ALIGNMENT REPORT

Project Name	*Consultancy Services for preparation of DPR for Development of Economic Corridors, Inter Corridors, Feeder Routes to improve the efficiency of freight movement in India under Bharatmala Pariyojana - Lot 3/ Andhra Pradesh, Karnataka, GOA & Kerala /Package 1 – Chittoor – Thatchur Road (NH-716B)*
Document Name	**ALIGNMENT REPORT**
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			Name/Position	Signature
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ALIGNMENT REPORT

1.0 GENERAL

The Ministry of Road Transport and Highways (MORTH), Government of India has proposed "Bharat Mala Pariyojana" an Umbrella scheme of road development project through National Highways Authority of India (NHAI), National Highway and Industrial Development Corporation (NHIDC) and state Public Works Departments (PWD) at an estimated cost of INR 5,35,000crores. This is the second largest highways construction project in the country after NHDP, in that almost 50,000 km of roads targeted across the country. This project aim to improve connectivity particularly on economic corridors, border areas and to remote areas with an aim of rapid and safe movement of cargo to boost exports. International trade considered as a key aspect in this scheme and northeastern states have given special focus. The project cleared by the Union Cabinet on October 25, 2017.

The ambitious project expected to create nearly 100million man days of jobs during the construction and subsequently to about 22million jobs of the increased economic activity across the country. The construction will carried out through many means including debt funds, budgetary allocation, private investment, toll operator transfer etc. The total length of around 34,800km considered in phase 1 including

- Economic corridors of around 9,000km,
- Inter-corridor and feeder routes of around 6,000km,
- National Corridors Efficiency Program of about 5,000 km roads
- Border and international connectivity roads of around 2,000 km,
- Coastal and port connectivity roads of around 2,000 km,
- Expressways of around 800 km
- NHDP roads of 10,000km

In pursuance of the above program, NHAI appointed M/s Louis Berger Consulting Private Limited, New Delhi as Consultants to carry out the Consultancy Services for preparation of DPR for development of Economic Corridors, Inner corridors, feeder Routes and Costal Roads to improve the efficiency of fright movement in India - Lot 3/Andhra Pradesh, Karnataka, Goa & Kerala, / Package 1. The project consists the following stretches of roads finalized as per final Inception Report.

1. Aurad – Bidar section - KA SH 15
2. Mydukur – Badvel section – NH 67
3. Puttur - Janappanchatram section - AP SH 4421 & TN SH 51
4. Belagavi (Belgaum) – Sanquelim with a proper Connectivity to NH4A and NH 17 through existing SH – KA SH 54, KA SH 31, GA SH 4

5. Balance Portion of Satellite Ring Road of Bangalore (West Side) including connection to Hosur town & Feasibility for widening the existing SH between Anekal to Sarjapur for Passenger traffic bound to Attibele/ Sarjapur to ensure ring road connectivity for Bangalore.

The Letter of Acceptance was communicated vide NHAI letter NHAI/Planning/ EC/2016/DPR/Lot 3/ Ap. Knt. Goa &KL/Package 1/98598 dated 21/04/2017. The contract agreement signed on 11/5/2017 vide letter NHAI/planning/EC/2016/DPR/Lot 3/AP, Karnataka, Goa &KL, / Package 1/99575 dated 11/05/2017 with immediate commencement date.

1.1 Chittoor – Nagari – Thatchur Alignment (NH 716B)

The contract road section of Puttur – Uttukkottai (AP SH 4421) & Uttukkottai – Janappanchatram (TN SH 51) declared as NH 716A considered in Inception report. The proposed Chennai – Kurnool economic corridor starts from Chennai and terminates in Kurnool and pass through Puttur, Renigunta, Kadapa and Nandyal. It was noted that the section from Nagari to Renigunta has been developed under NHDP. Therefore if Nagari- Chennai (Thatchur) with a spur to Chittoor section gets developed as part of Chennai – Kurnool corridor, it would offer alternative connectivity between Chennai and Bangalore/Chittoor. Further the container traffic originating from Bangalore and bound towards the ports of Kamarajar and Kattupalli currently passes through the congested Chennai bypass and the Tamil Nadu state is developing the northern port access road from Thatchur to Kamarajar (Ennore) and Kattupalli ports. Therefore Chittoor – Thatchur Greenfield alignment will provide direct port connectivity to Bangalore and Chittoor. Accordingly this route is notified in Gazette as NH 716B.

Present connectivity status to these ports

1. At present Bangalore & north India traffic negotiate through existing NH 48 and through Chennai city to reach Kamarajar & Kattupalli ports
2. Andhra Pradesh & Karnataka traffic negotiate through existing NH 40 and joins NH 48 in Walajahpet and through Chennai city to reach Kamarajar & Kattupalli ports
3. Andhra Pradesh traffic negotiate through existing NH 716 and joins NH 48 in Sriperumbudur and through Chennai city to reach Kamarajar & Kattupalli ports
4. Traffic from and to these ports create congestion in and around Chennai city
5. Growth of these ports is also constraint on these account
6. There is need for alternate connectivity bypassing Chennai city

Advantages of this alignment

1. The proposed greenfield alignment will provide direct connectivity to Kamarajar (Ennore) and Kattupalli ports through Bangalore – Chennai expressway
2. The alignment will ensure seamless connectivity without mixing with Chennai city traffic
3. This route will decongest Chennai city from port bound heavy truck traffic
4. This corridor will provide connectivity to Ponneri Smart City and Mahindra World City

5. Improve air quality due to reduction in truck traffic through Chennai city

6. Will provide connectivity to SEZs and other industrial estates in the vicinity of port

7. Total distance through this alignment will be shortened by about 30km resulting in huge saving in VOC (vehicle operating cost)

Salient Features

1. The proposed greenfield alignment starts from km 152.00 of Bangalore Chennai proposed expressway in Chittoor

2. The proposed alignment ends in Thatchur on NH 5 in the proposed Chennai Peripheral Road project

3. Coordinates for start & end points.

S. No	Easting (m)	Northing (m)	Latitude (Decimal)	Longitude (Decimal)	Remarks
1	291442.4400	1453851.0600	13.14394204	79.07598247	Start Point near Chittoor
2	409611.1316	1468925.1392	13.16553275	80.16553275	End Point near Thatchur

4. Total length of proposed alignment is 126.373km

5. The proposed alignment passes through the length of 83km in Chittoor district of Andhra Pradesh and 43.7km of Thiruvallur district in Tamil Nadu

6. Proposed alignment crosses railway line in 3 locations

7. The alignment envisage four major bridges.

The corridor proposed with 70m right-of-way (ROW) consists of divided 6lanes carriageways as per manual. The proposed alignment is shown below in **Figure 1**.

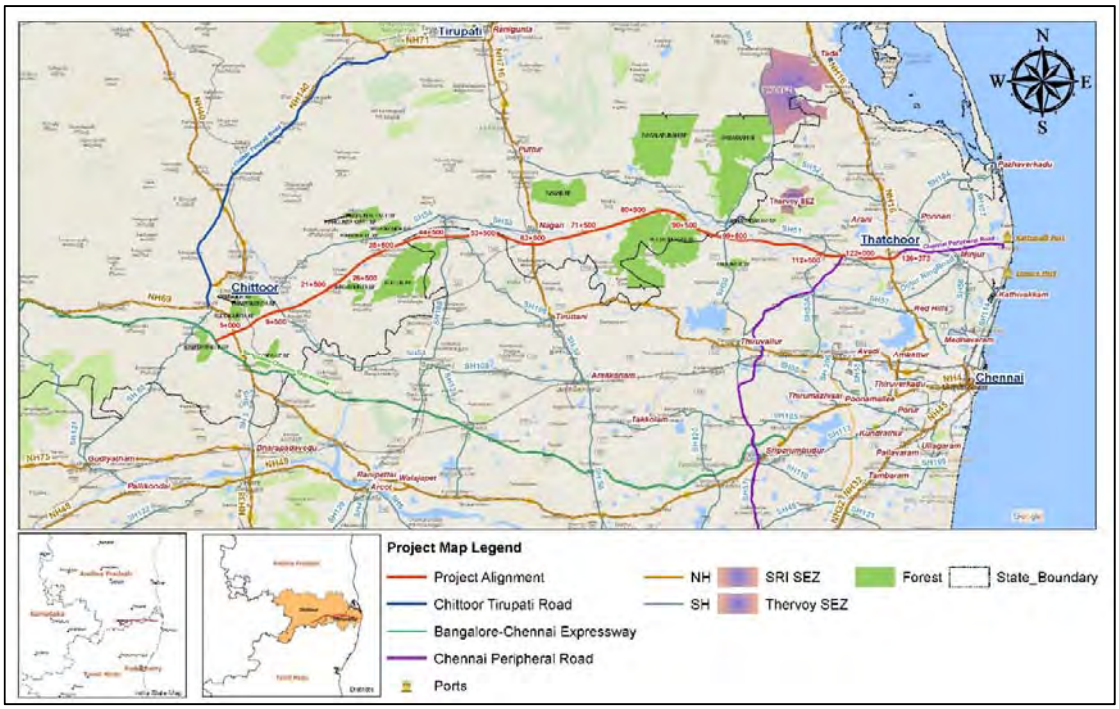


Fig 1: Chittoor - Nagari - Thatchur alignment.

1.2 Project Road

The project road intends to connect Chittoor and Thatchur via Nagari. The proposed road passes through Chittoor district of Andhra Pradesh State and Thiruvallur district of Tamil Nadu State. The section of the alignment are given in **Table 1** below.

Table 1: State wise length involved

S. No.	Chainage		Length (KM)	State
	Start	END		
1	0+000	43+800	43.80	Andhra Pradesh
2	43+800	49+900	6.10	Tamil Nadu
3	49+900	54+500	4.60	Andhra Pradesh
4	54+500	56+700	2.20	Tamil Nadu
5	56+700	90+700	34.00	Andhra Pradesh
6	90+700	126+550	35.850	Tamil Nadu
	Total Length		**126.550**	

Terrain

The project road stretch is passing through Plain and rolling terrain.

Land use

The land use along the alignment are predominantly barren and agriculture field.

Proposed ROW

Initially 60m ROW corridor was propose for the entire alignment as intimated by NHAI except at proposed interchange locations, where additional land requirement will be in accordance with proposed interchange design.

Louis Berger received office memorandum from MORT&H / NHAI on dated 03 May 2018 to adopt 70M ROW corridor for this particular section of Economic corridors under Bharatmala Pariyojana.

Major cross roads

Table 2: Major Cross road locations

S No	Tentative location (km)	Cross road	State
1	0.000	Propose BCE at Chainage 152.000	Andhra Pradesh
2	3.500	NH 4 (Vellore Road)	Andhra Pradesh
3	44.500	SH 108	Tamil Nadu
4	60.200	NH 205	Andhra Pradesh
5	67.000	Nalathur Road	Andhra Pradesh
6	95.500	SH 50	Tamil Nadu
7	113.500	SH 50A	Tamil Nadu
8	116.000	SH 51	Tamil Nadu
10	124.500	NH 5	Tamil Nadu

Major and Minor Bridges

The proposed alignment cross through existing rivers and canals. There are 10 Major and 33 Minor bridges are proposed along the alignment are listed below in **Table 3**.

Table 3: Proposed Major / Minor Bridges

S. No	Chainage	Type of Bridge		Span Arrangement	Length of Bridge (M)	River / Canal Crossing
		Major	Minor			
1	4+500		Minor Bridge	1x25	25	
2	7+625		Minor Bridge	1x25	25	
3	14+700	Major Bridge		10x35	350	PONNAI River
4	22+460		Minor Bridge	1x15	15	
5	28+620		Minor Bridge	1x13	13	
6	28+780		Minor Bridge	1x25	25	
7	32+560		Minor Bridge	1x17	17	
8	33+450		Minor Bridge	2x25	50	
9	34+350		Minor Bridge	2x25	50	
10	34+950		Minor Bridge	1x25	25	
11	35+760		Minor Bridge	1x15	15	
12	38+150		Minor Bridge	1x25	25	
13	44+220	Major Bridge		4x20	80	
14	46+300		Minor Bridge	1x20	20	

S. No	Chainage	Type of Bridge		Span Arrangement	Length of Bridge (M)	River / Canal Crossing
		Major	Minor			
15	57+170		Minor Bridge	2x25	50	
16	57+250		Minor Bridge	2x25	50	
17	66+000	Major Bridge		5x25	125	NAGARI River
18	67+450		Minor Bridge	1x18	18	
19	70+050	Major Bridge		5x30	150	
20	71+800		Minor Bridge	2x25	50	
21	72+600		Minor Bridge	1x15	15	
22	77+400		Minor Bridge	1x20	20	
23	77+550		Minor Bridge	1x20	20	
24	82+400		Minor Bridge	2x20	40	
25	85+820		Minor Bridge	1x20	20	
26	87+450		Minor Bridge	1x10	10	
27	87+780		Minor Bridge	1x20	20	
28	89+600		Minor Bridge	1x30	30	
29	90+370		Minor Bridge	1x30	30	
30	91+950	Major Bridge		4x25	100	
31	94+000	Major Bridge		2x35	70	
32	95+000	Major Bridge		2x30	60	
33	96+900		Minor Bridge	1x20	20	Telgu Ganga Canal
34	100+400	Major Bridge		10x25	250	ARANI River
35	102+600	Major Bridge		10x25	250	
36	104+400		Minor Bridge	1x30	30	
37	109+600		Minor Bridge	2x22.5	45	
38	111+800		Minor Bridge	1x25	25	
39	115+400		Minor Bridge	2x20	40	Canal crossing
40	115+750		Minor Bridge	1x30	30	
41	117+000		Minor Bridge	1x20	20	Canal crossing
42	119+100		Minor Bridge	1x25	25	
43	122+200	Major Bridge		4x20	80	

Proposed VUP / LVUP/SVUP

The proposed alignment cross through existing minor and local roads. 16 nos. of VUPs, 48 nos. of LVUP and 15 nos. of SVUPs are proposed along the alignment are listed below in **Table 4.**

Table 4: Proposed VUPs / LVUPs/SVUPs

S. No.	Chainage	Type of Structure	Road Crossing
VUP (20m x 5.5m)			
1	0+900	VUP	YSR Road
2	4+277	VUP	Other Road
3	6+542	VUP	Other Road
4	9+112	VUP	Other Road

S. No.	Chainage	Type of Structure	Road Crossing
5	11+089	VUP	Other Road
6	12+353	VUP	Chittoor-Punnai Road
7	15+550	VUP	Other Road
8	19+463	VUP	Other Road
9	27+408	VUP	Other Road
10	30+548	VUP	Other Road
11	44+558	VUP	SH-108
12	59+388	VUP	Nagar Railway Station Road
13	66+886	VUP	Nallathur Road
14	73+080	VUP	Nallathur Road
15	73+894	VUP	Vijayapuram Road
16	112+672	VUP	SH-50A
LVUP (12m x 4.0m)			
1	1+750	LVUP	Other Road
2	7+400	LVUP	Other Road
3	13+116	LVUP	Other Road
4	16+014	LVUP	Other Road
5	17+322	LVUP	Other Road
6	19+115	LVUP	Other Road
7	19+905	LVUP	Other Road
8	25+892	LVUP	Battujangana Palli Road
9	27+251	LVUP	Other Road
10	29+000	LVUP	Other Road
11	31+111	LVUP	Other Road
12	31+880	LVUP	Other Road
13	32+616	LVUP	Other Road
14	34+160	LVUP	Pullur Main Road
15	35+267	LVUP	Other Road
16	35+932	LVUP	Other Road
17	36+568	LVUP	Other Road
18	40+278	LVUP	Other Road
19	41+267	LVUP	Other Road
20	48+005	LVUP	Other Road
21	49+053	LVUP	Other Road
22	53+291	LVUP	Other Road
23	54+738	LVUP	Punniyam-Podhatturpet Road
24	56+635	LVUP	Other Road
25	57+166	LVUP	Other Road
26	58+287	LVUP	Other Road
27	63+480	LVUP	Other Road
28	64+300	LVUP	Other Road
29	71+842	LVUP	Other Road
30	74+800	LVUP	Other Road
31	75+534	LVUP	Other Road

S. No.	Chainage	Type of Structure	Road Crossing
32	76+457	LVUP	Other Road
33	82+023	LVUP	Other Road
34	86+244	LVUP	Other Road
35	92+000	LVUP	Other Road
36	99+232	LVUP	Other Road
37	102+648	LVUP	Other Road
38	104+405	LVUP	Other Road
39	105+423	LVUP	Other Road
40	107+571	LVUP	Other Road
41	109+160	LVUP	Other Road
42	110+532	LVUP	Other Road
43	115+400	LVUP	Other Road
44	117+926	LVUP	Other Road
45	121+123	LVUP	Other Road
46	122+300	LVUP	Other Road
47	126+221	LVUP	Other Road
48	126+555	LVUP	Other Road
SVUP (7.0m x 4.0m)			
1	20+682	SVUP	Other Road
2	21+990	SVUP	Other Road
3	38+148	SVUP	Other Road
4	39+259	SVUP	Other Road
5	42+781	LVUP	Other Dirt Road
6	52+125	SVUP	Other Dirt Road
7	63+045	SVUP	Other Road
8	67+536	SVUP	Other Road
9	69+000	SVUP	Other Road
10	75+300	SVUP	Local Road
11	79+408	SVUP	Other Road
12	80+200	SVUP	Other Road
13	83+425	SVUP	Other Road
14	101+357	SVUP	Other Road
15	123+562	SVUP	Other Road

Proposed ROBs

The proposed alignment cross exiting railway line at two locations, two ROBs are proposed along the alignment are listed below in **Table 5.**

Table 5: Proposed ROBs

S. No	Chainage	Structure Length	Span Arrangement	Remarks
1	6+731	36.00	1 x 36m	Spans shall be fixed in consultation with the Rail Authorities. There are two railway track.

S. No	Chainage	Structure Length	Span Arrangement	Remarks
2	60+200	36.00	1 x 36m	Spans shall be fixed in consultation with the Rail Authorities. There are two railway track.

Cross drainage Structures

There are 252 cross drainage structures are proposed along the alignment. Total 200 nos. of Box and 52 nos. of Pipe culverts are proposed.

Interchanges

The proposed alignment crosses various existing National/State highways and other planned Expressway / Roads. The proposed alignment is free flow and access control, hence there will not be any at grade intersection are proposed, all the exchange of traffic will be through free flow interchange. Total 8 nos. of free flow interchanges are proposed. The proposed locations of Interchanges are listed below in **Table 6.**

Table 6: Proposed Interchanges

S.No	Crossing at	Chainage	Type of IC
1	Bangalore Chennai Expressway	0+000	Trumpet
2	NH4	3+460	Viaduct IC
3	SH108	44+560	Viaduct IC
4	NH-205 / 716	60+383	Cloverleaf
5	SH50	95+500	Viaduct IC
6	Ngalapuram Road / Tirupati Road/CPR	116+518	Cloverleaf
7	NH-5(AH-5)	124+700	Cloverleaf
8	Chennai Peripheral Road	125+525	Directional

Highway Design Criteria

In general, the design standards used for the road design is in accordance with IRC codes. The key design standards used for the road design for this section of the alignment are listed below in **Table 7**.

Table 7: Proposed Highway Design Standards

No.	Description	Unit	Plain & Rolling
1	Design Speed	Km/h	100 (Ruling)
			80 (Minimum)
2	ROW Width	m	70
3	Pavement Width: Per Lane	m	3.5
	Two Lanes	m	7.0
	Three Lanes	m	10.5
4	Cross Slope	%	- 2.5 (Minimum)
5	Longitudinal Gradient		
	Ruling	%	2.5

No.	Description	Unit	Plain & Rolling		
	Limiting	%	3.3		
6	Maximum Super-elevation	%	5%		
7	Shoulder width		Open Area	Approaches to G.S.S.	Approaches to Bridges
	Paved	m	1.5	2.0	1.5
	Earthen	m	2.0	-	2.0
8	Shoulder's cross slope				
	Paved	%	- 2.5		
	Unpaved	%	- 3		
9	Horizontal Curvature: Desirable minimum	m	400		
	Absolute minimum	m	250		
10	Sight Distance for various speeds	Absolute Minimum (S.S.D)	Desirable Minimum (I.S.D)		
	100 km/h	180 m	360 m		
	80 km/h	130 m	260 m		
11	Interchange Ramp Design:				
	Ramp width	m	3.75/5.5/7.0		
	Ramp Design speed	Km/h	50		
	Radius of curvature	m	90		
	Super elevation maximum	%	7		
12	Minimum Length of Horizontal Curves:				
	For deflection angle=5°	m	150		
	For deflection angle=4°	m	180		
	For deflection angle=3°	m	210		
	For deflection angle=2°	m	240		
	For deflection angle=1°	m	270		
	For deflection angle<1°	m	0 (Not Required)		
13	Minimum Length Between same side Curves:				
		m	280 (10 sec travel time as per 100 kmph design speed)		
14	Vertical clearance at VUP/LVUP/PUP	m	5.5/3.5/3.0 (min)		
15	Vertical Curve, values for "K", where K= L/(G1-G2), in m:				
	Design speed (km/h)	Minimum (S.S.D)		Desirable (I.S.D)	
	65	18.4		33.8	
	80	32.6		60	
	100	73.6		135	
16	Minimum Length of vertical curves:				
	Design speed (km/h)	Maximum grade change(percent) not requiring vertical curve			Maximum length of a vertical curve(m)

No.	Description	Unit	Plain & Rolling	
	65		0.8	40
	80		0.6	50
	100		0.5	60

Typical Cross Section and Alignment Plan

The proposed cross sections are developed for 70 M ROW in accordance with Economic Corridor Concept Policy by NHAI dated 03 January 2018. Typical cross sections and Alignment Plan drawings are included **Appendix A** of the report.

1.3 Environment Studies

Environmental expert carried out reconnaissance survey of the project road. Important environmental components along the corridor of impact zone of reserved forest and Protected Forest. The alignment corridor is passing through Pulikundram RF from Km 82.100 to Km 83.600 and Km 86.000 to Km 90.250.

Ponds and check dams are the major water bodies along the project roads. Locals use that water predominantly from this source for bathing and washing purposes. There is one river (Arani) crossing along the project road. A total of 27 ponds/check dams falls along the project road, out of which some are directly impacting the proposed development. There are few stream and drains along/crossing the road. There is water scarcity in this region and therefore one of the chronically drought prone area. The enhancement for the impacted ponds and check dams, relocation of ground/surface water sources and provision of retaining walls in the periphery of the pond shall be proposed for effective conservation of water

The environment study will also identify trees, forests, National park and its core and buffer zones, public utilities, community resources, cultural sites, high pollution zones, accident prone zones/area etc. On the basis of back ground, information screening exercise will be conduct subsequently. The data collected will be compile to develop environmental scenario and sensitive component within that. Full road length and corridor of impact will put under screening to identify hot spot zones. On the basis of this environment impact assessment and Environmental, management plan will be frame.

The following mitigation measures will be consider in subsequent project stages

- Adequate drainage facilities along the road
- Provision of service roads
- Appropriate noise barriers at sensitive locations
- Development of strip plantation on both sides and median shrubs
- Regular monitoring of ambient air quality, noise level and water quality during construction.
- Grade separation/ interchanges at major intersections.
- Elevated arrangement for through traffic with barricade.

1.4 Social Assessment

The social assessment presents to determine the magnitude of actual potential impact due to this new road development. The idea of social study is to minimize the social impact with best possible engineering solutions at the optimal point. The social screening survey will be carry out to assess the negative impact and to suggest the mitigation measures

- To avoid / minimize the adverse impact on nearby communities and natural environment,
- People and properties falling on direct path of road development,
- People indirectly affected by the way of disruption of livelihood, breakage in community linkages
- Impact on land acquisition and resettlement, on indigenous people (SC &ST) and on human safety etc.

In order to minimize or avoid the adverse impact, all necessary modifications will made in design stage. However, in case of unavoidable negative impacts, these will be mitigate through suggested appropriate measures needs to be adopt during construction and operational stages.

To ensure that the project affected persons are duly compensated a Resettlement Action Plan (RAP) would be drawn up as an integral part of project design proposal to ensure that highway improvement are socially sound, sustainable and contribute to the development of social goals. The prime objective of this RAP is to ensure and provide a policy framework to ensure that the affected and displaced persons are aptly resettled and rehabilitated (to improve their livelihood and standard of living or at least to restore them in real terms).

Table 5: Major Built up along the Project

S. No	Chainage	Major built up	State
1	1.500	Mapakshi	Andhra Pradesh
2	3.500	Chittoor	Andhra Pradesh
3	4.500	Lakshmambapuram	Andhra Pradesh
4	8.500	Gollapalle	Andhra Pradesh
5	12.000	Arathala	Andhra Pradesh
6	15.000	G D Nellore	Andhra Pradesh
7	19.000	Vepanjeri	Andhra Pradesh
8	22.000	Kalepalle	Andhra Pradesh
9	25.000	Vinjam	Andhra Pradesh
10	28.500	Suparvarajapuram	Andhra Pradesh
11	34.000	Sindhurajapuram	Andhra Pradesh
12	39.000	Venkatarajapuram	Andhra Pradesh
13	45.000	Perumanullur	Tamil Nadu
14	54.000	Karimbedu	Andhra Pradesh
15	58.000	Melapattu	Andhra Pradesh
16	61.000	Nagari	Andhra Pradesh
17	69.500	Padiri	Andhra Pradesh
18	73.000	Nindra	Andhra Pradesh
19	83.000	Pulipadu	Andhra Pradesh
20	94.000	Puducheri	Tamil Nadu

21	97.000	Uttukkotai	Tamil Nadu
22	104.000	Palavakkam	Tamil Nadu
23	112.000	Periyapalayam	Tamil Nadu
24	120.000	Kannigaipair	Tamil Nadu
25	125.000	Thatchur	Tamil Nadu

Land use

The terrain along this alignment is predominantly mix of plain and rolling. The land use pattern along this project road comprises of agricultural, built up, barren, industrial, and forest. However, the main land use pattern is agricultural and barren. The tentative land uses along the project are as below.

Table 6: Tentative Land Uses along the Project

S. No	Land use pattern	% of land use
1	Agriculture	64
2	Barren	15
3	Built up	3
4	Industrial	8
5	Forest	10

Based on the findings during the initial assessment study some measures have noted for consideration that will reduce the detrimental effects of project appreciably.

- Alternative alignments such as realignment are attempt in the original STRR in order to find a suitable alignment that would have minimum adverse impact on social aspects and minimum land acquisition.
- The alignment avoids schools, places of worships, public utilities and other common resources.
- It will be ensure that the likely affected common properties used by local people will suitably rehabilitated before the start of civil construction work and budgetary provision for the same will be made in the project estimates.

Approximate Land requirement

The Chittoor - Nagari - Thatchur alignment passes through following districts and talukas in Karnataka and Tamil Nadu states.

S. No	State	District	Talukas
1	Andhra Pradesh	Chittoor	Chittoor
			Gangadhara Nellore
2			Srirangarajapuram
3			Palasamudram
4			Nagari
5			Vijayapuram
6			Nindra
7			Pichatur
1		Thiruvallur	Pallipattu

	Tamil		Uthukkottai
2	Nadu		Ponneri

It is propose to acquire a strip of land of 60m corridor for the proposed alignment so to accommodate the 6lanes carriageway configuration and other amenities as per six lanes Manual and standards. All requirements considered as per the NHAI. The total land requirement envisaged in this project considering the right of way as 60m is about

For Andhra Pradesh: (83x1000x60)/10000=498 Ha

For Tamil Nadu: (43x1000x60)/10000=258 Ha

Total 756 hectare (498 hectares in Andhra Pradesh state and 285 hectare in Tamil Nadu state). The Draft 3a for the project is already submitted.

Photographs of first site visit on 07.01.2018

	
At Crossing of NH 4 of the proposed alignment	At Crossing of NH 4 of the proposed alignment
	
Near MDR 4607 Km 11.00	Near Pallipattu SH 53 Km 9.200

	
Meeting on 28.12.2018 at Transport Bhavan	Meeting on 28.12.2018 at Transport Bhavan

Option Study

Three option study for the proposed route is carried considering start and end points, terrain, geometric details, land requirements, number of affected settlements, social and environment impacts on proposed alignments, merits and demerits of alignment. The details are given below. The alignment comparative statement given in **Table 7** & Drawing depicting all options are given in **Fig. 1.**

Option 1

This option starts from existing km 153.600 of NH 4 near Chittoor district Collector office and meets existing SH 54 (MDR 4607) near GD Nellore. The proposed alignment follows the existing SH 54 till Pallipattu and diverts on Greenfield and crossing SH 108, NH 716 and Nagalapuram Road near Nindra avoiding Pulikundram Reserve Forest. The proposed alignment crosses SH 50 near Uthokottai and matches with Chennai Peripheral Road in Kanigaipair on SH 51. The total length of this alignment will be 130.00km approximately.

Option 2

The option starts from km 152.000 of Bangalore Chennai Expressway near Chittoor (Mapakshi) and follows green field line crossing Chittoor Ponnai road, SH 108 and NH 716. The alignment crosses Nagalapuram road near Nindra encroaching part of Pulikundram Reserve Forest. The alignment crosses the SH 50 near Uthokottai in Tamil Nadu and matches with Chennai Peripheral Road at Kanigaipair on SH 51 after crossing SH 50A. The total length comes out to be 126.373 Km.

Option 3

The option starts from km 11.000 of SH 54 (MDR 4607) near GD Nellore and follows existing road up-to Krishnajammapuram and after this place the alignment follows Greenfield, crossing SH 108, Nochilli road, NH 716, Vanjeri road. The route crosses the SH 50 near Uthokottai and matches with Chennai Peripheral Road at Kanigaipair in SH 51 after crossing SH 50A. The total length comes out to be about 113.00 km.

Conclusion

Based on option study, joint inspection with PD/NHAI/Chennai and consultants on 07/01/2018 &11/01/2018, presentation to Secretary/MORTH & Additional Secretary/Tamil Nadu and other NHAI official on 19/02/2018 and presentation to Union Minister MORTH & Chief Minister of Tamil Nadu on 25/02/2018, option 2 is considered suitable.

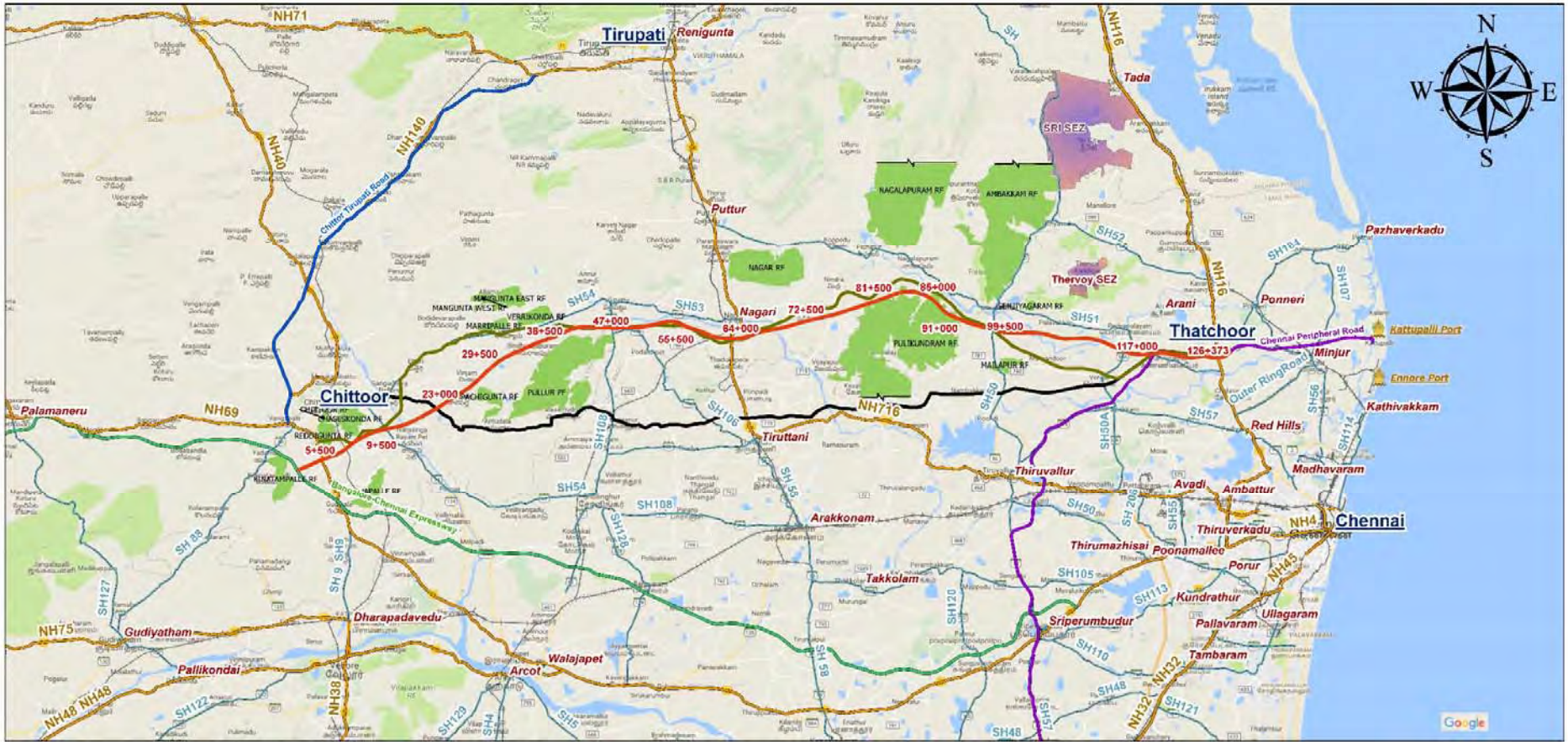
Table 7: Alignment option comparison

S. No.	Description	Option 1	Option 2	Option 3
1	Starting (km)	0.000	0.000	0.000
2	Ending (km)	130.000	126.373	113.000
3	Length of Alignment (km)	130.000	126.373	113.000
4	Built-up stretch	Nil	Nil	Nil
5	Terrain	Plain/Rolling	Plain/rolling	Plain/Rolling
6	Design Speed achievable	100 kmph	100 kmph	100 kmph
7	Geometries	The horizontal and vertical geometry will not achieve optimum as the route follow the existing state highway that has very poor geometry at some built up locations and its adjoining.	This alignment be likely to comprise good horizontal and vertical geometrics Sight distances as per geometric requirements in curves will be achieved.	The horizontal and vertical geometry will not achieve optimum Sight distances as per geometric requirements in curves may not achieved
8	Existing Land use pattern through proposed alignment	Mostly agricultural Land/ built up	Agricultural Land	Agricultural Land / Forest Land
9	Proposed right of way (m)	60.00	60.00	60.00
10	Total Additional land required (Ha)	780.00	758.24	678.00
11	No of affected Settlements	2	Nil	Nil
12	Social Impact	Widening of existing carriageway and geometrical improvements may need eviction of encroachments in this reaches	Not significant	Not significant

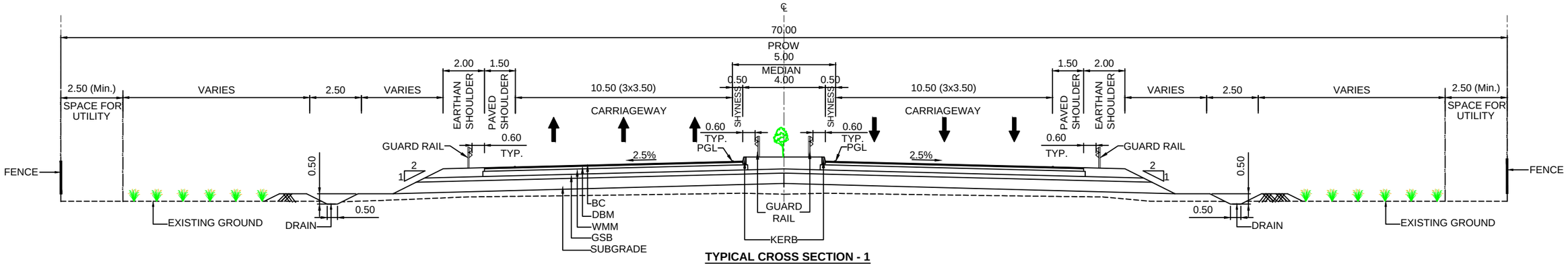
S. No.	Description	Option 1	Option 2	Option 3
13	Environmental Impact	Improved air quality	The proposed alignment passes through Pilikundram Reserve Forest and Forest Clearances will envisaged. Improve air quality due to reduction in truck traffic through Chennai city	Improved air quality
14	Proposed improvement as per Manual	Four/Six lane divided carriageway	Four/Six lane divided carriageway	Four/Six lane divided carriageway
15	Merits	Industries coming up in Renigunta and Kuppam will get connectivity to Sri city through Chittoor resulting increase in cargo traffic.	Travel time reduced for the movement of Goods to Chennai port Industries coming up in Renigunta and Kuppam will get connectivity to Sri city through Chittoor, Bangalore and beyond. The alignment will provide direct connectivity to Kamarajar (Ennore) and Kattupalli ports through Bangalore – Chennai expressway The alignment will ensure seamless connectivity without mixing with Chennai city traffic for Bangalore traffic This route will decongest Chennai city from port bound heavy truck traffic	Will get seamless connectivity to Kurnool/Renigunta/Tripathi traffic Shorter alignment length as is start away from Chittoor and close to GD Nellore

S. No.	Description	Option 1	Option 2	Option 3
			Improve air quality due to reduction in truck traffic through Chennai city	
16	Demerits	Passes through close to existing alignment and thus better geometry standards will be constraints Meandering horizontal alignment as the route passes through close to build ups and number of ponds. Land acquisition process may take longer as it is close to built-up	This alignment also pass close to some water bodies where structure arrangement is envisaged	Following existing road and acquiring land through the existing road will be tedious.
17	Recommendation	Not Recommended	**Recommended**	Not Recommended

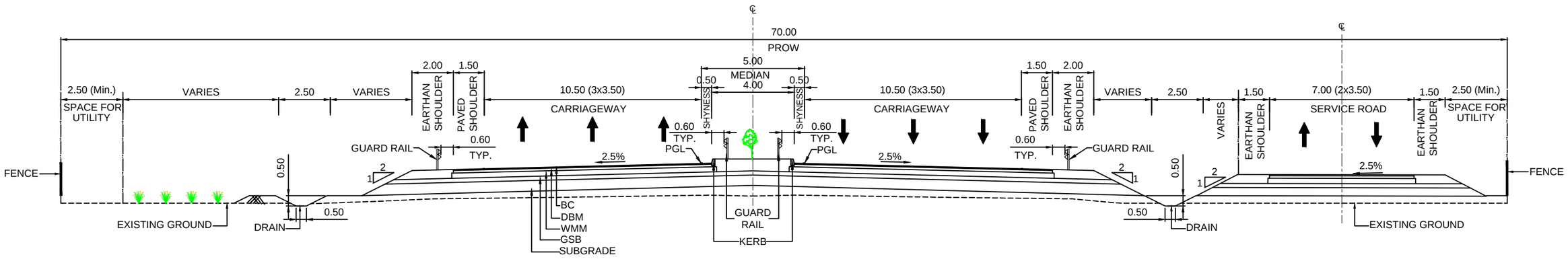
Alignment Options



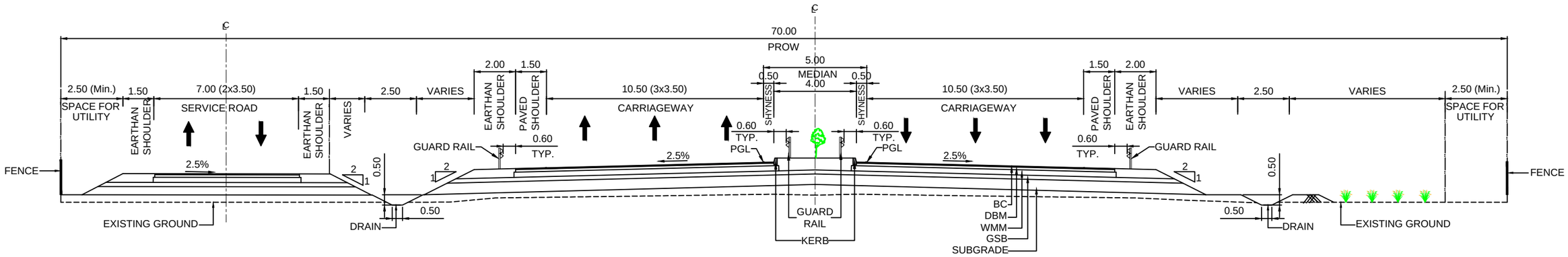
APPENDIX - A



TYPICAL CROSS SECTION - 1
NEW CONSTRUCTION 6-LANE ROAD



TYPICAL CROSS SECTION - 2
NEW CONSTRUCTION 6-LANE ROAD (SERVICE ROAD ON RHS)



TYPICAL CROSS SECTION - 3
NEW CONSTRUCTION 6-LANE ROAD (SERVICE ROAD ON LHS)

NOTE:
1.ALL DIMENSIONS ARE METERS
2.PROW - PROPOSED RIGHT OF WAY
3.EARTHEN SHOULDER WITH 150MM GRANULAR ON TOP LAYER
4.THE PROPOSED CROSS SECTIONS ARE DEVELOPED FOR 70M ROW IN ACCORDANCE WITH MORT&H OFFICE MORANDUM DATED 03 MAY 2018.

REV. NO.	DESCRIPTION	APPR'D
R0	DRAFT FEASIBILITY REPORT	KM

National Highways Authority of India (NHAI)

Louis Berger

CONSULTANCY SERVICES FOR PREPARATION OF DPR FOR DEVELOPMENT OF ECONOMIC CORRIDORS, INTER CORRIDORS, FEEDER ROUTES TO IMPROVE THE EFFICIENCY OF FREIGHT MOVEMENT IN INDIA UNDER BHARATMALA PARIYOJANA
LOT 3/ ANDHRA PRADESH, KARNATAKA, GOA & KERALA /PACKAGE 1

CHITOOR - THATCHOOR ROAD
TYPICAL CROSS SECTION

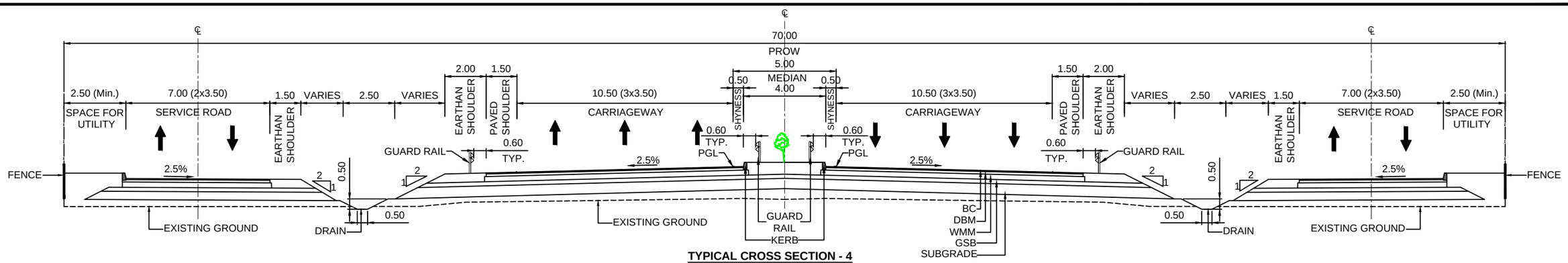
DRAWN:	RA
DESIGNED:	SKB
CHECKED:	MI
APPROVED:	KM

DATE: JUNE 2018
SCALE: 1:100
SCALE @ A2 SIZE SHEET

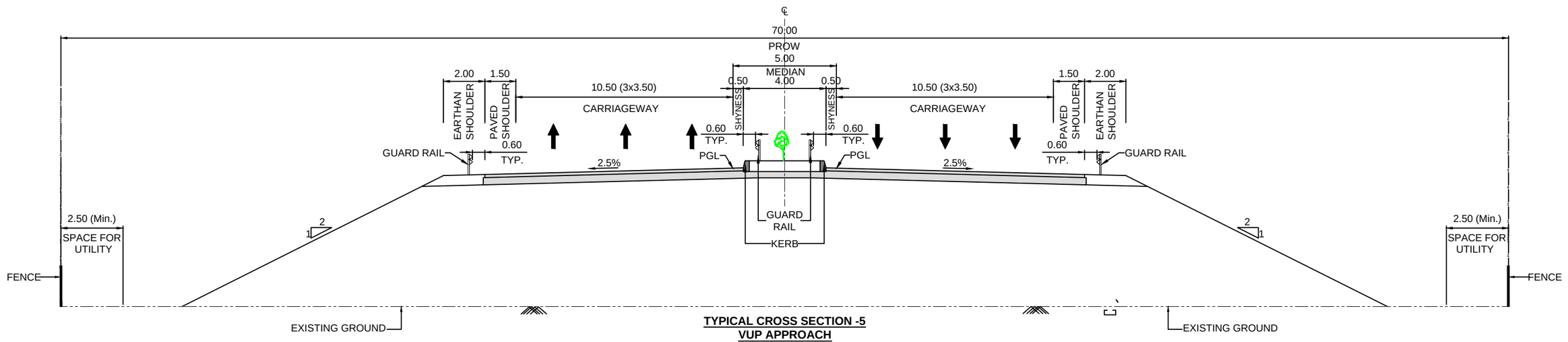
DRAFT FEASIBILITY REPORT

DRAWING NO:	SHEET NO.	REV.
4800182-CL-RD-TCS-07-001	01 OF 01	R0

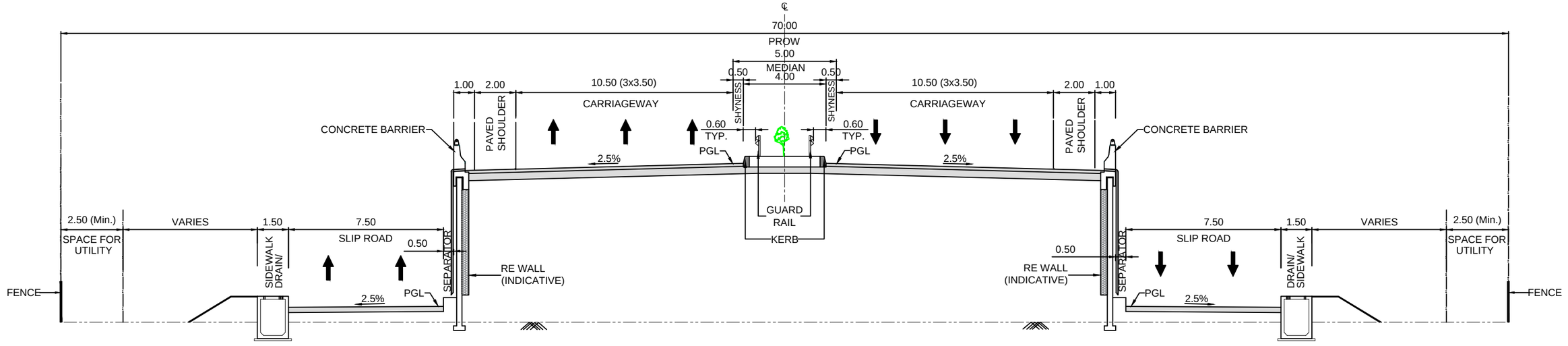
Plot Date: 06 July, 2018 - 12:14 PM



TYPICAL CROSS SECTION - 4
NEW CONSTRUCTION 6-LANE ROAD (SERVICE ROAD ON LHS & RHS)



TYPICAL CROSS SECTION -5
VUP APPROACH



TYPICAL CROSS SECTION - 6
VUP APPROACH WITH SLIP ROAD

NOTE:
1. ALL DIMENSIONS ARE METERS
2. PROW - PROPOSED RIGHT OF WAY
3. EARTHEN SHOULDER WITH 150MM GRANULAR ON TOP LAYER
4. THE PROPOSED CROSS SECTIONS ARE DEVELOPED FOR 70M ROW IN ACCORDANCE WITH MORT&H OFFICE MORANDUM DATED 03 MAY 2018.

REV. NO.	DESCRIPTION	APPR'D
R0	DRAFT FEASIBILITY REPORT	KM

National Highways Authority of India (NHAI)

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CONSULTANCY SERVICES FOR PREPARATION OF DPR FOR DEVELOPMENT OF ECONOMIC CORRIDORS, INTER CORRIDORS, FEEDER ROUTES TO IMPROVE THE EFFICIENCY OF FREIGHT MOVEMENT IN INDIA UNDER BHARATMALA PARIYOJANA
LOT 3/ ANDHRA PRADESH, KARNATAKA, GOA & KERALA /PACKAGE 1

CHITOOR - THATCHOOR ROAD
TYPICAL CROSS SECTION

DRAWN:	RA
DESIGNED:	SKB
CHECKED:	MI
APPROVED:	KM

DATE: JUNE 2018
SCALE: 1:100
SCALE @ A2 SIZE SHEET

DRAFT FEASIBILITY REPORT

DRAWING NO:	SHEET NO.	REV.
4800182-CL-RD-TCS-07-002	01 OF 01	R0

Plot Date: 06 July, 2018 - 12:14 PM