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Design of Flexible Pavements with Geogrid Reinforcement between Base and Sub-Base Layers Using IITPAVE

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Abstract: This study investigates the application of geogrid reinforcement for improving the structural efficiency of flexible pavements. The pavement response is analyzed using IITPAVE based on the mechanistic–empirical design approach specified by IRC:37–2018. Geogrid is incorporated at the interface between the base and sub-base layers, and its contribution is evaluated using LCR and MIF approaches. The critical pavement strains are assessed to examine the structural response and suitability of the reinforced pavement system. The study highlights the potential of geogrid reinforcement for optimizing pavement materials and achieving economical and sustainable pavement construction.
Keywords: Flexible pavement, Geogrid reinforcement, IITPAVE, IRC:37–2018, Layer Coefficient Ratio, Modulus Improvement Factor, Pavement thickness optimization, Tensile strain, Compressive strain.

I. INTRODUCTION

Flexible pavements carry most of the highway traffic in India, largely because they are inexpensive to build, simple to repair and can be strengthened as loading grows. In the mechanistic–empirical procedure of IRC:37-2018 [1], the strains that wheel loads induce in the layers, obtained from the IITPAVE program, are kept within fatigue and rutting limits. A geogrid placed within the granular courses restrains lateral movement of the aggregate and spreads the load over a wider area, which stiffens those courses and eases the strains in the bituminous layer and the subgrade. IRC: SP:59-2019 [2] allows this gain to be included in design through the Layer Coefficient Ratio (LCR) and the Modulus Improvement Factor (MIF). Here, pavement sections for a design traffic of 175 msa on a subgrade of 7 % CBR are worked out with and without geogrid and compared.

II. LITERATURE REVIEW

Research on geosynthetic-reinforced pavements spans laboratory tests, field trials and numerical modelling. Cyclic-load studies on aggregate bases reinforced with geogrid reported greater stiffness and smaller permanent deformation [3], and field-scale investigations noted less rutting and a higher resilient modulus [4]. A design procedure for geogrid-reinforced unpaved roads was put forward by Giroud and Han [5], and Han and Giroud [6] explained the improvement through aggregate interlock and lateral confinement. Numerical and mechanistic–empirical analyses have indicated smaller tensile strains at the base of asphalt layers when a geogrid is present [7]–[9]. In India, IITPAVE has been combined with modulus improvement concepts for reinforced sections [10], [11]; more recent contributions deal with low-carbon pavement design [12] and reinforced construction-and-demolition-waste aggregate layers [13]. Palla and Ram [14] thinned the bituminous and base layers for 130 msa on a 13 % CBR subgrade. The present work considers a heavier 175 msa loading on a weaker 7 % CBR subgrade, with the geogrid placed at the base–sub-base interface.

III. METHODOLOGY – PAVEMENT DESIGN

The unreinforced section was designed to IRC:37-2018 [1] and the geogrid-reinforced sections to IRC: SP:59-2019 [2]. Every section was analysed in IITPAVE for an 80 kN standard axle, that is, dual wheels carrying 20 000 N each at a tyre pressure of 0.56 MPa. Layer data and complete design calculations are presented in Tables 1–6.

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Table 1. Indicative Range of LCR and MIF for Geogrid

S.No.	CBR (%)	LCR for geogrid	MIF for geogrid
1	< 3	1.2 – 1.8	2.0 – 2.75
2	> 3	1.2 – 1.6	1.4 – 2.0

Table 2. Resilient Modulus of Bituminous Mixes (MPa)

Mix type	20 °C	25 °C	30 °C	35 °C	40 °C
BC and DBM, VG 10	2300	2000	1450	1000	800
BC and DBM, VG 30	3500	3000	2500	2000	1250
BC and DBM, VG 40	6000	5000	4000	3000	2000
BC, modified bitumen	5700	3800	2400	1600	1300

Table 3. Layer Data Adopted for IITPAVE Analysis

Section	Layer	Thickness (mm)	M_r (MPa)	μ
Without geogrid	BC + DBM (50 + 160)	210	3000	0.35
	Granular base + sub-base (WMM + GSB)	475	224.2	0.35
	Subgrade	–	70	0.35
LCR method	BC + DBM (50 + 150)	200	3000	0.35
	Reinforced WMM base	180	264.95	0.35
	GSB layer	175	143.05	0.35
	Subgrade	–	70	0.35
MIF method	BC + DBM (50 + 150)	200	3000	0.35
	Reinforced WMM base	180	274.46	0.35
	GSB layer	175	143.05	0.35
	Subgrade	–	70	0.35

Table 4. Design Calculations for the Conventional (Unreinforced) Pavement

S.No.	Description	Value
Input data and unreinforced trial section (IRC:37-2018)		
1	Design traffic (msa)	175
2	Effective subgrade CBR (%)	7
3	BC (bituminous concrete) thickness (mm)	50
4	DBM (dense bituminous macadam) thickness (mm)	160
5	Combined bituminous thickness, BC + DBM (mm)	210
6	WMM course thickness (mm)	250
7	GSB course thickness (mm)	225
8	Combined granular thickness, h = WMM + GSB (mm)	475
9	Overall crust thickness (mm)	685
10	Subgrade resilient modulus (MPa), $M_{R(subgrade)} = 10 \times CBR = 10 \times 7$	70
11	Granular layer resilient modulus (MPa), $M_{R(granular)} = 0.2 \times (h)^{0.45} \times M_{R(subgrade)}$ $M_{R(granular)} = 0.2 \times (475)^{0.45} \times 70$	224.2
12	Design pavement temperature (°C)	35
13	Binder grade (traffic above 30 msa)	VG 40 bitumen
14	Bituminous mix modulus from Table 2 (MPa)	3000
15	Poisson's ratio adopted for every layer	0.35
Allowable tensile strain beneath the bituminous layer (fatigue criterion)		
$$N_f = 0.5161 \times C \times 10^{-4} \times \left(\frac{1}{\varepsilon_t}\right)^{3.89} \times \left(\frac{1}{M_R}\right)^{0.854}$$ [90 % reliability]		
$$C = 10^M, \qquad M = 4.84\left(\frac{V_{be}}{V_a + V_{be}} - 0.69\right)$$		
16	Fatigue life requirement, N_f = design traffic (standard axles)	175×10^6
17	V_a = air voids in the mix, volume %	3.5
18	V_{be} = effective bitumen content, volume %	11.5
19	M = 4.84 × [11.5 / (3.5 + 11.5) − 0.69]	0.371
20	$C = 10^M = 10^{0.371}$	2.350
21	Multiplier 0.5161 × C = 0.5161 × 2.350 (to be multiplied by 10^{-4})	1.2128
$$175 \times 10^6 = 1.2128 \times 10^{-4} \times \left(\frac{1}{\varepsilon_t}\right)^{3.89} \times \left(\frac{1}{3000}\right)^{0.854}$$		
22	Allowable tensile strain, ε_t (micro strain)	136.0

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IITPAVE run for the three-layer pavement		
23	Layer 1 – BC + DBM: E (MPa), μ, thickness (mm)	3000, 0.35, 210
24	Layer 2 – WMM + GSB: E (MPa), μ, thickness (mm)	224.2, 0.35, 475
25	Layer 3 – subgrade: E (MPa), μ	70, 0.35
26	Load on each wheel (N) of the dual set; tyre pressure (MPa)	20000; 0.56
27	Evaluation depths Z (mm); radial offsets R (mm)	210, 685; 0, 150
28	Horizontal tensile strain ε_T at Z = 210 mm, R = 0 mm (micro strain)	118.9
29	Horizontal tensile strain ε_T at Z = 210 mm, R = 150 mm (micro strain)	124.1
30	Peak horizontal tensile strain given by IITPAVE (micro strain)	124.1
	Check (124.1 < 136.0)	Satisfactory
Allowable vertical compressive strain at subgrade top (rutting criterion)		
$N_R = 1.4100 \times 10^{-8} \times \left(\frac{1}{\varepsilon_v}\right)^{4.5337}$ [90 % reliability]		
31	Rutting life requirement, N_R = design traffic (standard axles)	175×10^6
$175 \times 10^6 = 1.41 \times 10^{-8} \times \left(\frac{1}{\varepsilon_v}\right)^{4.5337}$		
32	Allowable vertical compressive strain, ε_v (micro strain)	286.5
33	Vertical compressive strain ε_Z at Z = 685 mm, R = 0 mm (micro strain)	195.2
34	Vertical compressive strain ε_Z at Z = 685 mm, R = 150 mm (micro strain)	205.8
35	Peak vertical compressive strain given by IITPAVE (micro strain)	205.8
	Check (205.8 < 286.5)	Satisfactory

Table 5. Design Calculations for the Geogrid-Reinforced Pavement by the LCR Method

S.No.	Description	Value
Input data and reinforced trial section		
1	Design traffic (msa)	175
2	Effective subgrade CBR (%)	7
3	Geogrid location	Between WMM and GSB
4	BC (bituminous concrete) thickness (mm)	50
5	DBM (dense bituminous macadam) thickness (mm)	150
6	Combined bituminous thickness, BC + DBM (mm)	200
7	Reinforced WMM base thickness (mm)	180
8	GSB course thickness (mm)	175
9	Overall crust thickness (mm)	555

10	Subgrade resilient modulus (MPa), M_{RS} = 10 × CBR = 10 × 7	70
11	Bituminous mix modulus, VG 40 at 35 °C (MPa)	3000
12	Poisson's ratio adopted for every layer	0.35
Modulus of the GSB course (without reinforcement)		
$$M_{RGSB} = 0.2 \times (h)^{0.45} \times M_{RS}$$		
13	h = GSB course thickness (mm)	175
14	M_{RS} = subgrade resilient modulus (MPa)	70
15	$M_{RGSB} = 0.2 \times (175)^{0.45} \times 70$ (MPa)	143.05
Effective support modulus of GSB and subgrade from a two-layer IITPAVE analysis		
$$M_{RSupport} = \frac{2(1-\mu^2) \times p \times a}{\delta}$$		
16	Single-wheel load (N)	40000
17	Contact pressure, p (MPa)	0.56
18	Radius of contact circle, a (mm)	150.8
19	Two-layer model: GSB (175 mm) E = 143.05 MPa above subgrade E = 70 MPa	143.05; 70
20	Poisson's ratio, μ	0.35
21	Peak surface deflection δ from IITPAVE (mm)	1.518
22	$M_{RSupport}$ (MPa)	83.94
Modulus of the base course (without reinforcement)		
$$M_{RGB} = 0.2 \times (h)^{0.45} \times M_{RSupport}$$		
23	h = 175 mm; $M_{RGB} = 0.2 \times (175)^{0.45} \times 83.94$ (MPa)	171.54
24	M_{RGB} in psi = 171.54 × 145.038	24879.82
Structural layer coefficient and LCR (AASHTO 1993) [15]		
$SN = a_1D_1 + LCR_2 \cdot a_2D_2m_2 + LCR_3 \cdot a_3D_3m_3 + \ldots$; D is layer thickness, m the drainage coefficient and a the layer coefficient		
$$a_2 = 0.249 \times (\log_{10} M_{RGB}) - 0.977$$		
25	$a_2 = 0.249 \times \log_{10}(24879.82) - 0.977$	0.1176
26	LCR of base layer, LCR_{base} (Table 1, CBR > 3 %)	1.4
27	LCR of sub-base layer, $LCR_{sub\text{-}base}$	1.0
28	Improved base coefficient, $a_2' = LCR_{base} \times a_2 = 1.4 \times 0.1176$	0.1646
$$M'_{RGB}(\text{psi}) = 10^{\frac{(a'_2+0.977)}{0.249}}$$		

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29	M_{RGB}' (psi) = $10^{(0.1646 + 0.977)/0.249}$	38427
30	M_{RGB}' (MPa) = 38427 / 145.038	264.95
IITPAVE run for the reinforced four-layer pavement		
31	Layer 1 – BC + DBM: E (MPa), μ, thickness (mm)	3000, 0.35, 200
32	Layer 2 – reinforced WMM: E (MPa), μ, thickness (mm)	264.95, 0.35, 180
33	Layer 3 – GSB: E (MPa), μ, thickness (mm)	143.05, 0.35, 175
34	Layer 4 – subgrade: E (MPa), μ	70, 0.35
35	Load on each wheel (N) of the dual set; tyre pressure (MPa)	20000; 0.56
36	Evaluation depths Z (mm); radial offsets R (mm)	200, 555; 0, 150
Fatigue cracking check (underside of bituminous layer)		
$$N_f = 0.5161 \times C \times 10^{-4} \times \left(\frac{1}{\varepsilon_t}\right)^{3.89} \times \left(\frac{1}{M_R}\right)^{0.854}$$ [90 % reliability]		
$$C = 10^M, \quad M = 4.84\left(\frac{V_{be}}{V_a + V_{be}} - 0.69\right)$$		
37	V_a = 3.5 %, V_{be} = 11.5 %; M = 0.371; C = 2.350; constant 0.5161 × C	1.2128×10^{-4}
$$175 \times 10^6 = 1.2128 \times 10^{-4} \times \left(\frac{1}{\varepsilon_t}\right)^{3.89} \times \left(\frac{1}{3000}\right)^{0.854}$$		
38	Allowable tensile strain, ε_t (micro strain)	136.0
39	Horizontal tensile strain ε_T at Z = 200 mm, R = 0 mm (micro strain)	128.6
40	Horizontal tensile strain ε_T at Z = 200 mm, R = 150 mm (micro strain)	133.5
41	Peak horizontal tensile strain given by IITPAVE (micro strain)	133.5
	Check (133.5 < 136.0)	Satisfactory
Rutting check (top of subgrade)		
$$N_R = 1.4100 \times 10^{-8} \times \left(\frac{1}{\varepsilon_v}\right)^{4.5337}$$ [90 % reliability]		
$$175 \times 10^6 = 1.41 \times 10^{-8} \times \left(\frac{1}{\varepsilon_v}\right)^{4.5337}$$		
42	Allowable vertical compressive strain, ε_v (micro strain)	286.5
43	Vertical compressive strain ε_Z at Z = 555 mm, R = 0 mm (micro strain)	259.7
44	Vertical compressive strain ε_Z at Z = 555 mm, R = 150 mm (micro strain)	276.6
45	Peak vertical compressive strain given by IITPAVE (micro strain)	276.6
	Check (276.6 < 286.5)	Satisfactory

Table 6. Design Calculations for the Geogrid-Reinforced Pavement by the MIF Method

S.No.	Description	Value
Input data and reinforced trial section		
1	Design traffic (msa)	175
2	Effective subgrade CBR (%)	7
3	Geogrid location	Between WMM and GSB
4	BC (bituminous concrete) thickness (mm)	50
5	DBM (dense bituminous macadam) thickness (mm)	150
6	Combined bituminous thickness, BC + DBM (mm)	200
7	Reinforced WMM base thickness (mm)	180
8	GSB course thickness (mm)	175
9	Overall crust thickness (mm)	555
10	Subgrade resilient modulus (MPa), $M_{RS} = 10 \times CBR = 10 \times 7$	70
11	Bituminous mix modulus, VG 40 at 35 °C (MPa)	3000
12	Poisson's ratio adopted for every layer	0.35
Modulus of the GSB course (without reinforcement)		
$M_{RGSB} = 0.2 \times (h)^{0.45} \times M_{RS}$		
13	h = GSB course thickness (mm)	175
14	M_{RS} = subgrade resilient modulus (MPa)	70
15	$M_{RGSB} = 0.2 \times (175)^{0.45} \times 70$ (MPa)	143.05
Effective support modulus of GSB and subgrade from a two-layer IITPAVE analysis		
$M_{RSupport} = \frac{2(1-\mu^2) \times p \times a}{\delta}$		
16	Single-wheel load (N)	40000
17	Contact pressure, p (MPa)	0.56
18	Radius of contact circle, a (mm)	150.8
19	Two-layer model: GSB (175 mm) E = 143.05 MPa above subgrade E = 70 MPa	143.05; 70
20	Poisson's ratio, μ	0.35
21	Peak surface deflection δ from IITPAVE (mm)	1.518
22	$M_{RSupport}$ (MPa)	83.94
Modulus of the base course (without reinforcement)		
$M_{RGB} = 0.2 \times (h)^{0.45} \times M_{RSupport}$		
23	h = 175 mm; $M_{RGB} = 0.2 \times (175)^{0.45} \times 83.94$ (MPa)	171.54
huyhnyg		

$M_{reinforced\ base\ /\ sub\text{-}base} = MIF \times M_{unreinforced\ base\ /\ sub\text{-}base}$		
24	MIF of base layer, MIF_{base} (Table 1, CBR > 3 %)	1.6
25	MIF of sub-base layer, $MIF_{sub\text{-}base}$	1.0
26	$M_{reinforced\ base} = 1.6 \times 171.54$ (MPa)	274.46
IITPAVE run for the reinforced four-layer pavement		
27	Layer 1 – BC + DBM: E (MPa), μ, thickness (mm)	3000, 0.35, 200
28	Layer 2 – reinforced WMM: E (MPa), μ, thickness (mm)	274.46, 0.35, 180
29	Layer 3 – GSB: E (MPa), μ, thickness (mm)	143.05, 0.35, 175
30	Layer 4 – subgrade: E (MPa), μ	70, 0.35
31	Load on each wheel (N) of the dual set; tyre pressure (MPa)	20000; 0.56
32	Evaluation depths Z (mm); radial offsets R (mm)	200, 555; 0, 150
Fatigue cracking check (underside of bituminous layer)		
$N_f = 0.5161 \times C \times 10^{-4} \times \left(\frac{1}{\varepsilon_t}\right)^{3.89} \times \left(\frac{1}{M_R}\right)^{0.854}$ [90 % reliability]		
$C = 10^M, \quad M = 4.84\left(\frac{V_{be}}{V_a + V_{be}} - 0.69\right)$		
33	$V_a = 3.5$ %, $V_{be} = 11.5$ %; M = 0.371; C = 2.350; constant 0.5161 × C	1.2128×10^{-4}
$175 \times 10^6 = 1.2128 \times 10^{-4} \times \left(\frac{1}{\varepsilon_t}\right)^{3.89} \times \left(\frac{1}{3000}\right)^{0.854}$		
34	Allowable tensile strain, ε_t (micro strain)	136.0
35	Horizontal tensile strain ε_T at Z = 200 mm, R = 0 mm (micro strain)	127.3
36	Horizontal tensile strain ε_T at Z = 200 mm, R = 150 mm (micro strain)	132.1
37	Peak horizontal tensile strain given by IITPAVE (micro strain)	132.1
	Check (132.1 < 136.0)	Satisfactory
Rutting check (top of subgrade)		
$N_R = 1.4100 \times 10^{-8} \times \left(\frac{1}{\varepsilon_v}\right)^{4.5337}$ [90 % reliability]		
$175 \times 10^6 = 1.41 \times 10^{-8} \times \left(\frac{1}{\varepsilon_v}\right)^{4.5337}$		
38	Allowable vertical compressive strain, ε_v (micro strain)	286.5
39	Vertical compressive strain ε_Z at Z = 555 mm, R = 0 mm (micro strain)	258.7
40	Vertical compressive strain ε_Z at Z = 555 mm, R = 150 mm (micro strain)	275.7
41	Peak vertical compressive strain given by IITPAVE (micro strain)	275.7
	Check (275.7 < 286.5)	Satisfactory

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IV. RESULTS

Table 7 lists the IITPAVE strains, and Table 8 sets them against the IRC:37-2018 allowable values (Fig. 2). Without geogrid, the tensile and compressive strains were 124.1 and 205.8 με. With the reduced thicknesses, LCR gave 133.5 and 276.6 με, and MIF gave 132.1 and 275.7 με; each stays under the allowable 136.0 and 286.5 με. Fig. 1 and Table 9 show that the geogrid permitted 130 mm (19 %) less pavement thickness, mostly from a WMM base thinner by 28 %.

Table 7. IITPAVE Strains at Analysis Points (micro strain)

Section	Point (Z, R) mm	ε_T	ε_R	ε_Z
Without geogrid	210, 0	118.9	78.3	–
	210, 150	124.1	55.8	–
	685, 0	–	–	195.2
	685, 150	–	–	205.8
LCR	200, 0	128.6	86.2	–
	200, 150	133.5	59.2	–
	555, 0	–	–	259.7
	555, 150	–	–	276.6
MIF	200, 0	127.3	85.2	–
	200, 150	132.1	58.3	–
	555, 0	–	–	258.7
	555, 150	–	–	275.7

Table 8. Permissible and Computed Strains (micro strain)

Strain	Permissible	Without geogrid	LCR	MIF	Remark
Horizontal tensile strain, ε_t	136.0	124.1	133.5	132.1	Safe
Vertical compressive strain, ε_v	286.5	205.8	276.6	275.7	Safe

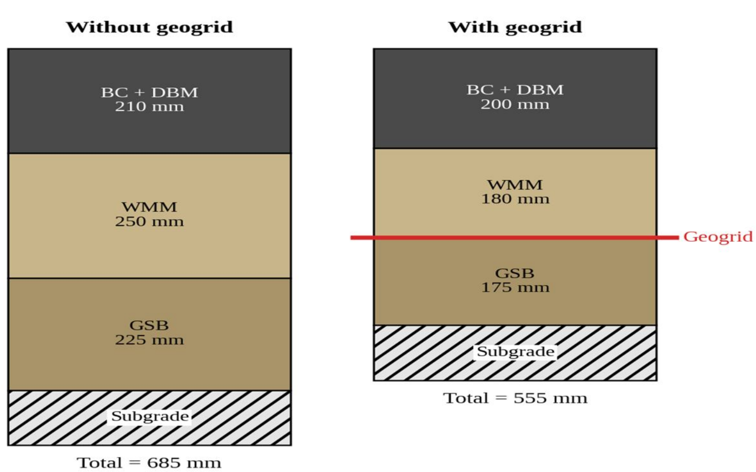

Fig. 1 Pavement sections without and with geogrid

Table 9. Layer Thickness Without and With Geogrid				
Layer	Without (mm)	With (mm)	Reduction (mm)	Reduction (%)
BC + DBM	210	200	10	4.8
WMM base	250	180	70	28.0
GSB	225	175	50	22.2
Total	685	555	130	19.0

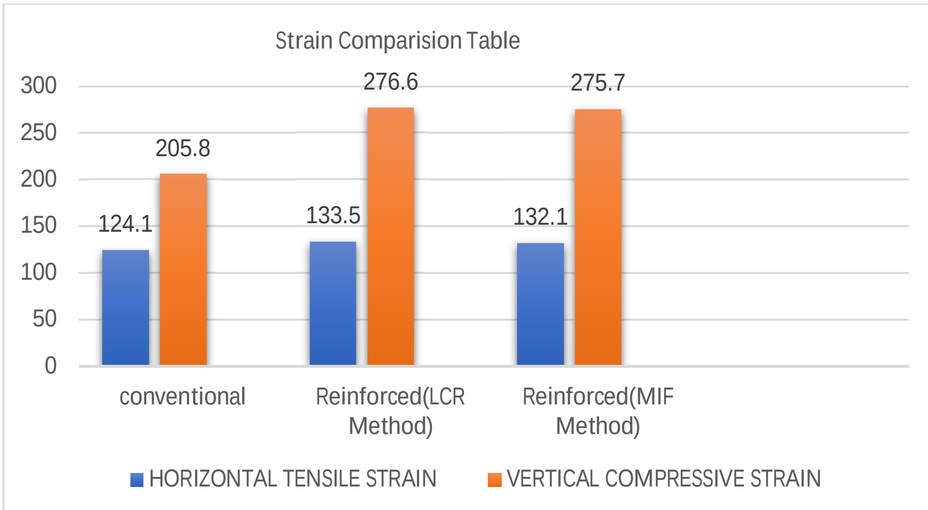

Fig. 2 Comparison of permissible and computed strains

V. CONCLUSIONS

For a design traffic of 175 msa and a subgrade CBR of 7 %, flexible pavement sections were proportioned without and with a geogrid at the base–sub-base interface. Taking LCR as 1.4 and MIF as 1.6, the bituminous layer could be 10 mm thinner, the WMM base 70 mm thinner and the GSB 50 mm thinner, cutting the overall thickness by 130 mm (19 %). The computed strains under LCR (133.5 and 276.6 με) and MIF (132.1 and 275.7 με) remained within the allowed values, and the two approaches agreed closely.

REFERENCES

[1] IRC:37-2018, Guidelines for the Design of Flexible Pavements (Fourth Revision), Indian Roads Congress, New Delhi.
[2] IRC: SP:59-2019, Guidelines for Use of Geosynthetics in Road Pavements and Associated Works, Indian Roads Congress, New Delhi.
[3] J. Leng and M. A. Gabr, “Characteristics of geogrid reinforced aggregate base course,” 2005.
[4] M. Abu-Farsakh and Q. Chen, “Performance of geosynthetic reinforced pavements,” 2012.
[5] J. P. Giroud and J. Han, “Design method for geogrid-reinforced unpaved roads,” 2004.
[6] J. Han and J. P. Giroud, “Behavior of geogrid-reinforced pavement systems,” 2011.
[7] H. A. Susanto, S.-H. Yang and M. A. Duc, “Performance evaluation of geogrid in flexible pavement using mechanical-empirical design approach,” 2021.
[8] M. Kim and J. H. Lee, “Effects of geogrid reinforcement in low volume flexible pavement,” 2013.
[9] E. M. Ibrahim, S. M. El-Badawy and H. M. Ibrahim, “Effect of geogrid reinforcement on flexible pavements,” 2017.
[10] G. N. Goud, S. S. Mouli and B. Umashankar, “Design and sustainability aspects of geogrid reinforced flexible pavements,” 2020.
[11] R. Baadiga and U. Balunaini, “Evaluation of pavement design input parameters of biaxial and triaxial geogrid stabilized flexible pavements overlying soft subgrades,” 2023.
[12] S. M. Polisetti and R. Baadiga, “Engineering geogrid enabled low carbon and aggregate efficient flexible pavement,” 2025.
[13] V. Kommanamanchi, H. Chennarapu and U. Balunaini, “Mechanistic evaluation of biaxial and triaxial geogrids and geocells reinforcing C&D waste aggregate layers for sustainable flexible pavements,” 2025.
[14] H. K. Palla and B. Raghu Ram, “Design of flexible pavement using IITPAVE as per IRC-37-2018 and minimize the pavement thickness by using geogrid,” Int. J. Sci. Res. Eng. Manag. (IJSREM), vol. 08, no. 05, May 2024, DOI: 10.55041/IJSREM34322.
[15] AASHTO, Guide for Design of Pavement Structures, American Association of State Highway and Transportation Officials, Washington, D.C., 1993.
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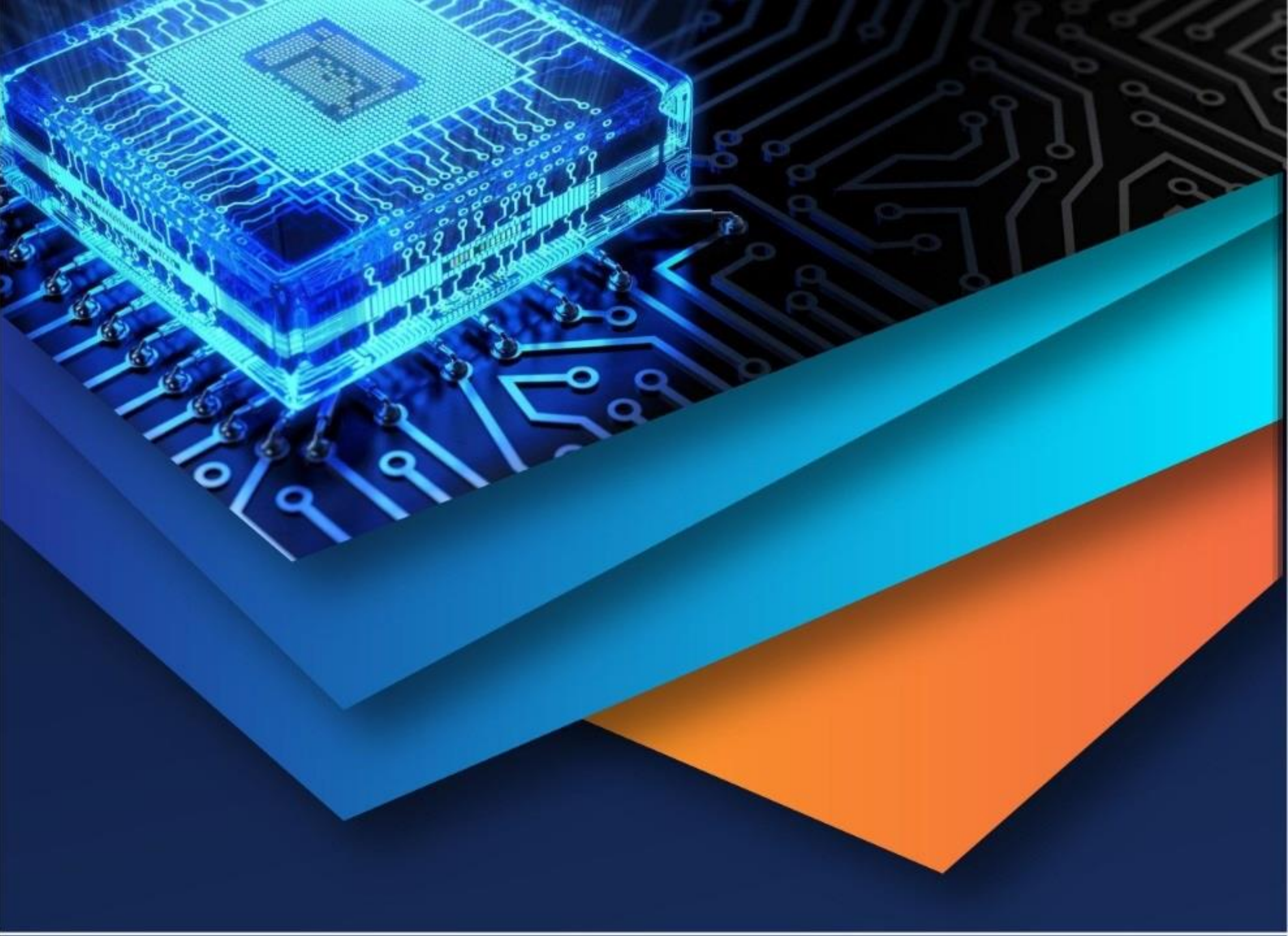

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