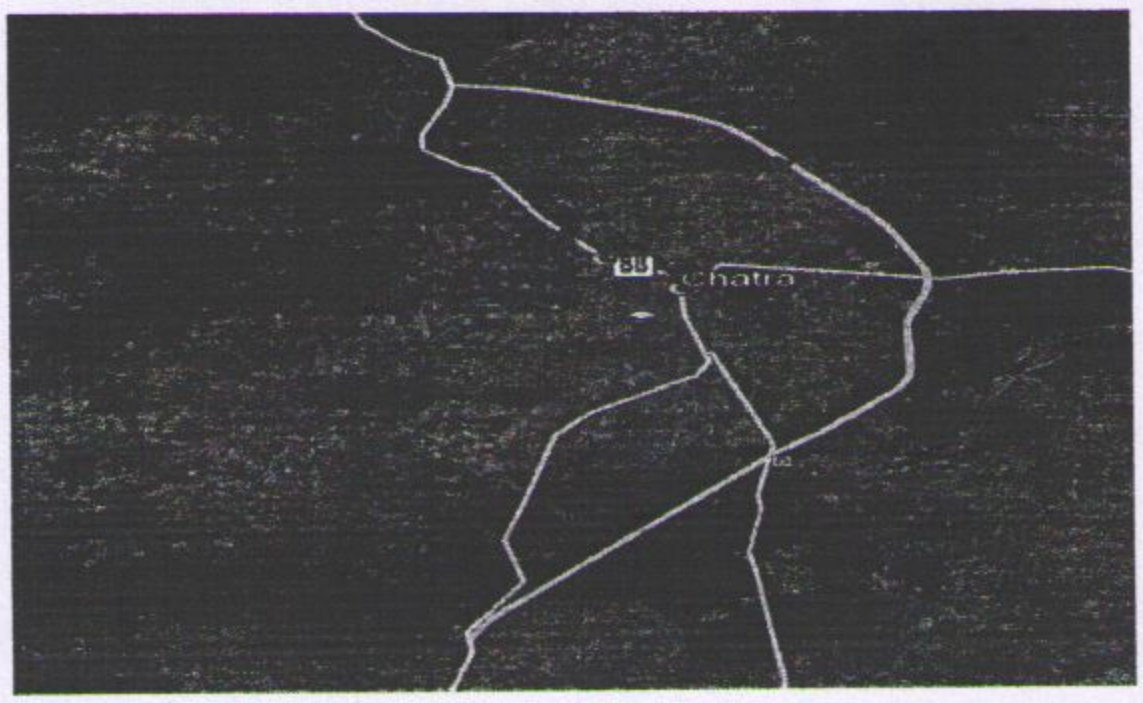
GOVERNMENT OF JHARKHAND
ROAD CONSTRUCTION DEPARTMENT

Name of Project: Consultancy services for preparation of feasibility report, Detail Survey/Investigation, Alignment Option & Detailed project Report for Chatra Bypass on NH-99,at Chatra in the State of Jharkhand. Total Length- 14.230 Km



DETAILED PROJECT REPORT

VOL-1 (1 OF 1)

EXECUTIVE SUMMARY REPORT

FEB – 2022

Submitted To: Executive Engineer
Advance Planning, Field Survey Division
Road Construction Department
Ranchi, Jharkhand

Prepared By: Cube Engitech Consultant Pvt. Ltd.
Ranchi, Jharkhand

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EXECUTIVE CUM MAIN SUMMARY REPORT

Sub: Construction of bypass around Chatra town of NH-22(Old NH-99) in the State of Jharkhand under EPC mode

1. Necessity of the work:

1.1 NH-99 is a National Highway in India within the states of Bihar and Jharkhand. NH-99 links Dobhi (NH 2) in Bihar and Chandwa in Jharkhand. It ends at the junction of NH 75 at Chandwa. The total length of NH-99 is 110 km.The Chatra Bypass is a necessity as the city portion has a very thin possibility to widen the road and it's a market area with shops on both sides of NH-99. Chatra stands at the crossing of NH-99 and NH-100. Further, Chatra-Chauparan road is an important state road in Chatra town and this state road ends on NH-19 (Grand Trunk Road) which is part of Golden Quadrilateral connecting Delhi-Kolkata. As reported, Chatra is densely populated town. Due to market area on both sides of NH-99 near Chatra town, traffic flow is obstructed and frequent no entry is imposed during day time on the National Highways. It is further to be mentioned that NH-100 also terminates at Chatra town resulting in further traffic congestion.

1.2 It is important to mention that Chatra district is one of the aspirational district of Jharkhand and also LWE district identified by Ministry of Home Affairs. The development of Chatra bypass will not only ease the traffic movement in the Chatra town but also elevate socio-economic status of the tribal population. The project road passes through villages Gulhutu village, Girwan, Arudana, Mohanadih, Dewaria, Banasam, Chaudharia village in Chatradistricts in the State of Jharkhand.

1.3 Due to large habitant in the market area, road safety issue is also a matter of concern for local administration. . Further, district of Chatra, gateway of Jharkhand has a number of tourist spots including waterfalls, fountains and Flora & Fauna. It attracts tourists from various districts of border state Bihar. Some of the tourist spots include Bhadrakali temple, Kunda Cave, Tamasin and Maa Kauleswary temple

1.4 Traffic volume based on traffic volume count survey and OD analysis on existing NH and connecting NH/SH on proposed bypass for4 lane section is12074PCU and for 2 lane Section is 7645PCU. As reported traffic survey has been conducted on 4 location i.e9797 PCUat km 42.0 of NH-22 (Darha village),7645 PCUat km 52.0 of NH-22 (Banasam village),6169 PCUat km 117.0of NH-100 (Pansala chowk),&6370 PCUat ChatraChouparan Road. Projected traffic in 2024 is 13312 PCU for 4 lane section and 8428 PCU on 2 lane section respectively. Accordingly, 4 lane configurations has been proposed from km 0.00to km 10.310 km and 2 lanes with paved shoulder from km 10.310 to km 14.230.

1.5 The Site of the Project Highway comprises the section of NH-22(Old NH-99) road from km 0.00 (Km 42.112 of NH22) and ends at Km 14.230approx (Km 54.701 of NH22). Proposed configuration of road stretch is in combination of 2-lane with paved shoulder and 4-lane as per traffic data.

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1.6 The proposed carriageway width has been taken as 21m for 4 lane and 10m for 2-lane with paved shoulder as reported by State RCD.

2.0.**Provisions of the estimate:** The estimate has been examined in the Regional office and following provisions are recommended:

2.1.**Detailed Project Report:** The Detailed Project Report is prepared by consultant M/s Cube Engitech Consultant Pvt. Ltd., Ranchi engaged by state RCD.

2.2.**Alignment:** Alignment of this bypass is entirely Greenfield alignment. Start point of this bypass is at km 42.112 and ends at km 54.701 of NH-22 (old NH-99).The alignment of the work was approved by Ministry vide Minutes of Meeting of presentation made before DG(RG) & SS held on 02.09.2020 issued vide this office letter no.RW/Ranchi/AP-01/2020-21 dated 04.09.2020.

2.3.**Scope of Work:** The proposed improvement on the above-mentioned stretch includes the following:

Sl. No.	Description	Details	
1	Length of the road	14.230Km	
2	Proposed road width for 4 lane with paved shoulder	27m(2x7m carriageway+2x2.5paved shoulder +5m Raised median+2x1.5m earthen shoulder width from km (0+000 to 10+310	
3	Proposed road width for 2 lane with paved shoulder	12m (7mcarriageway width+2x1.5paved shoulder +2x1.0m earthen shoulder width from km 10+310 to 14+230	
4	Proposed Length of Flexible pavement	14.230Km	
5	Length of Service road	(3896m with RE wall + 920m connecting service road+1040m Taper portion of service road to main carriageway)=5856m	
6	Proposed Crust Thickness (Flexible)	Main Carriageway Subgrade=500 mm `GSB=200mm WMM=250mm DBM=90mm BC=40mm	Service Road Subgrade = 500 mm GSB=200mm WMM=250mm DBM=60mm BC=30mm
7	Length of existing road to be strengthen	1000m (DBM=60mm, BC=40mm)	
8	Thrie beam crash barrier	13080m	
9	Proposed new culverts	10nos for 4 lane 6nos for 2 lanes.	
10	Construction of RE wall	2125.4m	
11	Construction of Toe-wall	8900m	

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12	SVUP/PUP/VUP	SVUP for 4 lane=1nos, PUP for 4 lane=1nos. &.VUP for 4 lane= 4nos.
13	Major Junction	2 nos.(Y Type)
14	Miscellaneous	Traffic sign = min.175nos., Printing new letter(min.114nos), Painting Lines, Dashes, Arrows(min.45sqm), Delineators(min.192nos.), road stud(min.7728nos), Road marking (min.8581sqm), Cement concrete M20 Kerb(min.21737m), street lighting(min.280nos), bus shelter and bus-bye-=2 nos., truck-lay-bye=3nos, Overhead Full Gantry=8 nos., Boundary pillar(min.600nos.), cement concrete pipe duct (min. 549 m), Rain water Harvesting (min.3nos), Road side amenities (min.1nos), Tree plantation (30690 nos.)etc.

2.4 Proposed Crust thickness and composition:

Type of TCS	Description of TCS	Length (m)	Minimum proposed crust/Drain
TCS-1	Typical cross section of 4 lane road with raised median	8063	Subgrade=500mm GSB=200mm WMM=250mm DBM=90mm BC=40mm
TCS-2	Typical cross section 4 lane with RE wall and service roadon both side (Grade separator location)	2115.4	Subgrade=500mm GSB=200mm WMM=250mm DBM=90mm BC=40mm
TCS-3	Typical cross section of 2 lane with Paved shoulder	3911	Subgrade=500mm GSB=200mm WMM=250mm DBM=90mm BC=40mm
	Additional length subtracted for construction of structures viz., VUPs, SVUPs, culverts, PUPs.	140.6	
	Total Length of main carriageway road	14230	
	Additional service road		

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TCS-4	Typical cross section of Service road connecting existing road to Proposed bypass road	920	Subgrade=500mm GSB=200mm WMM=250mm DBM=60mm BC=30mm
	Service road connected with RE wall	3896	Subgrade=500mm GSB=200mm WMM=250mm DBM=60mm BC=30mm
.	Taper Portion for service road	1040	Subgrade=500mm GSB=200mm WMM=250mm DBM=60mm BC=30mm

2.5. Other General Provisions:

2.5.1 The chainage wise typical cross-sections of main carriageway are as under:

S.No.	Design Chainage		Length	TCS
	From	To		
1.	0.000	5.780	5.780	TCS-1
2.	5.780	6.290	0.510	TCS-2
3.	6.290	6.600	0.310	TCS-1
4.	6.600	7.120	0.520	TCS-2
5.	7.120	8.700	1.580	TCS-1
6.	8.700	9.140	0.440	TCS-2
7.	9.140	9.300	0.160	TCS-1
8.	9.300	10.050	0.750	TCS-2
9.	10.050	10.310	0.260	TCS-1
10.	10.310	14.230	3.920	TCS-4
		Total Length	14.230	

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2.5.3 **Major/Minor Junctions Improvement:**

a. Two Major Junctions are proposed for improvements at the following locations:

Sl. No.	Existing Chainage, Km	Design Chainage, Km	Type of Junction	Location
1	42.112km of NH-22.	0+000	Y	42.112km of NH-99
2	54.701km of NH-22.	14+230	Y	54.701km of NH-99

2.5.4 **Major/Minor Bridges Improvement:**

Nil

2.5.5 **Culverts:** 16 nos. culverts are proposed as under:

Sl.No.	Chainage	Size	Type of Culvert
1.	0+700	1x3x4(1.5m Earth Cushion)	Box Culvert
2.	1+430	1x3x4(1.5m Earth Cushion)	Box Culvert
3.	1+742	1x3x4(1.0m Earth Cushion)	Box Culvert
4.	2+240	1x3x4	Box Culvert
5.	2+855	1x3x4	Box Culvert
6.	3+945	1x3x4(1.5m Earth Cushion)	Box Culvert
7.	4+670	1x3x4(0.5m Earth Cushion)	Box Culvert
8.	5+485	1x3x4	Box Culvert
9.	7+210	1x3x4	Box Culvert
10.	8+470	1x3x4	Box Culvert
11.	10+535	1x3x3(0.5m Earth Cushion)	Box Culvert
12.	11+370	1x3x4(2.5m Earth Cushion)	Box Culvert
13.	12+345	1x3x3	Box Culvert
14.	13+190	1x3x3	Box Culvert
15.	13+490	1x3x3(0.5m Earth Cushion)	Box Culvert
16.	13+940	1x3x4	Box Culvert

2.5.6 **VUP: 4** nos.of VUP are proposed as mentioned below:

Sl. No.	Location	Proposed Structure type	Total Width	Span details
1.	6+100	VUP(Girder type)	2x13.5m(2.9m median gap)	1x21.6x5.5m
2.	6+850	VUP(Box type)	2x13.5m(2.9m median gap)	1x12x5.5m
3.	8+970	VUP(Box type)	2x13.5m(2.9m median gap)	1x12x5.5m

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4	9+800	VUP(PSC Girder type)	2x13.5m(2.9m median gap)	1x45x5.5m

2.5.7 **SVUP:** 1 nos.ofSVUP are proposed as mentioned below:

Sl. No.	Location	Proposed Structure type	Total Width	Span details
1.	3+570	SVUP(BOX TYPE)	2x13.5m(2.9 m median gap)	1x7mx4m

2.5.9 **PUP:** 1nos.of PUP are proposed as mentioned below:

Sl. No.	Location	Proposed Structure type	Span details
1.	1+580	PUP	1x6mx4m

2.5.10 **Bus Bays & Bus Shelters:**

Total 2 nos. of Bus bays cum Bus Shelter are proposed at the following locations:

Sl. No.	DesignChainage(Km)	Side
1.	1+050	LHS
2.	14+050	LHS

2.5.11 **Truck lay bye:** Total . 3 of Truck Laybye are proposed at the following locations:

Sl. No.	Design Chainage	Side
1.	4+120	LHS
2.	7+520	RHS
3.	11+740	RHS

2.5.12 **Road safety:** Thrie metal beam crash barrier has been proposed to provide protection to the traffic at locations having height of embankment and near the approach side of the bridge as mentioned below:

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Chainage	Side		Length (m)		Total Length (m)
On main carriageway					
From Ch. 180m to 360 m	2	x	180.0	=	360.00
From Ch. 460m to 860 m	2	x	400.0	=	800.00
From Ch. 1190m to 1860 m	2	x	670.0	=	1340.00
From Ch. 2000m to 2510 m	2	x	510.0	=	1020.00
From Ch. 2760m to 4150 m	2	x	1390.0	=	2780.00
From Ch. 4210m to 4790 m	2	x	580.0	=	1160.00
From Ch. 4930m to 5080 m	2	x	150.0	=	300.00
From Ch. 5460m to 5650 m	2	x	190.0	=	380.00
From Ch. 7690m to 7950 m	2	x	260.0	=	520.00
From Ch. 8090m to 8210 ms	2	x	120.0	=	240.00
From Ch. 11120m to 11550 m	2	x	430.0	=	860.00
From Ch. 11850m to 12500 m	2	x	650.0	=	1300.00
From Ch. 12830m to 13060 m	2	x	230.0	=	460.00
From Ch. 13320m to 13530 m	2	x	210.0	=	420.00
From Ch. 13850m to 14020 m	2	x	170.0	=	340.00
Additional crash barrier at approach of service road at all 4 VUP location.	4	x	200.0	=	8000
Total length of crash barrier				=	**13080m**

2.5.13 **Toe wall:** Toe wall has been proposed as under:

Chainage	Side		Length (m)		Total Length(m)
From Ch. 180m to 360 m	2	x	180.0	=	360.00
From Ch. 460m to 860 m	2	x	400.0	=	800.00
From Ch. 1190m to 1860 m	2	x	670.0	=	1340.00
From Ch. 2000m to 2510 m	2	x	510.0	=	1020.00
From Ch. 2760m to 4150 m	2	x	1390.0	=	2780.00
From Ch. 4210m to 4790 m	2	x	580.0	=	1160.00
From Ch. 4930m to 5080 m	2	x	150.0	=	300.00
From Ch. 5460m to 5650 m	2	x	190.0	=	380.00
From Ch. 7690m to 7950 m	2	x	260.0	=	520.00
From Ch. 8090m to 8210 m	2	x	120.0	=	240.00
Total Length along main carriageway				=	**8900.00m**

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2.5.14 **Road Furniture and Miscellaneous:**

Provisions of road marking (min. 8581 sqm), traffic sign boards(min.175 nos.), delineators (min. 192 nos.), road studs (min.7728 nos.), Over Head Full Gantry Sign board (min. 8 nos.), Thrie beam crash barriers (min.13080 m),lighting on VUP, Amenities and service road (min.280 nos.), boundary/ hectometre/kilometre stones, pedestrian facilities, road side amenities(at chainage-6.200km). etc. has been proposed. Road furniture items with street lightening also proposed in Bus laybyes, truck laybyes. Provision of 3 nos. of rain water harvesting (at chainage-0.210km, 4.450km&7.360km) and utilities duct at 500m interval(min 549m) is also added with proposal. Plantation (min 30690 nos.) and median plantation has been proposed.

2.5.15 **Pavement Design:** The flexible pavement is designed for 20 years for design traffic of 20msa & effective CBR of 8% as per IRC: 37-2018. Further, 2-lane and 4-lane manuals viz. IRC: SP 73-2018 & IRC: SP 84-2019 has been followed.

3. **Pre-construction activities**:

3.1 **Land Acquisition**: State PWD has mentioned that the total extant of 71.06 Ha of private land to be acquired and provision of Rs. 9.22Cr (including 12% interest) has been included in the proposal.

3.2 **Forest & Environment clearance:** It has been reported that forest & environment clearance is applied.

4. The work shall be executed on EPC mode. All the relevant schedules shall be finalized by Chief Engineer(NH), RCD, Jharkhand state and got approved from the Regional Officer, MoRTH, Ranchi before tendering.

5. **Design specifications:**

Chief Engineer (NH), RCD, Jharkhand state shall ensure that all material, design and construction operations for the project are proposed conforming to the IRC:SP:84-2019 and IRC:SP:73:2018 and other relevant IRC codes , Manual of specifications and standards for Four/two-laning of Highways and design of overlay is proposed conforming to the IRC:115:2014 on cross roads, Guidelines for strengthening of flexible road pavements using Falling Weight Deflectometer technique.

5. **Modifications:-**

i. Current rate of VG-40 grade bituminous effective from 01.02.2022 has been considered for bituminous items as obtained from IOCL vide letter dated 01.02.2022.

ii. Provision for acquisition of private land has been considered including 12% interest after considering multiplication factor and solatium.

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iii. Contingency charge @1% has been considered in line with Ministry's circular No. A-12025 /1/12020-NHIDCL Cetl(Pt.) dated 10.08.2021.

iv. Maintenance charge @2.5% may be allowed in line Ministry's circular No.RW/NN-37010/4/2010 -E AP(Printing)Vol.IV dated 05.03.2019.

v. Other centages has been considered in line Ministry's circular No.MORTH/Misc/Format/2021 dated 17.03.2021.

9. Timeline for construction is proposed for 24 months.

10. **Authority Engineer/Supervision:** As project cost is more than 300 Crore, Authority Engineer needs to be engaged in the project as per Ministry's guidelines.

11. RFP is proposed to be invited from fresh bidders in single stage two cover systems by prescribing necessary eligibility (qualifying) criteria of the bidders as per Ministry's standard RFP document issued vide letter no RW/NH-37010/4/2010-EAP (Printing) Vol.-IV dated 05.03.2019 & Ministry's extant guidelines .

12. **Rates:**

All rates have been considered from Schedule of Rates of Jharkhand, Road Construction Department effective from 01.06.2021 except the rates of bituminous items with VG-40. For bituminous items, rate analysis with current rate of VG-40 has been made by State RCD as obtained from IOCL vide letter dated 01.01.2022. LabourCess @1% and thereafter GST @12% is added over the total cost of civil work as proposed by state RCD.

13. **Cost of work:** In light of above comments, the estimated cost modified to Rs. crore including centages charges as follow:-

	Items of work	Amount (Rs.)
1.0	Site Clearance	13,42,276.00
2.0	Earth Work	12,77,76,703.00
3.0	Sub Base and Base Course	31,12,11,067.00
4.0	Bituminous Course	33,20,02,671.00
	Total Extra Cost for Bitumen VG-40	5,36,06,360.00
5.0	Miscellaneous	3,65,10,272.29
6.0	Protection work	10,37,47,554.00
7.0	Junctions	1,45,81,603.00
8.0	Full Overhead Gantry (8 nos.)	41,98,581.91
9.0	Bus Bay & Bus Shelter (2 Nos.)	55,31,016.00

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10.0	Truck Lay Bay (3 Nos.)	62,18,312.10
11.0	Median plantation and Slope Turfing	9,90,959.50
A	Sub-total of Road Part -A	**99,77,17,375.80**
12.0	**Construction of Culverts (10 Nos. For 4 Lane)**	4,66,16,472.85
13.0	**Construction of Culverts (6 Nos. For 2 Lane)**	1,72,89,354.09
14.0	**Cost of Construction of PUP, SVUP & VUP**	
	(i)PUP at ch.1+580 (1x6x4m-1 Nos.)	75,55,532.72
	(ii)SVUP at ch.3+570 Km (1x7x4m-1 Nos.)	95,85,947.35
	(iii)VUP at ch.6+100 Km. (1x21.6mx5.5m)	4,06,80,723.10
	(iv)VUP at ch.6+850 Km. & 8+970Km (1x12mx5.5m- 2 nos.)	3,30,58,371.11
	(v)VUP at ch.9+800 Km. (1x45mx5.5m)	6,23,29,789.37
15.0	**Cost of Construction of RE wall & Toe wall**	
	(i)RE wall at ch.6+100 Km (Total Length - 488.4 m)	7,79,77,509.18
	(ii)RE wall at ch.6+850 Km (Total Length - 506 m)	6,53,10,622.24
	(iii)RE wall at ch.8+970 Km (Total Length - 426 m)	5,84,77,085.69
	(iv)RE wall at ch.9+800 Km (Total Length - 705 m)	9,91,40,083.19
	(v)Toe wall (Total Length - 8900m)	22,19,22,226.86
B	Sub-total of Structure Part -B	**73,99,43,717.73**
C	**Sub-total -(A+B)**	**1,73,76,61,093.53**
D	Labour Cess @ 1% of C	1,73,76,611.00
E	Civil Cost of work-(C+D)	1,75,50,37,704.53
F	G.S.T. @ 12% of E	21,06,04,524.54
G	**Sub-total (E+F)**	**1,96,56,42,229.08**
H	ContigencyCharges(1%) of E	1,75,50,377.00
I	Price Escalation @ 5% on G for 2nd years	9,82,82,111.45

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J	Agency Charges(3%) OF E	5,26,51,131.00
K	Supervision charge(3%) of E	5,26,51,131.00
L	Cost of maintenance @ 2.5% of G	4,91,41,056.00
M	Cost of land acquisition	9,22,35,061.00
N	Forest diversion,Tree cutting and compensatory Afforestation	2,60,11,790.00
	TOTAL PROJECT COST	**2,35,41,64,886.00**

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