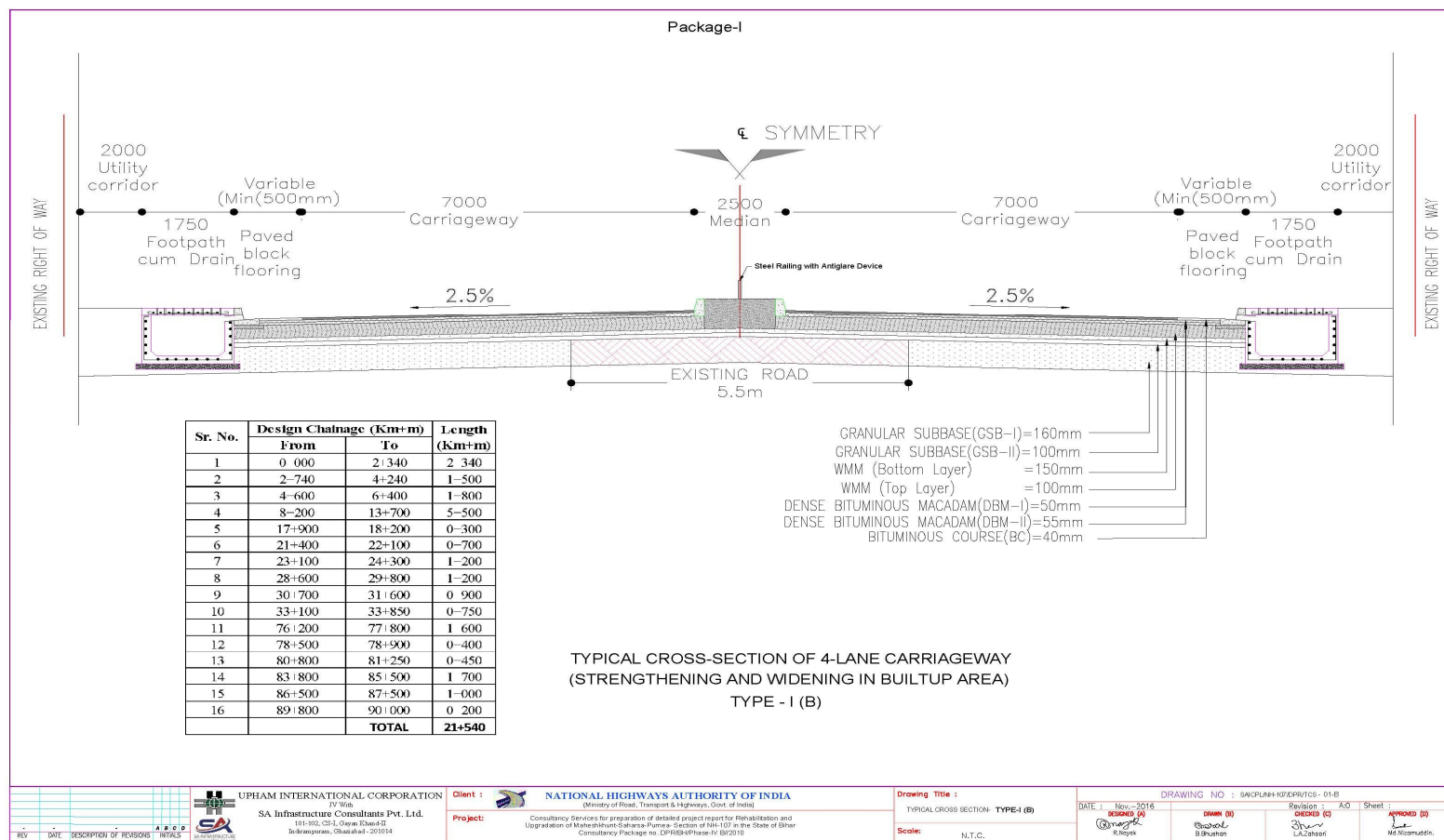


Figure 1.3

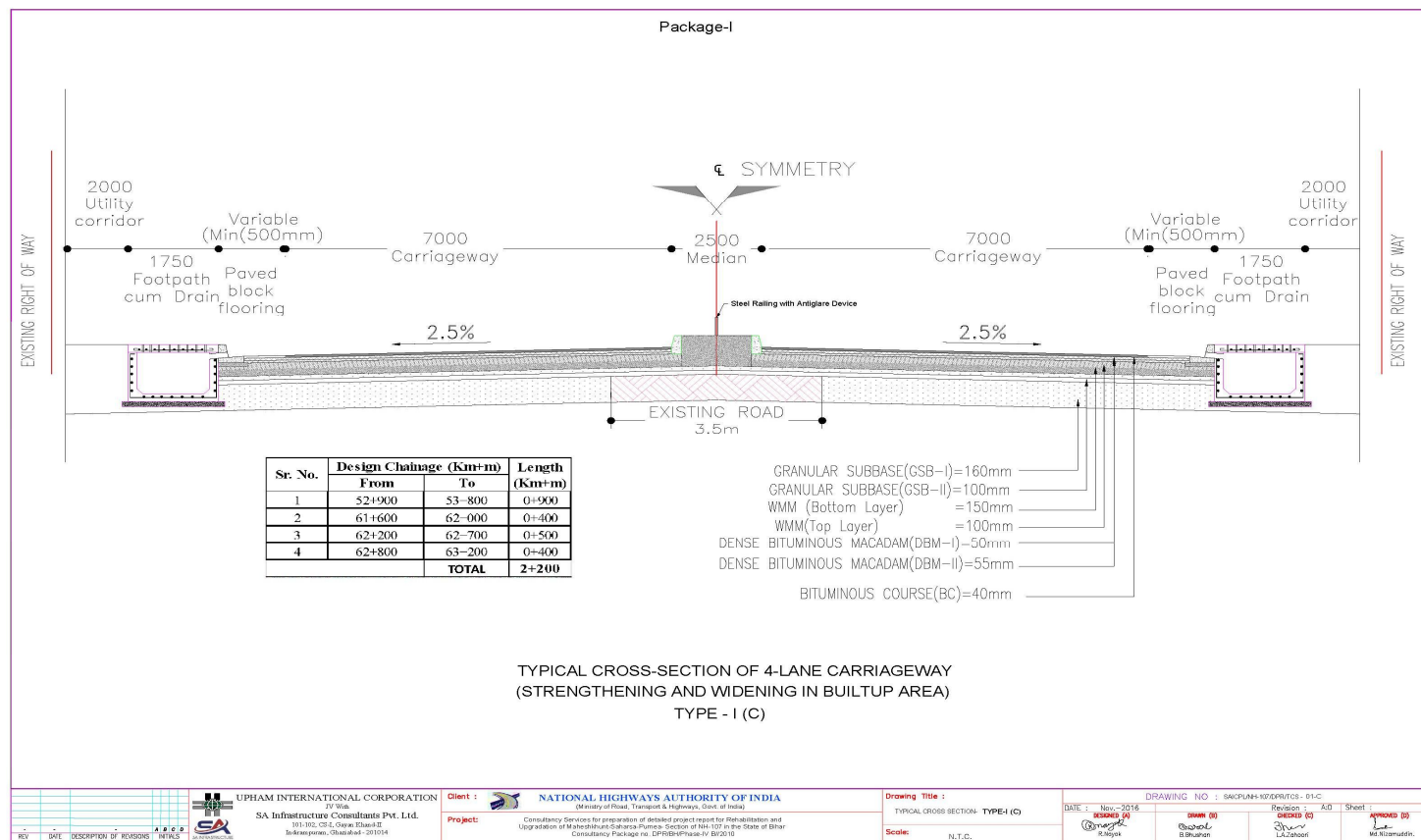


Figure 1.4

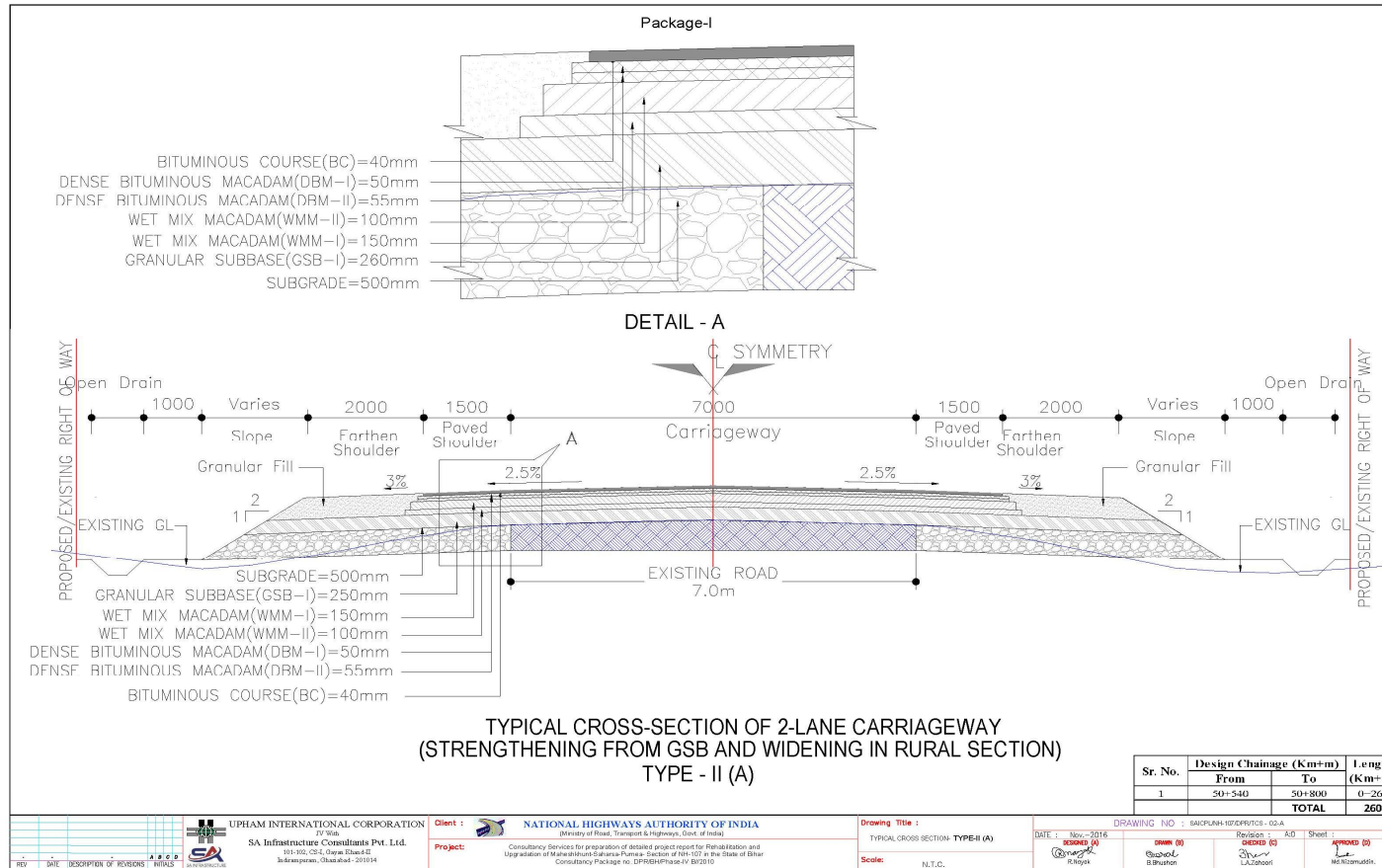


Figure 1.5

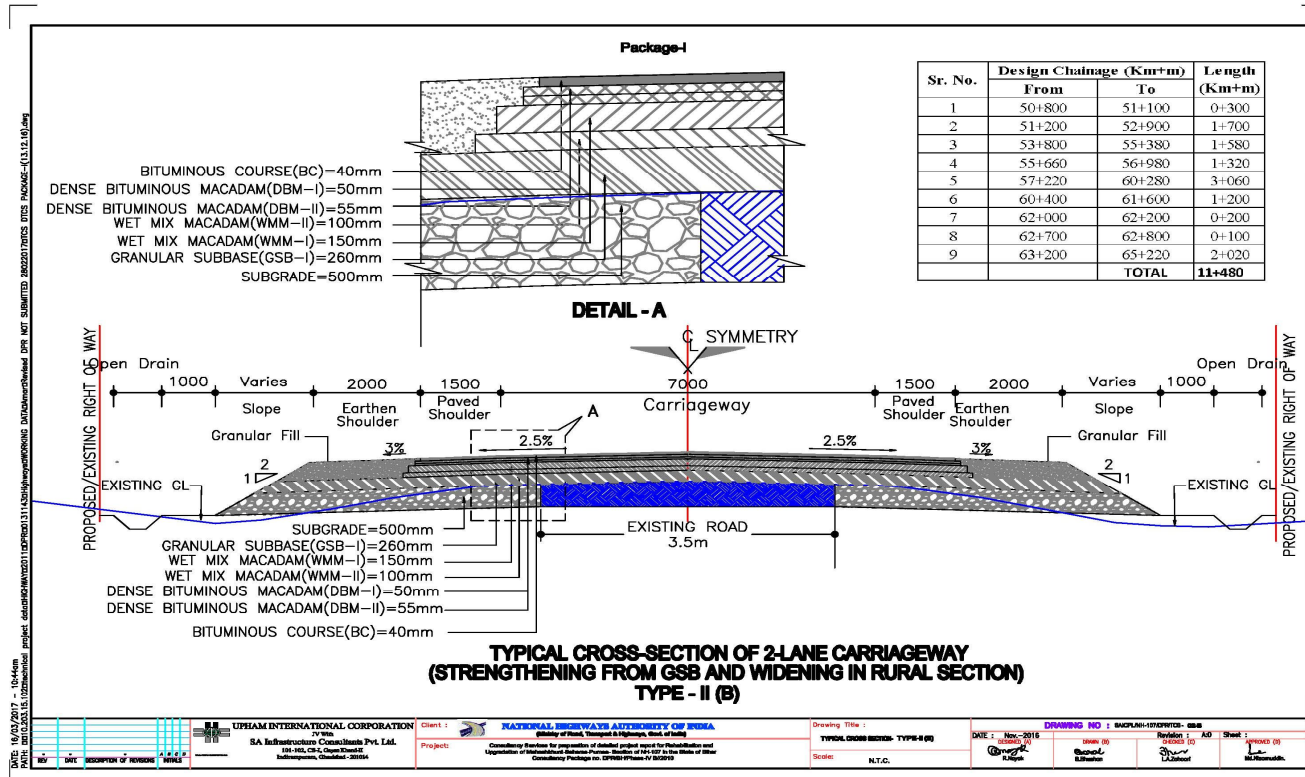


Figure 1.6

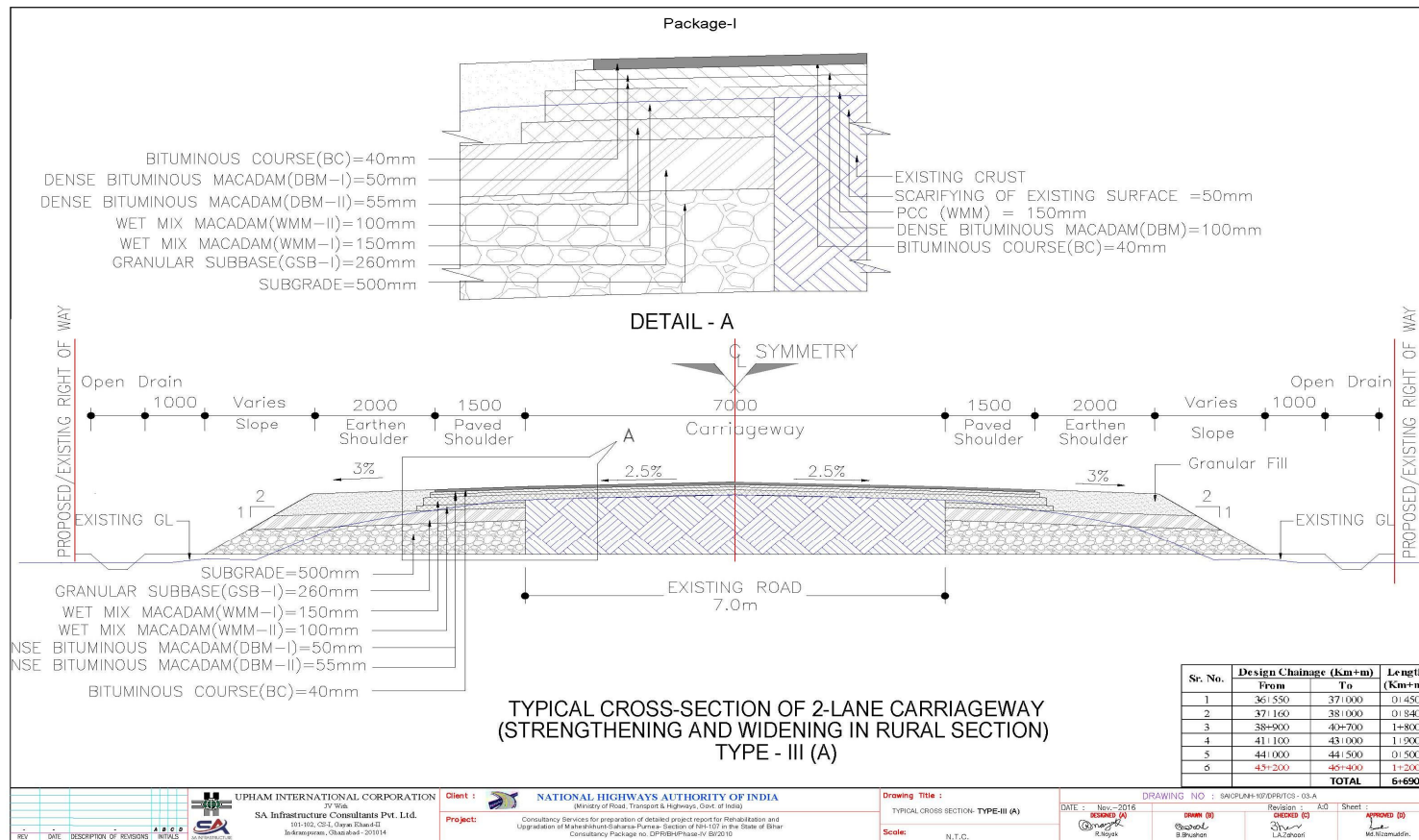


Figure 1.7

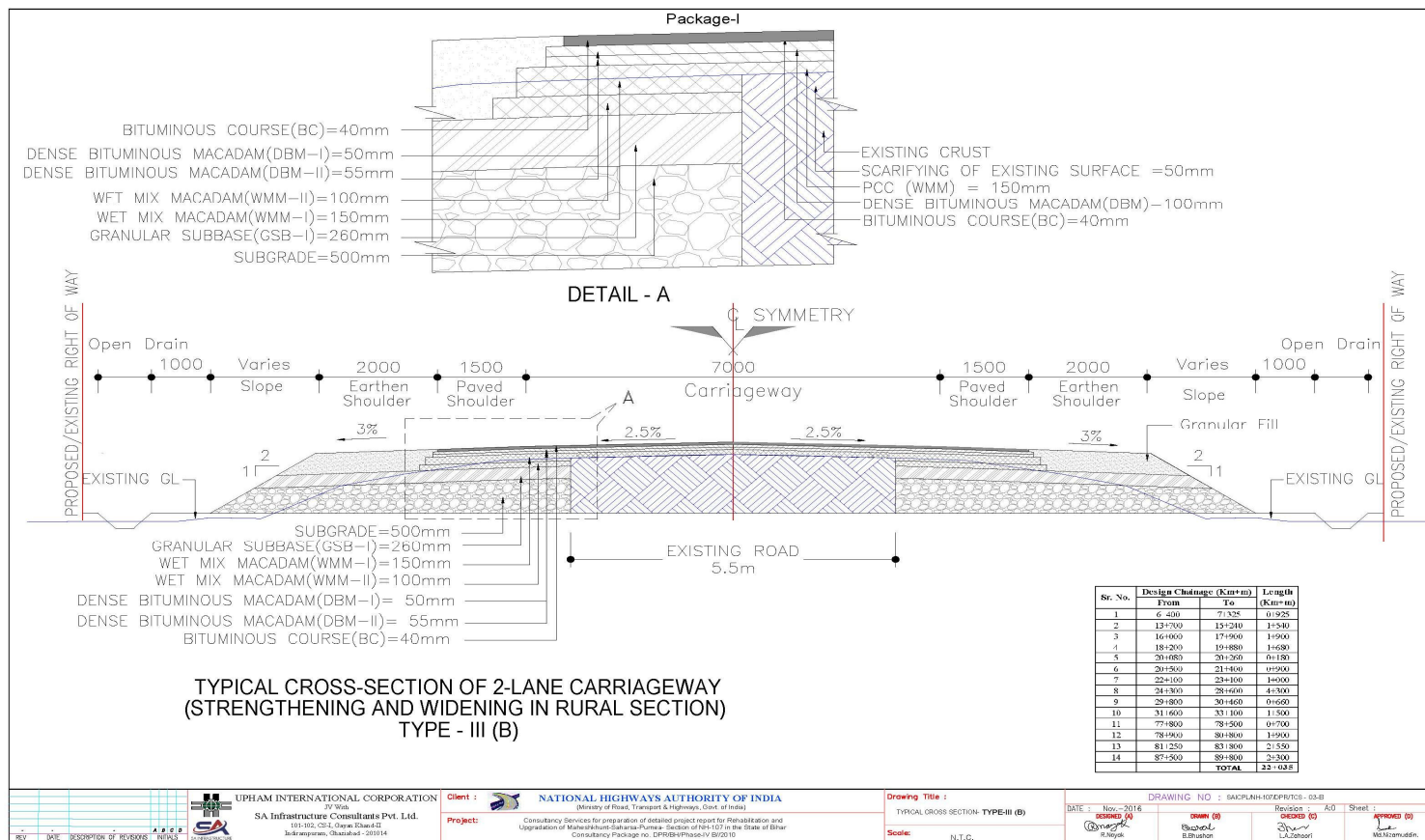


Figure 1.8

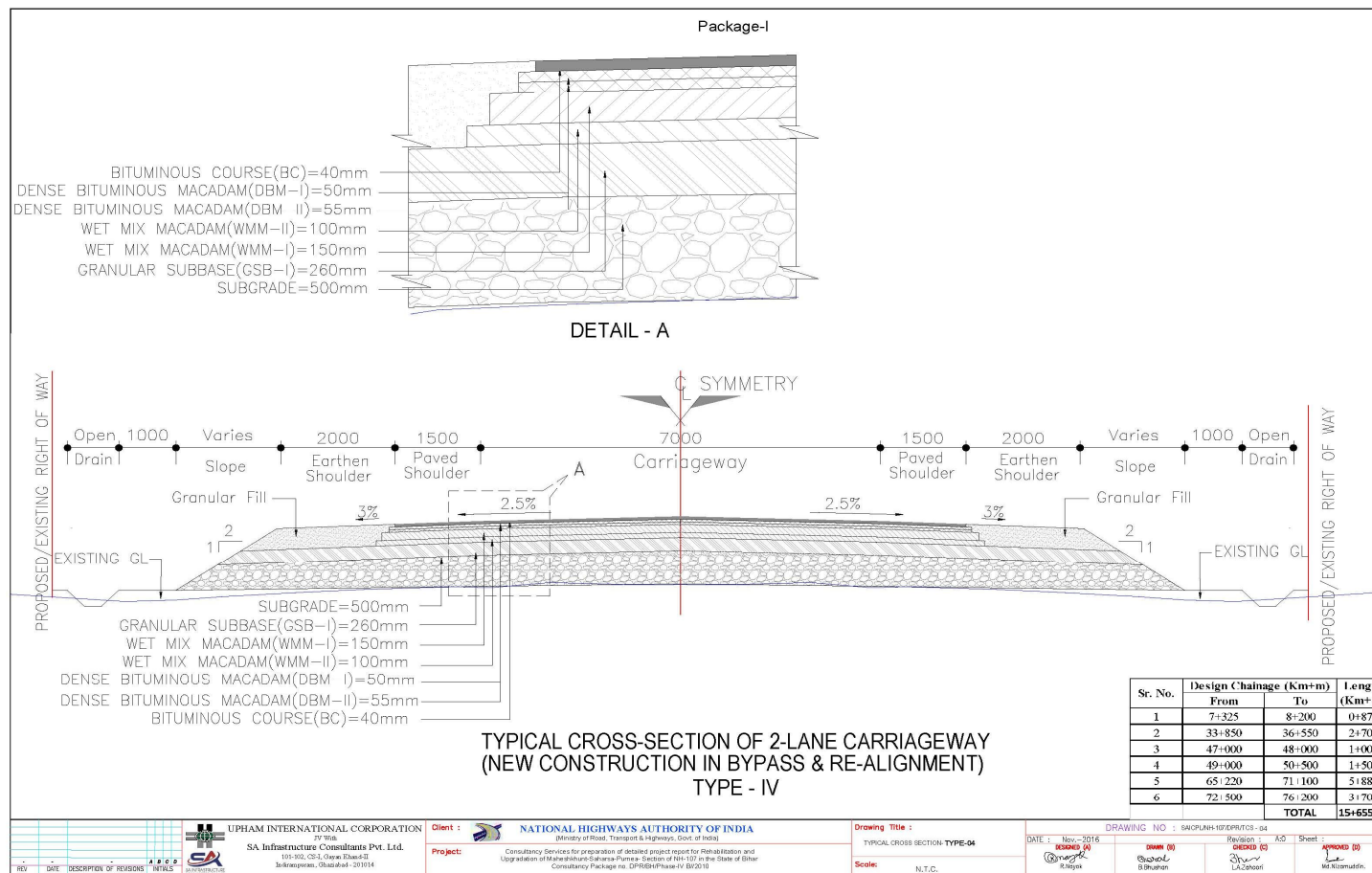


Figure 1.9

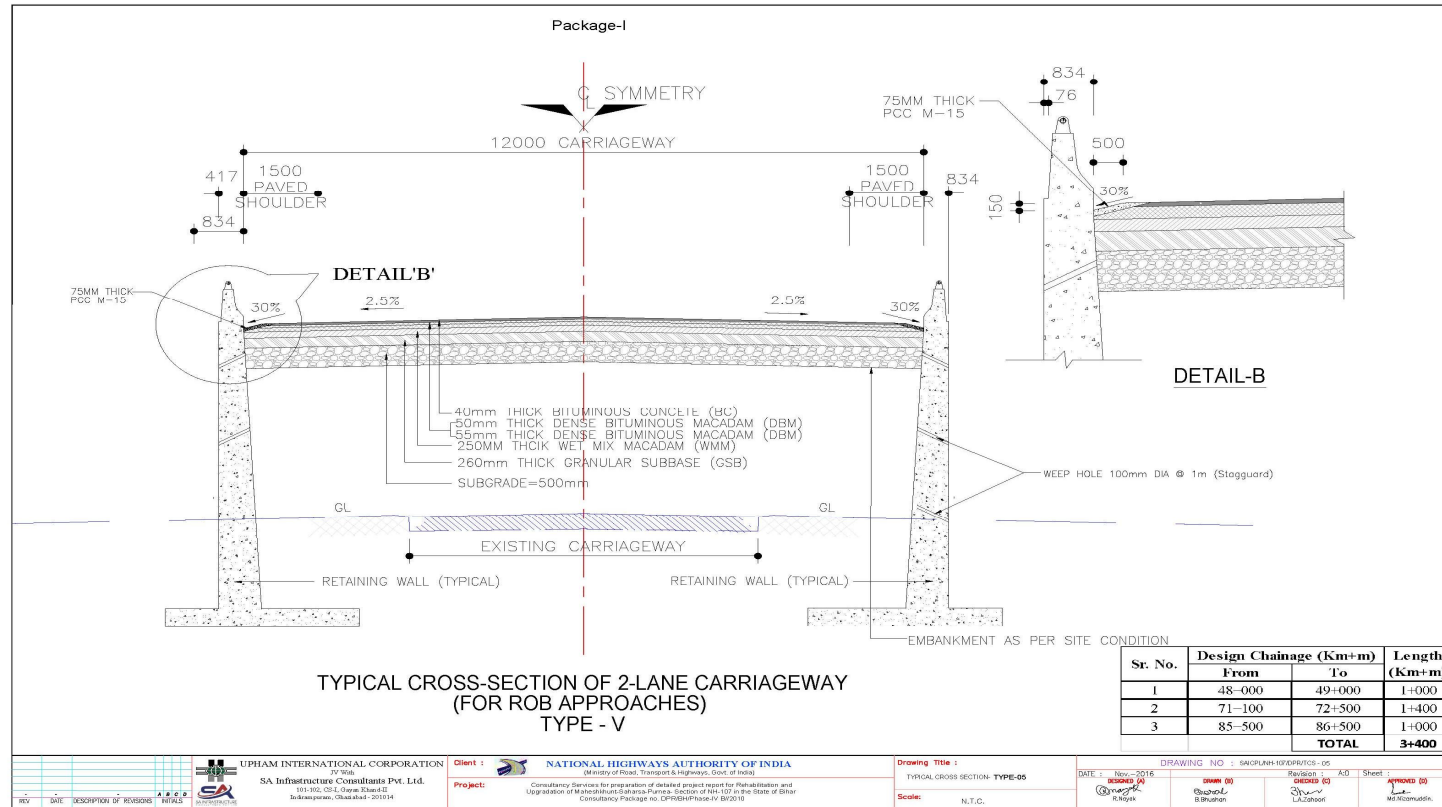


Figure 1.10

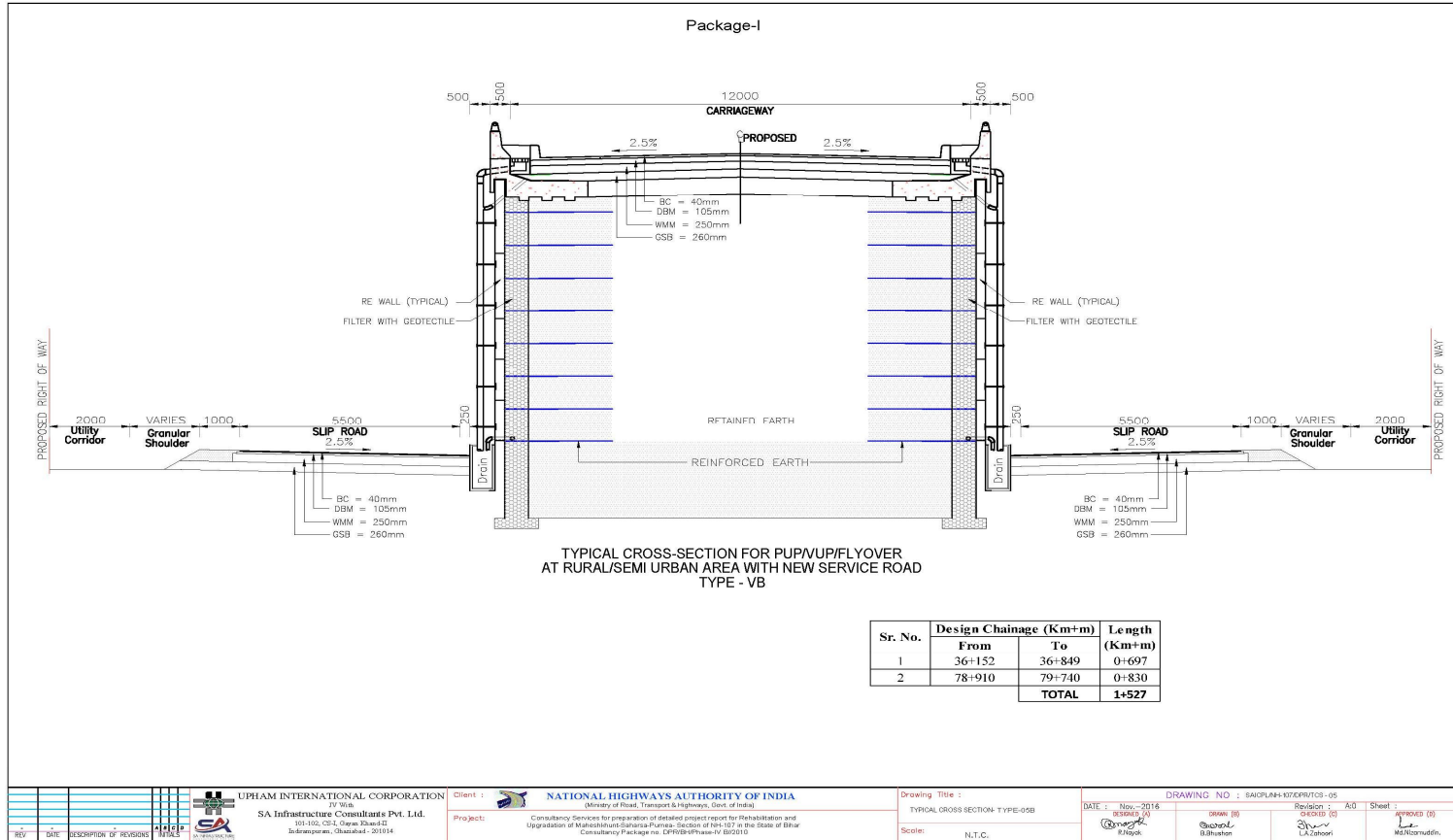


Figure 1.11

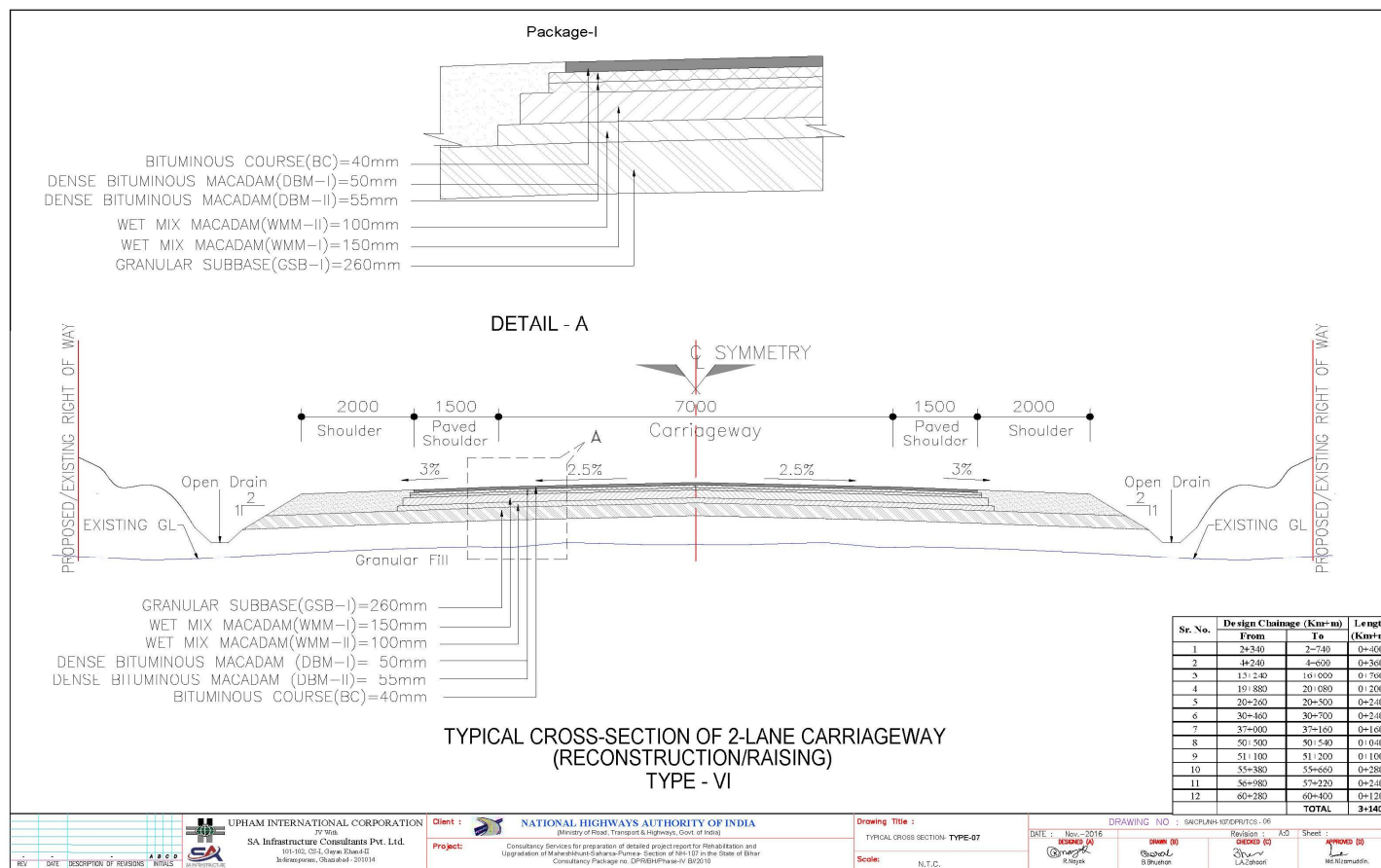


Figure 1.12

1.9 Cost Estimate

The summary of cost estimate has been revised presented below:

ABSTRACT OF COST ESTIMATE Package-I (Km 0+00 to Km 90+000) Based on SOR RCD, Bihar w.e.f 01/04/2016

Sl. NO	Items	Unit	Length (in Km)	Rate (in Rs.)	Amount (in Rs.)	Amount (in Cr.)	Annexure
A	ROAD WORKS						Annexure-I
(a)	TCS-I (A)	Km	3.600	37936907	136572866	13.657	
(b)	TCS-I(B)	Km	21.474	34618513	743397958	74.340	
(c)	TCS-I(C)	Km	2.170	39256935	85187549	8.519	
(d)	TCS-II(A)	Km	0.260	30722594	7987875	0.799	
(e)	TCS-II(B)	Km	11.450	31203532	357280447	35.728	
(f)	TCS-III(A)	Km	6.391	26545471	169652103	16.965	
(g)	TCS-III(B)	Km	21.075	27819891	586304195	58.630	
(h)	TCS-IV	Km	15.209	29492760	448555379	44.856	
(i)	TCS-V	Km	3.082	30112993	92802221	9.280	
(j)	TCS-V B	Km	1.515	73556410	111437961	11.144	
(K)	TCS-VI	Km	2.986	31687771	94619683	9.462	
	Total Road Works (A)	Km	89.21	-	2833798236	283.380	
B	BRIDGES and STRUCTURES						Annexure-I A
(a)	MAJOR BRIDGES	No.	3	-	305342968	30.534	
(b)	MINOR BRIDGES	No.	18	-	260784907	26.078	
(c)	VUP	No.	2	-	133200219	13.320	
(d)	RAIL OVER BRIDGE	No.	3	-	941518551	94.152	
(e)	Repair of Major Bridge	No.	4		7910289	0.791	
(f)	Repair of Minor Bridge	No.	4		4497987	0.450	
(g)	Box CULVERT COST	No.	73	-	255796410	25.580	
	Total Structure Works (B)		0.488	-	1909051332	190.905	
C	OTHER ROAD						

	APPURTENENCE/MISCELLENEOUS ITEMS						
(A)	TREE CUTTING						
I	Girth from 300mm to 600mm	No.	709	202.00	143218	0.014	
II	Girth from 600mm to 900mm	No.	768	389.00	298752	0.030	
III	Girth from 900mm to 1800mm	No.	92	713.00	65596	0.007	
IV	Girth above 1800mm	No.	40	1314.00	52560	0.005	
(B)	EARTHWORK						
i	Earthwork of soil (By MX Road Design)	Cum	119132 4	228.00	271621809	27.162	
ii	Earthwork for cutting (By MX Road Design)	Cum	4695.3 3	171.00	802902	0.080	
©	JUNCTIONS	No					
(i)	Major Junctions	No	3	4949984	14849952	1.485	Annexure-II
(ii)	Minor Junctions	No	40	2019476	80779026	8.078	Annexure-III
(D)	DRAINS						Annexure-IV
(i)	COVERED LINED DRAIN	Km	54.49	4425696.76	241147365.24	24.11	
(ii)	Earthen Drain	Km	125.51	73.00	9162.38	0.001	
(E)	BUS BAYS	No	12	2644685	31736216	3.174	Annexure-V
(F)	TRUCK LAY BYES	No	0	0	0	0.000	Annexure-VI
(G)	TOLL PLAZA	No /length	1/300 m	48545399	48545399	4.855	Annexure-VII
(H)	PROTECTION WORK						
(i)	Metal Crash Barrier	Rm	4010	2226	8926260	0.893	
(ii)	Boulder Pitching	Cum	10271	1996.00	20500517	2.050	
(iii)	Filter Media	Cum	5135	1438	7384705	0.738	
(iv)	Chute Drain	Cum	5135	637	3271250	0.327	

(I)	RETAINING WALL						
(i)	Retaining Wall of 2m height	Rm	870	17703.81	15402311	1.540	
(ii)	Retaining Wall of average height 4.5m	Rm	780	63172.28	49274378	4.927	
(J)	REINFORCED EARTH WALL (RE WALL)	Rm			89619420	8.962	
(K)	OTHER MISCELLANEOUS ITEMS (sign boards,rest areas, medical/traffic aid post,HTMS, ambulance,cranes etc to be listed out separately,parapet wall,turfing etc.)				109755892	10.976	
TOTAL OTHER ROAD APPURTENANCE/ MISCELLANEOUS ITEMS (C)					994186689	99.419	
TOTAL CIVIL COST (A+B+C)					5737036258	573.70	
TOTAL PROJECT LENGTH (ROAD+TOLL PLAZA) Km					90.000		
COST PER KM LENGTH					63744847	6.37	

The Ministry has sanctioned following work:

S. No.	Length (In km.)	Work	Remarks
1	Km 1 to Km 15	Period Renewal	
2	Km 16 to 30.300	PR work with 50mm BC+25 SDBC	
3	30.3 to 40	PR work with 30mm BC	Awarded but not started
4	73 to 95	IRQP with 50mm BM+ 30mm BC	Ongoing works
5	Km 15+241	B.P. Mandal Bridge sanctioned by Ministry, L-1 (Gammon India), LOA has not issued.	

The pavement composition 40 mm BC, 100 mm DBM, 250 mm WMM and 250 mm GSB is proposed to be provided in the widened portion, re-alignments and bypasses. As per BBD analysis and Pavement design, existing carriageway strengthening by WMM (100 mm) shall be

laid throughout and as a binding layer, topped throughout by DBM of 100 mm and BC of 40 mm.

Hence costing has been taken as per designed thickness. The bridge cost at Km 15+241 is not taken in cost estimate.

1.10 Lead for Material

For lead of material for Package-I

Borrowed Soil: about 5 Km along the project road

Stone Aggregate: The lead from Mirjachauki to Maheshkhunt is 122 km and from Maheshkhunt to gravity centre of the project stretch of Package I is 45 km by road.

Sand: The average lead from Kajralia to gravity centre of the project stretch of Package I is 126.00Km.

Bitumen: The average lead from Barauni and Haldia to gravity centre of the project stretch of Package I is 112 km and 644 km respectively.

Cement & Steel: The average lead from market to gravity centre of the project stretch of Package I is 53.00 Km respectively.

Bricks: The average lead is 8 km.

1.11 Economic Analysis

Economic analysis was carried out using HDM-4 software. The sensitivity analysis is carried out by varying cost and benefit as under:

1. Base costs plus 15% and base benefits
2. Base cost and base benefits minus 15%
3. Base costs plus 15% and base benefits minus 15%

The analysis has been done by changing the cost and benefit streams independently as well as in combination. The end results of this study has been presented in a series of EIRRs and NPVs. The project road is economically viable for proposed improvement as it yields more than 12% return (chapter 11).

1.12 Safety Measures

The following provisions for safety measures have been made.

1. At start of the project, the informatory sign board should be provided.
2. At the bridges, culvert and other structures, provisions for Diversion Board and Safety Ribbon, Caution Ribbon have been made.
3. On highways, provisions for diversion board to change the lane, Go Slow Board have been made.
4. In built-up areas, provisions for MS-railing, speed limit sign rumble strips and pedestrian crossing sign have been made.
5. Footpath with covered drain will be provided at built-up areas.
6. At the location of school, signboard for school, speed limit, horn please and rumble strips are provided.
7. At the location of Hospital, signboard for hospital, speed limit, no horn please and rumble strips are provided.
8. At the junctions, rumble strips and direction sign are provided.
9. At 12 nos. of locations, bus stops are provided.

1.13 Traffic Management during Construction

1.13.1 Traffic Management and Safety

The following points shall be followed with respect to safety:

- (i) Traffic Management Plan shall be site specific.
- (ii) Traffic Management Plan should include night time visibility and arrangements for pedestrians.
- (iii) Barricades should follow specifications as per IRC-55.
- (iv) Signs should be as per IRC-SP: 55/IRC-67.
- (v) 'No Passing Zone' shall be enforced at site.
- (vi) Lane marking shall be adhered in traffic worthy reach (if any).
- (vii) Dust Control measures shall be enforced.

1.13.2 Work Zone Safety

- i. The contractor should provide the PPE's to the workers at every step in construction site.
- ii. Proper plan should be formulated for identifications and emergency preparedness for safety of workers. It should be available in practice on 24 x 7 basis.
- iii. The contractor shall ensure securely covered/ fenced pits construction zone with proper warning signs.
- iv. The contractor should barricade all the work zones with proper fencing.
- v. All moving machinery must be inspected by a trained worker before being put in motion and lifting machinery must be inspected and maintained regularly.
- vi. In areas, where there are inflammable materials, there must be free routes of escape and appropriately maintained firefighting equipment
Eye protection gear must be provided to workers exposed to injury from fumes, fragments, chemicals and bright light.
Gas cylinders etc. must be kept on the trolley when in use and at demarcated places when not in use.
- vii. The contractor must ensure about covering of all electrical equipments and wiring (live and inactive) and with proper warning signs on all of them
Emergency cut-off switches and breakers must be provided at critical and accessible locations for power cut-off during emergencies.
- viii. Notice of all accidents, dangerous occurrences, injuries, disease and deaths have to be given to the Regional Officer through Project Director under intimation to Road Safety Cell of Employer and an enquiry conducted within one month and report be submitted to HQ (Employer) and Road Safety Cell.
There has to be a first aid box for every 150 workers and a permanent compounder and doctor on call with an ambulance and nurse for 500 workers.
- ix. All accidents on near-miss events must be recorded daily by the supervisor on site on a standard format and these records must be reviewed by the Safety Engineer on a daily/ weekly basis to take appropriate measures to ensure worker safety.
- x. Checking of drinking water supply should be done and arrangements for solid waste disposal system from living areas should not be overcrowded, have sufficient ventilation, washing and drying and storage facilities, along with convenient, sufficient and clean toilet facilities.

- xi. An annual Occupational Health and Safety Audit shall be conducted by an independent and competent agency. The method of conducting audit is outlined in work zone safety manual.

1.13.3 Conclusion

1. Three bypasses has been proposed to minimize the R&R cost, avoiding large nos. of destruction in densely populated market area.
2. Due to damaged bridges and poor geometry of road, motorized traffic is using alternative routes induced and diverted to this road.
3. The road is proposed to be widened in such a way to minimize the land acquisition and R&R effect.
4. Project road is economically viable and it may be taken for implementation.

1.14 RECOMMENDATIONS

Improvement of NH-107 is being proposed as “Two Lane with Paved Shoulders Configuration” under financial on EPC basis have social, Cultural and economic infrastructure benefits of huge population living in undeveloped areas along the project corridor.
