



**GOVERNMENT OF UTTARAKHAND**



**NATIONAL HIGHWAYS & INFRASTRUCTURE  
DEVELOPMENT CORPORATION (NHIDCL)**



## **ZONAL MASTER PLAN**

**DHARASHU – GANGOTRI ROAD NH-34 [OLD NH-108]**

**FOR BHAGIRATHI RIVER ECO-SENSITIVE ZONE**

**GOMUKH TO UTTARKASHI**

**FEBRUARY - 2016**

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## ZONAL MASTER PLAN [DHARASHU-GANGOTRI ROAD NH-34 (OLD NH-108)]

### 1.0 THE PROJECT ROAD

Project Road NH 108, starts from Dharasu bend (km 0.00) i.e. at the junction with NH 94 and ends at Gangotri (km 124.00). But presently as per new numbering of National Highway, NH 108 has been renamed as National Highway 34 which originates from Gangotri. Existing km stones also renamed as NH 34, chainage started from Gangotri (km 0) and continued towards Dharasu.

**For project preparation chainage is considered as per existing stones of NH 34, i.e km 0.0 at Gangotri and proceeding towards Dharasu. The project road entirely comes under Uttarkashi district.**

Project road passes through Built-up area Gangotri, Harsil, Gangnani, Bhatwari, Maneri, Netala, Gangori, Uttarkashi, Matli , Dunda and finally end at Dharasu. The project road mainly follows Bhagirathi river from start to end. The project Road key plan is given under *Fig. 1*



**Fig.1: Project Road Key Plan**

### 2.0 MOEF NOTIFICATION FOR ECO-SENSITIVE ZONE

Ministry of Environment and Forest, Notification, dated 18/12/2012 notifies entire watershed of about 100 km stretch of the river Bhagirathi from Gaumukh to Uttarkashi covering an area of 4179.59 sq.km as Eco-sensitive Zone. Accordingly a Master Plan shall be prepared for the proposed development within Eco-sensitive zone and to be presented to Monitoring Committee. As part of master plan, proposal for Dharasu – Gangotri Road project is prepared.



The project road alignment broadly follows the banks of Bhagirathi river from start to end. Project road in Eco-sensitive zone is shown in Fig.2.



Fig. 2: Project road in Eco-sensitive zone

## APPLICABLE CLAUSES OF NOTIFICATION FOR HILL ROADS

Applicable clauses of notifications for hill roads are studied in detail and compliance / a provision made in the project report preparation for each of the clause is described below:

### 2.1 Construction Of Road More Than 5km Length In Eco Sensitive Zone.

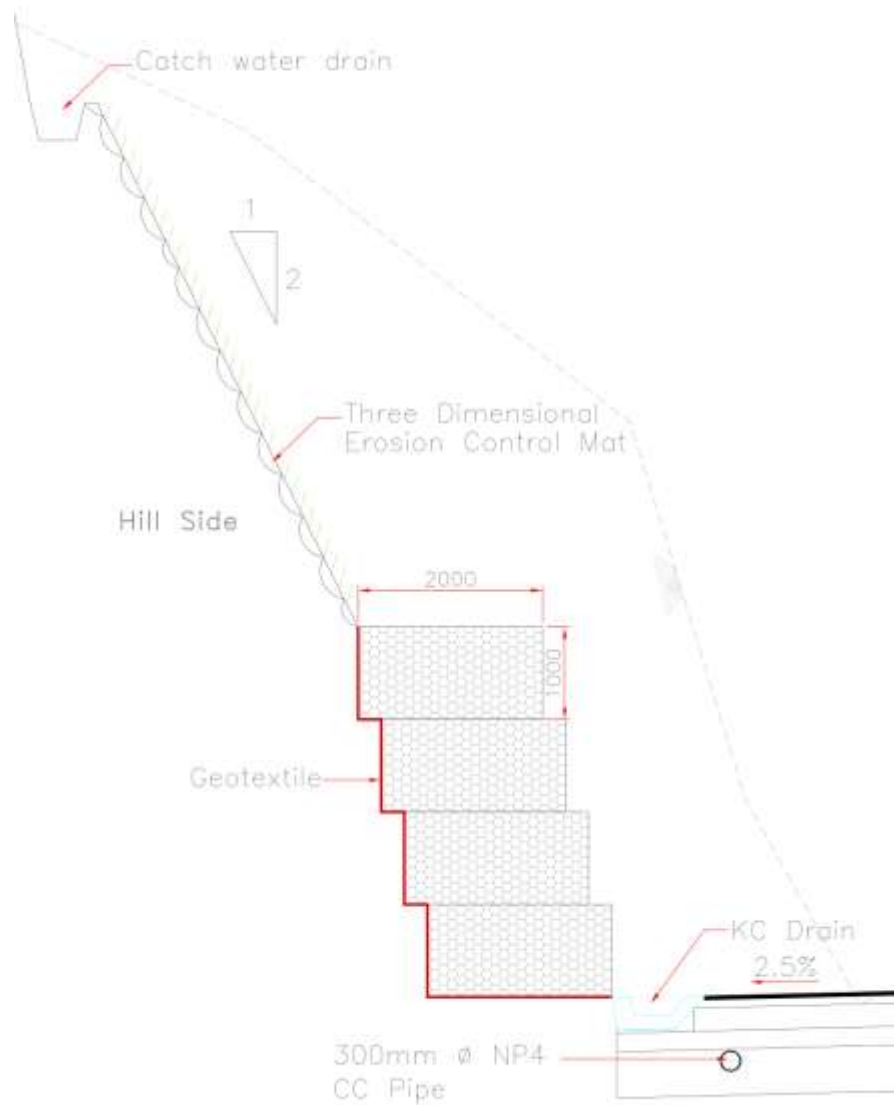
Page No.	Clause No.	Guidelines	Compliance
29	19 (i)	Applicable for construction of road more than 5km length in Eco-sensitive Zone	Approx. 94 km length from Gangotri to Uttarkashi falls in Eco- sensitive Zone

### 2.2 Provision in the design of the road for the treatment of Hill roads.

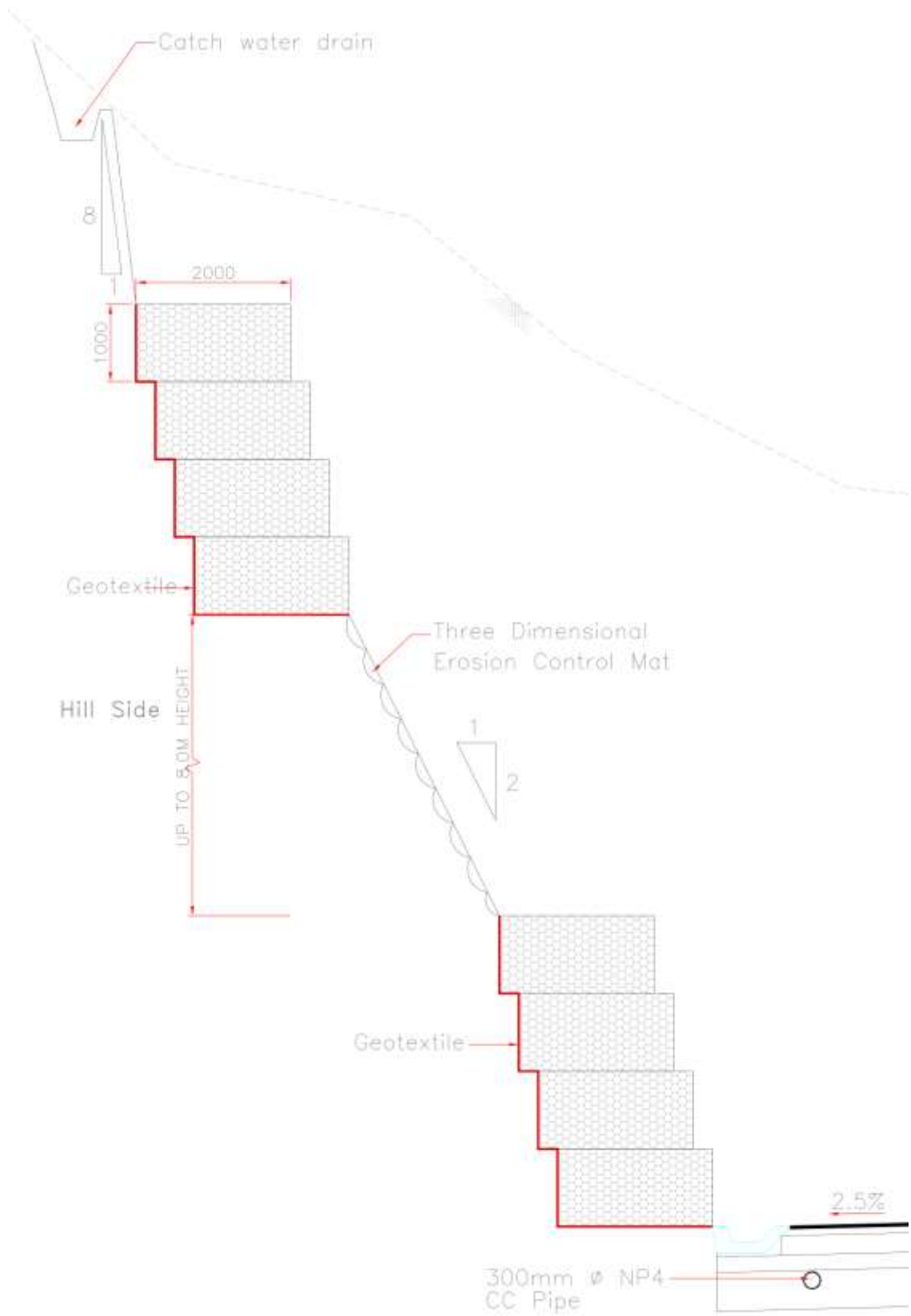
Page No.	Clause No.	Guidelines	Compliance
29	19(ii)	Provision shall be made for treatment of hill slope and cost of such protection measures should be included in the cost estimate of the proposed road.	For hill cut slopes various types of protection works (based on type of soil and height of cut) including bio-engineering is proposed and the same is included in the

Page No.	Clause No.	Guidelines	Compliance
			estimate. A typical arrangement for protection of slopes with height 10m and beyond 10m are given below.

Provision is made in design for protection of hill slope with breast wall and three dimensional erosion control mat for height up to 10m as below:



Provision is made in design for protection of hill slope with breast wall and three dimensional erosion control mat for height more than 10m as below:



### 2.3 Use of debris in the construction of road and provision for disposal of unused debris

Page No.	Clause No.	Guidelines	Compliance
	19 (iii)	The debris shall be subsumed in the road construction and provision shall be made for disposal of unused debris.	<p>Hard rock obtained from road cutting shall be reused for construction of retaining wall, breast wall and crushing aggregate (if suitable) shall be used for road and bridge works.</p> <p>Soil and soft rock obtained from road cutting shall be reused in filling portion of project road.</p> <p>For disposal of surplus material, 26 no. of dumping zone have been identified along the project highway by making joint site visit with forest officials.</p>

#### Location of Dumping Zones

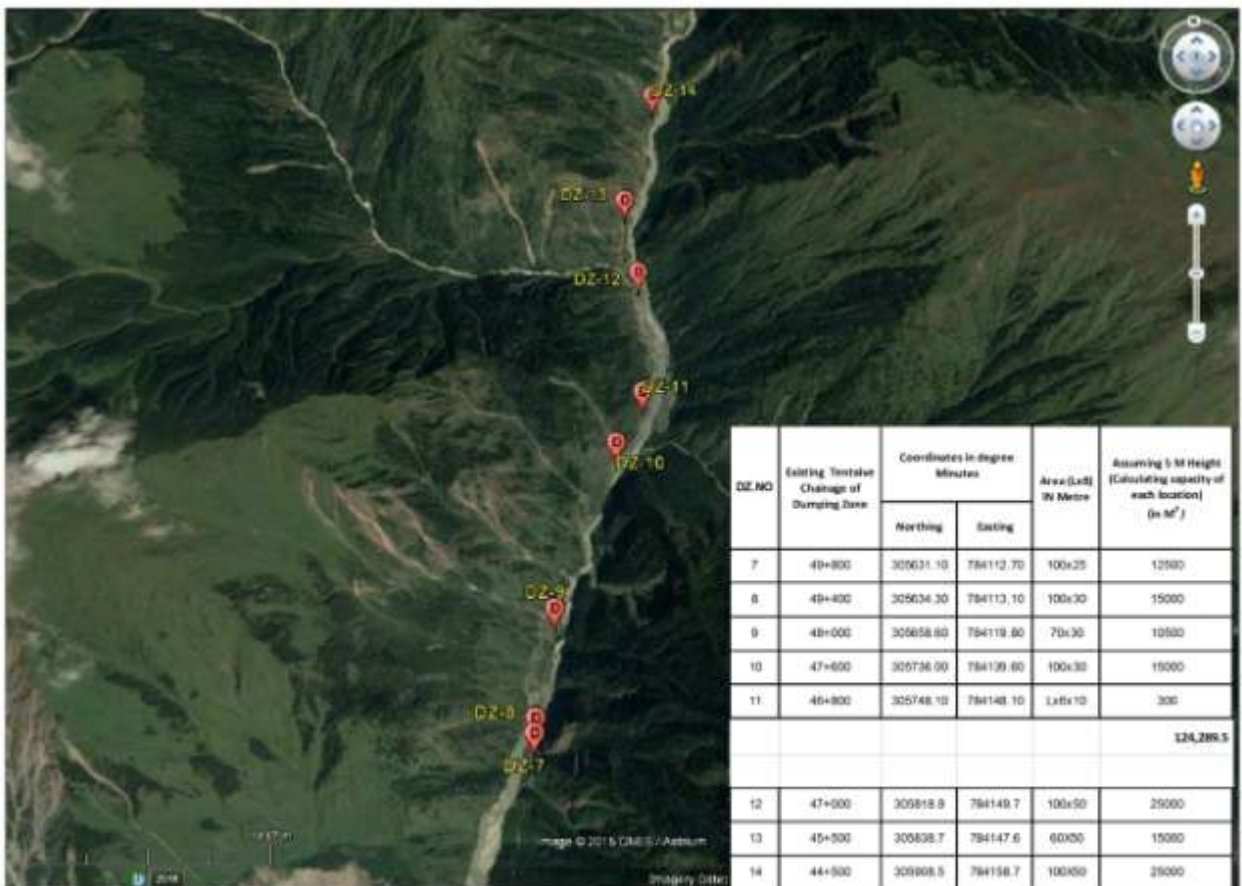
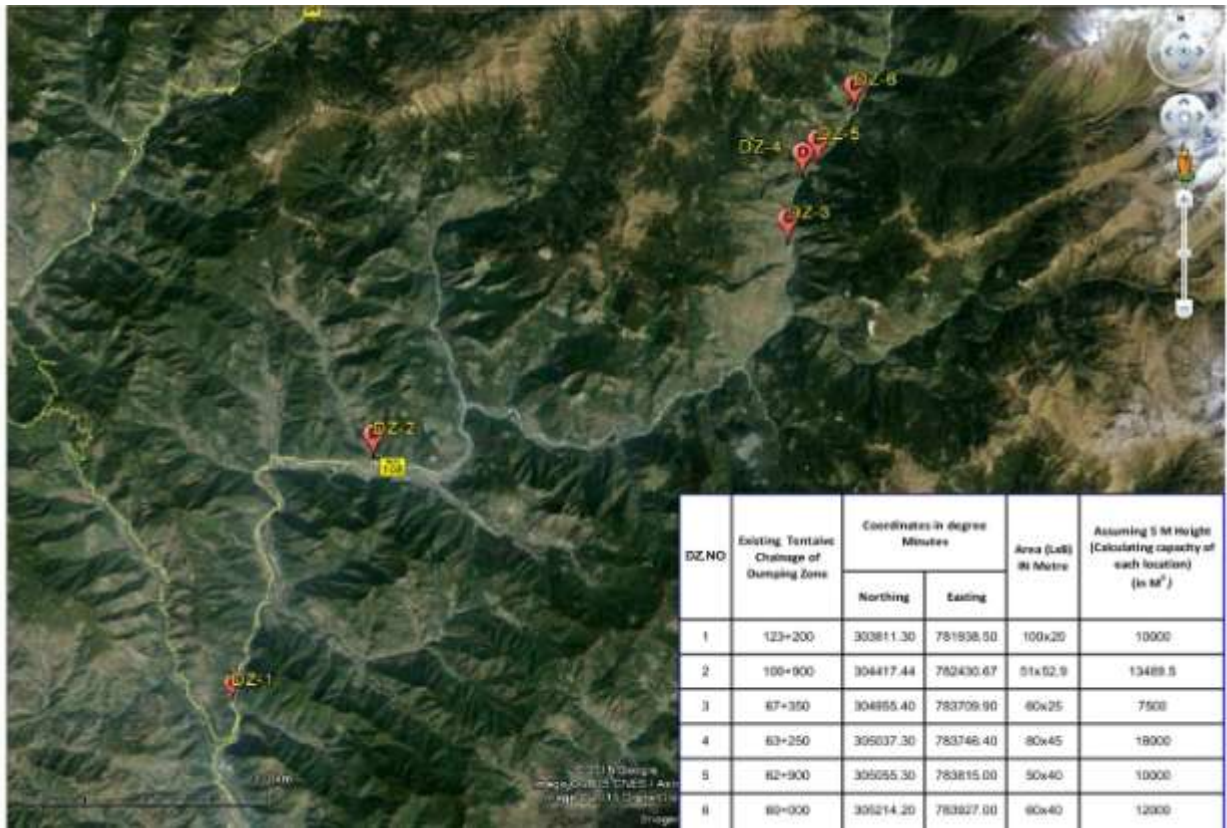
Details of identified dumping zones and its details are given below:

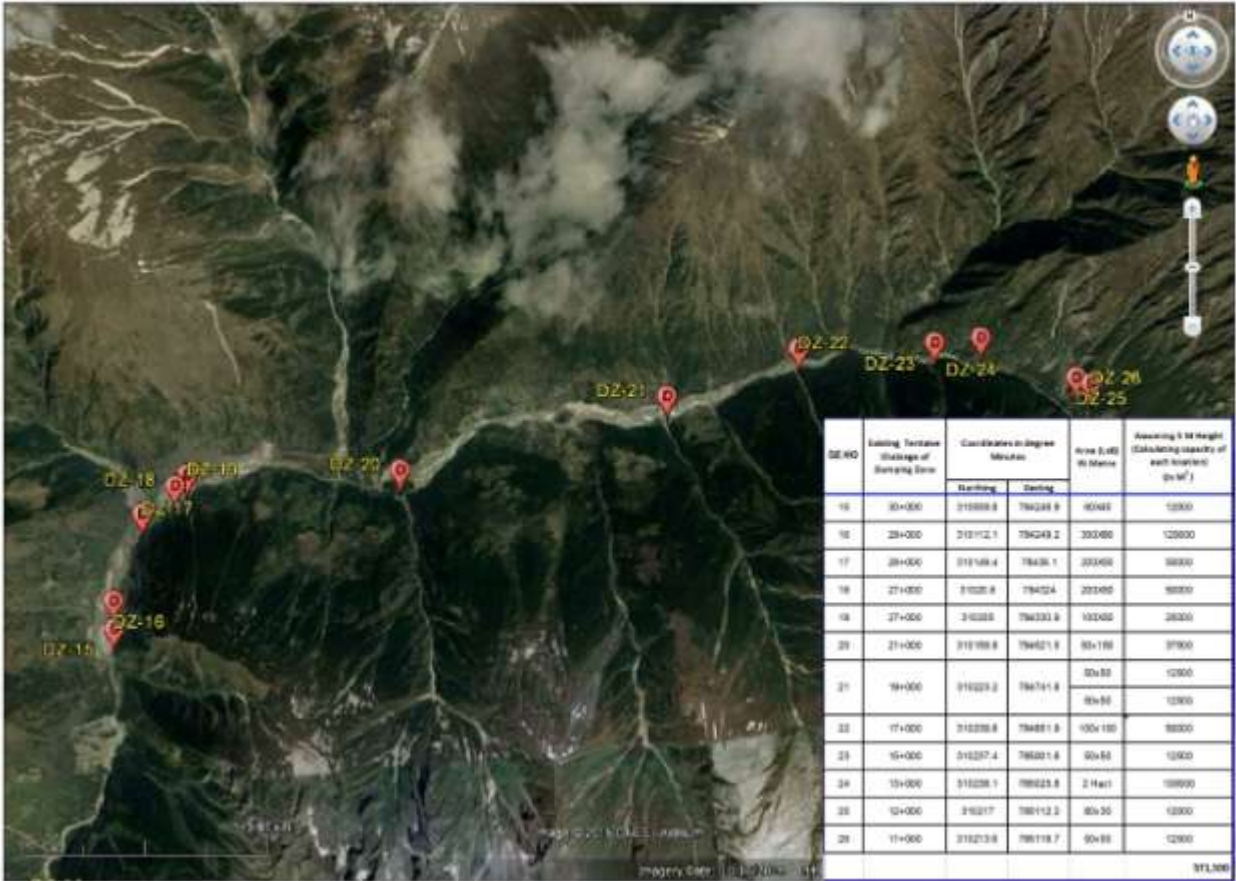
S.NO	Existing Tentaive Chainage of Dumping Zone	Coordinates in degree Minutes		Area (LxB) IN Metre	Assuming 5 M Height (Calculating capacity of each location) (in M <sup>3</sup> )	Legal Status of Land
		Northing	Easting			
1	123+200	303811.30	781938.50	100x20	10,000.0	Reserve Forest
2	100+900	304417.44	782430.67	51x52.9	13,489.5	Civil+Patta
3	67+350	304855.40	783709.90	60x25	7,500.0	Civil
4	63+250	305037.30	783746.40	80x45	18,000.0	Reserve Forest
5	62+900	305055.30	783815.00	50x40	10,000.0	Reserve Forest+NTPC
6	60+000	305214.20	783927.00	60x40	12,000.0	Reserve Forest+NTPC
7	49+800	305631.10	784112.70	100x25	12,500.0	Reserve Forest
8	49+400	305634.30	784113.10	100x30	15,000.0	Reserve Forest
9	48+000	305658.60	784119.80	70x30	10,500.0	Reserve Forest+NTPC
10	47+600	305736.00	784139.60	100x30	15,000.0	Reserve Forest+NTPC

S.NO	Existing Tentaive Chainage of Dumping Zone	Coordinates in degree Minutes		Area (LxB) IN Metre	Assuming 5 M Height (Calculating capacity of each location) (in M <sup>3</sup> )	Legal Status of Land
		Northing	Easting			
11	46+800	305748.10	784148.10	Lx6x10	300.0	NTPC Tunnel
12	47+000	305818.9	784149.7	100x50	25000	NTPC
13	45+500	305838.7	784147.6	60X50	15000	Reserve Forest
14	44+500	305908.5	784158.7	100X50	25000	Reserve Forest+NTPC
15	30+000	310059.8	784248.9	60X40	12000	Reserve Forest
16	29+000	310112.1	784249.2	300X80	120000	Reserve Forest
17	28+000	310149.4	78436.1	200X50	50000	Reserve Forest
18	27+000	31020.8	784324	200X50	50000	Reserve Forest
19	27+000	310205	784330.9	100X50	25000	Reserve Forest
20	21+000	310159.9	784521.5	50x150	37500	Reserve Forest
21	19+000	310223.2	784741.8	50x50	12500	Reserve Forest
				50x50	12500	
22	17+000	310239.8	784851.9	100x100	50000	Reserve Forest
23	15+000	310237.4	785001.6	50x50	12500	Reserve Forest
24	13+000	310238.1	785025.8	2 Hact	100000	Reserve Forest
25	12+000	310217	785112.2	80x30	12000	Reserve Forest
26	11+000	310213.6	785118.7	50x50	12500	Reserve Forest



## Location of Dumping on satellite Images





**2.4 Provision of Road Side Drains, Alignment of Road, mass balancing of cut and fill.**

Page No.	Clause No.	Guidelines	Compliance
30	19(iv)	All roads shall be provided with road side drains and shall be connected with the natural drainage system.	Keeping in view of efficient drainage Kerb & Channel drain has been proposed along hill side drains which shall be connected to adjoining culverts. In addition to existing culverts, 104 no. of new culverts has been proposed. Also catch water drains have been proposed on top of cut section to avoid flow of water through the cut slopes.
	19(v)	Alignment shall be selected so as to minimize loss of vegetal cover.	This issue is addressed by utilisation of existing formation width to the maximum possible extent. At constrained locations formation width of 10 m with safety provision has been proposed instead of 12m.
	19(vi)	Appropriate design standards shall be followed balancing cut and fill avoiding unnecessary cut.	Existing road is passing along banks of Bhagirathi river with one side river and one side hill.  The option available to widen the road is by cutting the hill with best utilisation of

Page No.	Clause No.	Guidelines	Compliance
			<p>existing formation width. Therefore surplus material from hill cut is more than the earth required for filling.</p> <p>However attempts are made to utilise the cut materials wherever feasible like use of hard rock for construction of retaining wall, breast wall, concrete and surplus material shall be dumped at pre-defined dumping zones</p>

## 2.5 Fault zone and land slide zones.

Page No.	Clause No.	Guidelines	Compliance
	19 (vii)	Fault zone and land slide zone shall be given.	Detailed geological study of the project road has been carried out and special protection work is proposed for major land slide locations as detailed here below.

### 2.5.1 Major Landslide Locations

Sl.No.	Location	Existing Chainage of NH 34	Remarks
1	Sukhi Top – 4 Nos	37 - 42	These slides are bypassed under Sukhi Top Realignment section
2	Gangnani	55 - 56	
3	Bhatwari	67 - 68	
4	Malla	72 - 74	
5	Bishanpur	78 - 79	
6	Laldang	79 - 80	
7	Netala	87 - 88	These slides are bypassed under Netala and Garampani realignment section
8	Ganeshpur	90 - 91	
9	Garampani	92 - 93	
10	Bareti	100 - 101	
11	Nalupani	123 - 124	

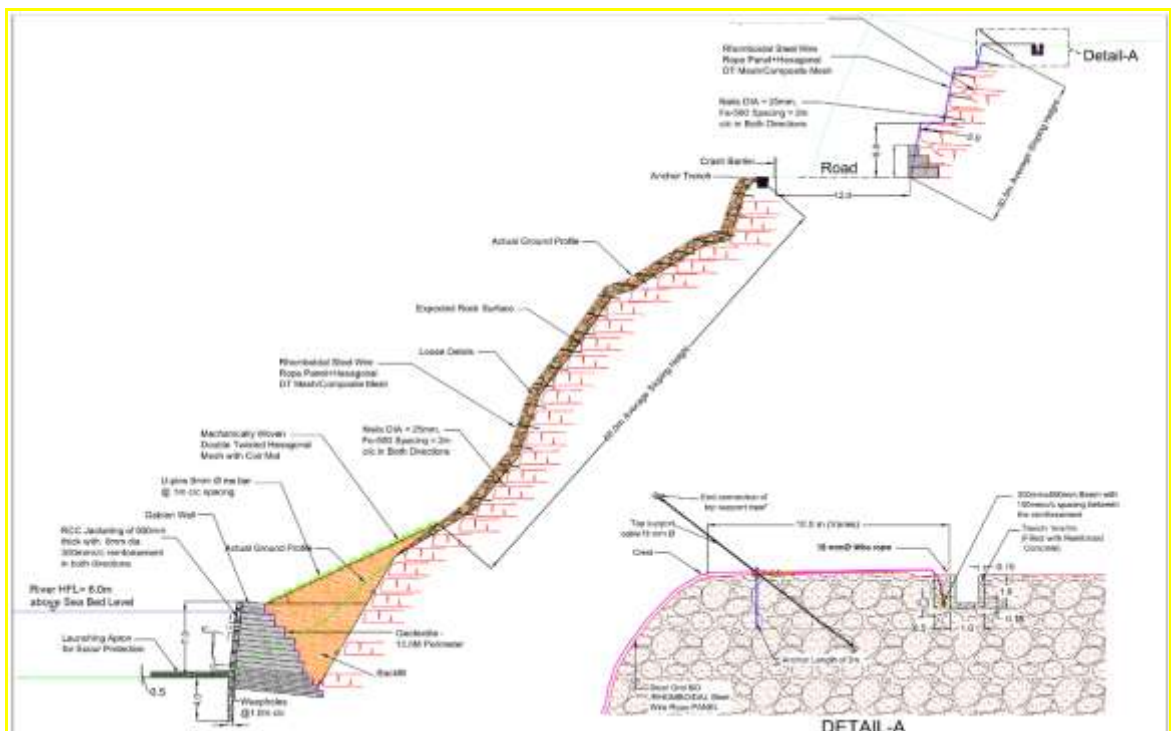


Special protection arrangement is proposed for all major slides and included in Cost Estimate of Project Road. As a sample proposed protection work for Baretí landslide is given below:



**View of Landslide at Baretí**

Typical Arrangement of Proposed Protection for Landslide at Baretí



Page No.	Clause No.	Guidelines	Compliance
33	3 (b) (vii)	Defense installation and any other infrastructure development related to National security.	This project is in the category of “Regulated activities in the Eco-sensitive zone”. The project highway has strategic importance being major connectivity to the Indo-China Border.

## 2.6 Summary of Provisions Made in Design of Project Road to meet the Guidelines of Notification on Eco –Sensitive Zone

- Hill cut slopes prone to slide (other than rock strata) are protected by Breast Wall and three dimensional erosion control mate.
- Special type of protection work is made for major landslide locations.
- Catch water drain is proposed on top of cut portion to avoid flow of water in cut surface.
- K C drain is proposed on hill side of road for proper drainage.
- Drains are connected to natural streams and culverts.
- Provision is made for utilization of cut materials to the extent possible.
- For disposal of surplus earth, Dumping Zones are already identified throughout the project road along with official of Forest Department.
- For pedestrians footpath is proposed in built-up stretches.
- Utility ducts with chambers are provided to avoid unnecessary excavation by various agencies.
- Cost of all proposed items are included in the Cost Estimate of Project Road.
- Proposal for Wildlife Clearance of Gangotri National Park already submitted

### 2.6.1 Benefits of the project

Following benefits are envisaged from the project:

- ❖ Reduction in travel time
- ❖ Reduction in Vehicle Operation Cost
- ❖ Enhanced Safety
- ❖ Reduction in pollution
- ❖ Increase in Tourism activities

### 2.6.2 Cost Benefits Ratio

The cost benefit analysis is has been carried out within the broad framework of social cost-benefit. This will provide more affordable public transportation. The housing in transit-oriented neighbourhoods improves accessibility for lower-income households. Based on project cost and above benefits cost benefit ratio has been worked out summary of the same is given below:



### Total project Cost

Item		Amount (Rupees)	Amount (Rupees Cr.)
<b>A</b>	<b>Total EPC Cost</b>	<b>8,39,29,76,779</b>	<b>839.30</b>
B	Cost of Land Acquisition	21,38,88,675	21.4
C	Cost of R & R	23,24,70,000	23.25
D	Cost of Environmental Mitigation Plan	26,80,36,468	26.80
<b>Total Project Cost (TPC)</b>			<b>910.75</b>

Cost Benefit Analysis			
S. No.	Parameters	Details of Benefits	Amount (in ₹ Cr.)
1	Travel Time	<ol style="list-style-type: none"> <li>1. Travel time will decrease</li> <li>2. Improved flow of traffic</li> <li>3. Better transportation of goods</li> <li>4. Reduces congestion and delays as total project length is reduced by 14 Km due to provision of bypass and short realignment</li> </ol>	648.00
2	Vehicle Cost	<ol style="list-style-type: none"> <li>1. Less fuel consumption for travel</li> <li>2. No/less Potholes reduces vehicle wear</li> <li>3. Curve radius increases, travel speed increases</li> <li>4. Vehicle operating cost reduces</li> </ol>	100.20
3	Safety	<ol style="list-style-type: none"> <li>1. Sharp curve in a road is decreased</li> <li>2. Safety to human life &amp; health</li> <li>3. No/less land slides provide safe travel due to specialized protection work, land slides are avoided and risk of human life is decreased</li> </ol>	120.00
4	Gas Emission and Induced Travel	<ol style="list-style-type: none"> <li>1. Less congestion cause less air pollution</li> <li>2. Better public transportation (like volvo buses, vanpool etc.) decreases private vehicles</li> <li>3. More trips will be made due to improved facilities &amp; less travel time</li> <li>4. Frequent road blockages are avoided, hence improved connectivity to Gangotri</li> </ol>	18.00
5	Economic Effects and Local/Regional Impacts	<ol style="list-style-type: none"> <li>1. Increased tourism due to better transport service</li> <li>2. Increased workers/ employee/ labour access</li> <li>3. Supplies and logistics can be sent more</li> </ol>	182.40

<b>Cost Benefit Analysis</b>			
<b>S. No.</b>	<b>Parameters</b>	<b>Details of Benefits</b>	<b>Amount (in ₹ Cr.)</b>
		efficiently and effectively 4. Effective mobility/ transportation facilities helps in developing more trade 5. Due to bypass provision, more villages are connected by road 6. Significantly enhances the visual effects of the locations	
<b>Total Cost Benefit</b>			<b>1068.60</b>
<b>B.C. Ratio</b>			<b>1.17</b>

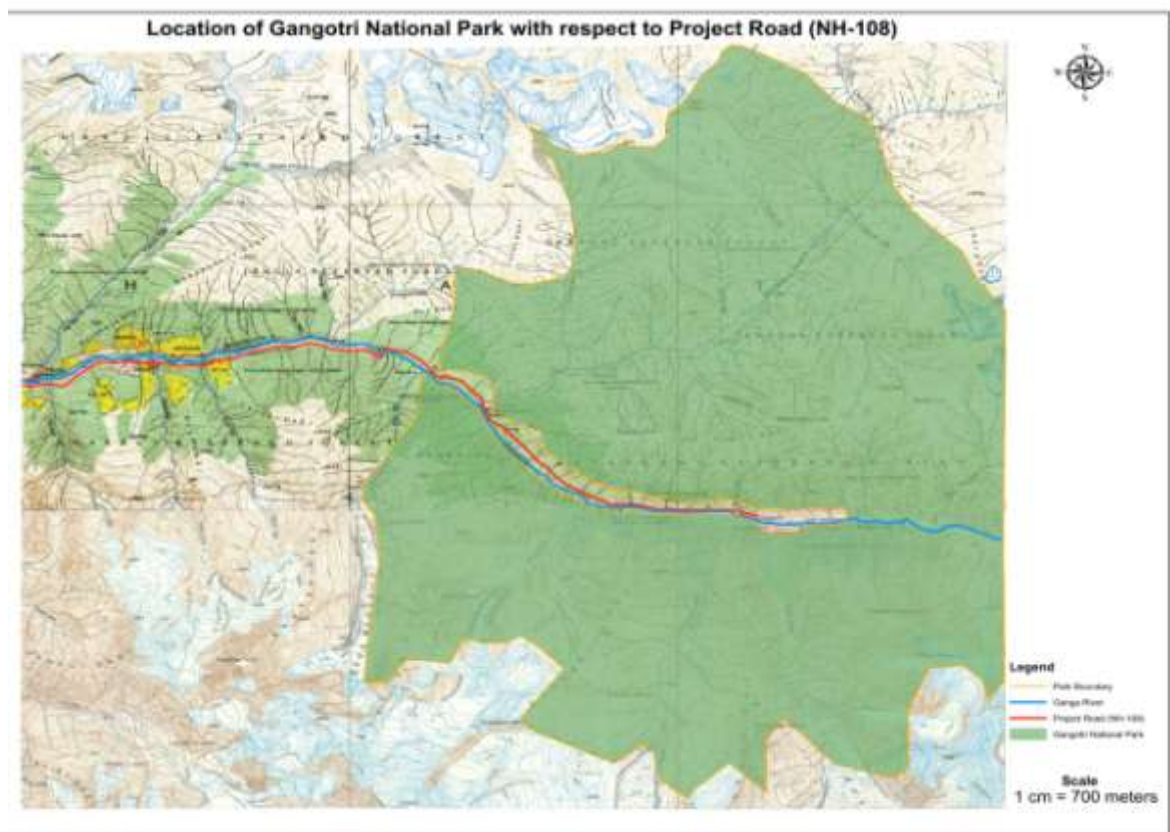
## 2.7 OTHER PROJECT ROAD DETAILS

### 2.7.1 PROJECT ROAD IN BUFFER ZONE OF GANGOTRI NATIONAL PARK

A section of the project road from Gangotri (km 0.00) to Uttarkashi (Km 94.0) is falling in Eco-sensitive zone.

A section of the project road from Gangotri (km 0.0) to Bhairoghathi (km 9.0) is in buffer zone of Gangotri National Park situated at Gangotri

The project road near Gangotri is traversing at distance of 200 m from buffer zone of Gangotri National Park. The Gangotri National Park (Latitude 78°45' to 79°02' East and Longitude 30°50' to 31°12' North) is located in the upper catchment of Bhagirathi river near Gangotri. Project road in in buffer zone of Gangotri National Park is shown in *Fig.3*



**Fig. 3: Project Road from Gangotri – Bhairoghathi (9.0 km) is in buffer zone of Gangotri National Park**

**Proposal for Wildlife Clearance already prepared and uploaded online in MoEF official Website.**

### 2.7.2 SOCIO-ECONOMIC CHARACTER ALONG THE ROAD

The preliminary assessment of land use pattern along the project corridor is presented in Table below. This indicates that the distribution of length of Project road and percentage Length in terms of land use and roadside environments:

### Type of Land Use

Sl. No.	Land use Pattern	Length (km)	% of Length
1	Urban/Built-up	22.6	18
2	Agricultural Land	3.00	2
3	Hiil / Forest Area	98.40	80
	<b>Total</b>	<b>100Km</b>	<b>100%</b>

#### 2.7.3 ENGINEERING SURVEYS, INVESTIGATIONS AND ANALYSIS

The Salient features in respect of the major field studies and investigations were taken up to determine the rehabilitation / construction requirements for the Project Road. Following are the various engineering surveys and investigations other than traffic surveys.

- Inventory and Condition Survey of Road and Pavement;
- Topographic Survey;
- Pavement Investigations;
- Sub-grade investigations
- Materials Investigations;
- Axle Load Surveys
- Inventory and Condition Surveys of Bridges and Culverts
- Hydrological and Hydraulic Investigations and
- Geo-technical investigations for Bridges and Structures

#### 2.7.4 Existing Road Details

The project road section comprises of varying carriageway width consisting of Single Lane, Intermediate Lane and Two Lane along with 0.5m to 1.5m varying width of earthen shoulder on both side of the project road. Few stretches, earthen shoulder does not exist along the road. The summary of existing road section with respect to the width is given below:

#### Lane Width Summary

Lane Configuration	Length (Km)	Percentage (%)
<b>Damaged Road</b>	8	6%
<b>SL</b>	107	86%
<b>IL</b>	1.2	1%
<b>2L</b>	7.8	6%
<b>Total, Km</b>	124	100%

## 2.7.5 TRAFFIC

Traffic in terms of PCU on project highway section of the NH-108 / NH-34 at the base year 2013-14 at km 114 and km 91+000 of NH-34 is 1546 and 829 PCUs respectively for all vehicles including tolled, Non-tolled & Exempted vehicles. The forecasted traffic in terms of PCU is presented in table below.

Projected traffic at constant 5% annual growth rate is given below:

### Traffic Projection

As per Calculated Growth Rate			Assuming 5% Growth Rate			Composition/ Remarks	Year
km 9.8	km 91.0	Average	km 114	km 91	Average		
1546	829	1188	1546	829	1188	Base Year	Year 2014-15
2002	1097	1549	1973	1059	1516	Year 5	Year 2019-20
2496	1395	1946	2519	1351	1935	Year 10	Year 2024-25
3073	1751	2412	3215	1724	2469	Year 15	Year 2029-30
3792	2199	2996	4103	2201	3152	Year 20	Year 2034-35
5813	3481	4647	6683	3585	5134	Year 30	Year 2044-45

As per para 3 of MoRTH circular No. NH-14019/6/2012-P&M, dated 05/10/2012 and as desired by NHIDCL proposed configuration of the project road is two lanes with paved shoulders.

## 2.7.6 Design Chainage System

As per new NH change system, design change system is started from Gangotri end and preceded towards Dharasu. There are two major realignments proposed at Sukhi Top and Netala & Garampani. Based on the realignment project road is divided in 5 sections. The section details are given below along with respective existing chainage.

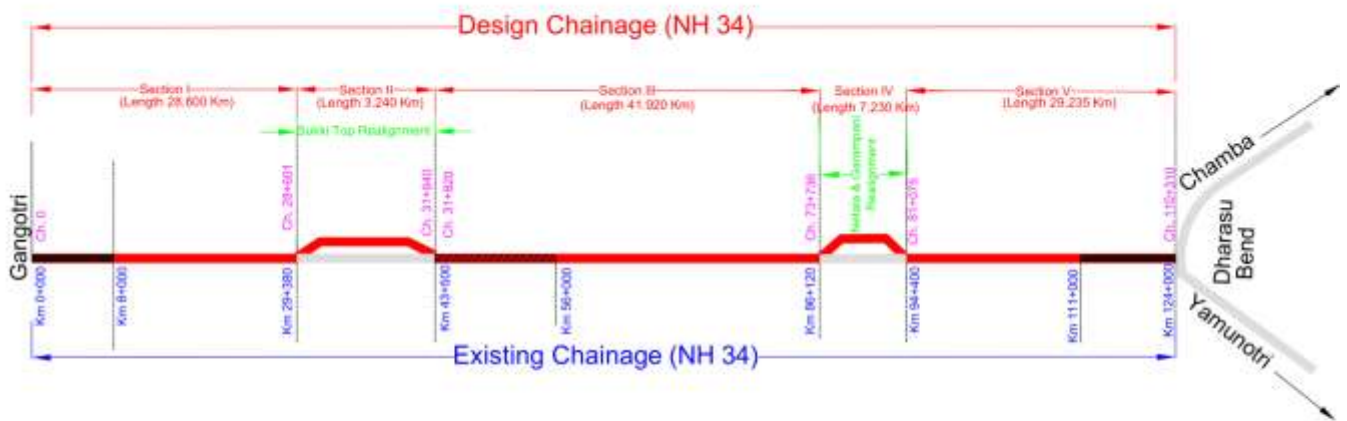
### Details of Project Road Sections

Section #	From	To	Existing Chainage (NH 34)		Design Chainage (km)		Design Length (km)
			From	To	From	To	
I	Gangotri	Start of Sukhi top bypass	0.00	29.30	0.00	28.60	28.60
II	Sukhi top Realignment		29.30	43.0	28.60	31.84	3.24
III	End of Sukhi top bypass	Start of Netala bypass	43.0	86.4	31.82 (Break in chainage-20m difference)	73.73	41.91



Section #	From	To	Existing Chainage (NH 34)		Design Chainage (km)		Design Length (km)
			From	To	From	To	
IV	Netala & Garampani Realignment		86.4	94.0	73.73	81.80	8.07
V	End of Netala bypass	Dharasu bend	94.0	124.0	81.80	110.31	28.51
<b>Total</b>							<b>110.33</b>

Graphical representation of the project road sections is given below:



Line diagram showing project road sections

LEGEND:-

1	PROJECT ROAD	
2	EXISTING ROAD	
3	UNDER CONSTRUCTION BY BRO	
4	ESTIMATE SANCTIONED IN ANNUAL PLAN 2015-2016 FOR EXECUTION BY BRO	

## 2.7.7 IMPROVEMENT PROPOSAL AND DESIGN

In addition to detailed reconnaissance, Consultant met officials of Border road Organization (BRO) and took information's regarding various problems encountered in the project road stretch and their suggestions are noted carefully for further study.

Alignment improvements are classified under two categories as under:

- Major Realignments
- Geometric Improvements

Major realignments are proposed at the following locations

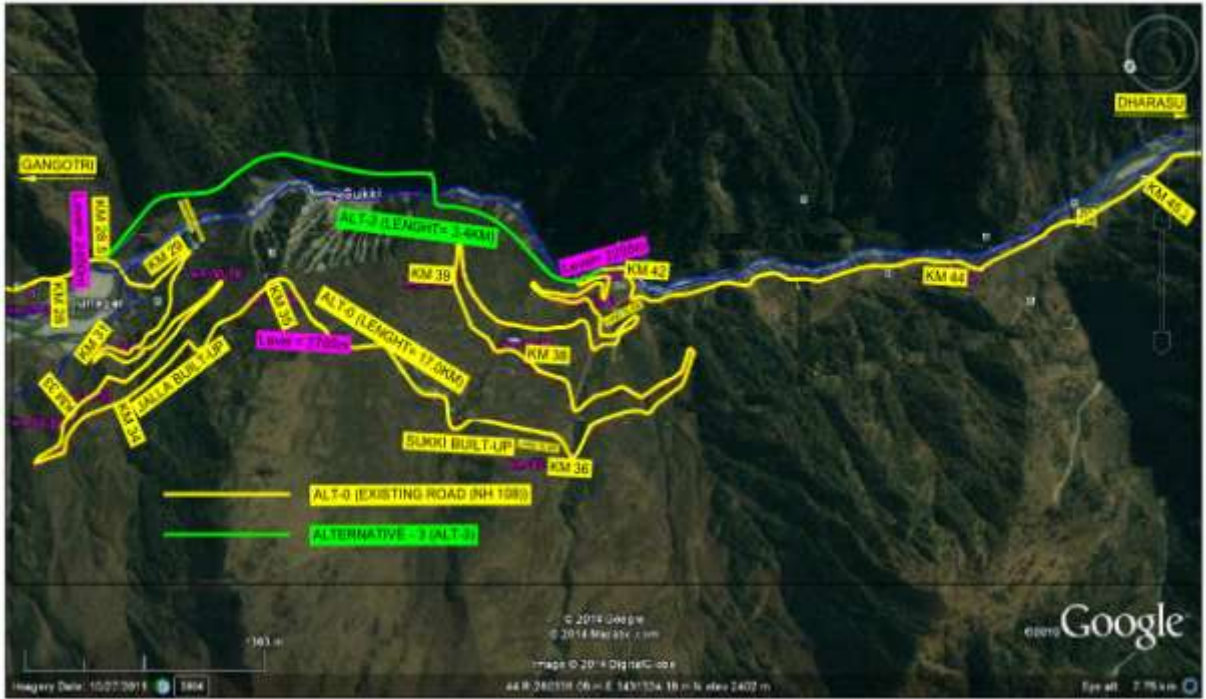
### Proposed Major Realignments

Sl. No.	Location				Existing length realigned (km)	Length of Proposed Realignment (km)	Name of village	Remarks / necessity for realignment
	Existing Chainage as per NH 34		Existing Chainage as per NH 108					
	From	To	From	To				
1	29.5	42.5	81.5	94.5	13.0	3.4	Sukhi Top	Poor geometrics with hairpin bends, steep gradient and existing alignment gradient ascending to peak point (Sukki top) and descending again.
2	86.0	94.4	29.6	38	8.4	7.6	Nethala and Garampani	Major land slide at Nethala and existing road at Garampani completely washed away during 2013 disaster.
					21.4		Total	

#### **SUKKI TOP REALIGNMENT**

Necessary for realignment at Sukki top

- Poor horizontal geometry with sub-standard hairpin bends & sharp curves.
- Landslides at stream crossings
- Major bridge (Jhala bridge) at km 29+800 is in poor condition and require reconstruction.
- Realignment length is 10 km shorter than existing road

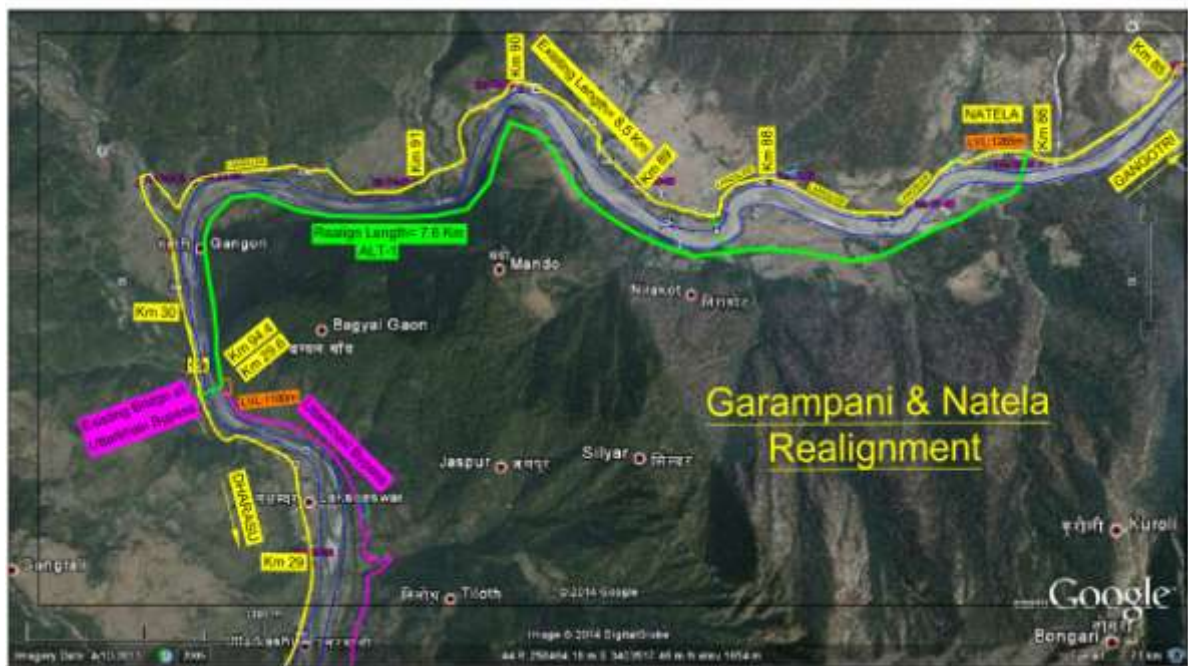


**Sukhi top realignment**

**NETALA & GARAMPANI REALIGNMENT**

Necessary for Netala & Garampani Realignment

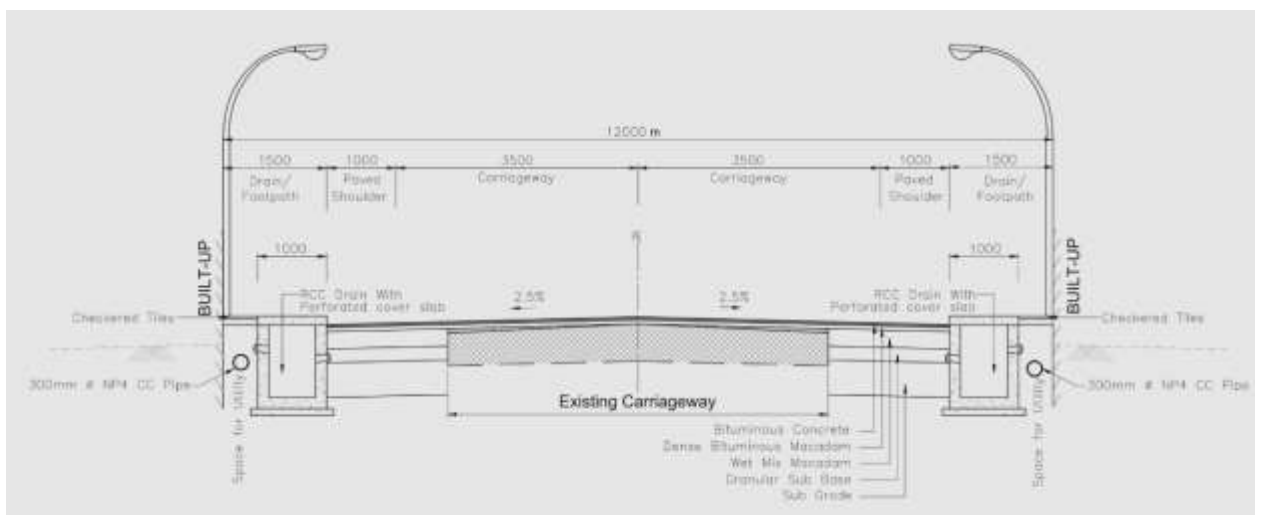
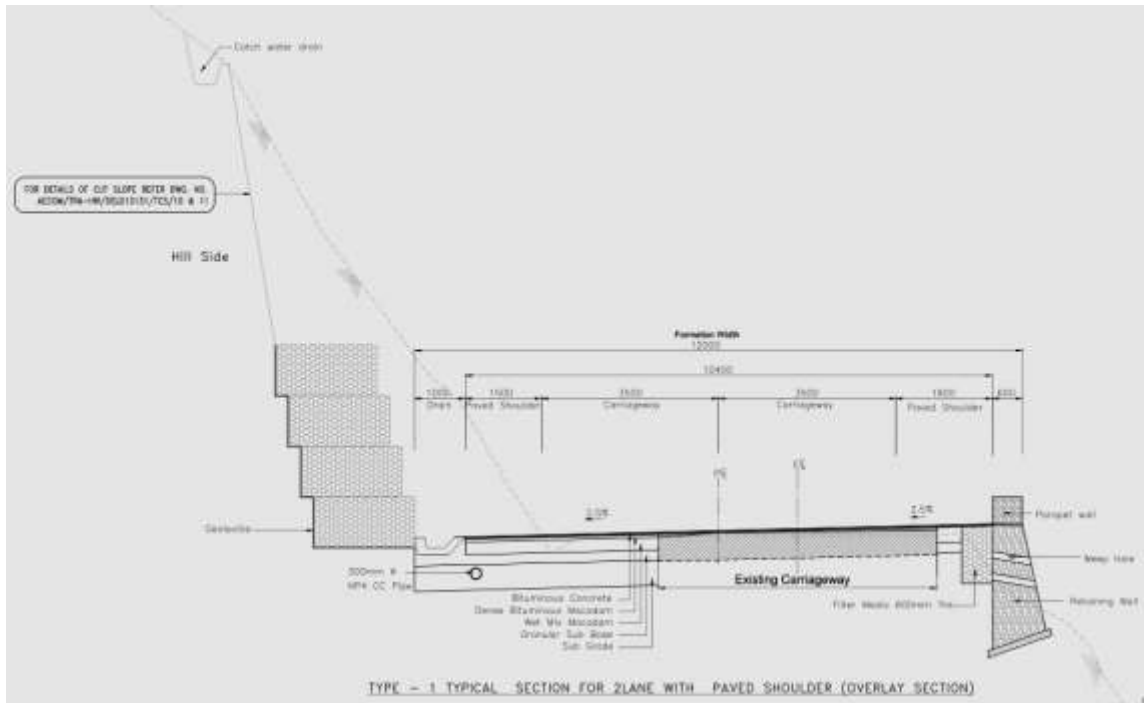
- Major landslide area
- Poor existing geometry at Garampani village
- Very tight RoW between built up lines, widening at this location is shall involve acquisition of many structures.
- Existing Bailey bridge at Gangori require reconstruction
- Road completely washed away which requires realignment



## 2.7.8 CROSS SECTIONAL ARRANGEMENT

The road formation shall be 12m which includes, 7 m carriageway, paved shoulders, drain on hill side and parapet on valley side.

As per site constrains, provision of 12m wide formation for the total project length is not feasible where tight RoW in built up sections and overhang cliff section etc. In such sections 10m formation width is proposed. Typical cross sections for rural and built up sections are shown in fig below:



In major realignments proposed RoW of 24m and in rural sections 18m is considered for the project road. However in built up sections to avoid damage to existing structures, existing RoW (distance between building lines) are considered improvements with minimum of 10m

## 2.7.9 STRUCTURE IMPROVEMENTS

Existing structures which are in sound condition and with adequate width as required for the project road are retained. In other existing structure locations, new structures are proposed adjacent to existing structures. Additional cross drainage structures and viaducts also provided wherever required. New structures also proposed in major realignment stretches. Summary of bridges and viaducts are given below:

### Summary and treatment of existing Bridges

Description	Total	Major Bridge	Minor Bridge
Total Existing Bridge	28	6	22
Retained	20	4	16
New 2 Lane Bridge	2	1	1
Abandoned due to bypass	4	1	3
Reconstruction	2	-	2

### Proposed Additional two lane bridges:

3 additional minor bridges are proposed.

### Proposal for New Bridges/ Structures along Realignments

Realignments have been proposed at various locations to bypass the potential landslide zones and poor geometrics along the highway. New structures are required along these realignments as follows.

### Major Realignments

Realignment	Major Bridges	Minor Bridges	Total
Sukhi Top	1	0	1
Nethala-Garampani	1	2	3
<b>Total</b>	<b>2</b>	<b>2</b>	<b>4</b>

**Viaducts:** 2 Viaducts are proposed (one at Maneri – 400 m long and one at Ex. Km 18+685- 82m long).

## 2.7.10 PROPOSED PROTECTION WORKS

The existing slide areas along the project road were studied and broadly categorised in to Minor and Major slides. Major slides are those which are chronic and keeping traffic blocks often and also create unsafe condition for traffic.

Since the project road is parallel to Bhagirathi river, in majority of the stretches widening is taking place on hill side only. Therefore after cutting it is mandatory to protect the cut slope. From the geological study, soil type along the project road is identified. Various types of protection arrangement is proposed based on type of soil and height of cut.

Special protection arrangements are proposed for major landslide locations at Gangnani,



Bhatwari, Malla, Bishanpur, Laldang, Bareti and Nalupani as mentioned above.

### 2.7.11 PAVEMENT DESIGN

Design for New Construction or Reconstruction is carried out in accordance with IRC: 37 – 2012, “Guidelines for the Design of Flexible Pavements ”. The pavement for New Construction or Reconstruction is designed for the design period of 15 years for the bituminous layers.

#### Pavement Design for New Construction/Reconstruction

<b>Homogeneous Section</b>	<b>HS-01 (Existing km 98.2 to 124.0)</b>	<b>HS-02 (Existing km 0.00 to 98.2)</b>
Length (km)	25.8	98.2
<b>Design CBR Value in %</b>	<b>10%</b>	<b>10%</b>
<b>Design Traffic in MSA</b>	<b>6.8</b>	<b>1.6 (Say 2)</b>
Wearing Course, mm	40 BC	40 BC
Binder Course, mm	50 DBM	50 DBM
Base Course (WMM), mm	250	250
Granular Sub-base Course (GSB), mm	200	150
Sub-grade layers, mm	500	500

Design of overlay is carried out as IRC 81 – 1997.

### 2.7.12 PRELIMINARY PROJECT COST

Construction cost of each of the project road section is worked out. Unit rate of each item is adopted from SOR (2015-16) of Uttarakhand for Dunda and Bhatwari block is used.

As discussed during meeting with Secretary, PWD, Govt of Uttarakhand on 16/10/2015, cost estimate of the present project report shall exclude the provisions already approved by MoRTH being executed by BRO.

The Cost estimate is prepared for a Total design length of 89.73 kms. Summary of EPC cost and TPC is given under:

### EPC Cost of Project

Item		Amount (Rupees)	Amount (Rupees Cr.)
<b>A</b>	<b>Total Civil Cost</b>	<b>6,89,90,82,558</b>	<b>689.91</b>
B	Contingencies @ 2.8% of (1)	19,31,74,312	19.32
C	Sub Total (A+B)	7,09,22,56,869	709.23
D	Construction Supervision Charge @ 3% on C	21,27,67,706	21.28
E	Administrative/Agency Charges @ 3% on (C+D)	21,91,50,737	21.92
F	Quality Control Charges @ 0.25% on C	1,77,30,642	1.77
G	Road Safety Audit Charges @ 0.25% on C	1,77,30,642	1.77
H	Add Maintenance for 4 years @ 1.75% on C	12,41,14,495	12.41
I	Escalation @ 10% on C	70,92,25,687	70.92
<b>Total EPC Cost</b>		<b>8,39,29,76,779</b>	<b>839.30</b>

### Total project Cost

Item		Amount (Rupees)	Amount (Rupees Cr.)
<b>A</b>	<b>Total EPC Cost</b>	<b>8,39,29,76,779</b>	<b>839.30</b>
B	Cost of Land Acquisition	21,38,88,675	21.4
C	Cost of R & R	23,24,70,000	23.25
D	Cost of Environmental Mitigation Plan	26,80,36,468	26.80
<b>Total Project Cost (TPC)</b>			<b>910.75</b>

#### 2.7.13 FINANCIAL VIABILITY

The project is financially Not Viable on BOT basis even with 40% Grant and 30 years Concession Period. Accordingly project should be undertaken on EPC/annuity. Hence consultant recommends the project road to be developed on EPC basis.