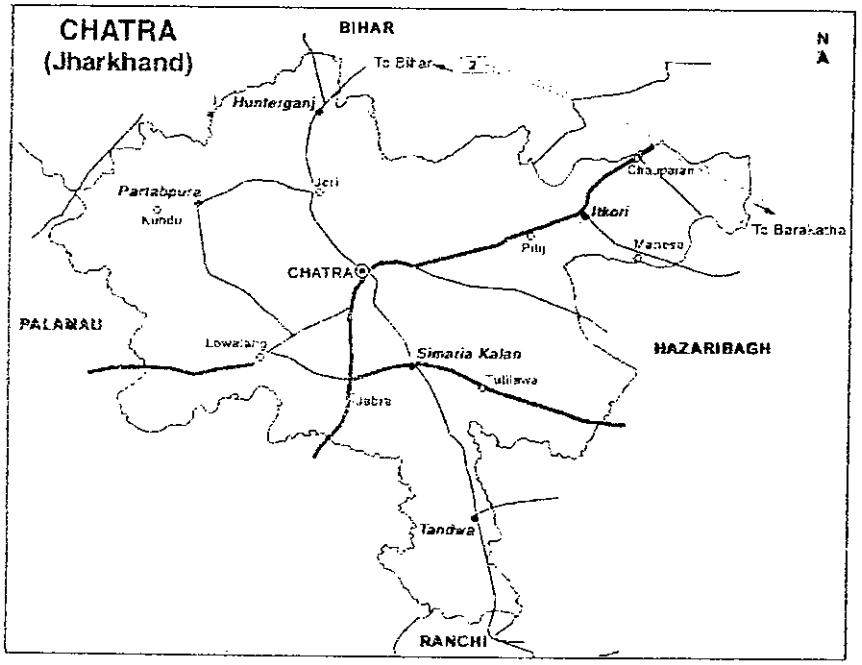
DPR

CENTRAL COALFIELDS LIMITED

(A MIMIRATNA COMPANY)

DETAIL PROJECT REPORT
FOR
DOUBLE LANING OF SARADHU TO PHULBASIA

TANDWA, JHARKHAND



VOLUME 1:
MAIN REPORT

MAY 2016

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EXECUTIVE SUMMARY

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1 (a) . EXECUTIVE SUMMARY

This shall be incorporated in final report. However, brief details of Project road and new construction proposal are given below:

1.	**Name of Project**	**Detailed Project Report for Double Laning of Saradhu to Phulbasia Road Under CCL, Ranchi, Jharkhand.**	
2.	**Name of Road**	**Saradhu to Phulbasia Road**	**Double Laning Road**
3.	**State**	**Jharkhand**	
4.	**District**	**Chatra**	
5.	**Length**		
	As per TOR	8.00 Km	
	Design length	7.985 Km	
6.	**Connectivity**	**Saradhu to Phulbasia Road** is a complete new alignment for mining haulage road; project road takes off from new proposed of Tanwa police chowki to Saradhu road which connects to Tandwa Police Chowki in Chatra and Latehar District of Jharkhand. The total length of 7.985 Km falls under Jharkhand.	
7.	**Terrain**	Plain	

8. ROW

- Existing — Open Area = 25m to 45 m
- Proposed — Open Area = 30m to 60 m (normal 45 m); Built up Area = 30m to 60m (normal 30 m)

9. **Carriageway Configuration**

- Existing Lane — New alignment.
- Proposed — Double Lane (7.0 m) with 1.5 m each side Pave Shoulder and 1.0 m Earthen Shoulder.

Formation Width — Double Lane (12.0 m.)
Structures (Culverts) — Formation width 12.0 m

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10. Pavement

(i) Existing Foot Track
(ii) Proposals Flexible

		Saradhu to Phulbasia Road
	Sub grade CBR Value proposed	7 %
	Design Period	15 years
	MSA for 15 Years	99.451

11 New Construction Length : 7.985 Kms

Pavement Composition for New Construction

Pavement Composition	Saradhu to Phulbasia Road	Remarks
GSB	230 mm	130 mm. Gr.-II as drainage layer and 100 mm. Gr.-III as separation layer
WMM	250 mm	
DBM	120 mm	Grading –II ,19 mm nominal size – VG-30
BC	50mm	Grading –I ,13 mm nominal size – VG-40

12. CD Structures

12.1 Bridges (Existing)

Description	Major	Minor	Total
No. of existing Bridges	-	-	-
Bridges proposed for new construction	1	4	5

12.2 Culverts

Particulars	Saradhu to Phulbasia Road				Total
	Slab	HP	Causeway	Others (Buried)	
No. of existing culverts	-	-	-	-	-
Bridges proposed for new construction	10	-	-	-	10

13. Trees Affected Exact nos furnished in DPR
14. Religious Structures Affected N.A.
15. Project Implementation period 1.25 years

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INTRODUCTION

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1. INTRODUCTION

1.1 General

Central Coalfields Limited is a Category-I Mini-Ratna Company since October 2007. During 2009-10, coal production of the company reached its highest-ever figure of 47.08 million tones, with net worth amounting to Rs. 2644 crore against a paid-up capital of Rs. 940 crore.

Central Coalfields Limited (CCL) is a subsidiary of Coal India Limited (CIL), an undertaking of the Government of India. CCL manages the nationalized coal mines of the Coal Mines Authority, Central division

Formed on 1st November 1975, CCL (formerly National Coal Development Corporation Ltd) was one of the five subsidiaries of Coal India Ltd. which was the first holding company for coal in the country (CIL now has 8 subsidiaries)..

The CMAL, with its three divisions continued upto 1st November 1975 when it was renamed as Coal India Limited (CIL) following the decision of Govt. of India to restructure the coal industry. The Central Division of CMAL came to be known as Central Coalfields Limited and became a separate company with the status of a subsidiary of CIL, which became the holding company.

1.2 State:

Jharkhand is a state in eastern India carved out of the southern part of Bihar on 15 November 2000. The state shares its border with the states of Bihar to the north, Uttar Pradesh and Chhattisgarh to the west, Odisha to the south, and West Bengal to the east. It has an area of 79,710 km^2 (30,778 sq mi). The city of Ranchi is its capital while the industrial city of Jamshedpur is the most populous city of the state.

According to writers including Gautam Kumar Bera, there was already a distinct geo-political, cultural entity called Jharkhand even before the Magadha Empire. Bera's book (page 33) also refers to the Hindu epic Bhavishya Purana. The tribal rulers, some of whom continue to thrive till today were known as the Munda Rajas, who basically had ownership rights to large farmlands. Many scholars now believe that the language used by tribes in the state of Jharkhand is identical to the one used by Harappan people. This has led to interest in deciphering Harappa inscriptions using rock paintings and language used by these tribes. For a greater part of Vedic age, Jharkhand remained unnoticed. During the age of Mahajanpadas around 500 BC, India saw the emergence of 16 large states that controlled the entire Indian subcontinent. In those days the northern portion of Jharkhand state was a tributary state of Magadha (ancient Bihar) Empire and southern part was a tributary of Kalinga (ancient Odisha) Empire.

1.3 Profile

Presently CCL has

Number of Mines 62 Operative Mines (22 Underground & 40 Opencast mines)

Washeries 7 Washeries

5 Coaking Coal Washeries (Kathara, Rajrappa, Kedla & Sawang,Kargali)

2 Non-Coking Coal Washeries (Piparwar,& Gidi)

Repair/Workshops 1 Central Workshop (ISO 9001) at Barkakana

5 Regional Repair/Workshops (3 w/s are ISO 9001) at Jarandih, Tapin North, Dakra, Giridih & Bhurkunda

Operating Coalfields

7 Coalfields (East Bokaro, West Bokaro, North Karanpura, South Karanpura, Ramgarh,Giridih & Hutar)

1.4 Scope of Study

The broad scope of services covered under preparation of Detailed Project Report as per stipulations laid down in the TOR is given as under:

(i) Review of all available reports and published information about the project road and the project influence area including the feasibility study report prepared.
(ii) Public consultation, including consultation with communities located along the road, other stake-holders and relevant departments at all the different stages of DPR preparation, with involvement, to the extent possible of the officers of the CCL concerned;
(iii) Detailed reconnaissance;
(iv) Traffic studies including traffic surveys and axle load survey and demand forecasting for next fifteen years;
(v) Inventory and condition surveys for road;
(vi) Inventory and condition surveys for bridges, cross-drainage structures and drainage provisions;
(vii) Detailed topographic surveys using Total Stations and DGPS;
(viii) Pavement Investigations;
(ix) Sub-grade characteristics and strength: Investigation of required sub-grade and sub-soil characteristics and strength of road and embankment design and subsoil investigation;
(x) Identification of sources of construction materials;
(xi) Road safety audit to identify areas of major concern, including black spots, and measures to be taken for improving detailed engineering design with respect to road safety;
(xii) Preliminary proposal for rehabilitation/widening including shoulder composition and cross-section details;
(xiii) Detailed design for rehabilitation/widening road, its cross-sections, horizontal and vertical alignment;
(xiv) Detailed design for rehabilitation/widening/reconstruction of bridges, cross-drainage structures, preparation of General Arrangement Drawing (GAD) and detailed drawings for

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bridges cross drainage structures and underpasses etc. In case of reconstruction, geotechnical investigations including bore holes, hydraulic surveys, etc. shall be carried out by the Consultant.

(xv) Identification of the type and design of intersections/junctions

(xvi) Design of drainage system and disposal point of storm water

(xvii) Value analysis/value engineering and Project costing

(xviii) Strip plans indicating the scheme for carriageway widening, location of all existing utility services and the scheme for their relocation, trees to be felled and planted;

(xix) Preparation of detailed project report, cost estimate, good for construction drawings, rate analysis, detailed bill of quantities;

1.5 Project Roads Under CCL Funds

Based on the feasibility study carried out under Pioneer Geomatics Engineering Ltd., Kolkata for 7.985 Km of Two Laning width with hard shoulder configuration mining haulage road between Saradhu to Phulbasia complete new alignment to preparation of DPR.

1.6 Detailed Project Report

Based on the approach & methodology detailed out in the Inception Report and from the available data/Consultant Reports and the results of surveys and investigations carried out, the detailed project report is compiled encompassing technical, social and economic parameters and aspects as laid down in the TOR of CCL, Ranchi, Jharkhand (Under supervision of Construction agency NBCC, Ranchi) of Jharkhand comprises of following volumes:

- Volume 1 : Main Report
- Volume 2 : Design Report
- Volume 3 : Material Report
  Geotechnical Report
- Volume 4 : Cost Estimate
  Analysis of Rate
- Volume 5 : Drawings

1.7 Composition of Main Report

The Main Report Volume of the Detailed Project Report consists of following components:

- Executive Summary
- Introduction
- Socio Economic Profile
- Approach and Methodology
- Project Road Description
- Engineering Surveys & Investigations
- Traffic Surveys
- Technical Proposal
- Cost Estimate
- Road Safety Audit
- Conclusions & Recommendations

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1.8 Contract Packages

The preparation of detailed project reports shall be for Saradhu to Phulbasia Road on new alignment from Saradhu to Phulbasia, considering the site condition of the Saradhu to Phulbasia road, in the district of Chatra and Latehar of Jharkhand.

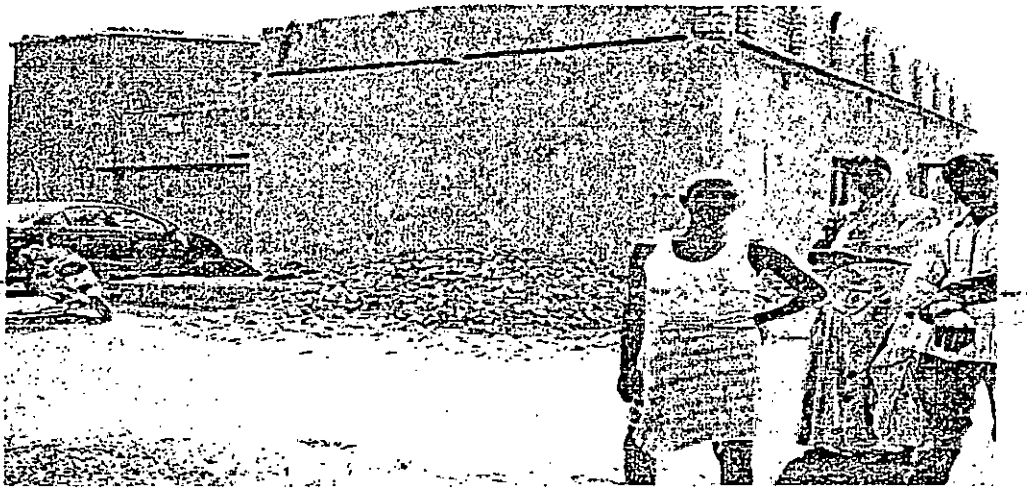
The report in hand covers the Project road sections ***Saradhu to Phulbasia*** *in the state of* Jharkhand.

Total length of this Project road, as per TOR of CCL, Ranchi, Jharkhand, is 8.0 Km. Road length of 7.985 Km. of project road.

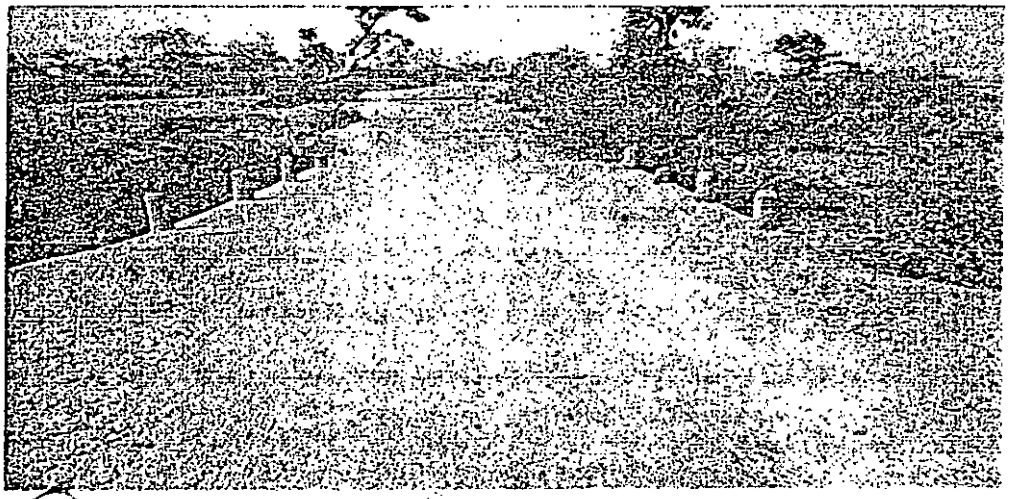
The description of the project road for the preparation of DPR as follows:

The Project Road:

State	From	To	Length (Km.)	Remarks
Jharkhand	Saradhu	Phulbasia	7.985	



START POINT OF THE ROAD



END POINT OF THE ROAD

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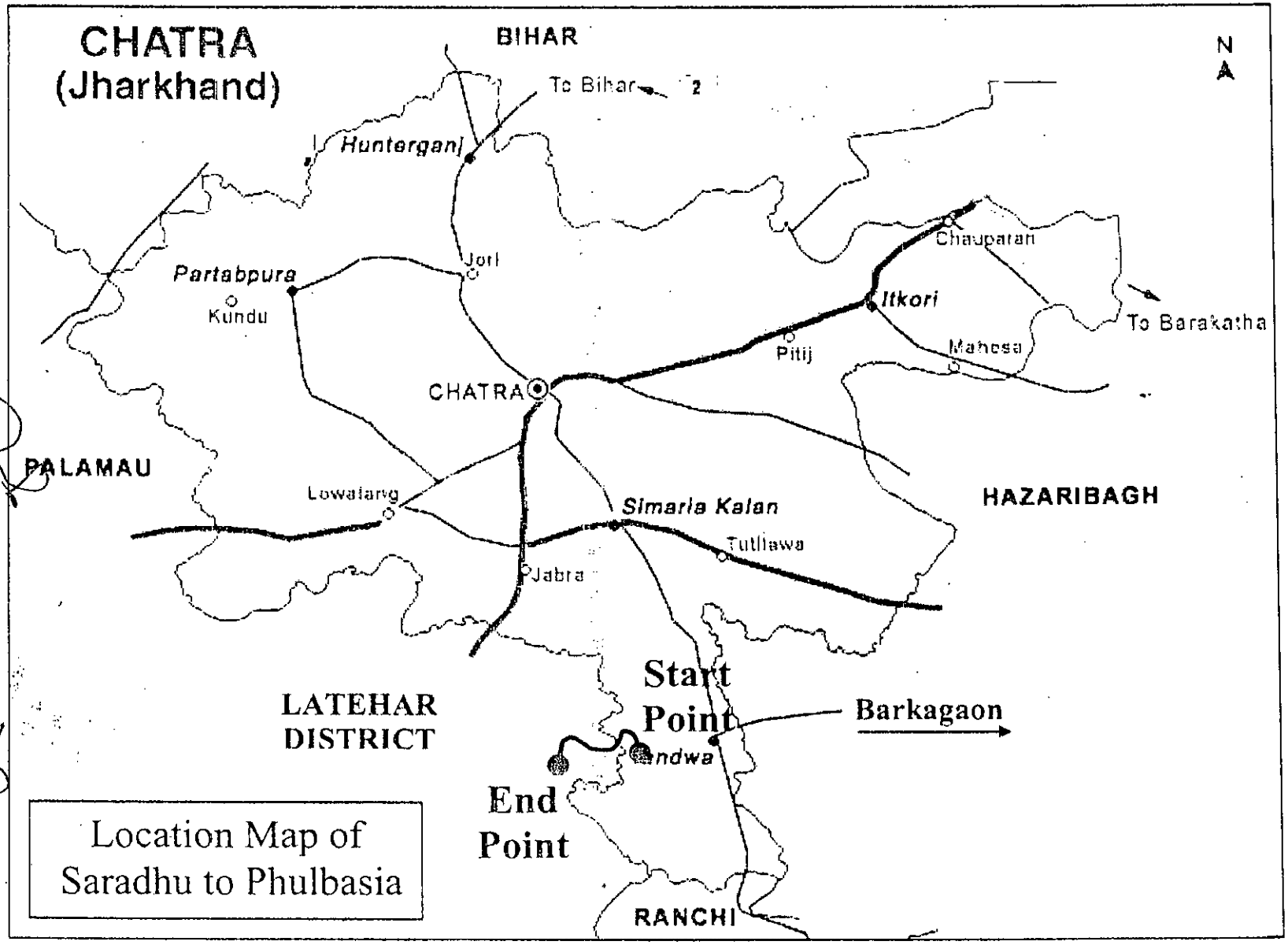

Location Map of
Saradhu to Phulbasia

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SOCIO-ECONOMIC PROFILE

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2 SOCIO-ECONOMIC PROFILE

2.1 General

Over 90% of inter-regional trade and personal travel within the Jharkhand depends on the road network, which is constrained by low capacity roads, comprising mainly sub-standard single lane roads. The state roads have deteriorated over the years due to heavy rains and floods in some areas of the state, failure of sub-grade and sub-base courses under increasing traffic load and paucity of maintenance funds and resources for the timely and adequate maintenance of such roads.

The new alignment Saradhu to Phulbasia Road takes off from SH-7 at Tandwa Police Chowki in Jharkhand and connects saradhu for mining haulage of Chatra district in Jharkhand. Total road length 7.985 Km falls in Jharkhand.

Geographical Location:

Chatra district is located in the Hazaribag plateau. It is bounded by the district of Gaya of Bihar state in the north, Palamu district in the west and Latehar in the South and Koderma and Hazaribag district in the East. It has an area of 3706 sq. km and population of 7,90,680 persons (Census of India, 2001). The district comprises Two Subdivision and twelve development blocks viz. Chatra, Simaria, Pratappur, Huntergunj, Itkhori, Tandwa, Kunda, Lawalong, Gidhour, Pathalgada, Mayurhand and Kanhachatti.

Physical Aspects:

Major parts of the geographical area of the district are formed of red laterite acidic soil. Upland has generally covered by Morum and Stone. The landscape is formed of hills and undulating plateau. The inhabitants of this area depend primarily on agriculture and forest products for their livelihood. Almost 90% of the total population depends on agriculture. The main crop of this area is paddy. Millets, Mustard, Niger and Maize are also quite popular. Wheat, Gram, pea, Soya beans, Groundnut etc. are also being cultivated. Total cultivated land is about 134024 hect, out of which only 16367-hect is irrigated. The agriculture is mainly depended on rainwater. The main forest products are Mahuwa, Chironjii, Lah ,Kendu leaves, Jack fruit, Black berry etc..

River:

Since the district consists of part of Upper Hazaribag plateau and Lower Hazaribag plateau and northen scarp, it presents diverse physiographic features. It has an elevation of about 450 m. Kalua hill and Lalabar hill forms the higher elevations of the district. Due to scarp

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landforms some waterfalls are observed in the district. The general slope of the district is from north to south. Geologically the area is comprised with Archean granites and gneisses. In southern part Gondwana rock formation occur in patches. Major rivers flowing in the district are Yamuna, Barki, Chako, Damodar and Garhi.

Climate:

The district receives an annual rainfall of 1500-1800 mm. and most of the rainfall occurs during the rainy season. During winter season the area receives 1 to 2 mm rainfall. The mean annual temperature remains about 250C but in summer season it reaches upto 460C and in winter season it comes down to 2 to 30C.

Agriculture and Land Use:

The major portion of the district is covered by forest (60.4 % of TGA) and has scattered settlement pattern. The forest is full of variety of medicinal plants, kendu leaves, bamboo, sal, teak and other timber species. The district has considerable flat land, which provide suitable site for agricultural use. The hilly areas are mostly under forest with patches of cultivation on scarp areas. Major crops grown in the district are rice, wheat and pulses. Only 12.21 percent area of agricultural use are net irrigated and major source of irrigations are well and tubewells.

2.1.1 Project District Description

Chatra district was a subdivision of Hazaribagh district and was created as districts vide notification no. 128 dated 29-05-1991 Personnel and Administrative Reforms Dept., Govt. of Bihar. The district comprises of one subdivision, 12 development Blocks/Anchals, 154 Panchayats and 1474 Revenue Villages. There is only one municipality - that is at the district head quarter of Chatra. There are 14 thanas (Police Station) in Chatra District. Chatra is passing through a very serious phase of extremists' violence by the banned naxal outfit called the M.C.C. (Maoist Communist Centre). How ever in the recent past the Chatra Police have been quite successful in stemming the red tide of the naxal wave. The Chatra Police has made a number of important arrests of naxalite personnel as well as seized a number of arms and ammunition along with lethal explosive materials and devices. The success of the Chatra Police against the naxal outfits has to a large extent led to the limiting of naxal violence.

A full-fledged judgeship has started functioning from 16th of June 2001. Under District and Session Judge, assisted by Additional District Judge, Chief Judicial Magistrate, Judicial Magistrates and Munsiff Magistrate. The District also has a functioning District Consumer

Forum. The forest portion comprises of 4 territorial divisions (North, South Chatra, Koderma, Hazaribagh West) one afforestation division and 2 state trading divisions. The forest of Chatra is full of variety of medicinal plants, Kendu leaves, Bamboo, Sal, Teak, other timber species and a wide range of carnivorous & herbivorous wild animals. The district has one wild life sanctuary also known as the Lawalong Wild Life Sanctuary, which hosts even tigers. The sanctuary was established vide Bihar Govt. notification no. 49/ 48/333 - F, dated 15/07/1978. 82 villages are located within the sanctuary area of which 21 villages are in the core area and 61 villages are situated in the buffer zone. The area of the sanctuary is 26, 886.23 hectares. In the sanctuary the principal animals that are found are Tigers, Leopards, Bear, Neelgai, Sambhar, Peacock, Wild Boar and Deer, together with variety of snakes and birds.

Most parts of this district are full of forests and stones. The cultivable land can be divided into two parts namely - Upper land and Lower land. The lands situated on the banks of rivers are fertile. One can get good crop even after using lesser amount of fertilizers in these lands. But the upper land is barren. A huge amount of fertilizers and irrigation is required for cultivation in these lands. Rabi and Kharif crops are generally sown here.

2.1.2 Population and Demographic Profile

Chatra district (Hindi: चतरा जिला) is one of the twenty-four districts of Jharkhand state, India, and Chatra is the administrative headquarters of this district. The district covers an area of 3706 km². It has a population of 791,434 (Census 2001).

According to the 2011 census Chatra district has a population of 1,042,304, roughly equal to the nation of Cyprus or the US state of Rhode Island. This gives it a ranking of 434rd in India (out of a total of 640). The district has a population density of 275 inhabitants per square kilometre (710 /sq mi). Its population growth rate over the decade 2001-2011 was 28.98 %. Chatra has a sex ratio of 951 females for every 1000 males and a literacy rate of 62.14%.p.

2.1.3 Literacy

As per the 2011 census, the total number of literates in Hazaribagh was 122,881 (90.14 per cent of total population) out of which 66,602 (93.82 percent of males) were males and 56,279 (86.14 percent of females) were females.

As per the 2011 census, the total number of literates in Hazaribag Nagar Parishad was 112,533, out of which 60,840 were males and 51,693 were females.

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2.1.4 Economy

Coal, Sand, Graphite and Stones are main mineral products of Chatra district. The Coal is available in Keradari and Tandwa Block area, the CCL is engaged in mining of Coal in the district. The following table gives the details of production of major and minor minerals produced during 2010-2011

In 2006 the Indian government named Chatra one of the country's 250 most backward districts (out of a total of 640). It is one of the 21 districts in Jharkhand currently receiving funds from the Backward Regions Grant Fund Programme (BRGF).

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3 APPROACH & METHODOLOGY

3.1 General

The detailed approach & methodology adopted for carrying out various activities in the preparation of the Final Detailed Project Report (DPR) have been described in detail in the Inception Report and discussed during presentation given at Inception Stage. The chapter provides an update of the Inception Report incorporating the response to the Inception Report. It provides a brief summary of the tasks and activities undertaken by the consultant in order to produce this DPR.

3.2 Task & Activities

Various tasks and activities carried out by the consultant during the consultancy services leading up to the preparation of the DPR included:

- detailed reconnaissance;
- traffic surveys and analysis;
- social impacts assessment;
- topographic surveys;
- inventory and condition surveys for roads, culverts and bridges;
- pavement investigations and subgrade characteristics and strength;
- materials investigation;
- hydraulic and hydrological studies;
- geotechnical investigations and subsoil exploration;
- design of highways and ancillary facilities;
- design of bridges and structures;
- arboriculture and landscaping;
- wayside amenities;
- development of a traffic management proposal for construction;
- calculation of project cost;

3.3 Implementation strategy

The work plan for carrying out the above activities and submittal of various deliverables has been given in Chapter 4 of the Inception Report. The Detailed Project Report Documentation has been carried out Volume wise. The graphical presentation in Figure 3.1 depicts the inter-activity relationship for a typical DPR road project.

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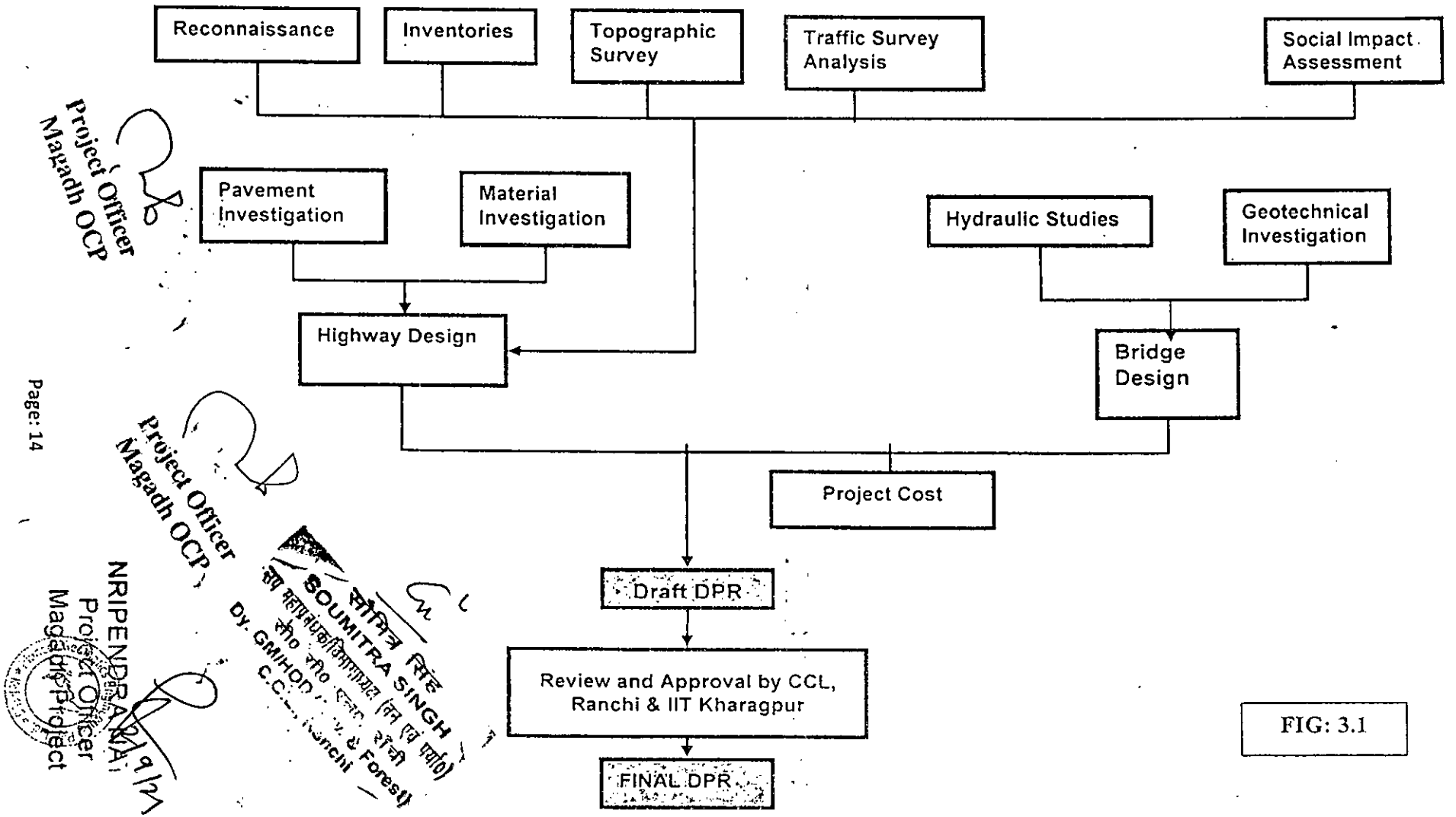

FIG: 3.1

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PROJECT ROAD DESCRIPTION

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4 PROJECT ROAD DESCRIPTIONS

The Project road **Saradhu to Phulbasia** in Chatra and Latehar **District,** which came under the CCL, Ranchi, Jharkhand.

The Saradhu to Phulbasia Road takes off from new project road Tandwa Police Chowki to Saradhu which falls in the Chatra District. This road is for mining haulage road between Saradhu to Phulbasia.

By constructing this road, large area nearby the road will be benefitted and traffic would be diverted from SH-7. The soil of this region is also suitable for paddy, maize and millets cultivation which can have easy to market outlet if this road are improved. Better road connectivity means easy for maintaining law and order due to quick movement Govt machineries and paramilitary forces. Services of Education and Health sector shall be improved. Due to improvement in the above mentioned fields, the pace of development shall increased manifold thereby improving socio-economic status of the people.

Work is currently going on for the development of NTPC's 3000 MW and Reliance Power's 3600 MW Super Thermal Power Projects. A major NTPC township is also coming 10 km from the Road. Many downstream steel plants and other industries are also envisioned due to its proximity to coal, water and power.

The road lies in a heavy rainfall area having an annual rainfall 1500 mm to 1800 mm due to which the longevity of road decreased.

CCL, Ranchi, Jharkhand has entrusted the project to the NBCC, Ranchi for Survey, Planning, Designing and Construction. NBCC, Ranchi will execute the project both departmentally and through Contract. All legal frame works will be as specified in the contract/legal documents at fixed time and fixed cost. No time lapse from the appointed date will be entertained. No escalation of cost will be agreed. No deviation of scope of work as well as specification and quality will be allowed. Any legal dispute will be settled within the terms and conditions of the contract or as decided by the GM, CCL, Ranchi, Jharkhand or arbitrator legally appointed for the purpose. Local disputes will be settled by the local administration through District court of law or panchayat or village council as per admissible. Since only widening works will be executed on the existing road, there will be no environmental impact and there will be no issues relating to land acquisition, diversion of forest Land, rehabilitation and resettlement. In case of requirement of forest clearance, land

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compensation and shifting of utilities due to widening of road, it shall be taken care of by the the state resources.

Presently no ongoing scheme has been sanctioned by the State Govt. Due care has been given to see that there is no duplication and synergy created through the proposed project.
Modern and economical techniques conforming to MORTH specifications shall be adopted.
Being a social project, Financial Analysis in this Project is not feasible. As it is a social project, it may not be possible to get a quantifiable benefit. Project has been prioritized to maximize social gains in the locality. Social gains anticipated from this project are both economic and non-economic.

After completion of the project, CCL, Ranchi, Jharkhand will take over for maintenance and up-keepment. Maintenance of the bridges and the road will be done as per norms followed in the Department. So, the Project will sustained by the CCL maintenance laborers.

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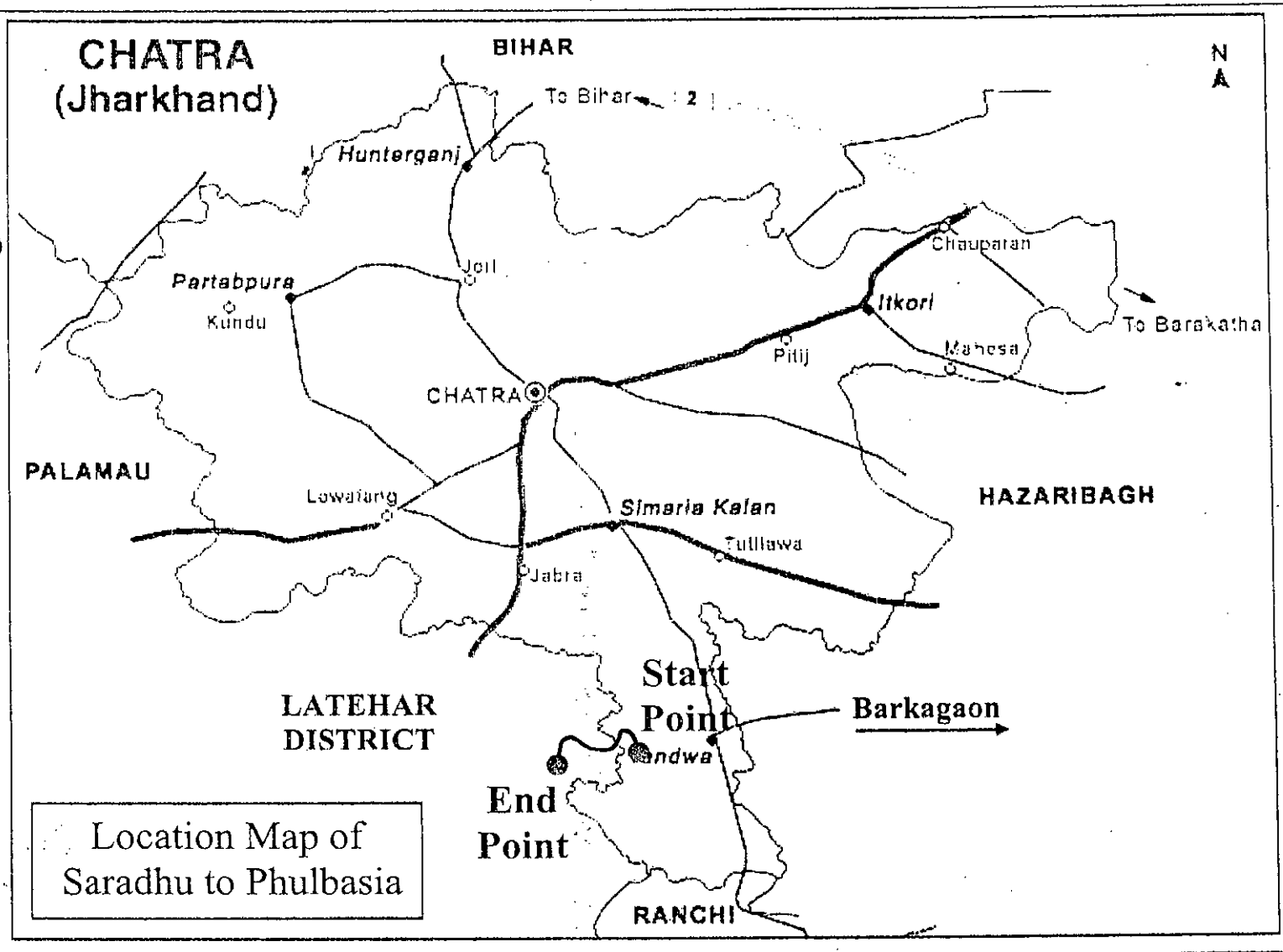

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4.2 Horizontal and Vertical Alignment

The proposed project road alignment generally follows the topography of the adjoining land through plain, having low laying area, ponds and cultivated land. The Project roads have a number of horizontal curves at various places and many of these are sharp with sharp radii.

The vertical profile of the existing road is generally steep.

4.3 Junctions and Intersections

Number of village roads and link roads join the Project road sections. The details of such road junctions are shown in Table: 4.2.

The summaries of major junctions / intersections are given table 4.2

Table: 4.2

Details of Junctions/intersections -Saradhu to Phulbasia Road

Sl. No.	Chainage (Km.)	Left or Right Side	Description	Road Going to
1.	3+640	Left	Earthen Road	To Balumath Road
2.	3+640	Right	Earthen Road	To Hahurwa Tola
3.	4+257	Right	Earthen Road	To Amradih Tola
4.	4+257	Left	Earthen Road	To Balumath Road
5.	4+515	Right	Earthen Road	To Amradih Tola
6.	4+515	Left	Earthen Road	To Chamatu
7.	5+022	Right	Earthen Road	To Amradih Tola
8.	5+022	Left	Earthen Road	To Chamatu
9.	5+434	Right	Earthen Road	Amradih Tola
10.	5+434	Left	Earthen Road	To Balumath Road
11.	6+000	Left	Earthen Road	To Balumath Road
12.	6+051	Right	Earthen Road	To Marawadih
13.	6+418	Right	Earthen Road	Tó Bahear Tola
14.	6+418	Left	Earthen Road	To Chamatu
15.	7+985	Right	Pucca Road	To Balumah
16.	7+985	Left	Pucca Road	To Chamatu

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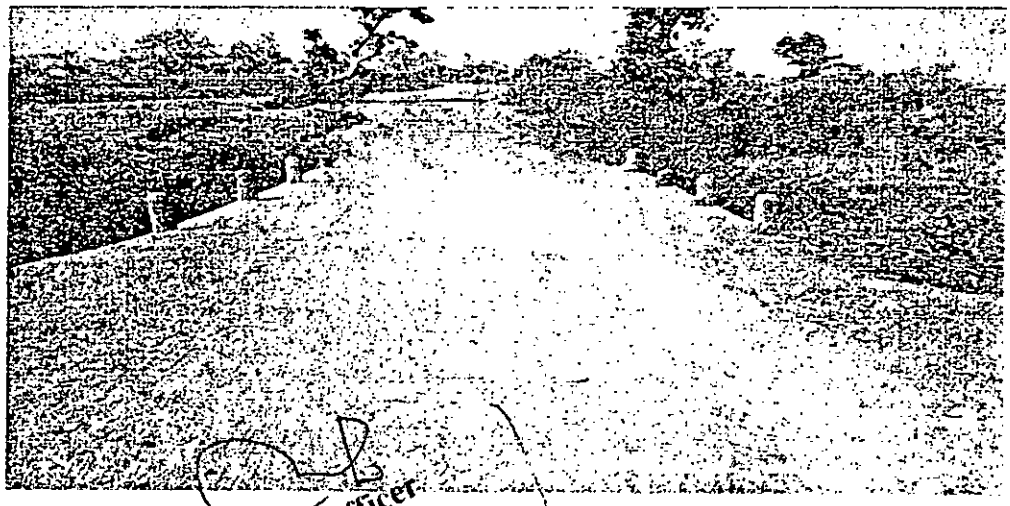
4.1 Engineering Features

4.2.1 Present Alignments

The Double Laning of Saradhu to Phulbasia Road takes off from new project road Tandwa Police Chowki to Saradhu.

Start point of Saradhu to Phulbasia Road



End point of Saradhu to Phulbasia Road

There is no existing road throughout, between Saradhu to Phulbasia.

The project road generally passes through plain terrain and some stretches have hill and forest either side.

The geographic coordinates of the Project road influence area lie in between following latitude and longitude and falls under Seismic Zone III.

Saradhu to Phulbasia	Longitude	Latitude
Start	84°58'53.07"	23°50'49.33"
End	84°57'14.79"	23°50'58.50"

4.10 Bus "Q" Shelters

There are twelve nos of bus "Q" shelters along the Project road. No bus bays exist along the Project road. Buses are parked on the road carriageway while embarking / disembarking passengers. In fact due to heavy traffic on the road, lots of problem arises during parking of the vehicles. The details and locations of existing Bus 'Q' Shelters are given in table 4.4:

Table: 4.4

Details of Bus Stand - Saradhu to Phulbasia Road				
Sl. No.	Chainage (m)	*Distance from C/L (m)*	*Left or right Side*	*Name of Stoppages*
There is no existing features				

4.11 Utilities and Services

Electric lines and other utilities services (electric / telephone poles) have been observed existing in the proposed alignment (ROW) road. The details given below:

Chainage in "M"	*Nos of poles*	*Left or right Side*	*Distance from C/L (m)*
Saradhu to Phulbasia			
There is no existing features			

4.12 Submergence

As confirmed from local inquiry during the reconnaissance survey, no submerged or overtopped sections are found during the rainy seasons.

4.13 Structures

4.13.1 Religious Structures

There are is no religious structures close to the formation edge on Saradhu to Phulbasia that may influence the horizontal alignment while evolving improvement proposal.

Saradhu to Phulbasia.

Chainage (Km)	*Structure*	*Distance from C/L (m)*	*Location*

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4.14 Details of Ongoing Works

As per the investigation and Survey carried out along the project road section, there are no ongoing works being spotted.

4.4 Railway Crossings

There is no railway crossing on the Project road, **Saradhu to Phulbasia**.

4.5 Cross Section

The existing cross-sections of the Project road vary throughout the length. Since the project road is plain and hilly. The formation width varies between 10.0 m and 25.0 m in general. The earthen flank width varies between 0.90 m. and 1.20 m. The depth of valley side and the height of hill side vary along the entire stretch of the road.

4.6 Pavement

There is no existing road.

4.7 Right of Way

The right of way (ROW) is not demarcated on the ground. There is sufficient acquired land by CCL, which could be provide for proposed ROW as per IRC 73-1980. The proposed ROW is 45.0 m. (Normal) in open areas.

4.8 Drainage

Project road, **Saradhu to Phulbasia**, is a complete new alignment. We have proposed drainage (sausage drain) according to grade of existing ground and cross section.

4.9 Bridges & Culverts

Bridges

Along the project road there is no existing bridge. The summary of existing bridges is given below:

Structure Type	Saradhu to Phulbasia	
	Major	Minor
RCC Bridge	Nil	Nil

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Culverts

There is no existing culvert on the Project road. Culvert Inventory is summarized below:

Type	Saradhu to Phulbasia
Slab	Nil
Hume Pipe	Nil
Total	Nil

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4.15 Critical Sections

There are a few problem areas along the Project road that will require site specific designs. These include:

i. Junctions with Link Roads
ii. Approaches to bridges
iii. Forest land at start of project road

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5 ENGINEERING SURVEYS AND INVESTIGATIONS:

5.1 Introduction:

General:

The following surveys and investigations have been carried out on the Project road for collection of relevant data for incorporation into the DPR.

- topographic surveys;
- traffic surveys;
- road and pavement condition survey;
- culverts and bridges condition survey;
- material surveys;
- geotechnical investigations and subsoil exploration; and
- existing utilities surveys.

Site Specific:

The Project road is a complete new alignment with 2 lane road configuration. CCL, Ranchi, Jharkhand, has entrusted to the NBCC, Ranchi, Jharkhand, Construction Agency (Consultant-Pioneer Geomatics Engineering Pvt. Ltd.) requires the DPR to be prepared on the basis of new construction of Saradhu to Phulbasia Road (Length – 7.985 Km) for a design period of 15 years.

5.2 Topographical Survey:

5.2.1 Objective and Scope:

General:

The topographic survey was carried out to:

- Determine the existing geometry of the road;
- Measure reduced levels along the existing road centre line and in the survey corridor for a width upto 50 m; and
- Identify obstructions and constraints to the improvement of the existing facility.

The topographic survey was carried out in following sequence:

- Construction of GPS and Temporary Bench Mark (TBM) control point pillars;
- Traverse with GPS and Total Station;
- Level transfer from the Survey of India GTS bench mark where these marks were available;
- Detailed physical survey;
- Measurement of long section and cross sections; and
- Mapping.

Site Specific:

There are no site specific requirements

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5.2.2 Features of Survey:

General

Bench Marks - Reduced levels of all control stations, GPS, traverse stations and benchmarks have been established by carrying out two way leveling using auto levels. The reduced level reference for the Project road was adopted from a DGPS measurement at Amingaon I.B and this GPS elevation was adopted as the starting elevation of the survey.

Pillar Construction - For the quality assurance of the Project and future referencing, reference pillars and Temporary Bench Marks (BMs) have been established. Control TBM pillars of size 150 mm x 150 mm x 450 mm have been fixed at interval of 250 m along the Project road. One nail of 75 mm has been fixed in the center of pillar to mark the control point. The pillars were painted yellow with reference number and reduced level painted in black paint on the pillar. Reference pillars have been established by GPS at every 5 km interval for establishing X, Y coordinates.

Total Station Traverse - A total station traverse was run in between the 5 km GPS control points. The traverse was connected to all control pillars and established a traverse point along the edge of the existing road. The closing error of the traverse was found to be within the permissible error limits.

Leveling - A closed circuit leveling line was run along the project road for its entire length. The values were marked on TBM's, secondary control points and the permanent structures.

Data Captured - The topographic survey captured the essential ground features along the alignment. It included building and their associated features, monuments, burial grounds, places of worship, railway crossings , streams, rivers and canals, water mains, trees and plantations, utility services such as electric and telephone lines, optic fiber cable (OFC).

Longitudinal Sections and Cross Sections - The longitudinal sections have been prepared by recording reduced levels at 25 m intervals on straight sections of road and closer interval at curves and summit areas.

The cross sections have been taken at 50m intervals in general and closer interval at curves.
The cross section points have been taken as follows:

- centre line point;
- edges of the road;
- edges of shoulders;
- toe of the embankment
- at every 5 m or closer (where it is necessary) from the toe point of the embankment or cut out to the ROW limit or width of survey corridor whichever is more.

At the culvert and bridges location, the survey was extended both up and down stream of the stream or river.

Ground Verification - On completion of the topographic detailed survey, a base map was prepared and data collected verified on the ground. The data was corrected as necessary.

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Site Specific

Instruments Used for Survey - The following precision survey instruments were used for the topographic survey:

Total Station – TS02 (Make- Lieca)
DGPS – GPS 1200

GPS Traverse - GPS readings were collected in UTM mode for a period of up to 24 hours for the base station and using the same method all GPS control points every 5 km were established. At the 5 km control point GPS readings were collected continuously for 3 to 4 hour periods for best results.

Mapping - The mapping was undertaken using ACAD 2014 software. All the data has been provided in code x, y, z in AutoCAD formats. All the mapping work was carried out at site.

5.3 Traffic Surveys

Traffic surveys are an essential task to assess the likely quantum and composition of traffic over the design period on any highway project. But this is a new alignment. So there is no traffic movement right now. This is a proposed mining haulage road. So we have designed as estimated traffic volume as instructed by NBCC and CCL.

5.4 Road Inventory & Condition Survey

The Project road feasibility study envisaged for new construction of total project road. Detailed survey has carried out according to site condition (Suitable grade and engineering feasibility, after reconnaissance survey) and cost effective.

Site Specific

There were no site specific issues.

A. Road Inventory

General

The road inventory data was collected along the Project road by actual verification and measurements. The data collected has been compiled in the format provided in IRC: SP: 19-2001

Site Specific

There were no site specific issues.

B. Condition Survey

General

To carry out comprehensive study of the existing road embankment and pavement condition, the following investigations were undertaken:

- test pit Investigations;
- subgrade characteristics investigations.

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Test pits of approx. 1.5 m x 1.5 m size, staggered on both sides of pavement, were excavated through the pavement crust up to subgrade level at regular interval of 1.0 km for the full length of the Project road. The main purpose of the test pits was to provide information on the composition of the existing pavement and to provide information of the subgrade type and strength.

Field testing and sampling for subsequent laboratory testing was carried out at 1.0 km intervals to broadly gauge the homogeneity of the subgrade soil and strength.

The process followed is described below:

- Excavation was extended from the pavement crust to subgrade level;
- Height and 60^0 cone having a diameter of 20 mm, was carried out to subgrade level;
- The field moisture content was determined on site using Speedy Moisture equipment;
- Field density and natural moisture content of subgrade were determined by sand replacement method conducted at each pit;
- A remolded sample of the subgrade material was collected and airtight stored for subsequent laboratory testing of the field moisture content;
- Three undisturbed samples of the subgrade material were collected in CBR moulds using core cutting equipment. The bulk (wet) density of each sample was determined on site by weighing;
- A remolded sample (approx. 20 kg) of the subgrade material was collected for subsequent laboratory testing; and
- The thickness of each pavement layer was recorded and a visual description of the individual layers made.

Laboratory testing has been carried out in accordance with the test program described in Table 5.2.

Table 5.2.Test Program for Laboratory Testing

Test	Test method	Frequency
Test pits through pavement crust: subgrade materials	IS 2720 (Part 16)	Note 1
CBR, 4 days soaked, on 3 undisturbed samples, including determination of in-situ dry density	IS 2720 (Part 16)	Note 1
In-situ moisture content	IS 2720 (Part 2)	Note 1
Grading	IS 2720 (Part 4)	Note 1
Atterberg limits	IS 2720 (Part 5)	Note 1
Determination of soil classification	IS 1498-1987	Note 1
Moisture/density relationship	IS 2720 (Part 8)	Note 1

Note 1: At 1.0 Km interval

Site Specific

There were no site specific issues.

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5.5 Condition Survey of Bridges and Culverts:

5.5.1 General:

Detailed inspection of the drainage structures have been carried out by a team of engineers and support staff.

Bridges:

The bridges are classified as major or minor depending on their span as shown hereunder:

- Minor bridges - above 6 m to 60 m
- Major Bridges - Above 60 m

Bridge Condition Survey Report is appended to in the Design Report Vol.II, Part-2 Bridge Works.

Site Specific

There is no existing bridge.

Culverts

There is no existing culvert as given in Annexure 5.2. Summary of existing culverts is given below:

Type	No. of CD
Slab	Nil
Hume Pipe	Nil
Total	Nil

5.5.2 Hydrological Study:

5.5.3 Introduction:

General:

The hydrology study is divided into two parts:

1. a hydraulic study for new slab culvert proposed for construction.

The likely discharges through existing bridges and culverts are determined from local enquiries and visible signs including Highest Flood Level (HFL) of bridges and wetted perimeter of culverts. Catchments of rivers, streams, and nallahs are marked on the drainage map (when one is available) and the catchments areas are determined. The peak discharge is determined using Dickens' formula in case of new slab culvert proposed for construction. For the new slab culvert proposed for construction, detailed hydrological studies have been carried out to assess the requirement of water way and the report has been given separately in Volume II Design Report-CD works.

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Site Specific

The Project road passes through plain & hilly terrain. Based on the hydrological investigations, new construction of CD structure has to be proposed.

5.5.4 Material Investigations and Surveys

General

Material investigations and surveys are conducted in two parts:

1. Investigations of existing embankment, subgrade and pavement.
2. Materials investigations and surveys for proposed construction/ strengthening.

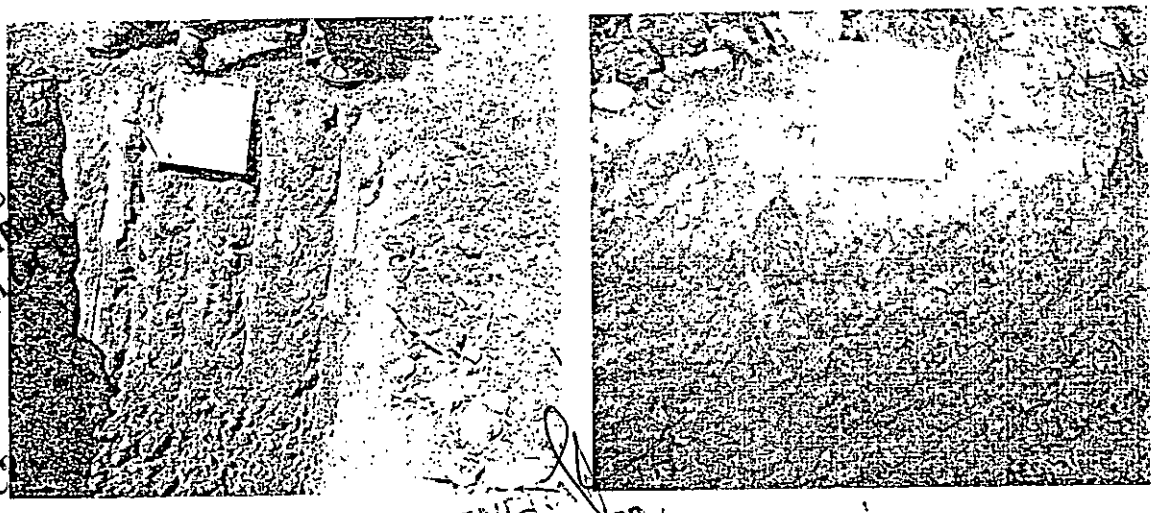
The detailed studies are incorporated in a separate volume i.e. Volume-3 Material Report".

The naturally occurring granular sub-base materials (GSB) materials have been tested for Californian Bearing Ratio (CBR), Liquid Limit (LL) and Plasticity Index (PI) to determine if they meet the specification requirements.

Water Mixed Macadam is proposed for the base course. The quarry chart, indicating the existing and prospective quarries and crusher sites is shown in Volume 3- Road Index and quarry maps. The samples collected from the quarries and crushers have been tested for the specification requirements of the MORT&H Specification. The detailed studies are incorporated in Volume 3 – Material Report of this DPR.

Site Specific

Suitable quarries for the pavement GSB have been identified in the Project road corridors. These materials in their natural state, do not satisfy the grading requirement of the MORT&H Specification, They have to be blended with crushed aggregates in appropriate proportion to meet the project specific grading requirement.



5.6 Tree

General

The project roads pass through plain, little portion of hill area, ponds, agricultural and built-up areas. There is forest area (mostly busses and other trees are less girth) along the Project road.

Site Specific

A numbers of trees shall need to be felled while construction of complete new alignment project road. The extent and details of trees to be affected shall be actually assessed while marking the corridor of impact.

5.7 Utilities

General

Existing utilities like electric lines and poles, transformers, telephone poles/cables, optic fibre cables (OFCs) and other services falling within the existing ROW have been located during topographic surveys.

Site Specific

Electric poles are existing within the proposed ROW, these are listed in Chapter 4. Other utilities within the corridor of impact likely to be affected, if any, due to the proposed improvement proposals shall be actually assessed while marking the corridor of impact and proposal marked for shifting and incorporated in the final DPR.

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IMPROVEMENT PROPOSAL FOR CD WORKS

Project Road Name : Two lane width with pave shoulder configuration mining haulage road between Saradhu to Phulbasia, Jharkhand.

State : Jharkhand

Annexure-5.2

Sl. No.	Existing Culvert Details				Proposed Culvert Details					
	Chainage (km)	Type	Size (No. x Span length) (m)	Width of Culvert (m)	CD No.	Chainage (km)	Type	Size (No. x Span length) (m)	Proposed Width of Culvert (m)	New Construction (m)
1	---	---	---	---	2/1	1+010	Slab Culvert	1 x 6.0	12.0	New Construction
2	---	---	---	---	2/2	1+472	Slab Culvert	1 x 6.0	12.0	New Construction
3	---	---	---	---	2/3	1+885	Concrete Bridge	87	12.0	New Construction
4	---	---	---	---	3/1	2+418	Concrete Bridge	24	12.0	New Construction
5	---	---	---	---	3/2	2+590	Slab Culvert	1 x 6.0	12.0	New Construction
6	---	---	---	---	3/4	2+822	Concrete Bridge	115	12.0	New Construction
7	---	---	---	---	4/1	3+075	Slab Culvert	1 x 6.0	12.0	New Construction
8	---	---	---	---	5/1	4+000	Slab Culvert	1 x 6.0	12.0	New Construction
9	---	---	---	---	5/2	4+534	Slab Culvert	1 x 6.0	12.0	New Construction
10	---	---	---	---	6/1	5+050	Slab Culvert	1 x 6.0	12.0	New Construction
11	---	---	---	---	6/2	5+595	Concrete Bridge	104	12.0	New Construction
12	---	---	---	---	7/1	6+575	Slab Culvert	1 x 6.0	12.0	New Construction
13	---	---	---	---	8/1	7+090	Slab Culvert	1 x 6.0	12.0	New Construction
14	---	---	---	---	8/2	7+675	Slab Culvert	1 x 6.0	12.0	New Construction
15	---	---	---	---	8/3	7+864	Concrete Bridge	102	12.0	New Construction

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TRAFFIC SURVEYS

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6 Traffic Surveys

6.1 General

As per norms, consultant carrying out following field traffic studies/surveys at identified locations.

- Classified Traffic Volume Count (CTVC)
- Origin-Destination (OD) and Commodity Movement Survey
- Turning Movement Survey
- Axle Load Surveys
- Speed Delay Surveys

But this is a new alignment, whereas there no existing road (either earthen or else). It is connecting to SH-7 and the project road has to be used for mining haulage road of CCL.

6.2 Objectives of the Traffic Surveys

The main objectives of the traffic surveys are:

- To assess the volume of traffic flows along the project roads and their characteristics.
- To assess the origin and destination of passenger flow by mode.
- To assess the origin and destination of commodity flows with type and quantity of commodity carried
- Accident spot study and review past accident data
- To assess the axle load distribution and estimate the Vehicle Damage Factor (VDF) used in the pavement design.
- Turning movement surveys at selected locations
- To assess the pedestrian flows at selected locations
- To assess the speeds on stretches of highway and identify the congested areas

6.3 Description of Project Road

The project road, as per TOR, designated as **Saradhu to Phulbasia Road** - length of 7.985 km, are considered in one package for the DPR study.

6.4 Existing Traffic Characteristics

There is no existing road along the proposed project road.

In order to assess the projected traffic conditions on the project road after completion of the above said road would be according to mining excavation capacity and transportation of the same. The detailed has provided in traffic data sheet.

Data Source: Informed by NBCC, Ranchi, confirmed from CCL Officials at Ranchi.

The classified vehicle types having different sizes and characteristics were converted into equivalent passenger car units. The Passenger Car Unit (PCU) factors recommended by

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Indian Road Congress in "Guidelines for Capacity of Roads in Rural Areas" (IRC-64-1990) used for conversion are presented below:

PCU Factors Adopted for Study

Fast Vehicles	PCU	*Slow Vehicles*	*PCU*
Car	1.0	Agricultural Tractor	1.5
Mini Bus	1.5	Agricultural Tractor &	4.5
Standard Bus	3.0	Trailer	6.0
LCV	1.5	Animal Drawn	0.5
2 Axle Truck	3.0	Cycle	2.0
3 Axle Truck	3.0	Cycle Rickshaw	8.0
MAV	4.5	Hand Drawn Cart	
Two Wheeler	0.5		
Auto Rickshaw	1.0		
Van/Tempo	1.0		

Source: IRC: 64-1990

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उप मो एल०. राँची
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C.C.L., Ranchi

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NRIPENDRA NATH
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THE DESIGN

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7 THE DESIGN:

7.1 Introduction:

General:

The new alignment proposal Project road **Saradhu to Phulbasia** in **Chatra** and **Latehar District** specifies for new construction. The design of the Project roads incorporates the following design components:

- Analysis of future traffic projections;
- Analysis of soil strata along the project road;
- Determination of new cross drainage structures.
- Determination of adequacy of the road's geometry (horizontal as well as vertical); and
- Ensuring road safety aspects are addressed.

Site Specific:

This design proposal covers one Project road section.

Saradhu to Phulbasia Road

The above road section, between **Saradhu to Phulbasia** is a continuous set of engineering features and as such it has been proposed to evolve a Detailed Project Report to asses the technical viability and feasibility of the Project road.

The Project road lies in plain & hilly terrain.

7.2 Lane Configuration:

This aspect of the design was addressed in Chapter 6 of this report.

Site Specific:

This mining haulage road, carrying heavy traffic, proposed project road to be 2- lane standard.

7.3 Horizontal Alignment:

General:

The alignment design is based on a number of parameters with varying weightages. The principles for alignment selection have been reached by discussions with bridge and highway engineers, environmental and social impact assessment teams as part of this design process. The selection of the alignment is broadly based on the following criteria:

- Technical soundness and economic viability;

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- Maximum comfort to road users.
- Reducing adverse impact on religious structures along the road.
- Reducing impacts on water bodies and other environmental features such as trees and plantations
- Providing safety to road users.
- Finding suitable locations for viaducts, culverts.

Site Specific:

This is totally new alignment.

7.4 Formation Width:

General:

The project road is proposed to be new construction of two lane standards.

Site Specific:

Formation width for the proposed two lane configuration shall be 12.0 m. All new structures shall be 12.0 m in width, carriageway width 7.0 m and Roadway width 12.0 m

7.5 Carriageway Width:

General:

The carriageway with design has been discussed in Chapter 6 of this report. The widening scheme viz-a-viz existing road is shown in Volume 5 (Drawings) Part 1 – Road Works.

Site Specific:

There is no existing road.

7.6 Right of Way:

General:

After detailed deliberations with the CCL, it has been decided that the new proposal be accommodated within the previously acquire land, by appropriate design detailing to avoiding adverse social impacts and resettlement & rehabilitation issues.

Site Specific:

The normal ROW as per IRC: 73-1980 for two lane is 45 m in open areas for plain and rolling terrain. Since the land acquisition shall not be necessary to for the proposal. Because land has been already acquired by the CCL.

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7.7 Cross-Drainage Structures:

General:

There is no existing CD structure; culverts, and bridges along the project road. Based on detailed topographic survey, condition survey and hydraulic studies, it is revealed that cross-drainage structures have to be newly constructed.

Site Specific

Details of new construction proposal for proposed culverts are given in Annexure- 5.2. The summary of improvement proposal is as under.

Particulars	Saradhu to Phulbasia Road			
	Causeway	Slab	HP	Total
No. of existing culverts	-	-	-	-
Proposed to be new construction	-	10	-	10

Bridges:

General

The bridge details and present condition of existing bridges have been described in Design Report Vol.-2 "Design Report Part 2 Bridge Works". The bridge inventory at Annexure 5.1 summarizes the physical features of the existing bridges.

Site Specific

There are 5 no.'s proposed RCC bridges on the Project road.

7.7.1 Design Parameters for new construction:

General

The design is based on IRC 37-2012.

The design methodology is described in detail in DPR Volume 2 Part 1 Road Works and summarized below. The method of design recommended is a modification of the CBR method incorporating mechanistic approach.

For design of heavily trafficked road carrying design life traffic from 1 cumulative million standard axles (CMSA) to 150 CMSA, a design catalogue providing standard pavement compositions is provided in Plate 1 and 2 of IRC: 37-2012. Plate 1 and 2 provide nine Subgrade CBR values ranging from 2 per cent to 10 per cent. The design pavement compositions specified in Plate 1 and 2 are relevant to Indian conditions, materials and specifications. Where any change in layer thickness and specification is considered desirable

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from practical reasons, the composition can be suitably modified using an analytical approach.

The current MORT&H specifications for Road & Bridge works (5th Revision, 2013) recommend that the subgrade shall be compacted to 98 % of dry density obtained with heavy compaction as per IS: 2720 (part-8) 1983.

Granular sub-base materials conforming to clause 401 of MORT&H specifications of Road & Bridge works with Liquid Limit and Plasticity Index of not more than 25 and 6 respectively, and CBR not less than 25% with minimum thickness of 150 mm are recommended for use.

Site Specific

Indicative pavement composition for new construction of the Project road is as under for design subgrade value of 7 %.

GSB	230 mm
WMM	250 mm
DBM	120 mm
BC	50 mm

The existing subgrade soaked CBR values and the sample of soil taken from borrow areas in the Project road section are as under (as per Material Report, Volume -3).

Sl. No.	Project Road	Soaked CBR for existing subgrade
1	Saradhu to Phulbasia	(6.53 to 7.32)%

It is proposed to adopt following subgrade design CBR for the purpose of Pavement Design.

Sl. No.	Project Road	Design CBR %
1	Saradhu to Phulbasia	7 %

Above design subgrade values are adopted in order to ensure that minimum CBR soil shall at least be available from the borrow areas.

7.7.2 Drains

General

These drains are the intercepting drains for surface runoff and are designated as side drains, depending on their location and formation. The design of drains is discussed at length in the Design Report Vol.2 – Part 1 Road Works.

Site Specific

Proposed sausage drain has provided in hilly area. From the surface run off from the road carriageway and discharge into nearest outfall.

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Summary of Drain Length in Project road (Proposed)

Sl. No.	Chainage		Length	Side	Drain Length in (m).	Remarks
	From	To	(m)		Sausage Drain	
1	2	3	4	5	6	7
1	0+800	0+950	150.00	Both	300.00	
2	0+950	1+010	60.00	LHS	60.00	
3	1+250	1+450	200.00	Both	400.00	
4	1+472	1+800	328.00	Both	656.00	
5	2+950	3+500	550.00	Both	1100.00	
6	4+250	4+534	284.00	Both	568.00	
7	4+550	5+000	450.00	Both	900.00	
8	5+100	5+300	200.00	Both	400.00	
9	6+250	6+500	250.00	Both	500.00	
10	6+850	7+090	240.00	Both	480.00	
11	7+096	7+350	254.00	Both	508.00	
TOTAL			**2966.00**		**5872.00**	
Total Length of the Sausage Drain				5872.00		
Total Length of Drain				**5872.00**		

7.8 Railway Crossing:

There is no railway crossing on the Project road between **Saradhu to Phulbasia.**

7.9 Junctions and Intersections:

General:

Existing junctions and intersections on the Project roads are deficient in layout and geometrics for easy & safe movement of traffic. Major junctions & intersections are designed in accordance with the peak hour projections of turning vehicles based on traffic movement surveys.

For minor junctions, the type designs as per IRC SP: 41-1994 are proposed to be followed. However, design of junctions/intersections is subject to constraint due to limited availability of ROW. For these locations, the standard designs may need to be adjusted during the construction to suit ground conditions.

Details of Junctions/intersections -Saradhu to Phulbasia Road

Sl. No.	Chainage (Km.)	Left or Right Side	Description	Road Going to
1.	3+640	Left	Earthen Road	To Balumath Road

2.	3+640	Right	Earthen Road	To Hahurwa Tola
3.	4+257	Right	Earthen Road	To Amradih Tola
4.	4+257	Left	Earthen Road	To Balumath Road
5.	4+515	Right	Earthen Road	To Amradih Tola
6.	4+515	Left	Earthen Road	To Chamatu
7.	5+022	Right	Earthen Road	To Amradih Tola
8.	5+022	Left	Earthen Road	To Chamatu
9.	5+434	Right	Earthen Road	Amradih Tola
10.	5+434	Left	Earthen Road	To Balumath Road
11.	6+000	Left	Earthen Road	To Balumath Road
12.	6+051	Right	Earthen Road	To Marawadih
13.	6+418	Right	Earthen Road	To Bahear Tola
14.	6+418	Left	Earthen Road	To Chamatu
15.	7+985	Right	Pucca Road	To Balumah
16.	7+985	Left	Pucca Road	To Chamatu

Site Specific:

Junctions / intersections / Service proposed for improvement.

7.10 **KM Stones and Hectometre Stone (At 200 M) & Boundary Pillars:**

General:

Where required,5th Km, KM Stones, 200 Meter stones and Boundary Pillars will be designed in accordance with the provision in IRC codes IRC: 8-1980, IRC: 26-1967 and IRC: 25-1967 respectively.

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Site Specific:

There is no existing alignment.

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Traffic Signs:

General:

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Road Traffic signs are proposed as per IRC: 67:2001 and Clause 800 of MORT&H Specifications and in broad guidelines in IRC: 31-1969 and IRC: SP: 31-1992 "Traffic

signs". The traffic signs shall be with retro-reflective materials as per standard design. The road signs are of three types as shown here under:

(i) Cautionary Signs: These are equilateral triangle in shape, 60 cm length of each side, and are meant to caution the traffic on the road. These cover following locations / objects:

- junctions / intersections
- curves
- pedestrian crossings
- schools, colleges, University, Religious place.
- gaps in median, variation in lane configuration etc.
- Narrow structures.

(ii) Mandatory Signs: These signs are mandatory by law and violators can be prosecuted. These are circular in shape, 60 cm. dia and depict following in general:

- speed limit
- no parking, no entry, one way sign, compulsory turns, give way
- overtaking prohibited zone,
- turns prohibited

(iii) Informatory Signs: These are informatory signs giving locational information in general. The size of the board depends upon the information to be depicted.

The traffic signs do not exist on the Project roads.

Site Specific:

There are no issues specific to the Project roads.

Where absolutely essential these signs are proposed in accordance with the above specifications and guidelines. These signs are shown and incorporated in the Drawings Volume -5 of this DPR.

7.12 Traffic Safety features

General

The project road lacks in required traffic safety features such as traffic signals, road safety barriers, delineators and footpaths etc that should ensure safety of road users, vehicles and pedestrians as well as the road side population, through built-up areas especially near schools, educational institutions, commercial areas, religious places and other public utility locations. Following traffic safety provisions are proposed along the project road.

- Road Delineators

Road delineators are hazard markers fixed along road side, on shoulders, near bridges and structures and high embankments and such locations which could be hazardous to the traffic on the road. The design and materials for road delineators as well as the locations where these are to be fixed shall conform to the guidelines as per IRC: 79-1981. The normally adopted road delineators include:

- Triangular object Marker - These are 300 mm side reflective triangular markers with red reflectors. These are fixed at corners of islands to identify the obstructions at an intersection/junction.
- Rectangular Hazard Marker - These are rectangular plates 600 m x 300 m in size with retro-reflective sheeting and are fixed close to the parapets of the structure, to delineate the existing obstructions especially narrow structures.
- R.C.C. Guide Posts - These are 1 m RCC hume pipe posts, 30 cm dia in NP2 type and are fixed on curves, and at every 100 m interval and opposite 200m stones and km stones. These guide posts delineate the edge of formation.
- Metal Beam Crash Barriers - Metal beam crash barriers made out of corrugated sheet steel beams are proposed to be located on approaches to bridge structures, locations where the embankment height is more than 3m and at horizontal curves, with radius less than 250m. Steel beam elements and terminal sections are galvanized, conforming to IS Specifications. The Specifications shall conform to clause 810 of MORT&H Specifications for Road and Bridge Works.

Site Specific:

R.C.C. Guard Posts:

Guard Posts / Roadway delineators, have been proposed, as per above proposal / guidelines along the Project roads. The details are given in Vol.-4 Cost Estimate of the DPR and drawings appended to in Vol.-5 Drawings (Road Works).

Metal Beam Crash Barriers: Locations, where Metal Beam Crash Barriers are proposed on horizontal curve locations.

7.13 Protection Works:

General

Protection works along road side include construction of breast walls; retaining walls as required against damage by land slide/flowing water. Construction of the various components of the protection works shall conform to IRC: 89-1985. In addition to above, where there this ROW constraint particularly in built up areas. Breast walls / retaining walls are proposed so that the shoulder and embankment is contained within the available ROW.

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Site Specific

Since the Project Road is in hilly and forest areas. It is proposed to protect the erosion, protection work has to be provided according to site.

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Summary of Protection work (Wall) Length in Project road (Proposed)

Sl. No.	Chainage		Length	Side	Retaining Wall	Height	Remarks
	From	To	(m)				
1	0+800	0+900	100.00	Left	100.00	4	
	0+800	0+910	110.00	Right	110.00	3	
	1+250	1+400	150.00	Both	300.00	5	
	1+550	1+700	150.00	Both	300.00	5	
	1+700	1+750	50.00	Both	100.00	3	
	2+950	3+050	100.00	Both	200.00	3	
	3+150	3+400	250.00	Both	500.00	3	
	4+600	4+950	350.00	Both	700.00	3	
	5+150	5+250	100.00	Both	200.00	3	
	6+300	6+400	100.00	Both	200.00	3	
	6+850	7+000	150.00	Both	300.00	3	
	7+200	7+300	100.00	Both	200.00	3	
Total			**1710.00**		**3210.00**		
Total Length of the Retaining Wall				3210.00			
Total				**3210.00**			

7.14 Arboriculture & Landscaping:

General:

Road side tree plantations along the existing Project road side is currently lacking in many stretches. It is proposed to provide road side evergreen shade trees along the full length of the Project road to enhance the environment and road side aesthetics. The road side plantation shall be as per NHAI guidelines and a forestation Policy under the Forest Conservation Act-1980.

Care needs to be taken to choose similar species to those that already exists. It is essential that mixtures of different species be avoided and avenues of a single species be planted on long stretches to enhance aesthetic quality. The planting pattern will depend upon the available ROW. Plantation patterns shall be decided at time of construction. Planting of trees will form part of the civil works contracts. One option is for the contractor to pay the Forest Department to do this work. This practice has been followed successfully in other states.

Site Specific

We have proposed Turfing with Sods and tree planting for the Project road.

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7.15 Bus bay:

General:

No designated bus bays exist on the project road. Buses currently park on the main carriageway while embarking / disembarking passengers thereby causing obstruction to movement of through traffic. The bus bays shall be provided in accordance with IRC: 80-1991 and IRC: SP: 12-1998. The pavement composition for bus bays shall be same as for widening of the existing road.

Site Specific

There are no bus bays on the Project road.

7.16 Utilities

General

In general along any road, the following overhead and underground utilities are to be found crossing the Project road or within the road's ROW:

- low tension (LT) and high tension (HT) overhead power distribution lines with transformers;
- telephone lines and cables, both over and underground including optic fibre cables (OFC) along the road; and
- water mains.

The details of these utilities along with location identified during topographic surveys are shown in Volume-5, Part 1 of the DPR (drawings). The shifting of utilities has been avoided as far as possible.

Site Specific:

This is newly proposed road. So there are no significant site specific services issues.

7.17 Road Construction Materials:

General

Embankment and Subgrade - Material surveys have been carried out for identification of the borrow areas. The material survey report is contained in Volume -3 of the DPR The soil for embankment and sub grade, as available, shall have CBR value not less than design CBR i.e 7%.

Granular Sub Base - For granular sub base course, naturally occurring aggregates confirming to MORT&H Specifications Clause 401.2 satisfying the grading requirements as per Table 400.2 for coarse graded granular sub base materials (Grading – I) and Grading –I I) are proposed. In case such materials are not naturally available, crushed materials confirming to the required grading will need to be produced and/or blended with naturally occurring aggregates, to meet grading requirement. Material surveys have been carried out for identification of the borrow areas and quarries. The Material Survey Report is contained in Volume -3 of the DPR.

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CENTRAL COALFIELDS LIMITED
DARBHANGA HOUSE: RANCHI

Sub: Forwarding Minutes of the 419th (No.7 of 2015) Meeting of the Board of Directors held on 27.11.2015

Extract from the minutes of the above meeting, in respect of following item, is appended below:

Item No. 4(5) Proposal seeking approval/ratification of Scheme/ Estimate for Construction of Road from Saradhu to Police Chowki near Tandwa Road proposed to be executed by NBCC as Project Management Consultant(PMC) under MoU with CCL.

Item No. 4(6) Proposal seeking approval/ratification of Scheme/ estimate for Construction of Road from Binglat to Balumath via Centre Point of Amrapali and Saradhu proposed to be executed by NBCC as PMC under MoU with CCL.

&

Item No. 4(7) Proposal seeking approval/ratification of Scheme/ estimate for Construction of Road from Barkagaon to Base Workshop Urimari proposed to be executed by NBCC as PMC under MoU with CCL.

During deliberations, the Board wanted to know, whether NBCC, known for construction of buildings, has constructed some roads/bridges as well in the past.

The Board was apprised that –

I. A few of the major bridge works along with approach road completed by NBCC in India are as below:-
   1.On G.T. road over river Sutlez near Ludhiana, Bridge length – 1800m
   2.Six lane Bridge over river Yamuna near ISBT at New Delhi – Asia's widest Bridge Bridge length - 560 m
   3.High level Bridge over river Kiul near Jamnui , Bihar,Bridge length – 360m
   4.High level Bridge over river Ulai near Gidhor , Jhajha , Bihar,Bridge length – 180m

II. A few of the NBCC road work projects completed and ongoing are as below:-
   1.PMGSY roads (620 nos.) for Govt. of Bihar valuing Rs 1700 Crore (Approx)
   2.PMGSY roads (240 nos) for Govt. of Jharkhand valuing Rs 280 Crore (Approx)
   3.PMGSY roads works for Govt. of Tripura valuing Rs 1600 Crore (Approx)
   4.PMGSY roads works for West Bengal Govt. valuing Rs 600 crore (Approx)
   5.PMGSY roads works for Orissa Govt. valuing Rs 1200 Crore (Approx)

III. One of the major Road work in Nepal namely Mahakali Highway has also been Constructed by NBCC.

IV. The Board was further apprised that-
   1. Roads under the proposal are required to be constructed urgently and expeditiously for evacuation and inturn, production of coal from Magadh & Amrapali Mines of CCL, so that the Company can achieve its targeted coal production.
   2. There is acute shortage of Civil Engineers in CCL competent to get such types of heavy duty roads constructed.
   3. One of these roads was initially entrusted to Jharkhand State Highway Authority for early construction but could not materialize, because of various reasons.
   4. Construction of one of these roads (Barkagaon to Urimari Base Workshop) is being pursued continuously by Hon'ble Minister of State (Finance), Mr. Jayant Sinha, at whose behest NOC was given by the State Govt. on 31.12.2014.

V. These roads are urgently required to solve the day to day problem of evacuation of coal from various mines such as Magadh and Amrapali mines etc. The construction of these roads will help in meeting the target of coal production of CCL, which in turn will help in achieving the target of coal production fixed by CIL and MOC to meet the demand of coal for the nation. If these roads are not constructed, it will lead to severe loss of despatch and production.

In view of the above, after detailed deliberation, the Board accorded approval to the subject proposal/ scheme and Draft MoU with NBCC, as brought out in the agenda note.

However, the Board directed that –

1.Work should be carried out strictly as per the guidelines of CVC and other relevant guidelines.
2.Civil department of CCL should meticulously monitor the work, right from the beginning till completion.
3.NBCC's service charges @ 8.5% of the project cost should be capped with a ceiling amount in each case.

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Magadh Project

Further, the Board directed that a medium term plan should be drawn for construction of roads at various sites. Modalities for engaging the PMC shall be deliberated and decided in next meetings of the Board.

It is requested kindly to take necessary action on the decision, wherever necessary, under intimation to this office.

(CVN Gangaram) 28/11/15.
Dy.GM(Fin.)/Co.Secy.

GM(Civil)

Copy for kind information to - D(T/P&P), CCL.

No.CS/BM/419/2015/ 1420(A) Date: 28..11.2015

Project Officer
Magadh OCP

PENDRA NATH
Project Officer
Magadh Project