

BEFORE THE NATIONAL GREEN TRIBUNAL

SOUTHERN ZONE, CHENNAI

Original Application No. 74 of 2024 (SZ)

In the matter of:

Tribunal on its own motion
SUO MOTU based on the News
Item in The Hindu dt:04.01.2024
titled "Road expansion along
Nilgiris highways ruining local
ecology, increasing risk of
landslips activists" .

... Applicant(s)

Versus

Tamil Nadu Pollution Control
Board and Anr.

...Respondent(s)

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Through
Dr. D. Shanmuganathan
Standing Counsel of Tamil Nadu
National Green Tribunal
Southern Zone, Chennai

DATE: 02.09.2024

BEFORE THE NATIONAL GREEN TRIBUNAL SITTING AT CHENNAI**Original Application No. 74 of 2024 (SZ)****Earlier OA No.115 of 2024 (PB)**

Suo Motu

Versus

1. Tamilnadu pollution Control Board
2. The District Collector, The Nilgiris.

... Respondents**STATUS REPORT FILED BY THE 2nd RESPONDENT**

1. I submit that the Hon'ble Tribunal based on the news item in The Hindu Newspaper Article dated 04.01.2024. titled "Road expansion along Nilgiris Highways ruining local ecology, increasing risk of landslips" has Suo Moto taken up the issue.
2. I submit that the work of "1). Widening from Intermediate Lane to Two Lane and Strengthening at km 31/2 - 33/2 of Ooty - Kotagiri Mettupalayam - Sathi - Gobi - Erode Road including CC Drain, Protective Works and Widening Culvert at Km 31/8 and 2). Widening from Intermediate Lane to Two Lane and Strengthening at km 41/0 - 43/0- of Ooty - Kotagiri Mettupalayam - Sathi - Gobi - Erode Road including CC Drain, Protective Works and Widening Culvert at Km 41/8 and 42/4" have been taken up under CRIDP 2023-24 by Construction & Maintenance wing. The work started on 04.10.2023. Widening of Culvert drainage works and protective works have been included in the work based on the requirements of the road. It is submitted that no major earth slips or


landslides occurred between Kotagiri and Mettupalayam in the last two years.

3. I submit that the work of "Widening to Two Lane with Paved shoulders from Km 414/4-428/0 (From Coonoor to Valley view) and Strengthening from Km 422/0 - 425/0 of NH 67 (Nagapattinam Gudalur Mysore road) including CD works and Protective works in the state of Tamilnadu on EPC mode" has been taken up under Annual Plan 2019-20 by National Highways wing for an amount of Rs 27.85 Crores. The work started on 05.10.2020. Culvert drainage works and protective works have been included in the work based on the requirements of the road. It is submitted that no major earth slips or landslides occurred between Ooty and Coonoor in the last three years.
4. Also, it is submitted that a Technical Expert Committee has been constituted by the District Collector, the Nilgiris District comprising of One Head and Eight members to study the prevention of landslides and soil erosion. The Technical Expert Committee has submitted their recommendations to the District Collector. Based on the recommendations necessary protective works will be taken up in the phased manner.
5. Slope stabilization using new techniques (soil nailing) were implemented to protect soil erosion in 3 location, two in Ooty-Kotagiri-Mettupalayam Road (SH 15) at Km 1/10 near Koadapamund and at Km 16/8 near Bakkiya nagar and one in Coonoor-Mettuplayam Road (NH67/181) at Km 95/8 near Marapalam. In continuation to this the same innovative technique (soil nailing) is taken up and completed in six locations at Km 2/2 near Kodapamund, 10/10 near Madithorai in Ooty - Kotagiri Mettupalayam Road (SH 15), Km 14/2 near Ithalar in Udhagai -Avalanchi -Kundha road (M 1071) , Km 12/6

near Naduhatty in Coonoor -Kattabatu road (M-1073) ,Km 0/8,Km 1/6 near Ketty in Ketty Palada sales road (M 1142) to control the soil erosion.

6. Further, proposals for Slope stabilization have been sent to Government during current year 2024-25 in four locations at km 10/10 (bit II) of Ooty - Kotagiri Mettupalayam - Sathi - Gobi - Erode Road (SH 15), km 13/4 of Udhagai - Avalanchi - Kundah -Thaishola road (M 1071), km 5/8 of Kotagiri Kodanadu View Point road (Via) Kodanadu (M 995) and km 1/10 of Selas Kolacombai road (ODR).
7. Necessary Protective works will be taken up on NH 67 (New NH 181) after obtaining approval from Ministry of Road Transport & Highways.

I therefore humbly submit that the above said facts may kindly be taken into consideration by the Hon'ble Tribunal and pass necessary orders as it deems fit and thus render justice.


District Collector,
The Nilgiris.

PROCEEDINGS OF THE DISTRICT COLLECTOR, THE NILGIRIS

Present: M.Aruna. I.A.S

Rc.DM/ E.6498179/2024

Dated:10.01.2024

Sub: Disaster Management – Constitution of Technical Expert Committee to study prevention of landslides and Soil Erosion - Orders issued

Read: Lr. No.22/2024/JDO Dated:05.01.2024 of the Divisional Engineer, Highways, Construction and Maintenance, Udhamandalam

ORDER:

The Nilgiris District being a hilly district witnesses rainfall during both the South West and North East Monsoons. Due to this, the roads are vulnerable to landslides which affect the daily life of the public.

In this regard, as per section 28 of the Disaster Management Act, 2005, , the following Technical Expert Committee is hereby formed with the following members to make a detailed study with respect to the following.

1. Impact on the soil structure & Stability during road expansion works.
2. Remedial measures to be taken up for any damages made due to road expansion.
3. Suggestion of improved/advanced techniques to be used in future cases of road expansion.

S.No.	Name and Designation	Position
1.	Dr.Somasundaram Jayaraman, Principal Scientist & Head, ICAR – Indian Insitute of Soil and Water Conservation, Research Center, Ooty	Head
2.	Dr.Jeevan Joseph, Assistant Professor, Department of Civil Engineering, National Institute of Technology, Trichy	Member

3.	Tmt.R.Keerthi Priyadharshini, District Revenue Officer, The Nilgiris	Member
4.	Er.P.Elango, Deputy Director II (Soils), Highways Research Station, Guindy, Chennai	Member
5.	Thiru.S.Gowtham, IFS, District Forest Officer, The Nilgiris Division	Member
6.	Er.S.Kulandairaju, Divisional Engineer, Highways (C&M), Udhagamandalam	Member
7.	Er.T.Selvam, Divisional Engineer, National Highways (C&M), Gobichettipalayam	Member
8.	Thiru.T.Radhakrishnan Executive Engineer, Agri Engineering, Near Rose Garden Udhagamandalam	Member
9.	Thiru.M.Suresh Kumar, Assistant Director(Mines), Geology & Mines, Additional Collectorate, Udhagamandalam	Member

Sd/-M.Aruna
District Collector,
The Nilgiris.

To
The Committee members

Copy to

- 1) Assistant Director, Village Panchayat
- 2) Assistant Director, Town Panchayat
- 3) Municipal Commissioners, Udhagamandalam/Coonoor/
Gudalur/Nelliyalam

//t.c.b.o//

T. Q. R.
10/11/2024
For Collector,
The Nilgiris.

10/01/24



ABSTRACT

Highways and Minor Ports Department – Widening and Strengthening of Roads, Construction of Bypasses and High Level Bridges, Urban Improvement of Roads, Road Safety, Construction of Culverts and Bridges under Comprehensive Road Infrastructure Development Programme (CRIDP) for the year 2023-2024 at a total cost of Rs.6033.93 crore - Administrative Sanction – Accorded – Orders – Issued.

HIGHWAYS AND MINOR PORTS (HF2) DEPARTMENT

G.O.(Ms) No.79

Dated: 05.07.2023

சோபகிருது, ஆனி-20, திருவள்ளூர்வராண்டு 2054

Read:

1. Announcement made by Hon'ble Minister for Public Works-Buildings, Highways and Minor Ports during the Budget Session 2023-2024.
2. From the Chief Engineer (Construction and Maintenance), Highways Department, Letter No.7512/Thittam/2023, dated 18.04.2023.
3. Government Letter No.1647/HF2/2023-1, dated 10.05.2023.
4. From the Chief Engineer (Construction and Maintenance), Highways Department, Letter No.7512/Thittam/2023, dated 08.06.2023.

ORDER:

The Hon'ble Minister for Public Works, Buildings, Highways and Minor Ports has made the following announcements on the floor of the Assembly during the discussion on 2023-2024 Budget Demand No.21:-

வ. எண்.	அறிவிப்பு எண்.	அறிவிப்பு
1.	10	முதலமைச்சர் சாலை மேம்பாட்டுத் திட்டத்தின் (CMRDP) கீழ் நடப்பாண்டில் 13.30 கி.மீ. நீள ஈரோடு வெளிவட்ட சுற்றுச் சாலை உள்ளிட்ட 200 கி.மீ. சாலைகள் நான்கு வழித்தடமாகவும் 600 கி.மீ. சாலைகள் இருவழித் தடமாகவும் அகலப்படுத்தி மேம்படுத்தப்படும்.
2.	13	அனைத்து மாநில நெடுஞ்சாலைகளில் சாலை பாதுகாப்பு தணிக்கை (Road Safety Audit) செய்யப்பட்டு சாலை விபத்துக்களை தடுக்க மிக முக்கிய உடனடி தேவைகள் கண்டறியப்பட்டு (Important and Immediate Measures) ரூ.150 கோடி மதிப்பில் சாலை பாதுகாப்பு பணிகள் மேற்கொள்ளப்படும். மலைப்பகுதிகளில் உள்ள கொண்டை ஊசி வளைவுகள் மற்றும் ஆபத்தான வளைவு பகுதிகளில் வெளிநாட்டு தொழில்நுட்பத்தை பயன்படுத்தி உருளை விபத்து தடுப்பான்கள் (Roller Crash Barrier) ரூ.100 கோடி மதிப்பில் அமைக்கப்படும்.

3.	14	"அனைத்து காலநிலைகளிலும் தங்கு தடையற்ற போக்குவரத்து" என்ற முதலமைச்சரின் முத்தாய்ப்பான திட்டத்தின் கீழ் 273 தரைப்பாலங்கள் உயர்மட்டப் பாலங்களாக ரூ.787 கோடி மதிப்பில் கட்டப்படும்.
4.	18	சென்னை பெருநகர பகுதியில் நிரந்தர வெள்ளத் தடுப்பு கட்டமைப்புப் பணிகளை மேற்கொண்டு கடந்த ஆண்டு வடகிழக்குப் பருவமழையின்போது, மழைநீர் எங்கும் தேங்காதவண்ணம் சாதனைப் படைக்கப்பட்டது. தேவைப்படும் இடங்களில் சிறுபாலங்கள் மற்றும் கால்வாய் ஆகியவை ரூ.116 கோடி மதிப்பீட்டில் செயலாக்கத்திற்கு எடுத்துக் கொள்ளப்படும்.
5.	8	மாநில நெடுஞ்சாலைகளின் நில எல்லை அளவு மற்றும் மரங்கள், சாலை உபகரணங்கள் உள்ளிட்ட சொத்துக்களின் (Assets) விவரங்கள் கணினிமயமாக்கப்படும் (Digitalization).
6.	11	9 மாவட்டங்களில் 13 ஆற்றுப் பாலங்கள் ரூ.215.80 கோடி மதிப்பில் கட்டப்படும்.
7.	12	துறையூர், திருப்பத்தூர் மற்றும் நாமக்கல் ஆகிய 3 நகரங்களுக்கு புறவழிச் சாலைகள் ரூ.286 கோடி மதிப்பில் அமைக்கப்படும்.
8.	1	மாண்புமிகு முதலமைச்சரின் பொண்ணா திட்டங்களில் ஒன்றான "உங்கள் தொகுதியில் முதலமைச்சர்" திட்டத்தில் மாண்புமிகு சட்டமன்ற உறுப்பினர்களிடம் பெறப்பட்ட கோரிக்கைகளை செயல்படுத்த முதற்கட்டமாக ரூ.1093 கோடி மதிப்பில் பணிகள் செயலாக்கத்திற்கு எடுத்துக் கொள்ளப்படும்.
9.	19	நாகப்பட்டினம் அரசு மருத்துவ கல்லூரி மற்றும் பாப்பாகோவில் கருங்கண்ணி சாலையை இணைக்கும் வகையில் ரூ.26 கோடி மதிப்பில் சாலை அமைக்கப்படும்.

2. It was decided to take up the above-mentioned announcements and regular activities under Comprehensive Road Infrastructure Development Programme (CRIDP) 2023-2024 against the Bank of Sanction for Rs.6300.00 crore. Accordingly, the Chief Engineer (Construction and Maintenance) was requested to submit proposals duly deducting amount for already sanctioned following works.

Sl. No.	G.O. No. and Date	Name of the work	Amount Rs. in Crore
1.	G.O.(Ms)No.242, Highways and Minor Ports (HS1) Department, dated 29.12.2022.	Construction of High Level Bridge in lieu of existing causeway at km -47/6 of Avinashi Tiruppur Palladam Pollachi Cochin (via) - Meenkarai – road (SH-19).	2.63
2.	G.O.(Ms)No.233, Highways and Minor Ports (HQ1) Department, dated 21.12.2022.	Forming Bypass to Tiruchengode town km 0/0-6/2 (Phase-I) and km 6/2-12/8 (Phase-II).	151.08
3.	G.O.(Ms)No.34, Highways and Minor Ports (EAP-I(1)) Department, dated 13.04.2023.	Construction of High Level Bridge (HLB) connecting Kangeyanallur to Sathuvachari villages across Palar river.	90.66
4.	G.O.(Ms)No.62, Highways and Minor Ports (HS1) Department, dated 31.05.2023.	Widening and improvements of Road leading to newly constructed Arena for Jallikattu in Alanganallur	21.70
Total			266.07

3. In the letter fourth read above, the Chief Engineer (Construction and Maintenance), Highways Department has sent a proposal for Comprehensive Road Infrastructure Development Programme (CRIDP) 2023-2024 for an amount of Rs.6033.93 crore duly deducting the provision for already sanctioned works to the tune of Rs.266.07 crore and requested for approval of Bank of Sanction for Rs.6,300.00 crore. He has furnished the list of 1772 works to be taken up under Comprehensive Road Infrastructure Development Programme (CRIDP) 2023-2024 and requested to accord Administrative Sanction for an amount of Rs.6033.93 crore.

4. Selection of works has also been done based on the requests received under Ungal Thoguthiyil Mudalamaichar (UTM). The abstract of works under UTM is given below:

Sl. No	Name of the work	No of works	Amount Rs. in Crore
1.	Construction of River Bridges, Culverts and Drain, Road Works (C&M)	35	186.96
2.	Formation of Namakkal Bypass (Phase-I&II) (NABARD)	1	194.00
3.	Construction of HLB (Projects)	2	79.05
	Total		460.01

The remaining works proposed under UTM will be taken up under various other schemes.

5. The Government, after careful examination of the proposal of the Chief Engineer (Construction and Maintenance), Highways Department accord approval for Bank of Sanction of Rs.6300.00 crore (Rupees Six Thousand and Three Hundred Crore only) under Comprehensive Road Infrastructure Development Programme (CRIDP) 2023-2024 and accord Administrative Sanction for 1772 new works for a sum of Rs.6033.93 crore (Rupees Six Thousand Thirty Three Crore and Ninety Three Lakh only) under Comprehensive Road Infrastructure Development Programme (CRIDP) 2023-2024 as annexed to this order. The abstract of the new works taken up under Comprehensive Road Infrastructure Development Programme (CRIDP) 2023-2024 is as follows:-

Sl. No.	Description	No of works	Length in Km	Cost Rs. in Crore
1.	CMRDP - 4 laning of Roads	30	163.71	1468.68
2.	CMRDP – Two lane Roads	178	545.63	800.89
3.	Construction of HLBs in lieu of causeways	201	-	313.52
4.	Urban Road Development	23	28.05	102.92
5.	Road Safety works	166		284.65
6.	IRQP	371	953.17	369.07
7.	Widening of roads Excluding Sl.No.1, 2 (SL-IL, DL-DLPV, END TO END)	349	824.28	1302.60
8.	Strengthening of roads	229	540.82	529.99
9.	Flood Permanent works	46	-	105.68

10.	Bridges / Culverts	63	-	67.32
11.	Others (including Digitization)	101		202.48
	C&M Total	1757	3055.66	5547.80
12.	Project works *	12	5.20	250.63
13.	NABARD & RR works **	3	17.43	235.50
	Total	1772	3078.29	6033.93

* (a) Construction of 11 High Level Bridges

(b) Formation of Thuraiyur Bypass (Phase-II)

** (a) Formation of Bypass for Thirupathur Town (Phase-I)

(b) Formation of Namakkal Bypass (Phase-I & II)

6. Out of Rs.6033.93 crore, an amount of Rs.301.98 crore has been earmarked for Special Component Plan. Break up details of Special Component Plan is given below:-

Sl. No.	Description	No. of Works	Length in Km	Cost Rs. in Crore
1.	CMRDP – IL – DL	6	17.23	23.75
2.	Causeway to HLB	10	-	17.54
3.	Road Safety	10	-	14.32
4.	Widening	56	144.80	176.89
5.	Strengthening	40	92.98	59.37
6.	Others	10	-	10.11
	Total	132	255.01	301.98

7. The expenditure sanctioned in para-5 above shall be debited to the following heads of accounts:-

a) **Comprehensive Road Infrastructure Development Programme - State Highways: Rs.2925.11 crore.**

5054	Capital Outlay on Roads and Bridges
03	State Highways
337	Road works – State's Expenditure
Jl	Comprehensive Road Infrastructure Development Programme (CRIDP) - State Highways
416	Major works – 01.Major works
(DPC-5054-03-337-Jl-41601)	

b) **Comprehensive Road Infrastructure Development Programme – Major District Roads: Rs.967.05 crore**

5054	Capital Outlay on Roads and Bridges
04	District and other roads
337	Road works – State's Expenditure
JT	Comprehensive Road Infrastructure Development Programme (CRIDP) - Major District Roads
416	Major works – 01.Major works
(DPC-5054-04-337-JT-41601)	

c) Comprehensive Road Infrastructure Development Programme – Other District Roads: Rs.1470.72 crore

5054	Capital Outlay on Roads and Bridges
04	District and other roads
337	Road works – State's Expenditure
JU	Comprehensive Road Infrastructure Development Programme (CRIDP) - Other District Roads
416	Major works-01-Major works
(DPC-5054-04-337-JU-41601)	

d) Comprehensive Road Infrastructure Development Programme – Other District Roads under Special Component Plan:Rs.301.98 crore

5054	Capital Outlay on Roads and Bridges
04	District and other roads
789	Special Component Plan for Scheduled Castes – State's Expenditure
JC	Comprehensive Road Infrastructure Development Programme (CRIDP) - Other District Roads under Special Component Plan
416	Major works-01-Major works
(DPC-5054-04-789-JC-41601)	

e) Comprehensive Road Infrastructure Development Programme – Improvements to Riding Quality: Rs.369.07 crore

5054	Capital Outlay on Roads and Bridges
04	District and other roads
337	Road works
KF	Improvement of Road Quality under Comprehensive Road Infrastructure Development Programme (CRIDP)
416	Major works – 01.Major works
(DPC-5054-04-337-KF-41601)	

8. The Chief Engineer (Construction and Maintenance), Highways Department is permitted to initiate land acquisition process even for works which do not specifically mention land acquisition in the nomenclature of works.

9. The Government accord exemption from policy of allocation of 10% of Comprehensive Road Infrastructure Development Programme (CRIDP) fund towards urban improvements.

10. The Chief Engineer (Construction and Maintenance), Highways Department is directed to send a proposal in case of any change in nomenclature of works, split / deletion, substitution of works even with no additional financial commitment to the Government.

11. The Chief Engineer (Construction and Maintenance), Highways Department is directed to prepare estimates as per Scheduled of Rates - 2023-2024 and prevailing Goods and Services Tax Notification (18%). No request for Revised Administrative Sanction for the works will be entertained on account of these reasons.

12. The Chief Engineer (Construction and Maintenance), Highways Department is directed to ensure that the works sanctioned herein are not included in any other scheme and have not been taken up previously.

13. The Chief Engineer (Construction and Maintenance), Highways Department should adhere to guidelines already issued for Chief Minister Road Development Programme (CMRDP) for selection of works.

14. This order issues with the concurrence of Finance Department vide its U.O.No.42/DS(SA)/Fin(infra-I)/2023, dated 04.07.2023.

(By Order of the Governor)

Pradeep Yadav
Additional Chief Secretary to Government

To
The Chief Engineer (Construction and Maintenance),
Highways Department, Chennai-25.
The Director General, Highways Department, Chennai-25.
All Chief Engineers in Highways Department, Chennai.
The Director, Highways Research Station, Chennai-25.
The Accountant General, Chennai-18.
All District Treasury Officers.
The Pay and Accounts Officer, Chennai / Madurai.

Copy to:-

The O/o. the Hon'ble Chief Minister, Chennai-9.
The Special Personal Assistant to the Hon'ble Minister,
(Public Works-Buildings, Highways and Minor Ports), Chennai-9.
The Private Secretary to Additional Chief Secretary to Government,
Highways and Minor Ports Department, Chennai-9.
The Finance (PW-I/BG-1 & BG-2) Department, Chennai-9.
All Scheme Sections in Highways and Minor Ports Department, Chennai-9.
The National Informatics Centre (NIC), Chennai-9.
Clean Copy: [1647/HF2/2023]
Stock File/Spare Copy

// Forwarded By Order //

Pradeep Yadav 05/07/2023

SECTION OFFICER

Pradeep
5/7/23

Rs. in Lakhs

Sl. No	Job Code	Division	Classification	Name of work	Length	Amount	Widening type	Necessity
259	01-CRIDP-23-24-S-0259	Udhagai	SH	Providing Roller Crash Barrier at km 125/6,8, 127/4, 128/8,10, 129/2 of Calicut Vythiri Gudalur road		95.00	No widening	Road safety
260	01-CRIDP-23-24-S-0260	Udhagai	SH	Providing Roller Crash Barrier at km 19/10, 25/8, 38/6 of Ooty - Kotagiri Mettupalayam - Sathi - Gobi - Erode Road		150.00	No widening	Road safety
261	01-CRIDP-23-24-S-0261	Udhagai	SH	Strengthening at km 104/6 - 106/0, 107/0 - 107/6, 108/6 - 109/4 of Calicut Vythiri Gudalur road including Protective Works and CC Drain	2.80	420.00	No widening	Strengthening
262	01-CRIDP-23-24-S-0262	Udhagai	SH	Strengthening at km 109/4 - 110/4, 119/8 - 123/2 of Calicut Vythiri Gudalur road including Protective Works and CC Drain	4.40	660.00	No widening	Strengthening
263	01-CRIDP-23-24-S-0263	Udhagai	SH	Construction of Retaining wall at km 8/8 of Ooty - Kotagiri Mettupalayam - Sathi - Gobi - Erode Road		80.00	No widening	Others
264	01-CRIDP-23-24-S-0264	Udhagai	SH	Construction of Retaining wall at km 14/8, 14/10 of Ooty - Kotagiri Mettupalayam - Sathi - Gobi - Erode Road		185.00	No widening	Others
265	01-CRIDP-23-24-S-0265	Udhagai	SH	Slope stabilisation using soil nailing method at km 2/2 of Ooty - Kotagiri Mettupalayam - Sathi - Gobi - Erode Road		25.00	No widening	Others
266	01-CRIDP-23-24-S-0266	Udhagai	SH	Slope stabilisation using soil nailing method at km 10/10 of Ooty - Kotagiri Mettupalayam - Sathi - Gobi - Erode Road		25.00	No widening	Others

Rs. in Lakhs

Sl. No	Job Code	Division	Classification	Name of work	Length	Amount	Widening type	Necessity
546	01-CRIDP-23-24-M-0546	Udhagai	MDR	Construction of Retaining wall at km 6/4, 6/6, 7/2 of Udhagai Kaikatty road including CC Drain		195.00	No widening	Others
547	01-CRIDP-23-24-M-0547	Udhagai	MDR	Construction of Retaining wall at km 19/8, 30/2 of Udhagai - Avalanchi - Kundah -Thaishola road including CC Drain		186.00	No widening	Others
548	01-CRIDP-23-24-M-0548	Udhagai	MDR	Slope stabilisation using soil nailing method at km 14/2 of Udhagai - Avalanchi - Kundah -Thaishola road		50.00	No widening	Others
549	01-CRIDP-23-24-M-0549	Udhagai	MDR	Construction of Retaining wall at km 14/8 of Udhagai - Avalanchi -Kundah -Thaishola road including Breast wall at km 18/2 and CC Drain		100.00	No widening	Others
550	01-CRIDP-23-24-M-0550	Udhagai	MDR	Construction of Retaining wall at km 3/10 of Wellington Kotagiri Road including Breast wall at Km 4/4 & 4/6		65.00	No widening	Others
551	01-CRIDP-23-24-M-0551	Udhagai	MDR	Slope stabilisation using soil nailing method at km 0/8, 1/6 of Ketty Palada Selas road		50.00	No widening	Others
552	01-CRIDP-23-24-M-0552	Udhagai	MDR	Slope stabilisation using soil nailing method at km 12/6 of Coonoor Kattabettu road		50.00	No widening	Others
971	01-CRIDP-23-24-O-0971	Udhagai	ODR	Providing roller crash barrier at km 120/10, 121/8, 123/2, 124/8, 125/4 of Calicut Vythiri Gudalur road		50.00	No widening	Road safety
972	01-CRIDP-23-24-O-0972	Udhagai	ODR	Providing roller crash barrier at km 3/8, 4/6, 4/8 of Catherine falls road.		50.00	No widening	Road safety

**Name of Work : Slope Stabilisation using soil nailing method at km 14/2 of Udhagai Avalanchi Kundha
Thaishola Road**



Before

**Name of Work : Slope Stabilisation using soil nailing method at km 14/2 of Udhagai Avalanchi Kundha
Thaishola Road**



**Name of Work : Slope Stabilisation using soil nailing method at km 14/2 of Udhagai Avalanchi Kundha
Thaishola Road**



Maintenance (Watering) of Applied Surface

**Name of Work : Slope Stabilisation using soil nailing method at km 14/2 of Udhagai Avalanchi Kundha
Thaishola Road**



Current Status of Germanation

SLOPE STABILISATION USING SOIL NAILING METHOD AT KM2/2 OF UDHAGAI KOTAGIRI METTUPALAYAM SATHI GOBI ERODE ROAD



SITE PREPARATION

SLOPE STABILISATION USING SOIL NAILING METHOD AT KM2/2 OF UDHAGAI KOTAGIRI METTUPALAYAM SATHI GOBI ERODE ROAD



GROUTED SURFACE

**SLOPE STABILISATION USING SOIL NAILING METHOD AT KM2/2 OF UDHAGAI KOTAGIRI METTUPALAYAM SATHI
GOBI ERODE ROAD**



APPLICATION OF HIGH PERFORMANCE FLEXIBLE GROWTH MEDIUM (HPFGM)

**SLOPE STABILISATION USING SOIL NAILING METHOD AT KM2/2 OF UDHAGAI KOTAGIRI METTUPALAYAM SATHI
GOBI ERODE ROAD**



MAINTENANCE (WATERING) OF APPLIED SURFACE

CIRCLE : COIMBATORE (H) C&M

DIVISION : UDHAGAI (H) C&M

SUB-DIVISION : COONOOR (H) C&M

SLOPE STABILISATION USING SOIL NAILING METHOD AT KM 0/8, 1/6 OF KETTY PALADA SELAS ROAD



GROUTING WORK AT KM 1/6

CIRCLE : COIMBATORE (H) C&M

DIVISION : UDHAGAI (H) C&M

SUB-DIVISION : COONOOR (H) C&M

SLOPE STABILISATION USING SOIL NAILING METHOD AT KM 0/8, 1/6 OF KETTY PALADA SELAS ROAD



MAINTENANCE (WATERING) OF APPLIED SURFACE IS IN PROGRESS AT KM 1/6

CIRCLE : COIMBATORE (H) C&M

DIVISION : UDHAGAI (H) C&M

SUB-DIVISION : COONOOR (H) C&M

SLOPE STABILISATION USING SOIL NAILING METHOD AT KM 0/8, 1/6 OF KETTY PALADA SELAS ROAD



NAIL POSITION MARKING AT KM 0/8

CIRCLE : COIMBATORE (H) C&M

DIVISION : UDHAGAI (H) C&M

SUB-DIVISION : COONOR (H) C&M

SLOPE STABILISATION USING SOIL NAILING METHOD AT KM 0/8, 1/6 OF KETTY PALADA SELAS ROAD



COMPLETION OF BIOTIC SOIL MEDIUM (BSM) AT KM 1/6

CIRCLE : COIMBATORE (H) C&M

DIVISION : UDHAGAI (H) C&M

SUB-DIVISION : COONOOR (H) C&M

SLOPE STABILISATION USING SOIL NAILING METHOD AT KM 0/8, 1/6 OF KETTY PALADA SELAS ROAD



MAINTENANCE (WATERING) OF APPLIED SURFACE IS IN PROGRESS AT KM 0/8

SLOPE STABILISATION USING SOIL NAILING METHOD AT KM 10/100F UDHAGAI KOTAGIRI METTUPALAYAM
SATHI GOBI ERODE ROAD



SITE PREPARATION

SLOPE STABILISATION USING SOIL NAILING METHOD AT KM 10/100F UDHAGAI KOTAGIRI METTUPALAYAM
SATHI GOBI ERODE ROAD



APPLICATION OF BIOTIC SOIL MEDIUM (BSM)

SLOPE STABILISATION USING SOIL NAILING METHOD AT KM 10/100F UDHAGAI KOTAGIRI METTUPALAYAM
SATHI GOBI ERODE ROAD



INSTALLATION OF THREE DIMENSIONAL EROSION CONTROL MAT



THE NILGIRIS DISTRICT

NATIONAL HIGHWAYS & HIGHWAYS ROADS

**Landslide Report by the
Technical Expert Committee**

Landslide Report by the Technical Expert Committee

Date of Meetings & Inspections	: 23.01.2024, 30.01.2024, 12.02.2024, 13.02.2024 & 28.02.2024
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**Preliminary meeting with all Technical Committee members at Additional
Collectorate at 10.30 A.M on 23.01.2024**

Technical Expert Committee		
1	Dr. Somasundaram Jayaraman Head & Principal Scientist, ICAR – Indian Institute of Soil and Water Conservation, Research Center, Ooty.	Chairman
2	Dr. Jeevan Joseph, Assistant Professor, Department of Civil Engineering, National Institute of Technology, Trichy.	Member
3	Tmt. R. Keerthi Priyadharshini, District Revenue Officer, The Nilgiris.	Member
4	Er. P. Elango, Deputy Director II (Soils), Highways Research Station, Guindy, Chennai.	Member
5	Thiru S. Gowtham, IFS, District Forest Officer, The Nilgiris Division	Member
6	Er. S. Kulandairaju, Divisional Engineer, Highways (C&M), Udhagamandalam.	Member
7	Er. T. Selvan, Divisional Engineer, National Highways, Gobichettipalayam.	Member
8	Thiru. T. Radhakrishnan, Executive Engineer (Agricultural Engineering), Near Rose Garden, Udhagamandalam.	Member
9	Thiru.M.Sureshkumar, Assistant Director, Geology & Mining, Additional Collectorate, Udhagamandalam.	Member

Inspection of NH 181 (Ooty to Barliar Stretch)

S.No	Location	Chainage	Observation	Suggestions
1	Latitude : 11°23'18" N Longitude : 76°43'57"E (Elevation : 2210 m)	Km 93/2 of NH 181 (Yellanalli, near Perinba vilas church)	<ol style="list-style-type: none"> 1. Disintegrated Rocky strata and Earth with boulders 2. Trees on the Hill side earth leads to landslide 3. Drainage Pattern II A subdendritic medium density and texture (LSI Value : 8) 4. Type of movement: Debris fall. 	<ol style="list-style-type: none"> 1. The vegetations in the Rock strata to be trimmed. 2. Trees (dangerous) in the hillside to be removed. Since the roots will disturb the rocky boulders / Soft weathered rocky terrain and earth slides due to the growth of Trees. 3. No additional structure required at present.

Photos:





Km 93/2 of NH 181 (Yellanalli, near Perinba vilas church)

S.No	Location	Chainage	Observation	Suggestions
2	Latitude : 11°21'59" N Longitude : 76°46'14"E (Elevation : 1890 m)	Km 86/6 of NH 181 (Aruvangadu)	<ol style="list-style-type: none"> 1. Regular Earth slip found. 2. The Earthslip found with wet and loose condition in the soil. 3. Drainage Pattern IV C Dendritic low density and coarse texture (LSI Value : 0.90) 4. Type of movement: Earth fall. 	<ol style="list-style-type: none"> 1. To avoid erosion of soil provide breast wall for 3m height (with batter) is required. 2. Easing the earth slope to more than 15° with respect to vertical to avoid soil erosion. 3. Geogrid nailing with jute geotextile and Local grass may be provided to stabilise the side slope. 4. Proper drainage facility needs to be provided in the upstream built-up portion.

Photos:





Km 86/6 of NH 181 (Aruvangadu)

S.No	Location	Chainage	Observation	Suggestions
3	Latitude : 11°20'59" N Longitude : 76°47'08" E (Elevation : 1770 m)	Km 82/8 of NH 181 (Near Wellington, Railway Quarters below)	<ol style="list-style-type: none"> 1. The Earthslip found with wet condition in the soil. 2. Spring water chocking is observed 3. Drainage Pattern IV C Dendritic low density and coarse texture (LSI Value : 0.90) 4. Loose soil; Soil thickness more than 3 m depth 5. Type of movement: Earth slide. 	<ol style="list-style-type: none"> 1. To avoid erosion of soil provide breast wall for 4m height (with batter) is required. 2. Easing the earth slope to more than 15° with respect to vertical to avoid sudden collapse / soil erosion. 3. Local seedling like grass (Lemon grass / Vettiveru) may be provided. 4. Proper drainage facility needs to be provided in the upstream built-up portion. 5. The detail study of spring water / water from upstream hill to be investigated.

Photos:



Km 82/8 of NH 181 (Near Wellington, Railway Quarters below)

S.No	Location	Chainage	Observation	Suggestions
4	Latitude : 11.337086 Longitude : 76.797666	Km 80/4 of NH 181 (Gandhipuram)	<ol style="list-style-type: none"> 1. Rocky strata and Earth with boulders 2. Drainage in the hilltop to be streamlined 3. Trees (2 nos) in the Hill slope leads to landslide 4. Drainage Pattern VI A Anomalous with local sub Dendritic medium to high density and medium to fine texture (LSI Value : 1.50) 5. Type of movement: Rock and Debris fall. 	<ol style="list-style-type: none"> 1. The vegetations in the Rock strata to be trimmed. 2. Drainage and dumping of waste materials in the wedge of hill to be controlled and streamlined. 3. Two trees (dangerous condition) in the hillside to be removed. Since the roots will disturb the rocky boulders and earth in the hill side 4. Breast wall / Gabion wall to be provided for a height of 3m in the left out portion; weathered rock boulders should be removed

Photos:



Km 80/4 of NH 181(Gandhipuram)

S.No	Location	Chainage	Observation	Suggestions
5	Latitude : 11°20'2" N Longitude : 76°47'54"E	Km 79/10 of NH 181 (Gandhipuram)	<ol style="list-style-type: none"> 1. Regular Earth slip found. 2. Number of choke pit / septic tank found in the Hilltop 3. Drainage Pattern VI A Anomalous with local sub Dendritic medium to high density and medium to fine texture (LSI Value : 1.50) 4. Type of movement: Earth fall. 	<ol style="list-style-type: none"> 1. To avoid erosion of soil provide breast wall / Gabion wall for 3m height. 2. Easing the earth slope to more than 15° with respect to vertical to avoid soil erosion. 3. Local seedling like grass (Lemongrass / Vettiveru) may be provided. 4. Existing choke pit / septic tank to be avoided in the hilltop on upstream side shall be shifted to safer locations.

Photos:



Km 79/10 of NH 181 (Gandhipuram)

S.No	Location	Chainage	Observation	Suggestions
6	Latitude : 11°19'57" N Longitude : 76°47'39"E	Km 77/6 of NH 181 (Near double road Katteri park)	<ol style="list-style-type: none"> 1. Earth slip found. 2. Number of Trees found on the edges of Hill intend to fall during windy and Rainy season. 3. Drainage Pattern VI A Anomalous with local sub Dendritic medium to high density and medium to fine texture (LSI Value : 1.50) 4. Type of movement: Earth fall. 	<ol style="list-style-type: none"> 1. To avoid erosion of soil provide breast wall for 2.5m height. 2. Remove the dangerous Tree in the top edge and slope of the soil. 3. Provide Geogrid nailing with jute geotextile to stabilise the soil layer.

Photos:



S.No	Location	Chainage	Observation	Suggestions
7	Latitude : 11°19'50" N Longitude : 76°48'28"E	Km 75/4 of NH 181 (Near Nanthagopal Bridge)	<ol style="list-style-type: none"> 1. Earth slip is found. 2. Soft soil and vertical slope of hill tense to repeated soil erosion. 3. Drainage Pattern VI A Anomalous with local sub Dendritic medium to high density and medium to fine texture (LSI Value : 1.50) 4. Type of movement: Earth fall. 	<ol style="list-style-type: none"> 1. To avoid erosion of soil provide breast wall for 3.00m height. 2. Easing the earth slope to more than 15° to avoid soil erosion. 3. Local seedling like grass (lemon grass / Vettiveru) may be provided. 4. Geogrid nailing with jute geotextile to stabilise the soil layer to stabilise the soil layer and to cover the bare soil.

Photos:

S.No	Location	Chainage	Observation	Suggestions
8	Latitude : 11°20'7" N Longitude : 76°48'49"E	Km 74/4 of NH 181 (Near Nanthagopal Bridge)	<ol style="list-style-type: none"> 1. Rock boulders and Earth with boulders 2. Sliding of earth (large mass) and rocks found continuously during last 1 year. 3. Drainage Pattern IV C Dendritic low density and coarse texture (LSI Value : 0.90) 4. Loose soil with silty clay & boulders; Soil thickness more than 10 m depth 5. Type of movement: Earth and debris slide. 	<ol style="list-style-type: none"> 1. To avoid erosion of soil provide breast wall / Gabion wall for 4m height (with batter) is required 2. Detail study by investigating the site with soil sample is proposed. 3. Easing the earth slope to more than 15° with respect to vertical to avoid sudden collapse/ soil erosion. 4. Local seedling like grass (Lemon grass / Vettiveru) may be provided to stabilise side slopes

Photos:



Km 74/4 of NH 181 (Near Nanthagopal Bridge)

S.No	Location	Chainage	Observation	Suggestions
9	Latitude : 11°20'7" N Longitude : 76°48'49" E	Km 74/4 (ii) of NH 181 (Near Nanthagopal Bridge)	<ol style="list-style-type: none"> 1. Rock boulders and Earth with boulders 2. Sliding of earth and rocks found continuously during last 1 year. 3. Drainage Pattern VI A Anomalous with local sub Dendritic medium to high density and medium to fine texture (LSI Value : 1.50) 4. Type of movement: Earth and debris slide. 	<ol style="list-style-type: none"> 1. To avoid erosion of soil and rock provide breast wall / Gabion wall for 4.00m height (with batter) is required. 2. Easing the earth slope to more than 15° with respect to vertical to avoid soil erosion. 3. Local seedling like grass (Lemon grass / Vettiveru) may be provided 4. Provide Geogrid nailing with jute geotextile to stabilise the soil layer. 5. Provide rock anchors to stabilise the rock strata.

Photos:



Km 74/4 (ii) of NH 181 (Near Nanthagopal Bridge)

S.No	Location	Chainage	Observation	Suggestions
10	Latitude : 11°20'8" N Longitude : 76°48'50"E	Km 74/4 (i) of NH 181 (Near Nanthagopal Bridge)	<ol style="list-style-type: none"> 1. Rock boulders and Earth with boulders 2. Sliding of earth and rocks found continuously during last 1 year. 3. Drainage Pattern VI A Anomalous with local sub Dendritic medium to high density and medium to fine texture (LSI Value : 1.50) 4. Type of movement: Earth and debris slide. 	<ol style="list-style-type: none"> 1. To avoid erosion of soil and rock provide breast wall / Gabion wall for 4.00m height (with batter) is required. 2. Easing the earth slope to more than 15° with respect to vertical to avoid soil erosion. 3. Local seedling like grass (Lemon grass / Vettiveru) may be provided 4. Provide Geo grid nailing with jute geotextile and rock anchors along with hydro seeding.

Photos:

S.No	Location	Chainage	Observation	Suggestions
11	Latitude : 11°20'8" N Longitude : 76°48'54"E	Km 74/2 of NH 181 (Near Nanthagopal Bridge)	<ol style="list-style-type: none"> 1. Sliding of earth and rocks found continuously. 2. Drainage Pattern VI A Anomalous with local sub Dendritic medium to high density and medium to fine texture (LSI Value : 1.50) 3. Type of movement: Earth and debris slide. 	<ol style="list-style-type: none"> 1. To avoid erosion of soil and rock construct breast wall / Gabion wall using Rock boulders in the field. 2. Easing the earth slope to more than 15° with respect to vertical to avoid soil erosion. 3. Provide Geo grid nailing with jute geotextile and rock anchors along with hydro seeding.

Photos:

S.No	Location	Chainage	Observation	Suggestions
12	Latitude : 11.335199 N Longitude : 76.817384 E	Km 72/4 of NH 181 (Near Marapalam)	<ol style="list-style-type: none"> 1. Slope soil stabilization of earth in hill side is carried out. 2. The seedling grass growth observed. 3. A proper seepage of water in the breast wall are observed 	<ol style="list-style-type: none"> 1. Desilting of weep holes shall be periodically carried out.

Photos: Gabion wall proved very effective in controlling soil erosion and land slides





Km 72/4 of NH 181 (Near Marapalam)

S.No	Location	Chainage	Observation	Suggestions
13	Latitude : 11°20'12" N Longitude : 76°49'37" E	Km 69/4 of NH 181 (Near KNR bend)	<ol style="list-style-type: none"> 1. Sliding of earth and rocks found continuously. 2. Jungle stream in the hillside found to be more intensity during rainy season. 3. Retaining wall and soil in the valley side has been eroded. 4. Drainage Pattern VI A Anomalous with local sub Dendritic medium to high density and medium to fine texture (LSI Value : 1.50) 5. Type of movement: Earth and debris fall. 	<ol style="list-style-type: none"> 1. To avoid erosion of soil and rock increase the breast wall /Gabion wall to a height of 4m. 2. Provide GEO jute fibre to cover the bare earth and rocky strata. 3. Remove the dangerous Trees on the edges of hill 4. Provide Drystone RR masonry or Gabion wall to a minimum width of 1.50m in the Jungle stream hill side to decrease the intensity of waterflow. 5. Provide Gabion wall on the valley side to protect the soil erosion.

Photos:



Km 69/4 of NH 181 (Near KNR bend)

S.No	Location	Chainage	Observation	Suggestions
14	Latitude : 11°20'15" N Longitude : 76°49'57" E	Km 66/10 of NH 181 (Near Kurumbaddi)	<ol style="list-style-type: none"> 1. Culvert is damaged due to jungle stream and excessive rain water flow and earth slurry. 2. The farmland in the hillside has diverted the flow of rain water by forming the earthen road. 3. The uprooted vegetations and branches of trees were placed in the rain water flowing channel. 4. Soil in the earthen road are eroded and filled the culvert in the NH road and excess of earth and soil were crossed the road and eroded the berms of the road 5. The protections were made in the NH road for single movement of vehicle or else the entire traffic movement may be closed. 	<ol style="list-style-type: none"> 1. A Proper cross drainage (Culvert) to be constructed in the NH road. 2. A Proper drainage and soil erosion to be made in the farmland. 3. Provide Drystone RR masonry or Gabion wall to a minimum width of 1.50m in the hill side up-stream at 2 or 3 locations to decrease the intensity of waterflow. 4. Provide Retaining wall for a height of 4m on the valley side to protect the soil erosion.

Photos:



Km 66/10 of NH 181 (Near Kurumbaddi)

Photos:



Km 66/10 of NH 181 (Near Kurumbaddi)

S.No	Location	Chainage	Observation	Suggestions
15	Latitude : 11°20'22" N Longitude : 76°50'8"E	Km 66/4 of NH 181 (Near Kurumbaddi)	<ol style="list-style-type: none"> 1. Culvert in the downstream side abutment wall has been scoured due to heavy jungle stream flow. 2. The jungle stream has diverted the flow direction from the main jungle stream. 3. Drainage Pattern VI A Anomalous with local sub Dendritic medium to high density and medium to fine texture (LSI Value : 1.50) 	<ol style="list-style-type: none"> 1. The scoured abutment to be strengthened immediately. 2. A new stream is found on Coonor side and a new culvert to be provided to have a proper drainage facility. 3. Provide Drystone RR masonry or Gabion wall to a minimum width of 1.50m in the hill side stream to decrease the intensity of waterflow. 4. Provide Retaining wall on the valley side to protect the soil erosion.

Photos:

Kotagiri Mettupalayam Stretch (SH-15)

S.No	Location	Chainage	Observation	Suggestions
16	Latitude : 11°21'39" N Longitude : 76°56'22"E (elevation : 870 m)	Km 45/10 of Ooty Kotigiri Mettupalayam Sathy Gobi Erode Road (SH-15) (Near Kunjappanai)	<ol style="list-style-type: none"> 1. Rock boulders and Earth with boulders 2. A stream with lot of rock boulders and continuous stream is found after the monsoon rain November 2023. 3. Drainage Pattern VI A Anomalous with local sub Dendritic medium to high density and medium to fine texture (LSI Value : 1.50) 	<ol style="list-style-type: none"> 1. To avoid erosion provide Drystone RR masonry or Gabion wall to a minimum width of 1.50m in the Jungle stream hill side to decrease the intensity of waterflow. 2. The boulders in the bottom portion of the stream can be utilized by properly orienting them to function as a barrier 3. Provide additional cross drainage works to manage Jungle stream heavy water flow.

Photos:



Km 45/10 of Ooty Kotigiri Mettupalayam Sathy Gobi Erode Road (SH-15) (Near Kunjappanai)

S.No	Location	Chainage	Observation	Suggestions
17	Latitude : 11°21'37" N Longitude : 76°56'19"E (Elevation : 900 m)	Km 45/4 of Ooty Kotigiri Mettupalayam Sathy Gobi Erode Road (SH-15) (Near Kunjappanai)	<ol style="list-style-type: none"> 1. Sliding of earth and rocks found. 2. Drainage Pattern VI A Anomalous with local sub Dendritic medium to high density and medium to fine texture (LSI Value : 1.50) 3. Type of movement: Rock fall. 	<ol style="list-style-type: none"> 1. The vegetations in the Rock strata to be trimmed 2. Trees in the Top wedge & slope of hill to be removed 3. Local seedling like grass (Lemongrass / Vettiveru) may be provided to stabilise the side or steep slopes

Photos:



Km 45/4 of Ooty Kotigiri Mettupalayam Sathy Gobi Erode Road (SH-15) (Near Kunjappanai)

S.No	Location	Chainage	Observation	Suggestions
18	Latitude : 11°21'29" N Longitude : 76°56'4"E (Elevation : 940 m)	Km 44/8 of Ooty Kotagiri Mettupalayam Sathy Gobi Erode Road (SH-15) (Near Kunjappanai)	<ol style="list-style-type: none"> 1. Sliding of earth and rocks found. 2. A deep valley with more soil erosion found in steep gradient 3. Drainage Pattern VI A Anomalous with local sub Dendritic medium to high density and medium to fine texture (LSI Value : 1.50) 4. Loose soil with silty clay; Soil thickness more than 10 m depth 4. Type of movement: Rock and earth fall. 	<ol style="list-style-type: none"> 1. To avoid erosion of soil provide breast wall / Gabion wall for 4.00m height. 2. Easing the earth slope to more than 15° to avoid soil erosion. 3. Local seedling like grass (Lemon grass / Vettiveru) may be provided. 4. A Geogrid nailing with jute geotextile to stabilise the soil layer with vegetation seedling roll about 50 m length rolled to the valley portion and to be anchored with a rigid RCC beam anchored beneath Ground level in the Hill side, laid adjacent to the bituminous carpet. Over which bituminous layer to be relayed. 5. Provide horizontal drain to reduce hydro static pressure and longitudinal drainage to collect and dispose the water from horizontal drain. 6. Provide rock anchors to stabilise the rock strata.

Photos:



Km 44/8 of Ooty Kotagiri Mettupalayam Sathy Gobi Erode Road (SH-15) (Near Kunjappanai)

S.No	Location	Chainage	Observation	Suggestions
19	Latitude : 11°25'8" N Longitude : 76°43'20" E (Elevation : 2290 m)	Km 2/2 of Ooty Kotagiri Mettupalayam Sathy Gobi Erode Road (SH-15) (Near Kunjappanai)	<ol style="list-style-type: none"> 1. Slope soil stabilization of earth in hill side is carried out. 2. The seedling grass growth observed. 3. Drainage Pattern VI A Anomalous with local sub Dendritic medium to high density and medium to fine texture (LSI Value : 1.50) 4. Type of movement: Rock and earth fall. 	<ol style="list-style-type: none"> 1. Local seedling like grass (Lemon grass / Vettiveru) may be provided to stabilise the slopes. 2. The easing of slope (not vertical cut) may increase the growth of grass. 3. Proper periodical maintenance shall be done.

Photos:



Km 2/2 of Ooty Kotigiri Mettupalayam Sathy Gobi Erode Road (SH-15)

Udhagai Avalanchi Kundha Thaishola Road

S.No	Location	Chainage	Observation	Suggestions
20	Latitude : 11°23'16" N Longitude : 76°40'25"E (Elevation : 2090 m)	Km 3/8 of Udhagai Avalanchi Kundha Thaishola Road	<ol style="list-style-type: none"> 1. Due to natural water course exists in the valley side, existing berms got fully eroded. If the erosion continuous, it may leads to breach of the Road. 2. The water course forms meandering flow 3. Drainage Pattern; II A -Sub Dentritic with medium density and texture (LSI Value : 8.00) 	<ol style="list-style-type: none"> 1. In the eroded berm location earth / boulders may be filled to stop the further erosion as temporary measures. 2. As Permanent measures stepped Retaining wall may be constructed 3. The meandering flow in the channel to be altered to avoid the breach of the road. 4. Existing natural water course shall be desilted to make it functioning well. 5. Additional cross drainage or side drainage work may be provided.

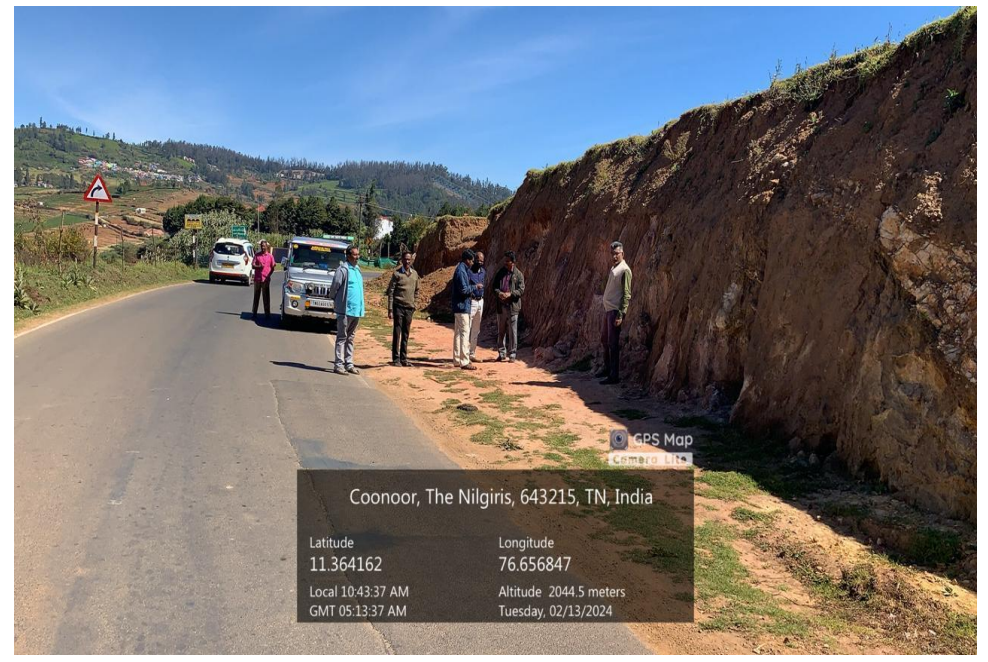
Photos:



S.No	Location	Chainage	Observation	Suggestions
21	Latitude : 11°21'51" N Longitude : 76°39'25"E (Elevation : 1890 m)	Km 7/10, 8/2 of Udhagai Avalanchi Kundha Thaishola Road	<ol style="list-style-type: none"> 1. Agriculture activities are done on the hilly side. Loosening of earth in the field causes frequent earthslip & soilwash. 2. Drainage Pattern II A Sub Dentritic with medium density and texture (LSI Value : 8.00) 	<ol style="list-style-type: none"> 1. Easing the earth slope to more than 15° with respect to the vertical to avoid soil erosion. 2. Bench terracing in the Agriculture field is recommended 3. To avoid erosion of soil provide Breast wall for 3m height

Photos:





Km 7/10, 8/2 of Udhagai Avalanchi Kundha Thaishola Road

S.No	Location	Chainage	Observation	Suggestions
22	Latitude : 11°20'30" N Longitude : 76°38'4"E (Elevation : 2110 m)	Km 13/2 of Udthagai Avalanchi Kundha Thaishola Road	<ol style="list-style-type: none"> 1. Regular earthslip found. 2. Earthslip found with wet and loose condition in the soil. 3. Soil thickness more than 3m depth 4. Drainage Pattern III Gross Sub- Rectangular & Angular with Local Sub Dentrific High to medium Density & Fine to medium Texture (LSI Value : 0.50) 5. Type of movement: Earth fall. 	<ol style="list-style-type: none"> 1. Easing the earth slope to more than 15° with respect to the vertical to avoid soil erosion 2. To avoid soil erosion provide breast wall / Gabion wall for 3.00m height (as per site condition with batter) is required. 3. Local seedling like grass (Lemon grass / Vettiveru) may be provided

Photos:



Km 13/2 of Udhagai Avalanchi Kundha Thaishola Road

S.No	Location	Chainage	Observation	Suggestions
23	Latitude : 11°19'26" N Longitude : 76°37'53"E (Elevation : 2030 m)	Km 15/4 of Udhagai Avalanchi Kundha Thaishola Road	<ol style="list-style-type: none"> The existing location is a builtup area. In the valley side ODR traverse from this location in down gradient which is parallel to this road. This place found to deposit of many garbage, which has changed the soil characteristics This location found to be prone for soil breach due to change of soil characteristics Drainage Pattern III Gross Sub- Rectangular & Angular with Local Sub Dentritic High to medium Density & Fine to medium Texture (LSI Value : 0.50) 	<ol style="list-style-type: none"> Stepped Retaining wall / Gabion wall may be proposed Local seedling like grass (Lemon grass / Vettiveru) may be provided Necessary instruction may be given to local bodies for avoiding disposal of garbage on road side.

Photos:



Km 15/4 of Udhagai Avalanchi Kundha Thaishola Road

S.No	Location	Chainage	Observation	Suggestions
24	Latitude : 11°18'35" N Longitude : 76°37'21"E (Elevation : 1970 m)	Km 19/2 of Udhaigai Avalanchi Kundha Thaishola Road	<ol style="list-style-type: none"> 1. Huge mudflow in the valley side has occurred during the 2022 Monsoon. 2. Vegetable cultivation has been done in this particular field 3. Drainage Pattern III Gross Sub- Rectangular & Angular with Local Sub Dentric High to medium Density & Fine to medium Texture (LSI Value : 0.50) 	<ol style="list-style-type: none"> 1. Soil conservation measures such as Terrace support wall/ gabion wall in particular intervals in the field is recommended. 2. Tea cultivation is recommended instead of vegetable 3. To protect the foundation of the existing Retaining wall, cut off wall may be constructed to avoid further damages.

Photos:



Km 19/2 of Udhagai Avalanchi Kundha Thaishola Road

S.No	Location	Chainage	Observation	Suggestions
25	Latitude : 11°18'28" N Longitude : 76°37'20"E (Elevation : 1990 m)	Km 19/8 of Udhagai Avalanchi Kundha Thaishola Road	<ol style="list-style-type: none"> 1. High fragile zone. 2. Very High vulnerable point. 3. Mass movement has occurred. 4. Drainage Pattern III Gross Sub- Rectangular & Angular with Local Sub Dentritic High to medium Density & Fine to medium Texture (LSI Value : 0.50) 5. Type of movement: Mud flow. 	<ol style="list-style-type: none"> 1. Not recommended for any building construction activities in this location. Since it falls under highly fragile zone. 2. Conservation measures such as Bench terracing / Gabion wall is recommended. Toe wall in the hill side is recommended. Paverblock may be provided between the BT road and Retaining wall so as to prevent the infiltration of water

Photos:



Km 19/8 of Udhaagai Avalanchi Kundha Thaishola Road

S.No	Location	Chainage	Observation	Suggestions
26	Latitude : 11°18'25" N Longitude : 76°37'31" E (Elevation : 1970 m)	Km 20/6 of Udthagai Avalanchi Kundha Thaishola Road	<ol style="list-style-type: none"> 1. Regular earthslip found. 2. Earthslip found with wet and loose condition in the soil. 3. Soil thickness more than 2m depth 4. Drainage Pattern III Gross Sub- Rectangular & Angular with Local Sub Dentritic High to medium Density & Fine to medium Texture (LSI Value : 0.50) 5. Type of movement: Earth slip. 	<ol style="list-style-type: none"> 1. Easing the earth slope to more than 15° with respect to the vertical to avoid soil erosion 2. To avoid soil erosion existing breast wall / Gabion wall may be extended (as per site condition with batter). 3. Local seedling like grass (Lemon grass / Vettiveru) may be provided

Photos:

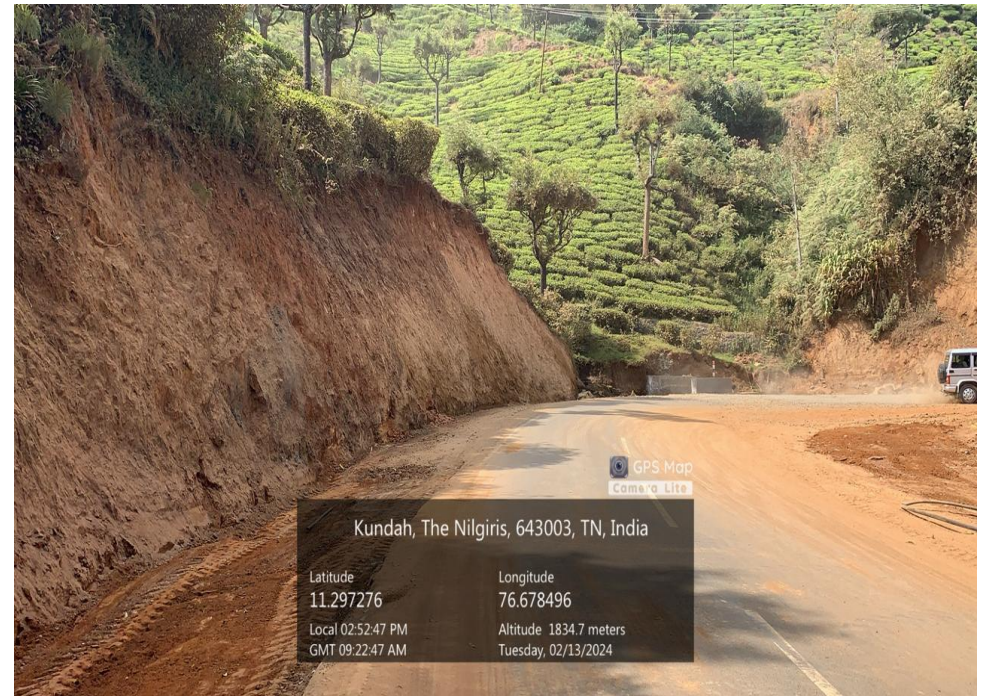


S.No	Location	Chainage	Observation	Suggestions
27	Latitude : 11°18'5" N Longitude : 76°38'26"E (Elevation : 1970 m)	Km 6/6 of Thangadu Yedakadu Road	<ol style="list-style-type: none"> 1. Crack was developed in the existing BT road during the 2022 Monsoon. 2. Surface runoff along the BT road occurred due to non availability of Cross drainage at this location. 3. Drainage Pattern III Gross Sub- Rectangular & Angular with Local Sub Dentritic High to medium Density & Fine to medium Texture (LSI Value : 0.50) 	<ol style="list-style-type: none"> 1. Provide culvert with Gabion wall / Retaining structure. 2. Provide CC drain to drain the rain water to the culverts to avoid surface runoff. 3. Provide Geogrid nailing with jute geotextile to stabilise the soil layer on valley slope.

Photos:



S.No	Location	Chainage	Observation	Suggestions
28	Latitude : 11°17'52" N Longitude : 76°40'43"E (Elevation : 1860 m)	Km 22/8 of Coonor Kundha Road	<ol style="list-style-type: none"> 1. Easing the earth slope to more than 15° with respect to the vertical to avoid soil erosion has been done. 2. Drainage Pattern II A Sub Dentritic with medium density and texture (LSI Value : 8.00) 	<ol style="list-style-type: none"> 1. The cut face / Hillock side slope is properly maintained at this location. The same kind of methodology / techniques is recommended for other location 2. Provide Geogrid nailing with jute geotextile to stabilise the soil layer may be provided 3. Provide CC drain to drain the rain water to the culverts to avoid surface runoff.

Photos:**Km 22/8 of Coonor Kundha Road**

S.No	Location	Chainage	Observation	Suggestions
29	Latitude : 11°18'48" N Longitude : 76°41'23"E (Elevation : 1850 m)	Km 15/2 of Udhagai Kaikatty Road	<ol style="list-style-type: none"> 1. Hard rock in the hill side found to be dangerous for the road users. 2. The existing retaining wall is damaged 3. Drainage Pattern II A Sub Dentritic with medium density and texture (LSI Value : 8.00) 	<ol style="list-style-type: none"> 1. Reconstruct the damaged Retaining wall 2. Extend the retaining wall 3. Partial remove the out crop of the hard rock for site visibility of driver's for safe vehicle movement.

Photos:





Km 15/2 of Udhagai Kaikatty Road

S.No	Location	Chainage	Observation	Suggestions
30	Latitude : 11°18'56" N Longitude : 76°41'27"E (Elevation : 1910 m)	Km 14/8 of Udthagai Kaikatty Road	1. Deep valley exists in the Road side 2. Drainage Pattern II A Sub Dentritic with medium density and texture (LSI Value : 8.00)	1. Construct Retaining wall / Gabion wall in the valley side to avoid Land slide 2. Provide roller crash barrier.

Photos:

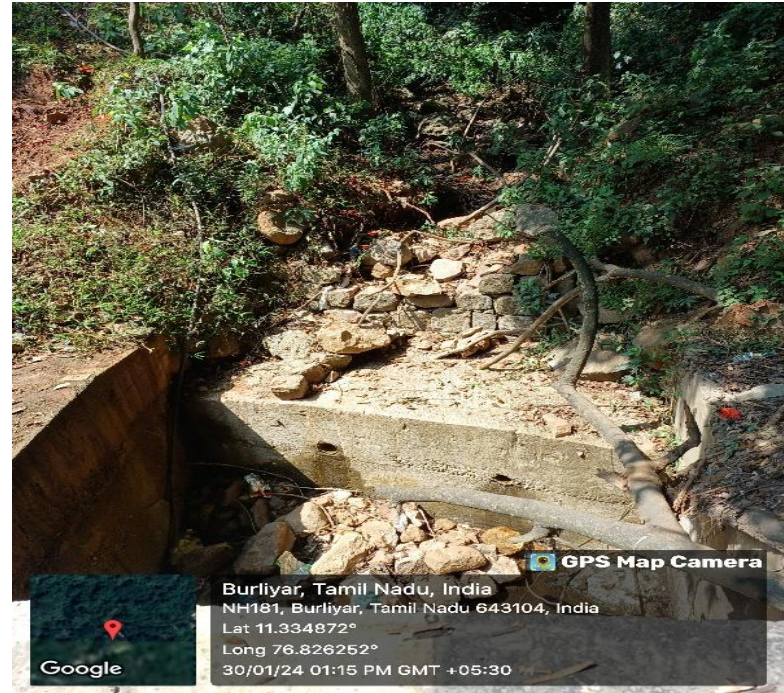


**Discussion with The Nilgiris District Collector at Collectors Chamber in Ooty
on 23 Jan 2024 at 7.00 P.M**



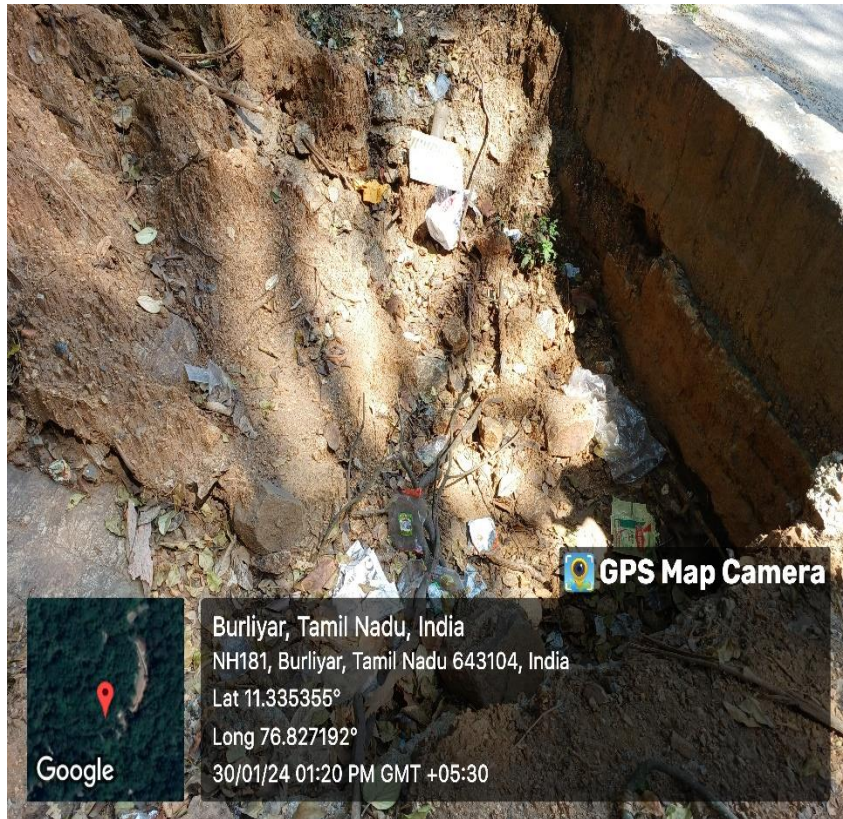


Some structure still serving its purpose





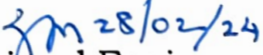
Some structure not serving its purpose

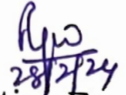


General Recommendations:

1. Existing Dry stone / RR Masonry Retaining walls where Top layers are damaged, the same may be rectified by providing Concrete structures on top of existing stone walls to avoid complete failure of the walls. Provide additional parapet walls to increase Road safety.
2. Proper drainage facility to drain off spring water and runoff water is to be provided; Proper care need to be given in the built-up area with regard to drainage to be facilitated by the concern local bodies.
3. Use of latest technique such as tools like Drone, Sensor based early warning system, Remote sensing and GIS technique/ Digital elevation models (DEM) to identify Hotspot & Landslide areas in the Nilgiris and adjoining areas.
4. The long-term stability of the unsupported cuts has to be ensured by performing slope stability check employing finite element models.
5. Wherever slope stabilisation techniques are designed care should be taken to provide horizontal drain to reduce hydro static pressure with longitudinal drainage to collect and dispose the water from horizontal drain.
6. Wherever Breast wall is been recommended to retain soil mass it is suggested to provide RCC key to resist overturning moment and sliding (as per the site condition)

7. To reduce the velocity of Stream water along the road protective Dry stone masonry / Gabion wall to a width of 1.50m to be provided.

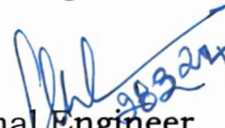

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