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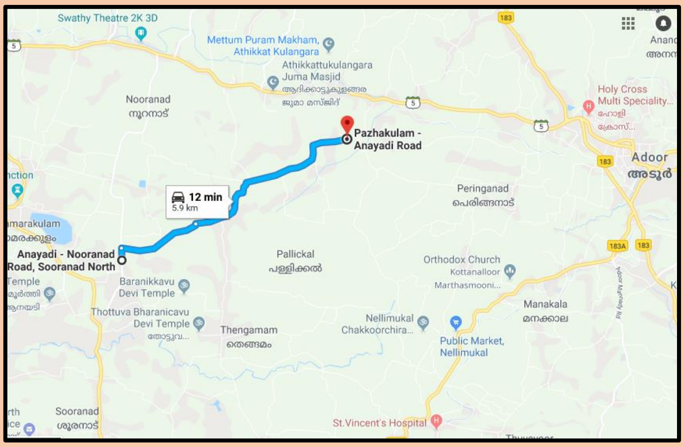

REPORT ON PAVEMENT STRUCTURAL STRENGTH SURVEY ,ANAYADI SECTION- KERALA

December 2018

Client:

Vishwa Samudra Engineering Pvt. Ltd.

Avani Ecoprojects Ltd.

QUALITY ASSURANCE STATEMENT		
CLIENT NAME **Vishwa Samudra Engineering Pvt Ltd -** **Avani Ecoprojects Pvt Ltd**		**PREPARED BY:** T. Pavanaram
REPORT NAME: **Report on Pavement structural strength survey**		**REVIEWED BY:** M. Ramamohana Rao, Chandra Sekhar Guptha
PROJECT/CONTRACT NUMBER:		**APPROVED FOR ISSUE BY:** K Srinivasulu
DATE OF ISSUE: December 2018		
REVISIONS:		
R0	17-12-2018	

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1 INTRODUCTION

In Pavement Design and Construction, there is an urgent need of economical and innovative Technology that provides sufficient strength and durability to pavement and also reduces energy consumption and Green House Gas (GHG) emission. Presently, there is lot of energy consumption and GHG emission in the manufacture of pavement material as well pavement construction. Soil and aggregate Stabilization is a solution for obtaining sustainable pavement and economically mitigating the critical issues such as energy consumption and GHG emissions.

Stabilroad German soil stabilization technology is one such solution. Kerala Infrastructure investment Fund Board (KIIFB) has constructed a road section near Anayadi using Stabilroad German Soil Stabilization technology by its principle contractor Vishwa Samudra Engineering Pvt Ltd with their technical partners Avani Ecoprojects Pvt Ltd, Hyderabad. Vishwa Samudra Engineering Pvt Ltd have outsourced work to **KDM Engineers (India) Pvt Ltd (KDM)** for structural evaluation of the pavement.

Accordingly, KDM has carried out Falling Weight Deflecometer (FWD) Test and prepared reports on Traffic and Structural condition of the pavement.

2 KDM'S COMAPANY PROFILE

KDM Engineers (India) Pvt. Ltd is a multi-disciplinary Civil Engineering consulting firm with demonstrated experience in Structures and Facilities, Transportation Infrastructure, Irrigation, Water Resources, Sanitation Construction Material Testing, Mix Designs, Geo-Technical Investigation, Pavement Study, Surveying and Structural Rehabilitation.

KDM Engineers (India) Pvt. Ltd laboratories are accredited by NABL for its wide range of testing facilities in Mechanical and Chemical fields as per ISO/IEC: 17025 – 2005, based at Hyderabad in Telangana, with branches at Visakhapatnam & Guntur in Andhra Pradesh, India

KDM Engineers (India) Pvt. Ltd is technically competent Organization with a team of experts and dedicated professionals including Engineers, Technicians and other Experts. KDM adopts a well-structured quality assurance and management system to carry out various types of testing and services and with a strong commitment to Aim and objective of providing complete solutions to its clients. The KDM endeavors to keep up the relentless efforts in finding the sound and quality solutions.

3 OBJECTIVE/SCOPE OF THE STUDY

The main objective of this consultancy services is Structural Condition of the pavement will be evaluated using Falling Weight Deflectometer (FWD) and subsequent analysis is to be carried out to ascertain the relative performance of the pavement in the context of evaluating residual life.

4 PROJECT STRETCH

Kerala Infrastructure investment Fund Board (KIIFB) has constructed a road section near Anayadi using Stabilroad German Soil Stabilization technology by its principle contractor Vishwa Samudra Engineering Pvt Ltd with their technical partners Avani Ecoprojects Pvt Ltd, Hyderabad. The length of Project road is 5.9 kms and having carriageway width of 6m.

Alignment of project stretch shown in Figure 1

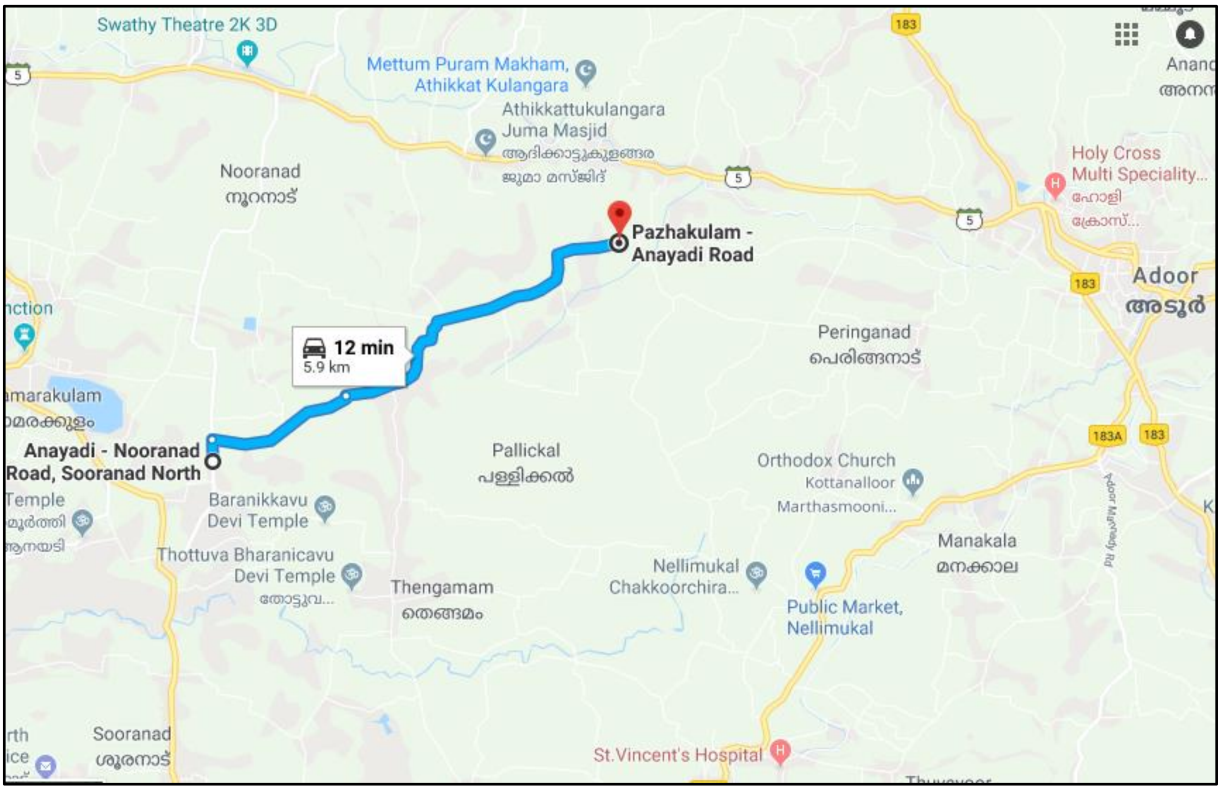


Figure 1: Project Location Map

5 DATA COLLECTION

After signing the contract, The KDM FWD Machine & Survey Crew was mobilized to anayadi Road near Pazakulam to collect the data. Accordingly, FWD test conducted and completed data collection using GEOTRAN FWD on 22-Nov-18 for the 5.9 km approx. Methodology for carrying out above-mentioned survey is explained in succeeding section.

6 METHODOLOGY

6.1 Methodology for Falling Weight Deflectometer (FWD) test

KDM uses a GEOTRAN Falling Weight Deflectometer. This unit is a non-destructive pavement testing device which provides accurate data on the response of the pavement (specifically the surface deflection bowl) to dynamic loads by simulating actual wheel loads in both response and duration. This allows more accurate and rapid measurement of pavement deflection under load than traditional methods.

Figure 2: FWD Machine

A dynamic load is generated by the dropping of a mass from a pre-set height onto a 300 mm diameter plate. The magnitude of the load and the pavement response are measured by a load cell and seven geophones. One geophone is located immediately under the load, whilst the others are located at variable offsets from the centre of the load.

The test load can be varied between 7 and 70 KN to meet the requirements of the particular task and the pavement response for up to four different magnitudes of load can be measured during any test sequence.

The offsets of the geophones can be set to any distance up to 1800 mm from the centre of the load and a typical sequence can be completed in approximately one minute. Highly accurate deflection bowl measurements are therefore possible and the FWD is very useful for carrying out large-scale pavement surveys.

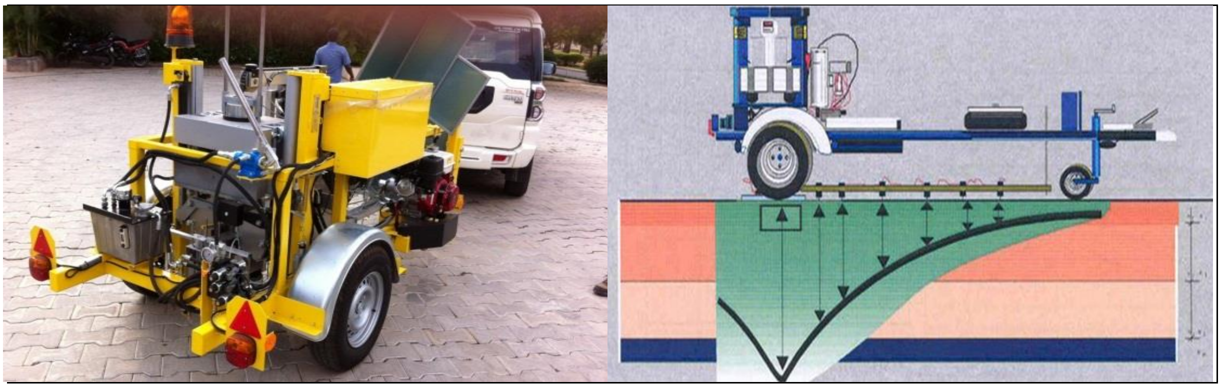


Figure 3: Location of Geo-Phones

This data can assist in applications such as pavement overlay design, pavement condition surveys and in the development and operation of Pavement Management Systems (PMS). It is also used as input in back-calculation of Pavement Moduli packages.

The FWD is integrally mounted on a trailer which is towed by a dedicated vehicle. All testing is controlled by a personal computer which is located in the vehicle towing the FWD. As a result, only one operator is required to conduct a survey on most occasions making it less labor/ equipment intensive than traditional methods.

Working Principle

- A set of weights is dropped onto a platform with springs (rubber buffers) and the impact load is transferred to the pavement through a loading plate.
- The load simulates the dynamic load from a truck
- Normally, the load applied on road pavements is 40 kN
- When subjected to a load, the pavement will bend and a deflection bowl is created. The deflections at various distances from the loading centre are recorded by the sensors (geophones) and stored in a data file

Confidence Limits

- Load cell accuracy 2% +/- 2 KPa (1kPa = 0.145 psi)
- Load resolution 0.03 - 0.12 KN (7 - 26 lbf), magnitude dependent
- Deflection range 2.0 mm (80 mil)
- Deflector accuracy 2% +/- 2 microns (1 micron = 0.04 mil)
- Deflector resolution 1 micron
- Deflection random error typically 1 - 2 microns (0.04 - 0.08 mil)
- Deflection systematic error +/- 2%

Data Collection

- The FWD data collection has been collected below
- Prepare the FWD unit for deflection testing
- Bring the FWD to a stopped position at the beginning of the test section, centre on the outside wheel path (or specific position), and take a measurement by applying load using following sequence:
- One settling drop to ensure proper contact.
- Three drops with an applied load of 40 KN ± 10% (or Specified Load).
- Deflections are recorded from the sensors located at the centre of the loading plate for each drop except the settling drop.
- Along with these deflection data, the parameter like Chainage, Temperature, Date and Time and position of Sensors will also be recorded.
- After each measurement, drive the FWD forward to next measurement point.

During the data collection process, the testing patterns we have used the lined pattern. In this position, the Data Collection will be made in the same direction. For example: if the Measurement at the beginning of the section is taken on outside wheel path, then the next measurement has to be taken after moving to the specified interval on same direction. While starting the adjacent lane, an offset distance is considered while starting and continued as stated earlier. Data collection pattern is mentioned in Figure 4.

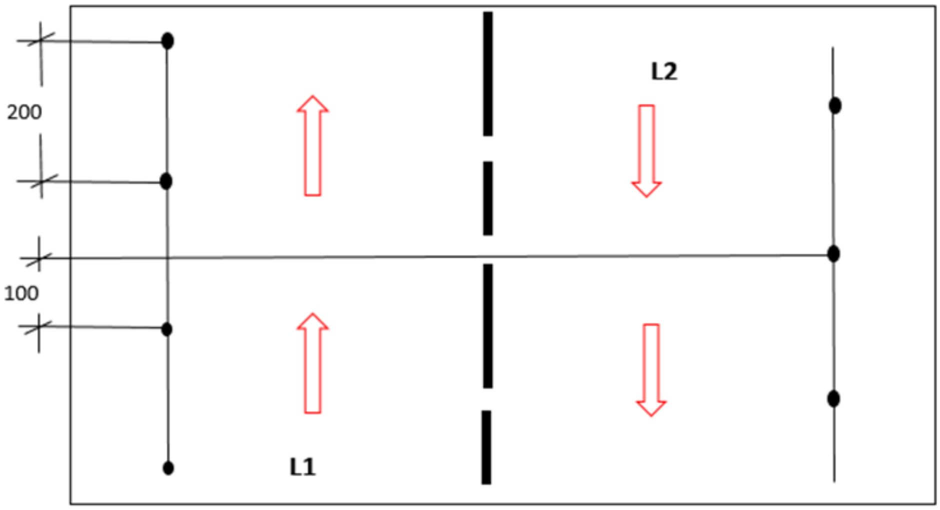


Figure 4: Data Collection Pattern -Lined

7 SITE OBSERVATIONS AT THE TIME OF SURVEY

During the time of survey, few observations were recorded by site engineers.

7.1 Road Inventory

Carriageway

Total length of the project road is 5.9km. Project road has 6m carriageway for entire length. The carriageway is built with BT & WMM with stabilizing agent of three coat surface dressing as wearing course.

Terrain

Project road passing through plain and rolling terrain. It can cater to the design speed of about 30-50 km/hr except in some of the built-up area and at sharp curve locations.

Land use

Project road traverse through builtup area.

Road Geometries

There is sharp curves found along the alignment. The vertical alignment is generally having smooth geometry. There are some locations observed, where adequate sight distances are not available which need improvement to the standards.

Pavement Condition

Entire stretch of the project road is in good condition.

Pavement Type and Composition

Existing pavement is flexible in nature. Pavement comprises of 40 mm bituminous layer and 300 mm Stabilized base. The crust composition details provided by the client is mentioned below. During Analysis, the same pavement thickness has been considered.

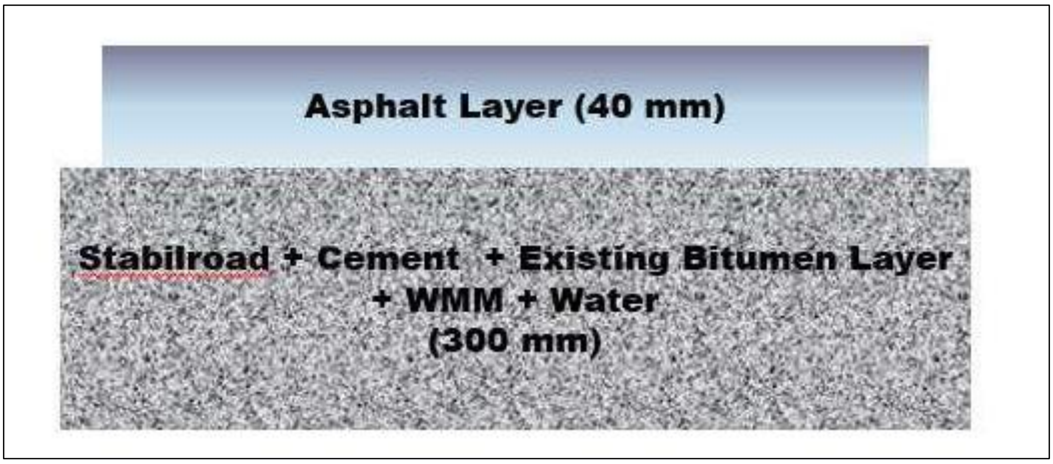


Figure 5: Existing Crust Composition

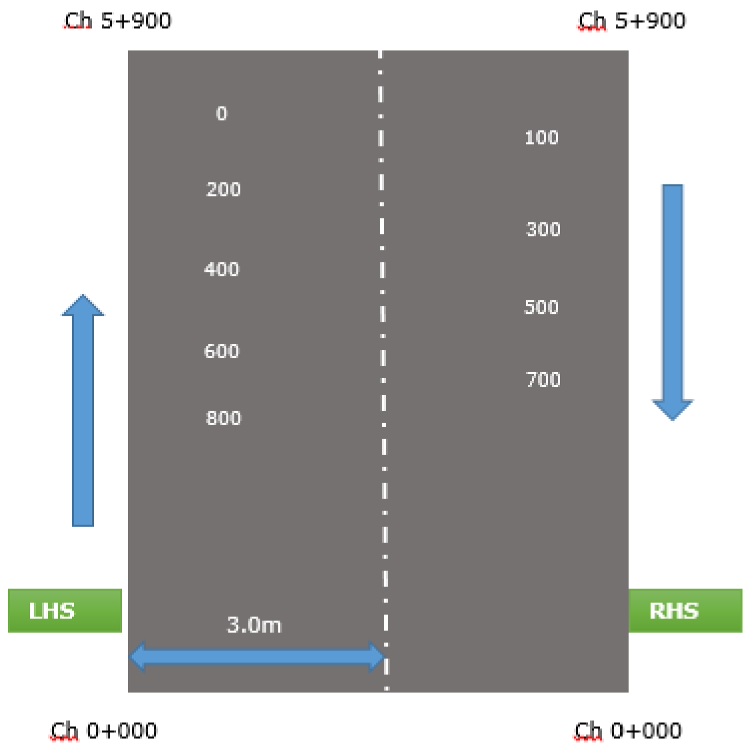


Figure 6: Site Section Sketch

Traffic Details

Light traffic observed on project road. It is understood that the design traffic volumes were calculated based on traffic growth, vehicle damage factors etc. provided from traffic counts. From the client records, we have identified traffic in between 5 to 10 MSA.

8 ANALYSIS METHODOLOGY AND RESULTS

8.1 Falling Weight Deflectometer

IRC 115: 2014 procedures were used as reference and provided Structural evaluation and strengthening of flexible Pavements. Accordingly, the sequence of testing and analysis steps has been conducted in accordance with the IRC 115:2014.

For Flexible Pavements:

The Remaining Life Analysis on the Flexible Pavement analysis is carried by Evaluating the Elastic Modulus of each Layers and Performance of Flexible Pavement - Fatigue and Rutting Behavioral checks.

The step by step analysis for flexible pavement has been explained in the flow chart attached in Figure 7.

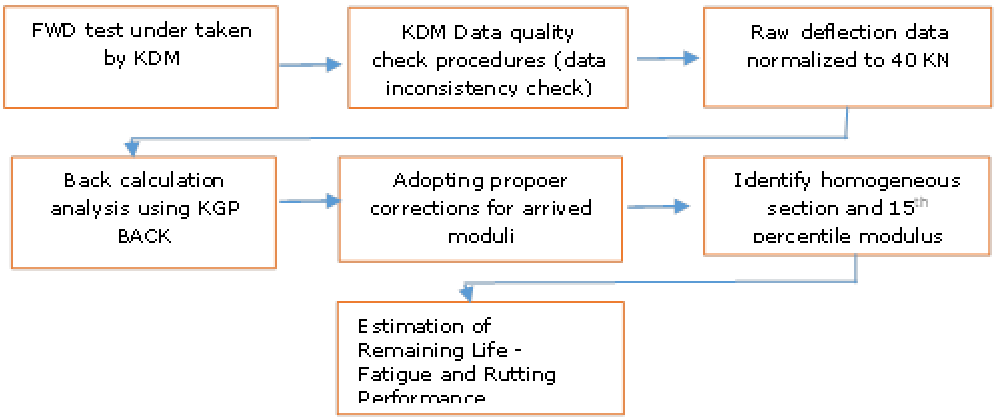


Figure 7: Process Flow to determine Pavement modulus values

These has been Explained in the procedural steps below

1. The recorded data was normalized to a standard load – 40kN (IRC 115).
2. The normalized deflections were then back calculated using the KGP-BACK application to obtain Elastic Modulus values of Bituminous, Granular layer and Sub-grade.
3. The corrections factors will be applied to all layers as suggested in IRC 115:2014.

In accordance with Section 6.4.2 of IRC 115, the calculated modulus values in the Bituminous Layers have been adjusted relative to the standard temperature of 35°C using equation 4 and 5 of IRC 115: 2014.

$$E\,T_1 = \lambda\,E\,T_2 \qquad \text{Eq 4, IRC115:2014}$$

$$\lambda = \frac{1-0.238\ln T1}{1-0.238\ln T2} \qquad \text{Eq 5, IRC115:2014}$$

Where,

λ - Temperature Correction factor

*E*T1 - Backcalculated Modulus (MPa) at Temperature T1

*E*T2 - Backcalculated Modulus (MPa) at Temperature T2

In accordance with Section 6.5.2 of IRC 115, the calculated modulus values for Sub-grade and Granular Layer have been adjusted relative to the moisture conditions at the time of the testing. Since the granular layer present here is cementitious Layer - No correction needs to be applied to this cementitious layer.

$$E_{sub\_mon} = 3.351 * (E_{sub\_win})^{0.7688} - 28.9 \qquad \text{Eq 6, IRC 115:2014}$$

$$E_{sub\_mon} = 0.8554 * (E_{sub\_win}) - 8.461 \qquad \text{Eq 7, IRC 115:2014}$$

Using these corrected Moduli Values - Homogenous sections are prepared and 15th percentile Moduli values are selected for Design. Here, we have considered each section as one homogenous section.

4. Checking the in-serviceability of the Pavement layers through Performance criteria - analyzing the Remaining life (IRC 115) with reference to the Traffic MSA.

Initially, The Critical Strains Values - tensile strain (in the bituminous layer), and compressive strain (at the top of the sub-grade layer), are evaluated using the IRC approved program IITPAVE application (refer 4.1.2).

Using the Critical Strain values, the pavement performance in term of Fatigue and Rutting can be evaluated as provided in Section 8.3 of IRC 115.

Fatigue Model

$$N_f = 0.711 * 10^{-04} \times [1/\varepsilon t]^{3.89} * [1/M_R]^{0.854}$$ Eq 16, IRC 115:2014

Rutting Model

$$N = 1.41 \times 10^{-8} \times [1/\varepsilon v]^{4.5337}$$ Eq 17, IRC 115:2014

For special case of Cementitious Layer,

A. Fatigue life in terms of standard axles

$$N = RF \left[\frac{(11300 / E.0804+191)}{\varepsilon t} \right]^{12}$$ Eq 6.6, IRC 37:2012

B. Fatigue equations for cumulative Damage Analysis

$$\text{Log } N_{fi} = \frac{0.972 / (\sigma t+MRup)}{0.0825}$$ Eq 6.7, IRC 37:2012

Using these equations, Actual Remaining Life of the pavement retained can be evaluated in terms of Traffic MSA.

8.2 KGP BACK Application

KGP BACK is a genetic algorithm-based model for back calculation of layer moduli provided along with IRC 115 publication. It uses linear elastic theory for the analysis of pavement in its forward calculation algorithm.

The procedure provided in Appendix III has been adopted to back calculate the Elastic modulus values of each layer listed below

- The Normalize the raw deflection values to 40KN
- Derive the limits for Modulus of Bituminous layer, Granular layer and Sub grade as discussed in Appendix III.8 of IRC 115:2014 and IRC 37: 2012

For this project, The Limits has been considered as below:

Table 1:Elastic Modulus range for pavement layers

	Low Limit	Upper Limit
Bituminous layers	750MPa,	3000MPa.
Cementitious layer[1]	2000MPa	9000MPa
Subgrade[2]	1.2*Esg calc *0.8	1.2* Esg calc *1.2

[1] For Cementitious Layer, the limits are derived based on UCS value shared by the client from their Records

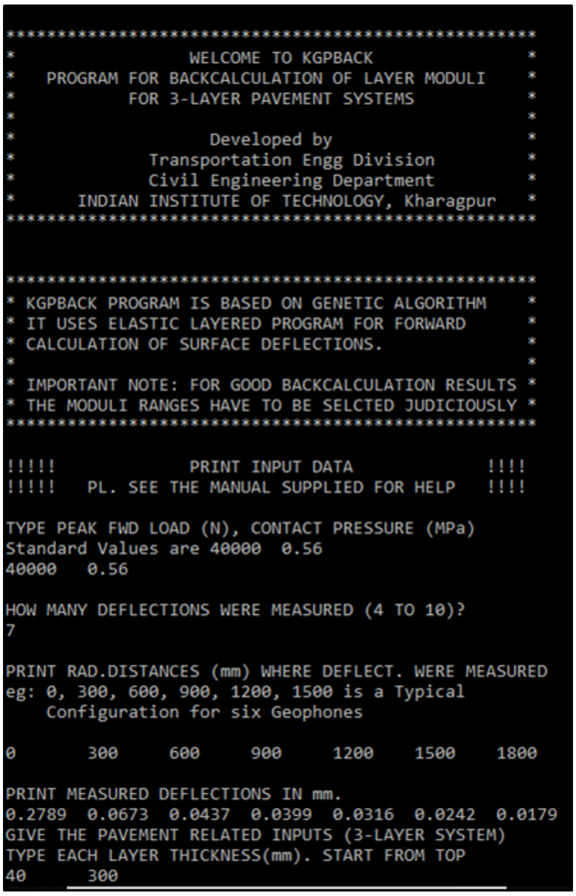
$E_{cgsb} = 1000*UCS$ Eq 7.2, IRC 37:2012

[2] $E_{subgrade}$ (MPa) = $(1-\mu^2)*P/(3.14*r*w$ Eq III.2, IRC 115:2014

Feed the pavement structure detailing values appropriately in KGPBACK application

Modulus values can be arrived; Review the results.

The screen shot of the KGPBACK application has been attached below.



```
****************************************************
*              WELCOME TO KGPBACK                  *
*   PROGRAM FOR BACKCALCULATION OF LAYER MODULI    *
*          FOR 3-LAYER PAVEMENT SYSTEMS            *
*                                                  *
*                  Developed by                    *
*            Transportation Engg Division          *
*            Civil Engineering Department          *
*      INDIAN INSTITUTE OF TECHNOLOGY, Kharagpur   *
****************************************************


****************************************************
* KGPBACK PROGRAM IS BASED ON GENETIC ALGORITHM    *
* IT USES ELASTIC LAYERED PROGRAM FOR FORWARD      *
* CALCULATION OF SURFACE DEFLECTIONS.              *
*                                                  *
* IMPORTANT NOTE: FOR GOOD BACKCALCULATION RESULTS *
* THE MODULI RANGES HAVE TO BE SELCTED JUDICIOUSLY *
****************************************************

!!!!!             PRINT INPUT DATA             !!!!
!!!!!    PL. SEE THE MANUAL SUPPLIED FOR HELP  !!!!

TYPE PEAK FWD LOAD (N), CONTACT PRESSURE (MPa)
Standard Values are 40000  0.56
40000   0.56

HOW MANY DEFLECTIONS WERE MEASURED (4 TO 10)?
7

PRINT RAD.DISTANCES (mm) WHERE DEFLECT. WERE MEASURED
eg: 0, 300, 600, 900, 1200, 1500 is a Typical
    Configuration for six Geophones

0       300     600     900     1200    1500    1800

PRINT MEASURED DEFLECTIONS IN mm.
0.2789  0.0673  0.0437  0.0399  0.0316  0.0242  0.0179
GIVE THE PAVEMENT RELATED INPUTS (3-LAYER SYSTEM)
TYPE EACH LAYER THICKNESS(mm). START FROM TOP
40      300
```

Figure 8: Feeding the data in KGP BACK application

```
backout - Notepad
File  Edit  Format  View  Help
################
No.of Layers                           =  3
FWD Load (N)                           = 40000.00
Contact Pressure (MPa)                 =  .56
No.of Deflection points                =  7
Deflections measured using FWD (mm)    =  .26500   .07700   .05230   .04700   .03600   .02700   .02100
Radial distances from centre of load(mm) =    .0  300.0  600.0  900.0  1200.0  1500.0  1800.0
Layer thickness (mm)                   =  40.00 300.00
Poisson ratio values                   = .35 .25 .35
Layer Modulus (MPa) Ranges Selected :-
(a) Bituminous Surfacing               =  750.0   3000.0
(b) Granular Base                      = 2000.0  9000.0
(c) Subgrade                           =  245.0   367.0


################
# OUTPUT DATA  #
################

Backcalculated Layer Moduli are:
Surface (MPa)  =     787.4
Base (MPa)     =    2041.1
Subgrade (MPa) =     310.5
```

Figure 9: Results obtained from KGPBACK

8.3 IIT PAVE Application

IITPAVE is a multilayer elastic layer linear analysis program provided along with IRC 37:2012. This IITPAVE has been used for the computation of stresses and strains in flexible pavements. Tensile strain, at the bottom of the bituminous layer and the vertical strain, on the top of the subgrade are conventionally considered as critical parameters for pavement design to limit cracking and rutting in the bituminous layers and non-bituminous layers respectively. Under repeated wheel loads the pavement foundation materials in different layers do not behave linear elastically. The granular materials and subgrade soils are nonlinear with an elastic modulus varying with level of stresses.

An overview of the analysis process using this IITPAVE is presented below.

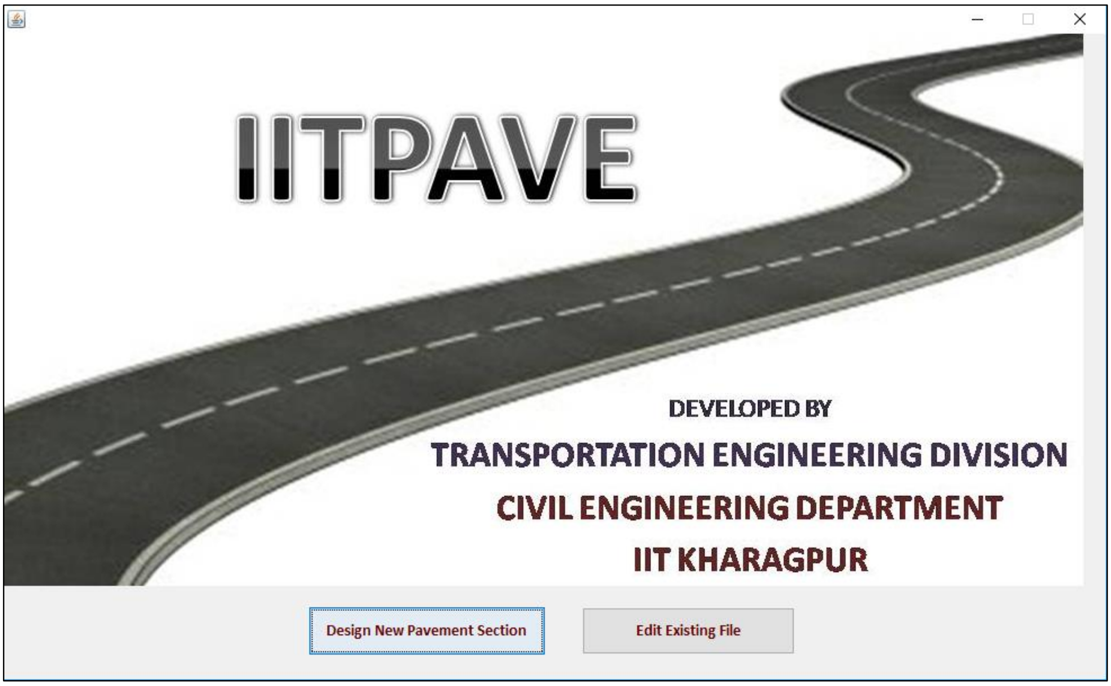


Figure 10: opening Page IITPAVE

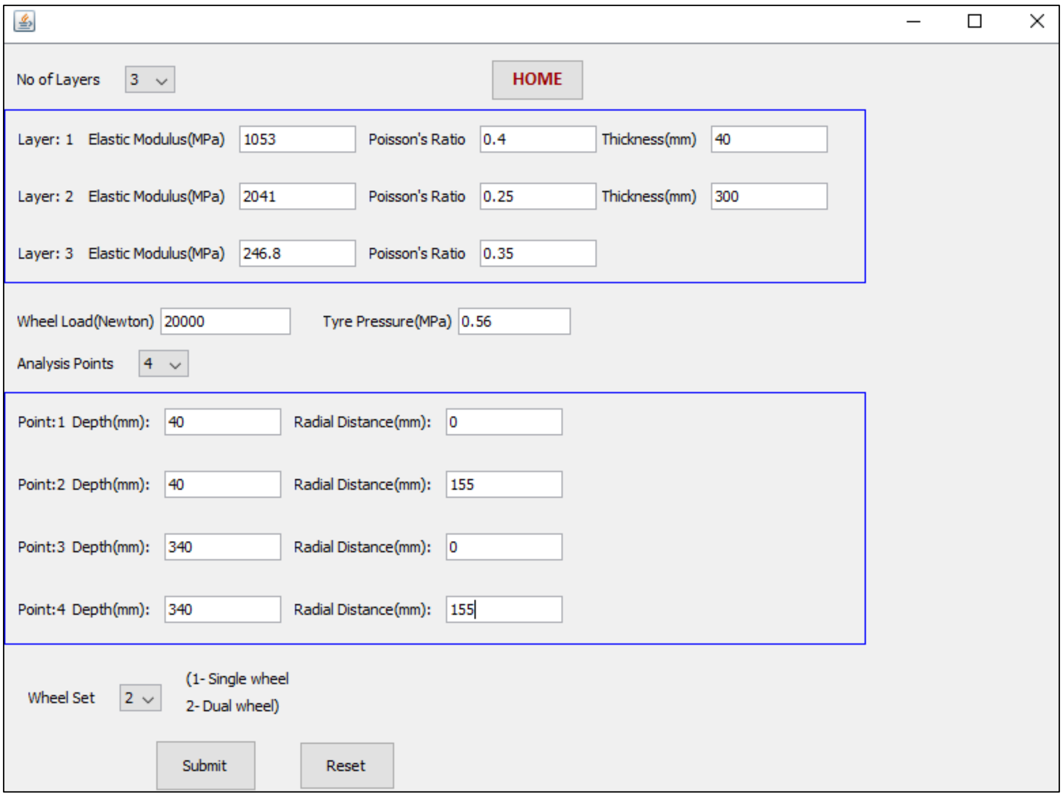


Figure 11: Providing the input values, obtained via KGP Back

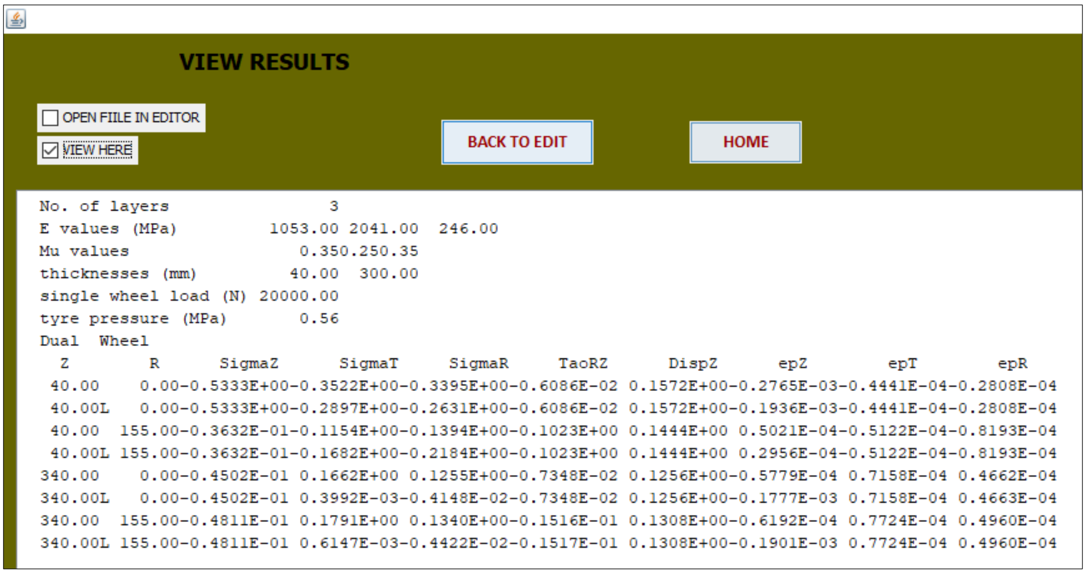


Figure 12: Obtaining required strain values for checking Fatigue and Rutting performances

8.4 Falling Weight Deflectometer (FWD) Results :

Listed below are the parameters included in the spreadsheet described the data fields:

Location	File Name indicating Road Name and Direction
Chainage	Distance from start point in meters
Date	Date of Testing
Time	Time of FWD test
Drop	Number of drop number, only second drop presented
Geophone 1	Deflection under load at 0mm offset
Geophone 2	Deflection at 300mm offset from load
Geophone 3	Deflection at 600mm offset from load
Geophone 4	Deflection at 900mm offset from load
Geophone 5	Deflection at 1200mm offset from load
Geophone 6	Deflection at 1500mm offset from load
Geophone 7	Deflection at 1800mm offset from load
kPa	Applied surface pressure from FWD load
kN	Applied surface load
Air (deg)	Air Temperature (Deg C)
Sur (deg)	Surface Temperature (Deg C) measured by non-contact sensor

Maximum Deflection

GEOTRAN Falling Weight Deflectometer (FWD) was used to collect pavement strength and stiffness information and these values are reported in mm. The results of the normalized maximum deflection testing are presented below.

Normalised Deflection Values

In accordance with international best practice and with Section 4.4 of IRC 115, the recorded deflection values have been normalized to the equivalent applied pressure of 40KN.

This Load is representative of a standard ESAL. The following figure presents the Peak Deflection.

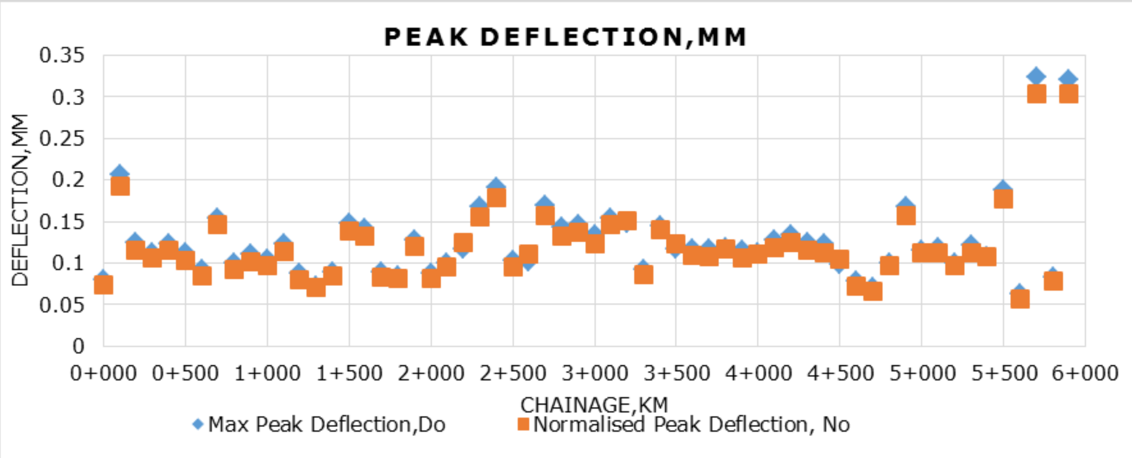


Figure 13: Peak Deflection Values

Modulus Values

In accordance with IRC 115 and IRC 37:2012, the recorded deflection values have been analyzed to determine back-calculated modulus value. The processed results are attached in Appendix.

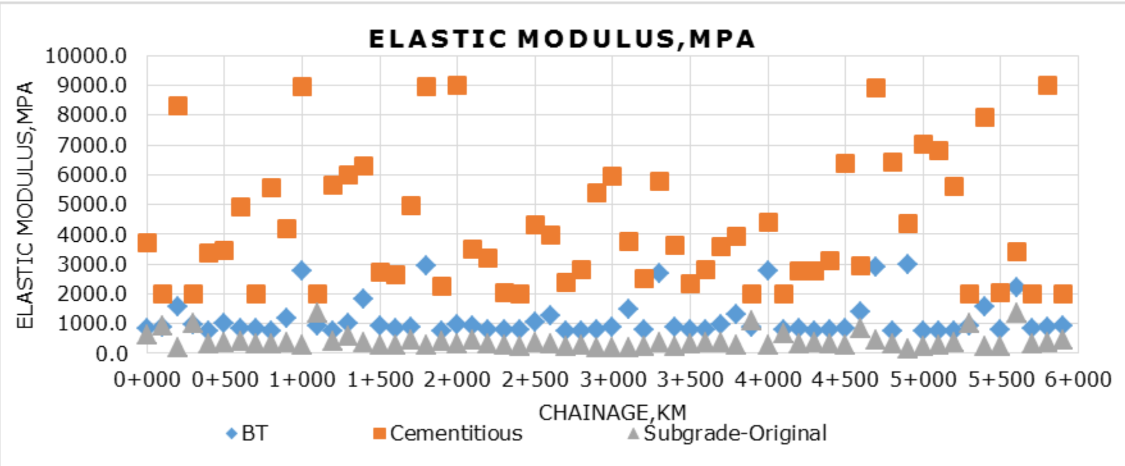


Figure 14: Back Calculated Elastic Modulus values of Pavement Layers

Temperature Corrected Values

In accordance with Section 6.4.2 of IRC 115, the calculated modulus values in the Layer 1 Bituminous Layers have been adjusted relative to the standard temperature of 35ºC. Temperature corrections were made based on the infrared pavement temperature readings collected at the time of deflection testing.

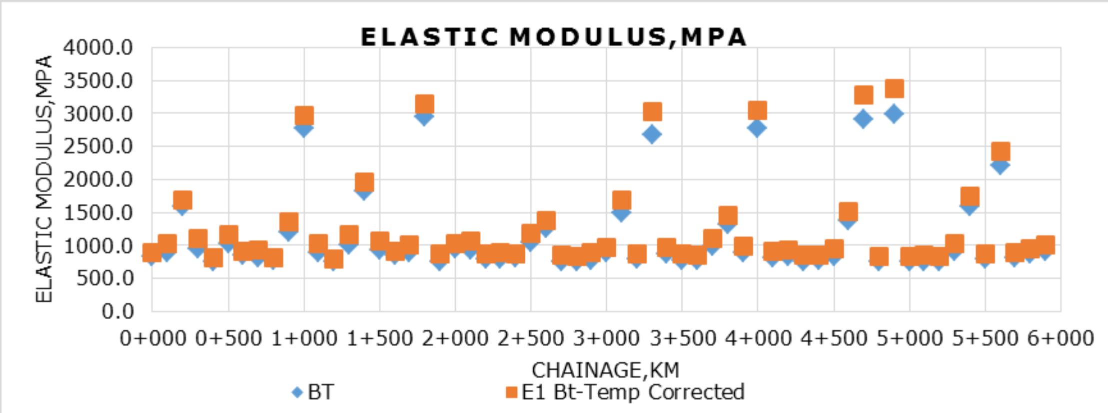


Figure 15: Elastic Modulus of Bituminous Layer (Back Calculated modulus (vs) temperature Corrected modulus)

Seasonal Corrected Values

In accordance with Section 6.5.2 of IRC 115 - No correction applied to Cementitious Layer and seasonal correction applied for Subgrade, as the test was executed in winter season.

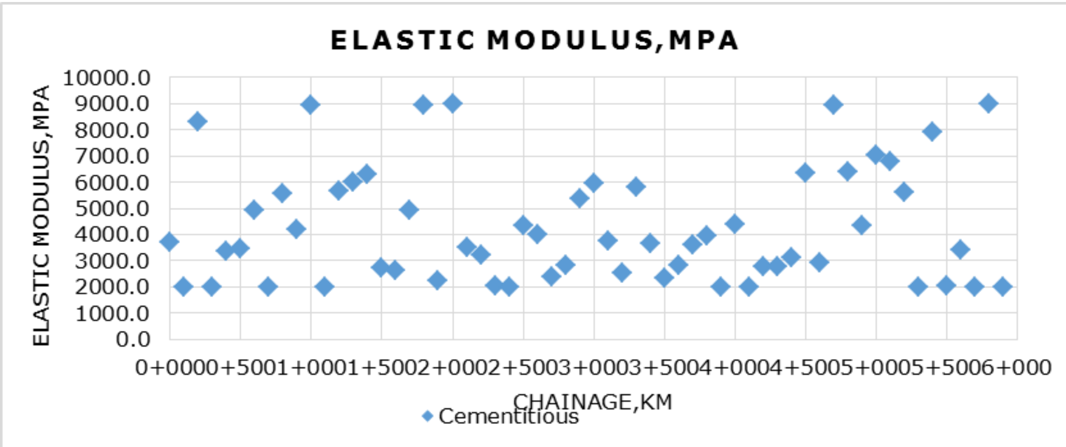


Figure 16: Elastic Modulus of Cementitious Layer

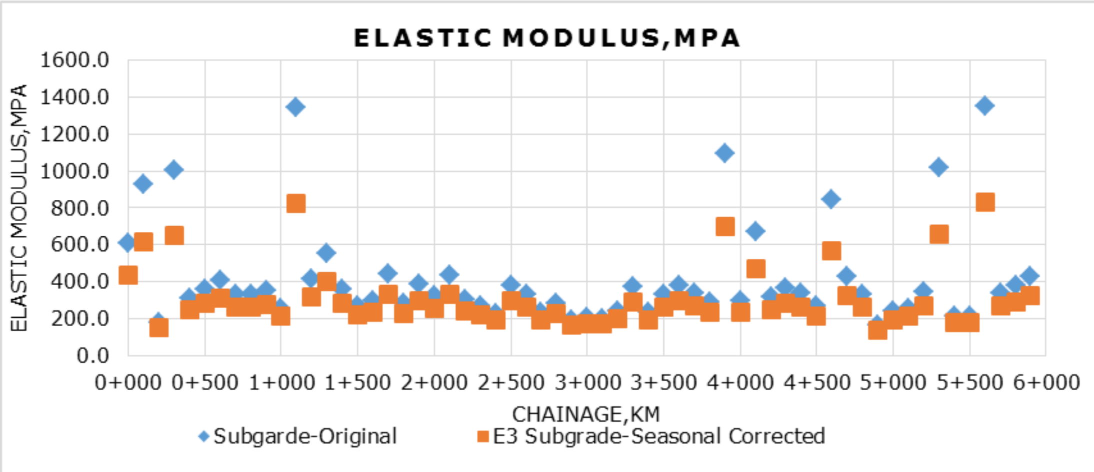


Figure 17: Elastic Modulus of Subgrade (Back calculated modulus (vs) Seasonal corrected modulus)

8.5 Performance Criteria

The Pavement performance is evaluated to find the actual Remaining Life retained at present in terms of Fatigue and Rutting performances for Flexible Pavements. The Design traffic is considered as 10 MSA from clients Records.

As Discussed in Section 8.1 the analysis has been carried out. Based on the Deflection data - Elastic Modulus values has been processed. After applying appropriate correction to Derived Elastic modulus values, the Sections has been grouped to Road-wise and 15% percentile values has been arrived.

The evaluated Fatigue performance of Bituminous layer, Rutting performance based on Subgrade layer, fatigue performance in cementitious layer are listed below

Table 2: Performance Criteria

S.No	15%			Fatigue in Bituminous Layer, Nf (MSA)	Fatigue in Cementitious Layer, Nfi (B) (MSA)	Rutting in	Design Traffic	Safe / Not Safe
	E-BT	E-Cementitious	E-Subgrade			Sub-grade, N (MSA)	Ni(MSA)	
1	853.04	2006.8	192.13	7363.95	663	580.85	10	Safe

9 DISCUSSION AND CONCLUSION

The project consists of a small road sections near Anayadi, Kerala. The total length of the existing project corridor is 5.9 km approx.

KDM's GEOTRAN Falling Weight Deflectometer was engaged for data collection and the survey was done on 21-Nov-2018. The testing was undertaken in all sections that reflected the road conditions and pavement composition. Subsequently the analysis was undertaken with appropriate pavement compositions as per IRC guidelines - IRC 115: 2014 and IRC 37: 2012.

The results from the entire stretch are presented in Section 8.

The results indicate:

1. Anayadi road section has a uniform Pavement composition.
2. During initial Testing, it is observed the deflection readings recorded in these sub sections indicates a very stiff underlying layers ensuring the privileges of the high performance heavy volume pavements.
3. For Back calculation process, the limits for Subgrade and Bituminous layer has been considered based on the IRC 115: 2014 and for cementitious layer the limits have been considered based on IRC 37: 2012. The same has been discussed in preceding section.
4. The predicted design traffic considered as 10 msa as per client records. Whereas through the performance check, remaining life of pavement obtained as 581 msa from KGP BACK and IIT PAVE analysis.
5. Overall the existing pavement has approximately 85 years of remaining life, which means that the existing pavement will acceptable functionally and structurally with only routine maintenance for 85 years.

Variability in the calculated results may be a reflection on variability of the pavement composition along the alignment. For each section, the available information only supports the consideration of provided pavement composition in that section.

Appendix-I-FWD Raw Data

Sl No.	Place	Chainage	Side	Drop	Load (kN)	Geophone 1 (mm)	Geophone 2 (mm)	Geophone 3 (mm)	Geophone 4 (mm)	Geophone 5 (mm)	Geophone 6 (mm)	Geophone 7 (mm)	Pavement Temp. (°C)
1	ANAYADI	0+000	LHS	1	43.8	0.083	0.061	0.055	0.033	0.022	0.011	0.009	36.5
	ANAYADI	0+000	LHS	2	43.3	0.079	0.06	0.054	0.032	0.02	0.011	0.008	36.5
	ANAYADI	0+000	LHS	3	43.8	0.078	0.061	0.054	0.032	0.02	0.011	0.008	36.5
2	ANAYADI	0+200	LHS	1	42.9	0.13	0.103	0.091	0.069	0.058	0.051	0.036	36.5
	ANAYADI	0+200	LHS	2	43.7	0.121	0.109	0.093	0.075	0.064	0.05	0.038	36.5
	ANAYADI	0+200	LHS	3	42.6	0.122	0.11	0.091	0.071	0.062	0.047	0.037	36.5
3	ANAYADI	0+400	LHS	1	42.6	0.127	0.086	0.069	0.049	0.037	0.026	0.017	36.5
	ANAYADI	0+400	LHS	2	42.3	0.124	0.088	0.067	0.047	0.036	0.026	0.018	36.5
	ANAYADI	0+400	LHS	3	43.7	0.121	0.092	0.074	0.051	0.04	0.028	0.018	36.5
4	ANAYADI	0+600	LHS	1	43.9	0.091	0.069	0.055	0.04	0.029	0.021	0.015	36.5
	ANAYADI	0+600	LHS	2	43.7	0.094	0.069	0.057	0.038	0.028	0.02	0.014	36.5
	ANAYADI	0+600	LHS	3	43.1	0.09	0.066	0.056	0.036	0.028	0.021	0.014	36.5
5	ANAYADI	0+800	LHS	1	44	0.098	0.077	0.06	0.044	0.035	0.025	0.02	36.5
	ANAYADI	0+800	LHS	2	42.8	0.099	0.072	0.059	0.044	0.035	0.025	0.019	36.5
	ANAYADI	0+800	LHS	3	43.4	0.101	0.077	0.06	0.045	0.035	0.025	0.019	36.5
6	ANAYADI	1+000	LHS	1	42.4	0.102	0.071	0.064	0.049	0.042	0.033	0.028	36.5
	ANAYADI	1+000	LHS	2	43.1	0.106	0.076	0.069	0.052	0.044	0.033	0.029	36.5
	ANAYADI	1+000	LHS	3	43.5	0.105	0.072	0.067	0.052	0.042	0.035	0.028	36.5
7	ANAYADI	1+200	LHS	1	42.4	0.087	0.063	0.049	0.033	0.027	0.021	0.015	36.5
	ANAYADI	1+200	LHS	2	43	0.084	0.065	0.049	0.034	0.028	0.021	0.015	36.5
	ANAYADI	1+200	LHS	3	43.9	0.09	0.063	0.051	0.037	0.027	0.022	0.014	36.5
8	ANAYADI	1+400	LHS	1	42.9	0.088	0.063	0.052	0.038	0.032	0.022	0.016	36.5
	ANAYADI	1+400	LHS	2	43.7	0.094	0.069	0.057	0.041	0.032	0.025	0.017	36.5
	ANAYADI	1+400	LHS	3	40.6	0.086	0.064	0.053	0.039	0.03	0.023	0.017	36.5

Sl No.	Place	Chainage	Side	Drop	Load (kN)	Geophone 1 (mm)	Geophone 2 (mm)	Geophone 3 (mm)	Geophone 4 (mm)	Geophone 5 (mm)	Geophone 6 (mm)	Geophone 7 (mm)	Pavement Temp. (°C)
9	ANAYADI	1+600	LHS	1	42.3	0.14	0.097	0.071	0.048	0.033	0.029	0.021	36.5
	ANAYADI	1+600	LHS	2	43.3	0.143	0.099	0.073	0.048	0.034	0.028	0.022	36.5
	ANAYADI	1+600	LHS	3	42.8	0.142	0.102	0.077	0.048	0.034	0.028	0.02	36.5
10	ANAYADI	1+800	LHS	1	41.8	0.085	0.069	0.057	0.044	0.04	0.033	0.026	36.5
	ANAYADI	1+800	LHS	2	42.5	0.089	0.073	0.06	0.048	0.041	0.032	0.026	36.5
	ANAYADI	1+800	LHS	3	40.1	0.079	0.063	0.054	0.043	0.037	0.03	0.024	36.5
11	ANAYADI	2+000	LHS	1	43.6	0.09	0.064	0.057	0.042	0.035	0.027	0.021	36.9
	ANAYADI	2+000	LHS	2	42.8	0.087	0.067	0.057	0.043	0.037	0.026	0.022	36.9
	ANAYADI	2+000	LHS	3	41.3	0.084	0.062	0.052	0.04	0.033	0.024	0.02	36.9
12	ANAYADI	2+200	LHS	1	39	0.127	0.083	0.066	0.044	0.034	0.024	0.019	36.9
	ANAYADI	2+200	LHS	2	36.5	0.111	0.075	0.058	0.04	0.029	0.022	0.016	36.9
	ANAYADI	2+200	LHS	3	36.1	0.111	0.077	0.06	0.04	0.03	0.023	0.017	36.9
13	ANAYADI	2+400	LHS	1	42.4	0.184	0.133	0.099	0.062	0.046	0.033	0.025	36.9
	ANAYADI	2+400	LHS	2	43.1	0.195	0.138	0.1	0.066	0.046	0.034	0.025	36.9
	ANAYADI	2+400	LHS	3	43	0.197	0.137	0.098	0.063	0.043	0.033	0.024	36.9
14	ANAYADI	2+600	LHS	1	36.2	0.1	0.061	0.049	0.034	0.028	0.021	0.016	36.9
	ANAYADI	2+600	LHS	2	37.2	0.103	0.065	0.051	0.036	0.028	0.022	0.015	36.9
	ANAYADI	2+600	LHS	3	37.1	0.102	0.065	0.055	0.039	0.031	0.023	0.016	36.9
15	ANAYADI	2+800	LHS	1	42	0.143	0.092	0.073	0.049	0.037	0.027	0.02	36.9
	ANAYADI	2+800	LHS	2	43.4	0.142	0.096	0.076	0.053	0.039	0.028	0.023	36.9
	ANAYADI	2+800	LHS	3	43.5	0.143	0.096	0.075	0.053	0.038	0.027	0.022	36.9
16	ANAYADI	3+000	LHS	1	42.5	0.13	0.102	0.086	0.065	0.053	0.043	0.031	36.9
	ANAYADI	3+000	LHS	2	43.2	0.129	0.103	0.085	0.062	0.054	0.043	0.032	36.9
	ANAYADI	3+000	LHS	3	43.9	0.141	0.105	0.089	0.066	0.054	0.042	0.032	36.9
17	ANAYADI	3+200	LHS	1	40.6	0.157	0.107	0.084	0.057	0.044	0.032	0.022	36.9

Sl No.	Place	Chainage	Side	Drop	Load (kN)	Geophone 1 (mm)	Geophone 2 (mm)	Geophone 3 (mm)	Geophone 4 (mm)	Geophone 5 (mm)	Geophone 6 (mm)	Geophone 7 (mm)	Pavement Temp. (°C)
	ANAYADI	3+200	LHS	2	37.5	0.142	0.098	0.076	0.052	0.041	0.03	0.021	36.9
	ANAYADI	3+200	LHS	3	39.5	0.145	0.107	0.083	0.056	0.044	0.032	0.022	36.9
18	ANAYADI	3+400	LHS	1	42.7	0.151	0.106	0.087	0.058	0.049	0.035	0.028	37.1
	ANAYADI	3+400	LHS	2	40.3	0.14	0.098	0.081	0.056	0.046	0.033	0.026	37.1
	ANAYADI	3+400	LHS	3	40.2	0.143	0.091	0.076	0.054	0.043	0.034	0.026	37.1
19	ANAYADI	3+600	LHS	1	42.8	0.117	0.083	0.064	0.042	0.031	0.021	0.013	37.1
	ANAYADI	3+600	LHS	2	43.1	0.117	0.085	0.066	0.045	0.031	0.02	0.014	37.1
	ANAYADI	3+600	LHS	3	42.7	0.116	0.079	0.062	0.043	0.029	0.02	0.013	37.1
20	ANAYADI	3+800	LHS	1	41.3	0.121	0.084	0.066	0.047	0.034	0.028	0.02	37.1
	ANAYADI	3+800	LHS	2	40.6	0.117	0.082	0.064	0.046	0.033	0.027	0.02	37.1
	ANAYADI	3+800	LHS	3	40	0.116	0.082	0.063	0.047	0.035	0.029	0.02	37.1
21	ANAYADI	4+000	LHS	1	40.6	0.112	0.076	0.062	0.043	0.036	0.028	0.022	37.1
	ANAYADI	4+000	LHS	2	40.3	0.11	0.077	0.057	0.042	0.034	0.028	0.021	37.1
	ANAYADI	4+000	LHS	3	40.3	0.114	0.073	0.062	0.042	0.036	0.027	0.021	37.1
22	ANAYADI	4+200	LHS	1	43.1	0.135	0.094	0.072	0.044	0.038	0.024	0.018	37.1
	ANAYADI	4+200	LHS	2	43.5	0.135	0.094	0.07	0.046	0.036	0.025	0.019	37.1
	ANAYADI	4+200	LHS	3	43.1	0.133	0.091	0.067	0.043	0.035	0.025	0.019	37.1
23	ANAYADI	4+400	LHS	1	43.3	0.123	0.091	0.068	0.045	0.032	0.025	0.017	37.1
	ANAYADI	4+400	LHS	2	43.2	0.121	0.084	0.067	0.044	0.031	0.023	0.017	37.1
	ANAYADI	4+400	LHS	3	43.9	0.124	0.09	0.069	0.047	0.033	0.024	0.017	37.1
24	ANAYADI	4+600	LHS	1	43.3	0.077	0.048	0.038	0.019	0.012	0.008	0.006	37.1
	ANAYADI	4+600	LHS	2	43.7	0.078	0.051	0.037	0.02	0.012	0.008	0.006	37.1
	ANAYADI	4+600	LHS	3	43.3	0.077	0.049	0.036	0.02	0.013	0.008	0.006	37.1
25	ANAYADI	4+800	LHS	1	40.9	0.097	0.065	0.052	0.04	0.034	0.026	0.02	37.1
	ANAYADI	4+800	LHS	2	39.5	0.095	0.064	0.05	0.038	0.031	0.024	0.019	37.1

Sl No.	Place	Chainage	Side	Drop	Load (kN)	Geophone 1 (mm)	Geophone 2 (mm)	Geophone 3 (mm)	Geophone 4 (mm)	Geophone 5 (mm)	Geophone 6 (mm)	Geophone 7 (mm)	Pavement Temp. (°C)
	ANAYADI	4+800	LHS	3	43.2	0.108	0.067	0.055	0.042	0.034	0.026	0.021	37.1
26	ANAYADI	5+000	LHS	1	40.6	0.113	0.082	0.07	0.053	0.044	0.036	0.026	37.1
	ANAYADI	5+000	LHS	2	39.9	0.112	0.08	0.07	0.054	0.042	0.037	0.025	37.1
	ANAYADI	5+000	LHS	3	42	0.119	0.085	0.073	0.055	0.045	0.039	0.027	37.1
27	ANAYADI	5+200	LHS	1	41.7	0.099	0.067	0.053	0.041	0.032	0.023	0.019	37.1
	ANAYADI	5+200	LHS	2	43	0.102	0.068	0.054	0.041	0.032	0.023	0.02	37.1
	ANAYADI	5+200	LHS	3	39.3	0.1	0.06	0.051	0.038	0.031	0.022	0.017	37.1
28	ANAYADI	5+400	LHS	1	39.9	0.107	0.089	0.079	0.057	0.047	0.038	0.031	37.1
	ANAYADI	5+400	LHS	2	40.5	0.109	0.09	0.076	0.057	0.046	0.04	0.032	37.1
	ANAYADI	5+400	LHS	3	39.9	0.106	0.092	0.079	0.058	0.048	0.037	0.032	37.1
29	ANAYADI	5+600	LHS	1	43.8	0.064	0.043	0.029	0.018	0.011	0.006	0.003	37.1
	ANAYADI	5+600	LHS	2	43.3	0.062	0.042	0.029	0.018	0.011	0.006	0.003	37.1
	ANAYADI	5+600	LHS	3	43.5	0.06	0.041	0.029	0.019	0.011	0.006	0.003	37.1
30	ANAYADI	5+800	LHS	1	40	0.08	0.05	0.044	0.033	0.028	0.022	0.018	37.1
	ANAYADI	5+800	LHS	2	43.6	0.083	0.053	0.047	0.036	0.031	0.024	0.019	37.1
	ANAYADI	5+800	LHS	3	43.3	0.088	0.056	0.05	0.035	0.028	0.025	0.019	37.1
31	ANAYADI	5+900	RHS	1	43.6	0.322	0.13	0.067	0.04	0.028	0.014	0.012	37.1
	ANAYADI	5+900	RHS	2	43.1	0.338	0.13	0.067	0.04	0.027	0.014	0.012	37.1
	ANAYADI	5+900	RHS	3	40	0.304	0.116	0.059	0.036	0.027	0.014	0.011	37.1
32	ANAYADI	5+700	RHS	1	43.8	0.347	0.145	0.067	0.039	0.028	0.022	0.017	37.1
	ANAYADI	5+700	RHS	2	41	0.308	0.136	0.064	0.037	0.026	0.021	0.016	37.1
	ANAYADI	5+700	RHS	3	42.8	0.315	0.135	0.064	0.037	0.027	0.023	0.016	37.1
33	ANAYADI	5+500	RHS	1	42.8	0.192	0.134	0.099	0.066	0.051	0.038	0.028	37.1
	ANAYADI	5+500	RHS	2	42.7	0.185	0.132	0.099	0.065	0.05	0.039	0.029	37.1
	ANAYADI	5+500	RHS	3	42.1	0.189	0.13	0.093	0.063	0.047	0.036	0.026	37.1

Sl No.	Place	Chainage	Side	Drop	Load (kN)	Geophone 1 (mm)	Geophone 2 (mm)	Geophone 3 (mm)	Geophone 4 (mm)	Geophone 5 (mm)	Geophone 6 (mm)	Geophone 7 (mm)	Pavement Temp. (°C)
34	ANAYADI	5+300	RHS	1	43.4	0.12	0.099	0.08	0.062	0.017	0.008	0.004	37.6
	ANAYADI	5+300	RHS	2	43.7	0.123	0.093	0.084	0.067	0.016	0.008	0.004	37.6
	ANAYADI	5+300	RHS	3	42	0.119	0.096	0.077	0.061	0.016	0.008	0.004	37.6
35	ANAYADI	5+100	RHS	1	43.3	0.122	0.078	0.071	0.052	0.043	0.034	0.028	37.6
	ANAYADI	5+100	RHS	2	41.3	0.117	0.076	0.068	0.049	0.043	0.034	0.025	37.6
	ANAYADI	5+100	RHS	3	41.4	0.117	0.077	0.067	0.051	0.042	0.032	0.026	37.6
36	ANAYADI	4+900	RHS	1	42.8	0.165	0.126	0.104	0.083	0.068	0.052	0.042	37.6
	ANAYADI	4+900	RHS	2	43.6	0.174	0.126	0.107	0.084	0.07	0.057	0.042	37.6
	ANAYADI	4+900	RHS	3	41.5	0.163	0.125	0.101	0.081	0.066	0.054	0.04	37.6
37	ANAYADI	4+700	RHS	1	42.1	0.069	0.052	0.041	0.032	0.025	0.021	0.015	37.6
	ANAYADI	4+700	RHS	2	42.4	0.07	0.052	0.041	0.032	0.026	0.02	0.016	37.6
	ANAYADI	4+700	RHS	3	43.8	0.073	0.052	0.044	0.033	0.027	0.021	0.016	37.6
38	ANAYADI	4+500	RHS	1	37	0.095	0.07	0.06	0.046	0.037	0.029	0.022	37.6
	ANAYADI	4+500	RHS	2	39.7	0.105	0.078	0.064	0.05	0.04	0.031	0.022	37.6
	ANAYADI	4+500	RHS	3	37	0.097	0.07	0.058	0.044	0.036	0.028	0.02	37.6
39	ANAYADI	4+300	RHS	1	43.8	0.125	0.086	0.064	0.043	0.031	0.025	0.015	37.6
	ANAYADI	4+300	RHS	2	42.8	0.123	0.081	0.059	0.04	0.029	0.023	0.015	37.6
	ANAYADI	4+300	RHS	3	42.5	0.127	0.076	0.057	0.042	0.029	0.023	0.015	37.6
40	ANAYADI	4+100	RHS	1	43.5	0.126	0.085	0.066	0.046	0.023	0.012	0.006	37.6
	ANAYADI	4+100	RHS	2	43.2	0.13	0.085	0.063	0.047	0.023	0.012	0.006	37.6
	ANAYADI	4+100	RHS	3	42.4	0.128	0.083	0.066	0.048	0.024	0.012	0.006	37.6
41	ANAYADI	3+900	RHS	1	42.2	0.114	0.084	0.07	0.051	0.014	0.007	0.004	37.6
	ANAYADI	3+900	RHS	2	43.2	0.118	0.084	0.071	0.054	0.015	0.007	0.004	37.6
	ANAYADI	3+900	RHS	3	43.9	0.111	0.08	0.068	0.05	0.016	0.008	0.004	37.6
42	ANAYADI	3+700	RHS	1	43.4	0.118	0.082	0.063	0.045	0.034	0.024	0.018	37.6

Sl No.	Place	Chainage	Side	Drop	Load (kN)	Geophone 1 (mm)	Geophone 2 (mm)	Geophone 3 (mm)	Geophone 4 (mm)	Geophone 5 (mm)	Geophone 6 (mm)	Geophone 7 (mm)	Pavement Temp. (°C)
	ANAYADI	3+700	RHS	2	42.1	0.116	0.077	0.059	0.042	0.033	0.024	0.016	37.6
	ANAYADI	3+700	RHS	3	43.9	0.116	0.079	0.065	0.043	0.033	0.023	0.017	37.6
43	ANAYADI	3+500	RHS	1	38.3	0.115	0.085	0.062	0.042	0.029	0.021	0.014	37.6
	ANAYADI	3+500	RHS	2	37	0.114	0.081	0.059	0.039	0.028	0.021	0.013	37.6
	ANAYADI	3+500	RHS	3	38.3	0.121	0.084	0.061	0.043	0.03	0.022	0.014	37.6
44	ANAYADI	3+300	RHS	1	43.5	0.091	0.069	0.052	0.038	0.031	0.024	0.018	37.6
	ANAYADI	3+300	RHS	2	42.4	0.093	0.063	0.051	0.037	0.028	0.022	0.017	37.6
	ANAYADI	3+300	RHS	3	43.7	0.094	0.068	0.051	0.038	0.029	0.024	0.018	37.6
45	ANAYADI	3+100	RHS	1	42.3	0.155	0.112	0.093	0.068	0.054	0.044	0.032	37.6
	ANAYADI	3+100	RHS	2	41.3	0.15	0.112	0.09	0.066	0.053	0.041	0.029	37.6
	ANAYADI	3+100	RHS	3	42.9	0.159	0.117	0.09	0.07	0.058	0.042	0.031	37.6
46	ANAYADI	2+900	RHS	1	43.6	0.15	0.116	0.092	0.07	0.055	0.045	0.035	37.6
	ANAYADI	2+900	RHS	2	42.2	0.145	0.104	0.092	0.069	0.057	0.046	0.037	37.6
	ANAYADI	2+900	RHS	3	42	0.144	0.11	0.092	0.068	0.056	0.044	0.034	37.6
47	ANAYADI	2+700	RHS	1	42.9	0.176	0.116	0.088	0.065	0.049	0.033	0.027	37.6
	ANAYADI	2+700	RHS	2	43.9	0.166	0.12	0.093	0.064	0.048	0.033	0.026	37.6
	ANAYADI	2+700	RHS	3	43	0.165	0.118	0.094	0.062	0.048	0.033	0.027	37.6
48	ANAYADI	2+500	RHS	1	43	0.103	0.067	0.057	0.039	0.03	0.023	0.014	37.6
	ANAYADI	2+500	RHS	2	43.9	0.103	0.07	0.057	0.041	0.033	0.023	0.014	37.6
	ANAYADI	2+500	RHS	3	42.8	0.103	0.07	0.057	0.041	0.031	0.023	0.014	37.6
49	ANAYADI	2+300	RHS	1	42	0.165	0.111	0.079	0.053	0.044	0.026	0.02	37.6
	ANAYADI	2+300	RHS	2	43.5	0.168	0.118	0.09	0.057	0.046	0.03	0.019	37.6
	ANAYADI	2+300	RHS	3	44	0.17	0.117	0.09	0.059	0.047	0.028	0.021	37.6
50	ANAYADI	2+100	RHS	1	41.7	0.099	0.066	0.051	0.033	0.025	0.018	0.012	38
	ANAYADI	2+100	RHS	2	41.9	0.097	0.065	0.05	0.032	0.024	0.018	0.013	38

Sl No.	Place	Chainage	Side	Drop	Load (kN)	Geophone 1 (mm)	Geophone 2 (mm)	Geophone 3 (mm)	Geophone 4 (mm)	Geophone 5 (mm)	Geophone 6 (mm)	Geophone 7 (mm)	Pavement Temp. (°C)
	ANAYADI	2+100	RHS	3	43.3	0.106	0.071	0.051	0.034	0.026	0.018	0.012	38
51	ANAYADI	1+900	RHS	1	43.2	0.136	0.087	0.068	0.041	0.031	0.018	0.013	38
	ANAYADI	1+900	RHS	2	42	0.124	0.086	0.061	0.038	0.029	0.018	0.013	38
	ANAYADI	1+900	RHS	3	42.9	0.125	0.087	0.064	0.039	0.03	0.019	0.014	38
52	ANAYADI	1+700	RHS	1	42.4	0.086	0.058	0.048	0.033	0.027	0.021	0.012	38
	ANAYADI	1+700	RHS	2	43.7	0.091	0.06	0.05	0.035	0.027	0.021	0.012	38
	ANAYADI	1+700	RHS	3	42.2	0.089	0.06	0.049	0.035	0.028	0.021	0.012	38
53	ANAYADI	1+500	RHS	1	42.5	0.148	0.105	0.078	0.052	0.039	0.032	0.022	38
	ANAYADI	1+500	RHS	2	43.4	0.151	0.105	0.079	0.054	0.042	0.031	0.022	38
	ANAYADI	1+500	RHS	3	42.4	0.146	0.1	0.078	0.053	0.04	0.03	0.022	38
54	ANAYADI	1+300	RHS	1	41.5	0.071	0.044	0.034	0.023	0.018	0.014	0.013	38
	ANAYADI	1+300	RHS	2	40.2	0.074	0.044	0.034	0.021	0.019	0.013	0.012	38
	ANAYADI	1+300	RHS	3	41.5	0.071	0.045	0.035	0.021	0.018	0.015	0.013	38
55	ANAYADI	1+100	RHS	1	43.2	0.124	0.085	0.08	0.06	0.012	0.006	0.003	38
	ANAYADI	1+100	RHS	2	42.9	0.119	0.087	0.073	0.057	0.012	0.006	0.003	38
	ANAYADI	1+100	RHS	3	43.6	0.127	0.088	0.076	0.059	0.012	0.006	0.003	38
56	ANAYADI	0+900	RHS	1	42.6	0.108	0.074	0.055	0.039	0.031	0.025	0.017	38
	ANAYADI	0+900	RHS	2	43.6	0.109	0.074	0.057	0.04	0.032	0.026	0.018	38
	ANAYADI	0+900	RHS	3	43.3	0.114	0.076	0.061	0.039	0.031	0.025	0.017	38
57	ANAYADI	0+700	RHS	1	42.3	0.152	0.118	0.086	0.057	0.032	0.02	0.015	38
	ANAYADI	0+700	RHS	2	41.4	0.156	0.107	0.08	0.058	0.032	0.02	0.015	38
	ANAYADI	0+700	RHS	3	42.8	0.157	0.114	0.089	0.059	0.033	0.02	0.015	38
58	ANAYADI	0+500	RHS	1	42.8	0.11	0.08	0.065	0.045	0.034	0.023	0.014	38
	ANAYADI	0+500	RHS	2	42.7	0.111	0.084	0.064	0.046	0.033	0.024	0.014	38
	ANAYADI	0+500	RHS	3	43.8	0.113	0.084	0.065	0.046	0.035	0.024	0.014	38

Sl No.	Place	Chainage	Side	Drop	Load (kN)	Geophone 1 (mm)	Geophone 2 (mm)	Geophone 3 (mm)	Geophone 4 (mm)	Geophone 5 (mm)	Geophone 6 (mm)	Geophone 7 (mm)	Pavement Temp. (°C)
59	ANAYADI	0+300	RHS	1	42.2	0.111	0.076	0.068	0.055	0.015	0.008	0.004	38
	ANAYADI	0+300	RHS	2	42.2	0.112	0.076	0.066	0.05	0.016	0.008	0.004	38
	ANAYADI	0+300	RHS	3	42.7	0.113	0.077	0.07	0.051	0.015	0.008	0.004	38
60	ANAYADI	0+100	RHS	1	43.2	0.21	0.124	0.098	0.076	0.017	0.009	0.004	38
	ANAYADI	0+100	RHS	2	43.4	0.205	0.118	0.095	0.07	0.018	0.009	0.005	38
	ANAYADI	0+100	RHS	3	42.1	0.205	0.124	0.095	0.07	0.017	0.008	0.004	38

Appendix-II-FWD Results

Sl No.	Chainage	LHS/RHS	Corrected Deflection							Back Calculated Moduli (MPa)			Corrected Moduli (MPa)			15%		
			Geophone1 (mm)	Geophone 2 (mm)	Geophone 3 (mm)	Geophone 4 (mm)	Geophone 5 (mm)	Geophone 6 (mm)	Geophone 7 (mm)	BT	Granular	Subgrade	BT	Granular	Subgrade	BT	Granular	Subgrade
1	0+000	LHS	0.074	0.056	0.05	0.03	0.019	0.01	0.008	824.8	3724.3	609.7	882.1	3724.3	434.9			
2	0+100	RHS	0.192	0.114	0.089	0.067	0.016	0.008	0.004	890.8	2000	930.5	1020.7	2000	613			
3	0+200	LHS	0.116	0.1	0.085	0.067	0.057	0.046	0.035	1585.8	8322.6	181	1695.9	8322.6	153.3			
4	0+300	RHS	0.106	0.072	0.064	0.049	0.015	0.007	0.004	956.7	2000	1003	1096.2	2000	651.1			
5	0+400	LHS	0.116	0.083	0.065	0.046	0.035	0.025	0.016	763.2	3375.4	312.6	816.2	3375.4	248.5			
6	0+500	RHS	0.104	0.077	0.06	0.042	0.032	0.022	0.013	1018.3	3471.2	360.5	1166.8	3471.2	280.7			
7	0+600	LHS	0.084	0.062	0.051	0.035	0.026	0.019	0.013	844.6	4908.1	404.2	903.2	4908.1	309.2			
8	0+700	RHS	0.147	0.107	0.08	0.055	0.031	0.019	0.014	813.8	2000	330.7	932.4	2000	260.8			
9	0+800	LHS	0.092	0.07	0.055	0.041	0.032	0.023	0.018	765.4	5571.8	331.1	818.5	5571.8	261.1			
10	0+900	RHS	0.102	0.069	0.053	0.037	0.029	0.023	0.016	1192.1	4182.8	350.8	1365.9	4182.8	274.3			
11	1+000	LHS	0.097	0.068	0.062	0.047	0.04	0.032	0.026	2775.7	8965.8	257.4	2968.4	8965.8	210	853.04	2006.8	192.13
12	1+100	RHS	0.114	0.08	0.07	0.054	0.011	0.006	0.003	899.6	2000	1341.6	1030.8	2000	821.5			
13	1+200	LHS	0.081	0.059	0.046	0.032	0.025	0.019	0.013	750	5660.8	416.2	802.1	5660.8	316.9			
14	1+300	RHS	0.07	0.043	0.034	0.021	0.018	0.014	0.012	1009.5	6002.9	556.4	1156.7	6002.9	403.4			
15	1+400	LHS	0.084	0.062	0.051	0.037	0.03	0.022	0.016	1832.1	6276.6	360.9	1959.3	6276.6	281			
16	1+500	RHS	0.139	0.097	0.074	0.05	0.038	0.029	0.021	921.6	2711.6	267.6	1056	2711.6	217.3			
17	1+600	LHS	0.132	0.093	0.069	0.045	0.031	0.027	0.019	851.2	2622.7	293.1	910.3	2622.7	235.1			
18	1+700	RHS	0.083	0.055	0.046	0.032	0.026	0.02	0.011	884.2	4942.3	442.1	1013.1	4942.3	333.3			
19	1+800	LHS	0.081	0.066	0.055	0.043	0.038	0.031	0.024	2949.4	8952.1	279.7	3154.2	8952.1	225.8			
20	1+900	RHS	0.12	0.081	0.06	0.037	0.028	0.017	0.013	756.6	2260	388.3	866.9	2260	298.9			
21	2+000	LHS	0.082	0.061	0.052	0.039	0.033	0.024	0.02	945.7	8979.5	323.9	1029.9	8979.5	256.2			
22	2+100	RHS	0.095	0.064	0.048	0.031	0.024	0.017	0.012	934.8	3491.7	435.3	1071.1	3491.7	329			

Sl No.	Chainage	LHS/RHS	Corrected Deflection							Back Calculated Moduli (MPa)			Corrected Moduli (MPa)			15%		
			Geophone1 (mm)	Geophone 2 (mm)	Geophone 3 (mm)	Geophone 4 (mm)	Geophone 5 (mm)	Geophone 6 (mm)	Geophone 7 (mm)	BT	Granular	Subgrade	BT	Granular	Subgrade	BT	Granular	Subgrade
23	2+200	LHS	0.125	0.084	0.066	0.045	0.034	0.025	0.019	800.6	3197.5	302.7	871.9	3197.5	241.8			
24	2+300	RHS	0.155	0.107	0.08	0.052	0.042	0.026	0.019	796.2	2020.5	270	895.5	2020.5	219			
25	2+400	LHS	0.179	0.127	0.093	0.06	0.042	0.031	0.023	802.8	2000	230.4	874.3	2000	190.5			
26	2+500	RHS	0.096	0.064	0.053	0.037	0.029	0.021	0.013	1049.1	4319.6	380.6	1179.9	4319.6	293.9			
27	2+600	LHS	0.11	0.069	0.056	0.039	0.031	0.024	0.017	1260.3	3991.2	333.3	1372.6	3991.2	262.6			
28	2+700	RHS	0.157	0.109	0.085	0.059	0.045	0.031	0.024	758.8	2390	231.5	853.4	2390	191.3			
29	2+800	LHS	0.133	0.088	0.069	0.048	0.035	0.025	0.02	761	2814.3	285.4	828.8	2814.3	229.8			
30	2+900	RHS	0.137	0.103	0.086	0.065	0.052	0.042	0.033	783	5387.1	193.8	880.6	5387.1	163.2			
31	3+000	LHS	0.123	0.096	0.08	0.06	0.05	0.039	0.029	884.2	5955	209.5	963	5955	175			
32	3+100	RHS	0.147	0.108	0.087	0.064	0.052	0.04	0.029	1493.4	3751.7	201.7	1679.6	3751.7	169.2			
33	3+200	LHS	0.151	0.106	0.083	0.056	0.044	0.032	0.022	798.4	2520	240	869.5	2520	197.5			
34	3+300	RHS	0.086	0.062	0.047	0.035	0.027	0.022	0.016	2685.5	5797.7	371.4	3020.4	5797.7	287.9			
35	3+400	LHS	0.141	0.096	0.079	0.054	0.045	0.033	0.026	875.4	3635.4	232.8	962.1	3635.4	192.3			
36	3+500	RHS	0.123	0.088	0.064	0.044	0.03	0.023	0.015	776.4	2342.1	334.6	873.2	2342.1	263.4			
37	3+600	LHS	0.109	0.077	0.06	0.041	0.028	0.019	0.013	778.6	2821.1	380.4	855.7	2821.1	293.8			
38	3+700	RHS	0.108	0.074	0.058	0.04	0.031	0.022	0.016	978.7	3601.2	340.2	1100.7	3601.2	267.2			
39	3+800	LHS	0.116	0.081	0.063	0.046	0.034	0.028	0.02	1317.4	3950.1	290	1447.9	3950.1	233			
40	3+900	RHS	0.106	0.077	0.065	0.048	0.014	0.007	0.003	884.2	2006.8	1092.8	994.5	2006.8	697.5			
41	4+000	LHS	0.111	0.075	0.06	0.042	0.035	0.027	0.021	2766.9	4394.9	294.7	3041.1	4394.9	236.2			
42	4+100	RHS	0.119	0.078	0.061	0.044	0.022	0.011	0.006	805	2000	667.7	905.4	2000	468.4			
43	4+200	LHS	0.125	0.086	0.064	0.041	0.034	0.023	0.017	840.2	2759.5	316.1	923.5	2759.5	250.9			
44	4+300	RHS	0.116	0.075	0.056	0.039	0.028	0.022	0.014	763.2	2780.1	363.2	858.4	2780.1	282.5			
45	4+400	LHS	0.113	0.081	0.062	0.042	0.03	0.022	0.016	774.2	3101.7	334.9	850.9	3101.7	263.6			

Sl No.	Chainage	LHS /RHS	Corrected Deflection							Back Calculated Moduli (MPa)			Corrected Moduli (MPa)			15%		
			Geophone1 (mm)	Geophone 2 (mm)	Geophone 3 (mm)	Geophone 4 (mm)	Geophone 5 (mm)	Geophone 6 (mm)	Geophone 7 (mm)	BT	Granular	Subgrade	BT	Granular	Subgrade	BT	Granular	Subgrade
46	4+500	RHS	0.105	0.077	0.064	0.049	0.039	0.031	0.023	838	6372.4	265.7	942.5	6372.4	215.9			
47	4+600	LHS	0.071	0.045	0.034	0.018	0.011	0.007	0.006	1383.4	2923.8	841.5	1520.5	2923.8	565.2			
48	4+700	RHS	0.066	0.048	0.039	0.03	0.024	0.019	0.014	2918.6	8924.7	429.6	3282.5	8924.7	325.4			
49	4+800	LHS	0.097	0.064	0.051	0.039	0.032	0.024	0.019	750	6406.6	327.8	824.3	6406.6	258.9			
50	4+900	RHS	0.157	0.118	0.098	0.077	0.064	0.051	0.039	2997.8	4340.2	162.7	3371.6	4340.2	139			
51	5+000	LHS	0.112	0.08	0.069	0.053	0.043	0.036	0.026	763.2	7043	237.6	838.8	7043	195.8			
52	5+100	RHS	0.113	0.074	0.065	0.048	0.041	0.032	0.025	754.4	6789.8	258.3	848.5	6789.8	210.7			
53	5+200	LHS	0.097	0.063	0.051	0.039	0.03	0.022	0.018	756.6	5612.9	342.8	831.6	5612.9	268.9			
54	5+300	RHS	0.112	0.089	0.075	0.059	0.015	0.007	0.004	904	2006.8	1014.9	1016.7	2006.8	657.3			
55	5+400	LHS	0.107	0.09	0.078	0.057	0.047	0.038	0.031	1581.4	7912	211.2	1738.1	7912	176.3			
56	5+500	RHS	0.177	0.124	0.091	0.061	0.046	0.036	0.026	787.4	2041.1	214.9	865.4	2041.1	179.1			
57	5+600	LHS	0.057	0.039	0.027	0.017	0.01	0.005	0.003	2208.2	3416.4	1353.4	2427	3416.4	827.3			
58	5+700	RHS	0.304	0.131	0.061	0.035	0.025	0.021	0.015	813.8	2006.8	337.5	894.4	2006.8	265.4			
59	5+800	LHS	0.079	0.05	0.044	0.033	0.027	0.022	0.018	868.8	9000	378	954.9	9000	292.2			
60	5+900	RHS	0.304	0.119	0.061	0.037	0.026	0.013	0.011	908.4	2000	430.8	998.4	2000	326.2			