


प्रपत्र-26

परियोजना का नाम-तराई केन्द्रीय वन प्रभाग में केन्द्रीय सड़क अवसंरचना निधि योजना के अन्तर्गत वर्ष 1980 से पूर्व से निर्मित गदरपुर-दिनेशपुर-मदकोटा हल्द्वानी मोटरमार्ग (राज्य मार्ग सं०-05) को मदकोटा से हल्द्वानी तक दो लेन पेव्ड शोल्डर सहित चौड़ीकरण व सुदृढीकरण के कार्य हेतु (किमी 17 से किमी 38 तक) वन भूमि हस्तान्तरण प्रस्ताव।

भू-वैज्ञानिक की आख्या

भू-वैज्ञानिक की आख्या संलग्न है।


प्रयोक्ता एजेन्सी
अधिसूचि अभियन्ता
निर्माण खण्ड, लो० नि० वि०
हल्द्वानी (नैनीताल)

GEOLOGICAL
ASSESSMENT/INSPECTION REPORT
WITH FEASIBILITY STATEMENT FOR
CONSTRUCTING/WIDENING OF
EXISTING MOTORABLE ROAD FROM A
PART MADKOTA TO HALDWANI
(GADARPUR-DINESHPUR-MADKOTA-
HALDWANI MOTOR ROAD, STATE ROAD
NO.5), DISTRICT-US NAGAR &
NAINITAL, UTTARAKHAND
(SITE INSPECTION-23/06/2022)

PREPARED FOR
EXECUTIVE ENGINEER,
CONSTRUCTION DIVISION,
PUBLIC WORK DEPARTMENT (PWD), HALDWANI,
DISTRICT- NAINITAL, UTTARAKHAND

PREPARED BY
BHUWAN JOSHI
Empanelled Geologist, RQP, IBM
Forest & Rural Development Cell (FRDC)
Empanelment No. URRDA/2008-09/3190
Govt. of Uttarakhand
RQP, Registration No. RQP/DDN/180/2009/A
Indian Bureau of Mines
Govt. of India

ADDRESS-

PROGRESSIVE GEOLOGICAL & GEOTECHNICAL SERVICES
(PG2S)

20- SHASTRINAGAR LANE NO.-3,
DEHRADUN, UTTARAKHAND

joshibhuvan@yahoo.co.in

joshibhuvan75@gmail.com

Mobile No. 09412152105, 07533858409

USE GEOLOGICAL KNOWLEDGE FOR MAKING DISASTER
RESILIENT COMMUNITY

**GEOLOGICAL ASSESSMENT/INSPECTION
REPORT WITH FEASIBILITY STATEMENT FOR
CONSTRUCTING/WIDENING OF EXISTING
MOTORABLE ROAD FROM A PART MADKOTA
TO HALDWANI (GADARPUR-DINESHPUR-
MADKOTA- HALDWANI MOTOR ROAD, STATE
ROAD NO.5), DISTRICT-US NAGAR & NAINITAL,
UTTARAKHAND
(SITE INSPECTION-23/06/2022)**

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ANNEXURE-

1. JOINT INSPECTION REPORT (DEPARTMENTAL)
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PROGRESSIVE GEOLOGICAL & GEOTECHNICAL SERVICES (PG2S)

Bhuvan Joshi
Empanelled Geologist
FRDC, Govt of Uttarakhand
RQP Indian Bureau of Mines
Registration No. RQP/DDN/180/2009/
Govt. of India

**GEOLOGICAL ASSESSMENT/INSPECTION REPORT WITH
FEASIBILITY STATEMENT FOR CONSTRUCTING/WIDENING
OF EXISTING MOTORABLE ROAD FROM A PART MADKOTA
TO HALDWANI (GADARPUR-DINESHPUR-MADKOTA-
HALDWANI MOTOR ROAD, STATE ROAD NO.5), DISTRICT-US
NAGAR & NAINITAL, UTTARAKHAND
(SITE INSPECTION-23/06/2022)**

TERMS OF REFERENCE

The Road Alignment Geological Report, entitled "GEOLOGICAL ASSESSMENT/INSPECTION REPORT WITH FEASIBILITY STATEMENT FOR CONSTRUCTING/WIDENING OF EXISTING MOTORABLE ROAD FROM A PART MADKOTA TO HALDWANI (GADARPUR-DINESHPUR-MADKOTA- HALDWANI MOTOR ROAD, STATE ROAD NO.5), DISTRICT-US NAGAR & NAINITAL, UTTARAKHAND (SITE INSPECTION-23/06/2022)" prepared for Executive Engineer, Construction Division, Public Work Department (PWD), Haldwani, Nainital, via work order letter No. 1503/4 C, Dated 22/6/2022, by Chief Geological Consultant of Progressive Geological & Geotechnical Services (PG2S), Bhuwan Joshi, Empanelled Geologist, Govt. of Uttarakhand & RQP- IBM, Govt. of India for assessing geological conditions of the proposed improvement/development of road alignment in order to assure its feasibility.

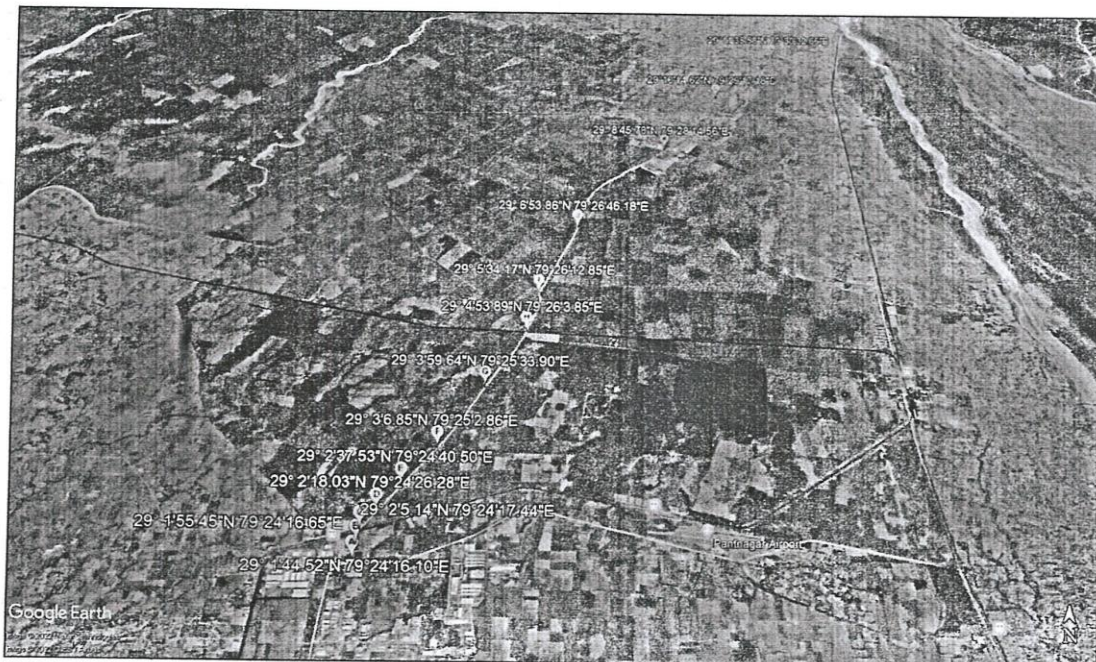
Undersigned (Geological Consultant) carried site visit on 23 June 2022 & geologically evaluated the area & surroundings. During the site visit representatives of PWD & BRIDCUL, were accompanied with the geologist; geological assessment carried as per available land/area & community needs. Site assessment carried based on site visit, information extracted from available toposheets, geological maps published in referred journals, satellite imageries and literature on work previously done in the area.

LOCATION SITE

The proposed construction/widening of total length of road is 21.0Kms, the road alignment falls under two districts of Uttarakhand, initially starts from US Nagar i.e. about 6.00Kms & terminates at Haldwani town of district Nainital i.e. about 15Kms. Presently about 07meters wide road is already constructed along the proposed reconstruction/widening (Georeference Map & other Maps Attached as Annexure for proposed widening).

Alignment starting, geographically from the coordinate point- $79^{\circ} 24' 16.10''$ E, $29^{\circ} 01' 44.52''$ N, at US Nagar & terminates at coordinate point- $79^{\circ} 30' 32.66''$ E, $29^{\circ} 11' 35.58''$ N, at Haldwani town of district Nainital. **Udham Singh Nagar** district falls in the Tarai region of Kumaon Division. The geographical area of the district is 3055 Km² and in aerially it ranks 9th in Uttarakhand state. It is located between latitude $28^{\circ} 53'$ N and $29^{\circ} 23'$ N and laterally extends between longitudes $78^{\circ} 45'$ E and $80^{\circ} 08'$ E. For the Administrative convenience, the district has been divided into 7 developmental blocks and 7 tehsils, viz. *Japsur, Kashipur, Bazpur, Gadarpur, Rudrapur, Sitargunj and Khatima* with the district's headquarters at Rudrapur.

Nainital district forms part of Kumaon Division of Uttarakhand State. It lies between $29^{\circ} 0'$ and $29^{\circ} 36' 21''$ N latitudes and $78^{\circ} 50' 53''$ and $80^{\circ} 0'$ E longitudes. The district comprises of four tehsils namely, Nainital, Dhari, Haldwani and Kosya Kutoli and eight developmental blocks viz., Haldwani, Ramnagar, Kotabagh, Dhari, Betalghat, Ramgarh, Bhimtal and Okhalkanda.



PROPOSED ROAD WIDENING ALIGNMENT, DISTRICT-US NAGAR & NAINITAL

PHYSIOGRAPHY OF SITE

As discussed above, the proposed road alignment runs along the almost plain topography. The overall direction of the alignment is South-West to North-East, starting at Madkota from about 225MSL to 399MSL at Haldwani. The classification of required land with area for proposed widening mentioned in Joint Inspection Report & the tentative plan of the proposed alignment,

provided by the implementing agency. (Attached as annexure). Udham Singh Nagar District is the food bowl of Uttarakhand State. Prior to its formation, it was part of District Nainital. It was separated out on the basis of physiographical conditions i.e. Tarai Region.

The climate varies from Sub-tropical and sub-humid with three distinct seasons i.e. summer, monsoon (rainy season) and winter. The rainy season starts from the month of middle June to September end, and followed by the winter season, which starts from the end of October and goes up to February. The maximum temperature in the region goes up to 42°C during the summers and the minimum temperature is between 1 and 4°C. Rainfall, spatially, is highly variable depending upon the altitude. The intensity of the rainfall increases from south to north. About 90% of the rainfall received during the monsoon period, and the remaining 10% of the rainfall in non-monsoon period (*Reference: DSR Dist*)

PURPOSE AND SCOPE

The present report aims to assess geological conditions of the proposed road alignment in order to assure its feasibility. The major scope of the assignment includes as:

- Regional Geological correlation with respect to proposed alignment.
- Local Geological interpretation with respect to proposed alignment.
- Identification of major hazards/natural hazards & possible recommendations/feasibility for construction of road as per proposed alignment.

METHODOLOGY

The report is based on primary & secondary methods/sources of investigation. Following sources being used for locating/assessing the alignment: -

- Alignment reconnaissance/site visit
- Identification of proposed road alignment through satellite imageries and Survey of India toposheets etc.
- Literature review, collection of site history, regional geology & community requirement etc.
- Interpretation of geomorphology, drainage characteristics, vegetation cover, instability etc from satellite imageries.
- Data provided by implementing agency.

SITE GEOLOGY (SITE SPECIFIC GEOLOGY ALONG THE ALIGNMENT)

Proposed road alignment geologically falls initially under Tarai Formation & later on Bhabar Formation

TARAI FORMATION: The Tarai formation is exposed immediately south of the Bhabar formation and the name itself being derived from marshy conditions. Tarai formation consists of clays, sandy clays, fine to medium sand and occasional gravels. In this formation there is a dominance of clayey successions over sandy horizons. The granular zones mostly occur as lenses and have inter-tonguing relationships with clastic and non-clastic units. The northern limit of the zone is demarcated by the spring line. The Tarai sediments representing the finer portion of the channel bed load and the load in suspension and solution, which are brought by the streams and evenly sorted out by the river action. Tarai formation is better sorted as compared to the Bhabar.

BHABAR FORMATION: Bhabar formation is essentially constituted of alluvial deposits lying on the sloping plains in the Himalayan foothills. It is primarily constituted of unconsolidated sediments like sand, gravel, boulder and clays. The grain size varies from material of sand grade (2 mm) through granules, pebbles, cobbles to boulders size i.e. >256 mm, sometimes the boulders have dimensions in feet. The clays are generally brown in color and clay bed sequences tend to pinch and for the same reason have short lateral continuity. The Bhabar formation is exposed immediately south of the Siwaliks of the Himalayan foothills. The exact trend and disposition of Bhabar formation depends largely upon the disposition of the Siwaliks. The extreme northern portion of the Bhabar zone is marked by the contact with Siwalik Ranges, whereas the southern limit is defined by the contact between Bhabar and Tarai, which forms the spring line or marshy conditions. The width of the bhabar formation is quite variable, the maximum being 21 kms.

PROPOSED ALIGNMENT AND FEASIBILITY STATEMENT

State- Uttarakhand

Districts- US Nagar & Nainital

Development Block- Reserve Forest Land-16.27Hectare, Protected Forest Land-0.42Hectare, Naap Land- 10.25Hectare

Proposed Site Location- 21.00kms long road from Madkota to Haldwani

Proposed Construction- Road widening work from Madkota to Haldwani, about 21kms

Alignment points-

- Start Point
Latitude- 29° 01' 44.52" N/Longitude- 79° 24' 16.10" E
- End Point
Latitude- 29° 11' 35.58" N/Longitude- 79° 30' 32.66" E

Vegetation- Reserve Forest Land-16.27Hectare, Protected Forest Land-0.42Hectare

Dominant Lithology- Tarai & Bhabar Formation (detail as per discussed above)

Important Hazards- Earthquake, Landslides and excessive rain fall induced Landslides & related phenomena

DESCRIPTION OF ALIGNMENT

The alignment is very smooth as it is passing through plain terrain in its entire length. It runs from an elevation of about 225m to 399m having one slight curve & one S curve. The proposed construction/widening of total length of road is 21.0Kms, the road alignment falls under two districts of Uttarakhand, initially starts from US Nagar i.e. about 6.00Kms & terminates at Haldwani town of district Nainital i.e. about 15Kms. Presently about 07meters² wide road is already constructed along the proposed reconstruction/widening. About 12m broad double lane paved shoulder Road widening/Road improvement work is proposed. There are two railway crossings existed within the alignment whereas construction one box culvert & one or two pipe culvert are proposed (Alignment map attached as Annexure).

FEASIBILITY STATEMENT

Based on above facts, proposed alignment of road construction/road widening from a part of Madkota to Haldwani Road, district US Nagar & Nainital, Alignment starting, geographically from the coordinate point- 79° 24' 16.10" E, 29° 01' 44.52"N, at US Nagar & terminates at coordinate point- 79° 30' 32.66"E, 29° 11' 35.58" N, at Haldwani town of district Nainital. Uttarakhand seems feasible under informed conditions with proper consideration of recommendations as mentioned in the report below.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS-

Based on above data & community requirement, the road alignment from Madkota to Haldwani, starting point position coordinate is- Latitude- 29° 01' 44.52" N to 29° 11' 35.58" N, Longitude- 79° 24' 16.10" E to 79° 30' 32.66" E; District US Nagar & Nainital, Uttarakhand, for construction/widening of motor road is conditionally feasible.

Based on the available data, the following conclusions are drawn: -


- The alignment falls under seismically high zones (seismic zone IV) as per seismic zonation map of India. Hence suitable provisions should be made for seismic resilience.
- Proper drainage arrangement should be constructed all along the road.

- Near culverts & bends within the alignment proper stability measures like construction of proper retaining walls shall be recommended.
- Construction of road shall be as per the specifications defined for the construction of motorable roads in plain terrain (IS code).
- Reference of site specific geotechnical assessment would be highly recommended for road construction (Load bearing analysis).
- This report is based on reconnaissance site survey & secondary sources, hence, during construction phase if any stability issue/subsidence issue arises within any part of the alignment then specific consultation would be required/recommended.

CERTIFICATION

BHUWAN JOSHI, Empanelled Geologist, RQP, IBM, Govt. of India with Business Address: - 20-Shastrinagar, Lane No.-3, Dehradun, Uttarakhand; do hereby certify that:-

- I am Consulting Geologist registered with National & State Accreditation bodies.
- I am Life member of Himalayan Geology, Wadia Institute of Himalayan Geology, 33-GMS road, Dehradun
- I hold M.Sc. Geology from University of Lucknow, Lucknow.
- I was associated as RA with Wadia Institute of Himalayan Geology, Dehradun.
- I have obtained various trainings from JNU, New Delhi, Centre University, Allahabad, Wadia Institute of Himalayan Geology, Anna University, NIDM, IIRS, Dept. of Space, Govt of India etc, related to my professional Career.
- I am consulting various departments in the state as per their requirement.
- This report is based on secondary sources of data.


BHUWAN JOSHI
EMPANELLED GEOLOGIST, RQP, IBM
FOREST & RURAL DEVELOPMENT CELL (FRDC)
EMPANELMENT NO. URRDA/2008-09/3190
GOVT. OF UTTARAKHAND
RQP, REGISTRATION NO. RQP/DDN/180/2009/A
INDIAN BUREAU OF MINES
GOVT. OF INDIA

ANNEXURE, - MAPS OF THE PROPOSED ALIGNMENT

ANNEXURE

परियोजना का नाम- गढ़रपुर-दिनेशपुर-तराई केन्द्रीय वन प्रभाग में केन्द्रीय सड़क अवरोधना निधि योजना के अन्तर्गत गढ़रपुर-दिनेशपुर-मदकोटा हल्द्वानी मोटरमार्ग (राज्य मार्ग सं०-05) को मदकोटा से हल्द्वानी तक दो लेन पेव्ड शोल्डर सहित चौड़ीकरण व सुदृढीकरण के कार्य (किमी 17 से किमी 38 तक) वन भूमि हस्तान्तरण प्रस्ताव।

संयुक्त निरीक्षण रिपोर्ट (प्रमाण पत्र)

प्रमाणित किया जाता है कि आज दिनांक 10.06.2022 को प्रश्नगत परियोजना के लिए वन भूमि प्रत्यावर्तन प्रस्ताव तैयार करने हेतु संयुक्त निरीक्षण किया गया। संयुक्त निरीक्षण के समय वन विभाग, राज्य विभाग, लोक निर्माण विभाग (प्रयोक्ता विभाग) एवं ब्रिडकुल के अधिकारी/कर्मचारी उपस्थित रहे। संयुक्त निरीक्षण के समय पाया गया कि उपरोक्त प्रयोजन हेतु निम्नानुसार भूमि प्रभावित हो रही है:-

क्र०सं०	भूमि का प्रकार	क्षेत्रफल हे० में	अभ्युक्ति
1	आरक्षित वन भूमि	16.27	✓
2	नाप भूमे	10.25	✓
3	सिद्धिल सोयम भूमि	-	-
4	संरक्षित वन भूमि	0.42	✓
5	राजस्व भूमि	-	-
	कुल योग-	26.95	✓

भूमि के प्रकार के क्षेत्रफल का विस्तृत विवरण एवं मानचित्र प्रस्ताव में संलग्न है।

परियोजना हेतु आवेदित वन भूमि के अतिरिक्त अन्य वैकल्पिक भूमि का घयन नहीं किया जा सकता है तथा सम्मिश्रित क्षेत्र (मार्ग) के चौड़ीकरण एवं सुदृढीकरण से जन सामान्य को लाभ मिलेगा। प्रस्तावित क्षेत्र के सड़क के चौड़ीकरण एवं सुदृढीकरण कार्य सर्वदा उपयुक्त है। प्रस्तावित कार्य जनहित में किया जाना है व स्थानिय एवं अन्य निवासियों को रोजगार के अवसर प्रदान होंगे।

आवेदित भूमि में पातन हेतु पड़ने वाले वृक्षों की संख्या 778 में शाख तरासी हेतु वृक्षों की संख्या 228 का सम्मिलित करते हुए कुल 1006 वृक्ष प्रभावित हो रहे हैं तथा 124 वृक्षों के खूट व दूठ हैं जिनका विवरण निम्न प्रकार है:-

क्र०सं०	राजि का नाम	पातन हेतु प्रभावित वृक्ष संख्या में	शाख तरासी वृक्षों की संख्या में	खूट व दूठ	अभ्युक्ति
1	रुद्रपुर राजि	22	42	0	-
2	टाण्डा राजि	176	179	0	-
3	भायडा राजि	184	07	32	-
4	हल्द्वानी राजि	396	0	92	-
	कुल योग-	778	228	124	

प्रभावित होने वाले वृक्षों का विस्तृत विवरण प्रस्ताव में संलग्न है। प्रश्नगत क्षेत्र का जी०पी०एस० कोऑर्डिनेट कमरा:-

- 1- Start Point (km 16.850) 29° 1' 44.52" N, 79° 24' 16.30" E
- 2- Pattharchatta railway crossing 29° 2' 5.09" N, 79° 24' 17.40" E

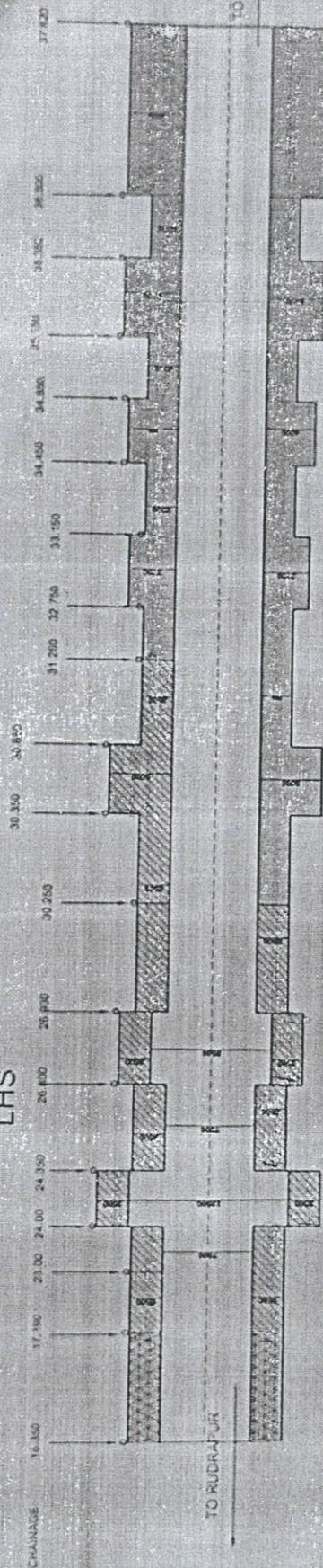
Bhawan Joshi
Empanelled Geologist
FRDC, Govt of Uttarakhand
RQP Indian Bureau of Mines
Registration No. RQP/DDN/180/2009/
Govt. of India

Ann-2

MADKOTA- HALDWANI SH-05
(TENTATIVE PLAN)

LHS

RHS



(NOT TO SCALE)

- EXISTING ROAD
- WIDENING IN PROTECTED FOREST
- WIDENING IN RESERVED FOREST
- WIDENING IN N-AP LAND

Bhuwan Joshi
Empanelled Geologist
FRDC, Govt of Uttarakhand
RQP Indian Bureau of Mines
Registration No. RQP/DDN/180/2009/
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Ann-3



29° 13' 58" N 79° 30' 32" E

29° 10' 14" N 79° 29' 17" E

29° 8' 45" N 79° 28' 14" E

29° 6' 53" N 79° 26' 46" E

29° 5' 34" N 79° 26' 12" E

29° 4' 53" N 79° 26' 3" E

29° 3' 59" N 79° 25' 33" E

29° 3' 6" N 79° 25' 2" E

29° 2' 37" N 79° 24' 40" E

29° 2' 18" N 79° 24' 26" E

29° 2' 5" N 79° 24' 17" E

29° 1' 44" N 79° 24' 16" E

29° 1' 55" N 79° 24' 16" E

Pantnagar Airport

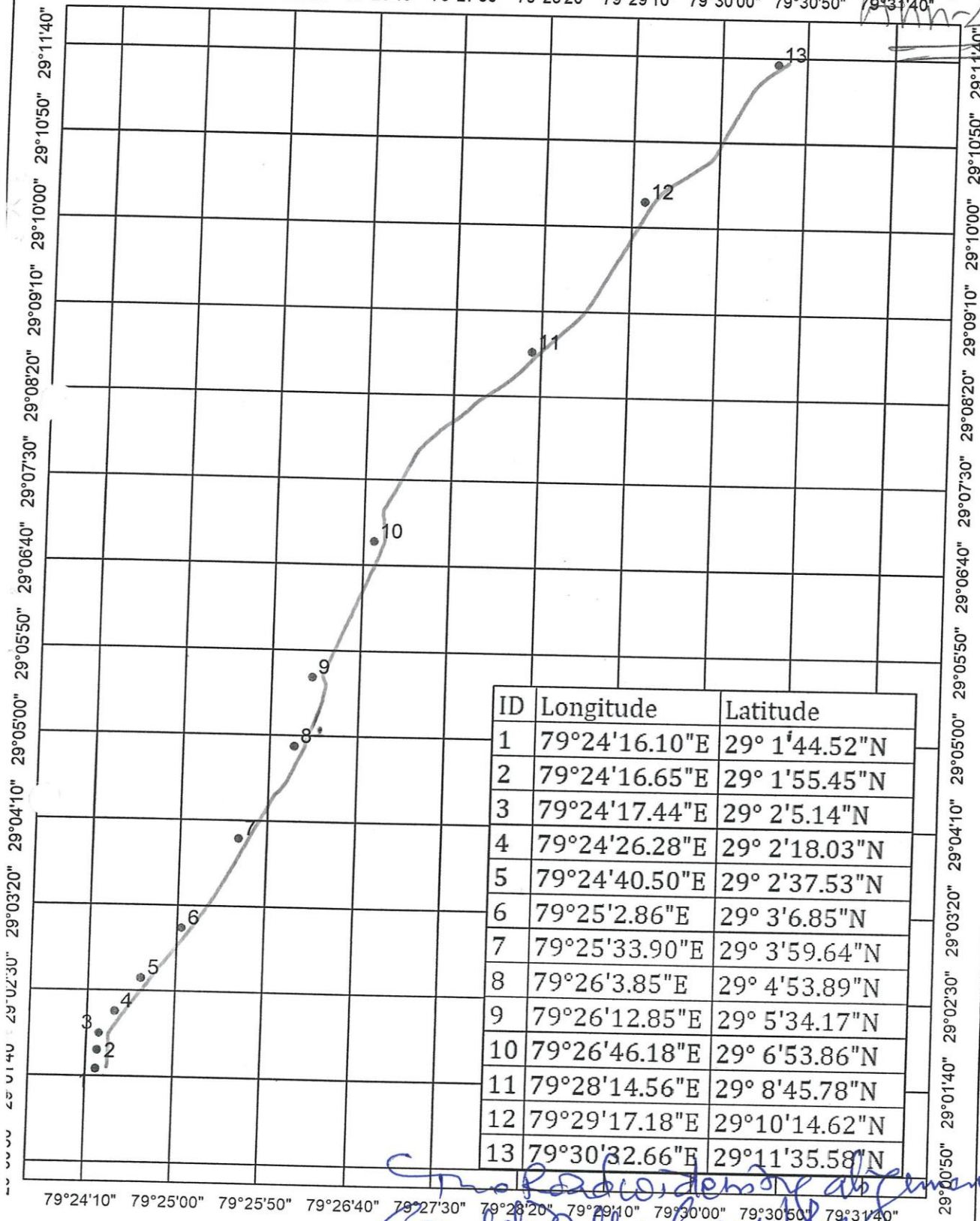
Radw...
...

Bhuvan Joshi
Impeller Geologist
FBOC, Govt of Uttarakhand
BOP Indian Bureau of Mines
Registration No. R0870/30/2009/
Govt. of India

जियो रैफरेन्स मैप- गदरपुर-दीनेशपुर-मदकोटा-हल्द्वानी मोटर मार्ग (राज्यमार्ग सं० -05) के किमी 0 17.00 से 38.00 तक के मदकोटा से हल्द्वानी तक 02 लेन पेड शोल्डर सहित सुदृढीकरण का कार्य।



79°24'10" 79°25'00" 79°25'50" 79°26'40" 79°27'30" 79°28'20" 79°29'10" 79°30'00" 79°30'50" 79°31'40"



ID	Longitude	Latitude
1	79°24'16.10"E	29° 1'44.52"N
2	79°24'16.65"E	29° 1'55.45"N
3	79°24'17.44"E	29° 2'5.14"N
4	79°24'26.28"E	29° 2'18.03"N
5	79°24'40.50"E	29° 2'37.53"N
6	79°25'2.86"E	29° 3'6.85"N
7	79°25'33.90"E	29° 3'59.64"N
8	79°26'3.85"E	29° 4'53.89"N
9	79°26'12.85"E	29° 5'34.17"N
10	79°26'46.18"E	29° 6'53.86"N
11	79°28'14.56"E	29° 8'45.78"N
12	79°29'17.18"E	29°10'14.62"N
13	79°30'32.66"E	29°11'35.58"N

Legend

GPS_Points

Proposed_Road



Bhuvan Joshi

Empanelled Geologist

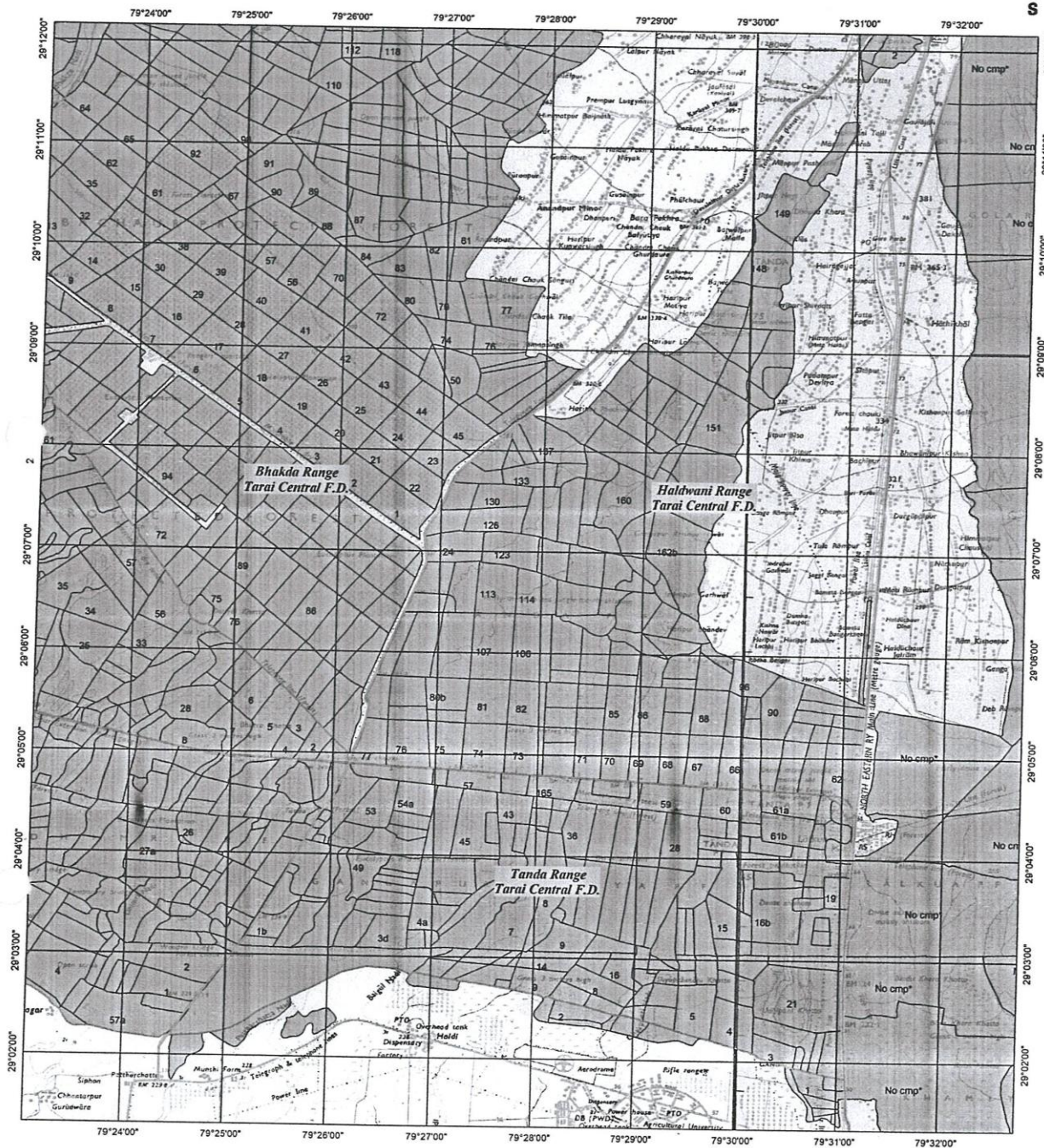
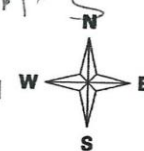
HRDC, Govt of Uttarakhand

ROP Indian Bureau of Mines

Registration No. ROP/DE-1/130/2009/

Govt. of India

डिजिटल मैप- गदरपुर-दीनेशपुर-मदकोटा-हल्द्वानी मोटर मार्ग (राज्यमार्ग सं० -05) के किमी० 17.00 से 38.00 तक के मदकोटा से हल्द्वानी तक 02 लेन पेड शोल्डर सहित सुदृढीकरण का कार्य।



Legend

Proposed_Road

Reserve Forest Area

Reserve Forest Boundary

Range_Boundary

Division_Boundary

0.00 0.75 1.50 2.25 3.00 3.75
Km

*Road is in line of alignment
conditionally feasible*

Bhuwan Joshi

Empanelled Geologist

FRDC, Govt of Uttarakhand

RQP Indian Bureau of Min.


Registration No. RQP/D. 1009/
Govt. of India

प्रपत्र-27

परियोजना का नाम:-तराई केन्द्रीय वन प्रभाग में केन्द्रीय सड़क अवसंरचना निधि योजना के अन्तर्गत वर्ष 1980 से पूर्व से निर्मित गदरपुर-दिनेशपुर-मदकोटा हल्द्वानी मोटरमार्ग (राज्य मार्ग सं०-05) को मदकोटा से हल्द्वानी तक दो लेन पेव्ड शोल्डर सहित चौड़ीकरण व सुदृढ़ीकरण के कार्य हेतु (किमी 17 से किमी 38 तक) वन भूमि हस्तान्तरण प्रस्ताव।

भू-वैज्ञानिक की संस्तुतियों/सुझावों का अनुपालन किये जाने का प्रमाण-पत्र।

प्रमाणित किया जाता है कि तराई केन्द्रीय वन प्रभाग में केन्द्रीय सड़क अवसंरचना निधि योजना के अन्तर्गत वर्ष 1980 से पूर्व से निर्मित गदरपुर-दिनेशपुर-मदकोटा हल्द्वानी मोटरमार्ग (राज्य मार्ग सं०-05) को मदकोटा से हल्द्वानी तक दो लेन पेव्ड शोल्डर सहित चौड़ीकरण व सुदृढ़ीकरण के कार्य (किमी 17 से किमी 38 तक) हेतु भू-वैज्ञानिक द्वारा दिये गये सुझावों/संस्तुतियों का अनुपालन सुनिश्चित किया जायेगा।


प्रयोक्ता, एजेन्सी
अधिसिआ आर.ए.सी.
निर्माण खण्ड, लो० नि० दि०
हल्द्वानी (नंदीगाव)