DESIGN AND EVALUATION OF VARIOUS COMPONENTS OF HIGHWAY PROJECTS

Dissertation Submitted in Fulfilment of the Requirement for the Award of the Degree of

Masters of Engineering

in

Infrastructure Engineering

SUBMITTED BY

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UNDER SUPERVISION OF

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JULY, 2023

DECLARATION

I, Gurjot Singh hereby declare that the work presented in this thesis entitled "Design and Evaluation of Various Components of Highway Projects", in fulfilment of the requirement for the award of the degree of Masters of Engineering (Infrastructure Engineering) submitted at Department of Civil Engineering, Thapar Institute of Engineering and Technology (Deemed to be a University), Patiala is an authentic record of work carried out under super vision of Dr Tanuj Chopra (Assistant Professor), Department of Civil Engineering, TIET, and Mr Tanuj (Senior Highway Design Engineer), G Eng Advisory Services Pvt Ltd , from July, 2022 to July, 2023. The matter presented in this has not been submitted either in part or in full to any other university or institute for the award of any other degree.

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This is to certify that the above declaration made by the student concerned is correct according to the best of my knowledge and belief.

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TO WHOM IT MAY CONCERN

This is to certify that **Mr. Gurjot Singh, Roll No. 802123003** a student of **M.E Infrastructural Engineering** from "**Thapar Institute of Engineering & Technology**" has successfully completed his one year industrial training in our organization "**G-Eng Advisory Services Pvt. Ltd.**" from **18th Jul, 2022 to 04th Jul, 2023.**

During this period, he has keenly observed the techniques of our engineers through frequent on-site visits of Material Testing and works on Geometric Design of Highways, Pavement Design (Structural Evaluation of Pavement by FWD, Functional Evaluation of Pavement by NSV), Structural Design of culverts and minor bridges as well under the guidance of our engineer **Mr. Tanuj.**

During the course of training, his code of conduct is appreciable. We wish him all the best for his future endeavors.

For G-Eng Advisory Services Private Limited

Nisha Yadav.

HR Manager

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Lastly, I would like to express my sincere appreciation to my parents for encouraging and supporting me throughout the study.

ABSTRACT

The design, evaluation, and maintenance of highways are critical aspects of transportation infrastructure management to ensure safe and efficient mobility. This thesis presents an integrated approach that leverages state-of-the-art technologies and methodologies for comprehensive highway design and evaluation. The four main components of this research include highway design using Civil 3D, structural evaluation employing the Falling Weight Deflectometer (FWD), functional evaluation using the Network Survey Vehicle (NSV), and Pavement Design.

The objective of this study focuses on highway design using Civil 3D, an advanced computer-aided design (CAD) software, to create precise 3D models of the proposed highway alignments, cross-sections, and geometric configurations. The structural evaluation is conducted using the Falling Weight Deflectometer (FWD) to assess pavement stiffness, load-bearing capacity, and deflection characteristics. Subsequently, the functional evaluation of the highway network is performed using the Network Survey Vehicle (NSV). Equipped with advanced sensors and data collection systems, the NSV captures valuable information on ride quality, surface roughness, and road user comfort. Lastly, the research focuses on pavement design, taking into account the data obtained from both the structural and functional evaluations. By integrating this data with pavement material properties, environmental factors, and traffic loads, the pavement design process is optimized to ensure the longevity, durability, and sustainability of the highway.

Ultimately, this research contributes to the advancement of modern highway engineering practices by offering a comprehensive and efficient approach to design, evaluation, and maintenance. By combining cutting-edge technologies, data-driven analysis, and advanced modelling, the proposed integrated framework enables engineers and transportation authorities to make informed decisions that result in safer, more sustainable, and high-performing highways for the benefit of society.

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CHAPTER - 1

INTRODUCTION

Geometric design and pavement design are critical aspects of the civil engineering field, responsible for shaping the infrastructure that supports our transportation systems. With the advancement of technology, software tools like civil 3D have revolutionized the way engineers approach these design processes, allowing for more precise and efficient results. Additionally, evaluating the performance and durability of pavements is essential to ensure their longevity and safety. This introduction provides an overview of the importance and applications of geometric design using Civil 3D, as well as the techniques involved in pavement design and evaluation.

Geometric design is the process of creating the physical layout of roads, highways, and intersections, considering factors such as traffic flow, safety, and aesthetics. It involves determining the alignment, horizontal and vertical curves, cross-sectional profiles, and other geometric elements that dictate the shape and dimensions of the roadway. Civil 3D, a powerful computer-aided design (CAD) software developed by Autodesk, has become a standard tool for geometric design in the civil engineering industry. It allows engineers to create and analyse 3D models of road networks, integrating data from various sources, such as surveying measurements and geographic information systems (GIS), to facilitate accurate design representations. Civil 3D provides functionalities for generating alignments, profiles, and cross-sections, as well as conducting analysis on sight distances, turning radii, and grading. By leveraging this software, engineers can optimize road geometries, enhance safety, minimize environmental impacts, and improve the overall efficiency of transportation systems.

Pavement design, on the other hand, focuses on determining the appropriate materials and thicknesses for constructing durable and resilient road surfaces. The design process takes into account factors such as traffic loads, climate conditions, and the expected lifespan of the pavement. It aims to create a structure that can withstand the stresses imposed by vehicular traffic while providing a smooth and comfortable ride for road users. Pavement design considers various types of pavements, including flexible (asphalt) and rigid (concrete) pavements, each with its own design methodologies and considerations.

Once a pavement is constructed, continuous evaluation becomes crucial to monitor its performance and identify any signs of distress or deterioration. Pavement evaluation techniques involve assessing the condition of the pavement and making informed decisions regarding maintenance, repair, or rehabilitation strategies. Engineers employ various methods, such as visual inspections, non-destructive testing, and pavement performance modelling, to evaluate factors like cracking, rutting, roughness, and structural integrity. These evaluations help optimize maintenance activities, allocate resources effectively, and extend the lifespan of pavements, ensuring the safety and reliability of transportation infrastructure.

In conclusion, geometric design using civil 3D and pavement design and evaluation techniques are fundamental components of civil engineering, crucial for developing efficient and sustainable transportation networks. The integration of advanced software tools like Civil 3D has revolutionized

the design process, enabling engineers to create accurate and comprehensive geometric models. Simultaneously, pavement design and evaluation techniques play a vital role in ensuring the longevity and performance of road surfaces. By employing these methodologies, civil engineers can effectively plan, design, construct, and maintain transportation infrastructure, contributing to the safe and efficient movement of people and goods in our modern world.

1.1 Objectives carried out in these thesis project:

- Geometric Design of Highways Using Civil3D
- Structural Evaluation of Pavement Using Falling Weight Deflectometer (FWD)
- Functional Evaluation of Pavement Using Network Survey vehicle (NSV)
- Pavement Design Using IITPAVE

G-ENG ADVISORY SERVICES. PVT. LTD. is an emerging as a quickly growing civil engineering consultancy for survey work, feasibility studies, design engineering services, procurement & supply, technology & product development, and execution related to various infrastructure projects including transport (road, rail, bridges, ports, and tunnel), water & built environment, architectural services, urban development, industrial infrastructure, etc. In addition, they also have an in-house material testing laboratory. Company has been established in *August 2012* by the professionals of civil engineers. Company has highly qualified and experienced team with established track records. The company is well equipped with latest state of technology, Instruments and software of surveys and design. Company has been empanelled with Haryana Urban Development Authority (HUDA). The list of clients comprises are NHAI, HUDA, HSRDC, HSIIDC, PWD Haryana and Rajasthan (B&R), Municipal Corporation of Gurgaon, municipal corporation of Faridabad and several private sector firms like DLF & IREO and some well-known private builder too.

I have worked and learned the application of followings Codes that are necessary important for carrying out different tasks and objectives.

- ***IRC 038.1988*** *(Guidelines for Design of Horizontal Curves for Highway and Design Table)*
- ***IRC 073.1990*** *(Geometric Design standards for Rural (Non -Urban) Highways)*
- ***IRC 052.2019*** *(Guidelines for the Alignment Survey and Geometric Design of Hill Road)*
- ***IRC 023.1993*** *(Vertical curves for Highways)*
- ***IRC 048.1998*** *(Hill Road Manual)*
- ***IRC:81-1981****(Guidelines for Strengthening of flexible road pavements using Benkelman Beam Deflection Technique)*
- ***IRC:115-2014,*** *(Guidelines for Structural Evaluation and Strengthening of flexible road pavements using Falling Weight Deflectometer Technique)*
- ***IRC:117-2015,*** *(Guidelines for Structural Evaluation and Strengthening of for rigid pavement by Falling Weight Deflectometer (FWD) Technique)*
- ***IRC: SP 84-2014)*** *(Manual of Specifications & Standards for Four Laning of Highways Through Public Private Partnership)*
- ***IRC:82-2015*** *(Code of practice for maintenance of Bituminous Road Surface)*
- ***IRC: SP:16-2019****(Guidelines of Measuring Road Roughness and Norms)*
- ***IRC: 9-1972*** *(Traffic Census on Non- Urban Roads)*
- ***IRC: 102-1988***. (*The Traffic Studies for Planning Bypasses Around Towns)*
- ***IRC: 58-2015*** *(Guidelines for the Design of Plain Jointed Rigid Pavements for Highways)*
- ***IRC: SP:62-2014*** *(Guidelines for Design and Construction of cement Concrete Pavements for Low Volume Roads)*
- ***IRC: SP:73-2019*** *(Manual of Specifications and Standards for 2-Laning of Highways)*
- ***MORT&H*** *Specifications for Road and Bridge Works (Fifth Revision), 2013*
- ***IRC: SP:46-2013****(Guidelines for Design and Construction of Fibre Reinforced Concrete Pavement)*

In this Internship of one year at **G-ENG ADVISORY SERVICES.PVT. LTD.** I have learned and worked on following projects as shown in Table no 1:

TABLE NO. 1

S.NO	Name of Project	Type of Road Pavement
1	Design Geometric design of Inner Road of IIM JAMMU using Civil 3D	Rigid Pavement
2	Operation and Maintenance period for the work of 4 laning from Km. 360+915 to Km. 440+000 of Gorakhpur-Kotwa section of NH-28 in the state of Bihar. (Package-9)	Flexible Pavement
3	Structural Evaluation of 2/4lane Road from Km. 0+00 to 26+300 Km. of Suchetgarh-Gharana-Tawi Bridge Jammu	Flexible Pavement
4	UP-Gradation to 4 lane Configuration & Strengthening of Rohna/Hassangarh to Jhajjar Section from Km. 44.800 to Km. 80.250 of NH-334B in the State of Haryana on HAM Basis (Package-2)	Rigid Pavement
5	Carried out condition surveys for Upgradation of Kullu-Manali section of NH-21 (now NH-3) from Km. 272.00 to Km. 309.345 (designed chainage) on EPC Mode in the State of Himachal Pradesh under NHDP Phase-IVB.	Flexible Pavement
6	Carried out condition surveys for work of Strengthening of Road from Km.24.500 to Km 46.950 including improvement of service road in Sohna and Nuh City of NH-248A in the state of Haryana	Flexible Pavement
7	Carried out condition surveys for Four Laning of Rajauli - Bakhtiyarpur section of NH-31 (New NH-20) From Km 54+405 to Km 101+630 (Package II) on Hybrid Annuity Mode in the State of Bihar.	Flexible Pavement
8	Pavement Design of Internal Roads at Permanent campus of IIT Jammu	Rigid Pavement

CHAPTER - 2

LITERATURE REVIEW

Study on Dynamic Analysis of Falling Weight Deflectometer (FWD) has been conducted. FWD testing has been used to evaluate the structural condition of pavement to predict the layer modulus using back calculation process [3].

Study on the prediction of the remaining service life of road using pavement condition index has been conducted, which found that the pavement condition encounters early damage hence service period is shorter than the designed plan [4].

The main objective of this study is to analyse the FWD test results of flexible pavement in Western Australia to predict the pavement structural capacity. Collected data includes, in addition to FWD measurements, core data and pavement distress surveys. Results showed that the dynamic analysis of falling weight deflectometer test and prediction for the strength of character of flexible pavement layer moduli have been achieved, and algorithms for interpretation of the deflection basin have been improved. The variations of moduli of all layers along the length of sections for majority of the projects are accurate and consistent with measured and computed prediction. However, some of the projects had some inconsistent with modulus values along the length of the sections. Results are reasonable but consideration should be taken to fix varied pavement layers moduli sections.[3]

The aim of this research is to evaluate the functional and structural of the flexible pavement on south arterial road in Yogyakarta and to provide recommendation of maintenance and rehabilitation. The functional evaluation of pavement is based on DGH and PCI method, which combines International Roughness Index (IRI) and Pavement Condition Index (PCI) values, while structural pavement evaluation is performed by analysing the deflection value of Falling Weight Deflectometer (FWD) measurement analysed by AASHTO 1993, The structural analysis for 2018 shows all segments yield SCI value.[2].

Here, we study the possibility of measuring LTE using a moving load with the aim of achieving higher productivity. An experiment simulating Rolling Weight Deflectometer (RWD) measurements on a joint was carried out to gain understanding and confidence that can guide the analysis of real RWD data. Continuous data from measurements across a joint allows for determination of not only the LTE but also additional parameters characterizing the pavement and the joint. A semi-analytical model was implemented for simulating the pavement response next to a joint and used for interpretation and verification of the experimental data. The results show promise for the use of moving loads for rapid evaluation of joints.[5].

This study evaluated a management program of cavities under flexible pavement road network in Seoul Metropolitan City. Consequently, directions for improvement were suggested. The underground cavities beneath the pavement layer were scanned using a vehicle-type multichannel ground penetrating radar (GPR). In addition, the size information including overburden thickness, cavity height, and lengths in longitudinal and transverse directions of the cavities were estimated and compared with the volume of cavities measured via a digital cavity imaging (DCI) system. Thus, the crack width and depth were measured for the selected 14 locations and compared with the dimensions of the cavities. The results demonstrated that the depth of crack rather than the width exhibited a meaningful correlation with the cavity size. Additionally, the cavities under the flexible pavement layer were repaired using a low-strength filling repair material. Further, the elastic modulus on the pavement surface above a cavity was assessed using a light weight deflectometer (LWD) before and after the rehabilitation process and compared with the value of elastic modulus on the normal surface

with no cavity but near the repair work. The results demonstrated that although the rehabilitation process increased the elastic modulus of the pavement layer, it could not be fully recovered owing to the characteristics of the repair material. Furthermore, the rehabilitation process was found to be more effective as the size of cavity was small.[6].

In the present research work the pavement is evaluated using destructive and non-destructive methods. An attempt is made to evaluate the condition of a selected section of a pavement from Budalur to Pudupatti on State Highway 99. Based on the analysis of distress data, the pavement is rated by making use of IRC: 82 - 2015. Structural evaluation of pavement is carried out with Benkelman Beam to determine the capacity of the pavement to withstand future traffic loading.[7].

This paper deals with the prediction, comparison and analysis of the overlay to be provided over the existing pavement of the National highway in the state of Haryana, India using the salient features of KGPBACK, IITPAVE and HDM-4. In this study, deflection measurements were carried out on the pavement using the established FWD system on the three selected sections classified as H-1, H-2 and H-3 based upon the pavement condition. The deflection measurements were used for obtaining the elastic moduli of each layer through KGPBACK software. The elastic moduli of the H-3 was found out to be the highest whereas for section H-1, it was found out to be the lowest which tells the effect of the pavement condition on the elastic modulus. Prediction of the overlay was done with the help of IIT PAVE software and the overlay thickness was found to be varying depending upon the elastic modulus of the existing pavement. The accountability of the provided overlay thickness was ensured by the HDM-4 software as it depicted a clear decrease in the cracking, ravelling, rutting and roughness distress values. The improvement in conditions of all pavement sections on modelling the bituminous overlay maintenance strategy suggested that if such strategies are applied on the Indian roads, it would increase the lifetime of the Indian Highway Roads.[8].

Dar-Hao Chen *et al.* [9] they studied falling weight deflectometer (FWD) tests were conducted at three sites. The tests were conducted at regular intervals for 2 to 3 consecutive days per location and also done during different seasons in order that the widest possible range of temperatures could be obtained. The influence of cracks on temperature correction was also investigated. It was founded that only the W1 and W2 deflections are significantly affected by temperature. W3 through W7 deflections remained almost constant at various temperatures. The same trend was observed for all pavements using in this study. The temperature will not affect a pavement's FWD deflections on a cracked location as much as on an intact pavement. The correction factor–based slopes are flatter on the cracked locations. Since the temperature- dependent characteristics are different between intact and cracked locations, the equations developed from the intact locations may not be used on cracked locations. Comparison with other reported temperature-correction equations showed that there is a close agreement for deflections, but not for the module.

The experiment has been planned keeping in mind the configure ration of equipment’s housed in NSV, Relevant equipment’s related to this objective are a GPS receiver, antenna and a PC loaded with suitable user-friendly software for comprehensive analysis. NSV (Figure .1) is equipped with several sensors including a GPS receiver and a computer, The NSV system is based on the latest survey techniques utilising Laser, GPS and Video image processing tools etc. The NSV is supposed to be used for automatic collection for road condition related data for National Highways. The inventory data will include measurement of gradient (rise and fall (, horizontal curvature, pavement surface roughness, payment surface distress, and GPS coordinates (XYZ), such as longitude, latitude and altitude.[10]

CHAPTER 3

GEOMETRIC DESIGN OF PAVEMENT

3.1 INTRODUCTION

Objective of this research is to Design Geometric design of road of IIM JAMMU using Civil 3D. Start point of project is shown in Figure: 3.1 is taken from Google Earth.

Figure 3.1: Google earth image shows Start point of project

Geometric design of Highways is the part of civil engineering that deals with the visible features like providing horizontal curves, gradients, controlling speed, intersections, camber etc. For safe and efficient functioning of highway keeping in view of the aesthetics.

3.2 Factors affecting Geometric design:

a) Topography: Type of terrain i.e., Slope of the area greatly influences the aesthetics and geometrics of a road

b) Design speed: It is a very crucial parameter which varies at different type of road (expressways, national highways, state highway, district roads etc.). Transition length, radius of curve, superelevation and gradient all depends on design speed.

c) Environment: Rainfall and temperature influence design of pavement

3.2.1 Elements covered in geometric design are:

- Cross sectional elements: Width of formation, shoulder, kerb, right of way, camber, medians and toll plaza.
- Sight distance elements: Stopping sight distance, Overtaking sight distance, Intermediate sight distance.

Horizontal alignment:

Design of Horizontal curves which include Radius of curve, transition length, super elevation and extra widening of curves. The horizontal alignment must provide a safe, functional roadway facility that provides adequate sight distances within economical constraints. The alignment must adhere to specific design criteria such as minimum radii, super elevation rates, and sight distance. These criteria will maximize the overall safety of the facility and enhance the aesthetic appearance of the highway. The horizontal alignment of a roadway is defined in terms of straight-line tangents and horizontal curves. The curves allow for a smooth transition between the tangent sections. Circular curves and spirals are two types of horizontal curves utilized to meet the various design criteria.

Superelevation

Centrifugal force is the outward pull on a vehicle traversing a horizontal curve. When traveling at low speeds or on curves with large radii, the effects of centrifugal force are minor. However, when travelling at higher speeds or around curves with smaller radii, the effects of centrifugal force increase. Excessive centrifugal force may cause considerable lateral movement of the turning vehicle and it may become impossible to stay inside the driving lane.

Superelevation and side friction are the two factors that help stabilize a turning vehicle.
Superelevation is the banking of the roadway such that the outside edge of pavement is higher than the inside edge. The use of superelevation allows a vehicle to travel through a curve more safely and at a higher speed than would otherwise be possible. Side friction developed between the tires and the road surface also acts to counterbalance the outward pull on the vehicle. Side friction is reduced when water, ice, or snow is present or when tires become excessively worn.

The transitional rate of applying superelevation into and out of curves is influenced by several factors. These factors include design speed, curve radius, and number of travel lanes. Minimum curve radii for a horizontal alignment are determined by the design speed and superelevation rate. Higher design speeds require more superelevation than lower design speeds for a given radius. Additionally, sharper curves require more superelevation than flatter curves for a given design speed. Figure 3.2. Superelevation rotation

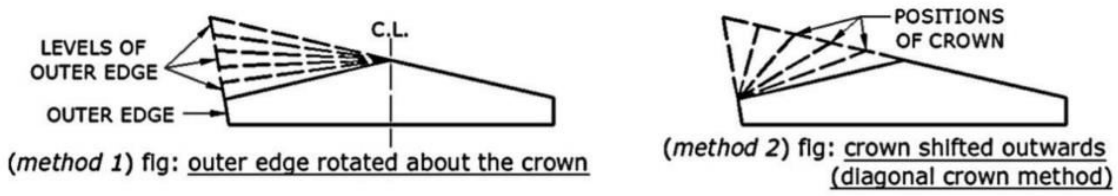


Figure 3.2. Superelevation rotation

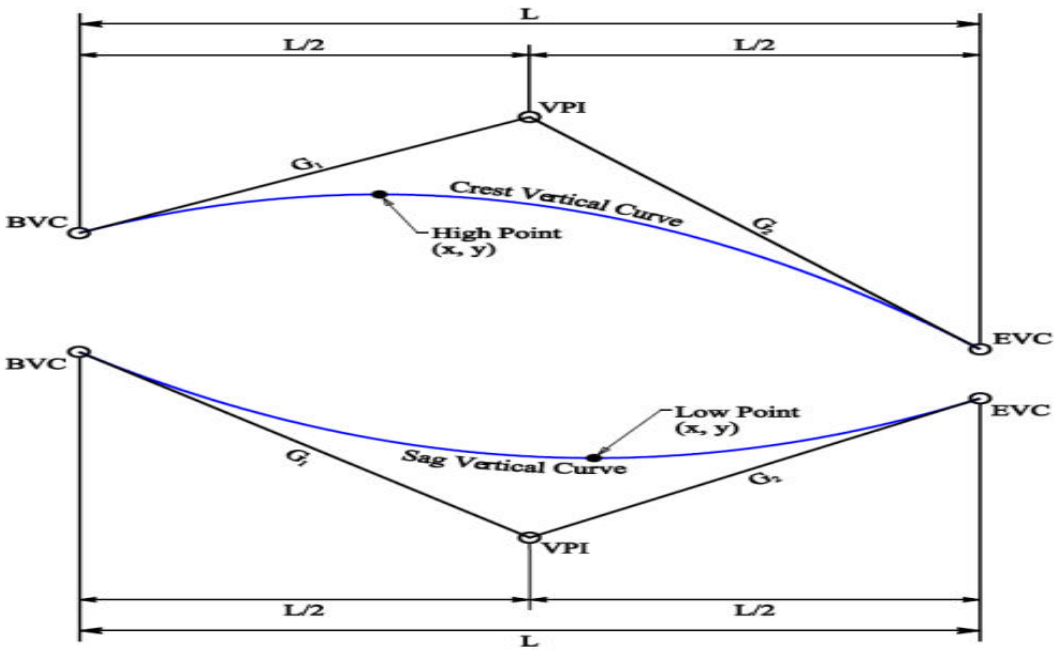
Source: WYOMING Department of Transportation

Vertical alignment:

A roadway's vertical alignment is influenced by design speed, topography, traffic volumes, highway functional categorization, sight distance, horizontal alignment, vertical clearances, drainage, economics, and aesthetics. The point of rotation is often when the vertical alignment (or profile) of the roadway is set. Because superelevation has no effect on this location, it is employed. In order to provide a seamless change in roadway grade, vertical curves are used. A parabolic curve, which offers a consistent rate of change in grade, is the foundation of a vertical curve. For greater driver visibility, a parabolic curve "flattens" the curve at the peak or bottom of a hill.

The vertical alignment of a road will depend on a number of things. The depths of cuts and fills can be minimised by matching the projected grade to the terrain. The demand for waste sites or borrow sources is reduced when the volume of cut material and fill material are balanced. Maximum grades shouldn't be exceeded by the vertical alignment, and it shouldn't obstruct any drainage systems that already exist. For the purpose of crossing, going under, or intersecting other highways or railroads, the vertical alignment will have to adhere to predetermined altitudes. And finally, the vertical curve ought to be long enough to provide for adequate visual distance.

For vertical curves, the crest and sag are the two main forms and images that are shown in Figure 3.3 is according to ***WYOMING Department of Transportation***



Source: WYOMING Department of Transportation

Figure 3.3. Crest and sag vertical curves

- **Intersection detail**: Intersection at grade or grade separated.

3.3 Important Terminologies:

There are certain important Terminologies that are used in Geometric design either horizontal or vertical are given in Table 3.1

Table 3.1 Important terms used in geometric design

S. NO	Term	Definition
1	Right of way	Total width of land acquired for the road used for future expansion
2	Width of formation	Carriageway and shoulders total width
3	Design speed	Safe speed for which road is designed
4	Sight distance	Actual distance on road available to driver to just see an object
5	SSD (stopping sight distance)	Absolute minimum sight distance available for the driver to stop the vehicle to prevent collision. This is equal to Lag distance + Breaking distance
6	OSD (overtaking Sight distance)	Minimum safe distance available for overtaking
7	ISD (Intermediate sight distance	Generally, roads are designed for ISD only ISD = 2 x SSD
8	Super-elevation	Transverse slope provided at horizontal curve to counter act the centrifugal force and provide smooth travel and prevents overturning
9	Transition length	The length of transition curve need for smooth and safe travel on a circular curve
10	Shift of curve	The rate at which transition occurs for widening
11	Gradients	The rate of rise/fall with respect to horizontal along the road
12	Deviation angle n	Angle which measures change of direction when two grades / curves meet

13	Compensated gradient	Gradient has to be eased off to take into account centrifugal force along with weight of vehicle which occurs when there is gradient in a curve. CG = RG - Grade compensation Grade compensation = Min 4%, Max =75/R
14	Ruling gradient	The maximum gradient for design depending on terrain.
15	Cogo point	In civil 3d every point imported has information about northing easting and elevation. The eastward-measured distance (or the x-coordinate) is referred to as easting, while the northward-measured distance is referred to as northing (or the y-coordinate).
16	Tangent length (Ts)	Length between apex and tangent point of the curve
17	Apex distance (Es)	Shortest distance from apex to curve
18	K value	The K-value is the horizontal distance required to achieve a 1% change in the slope of the vertical curve

3.4 Design Approach

Software used: CIVIL 3D

Topo survey: Firstly, for highway design engineering survey is done for alignment using total station or theodolite to propose highway from minimum obstruction and maximum land utilization After that Map study topographical and counter survey along with drainage survey and reconnaissance is done, then final location and detail survey in which finalized road centre line is proposed. We try to design new centreline that matches this existing survey centre line because Right of way is fixed and being a built-up area major deviation from existing centre line can cause problems in road design and widening, our purpose is to improve geometrics of the widened road.

Overall, the idea is to provide horizontal curves with transition and super elevation as well as gradients for vertical curves and create a Plan and Profile of the road that shows following details at every 10 m interval.

- Chainage
- Finished Road Level (FRL)

- Existing Ground (EGL)
- Super elevation (SE)
- Vertical Gradient
- Horizontal gradient

3.4.1 Project background

All roads shall be pavement quality cement concrete roads. The work shall be carried out using ***MORTH Specifications*** for Road and bridge work (Fifth Revision) / CPWD Specification. Rigid pavement as per site conditions and maintain entire road network for a period of 5 years. The edges of roads should be at least 20 cm above the adjoining ground level. The Machine moulded M-35 kerb stone shall be provided along the edge of internal road.

The alignment of Hill Road: The alignment of road has to be as per Master layout plan. However, this can be modified depending upon site conditions after the approval of Engineer-in-Charge. Trace cut of width 1 to1.2 meter width shall be made along the alignment of the hill Road at a ruling gradient of 1:25 on bends, hair pin joint ruling gradient has to be almost level.

The ruling design speed shall be 50 kmph and minimum design speed is 40 kmph on mountainous terrain. For steep terrain the ruling and specified design speed are 40kmph and 30 kmph respectively. 2% camber should be provided. The safe stopping sight distance (SSD) should invariably be made available all through the hill road stretches.

It is desirable that in as much length as possible, intermediate sight distances (2 times the stopping sight distance) should be made available. However, if it is not possible to provide over taking sight distances, values of SSD and ISD for different speeds as recommended by IRC should be adopted.

3.4.2 Horizontal curves:

Maximum super elevation should not exceed 10%. Horizontal curves should be provided with suitable transition curves at both ends. Reverse curve should have sufficient straight distance (minimum 9.0 m) between their transition ends. The ruling minimum radius should be kept 50 metre and absolute minimum should be 35 metres. The formation or road way width also should be increased at horizontal curves. In case of single lane extra widening should be between 0.6 to 0.9 meter and for other roads it should be 1.5 metre.

Transition curves: The minimum length required shall be as per ***IRC 052:2019 or IRC 038.1988*** depending upon speed and radius.

Set back distance: The minimum set back distance on inner side of horizontal curves should be as per ***IRC***. Hair Pin Bends:

Hair pin bends should be avoided. However, if it becomes necessary to provide hair pin bends following criteria be adopted:

a) Minimum design speed= **20 kmph**

b) Minimum radius of inner curve=**14 metre**

c) Minimum length of transition=**15 metre**

d) Super elevation in circular portion of the curve=**1 in 10**

e) Minimum width of carriage way at apex of the curve are 11.5 metre and 9.0 metre for two lane and single lane respectively

f) The maximum and minimum gradients are 1 in 40 and 1 in 200 respectively at curve

g) Approach gradient should not be steeper than 1 in 20 for a length of 40 metre and not steeper than 1 in15 beyond this stretch.

h) For good visibility at hair-pin bend, the island portion shall be cleared of all obstructions including trees and shrubs.

3.5.1 Vertical alignment:

(i) Gradients: The ruling, Limiting and exceptional gradients are 6, 7 and 8 percent respectively. The exceptional gradients steeper than the limiting gradient may be sparingly used, separated by a minimum length of 100 metre. At horizontal curves the percentage compensation in gradient may be provided using the formula (30+R)/R, subject to a maximum of 75/R (R is the radius of curvature of horizontal curve). The compensated gradient may not be flatter than 4%.

(ii) Summit curves: the length should be provided keeping in view design speed, and deviation angled as per ***IRC 052:2019*** recommendations, in order to provide required intermediate sight distance (ISD).

(iii) Valley curves: The length of valley curves should be calculated /provided as per design speed to provide required stopping site distance (SSD) during night and as per ***IRC 023.1993*** recommendation.

3.5 Design steps

3.5.1 Horizontal alignment

1) Location: Alignment of gate is designed at the given location

2) Open topo survey: From below topo survey we can see the levels of points for gate alignment as shown in Figure 3.4 as shown below:

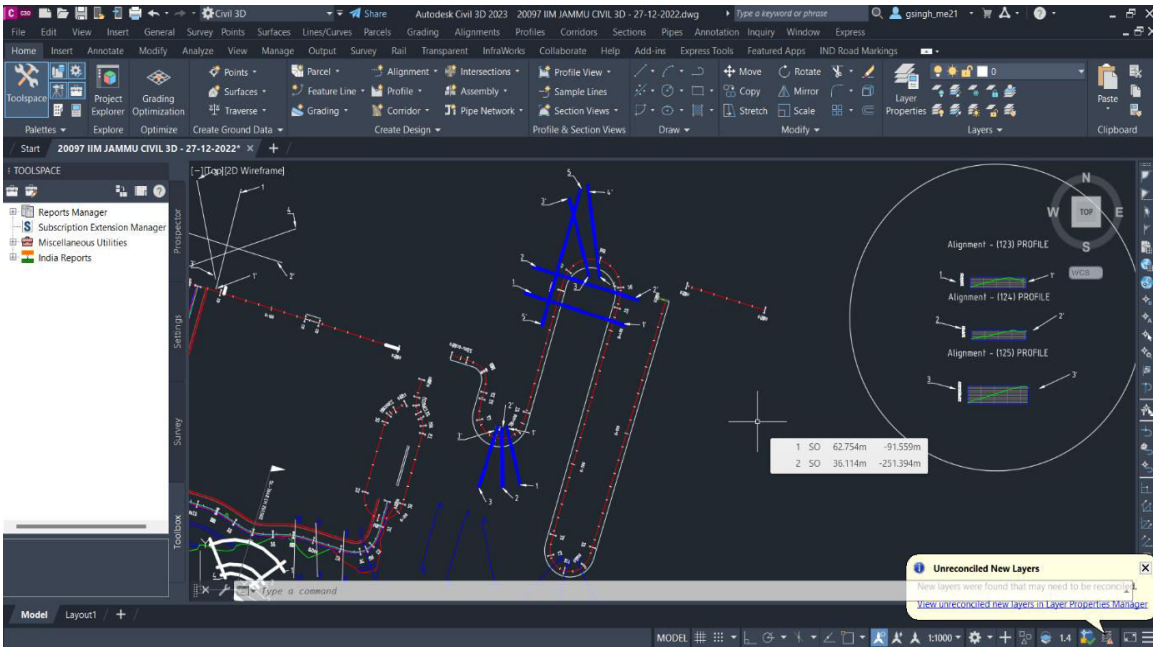


Figure 3.4. Location of Gate

3) Creating points in Civil 3d: Copying important data points from the survey file to a new civil 3d file. Data extraction command is used to save the points easting northing elevation in excel. The excel sheet is now converted to. csv format since civil 3d takes input only in. txt or. csv format. as shown in Figure 3.5 below

1	1	TBM 1	3008053	374360.2	305
2	2	BSP	3008053	374360.2	304.984
3	3	BW+	3008045	374366.3	304.172
4	4	NL	3008046	374365.9	304.187
5	5	NL	3008046	374365.5	304.211
6	6	R	3008048	374364.4	303.731
7	7	R	3008059	374360.2	304.055
8	8	R	3008068	374355.5	303.796
9	9	NL	3008071	374348.5	304.125
10	10	NL	3008071	374348.1	304.139
11	11	BW+	3008072	374347.9	304.142
12	12	BW+G	3008090	374387.1	303.843
13	13	NL	3008088	374386.6	304.056
14	14	NL	3008089	374386.3	304.005
15	15	NYAYIK AA	3008092	374391.5	303.876
16	16	R	3008085	374401.3	303.807
17	17	R	3008080	374404.4	304.003
18	18	R	3008076	374408	303.795
19	19	NL	3008068	374415.6	304.079
20	20	NL	3008068	374415.9	304.101
21	21	BW	3008067	374416	303.981
22	22	NL	3008069	374417	303.778
23	23	NL	3008068	374417.2	303.775
24	24	NL	3008088	374459.2	303.699
25	25	NL	3008088	374459.1	303.653
26	26	BW	3008088	374459.2	303.717

Figure 3.5: Excel Point in Csv format

4) Importing Points: Using point creation tools > choose correct format in which the points are listed in excel .csv format, it is eating northing elevation in our case. Point group is created by adding all points in it as shown in Figure : 3.6.

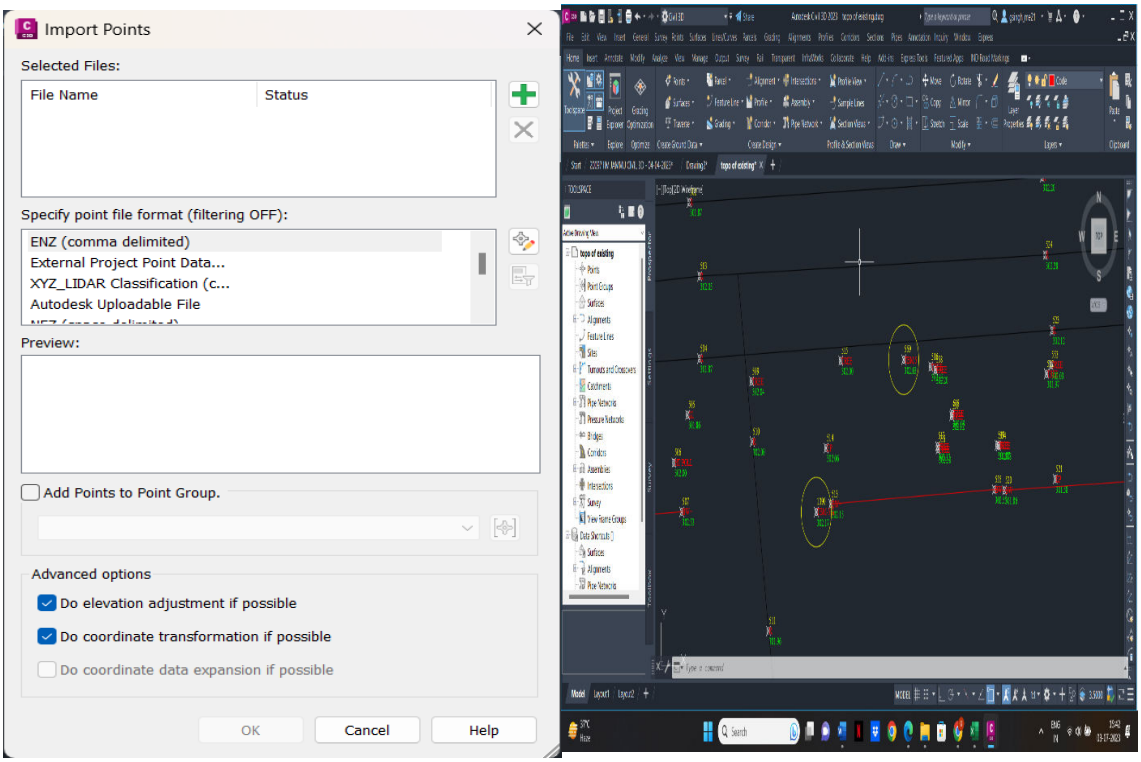


Figure 3.6. Importing Survey Points to Civil 3D

5) Paste Topo survey file in original design file: save fine an amend as in Figure no 3.7

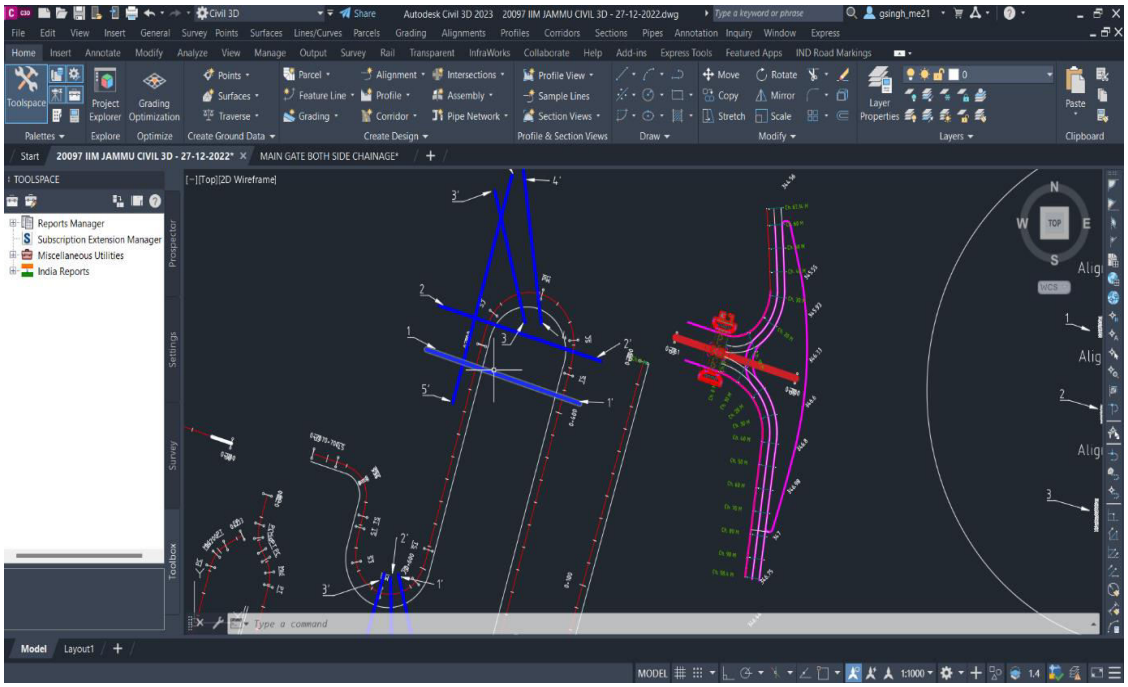


Figure 3.7: Topo survey pasted in original coordinate file

6) Creating Surface:

Existing surface is created from create surface command and adding point groups to it counter style selected is counter 2 m and 10 m. The surface is important for the creation of profile of road. The surface is created named EG (existing ground) but some cogo points were outside of the surface so manual boundary is drawn as shown in *Figure 3.8*. Surface properties > change surface style to No display > using polyline to create boundary > attach manually drawn boundary to surface using Definition and boundaries command Automatically created surface boundary is shrinked inside new boundary and we get more accurate boundary for horizontal design as shown in *Figure 3.9*

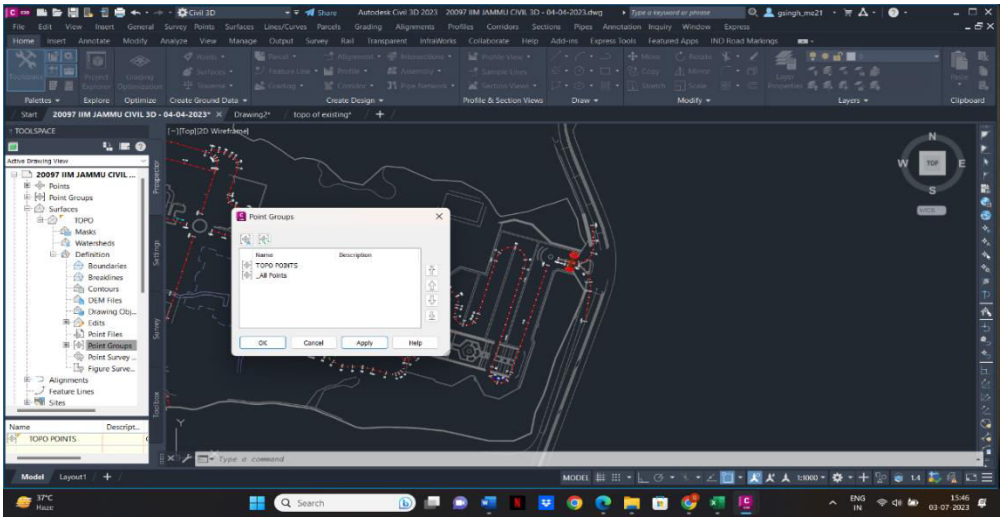


Figure 3.8 Surface creation step by adding point groups

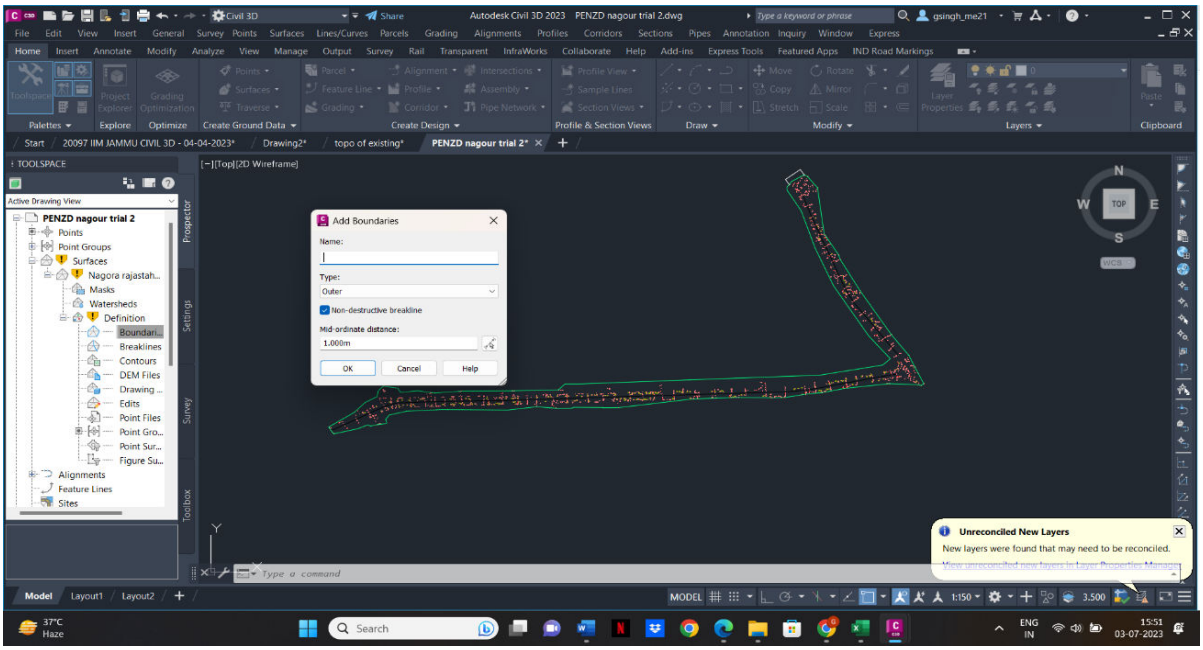


Figure 3.9: Shows shrinked more accurate final surface in green

7) Land XML: To get light weight surface the created civil 3d surface is then converted to xml file. Surface > EG > Land XML. The XML file is imported to a new civil 3d window and now we have lighter version of surface to work on. Existing centre line is copied from survey to use as reference and draw new design centreline as shown in Figure 3.10.

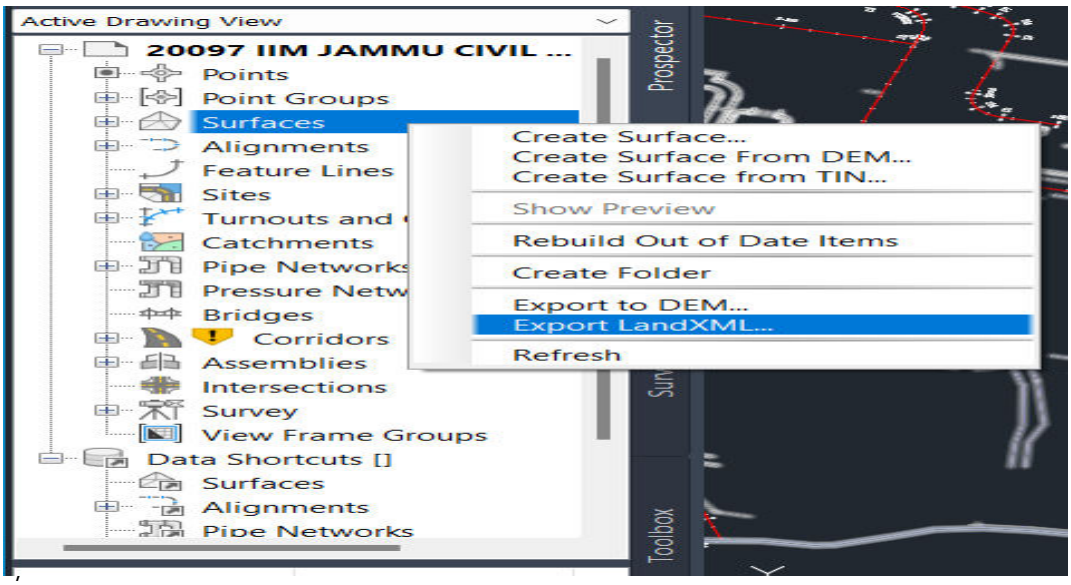


Figure 3.10 Exporting file in land xml format

8) Creating Horizontal alignment:

Using alignment creation tools Road Design Centre line is created according to design speed of 20 kmph. Then in alignment properties a tangent is drawn from start to end chainage which

will help in new design of centre line. To display chainage > alignment labels > to change alignment style > alignment properties > edit alignment style. Now using X line tangents are drawn and the intersection points are marked as PI by adding PI command from alignment creation tools. The blue line represents the design centre line and PI (white cross) points being added at intersection of tangents drawn using X-line (white). PI points are given wherever the curves are to be provided and shown in Figure 3.11.

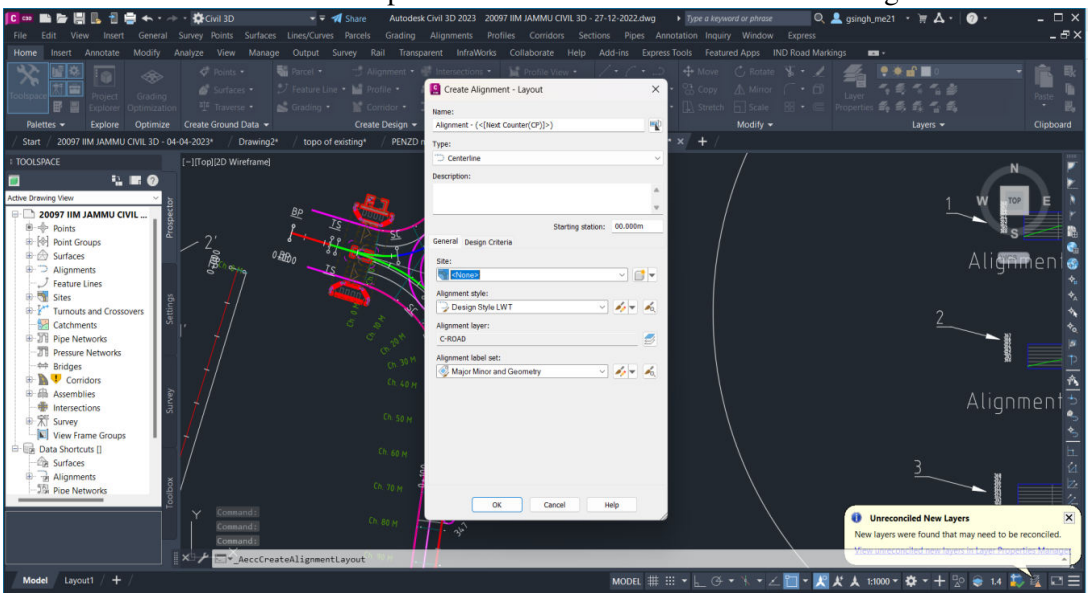


Figure 3.11: Creating profile on surface

9) Adding Curves:

Next Curves are given between each PI points, select curve fillet (between two entities) as shown in *Figure 3.12* and for transition curve choose spiral curve spiral with input as angle less than greater than 180, radius and Spiral in length and spiral out length as shown in *Figure 3.13.* As per the design speed the radius which satisfies the condition as per ***IRC 052:2019*** guidelines are accepted in Civil 3D and transition length as per ***Table 6.9IRC 52:2019***is selected and shown in *Table 3.5* of Annexure-I.

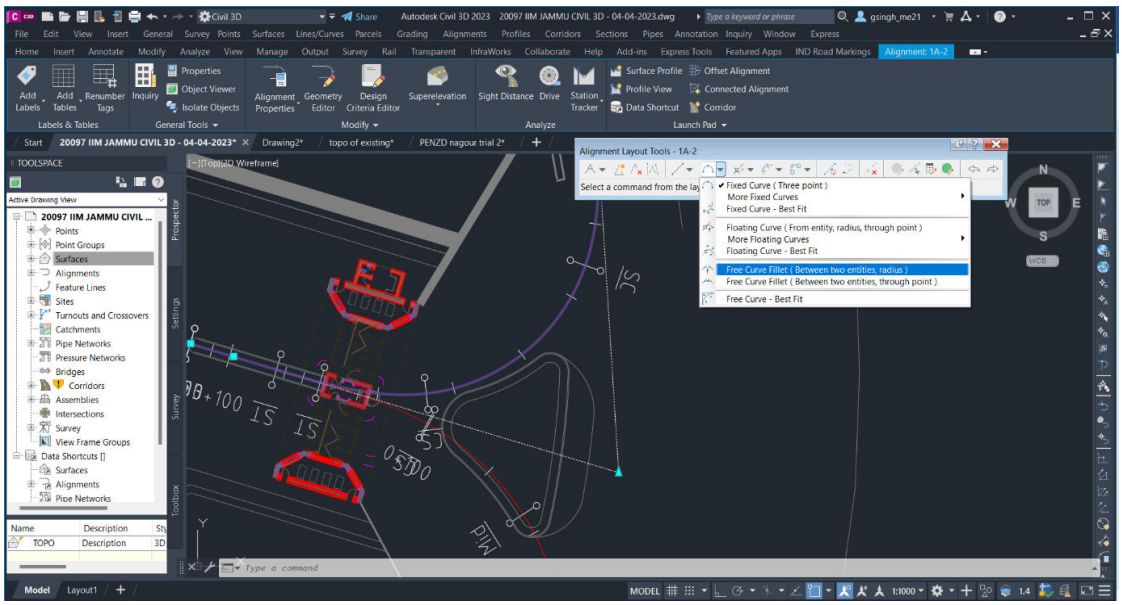


Figure 3.12. Adding PI points

Figure 3.13. Adding curve with transition

10) Adding super-elevation: After defining the curves we provide super elevation to the required section of road by selecting calculate super elevation option and providing Roadway type - Undivided crown, Roadway width and camber - 7and 2.0 % and Shoulder width. Step wise is shown in Figure 3.14,3.15 & 3.16.

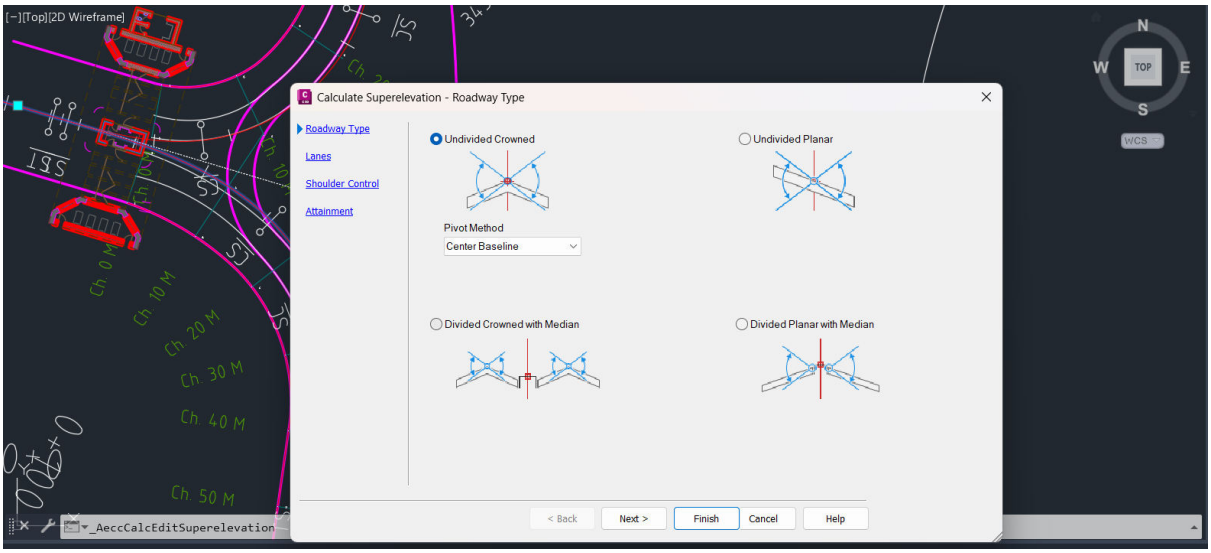


Figure 3.14: Selection of road type

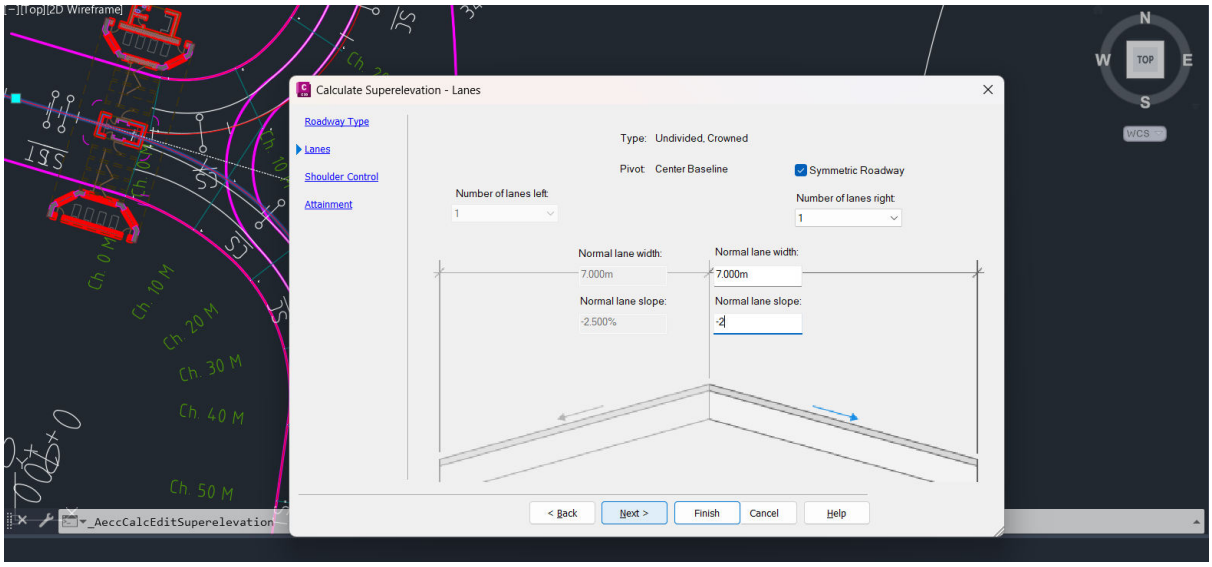


Figure 3.15: Selection of roadway width and camber

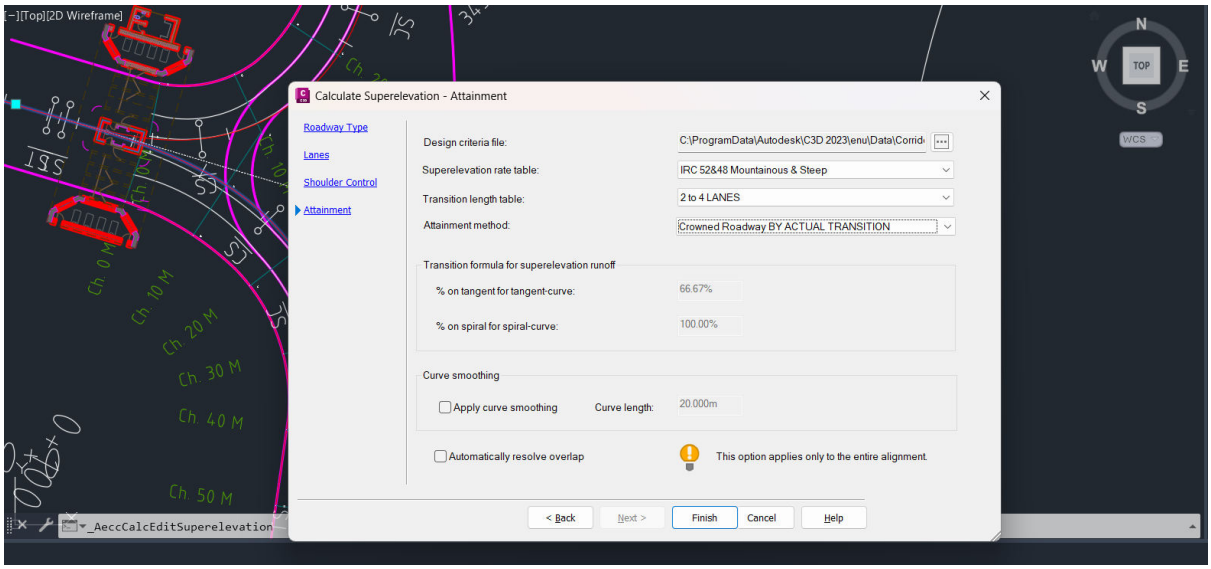


Figure 3.16: Selection of Code for superelevation

11) Super elevation calculation:

Go to Tabular Editor in Superelevation and select superelevation icon as shown in Figure 3.17 and export the format and in excel and Interpolate for every 10m interval as shown in Figure 3.18.

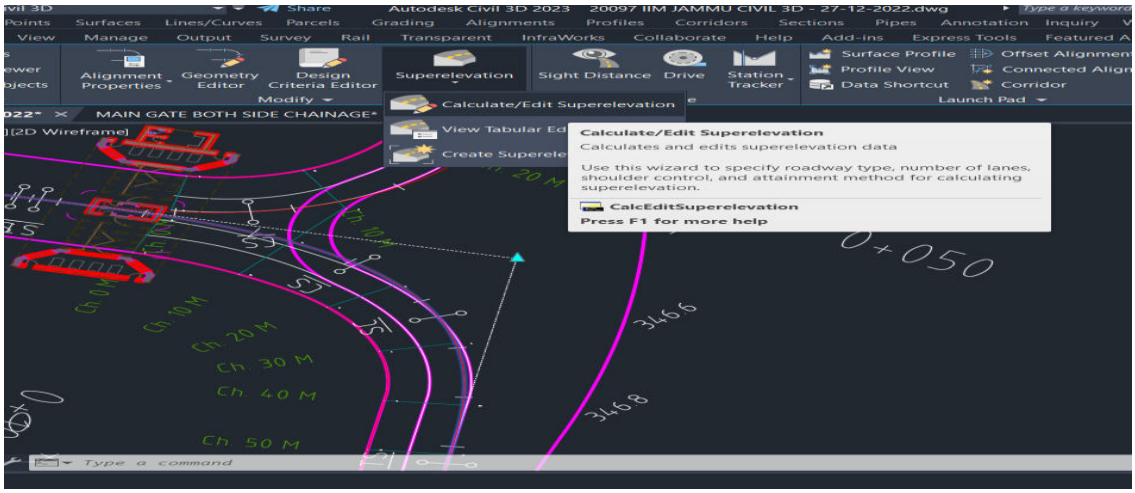


Figure 3.17: Selection of superelevation calculation tool

12) **Create Super elevation profile:** Go to Tabular Editor in and select create superelevation view as shown in Figure 3.18 and 3.19.

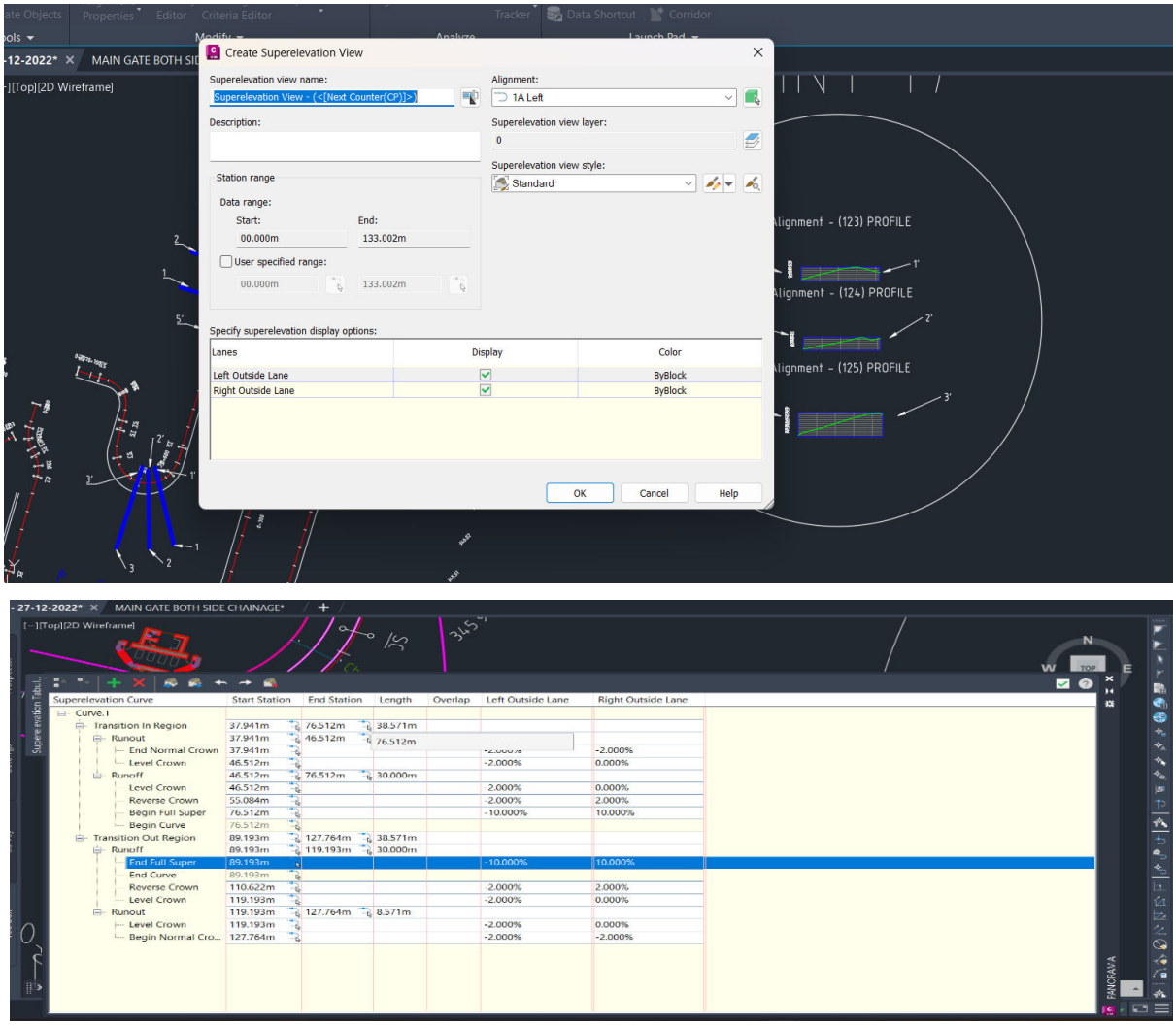


Figure 3.18: creating superelevation

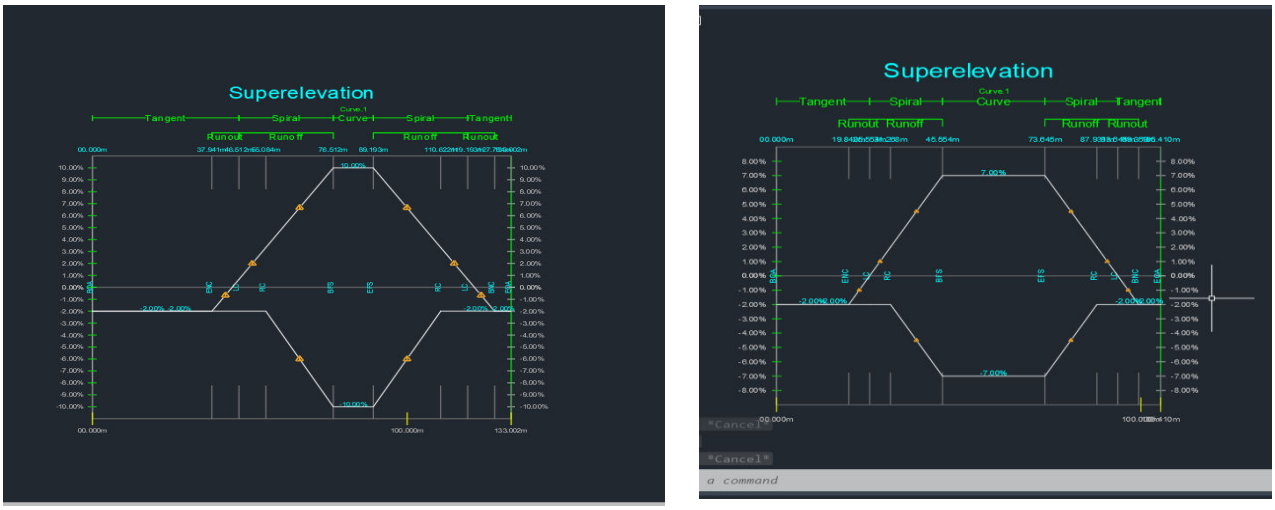


Figure 3.19: Superelevation view of left and right alignments of gate

13) Adding curve table: Curve tables can be inserted through Alignment labels which shows Curve no, Radius, Chainage, super elevation, Length of transition curve and length of curve along with coordinates as shown in Figure 3.20.

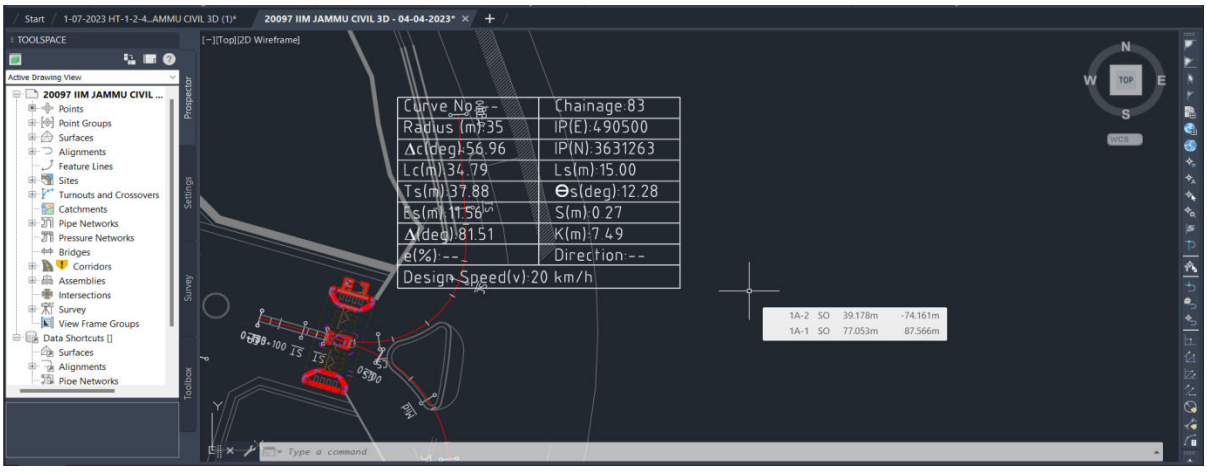


Figure 3.20: Addition of curve box

14) Cross-checked by using all design standards for curve radius and superelevation according to codes and making an excel sheet for convenience and time saving as shown in Figure 3.21.

For Hilly Terrain					
Input Data					
	Velocity	20			
	Radius Of Curve	25			
	super Elevation	0.071111111		Superelevation	7.11%
	Width Of Carriageway	5.5			0.07
	superelevation rate(n)=	60			
Calculated Values					
	V^2=	400			
	V^3=	8000			
Transition curve	L1	8.60	16.00	Values Taken	20
	L2	16			
Widening Purpose	Ls	14.81021053			
Check For Friction					
	F=	0.055984252	SAFE		
Shift Of Curve	0.667				
Velocity	50	40	30	25	20

2 Lane | Hilly Terrain | Sheet3 | Sheet6

Figure 3.21: cross check for friction

3.5.2 Vertical alignment

In this we will create a profile view which shows elevation of the road at every 10 m chainage.

Gradients are joint with vertical curves (valley or summit curve) just long horizontal curves are used to join straight stretches of road.

Valley curves should be long enough such that the distance ahead is lighted by the headlights is at least equal to safe stopping sight distance.

Steps

1) Creating Vertical profile: Civil 3d takes the elevation of the centreline

Select Design alignment > create profile > create profile from profile view shown in Figure 3.22.

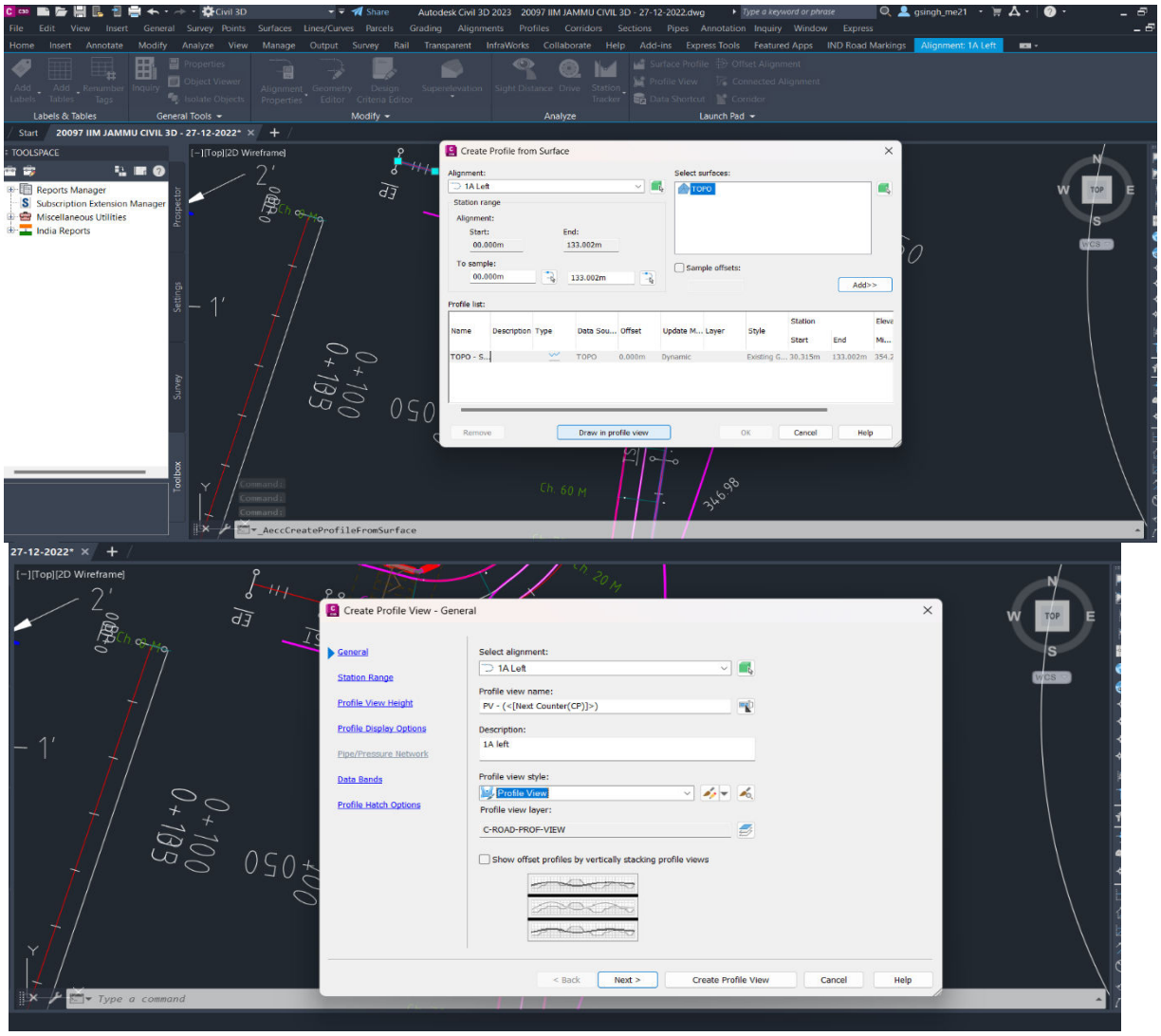


Figure 3.22. Adding surface to create vertical profile

2) Adding desired bands to profile view: shown in Figure 3.23.

Add Profile data and select FRL
Add Profile data select OGL
Add Horizontal Geometry and select Horizontal geometry
Add vertical fill and select geometry fill.
Add Superelevation and select superelevation
Add profile data select Chainage

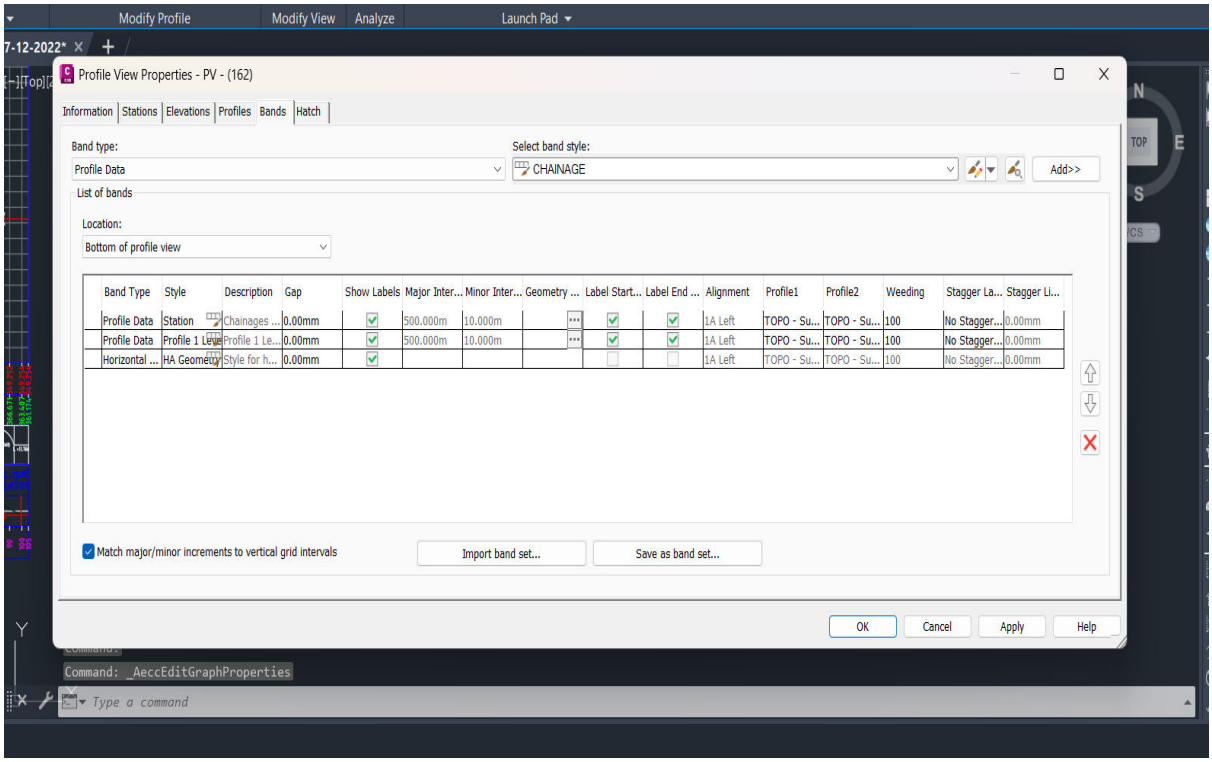


Figure 3.23: Shows various bands

3) Importing Existing level profile:

From design data existing level below proposed centreline is copied to text file. Profile > create profile from file > import existing ground profile points. The existing centreline profile is shown in green and design centreline in red shown in Figure 3.24.

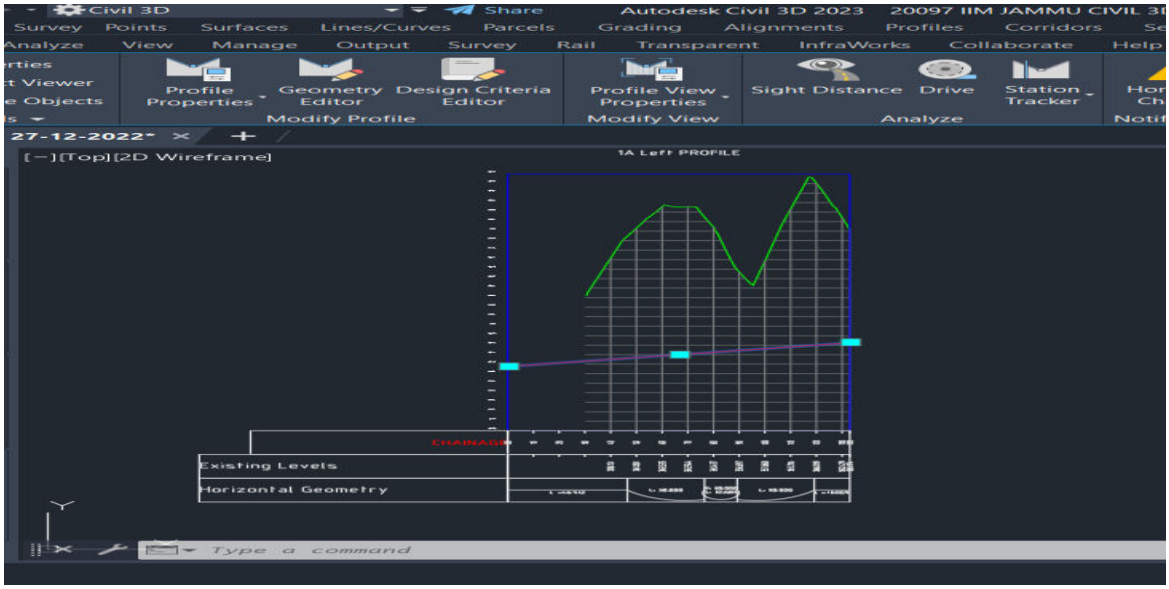


Figure 3.24: creation of centre line from in vertical profile

Tangent is drawn with yellow line as start and end, now design profile is to be such that it overlaps yellow (offset line) as much as possible. Inserting point of vertical intersection be drawing tangents

using x line wherever grade change is more than 1.5 per k since design speed is 20 kmph. Minimum distance between Vertical PI's should be 150 m. shown in 3.25

Vertical curves are provided between each PI input asked is either length of curve or K value.

K = L / A, where A is grade change which should be at least 1.5 perk for providing a vertical curve as per ***IRC SP 23:1993****(Table 7)* as shown in *Table 3.8* of ***Annexure -I***

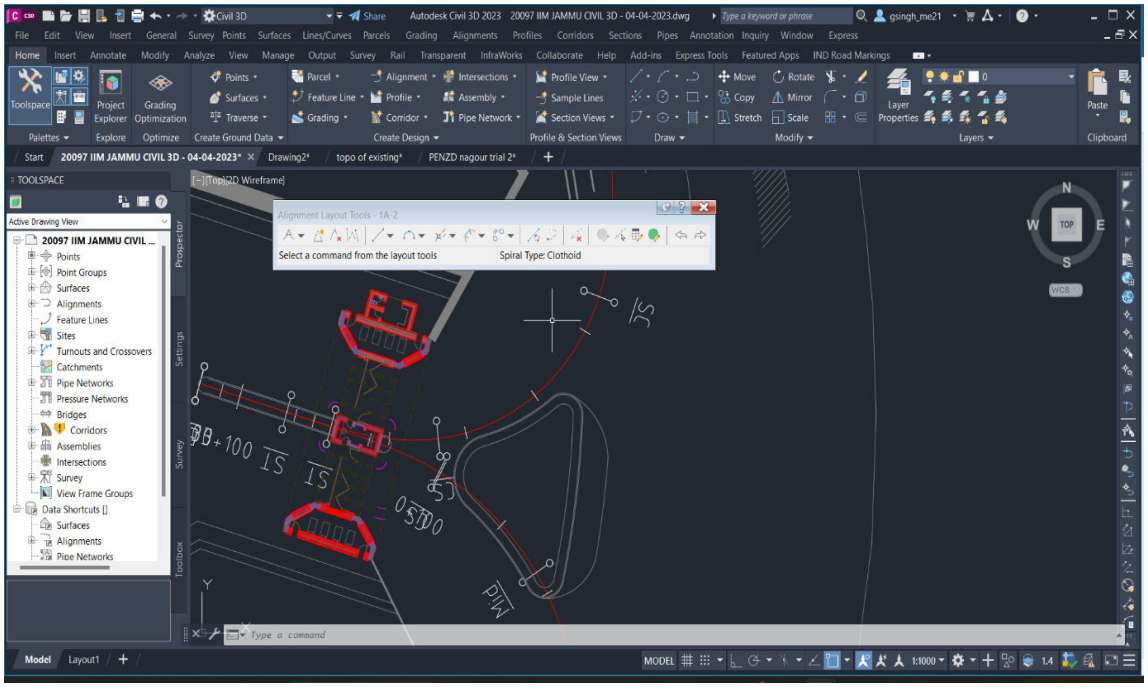


Figure 3.25: Geometric profile editor

Generally, summit curve is designed for ISD if not possible then provided for Safe stopping sight distance SSD, Valley curves are designed for headlight distance. o Hence Based on this vertical curve length is entered and K value should be > 1.7, radius is automatically taken by civil 3d shown in Figure 3.26.

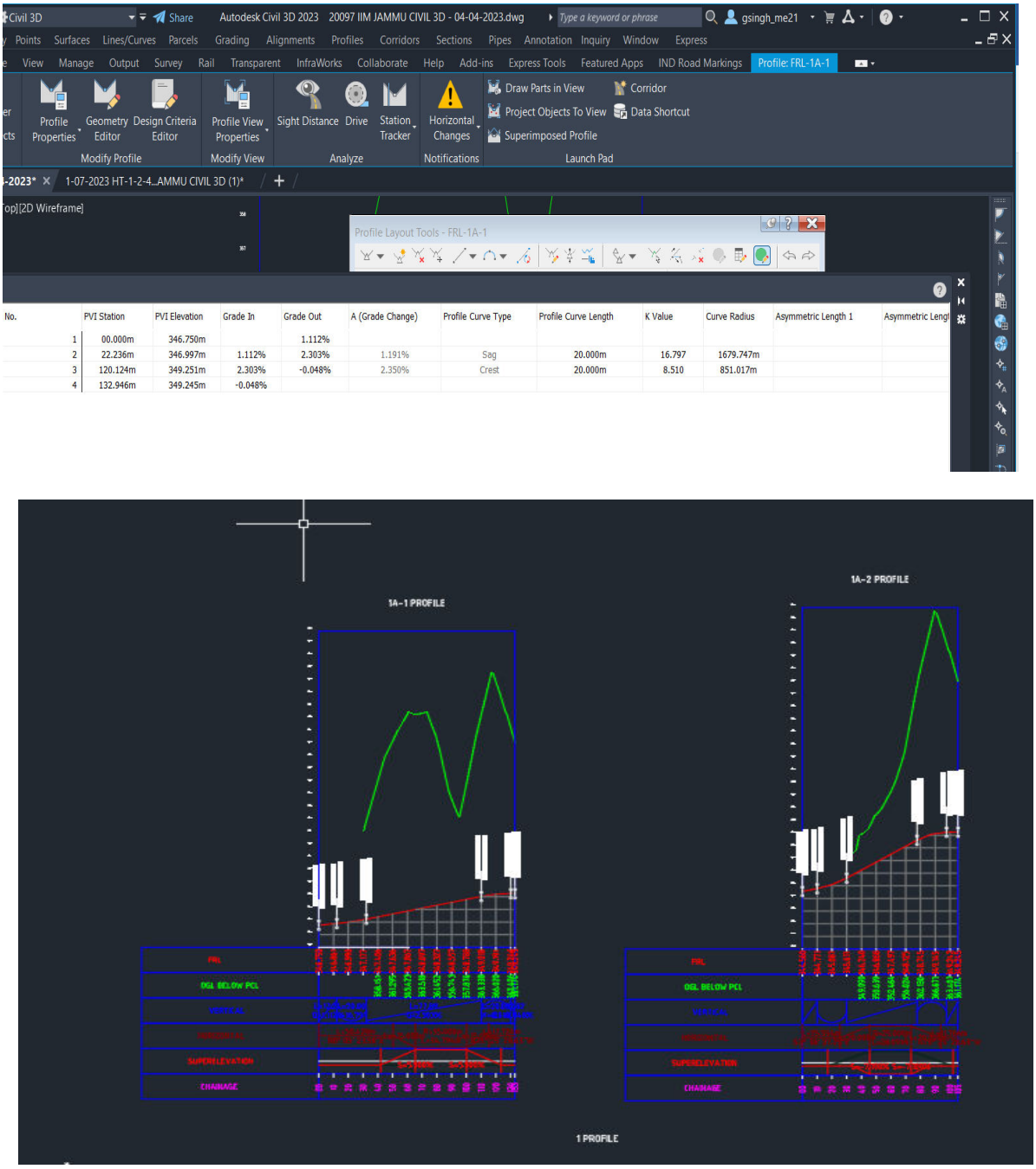


Figure 3.26: Creating horizontal alignment, Red line shows existing centreline and green is the surface

4) Final VIP (vertical intersection point) Report which shows basic Design parameters for vertical curves which includes gradient, K value, PVI elevation, curve length, design speed. Horizontal and vertical alignment reports are given in Table 3.2- Of Annexure -I.

3.6 Plan and profiles:

Plan and profiles of few Main carriage way and Fire tender roads are shown in *Figure 3.27-3.31.*

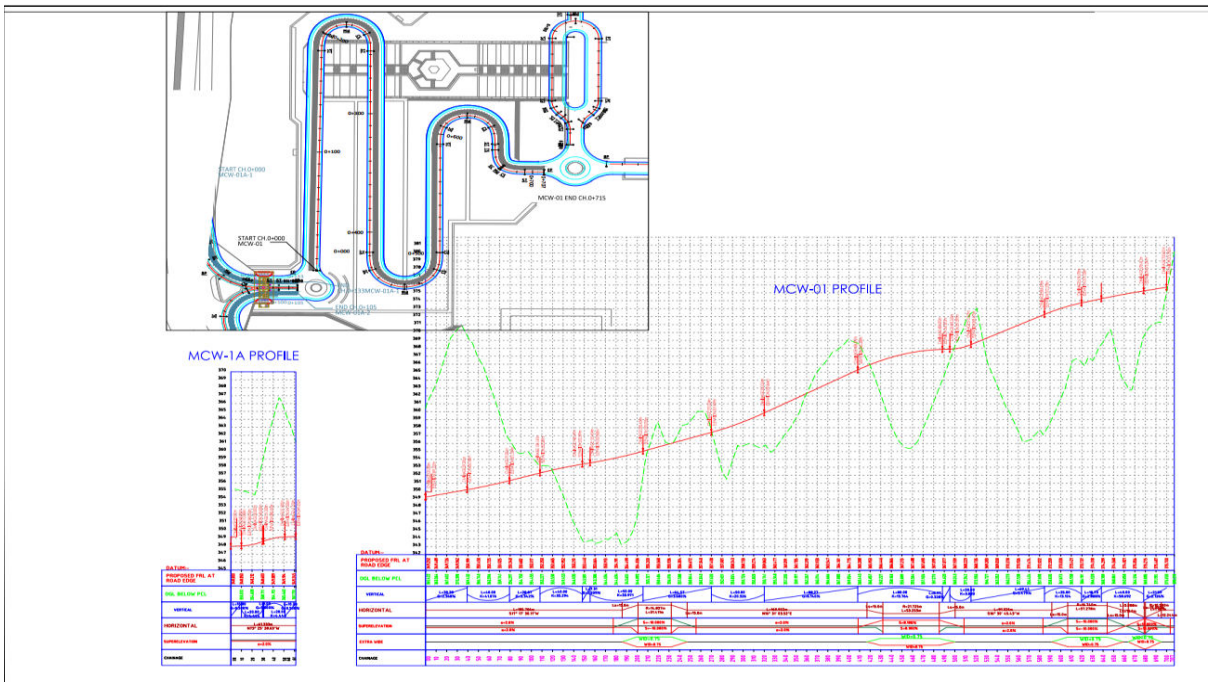


Figure 3.27: Plan and profile of MCW 01

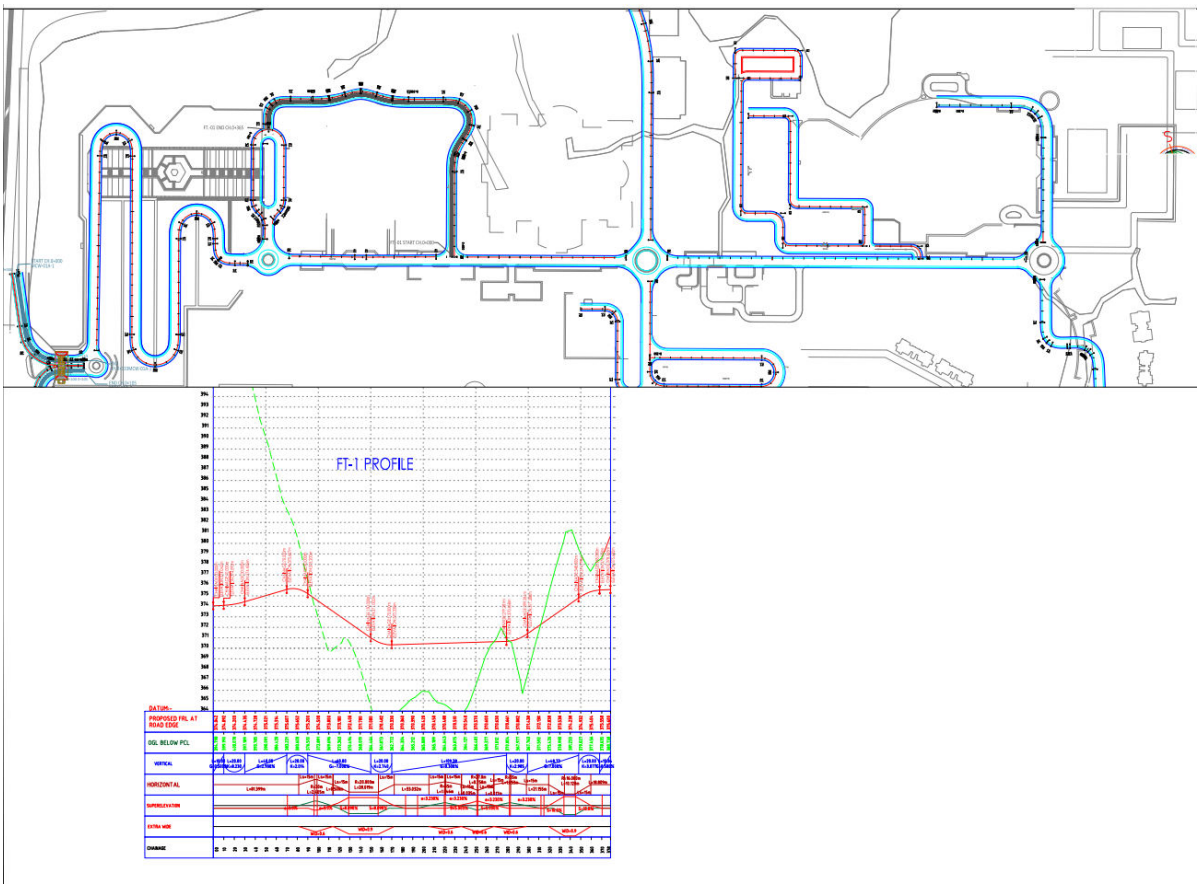


Figure 3.28: Plan and profile of FT-1

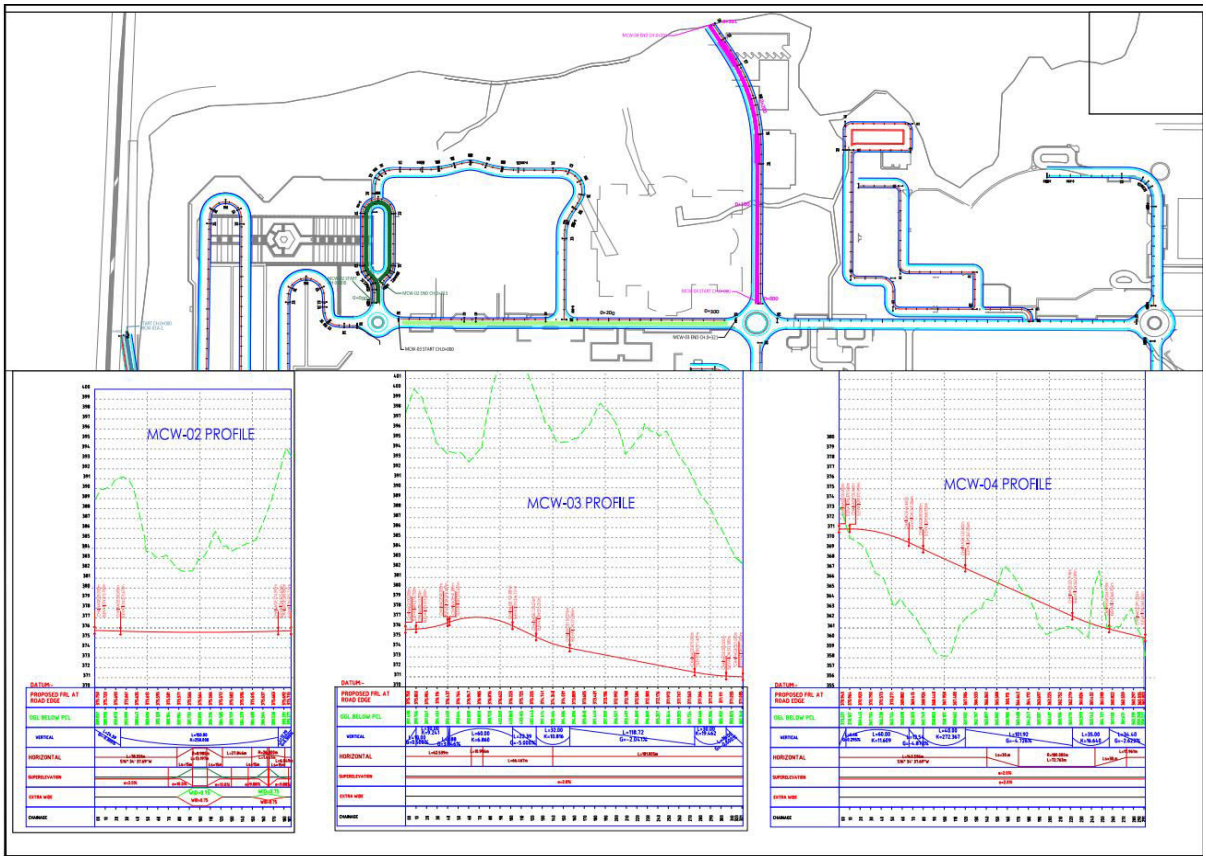


Figure 3.29: Plan and profile of MCW-02,03,04

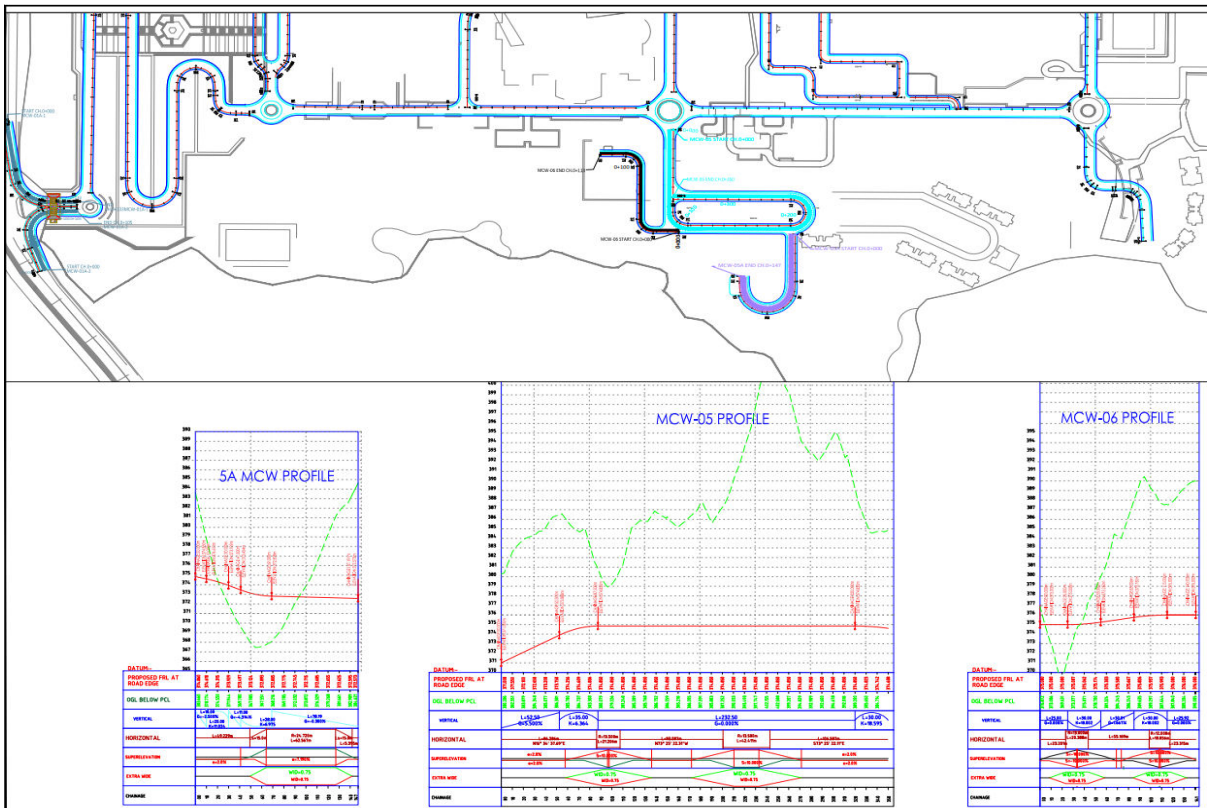


Figure 3.30: Plan and profile of MCW-5A,05,06

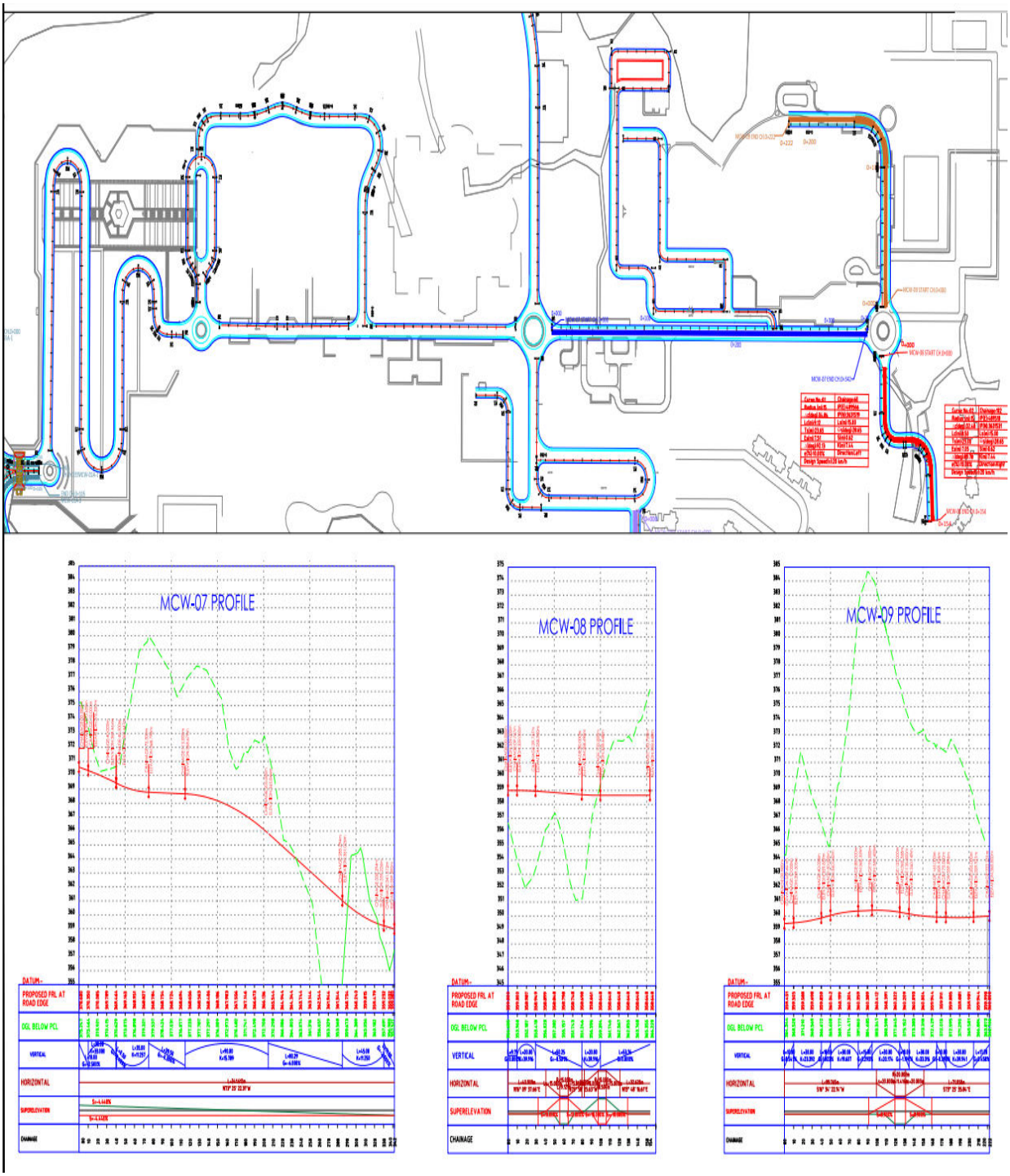


Figure 3.31: Plan and profile of MCW-07,08,09

Site Photographs:

Some photographs clicked during site visit and construction phase of IIM JAMMU.

Figure 3.32: Front gate of IIM Jammu before construction

Figure 3.33: Construction phase and Site photographs of MCW-08

Figure 3.34: Site photographs of MCW-01

Figure 3.35: Site Photograph ofMCW-05

Annexure-I

Table 3.2: Horizontal alignment report

CARRIAGEWAY-1

CURVE No.	HIP			RADIUS	HAND OF ARC	TRANSITION			CIRCULAR			DESIGN SPEED	Δ	Δc	Θs	Ts	Es	S	K	e
	CHAINAGE	EASTING	NORTHING			START CHAINAGE	LENGTH (Ls)	END CHAINAGE	START CHAINAGE	LENGTH (Lc)	END CHAINAGE									
				m			m			m		Km/hr	Deg.	Deg.	Deg.	m	m	m	m	%
1	0+216	489693	3628899	15.000	RIGHT	0+186	15	0+247	0+201	31.410	0+232	20	179.230	121.300	28.960	2296.580	2274.360	0.630	7.440	10.000
2	0+459	346755	3146891	22.000	LEFT	0+417	15	0+432	0+432	53.250	0+485	20	179.990	140.450	19.770	505221.910	505207.660	0.430	7.470	8.180
3	0+625	489798	3629406	17.000	RIGHT	0+592	15	0+607	0+607	37.280	0+644	20	178.930	127.590	26.670	1859.690	1835.580	0.560	7.450	10.000
4	0+679	490299	3631221	10.000	LEFT	0+664	15	0+695	0+679	1.190	0+680	20	88.330	6.480	40.930	18.420	5.360	0.880	7.370	10.000

CARRIAGEWAY-2

CURVE No.	HIP			RADIUS	HAND OF ARC	TRANSITION			CIRCULAR			DESIGN SPEED	Δ	Δc	Θs	Ts	Es	S	K	e
	CHAINAGE	EASTING	NORTHING			START CHAINAGE	LENGTH (Ls)	END CHAINAGE	START CHAINAGE	LENGTH (Lc)	END CHAINAGE									
				m			m			m		Km/hr	Deg.	Deg.	Deg.	m	m	m	m	%
1	0+100	490224	3631132	8.980	RIGHT	0+078	15	0+122	0+093	13.000	0+107	20	179.900	84.200	47.850	5.100	1.700	1.020	7.300	10.000
2	0+165	490218	3631185	26.000	RIGHT	0+149	15	0+181	0+164	1.000	0+166	20	36.270	3.210	16.530	16.200	2.100	0.360	7.500	6.840

CARRIAGEWAY-4

CURVE No.	HIP			RADIUS	HAND OF ARC	TRANSITION			CIRCULAR			DESIGN SPEED	Δ	Δc	Θs	Ts	Es	S	K	e
	CHAINAGE	EASTING	NORTHING			START CHAINAGE	LENGTH (Ls)	END CHAINAGE	START CHAINAGE	LENGTH (Lc)	END CHAINAGE									
				m			m			m		Km/hr	Deg.	Deg.	Deg.	m	m	m	m	%
1	0+207	489836	3631116	180.000	LEFT	0+141	30	0+273	0+171	73.000	0+243	50	32.700	23.160	4.770	68.200	7.400	0.210	15.000	6.170

CARRIAGEWAY-5

CURVE No.	HIP			RADIUS	HAND OF ARC	TRANSITION			CIRCULAR			DESIGN SPEED	Δ	Δc	Θs	Ts	Es	S	K	e
	CHAINAGE	EASTING	NORTHING			START CHAINAGE	LENGTH (Ls)	END CHAINAGE	START CHAINAGE	LENGTH (Lc)	END CHAINAGE									
				m			m			m		Km/hr	Deg.	Deg.	Deg.	m	m	m	m	%
1	0+097	489935	3631450	14.000	LEFT	-	-	-	0+086	21.210	0+107	20	90.000	90.000	-	13.500	5.590	-	-	10.000
2	0+222	26799834	11755027	14.000	LEFT	-	-	-	0+201	42.410	0+243	20	180.000	180.000	-	28473108.630	28473095.130	-	-	10.000

CARRIAGEWAY-5A

CURVE No.	HIP			RADIUS	HAND OF ARC	TRANSITION			CIRCULAR			DESIGN SPEED	Δ	Δc	Θs	Ts	Es	S	K	e
	CHAINAGE	EASTING	NORTHING			START CHAINAGE	LENGTH (Ls)	END CHAINAGE	START CHAINAGE	LENGTH (Lc)	END CHAINAGE									
				m			m			m		Km/hr	Deg.	Deg.	Deg.	m	m	m	m	%
1	0+096	489855	3631569	24.720	RIGHT	0+049	15	0+142	0+064	63.000	0+127	20	179.780	145.020	17.380	33.500	11.500	0.380	7.500	7.190

CARRIAGEWAY-6

CURVE No.	HIP			RADIUS	HAND OF ARC	TRANSITION			CIRCULAR			DESIGN SPEED	Δ	Δc	Θs	Ts	Es	S	K	e
	CHAINAGE	EASTING	NORTHING			START CHAINAGE	LENGTH (Ls)	END CHAINAGE	START CHAINAGE	LENGTH (Lc)	END CHAINAGE									
				m			m			m		Km/hr	Deg.	Deg.	Deg.	m	m	m	m	%
1	0+029	489961	3631441	15.000	LEFT	0+010	15	0+048	0+025	7.790	0+033	20	87.050	29.760	28.650	22.270	6.540	0.620	7.440	0.100
2	0+070	489949	3631396	15.000	RIGHT	0+051	15	0+089	0+066	8.050	0+074	20	88.060	30.770	28.650	22.540	6.730	0.620	7.440	0.100

CARRIAGEWAY-8

CURVE No.	HIP			RADIUS	HAND OF ARC	TRANSITION			CIRCULAR			DESIGN SPEED	Δ	Δc	Θs	Ts	Es	S	K	e
	CHAINAGE	EASTING	NORTHING			START CHAINAGE	LENGTH (Ls)	END CHAINAGE	START CHAINAGE	LENGTH (Lc)	END CHAINAGE									
				m			m			m		Km/hr	Deg.	Deg.	Deg.	m	m	m	m	%
1	0+066	489508	3631522	100.000	RIGHT	0+012	15	0+121	0+027	79.000	0+106	40	53.750	45.150	4.300	58.600	11.900	0.090	7.500	7.110

FIRE TENDER-1

CURVE No.	HIP			RADIUS	HAND OF ARC	TRANSITION			CIRCULAR			DESIGN SPEED	Δ	Δc	Θs	Ts	Es	S	K	e
	CHAINAGE	EASTING	NORTHING			START CHAINAGE	LENGTH (Ls)	END CHAINAGE	START CHAINAGE	LENGTH (Lc)	END CHAINAGE									
				m			m			m		Km/hr	Deg.	Deg.	Deg.	m	m	m	m	%
1	0+098	490051	3631185	30.000	RIGHT	0+081	15	0+114	0+096	2.000	0+099	20	33.230	4.590	14.320	16.700	1.700	0.310	7.500	5.930
2	0+143	490003	3631145	20.000	LEFT	0+114	15	0+172	0+129	28.000	0+157	20	123.250	80.270	21.490	45.600	23.400	0.470	7.500	8.890
3	0+220	490093	3631118	55.000	RIGHT	0+205	15	0+236	0+220	1.000	0+221	20	16.710	1.090	7.810	15.300	0.500	0.170	7.500	3.230
4	0+252	490120	3631101	27.000	LEFT	0+236	15	0+267	0+251	1.000	0+252	20	33.450	1.610	15.920	16.000	1.400	0.350	7.500	6.580
5	0+282	490151	3631101	55.000	RIGHT	0+267	15	0+298	0+282	1.000	0+283	20	16.720	1.100	7.810	15.700	0.700	0.170	7.500	3.230
6	0+340	490209	3631084	16.000	LEFT	0+319	15	0+360	0+334	10.000	0+345	20	89.990	36.270	26.860	23.800	7.100	0.580	7.400	10.000

CARRIAGEWAY-1											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	349.352	-	2.370%	-	20
2	0+059	Sag Curve	40	41.076	0+039	0+079	350.656	2.370%	3.340%	0.970%	20
3	0+128	Crest Curve	40	35.294	0+108	0+148	352.957	3.340%	2.230%	1.130%	20
4	0+180	Sag Curve	50	33.971	0+155	0+205	354.113	2.210%	3.680%	1.470%	20
5	0+295	Sag Curve	50	20.326	0+270	0+320	358.329	3.680%	6.140%	2.460%	20
6	0+448	Crest Curve	80	13.764	0+408	0+488	367.740	6.140%	0.330%	5.810%	50
7	0+505	Sag Curve	20	3.883	0+495	0+515	367.927	0.330%	5.480%	5.150%	20
8	0+602	Crest Curve	35	13.104	0+585	0+620	373.237	5.480%	2.810%	2.670%	20
9	0+658	Crest Curve	40	58.692	0+638	0+678	374.816	2.810%	2.130%	0.680%	20
10	700.001	-	-	-	-	-	375.7	0.0213	-		20
CARRIAGEWAY-2											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	-	-	-0.300%	-	50
2	0+100	Sag Curve	150	250.000	0+025	0+175	375.451	-0.300%	0.300%	0.600%	20
3	0+187	-	-	-	-	-	-	0.300%	-	-	20
CARRIAGEWAY-3											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	-	-	0.500%	-	40
2	0+025	Sag Curve	30	9.241	0+010	0+040	375.875	0.500%	3.750%	3.250%	40
3	0+072	Crest Curve	60	6.860	0+042	0+102	377.631	3.750%	-5.000%	8.750%	35
4	0+140	Sag Curve	32	10.816	0+124	0+156	374.212	-5.000%	-2.040%	2.960%	50
5	0+290	Sag Curve	30	19.462	0+275	0+305	371.155	-2.040%	-0.500%	1.540%	50
6	0+321	-	-	-	-	-	-	-0.500%	-	-	40
CARRIAGEWAY-4											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	370.940	-	0.300%	-	50
2	0+036	Crest Curve	60	11.609	0+006	0+066	371.048	0.300%	-4.870%	5.170%	50
3	0+100	Sag Curve	40	272.367	0+080	0+120	367.951	-4.870%	-4.730%	0.150%	50
4	0+239	Sag Curve	35	16.64	0+222	0+257	361.361	-4.730%	-2.620%	2.100%	50
5	0+291	-	-	-	-	-	360.000	-2.620%	-	-	50
CARRIAGEWAY-5											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	371.000	-	5.500%	-	40
2	0+070	Sag Curve	35	6.364	0+053	0+088	374.850	5.500%	0.000%	5.500%	20
3	0+335	Crest Curve	30	18.595	0+320	0+350	374.850	0.000%	-1.610%	1.610%	20
4	0+350	Crest Curve	-	-	-	-	374.608	-1.610%	-	-	20
CARRIAGEWAY-5A											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	-	-	-2.500%	-	40
2	0+020	Crest Curve	20	11.024	0+010	0+030	374.360	-2.500%	-4.310%	1.810%	40
3	0+055	Sag Curve	28	6.975	0+041	0+069	372.850	-4.310%	-0.300%	4.010%	20
4	0+147	-	-	-	-	-	-	-0.300%	-	-	20
CARRIAGEWAY-6											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	375.060	-	0.016%	-	20
2	0+055	Sag	30	54.175	0+040	0+070	375.069	0.016%	0.570%	0.554%	20
3	0+113	-	-	-	-	-	375.400	0.570%	-	-	20
CARRIAGEWAY-7											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	-	-	-2.500%	-	40
2	0+025	Crest Curve	30	33.000	0+010	0+040	369.975	-2.500%	-3.410%	0.910%	40
3	0+058	Sag Curve	35	11.257	0+041	0+076	368.850	-3.410%	-0.300%	3.110%	40
4	0+160	Crest Curve	90	15.789	0+115	0+205	368.544	-0.300%	-6.000%	5.700%	40
5	0+308	Sag Curve	45	11.250	0+285	0+330	359.676	-6.000%	-2.000%	4.000%	40
6	0+342	-	-	-	-	-	-	-2.000%	-	-	40
CARRIAGEWAY-8											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	-	-	-2.500%	-	40
2	0+020	Crest Curve	20	5.333	0+010	0+030	358.500	-2.500%	-6.250%	3.750%	40
3	0+078	Sag Curve	25	4.000	0+066	0+091	354.850	-6.250%	-	6.250%	40
4	0+183	-	-	-	-	-	-	-	-	-	40
CARRIAGEWAY-9											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	-	-	0.500%	-	50
2	0+025	Sag Curve	30	22.345	0+010	0+040	359.125	0.500%	1.840%	1.340%	50
3	0+065	Crest Curve	30	19.448	0+050	0+080	359.862	1.840%	0.300%	1.540%	50
4	0+111	-	-	-	-	-	-	0.300%	-	-	50

Table 3.4: Vertical alignment report:

MAIN CARRIAGEWAY 07											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	370.600	-	-2.50%	-	30
2	0+025	Crest	30	33	0+010	0+040	369.975	-2.50%	-3.41%	0.91%	30
3	0+058	Sag	35	11.257	0+041	0+076	368.850	-3.41%	-0.30%	3.11%	30
4	0+160	Crest	90	15.789	0+115	0+205	368.544	-0.30%	-6.00%	5.70%	30
5	0+291	Sag	55	15.439	0+264	0+319	360.669	-6.00%	-2.44%	3.56%	30
6	0+342	-	-	-	-	-	359.442	-2.44%	-	-	30

MAIN CARRIAGEWAY 08											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	359.000	-	0.00%	-	30
2	0+020	Crest	20	39.916	0+010	0+030	359.000	0.00%	-0.50%	0.50%	30
3	0+090	Sag	20	39.916	0+080	0+100	358.648	-0.50%	0.00%	0.50%	30
4	0+154	-	-	-	-	-	358.648	0.00%	-	-	30

MAIN CARRIAGEWAY 02											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	359.451	-	0.54%	-	30

2	0+025	Sag	30	23.392	0+010	0+040	359.586	0.54%	1.82%	1.28%	30
3	0+065	Crest	30	19.607	0+050	0+080	360.315	1.82%	0.29%	1.53%	30
4	0+110	Crest	30	20.174	0+095	0+125	360.447	0.29%	-1.19%	1.49%	30
5	0+150	Sag	30	33.316	0+135	0+165	359.970	-1.19%	-0.29%	0.90%	30
6	0+190	Sag	30	39.952	0+175	0+205	359.853	-0.29%	0.46%	0.75%	30
7	0+222	-	-	-	-	-	360.000	0.46%	-	-	30

MAIN CARRIAGEWAY 01											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	349.252	-	2.37%	-	30
2	0+059	Sag	39.839	41.076	0+039	0+079	350.657	2.37%	3.34%	0.97%	30
3	0+128	Crest	39.877	35.294	0+108	0+148	352.957	3.34%	2.21%	1.13%	30
4	0+180	Sag	50	34.012	0+155	0+205	354.113	2.21%	3.68%	1.47%	30
5	0+295	Sag	50	20.326	0+270	0+320	358.329	3.68%	6.14%	2.46%	30
6	0+448	Crest	80	13.769	0+408	0+488	367.740	6.14%	0.33%	5.81%	30
7	0+505	Sag	20	3.883	0+495	0+515	367.928	0.33%	5.48%	5.15%	30
8	0+602	Crest	35	13.109	0+585	0+620	373.239	5.48%	2.81%	2.67%	30
9	0+658	Crest	40	58.379	0+638	0+678	374.819	2.81%	2.13%	0.69%	30
10	0+707	-	-	-			375.858	2.13%	-	-	30

MAIN CARRIAGEWAY 03											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	375.750	-	0.50%	-	30
2	0+025	Sag	30	9.92	0+010	0+040	375.875	0.50%	3.52%	3.02%	30
3	0+075	Crest	60	7.04	0+045	0+105	377.631	3.52%	-5.00%	8.52%	30

4	0+143	Sag	32	10.822	0+127	0+159	374.212	-5.00%	-2.04%	2.96%	30
5	0+293	Sag	30	19.462	0+278	0+308	371.155	-2.04%	-0.50%	1.54%	30
6	0+324	-	-	-	-	-	371.000	-0.50%	-	-	30

MAIN CARRIAGEWAY 04											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	370.940	-	0.30%	-	30
2	0+036	Crest	60	11.609	0+006	0+066	371.048	0.30%	-4.87%	5.17%	30
3	0+100	Sag	40	272.367	0+080	0+120	367.951	-4.87%	-4.73%	0.15%	30
4	0+239	Sag	35	16.64	0+222	0+257	361.361	-4.73%	-2.62%	2.10%	30
5	0+291	-	-	-	-	-	360.000	-2.62%	-	-	30

MAIN CARRIAGEWAY 05											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	371.000	-	5.50%	-	30
2	0+070	Crest	35	6.364	0+053	0+088	374.850	5.50%	0.00%	5.50%	30
3	0+335	Crest	30	18.672	0+320	0+350	374.850	0.00%	-1.61%	1.61%	30
4	0+350	-	-	-	-	-	374.609	0.00%	-	-	30

MAIN CARRIAGEWAY 05A											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	374.85	-	0.00%		30
2	0+147	-	-	-	-	-	374.85	0.00%	-		30

MAIN CARRIAGEWAY 06											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0	-	-	-	-	-	375.000	-	0.30%	-	30
2	50.121	Sag	40	37.385	0+030	0+070	375.151	0.30%	1.37%	1.07%	30
3	95.396	Crest	30	32.476	0+080	0+110	375.772	1.37%	0.45%	0.92%	30
4	146.484	-	-	-	-	-	376.000	0.45%	-	-	30

MAIN CARRIAGEWAY 09											
Sl. No.	IP CHAINAGE	CURVE TYPE	CURVE LENGTH	K VALUE	CURVE START CHAINAGE	CURVE END CHAINAGE	PVI ELEVATION	CURVE IN GRADIENT	CURVE OUT GRADIENT	GRADE DIFFERENCE	SPEED
1	0+000	-	-	-	-	-	359.451	-	0.54%	-	30
2	0+025	Sag	30	23.392	0+010	0+040	359.586	0.54%	1.82%	1.28%	30
3	0+065	Crest	30	19.607	0+050	0+080	360.315	1.82%	0.29%	1.53%	30
4	0+110	Crest	30	20.174	0+095	0+125	360.447	0.29%	-1.19%	1.49%	30
5	0+150	Sag	30	33.316	0+135	0+165	359.97	-1.19%	-0.29%	0.90%	30
6	0+190	Sag	30	39.952	0+175	0+205	359.853	-0.29%	0.46%	0.75%	30
7	0+222	-	-	-	-	-	360	0.46%	-	-	30

*Table 3.5: Table used for transitions (**Table no 6.9 of IRC 052.2019**)*

Velocity	**50**	**40**	**30**	**25**	**20**
Radius	**length Of Transition Curve**				
14					30
20				35	20
25				25	20
30			30	25	15
40			25	20	15
50		40	20	15	15
55		40	20	15	15
70		30	15	15	15
80	55	25	15	15	
90	45	25	15	15	
100	45	20	15	15	
125	35	15	15		
150	30	15	15		
170	25	15			
200	20	15			
250	15	15			
300	15				
400	15				
500					

*Table 3.6: minimum transitions length (Table no 9 of **IRC 038.1988**)*

Velocity	**100**	**80**	**65**	**50**	**40**
Radius	**Length Of Transition Curve**				
45					
60					**75**
90				**75**	**50**
100				**70**	**45**
150			**80**	**45**	**30**
170			**70**	**40**	**25**
200			**60**	**35**	**25**
240		**90**	**50**	**30**	**20**
300		**75**	**40**	**25**	
360	**130**	**60**	**35**	**20**	
400	**115**	**55**	**30**	**20**	
500	**95**	**45**	**25**		
600	**80**	**35**	**20**		
700	**70**	**35**	**20**		
800	**60**	**30**			
900	**55**	**30**			
1000	**50**	**30**			
1200	**40**				
1500	**35**				
1800	**30**				
2000					

Table 3.7: Minimum length of Vertical curves (Table no 6 of IRC 023.1993)

Design speed (km/h)	Length of Summit curve (metre) for			Length of valley curve (metre) for headlight distance
	Stopping sight distance	Intermediate sight distance	Overtaking sight distance	
20	0.9A	1.7A	-	1.8A
25	1.4A	2.6A	-	2.6A
30	2.0A	3.8A	-	3.5A
35	3.6A	6.7A	-	5.5A
40	4.6A	8.4A	28.4A	6.6A
50	8.2A	15.0A	57.5A	10.0A
60	14.5A	26.7A	93.7A	15.0A
65	18.4A	33.8A	120.4A	17.4A
80	32.6A	60.0A	230.1A	25.3A
100	73.6A	135.0A	426.7A	41.5A

Table 3.8: minimum length of curve for vertical curves (Table no 7 of **IRC 023.1993**)

Design speed (km/h)	Maximum grade change (per cent) not requiring a vertical curve.	Minimum length of vertical curve (metre)
Upto 35	1.5	15
40	1.2	20
50	1	30
65	0.8	40
80	0.6	50
100	0.5	60

CHAPTER-4

STRUCTURAL STRENGTH OF PAVEMENT USING FWD

4.1 INTRODUCTION

The National Highways Authority of India has been engaged in the development of National Highways. In this regard, it has decided to undertake **Operation and Maintenance period for the work of 4 lanning from Km. 360+915 to Km. 440+000 of Gorakhpur-Kotwa section of NH-28 in the state of Bihar. (Package-9)", Voyants Solutions Private Limited** has awarded the project to G-Eng Advisory Services Private Limited, Gurugram, to carry out the Falling Weight Deflectometer (FWD) Test for the project corridor.

4.2 Project Road 1

Operation and Maintenance period for the work of 4 Lanning from Km. of Gorakhpur-Kotwa section of NH-28 in the state of Bihar shown in Figure 4.1

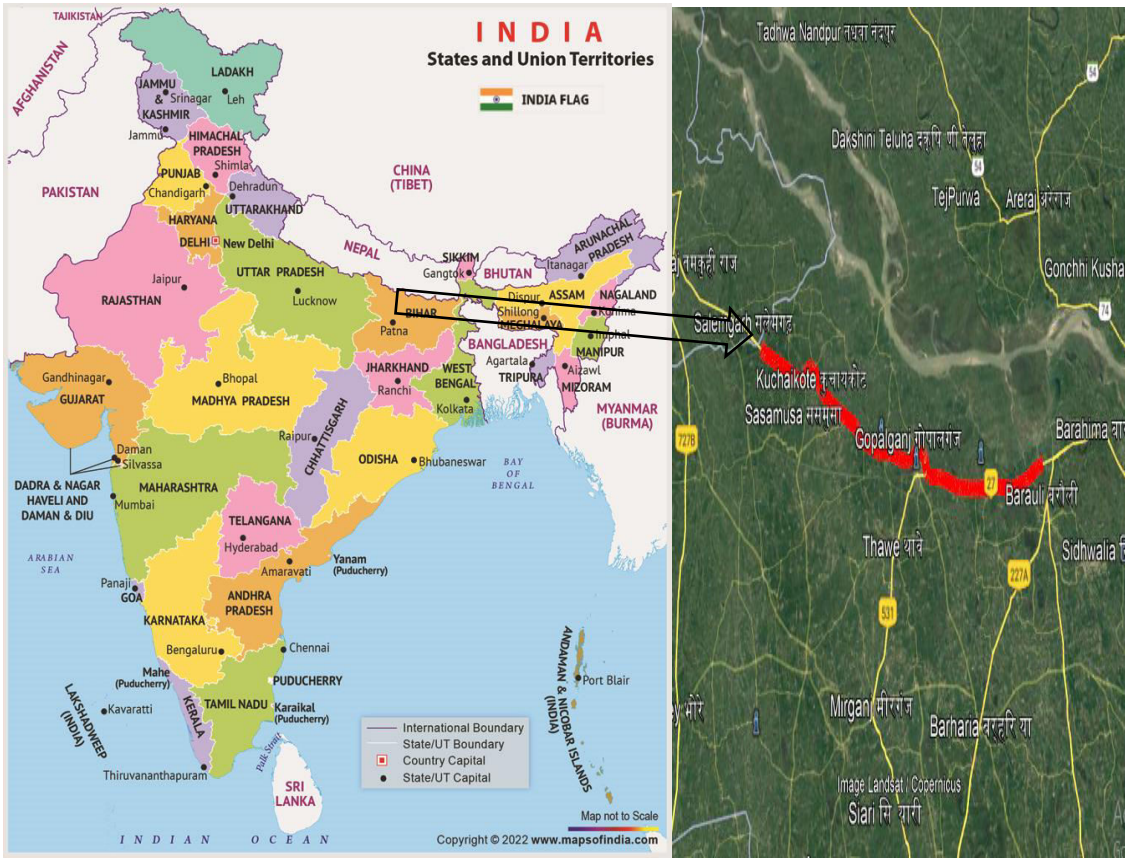


Figure 4.1Map Showing FWD Test

4.3 Scope of Work

The Study has been initiated with the aim of Strength and life of Pavement by measuring deflection as per Indian Codes/Standards. To accomplish this purpose Falling Weight Deflectometer (FWD). Test were performed along the project stretch.

Project stretch details are given in table 4.1 below.

Table 4.1: Stretch details

S.No	From	To	Type of Pavement	Remarks
1	360+915	402+000	Flexible Pavement	**4-Lane**

Out of which, a length of 3.15Km is under construction starting at Km.383+800 to Km. 386+950.

4.4 General

Introduction

Falling Weight Deflectometer is an impulse loading device in which a ephemeral load is applied on the pavement surface and deflected shape of the pavement is measured. The short-lived load is applied by the means of a falling mass, allowed to drop vertically on a system of springs placed directly over a circular loading plate

4.4.1 History

A.C. Benkelman developed a deflection beam in 1953, for measurement of surface deflection under loading condition.

The deflection beam has been used in India for a long period of time is shown in *Figure 4.2*, and ***IRC:81-1981***, defines the guidelines for carrying the Benkelman Beam Method of deflection measurement for the purpose of strengthening of pavement. The beam which consists of a 3.66m long pivoted at a distance of 2.44m.

By carefully placing the load i.e., a loaded truck between the probe, we achieve residue and rebound deflection. Residual deflection exists because of the non-recoverable deflection of by the influence of the deflection caused by front of the beam. Only Rebound Deflection is used for pavement evaluation.

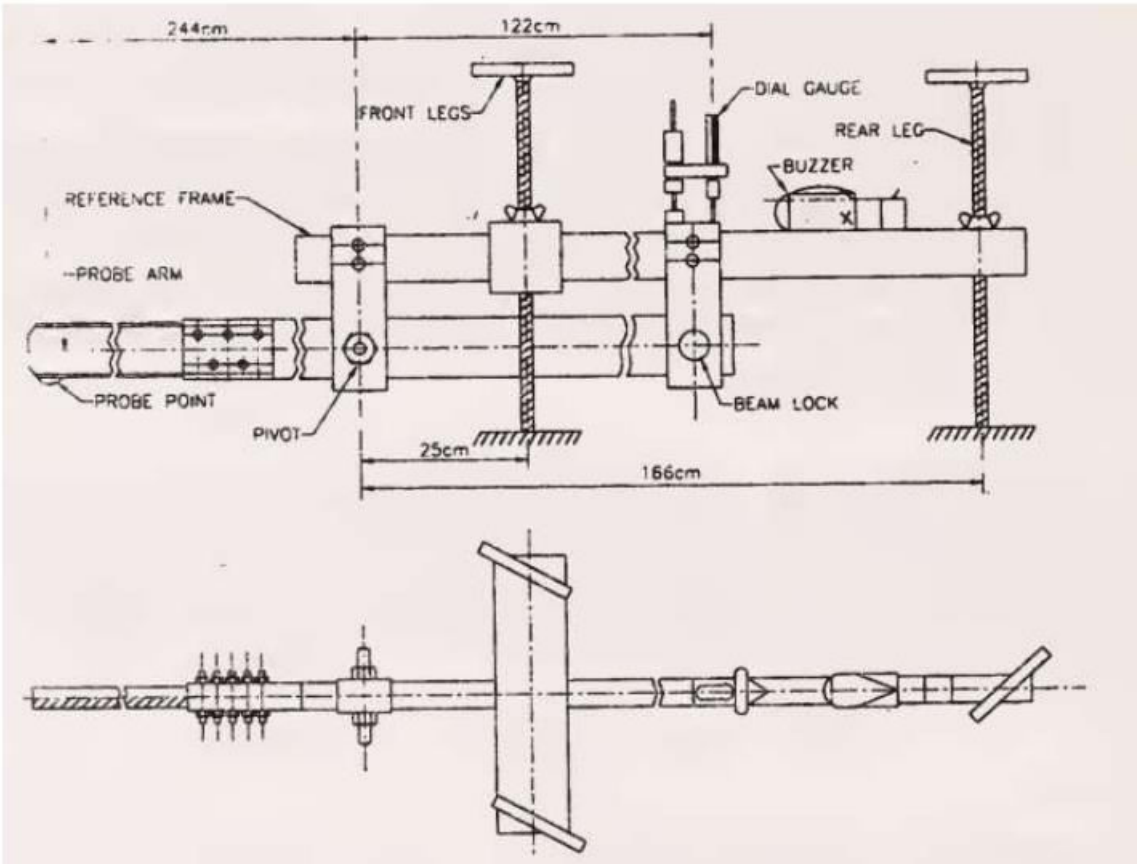


Figure 4.2: Benkelman Beam

Source: ***IRC 81-1981***

4.4.2 Short Comings of Benkelman Beam

1) Benkelman beam involves static moving load, which does not produce deflection produced by loading conditions of a moving load.

2) The evaluation of pavement by this method was labour extensive and time consuming.

3) The beam evaluation under static load was found accurate for older generation of pavements, which comprised of thin and less stiff bituminous course. Benkelman beam evaluation under static load is known to under estimate the strength of modern thick and stiffer bituminous layer such as DBM and BC

4) The test results are likely to be affected by the moving traffic in the nearby lane.

5) The repeatability of the test is hard and it is always a concern. Because of these limitations, there was a need to develop a new deflection measuring device, which could perform efficiently and effectively and should be able to produce accurate results for High Volume Modern Pavements

4.5 Falling Weight Deflectometer

4.5.1 General Introduction

Pavement structure is typically composed of several layers of different material, each of which receives the loads from the above layer, spreads them out, and then passes them on to the layer below. Material layers are usually arranged within a pavement structure in order of descending load bearing capacity with the highest load bearing capacity material on the top and the lowest load bearing

capacity material on the bottom. In general pavements should be designed to perform satisfactorily without developing unacceptable levels of distresses during the design life period. The structural adequacy of the existing pavement is demonstrated based on the study of structural performance of the pavement. If a pavement shows load associated distress like fracture, permanent deformation etc., then it is considered to have failed structurally. To ensure that unacceptable levels of distresses do not occur during design period, the critical strains developed under the load should be less than the limiting strain values corresponding to the design traffic selected.

4.5.2 Principal

Structural evaluation of pavements involves application of a standard load to the pavement and measuring its response in terms of stress, strain or deflection. Among the equipment available for structural evaluation of pavements, the Falling Weight Deflectometer (FWD) is extensively used world-wide because it simulates, to a large extent, the actual loading conditions of the pavement. The resulting load-deflection data can be interpreted through appropriate analytical techniques, such as back calculation technique, to estimate the elastic moduli of the pavement layers. The computed moduli are, in turn, used for

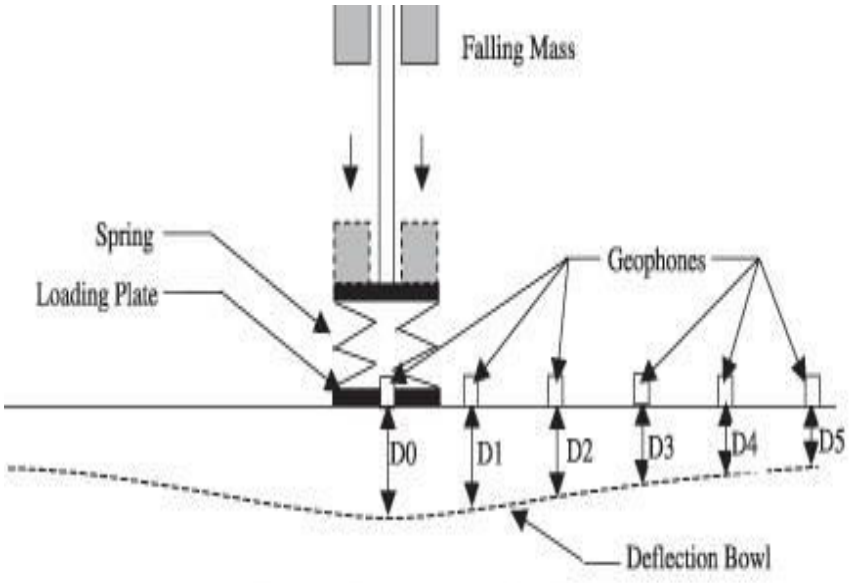
(i) The strength evaluation of different layers of in-service pavements

(ii) The estimation of the remaining life of in-service pavement

(iii) Determination of strengthening requirement, if any and

(iv) Evaluation of different rehabilitation alternatives (Overlay, recycling, partial reconstruction, etc.).The guideline for the test and evaluation of structural condition of in-service pavements is detailed ***in IRC:115-2014,*** *for flexible pavement* ***and IRC:117-2015***, for rigid pavement.

The test was carried out using 300mm diameter plate and 40 KN (+/- 4KN) load for flexible pavement and higher load (Above 40KN)-for rigid pavement. The deflections were measured at 7 geo-phones, each at a radial distance of 0, 200, 300, 450, 600, 900 and 1200 (all in mm).



Source: IRC 115-2014

Figure 4.3: Working Principle of Falling Weight Deflectometer

Figure 4.4: KAUB FWD

1. KAUB FWD is a vehicle mounted FWD, produced as per specifications of IRC-115:2014 is shown in Figure 4.4.
2. The peak load of KAUB FWD is between 10 KN to 70KN, which makes it compatible with both flexible as well as rigid pavement.
3. KAUB FWD, have a 300mm TYPE-4 loading plate with individual tilt and individual vertical movement, with a 32mm ribbed rubber pad under the plate as opposed to 5mm rubber pad referred by IRC-115:2014.
4. KAUB FWD, have a falling mass of 50KG - 350KG, and is dropped by the varying height of 100mm to 600mm to produce load pulse of desired peak and duration,
5. A total of 7 number of Geophones are placed as specified in the table below

Table 4.2: FWD Configuration

KAUB Vehicle Mounted FWD		
Criteria	*Value*	*Value of IRC-115:2015*
Peak load	70KN	80KN
Loading Plate	300mm	300-400mm
Rubber Pad	32mm	5mm
Falling Mass	50kg-350kg	50kg-350kg
Drop Hammer	100mm-500mm	100mm-600mm
Geophones (away from loading plate)	7-Sensors @ 0,200,300,450,600,900,1200(mm) radial distance	a) 7 sensors at 0, 300, 600, 900,1200,1500 and 1800 mm radial distances b) 7 sensors at 0, 200, 300, 450, 600, 900, 1500 mm radial distances c) 6 sensors at 0, 300, 600, 900, 200 and1500 mm radial distances

		d) 6 sensors at 0, 200, 300, 600, 900, 1200 mm radial distances.

4.6 Analysis Methodology

IRC:115-2014 provides detailed procedure for the evaluation of structural condition of in- service pavements using deflection data from Falling Weight Deflectometer as well as other pavement data as inputs to a back calculation model for determining the elastic moduli of pavement layers, and, thereafter, using these moduli as inputs to a pavement design model for estimating the overlay requirement.

Accordingly, the sequence of analysis steps as per the ***IRC: 115-2014*** is as follows:

- The recorded data will be normalized to a standard load (***IRC 115-2014***)
- The normalized deflections will be then processed and back calculated using KGPBACK to obtain Elastic Modulus values of Bituminous, Granular layer and Sub- grade.
- The corrections factors for temperature corrections and seasonal variations will be applied to all layers as suggested in ***IRC:115-2014***
- Selecting 15th percentile Moduli values for the purpose of design for each homogeneous section;
- Checking the in-serviceability of the Pavement layers through Performance criteria (Both Rutting and Cracking) - Analysing the Remaining life.

Sequence of FWD data analysis and snapshot of application used for analysis are presented in Figure ure-4.5 below:

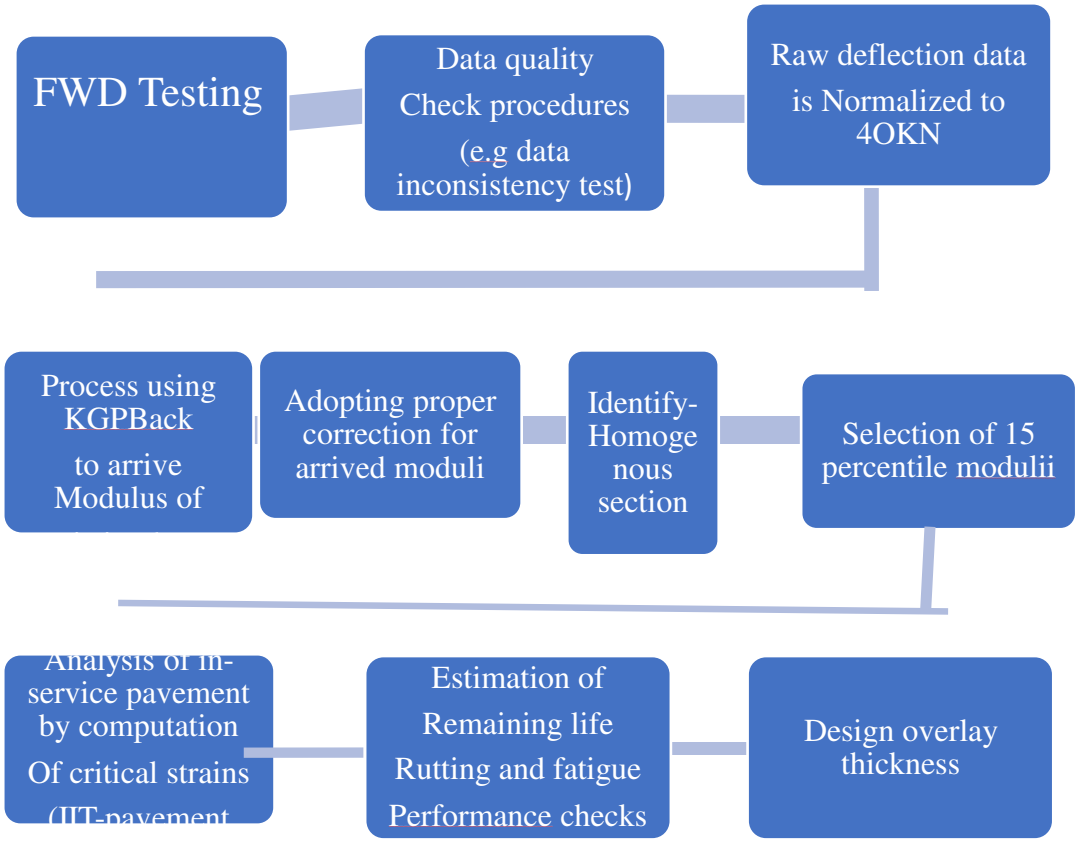


Figure 4.5: Flow Chart of FWD data analysis

IRC:117-2015 provides details procedure for the evaluation of structural condition of rigid pavement using deflection data from Falling Weight Deflectometer.

Accordingly, the sequence of analysis step as per the ***IRC:115-2014*** is follows

- The recorded data at a radial distance 0,300,600 and 900 will be normalized to a standard load.
- From area Parameter, radius of relative stiffness and normalized equations are derived.
- Modulus of Subgrade reaction, Elastic modulus of concrete and flexural strength is calculated from above parameters.
- These strength parameters are given as input to Cumulative Fatigue Damage analysis as per ***IRC:58-2015*** to estimate remaining life of rigid pavement.

```
#########################################################
#         !!!  THANKS FOR USING KGPBACK  !!!            #
#             THE RESULTS ARE GIVEN BELOW               #
#########################################################

#################
#  INPUT DATA   #
#################
No.of Layers                              =  3
FWD Load (N)                              = 40000.00
Contact Pressure (MPa)                    =  .56
No.of Deflection points                   =  7
Deflections measured using FWD (mm)       =  .30300   .24600   .21500   .17800   .14200   .08500   .05700
Radial distances from centre of load(mm) =    .0  200.0  300.0  450.0   600.0   900.0  1200.0
Layer thickness (mm)                      = 170.00 450.00
Poisson ratio values                      = .35 .35 .35
Layer Modulus (MPa) Ranges Selected :-
(a) Bituminous Surfacing                  =  750.0   3000.0
(b) Granular Base                         =  100.0   500.0
(c) Subgrade                              =   65.0   100.0


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

Backcalculated Layer Moduli are:
Surface (MPa)  =    2969.2
Base (MPa)     =     419.1
Subgrade (MPa) =     100.0
```

Figure 4-6: KGPBACK Output

4.7 Procedure - Flexible pavement

The FWD testing have been carried out at spacing ***Table-2 of IRC:115-2014***shown in *Table 4.3* below for different Lane & km. Deflections measured by the FWD equipment are influenced by pavement temperature. Measurements made when the pavement temperature is different than standard temperature has be corrected. The deflection measurements, pavement temperature, subgrade soil & deflection, and other information collected during the deflection study have been recorded. Following procedure has been followed for measurement of FWD:

- The test location is marked on the field.
- The loading plate along with the deflection sensors have been lowered at the test location.
- The target load has been applied and the deflections have been measured for 3 times. The first load is considered as a seating load and the values are not adopted for analysis.

4.8 Pavement Condition Data

The pavement condition data different modes of distress, extent and severity levels is collected along the project carriageway or client shall provide Pavement Condition Survey data so that intervals at test shall be conducted could be evaluated. As per **IRC-115-2014**, criteria for classification of Pavement sections shall be worked out as given in **Table 4-3.**

Table 4-3: Classification of Pavement Stretch

Classification	**Pavement Condition**
Good	Isolated cracks of less than 3.0 mm width in less than 5% area of total Paved Surface AND average rut less than 10mm
fair	Isolated cracks of less than 3.0 mm width in less than 5 to 20% area of total Paved Surface AND/OR average rut less than 10 to 20mm
Poor	Wide Interconnected cracking of More than 3.0mm Width in 5 to 20% area (Include area of patching and raveling in this) of paved area OR cracking of any type in more than 20% area of paved surface AND/OR average rut depth of more than 20mm

The Pavement is classified as good, fair and poor according to the present condition of pavement observed on site. Once total stretch is classified according to pavement condition test points has been finalized according to *Table 2* **of IRC: 115-2014**shown in Table 4-4 below:

Table4.4: -Measurement Scheme for deflection survey

Type of Carriage way	**Recommended measurement scheme**	**Maximum Spacing (m) for test points along selected wheel path for pavements of different classification**		
		Poor	**Fair**	**Good**
Single Lane Two-Way	measure along both outer wheel paths	60	130	500

Carriageway				
Two Lane Two Way single Carriageway	measure along both outer wheel paths	60	130	500
Four Lane Single Carriageway	1) measure along both outer wheel paths 2) measure along outer wheel path of more distressed inner lane 3) measure along the centre line of paved shoulder	30 60 120	65 130 260	250 500 500
Four Lane Dual Carriageway	1) measure along outer wheel path of more distressed outer lane 2) measure along outer wheel path of more distressed inner lane 3) measure along the centre line of paved shoulder	30 60 120	65 130 260	250 500 500
Dual Carriageway with three or more lanes	1) measure along outer wheel path of more distressed outer lane 2) measure along outer wheel path of more distressed inner lane 3) measure along the centre wheel path of paved shoulder	30 60 120	65 130 260	250 500 500

4.9 Position of Wheel Path

As per ***IRC:115-2014,*** wheel path along which the deflection data is collected is specified, the wheel path is defined below in *Figure 4.7.1* to *Figure .4.7.3*:

Outer wheel paths of outer lanes: -

1) For single-lane two-way carriageway: - at 0.6 m from the outer edge of the outer lane

2) For two-lane two-way carriageway and for multi-lane single carriageway: - at 1 .0 m from the outer edge of outer lane

3) For divided carriageways with two or more lanes in each direction: - 0.75 m from the outer edge of outer lane

Outer wheel paths of inner lanes for multi-lane single carriageway: -

1) at 4.0 m from the outer edge of outer lane

2) For divided carriageways with two lanes in each direction 4.2 m from the outer edge of outer lane

3) For divided carriageways with three lanes in each direction 4.2 m from the outer edge of outer lane for central lane and at 5.2 m from the outer edge of outer lane for the lane adjacent to median

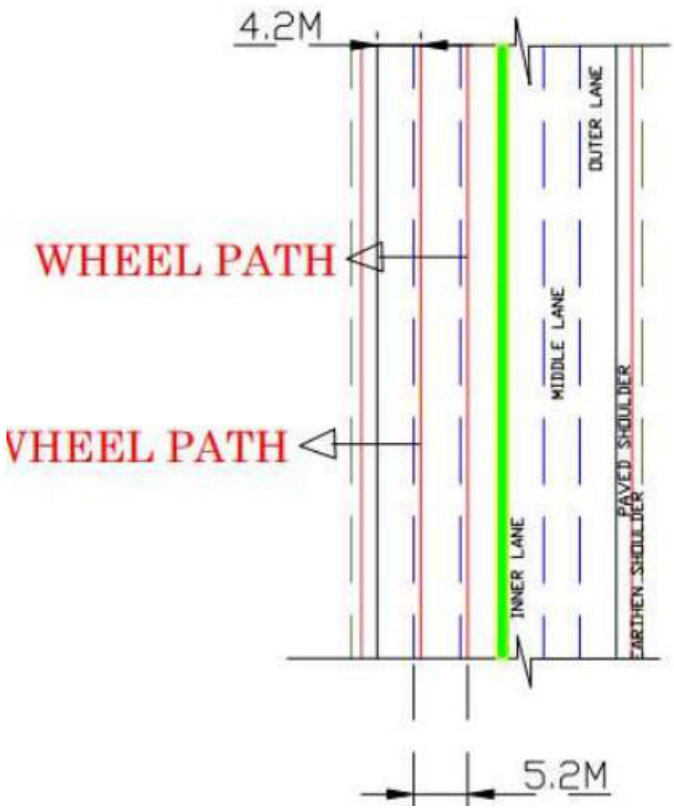


Figure -4.7.1 or more lane wheel path

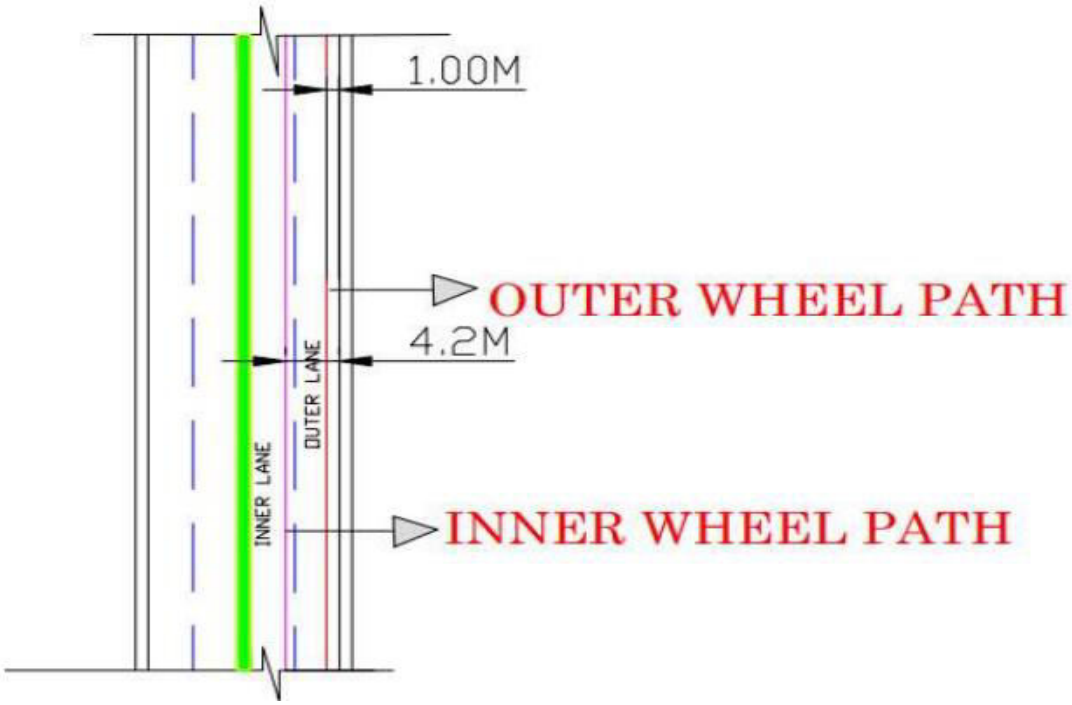


Figure 4.7.2: -Lane Wheel path

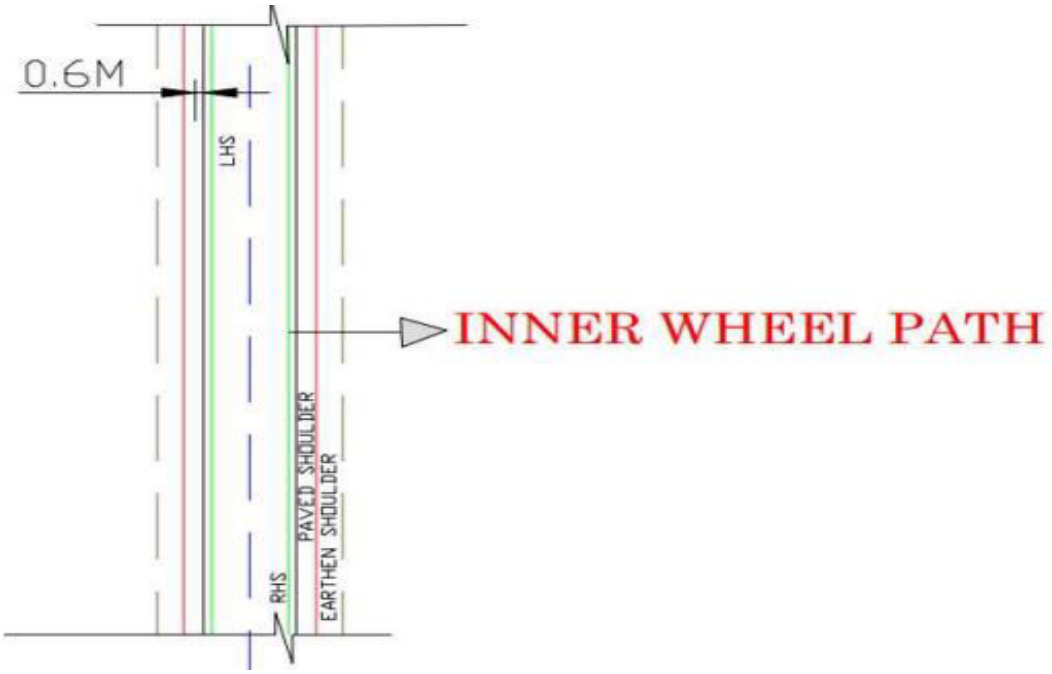


Figure .4.7.3-Single Lane Carriageway Wheel Path

Table 4-5: -Pavement Condition Details

S.No	From	To	Length	Pavement Condition	Remarks
1	360+915	402+000	41.805	Fair	
2	402+000	360+915	41.805	Fair	

4.10 Temperature Measurement

The standard temperature for doing the experiment is 35°C. Since it is not possible to conduct the test at the standard temperature, a correction factor has to be applied for the deflection. The correction factor is determined by knowing the temperature at the time of the survey. The pavement temperature during the survey has been measured for every one hour by drilling a hole of 40mm in the pavement and filling it with glycerol.

4.11 Back Calculation and data Required-Flexible Pavement Software Used:

4.11.1 Calculation and Interpretation

- KGPBACK – Genetic Algorithm based software for back calculating the layer moduli.
- Three-layer system (Bituminous, Granular & Subgrade)

Data required:

- Deflection at various radial distances is given in **Annexure-II-A.**
- Existing layer thickness – the existing layer thicknesses of various stretches have been obtained from the Client based on the construction records.
- Layer moduli range – the layer moduli adopted for the analysis is shown in next section
- **Poisson's ratio:** BT-0.5, Granular-0.4, Subgrade-0.4 (For Back calculation and IITPAVE analysis without considering overlay).

4.11.2 Existing Layer thickness

Thickness of existing pavement layers is as given below in Table 4-6:

Table4-6: -Existing Crust Thickness

Location, Km		**Bituminous (BT), mm**	**Granular, mm**
BHS			
360+915	402+000	210	450

Note: Existing crust thickness and CBR value and design MSA provided by the client.

4.11.3 Range of Moduli

Table 4-7: Range of Moduli

Type of layer	Lower and Upper Limit (MPa)
Subgrade	35 to 100 Mpa
Granular	100 to 500 Mpa
Bituminous	750 to 3000 Mpa, For Good Condition
	400 to 1500 Mpa, For Fair-Poor Condition

4.11.4 Correction for Temperature - Flexible pavement

The stiffness of bituminous layer is highly susceptible to temperature and hence consequently the surface deflections of a given pavement will vary depending on the temperature of the constituent bituminous layers. If the depth of the BT surface is more than 40mm, then correction factor has to be applied. If the depth is less i.e., if it is a thin bituminous surfacing like premix carpet and surface dressing, then no correction is required. Correction for temperature variation on deflection values measured at temperature other than 35°C should be calculated by the formula provided in ***IRC 115-2014***.

The key points to consider are:

- Pavement temperature range applicable for correction factor – 20°C to 45°C.
- FWD shall not be carried for pavement temperature more than 45°C

Temperature correction not required for following cases:

- Bituminous layers (depth < 40 mm)
- "Poor" sections
- Where average daily temperature is < 20°C for more than 4 months

4.12 Correction for Seasonal Variation - Flexible pavement

Moisture content affects the strength of subgrade and granular sub base/base layers. The extent to which the strength is affected will depend on the nature of subgrade soil, gradation and nature of fines in the granular layers, etc. For the purpose of applying these guidelines, it is intended that the pavement layer moduli values should pertain to the period when the subgrade is at its weakest condition. As per IRC: 115-2014, granular layers and subgrade will be in its weakest condition during the post-monsoon season. Since survey was conducted in the month of **February-2022, Correction for Winter season, as per equation 6 and 9 of IRC:115-2014 is adopted.**

4.13 Data Analysis - Flexible pavement

Moduli of each layer are calculated using KGPBACK for each test point. Details of input parameters are shown in Table 4.9,4.10 are given in **Annexure-II-A.**

4.14 Delineation of Homogeneous Section- Flexible Pavement

A statistical technique popularly used for identification of homogeneous sections is the "Cumulative Difference" approach. This approach is already being used extensively in India in many highway projects. In this approach, the sequence of actual cumulative sums in a measurement series is compared with the sums that would have resulted from adding averages. The difference between these values is termed as cumulative difference. Surface Curvature Index (SCI) calculated as the difference between and D0 and D300 where,

D0 and D300 are the peak deflections (mm) measured at the centre of loading plate and at a radial distance of 300 mm is a bowl shape parameter, which reflects the contribution of upper layers, is the bowl shape parameter used to calculate cumulative difference. Wherever the slope changes in the plot of cumulative difference VS distance (or number of test location), that should be considered as a possible delineator for identifying homogeneous sections shown in Fig. 4.7.4

The graph below shows plot between Cumulative Difference and test locations. The homogenous sections identified from Cumulative difference approach was further divided based on stretches with homogenous traffic. 15th percentile of modulus and average of existing pavement thickness in each homogenous section identified is given in table below:

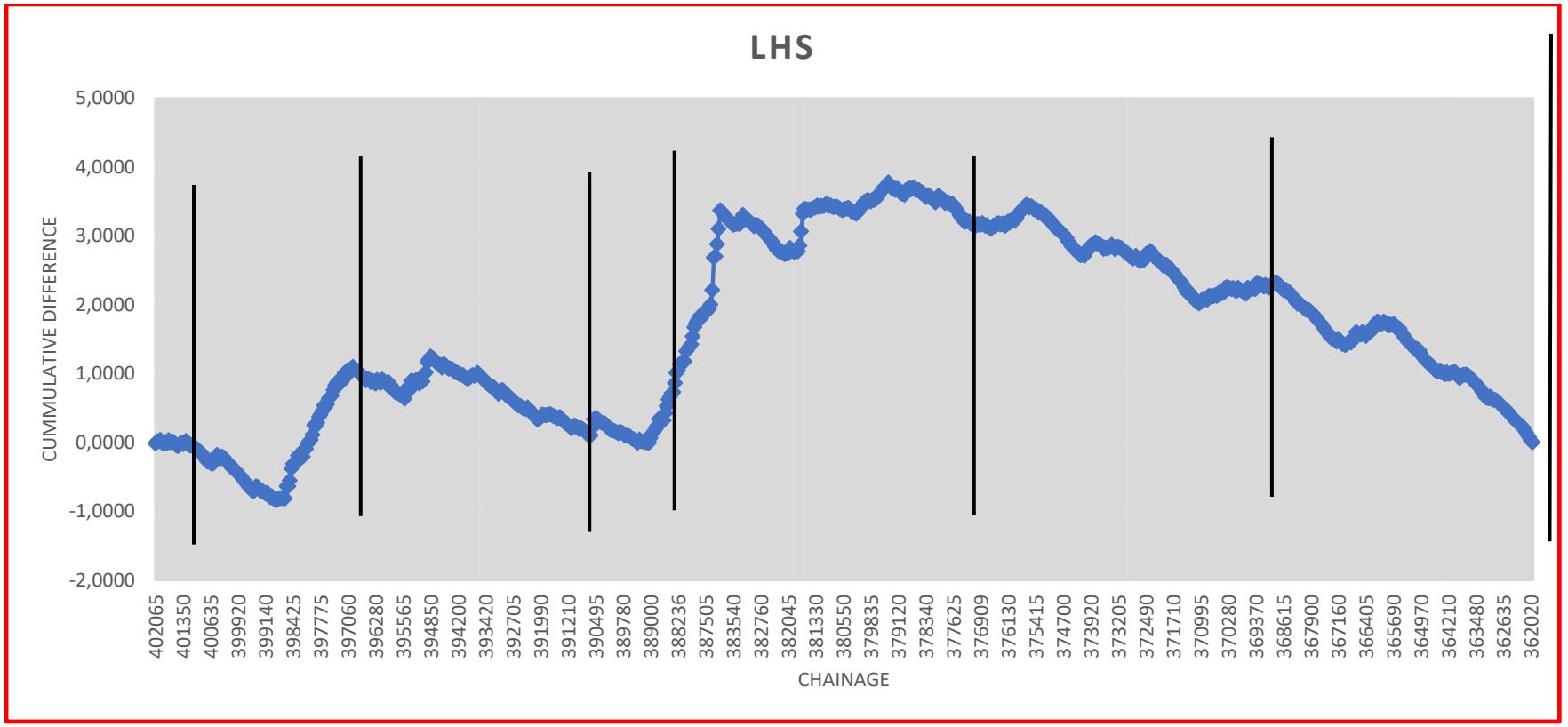


Figure 4-7.4: Cumulative Difference v/s Chainage-LHS

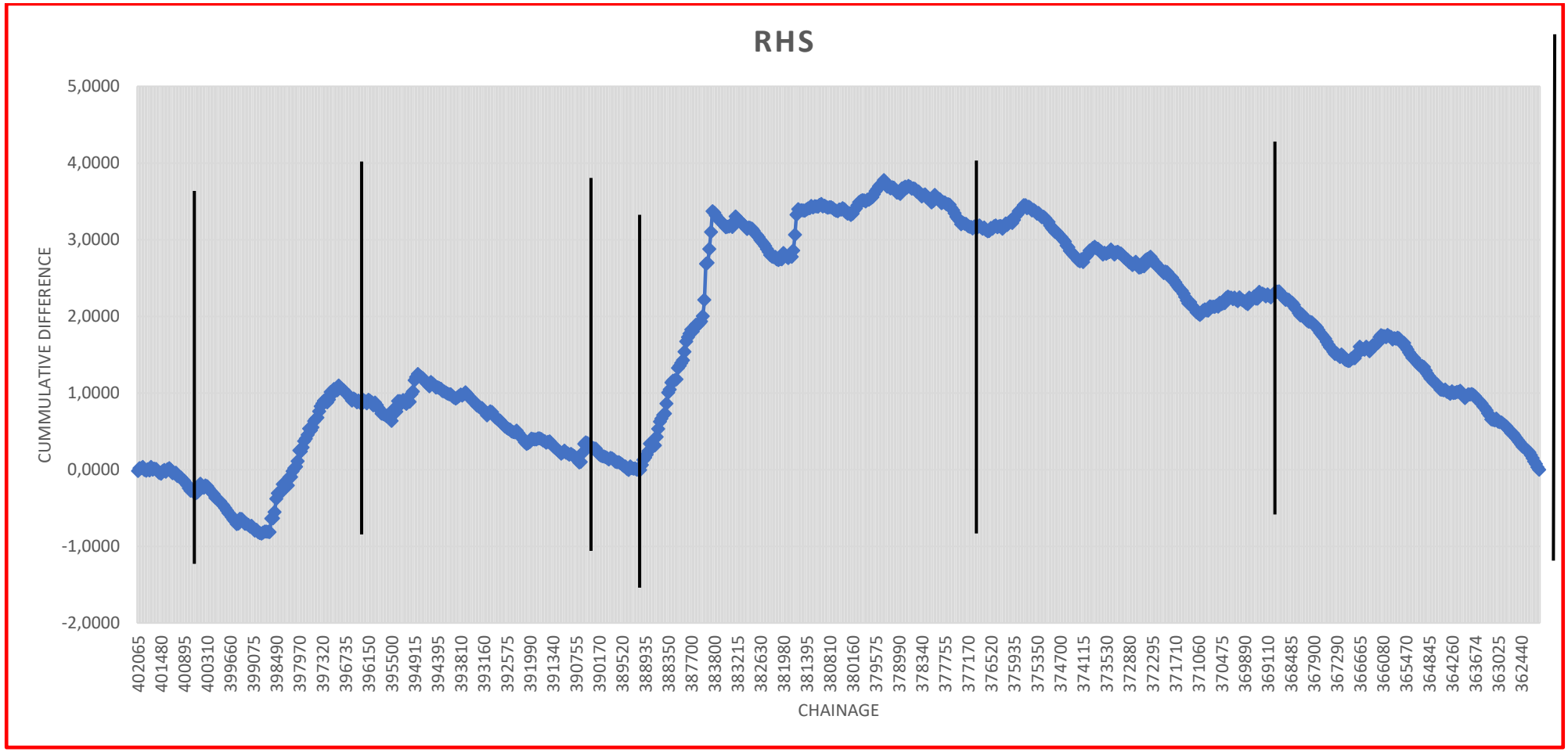


Figure 4.8: Cumulative Difference v/s Chainage-RHS

4.15 15th Percentile Corrected Moduli MPa respectively for Bituminous, granular and Subgrade layers - Flexible pavement

Selecting 15th Percentile Corrected moduli of in-Service layers respectively for bituminous, granular and Subgrade layers' accordance with IRC:115-2014. The summary of the results is shown in table 4.8 below.

Table4-8: Corrected Moduli MPa respectively for Bituminous, granular and Subgrade layers

S.No.	Homogenous Sections		Side	15th Percentile Back cal. Elastic Modulus, MPa			Remarks
	From	To		BT	Granular	Subgrade	
1	360+915	366+895	LHS	1478.95	366.24	76.91	4-Lane
2	366+895	369+820	LHS	1270.17	170.24	76.99	4-Lane
3	369+820	376+135	LHS	1570.24	363.67	76.99	4-Lane
4	376+135	387+350	LHS	1294.87	365.99	76.97	4-Lane
5	387+350	394+520	LHS	1213.87	363.76	76.99	4-Lane
6	394+520	401+403	LHS	1119.08	313.44	76.91	4-Lane
7	402+065	398+750	LHS	1129.15	365.41	76.95	4-Lane
8	398+750	394+655	LHS	1094.72	359.15	76.99	4-Lane
9	394+655	389+000	LHS	1696.56	361.19	76.99	4-Lane
10	389+000	383+670	LHS	639.68	229.62	76.99	4-Lane
11	383+670	376+390	LHS	1207.79	364.76	76.91	4-Lane
12	376+390	368+680	LHS	1121.50	364.20	76.91	4-Lane
13	368+680	362+180	LHS	1489.74	366.61	76.83	4-Lane

Annexure-II-A

Table 4.9: Remaining Life

	Homogenous Sections		Side	Thickness, mm		Moduli, Mpa			Strains		Existing Remaining Life 90% reliability			Design msa	Check
S. No	From	To		Existing BT	Existing Granular	BT	Granular	Sub grade	Tensile	Vertical	Fatigue	Rutting	Remaining life		
1	360+915	366+895	LHS	210	450	1478.95	366.24	76.91	1.41E-04	1.99E-04	131.67	853.27	131.67	110	**SAFE**
2	366+895	369+820	LHS	210	450	1270.17	170.24	76.99	2.19E-04	2.55E-04	27.39	276.97	27.39	110	**UNSAFE**
3	369+820	376+135	LHS	210	450	1570.24	363.67	76.99	1.38E-04	1.97E-04	137.14	893.3	137.14	110	**SAFE**
4	376+135	387+350	LHS	210	450	1294.87	365.99	76.97	1.50E-04	2.04E-04	117.84	759.01	117.84	110	**SAFE**
5	387+350	394+520	LHS	210	450	1213.87	363.76	76.99	1.55E-04	2.07E-04	110.42	710.4	110.42	110	**SAFE**
6	394+520	401+403	LHS	210	450	1119.08	313.44	76.91	1.74E-04	2.22E-04	74.38	518.38	74.38	110	**UNSAFE**
7	402+065	398+750	RHS	210	450	1129.15	365.41	76.95	1.59E-04	2.10E-04	105.82	672.77	105.82	110	**UNSAFE**
8	398+750	394+655	RHS	210	450	1094.72	359.15	76.99	1.62E-04	2.12E-04	99.34	637.54	99.34	110	**UNSAFE**
9	394+655	389+000	RHS	210	450	1696.56	361.19	76.99	1.34E-04	1.94E-04	145.6	953.26	145.6	110	**SAFE**
10	389+000	383+670	RHS	210	450	639.68	229.62	76.99	2.64E-04	2.72E-04	23.92	205.63	23.92	110	**UNSAFE**
11	383+670	376+390	RHS	210	450	1207.79	364.76	76.91	1.55E-04	2.07E-04	110.62	708.85	110.62	110	**SAFE**
12	376+390	368+680	RHS	210	450	1121.5	364.2	76.91	1.60E-04	2.10E-04	104.38	664.1	104.38	110	**UNSAFE**
13	368+680	362+180	RHS	210	450	1489.74	366.61	76.83	1.41E-04	1.99E-04	133.04	859.14	133.04	110	**SAFE**

Table 4-10: Overlay Requirement

S. No	Homogenous Sections		Side	Thickness, mm		Moduli, Mpa			Strains		Existing Remaining Life 90% reliability			Design msa	Check
	From	To		Existing BT	Existing Granular	BT	Granular	Subgrade	Tensile	Vertical	Fatigue	Rutting	Remaining life		
1	360+915	366+895	LHS	210	450	1478.95	366.24	76.91	1.41E-04	1.99E-04	131.67	853.27	131.67	110	**SAFE**
2	366+895	369+820	LHS	210	450	1270.17	170.24	76.99	2.19E-04	2.55E-04	27.39	276.97	27.39	110	**UNSAFE**
3	369+820	376+135	LHS	210	450	1570.24	363.67	76.99	1.38E-04	1.97E-04	137.14	893.3	137.14	110	**SAFE**
4	376+135	387+350	LHS	210	450	1294.87	365.99	76.97	1.50E-04	2.04E-04	117.84	759.01	117.84	110	**SAFE**
5	387+350	394+520	LHS	210	450	1213.87	363.76	76.99	1.55E-04	2.07E-04	110.42	710.4	110.42	110	**SAFE**
6	394+520	401+403	LHS	210	450	1119.08	313.44	76.91	1.74E-04	2.22E-04	74.38	518.38	74.38	110	**UNSAFE**
7	402+065	398+750	RHS	210	450	1129.15	365.41	76.95	1.59E-04	2.10E-04	105.82	672.77	105.82	110	**UNSAFE**
8	398+750	394+655	RHS	210	450	1094.72	359.15	76.99	1.62E-04	2.12E-04	99.34	637.54	99.34	110	**UNSAFE**
9	394+655	389+000	RHS	210	450	1696.56	361.19	76.99	1.34E-04	1.94E-04	145.6	953.26	145.6	110	**SAFE**
10	389+000	383+670	RHS	210	450	639.68	229.62	76.99	2.64E-04	2.72E-04	23.92	205.63	23.92	110	**UNSAFE**
11	383+670	376+390	RHS	210	450	1207.79	364.76	76.91	1.55E-04	2.07E-04	110.62	708.85	110.62	110	**SAFE**
12	376+390	368+680	RHS	210	450	1121.5	364.2	76.91	1.60E-04	2.10E-04	104.38	664.1	104.38	110	**UNSAFE**
13	368+680	362+180	RHS	210	450	1489.74	366.61	76.83	1.41E-04	1.99E-04	133.04	859.14	133.04	110	**SAFE**

4.16 Experimental Study

4.16.1 About the Project

4.16.2 Introduction

The National Highway Association of India has been engaged in the development of National Highways. In this regard it is decided to undertake the following projects to carry out the Falling Weight Deflectometer (FWD) Test for the project corridors.

This thesis provides the: -

i. The corrected Back calculated Moduli for bituminous, granular and Subgrade layers

ii. Remaining life of the pavement surface in both Rutting and Fatigue Criteria

iii. The Overlay requirement wherever necessary

The following pavements have been selected and are mentioned in table 4.11: , where structural evaluation is done using FWD.

Table:4.11: -List of Projects

S. No	Codes	Name of Project	Type of Pavement
1	NH-28	Operation and Maintenance period for the work of 4 Lanning from Km. 360+915 to Km. 440+000 of Gorakhpur-Kotwa section of NH-28 in the state of Bihar. (Package-9)	Flexible Pavement
2	RS Pura Road	Structural Evaluation of 2/4 Lane Road from Km. 0+00 to 26+300 Km. of Suchetgarh-Gharana-Tawi Bridge Jammu	Flexible Pavement
3	NH-334B	UP-Gradation to 4 lane Configuration & Strengthening of Rohna/Hassangarh to Jhajjar Section from Km. 44.800 to Km. 80.250 of NH-334B in the State of Haryana on HAM Basis (Package-2)	Rigid Pavement

4.17 Project 2 Introduction

2/4 lane Road Suchetgarh-Gharana-Tawi Bridge Jammu. M/s Intercontinental Consultants and Technocrats Private Limited. as Client has appointed G-Engineering Advisory Services Private Limited, Gurugram, as the "Design Consultant" to carry out the Falling Weight Deflectometer (FWD) Test Analysis for the project corridor.

4.17.1 Project Road

2/4 lane Road Suchetgarh-Gharana-Tawi Bridge Jammu

4.17.2 Scope of Work

The Study has been initiated with the aim of Strength and life of Pavement by measuring deflection as per Indian Codes/Standards. To accomplish this purpose Falling Weight Deflectometer (FWD). Test were performed along the project stretch.

Project stretch details are given in table 4.12 below.

Table 4.12: Project Stretch details

S.No	From, Km	To, Km	Type of Pavement	Remarks
1	0+000	18+250	Flexible Pavement	4- Lane
2	18+250	18+750	Flexible Pavement	2-Lane
3	18+750	19+500	Flexible Pavement	4- Lane
4	19+500	24+900	Flexible Pavement	2-Lane
5	24+900	26+300	Flexible Pavement	4- Lane

Table 4-13: Pavement Condition Details

S.No	From	To	Side	Pavement Condition	Remarks
1	0.000	26+300	BHS	Good	

Figure 4.9: Photograph Showing Falling Weight Deflectometer at site

Figure 4.10: Photographs Showing Falling Weight Deflectometer at site

4.17.3 Existing Layer thickness

Thickness of existing pavement layers is as given in table 4.13 below:

Table 4.14: Existing Crust Thickness

S.NO	Chainage (Km)	SIDE	BC (mm)	GSB (mm
1	0+000	R/S	110	270
2	3+100	L/S	120	160
3	5+350	R/S	180	300
4	6+000	L/S	135	360
5	7+000	R/S	120	200
6	8+000	L/S	80	250
7	9+000	R/S	100	200
8	10+000	L/S	110	210
9	11+000	R/S	190	270
10	12+000	L/S	70	270
11	13+000	R/S	70	270
12	14+000	L/S	85	150
13	15+000	R/S	70	200
14	16+000	L/S	80	210
15	17+000	R/S	55	210
16	18+000	L/S	50	210
17	20+000	L/S	100	200
18	21+000	R/S	110	340
19	22+000	L/S	110	150
20	23+000	R/S	110	270
21	24+000	L/S	90	210
22	26+000	L/S	25	230

4.17.4 Range of Moduli

Table 4.15: Range of moduli

Type of layer	Lower and Upper Limit (MPa)
Subgrade	30 to 100 MPa
Granular	100 to 500 MPa
Bituminous	750 to 3000 MPa, For Good Condition
	400 to 1500 MPa, For Fair-Poor Condition

Soil CBR=6%

ANNEXURE-II-B

Table 4.16: Remaining Life of Existing Pavement

Sl. No.	Homogenous Sections		Side	Thickness, mm		Moduli, MPa			Strains as per IIT Pave		Existing Remaining Life 90% reliability		
	From	To		Existing BT	Existing Granular	BT	Granular	Sub grade	Tensile	Vertical	Fatigue	Rutting	Remaining life
1	0+000	18+250	LHS	96	229	1445.26	62.63	58.77	0.00065600	0.00106700	0.34	0.42	0.34
2	18+250	0+000	RHS	113	246	1170.63	60.21	60.42	0.00064590	0.00091980	0.44	0.82	0.44
3	18+250	18+750	BHS	75	206	2072.93	366.43	72.12	0.00027020	0.00076650	7.95	1.88	1.88
4	18+750	19+500	LHS	100	200	1556.89	199.57	60.21	0.00038800	0.00092440	2.48	0.80	0.80
5	19+500	18+750	RHS	55	210	2287.36	348.02	76.99	0.00027800	0.00083520	6.54	1.27	1.27
6	19+500	24+900	BHS	98	223	1081.09	60.21	47.98	0.00078680	0.00132700	0.22	0.16	0.16
7	24+900	26+300	LHS	25	230	1024.29	60.21	43.17	0.00107200	0.00242600	0.07	0.01	0.01
8	26+300	24+900	RHS	110	270	566.34	59.85	40.31	0.00102300	0.00139500	0.14	0.12	0.12

4.18 Project Road 3

Rehabilitation and UP-Gradation to 4 lane Configuration & Strengthening of Rohna/ Hassangarh to Jhajjar Section from Km. 44.800 to Km. 80.250 of NH-334B in the State of Haryana on HAM Basis (Package-2)

4.18.1 Scope of Work

The Study has been initiated with the aim of Strength and life of Pavement by measuring deflection as per Indian Codes/Standards. To accomplish this purpose Falling Weight Deflectometer (FWD). Test were performed along the project stretch.

Project stretch details are given in table 4.15 below.

Table 0.17: Project Stretch details

S.No	From	To	Length	Type of Pavement	Remarks
1	44+800	80+250	35.450	Rigid Pavement	**4 lane**

Table 0-18: Pavement Condition Details

S.No	From	To	Length	Pavement Condition	Remarks
1	44+800	80+250	35.450	Good	

4.18.2 Existing Layer thickness

Thickness of existing pavement layers is as given in table 4.17 below:

Table 0-19: Existing Crust Thickness

Configuration	Thickness, mm
Pavement Quality Concrete, PQC	260mm
Dry Lean Concrete, DLC	150mm
Granular Sub-base, GSB	150mm

4.18.3 Data, analysis and results for Rigid Pavement

Different Strength Parameters were calculated from deflections at radial distance 0, 300, 600, and 900mm. Results of analysis are given in Annexure-II. Sample of analysis as per IRC:117-2015 is given in Annexure-II. 15th percentile of all strength parameters is used for remaining life calculation. Summary of strength Parameters are given in Table 4.18

Table 0-20: Summary of Strength Parameters

Parameters	15th percentile
Km. 44+800 to Km. 80+250 LHS	
Modulus of Subgrade reaction of subgrade, MPa/m	87.74
Elastic Modulus of Concrete, EC (MPa)	46216.11

28-day Flexural strength of cement concrete, MPa	6.47
Km. 80+250 to Km. 44+800 RHS	
Modulus of Subgrade reaction of subgrade, MPa/m	85.73
Elastic Modulus of Concrete, EC (MPa)	50124.73
Flexural strength of cement concrete, MPa	7.02

4.18.4 Load Transfer Efficiency (LTE) – Rigid Pavement

Proper functioning of pavement requires efficient transfer of load at joints. Joints may deteriorate overtime, resulting in reduces load transfer efficiency. Load transfer efficiency can be determined if deflection at either side of joint is known, when load is applied on one of the slabs. If D1 and D2 are deflection on loaded and unloaded slab respectively,

$$\text{LTE} = \frac{D2}{D1} \text{x } 100$$

If LTE is less than 50%, joint should be identified as in critical condition and retrofitting is recommended as per IRC: SP:83.

Average LTE obtained in project stretch is more than 50% as shown in table 4.19 below, hence joints are in safe Condition.

Table 4.21: LTE readings

Location Km.	Load	Side	Lane	Loaded Slab deflection D0 (mm)	Unloaded Slab deflection D300 (mm)	LTE (%)
44+802	65.10	LHS	Outer	0.13	0.11	84.62
45+309	65.60	LHS	Outer	0.10	0.07	70.00
45+796	64.50	LHS	Outer	0.24	0.17	70.83
46+304	65.90	LHS	Outer	0.13	0.11	84.62
46+809	42.50	LHS	Outer	0.20	0.15	75.00
47+302	65.50	LHS	Outer	0.36	0.33	91.67
47+804	63.80	LHS	Outer	0.36	0.30	83.33
48+302	64.50	LHS	Outer	0.32	0.27	84.38
48+804	65.00	LHS	Outer	0.32	0.29	90.63
49+305	66.50	LHS	Outer	0.15	0.13	86.67
49+803	65.90	LHS	Outer	0.12	0.11	91.67
50+304	66.10	LHS	Outer	0.11	0.09	81.82
50+803	66.20	LHS	Outer	0.12	0.10	83.33
51+305	65.40	LHS	Outer	0.18	0.16	88.89
51+813	67.00	LHS	Outer	0.09	0.07	77.78
52+306	65.60	LHS	Outer	0.12	0.11	91.67
52+803	66.60	LHS	Outer	0.12	0.10	83.33
53+304	65.90	LHS	Outer	0.13	0.10	76.92
53+804	66.90	LHS	Outer	0.13	0.11	84.62
54+372	66.40	LHS	Outer	0.11	0.10	90.91
54+805	66.30	LHS	Outer	0.15	0.14	93.33
55+306	66.50	LHS	Outer	0.10	0.09	90.00

Location Km.	Load	Side	Lane	Loaded Slab deflection D0 (mm)	Unloaded Slab deflection D300 (mm)	LTE (%)
55+805	66.10	LHS	Outer	0.14	0.13	92.86
56+303	66.50	LHS	Outer	0.11	0.09	81.82
56+806	66.20	LHS	Outer	0.11	0.09	81.82
57+303	66.30	LHS	Outer	0.10	0.08	80.00
57+964	66.60	LHS	Outer	0.10	0.08	80.00
58+305	66.50	LHS	Outer	0.16	0.12	75.00
58+805	66.40	LHS	Outer	0.15	0.13	86.67
59+306	66.80	LHS	Outer	0.14	0.12	85.71
59+804	66.90	LHS	Outer	0.11	0.10	90.91
60+306	67.00	LHS	Outer	0.11	0.09	81.82
60+804	67.00	LHS	Outer	0.10	0.09	90.00
61+305	67.00	LHS	Outer	0.11	0.09	81.82
61+817	67.00	LHS	Outer	0.11	0.09	81.82
62+314	67.10	LHS	Outer	0.11	0.08	72.73
62+807	67.20	LHS	Outer	0.13	0.11	84.62
63+306	66.80	LHS	Outer	0.12	0.10	83.33
63+803	67.10	LHS	Outer	0.13	0.11	84.62
64+324	67.00	LHS	Outer	0.13	0.12	92.31
64+803	67.10	LHS	Outer	0.11	0.10	90.91
65+301	67.60	LHS	Outer	0.14	0.12	85.71
65+850	67.40	LHS	Outer	0.14	0.12	85.71
66+302	66.20	LHS	Outer	0.13	0.11	84.62
66+805	66.10	LHS	Outer	0.11	0.09	81.82
67+309	66.70	LHS	Outer	0.12	0.10	83.33
67+783	66.60	LHS	Outer	0.11	0.10	90.91
68+301	66.40	LHS	Outer	0.11	0.09	81.82
68+804	66.50	LHS	Outer	0.14	0.11	78.57
69+303	66.10	LHS	Outer	0.18	0.16	88.89
69+803	66.70	LHS	Outer	0.14	0.12	85.71
70+303	66.70	LHS	Outer	0.15	0.13	86.67
70+803	66.80	LHS	Outer	0.14	0.12	85.71
71+303	66.50	LHS	Outer	0.11	0.09	81.82
71+806	66.60	LHS	Outer	0.16	0.14	87.50
72+302	66.70	LHS	Outer	0.11	0.09	81.82
72+803	67.40	LHS	Outer	0.13	0.10	76.92
73+302	68.50	LHS	Outer	0.13	0.10	76.92
73+803	68.50	LHS	Outer	0.13	0.10	76.92
74+301	68.10	LHS	Outer	0.13	0.10	76.92
74+809	68.10	LHS	Outer	0.11	0.09	81.82
75+305	68.90	LHS	Outer	0.09	0.07	77.78
75+802	68.40	LHS	Outer	0.12	0.10	83.33
76+301	68.00	LHS	Outer	0.13	0.11	84.62

Location Km.	Load	Side	Lane	Loaded Slab deflection D0 (mm)	Unloaded Slab deflection D300 (mm)	LTE (%)
76+801	68.40	LHS	Outer	0.12	0.10	83.33
77+301	68.50	LHS	Outer	0.12	0.10	83.33
77+802	68.50	LHS	Outer	0.12	0.09	75.00
78+302	68.00	LHS	Outer	0.12	0.10	83.33
78+807	68.20	LHS	Outer	0.11	0.09	81.82
79+840	68.60	LHS	Outer	0.12	0.10	83.33
80+000	63.80	RHS	Outer	0.58	0.39	67.24
79+501	66.30	RHS	Outer	0.30	0.19	63.33
79+000	67.20	RHS	Outer	0.15	0.12	80.00
78+500	66.20	RHS	Outer	0.29	0.19	65.52
77+998	66.90	RHS	Outer	0.16	0.12	75.00
77+500	64.90	RHS	Outer	0.41	0.27	65.85
77+000	66.50	RHS	Outer	0.19	0.14	73.68
76+499	65.80	RHS	Outer	0.29	0.24	82.76
75+999	66.00	RHS	Outer	0.25	0.18	72.00
75+500	66.30	RHS	Outer	0.16	0.13	81.25
74+999	66.90	RHS	Outer	0.15	0.12	80.00
74+501	66.20	RHS	Outer	0.24	0.21	87.50
73+999	66.20	RHS	Outer	0.24	0.17	70.83
73+500	66.90	RHS	Outer	0.18	0.15	83.33
72+999	68.00	RHS	Outer	0.07	0.06	85.71
72+500	66.70	RHS	Outer	0.24	0.18	75.00
71+998	67.20	RHS	Outer	0.19	0.13	68.42
71+500	67.70	RHS	Outer	0.19	0.15	78.95
70+999	65.20	RHS	Outer	0.45	0.20	44.44
70+500	66.80	RHS	Outer	0.20	0.14	70.00
70+000	66.50	RHS	Outer	0.28	0.22	78.57
69+504	66.60	RHS	Outer	0.29	0.21	72.41
68+949	67.00	RHS	Outer	0.18	0.14	77.78
68+498	67.80	RHS	Outer	0.19	0.17	89.47
67+999	67.90	RHS	Outer	0.16	0.14	87.50
67+498	65.10	RHS	Outer	0.12	0.10	83.33
66+998	65.50	RHS	Outer	0.14	0.12	85.71
66+498	65.10	RHS	Outer	0.19	0.15	78.95
65+999	65.00	RHS	Outer	0.12	0.10	83.33
65+498	66.40	RHS	Outer	0.14	0.12	85.71
64+998	66.50	RHS	Outer	0.19	0.15	78.95
64+498	66.00	RHS	Outer	0.14	0.12	85.71
63+998	66.60	RHS	Outer	0.18	0.15	83.33
63+497	67.00	RHS	Outer	0.13	0.12	92.31
62+903	67.40	RHS	Outer	0.17	0.14	82.35
62+498	67.60	RHS	Outer	0.15	0.13	86.67

Location Km.	Load	Side	Lane	Loaded Slab deflection D0 (mm)	Unloaded Slab deflection D300 (mm)	LTE (%)
61+998	66.50	RHS	Outer	0.18	0.16	88.89
61+498	67.70	RHS	Outer	0.13	0.11	84.62
60+997	67.80	RHS	Outer	0.14	0.12	85.71
60+498	67.60	RHS	Outer	0.14	0.12	85.71
59+999	67.40	RHS	Outer	0.15	0.13	86.67
59+497	68.10	RHS	Outer	0.13	0.11	84.62
58+998	67.80	RHS	Outer	0.18	0.15	83.33
58+497	67.80	RHS	Outer	0.18	0.13	72.22
57+826	67.90	RHS	Outer	0.18	0.13	72.22
57+491	67.40	RHS	Outer	0.17	0.13	76.47
56+999	66.70	RHS	Outer	0.29	0.26	89.66
56+500	67.50	RHS	Outer	0.14	0.11	78.57
56+000	68.50	RHS	Outer	0.15	0.12	80.00
55+499	67.50	RHS	Outer	0.16	0.13	81.25
55+000	68.10	RHS	Outer	0.15	0.13	86.67
54+492	67.50	RHS	Outer	0.20	0.16	80.00
54+000	66.70	RHS	Outer	0.30	0.21	70.00
53+498	68.70	RHS	Outer	0.13	0.11	84.62
52+996	68.40	RHS	Outer	0.14	0.12	85.71
52+500	67.90	RHS	Outer	0.69	0.19	27.54
52+000	68.70	RHS	Outer	0.12	0.10	83.33
51+500	68.70	RHS	Outer	0.13	0.11	84.62
51+000	67.60	RHS	Outer	0.17	0.12	70.59
50+500	67.50	RHS	Outer	0.20	0.15	75.00
50+000	67.90	RHS	Outer	0.20	0.16	80.00
49+384	61.80	RHS	Outer	0.14	0.12	85.71
48+999	67.90	RHS	Outer	0.12	0.10	83.33
48+498	67.90	RHS	Outer	0.13	0.11	84.62
47+999	66.60	RHS	Outer	0.13	0.10	76.92
47+500	67.30	RHS	Outer	0.19	0.14	73.68
47+000	67.30	RHS	Outer	0.20	0.14	70.00
46+493	67.90	RHS	Outer	0.14	0.11	78.57
45+992	68.10	RHS	Outer	0.23	0.17	73.91
45+400	67.40	RHS	Outer	0.24	0.16	66.67
44+800	68.20	RHS	Outer	0.18	0.14	77.78

Note: Rigid Pavement Analysis as per ***IRC:117-2015***

CHAPTER-5

ROAD CONDITION ASSESMENT USING NSV

5.1 INTRODUCTION

The National Highways Authority of India has been engaged in "**Carried out condition surveys for Upgradation of Kullu-Manali section of NH-21 (now NH-3) from Km. 272.00 to Km. 309.345 (designed chainage) on EPC Mode in the State of Himachal Pradesh under NHDP Phase-IVB.".** NHAI has awarded the project to NHAI has awarded the Project to **G-Eng Material Testing Laboratory** A Subsidiary of **G-Eng Advisory Services Private Limited.** "Authority Engineer" carrying out the Condition survey for the project corridor using Network Survey Vehicle (NSV).

The methodology used for preparation of Road condition is called Road Condition Survey. A condition survey is the process of collecting data to determine the structural integrity, pavement distresses and overall riding quality of the pavement.

The following pavements have been selected shown in table 5.1, where Road Condition survey is done using NSV (Network Survey Ves:

Table 5.1: -List of Projects

S.No	Codes	Name of Project	Type of Pavement
1	NH-3	Carried out condition surveys for Upgradation of Kullu-Manali section of NH-21 (now NH-3) from Km. 272.00 to Km. 309.345 (designed chainage) on EPC Mode in the State of Himachal Pradesh under NHDP Phase-IVB.	Flexible Pavement
2	NH-248A	Carried out condition surveys for Work of Strengthening of Road from Km.24.500 to Km 46.950 including improvement of service road in Sohna and Nuh City of NH-248A in the state of Haryana	Flexible Pavement
3	NH-334B	Carried out condition surveys for Four Laning of Rajauli - Bakhtiyarpur section of NH-31 (New NH-20) From Km 54+405 to Km 101+630 (Package II) on Hybrid Annuity Mode in the State of Bihar.	Rigid Pavement

5.2 Project Road 1

Upgradation of Kullu-Manali section of NH-21 (now NH-3) from Km. 272.00 to Km. 309.345 (designed chainage) on EPC Mode in the State of Himachal Pradesh under NHDP Phase-IVB.

Road condition surveys is one of the most important and crucial field tasks under the project. A team of G-E Eng Advisory Services Private Limited. Carried out condition surveys using equipment as defined under table 5.2:

Table 0.2: List Road Condition Surveys Conducted

Sr. No.	Key metrics of Asset	Equipment Used	Condition Survey Date
1	Roughness of pavement	Laser Profilometer	03rd June 2023
2	Condition Survey	Laser Crack Measurement System	03rd June 2023

5.3 MEASUREMENT OF PAVEMENT SURFACE DEFECTS AND ROUGHNESS

5.4 Network Survey Vehicle (NSV)

The Network Survey Vehicle is based on the latest survey techniques utilizing Laser, Global Positioning System and Video image processing tools etc. The Survey Vehicle is used for automatic collection of road inventory and pavement condition related data required for Road Asset Management, Pavement Maintenance Management System and Road Safety Audit Related Studies.

5.4.1 Key features of Network Survey Vehicle System

- High survey speeds up to 80 kmph
- Longitudinal (International Roughness Index) and Transverse profiling (Rut Depth) conforming to ASTM standards
- Pavement Texture in terms of Mean Profile Depth
- Slope, Cross-fall and Radius of curvature
- GPS Coordinates (X, Y, Z) viz. longitude, latitude & altitude using DGPS
- Video imaging for Roadside furniture / Road Asset
- Advanced data processing and reporting software
- Real time in-vehicle data acquisition software for display and collection of data from all parameters simultaneously (ROMDAS software)
- Post processing software for data analysis and report preparation (DATAVIEW software)

Some additional applications for NSV are as follows:

- Roadside inventory and asset management
- Network and project level road and asset collection surveys
- Contractor quality control
- Airport runway maintenance
- Road safety assessment
- Road geometry and mapping surveys

5.4.2 Benefits of Network Survey Vehicle (NSV)

- Detect the root causes of damages and road problems
- Determine the exact location and dimensions of the problem areas

- Adapt new design practices to solve the problem
- Learn to move towards proactive pavement maintenance policies
- Get longer pavement life and better roads
- Gain savings with asset management costs.

5.5 Type of Surface defects Measured and Reported

Network Survey Vehicle (NSV) mounted with equipment such as Laser based automatic crack detection system [Laser Crack Measurement System (LCMS)], high resolution digital cameras for ROW, high accuracy DGPS receiver and In-vehicle data processing software [ROMDAS (Road Measurement Data Acquisition System) software developed by Data Collection Ltd. (DCL), New Zealand] was used to accurately measure following pavement surface properties & defects are shown in Table 5.3:

Table 5.3: Type of Surface defects and its dimensions measured & reported

Surface defects & Roughness	Dimensions Reported
Cracking	• Length • Width • Depth • Classification • Degree of Severity
Potholes	• Area • Maximum Depth • Average Depth • Degree of Severity
Rutting	• Left Wheel Path Rut Depth • Right Wheel Path Rut Depth • Average Lane Rut Depth • Degree of Severity
Roughness	• International Roughness Index (IRI) in m/km for both Left and Right wheel path • Roughness Index (RI) in mm/km for both wheel paths for each lane • Condition of Road/Degree of Severity • Speed of NSV

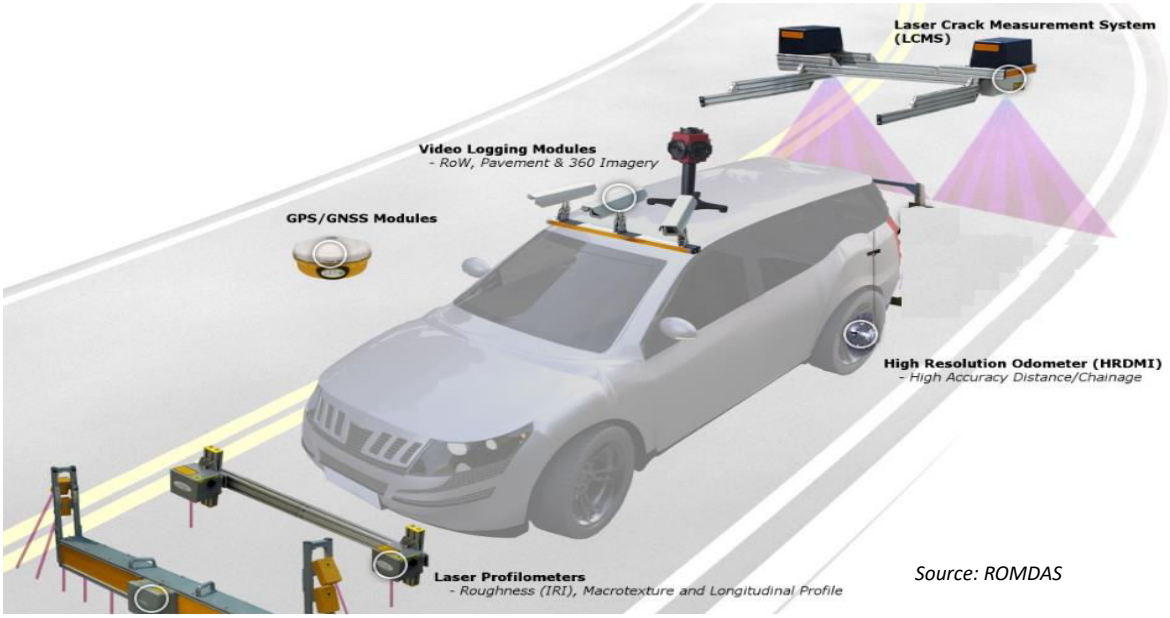


Figure 5.1: Schematic Representation of NSV

5.6 Different Modules of Network Survey Vehicle (NSV)

5.6.1 Laser Crack Measurement System (LCMS Module)

- Invisible laser fires at surface up to 28800 Hz
- Acquires full 4 m width profiles of a highway lane at normal traffic speed
- Capture in both full daylight or in night time conditions
- Automatic detection of a number of pavement defects

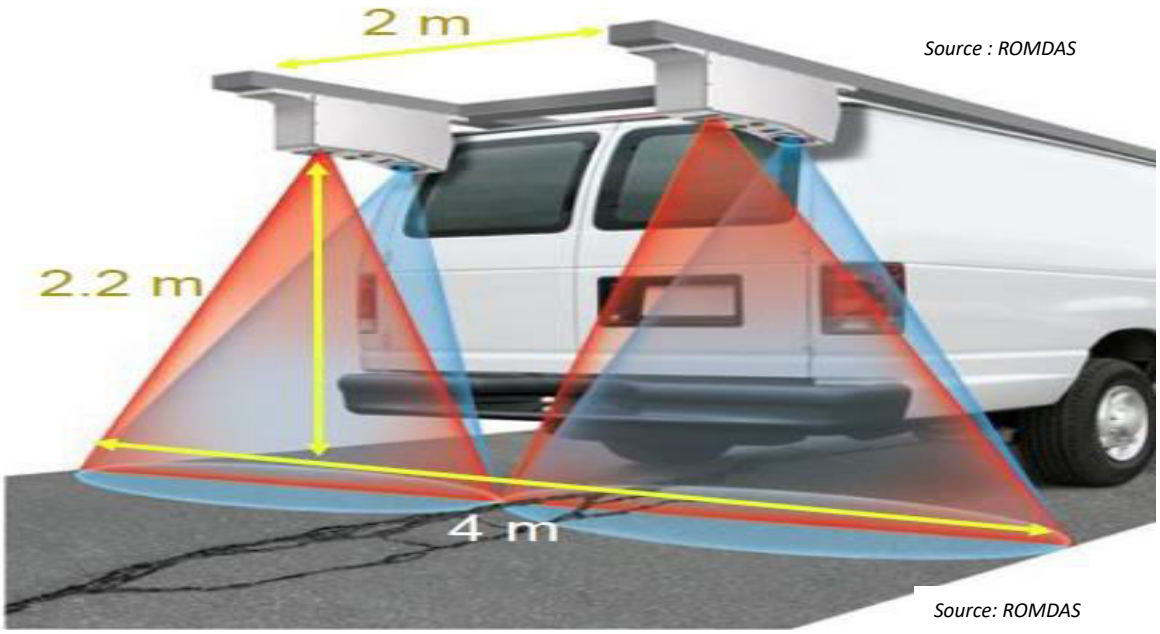


Figure 5.2: LCMS Principle of Operation

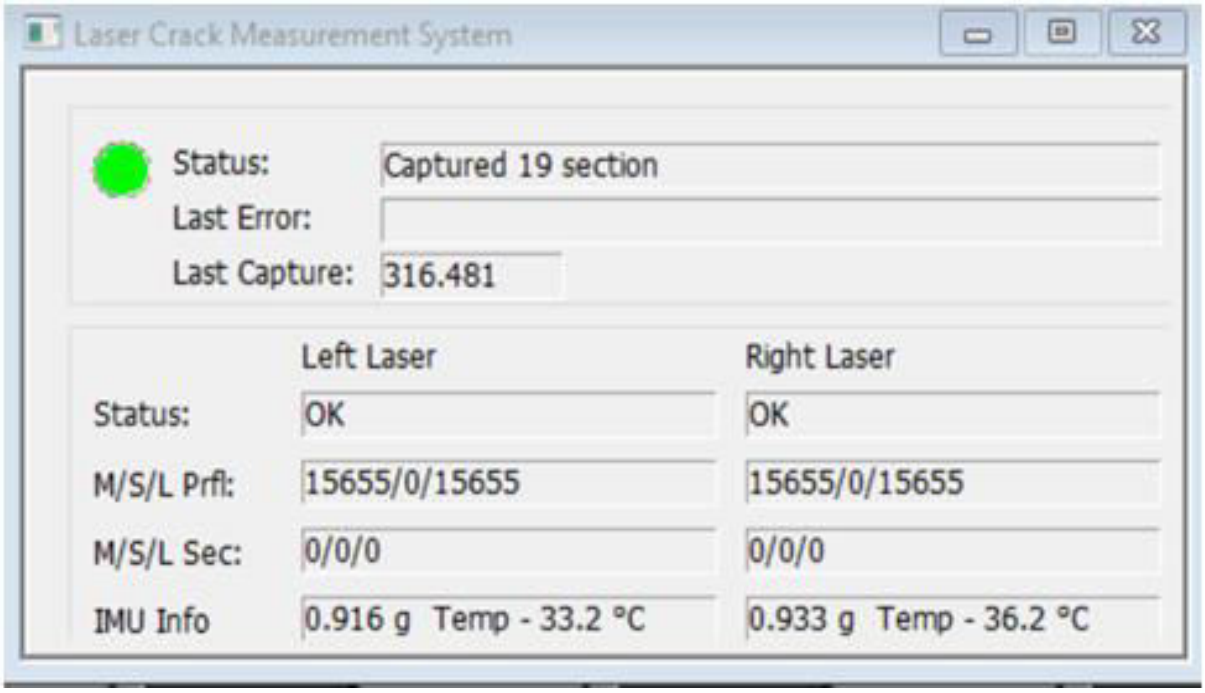


Figure 5.3: LCMS Real Time Survey Display During Survey (Each Section is of 10m length)

5.6.2 Laser Profilometer Module of Network Survey Vehicle

Integrated into the NSV is a Laser Profilometer consisting of 2 lasers. This inertial profiler is capable of measuring Surface Pavement Roughness (one laser in each wheel path)

The outputs of the lasers and accelerometers located in each wheel path (750 mm either side of the centreline of the vehicle) are sampled every 25 mm of longitudinal travel and are used to calculate the longitudinal profile of the road.

The profile is then passed through the Quarter Car model to calculate the International Roughness Index (IRI) lane roughness as per the methodologies specified in the Austroads Guide to Asset Management, Part 5B - Roughness.

Post survey, any spikes in the roughness outputs will be excluded that may arise from rumble strips, speed breakers, expansion joints, cattle grids, railway crossings, bridge abutments etc. Automated checks in the data processing software are already incorporated to exclude any contribution to roughness from data collected below the minimum survey speed which is typically set at 5-30 kmph (user definable).

*** The above-mentioned Roughness Digital Laser Profile System fall under the specification defined in Circular no 11041/218/2007 - admin issued by NHAI for use of Laser Profilometer in NHAI Works and Circular No. RW / NH-33044/ 32/2019 issued by Surface & Roads Division of MINISTRY OF ROAD TRANSPORT & HIGHWAYS, GOVERNMENT OF INDIA Dated 13th November,2019**

Figure 5.4 Photograph of laser Profilometer component of (NSV)

It is a Class I Roughness Measuring Device (as per World Bank Technical Paper No. WTP 46 Guidelines for conducting and calibrating road roughness measurements.

(http://documents.worldbank.org/curated/en/851131468160775725/pdf/multi-page.pdf)
It meets International Standards mentioned below:

- World Class 1 Profiler
- ASTM E950
- ASTM E1926
- ISO 13473
- ASTM E1845

6 Limitations of Laser Profilometers

- Cannot be used on wet road surface

- Recommended not be used on Roads with IRI > 8 (accuracy decreases and possibility of damage)
- Accuracy decreases under 20 km/h
- Shouldn't be used on unsealed roads

5.7 Surface Defects and Roughness Data from NSV and Laser Profilometer

Surface Defects Data from Network Survey Vehicle (NSV)

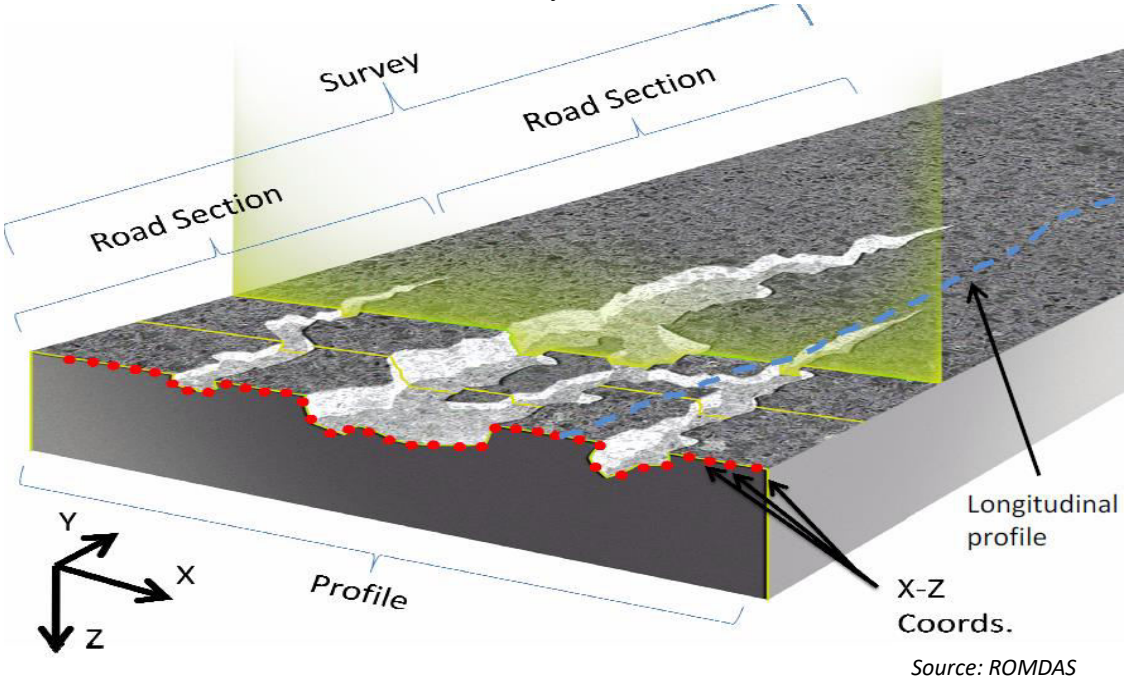


Figure 5.5: LCMS data and image processed into Road sections of 10m lengths

The LCMS data types are all summarized over the Road Section lengths (default 10 m) shown in Figure 5.5.

There will be a separate. fis file for each Road Section (i.e. 10m default and maximum length). The filenames are in the form RoadID_SectionID.fis where RoadID is the Romdas Survey ID and SectionID is the sequential Section id starting from 0 in a six-digit number 000001 (giving max survey length of 10,000 km).

e.g…/LCMS_NH19/NH19_000001.fis

LCMS splits the lane into the five bands defined by AASHTO as shown below in Figure 5.6:

- The central band (default 1 m wide)
- The two-wheel path bands (default 0.75 m wide)
- And the two outside bands

Source: ROMDAS

Figure 5.6 Five Lane Bands in LCMS

Some of the outputs are defined in terms of these bands e.g.

- Roughness is reported in centre of Wheel path band
- Bleeding is per wheel path band
- Rutting is per wheel path band

Mentioned below are the set of surface defects dimensions which are submitted in RIS template for surface defects in all lanes of Main Carriageway respectively using LCMS raw data Processing software namely **ROMDAS** and post processing software namely **DATAVIEW.**

5.7.1 Cracking Data

- Chainage of Crack
- Length, Width & Depth of Crack (in mm)
- Classification of Crack
    - ✓ Multiple Crack
    - ✓ Transversal Crack
    - ✓ Alligator Crack
    - ✓ Longitudinal Crack
    - ✓ Unclassified Crack
- **Severity of Crack**
- Very Weak < 3mm wide
- Weak < 6mm wide
- Medium < 20 mm wide
- Major > 20 mm wide

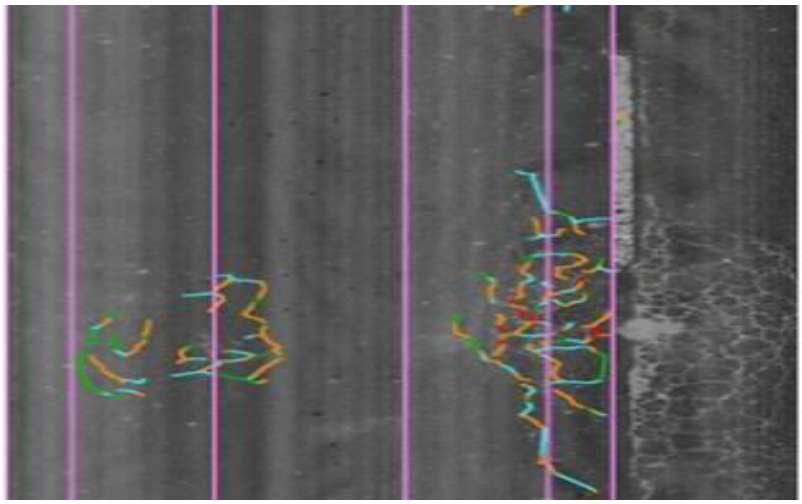


Figure 5.7: Colour Coding of cracks depending upon their Severity

5.7.2 Raveling Data

Raveling is defined as the "wearing away of the pavement surface caused by dislodging of aggregates particles and loss of asphalt binder. Raveling ranges from loss of fines to loss of some coarse aggregate and ultimately to a very rough and pitted surface with obvious loss of aggregate" (*source: Distress Identification Guide, US Dept. of Transportation, Federal Highway Administration*).

Figure 5.8: Raveling Representation Source: Google

- Chainage of Raveling
- Raveling Index Value (Indicator of Raveling)
- Percentage of Raveling (%)
- Area of Raveling (in m^2)
- Severity of Raveling

Step-by-step Algorithm:

- For each road section a 3D curve fitting algorithm is applied to fit a 3D smooth surface over the textured pavement surface.
- The road section is then divided into 250mm x 250mm Squares.
- For each square the Air Void Content (AVC)volume Is measured between the 3D smooth surface and 3D Pavement surface.
- Air Void Contents re-measured this time without considering the ravelling sport. This value gives the Road Porosity Index (RPI).

  Ravelling Index=AVC-RPI

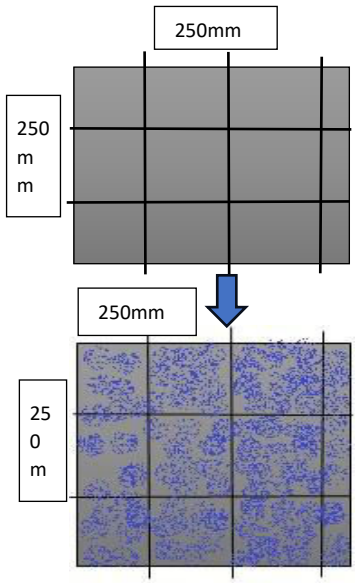


Figure 5.9: Raveling Index (RI) calculation steps

5.7.3 Potholes Data

To be detected as a pothole it must have a minimum diameter of 150 mm (this is adjustable). This is the default value set according to the "Distress Identification Manual for the Long-Term Pavement Performance Program" published by FHWA (Federal Highway Administration) in 2003

- Chainage of Pothole
- Area of Pothole (in m^2)
- Maximum Depth (in mm)
- Average Depth (in mm)
- Severity of Crack: Pothole Severity is defined according to IRC:82-2015 as below:
  - ✓ Small : Less than 25 mm deep.
  - ✓ Medium : 25 mm to 50 mm deep.
  - ✓ Large : More than 50mm deep.

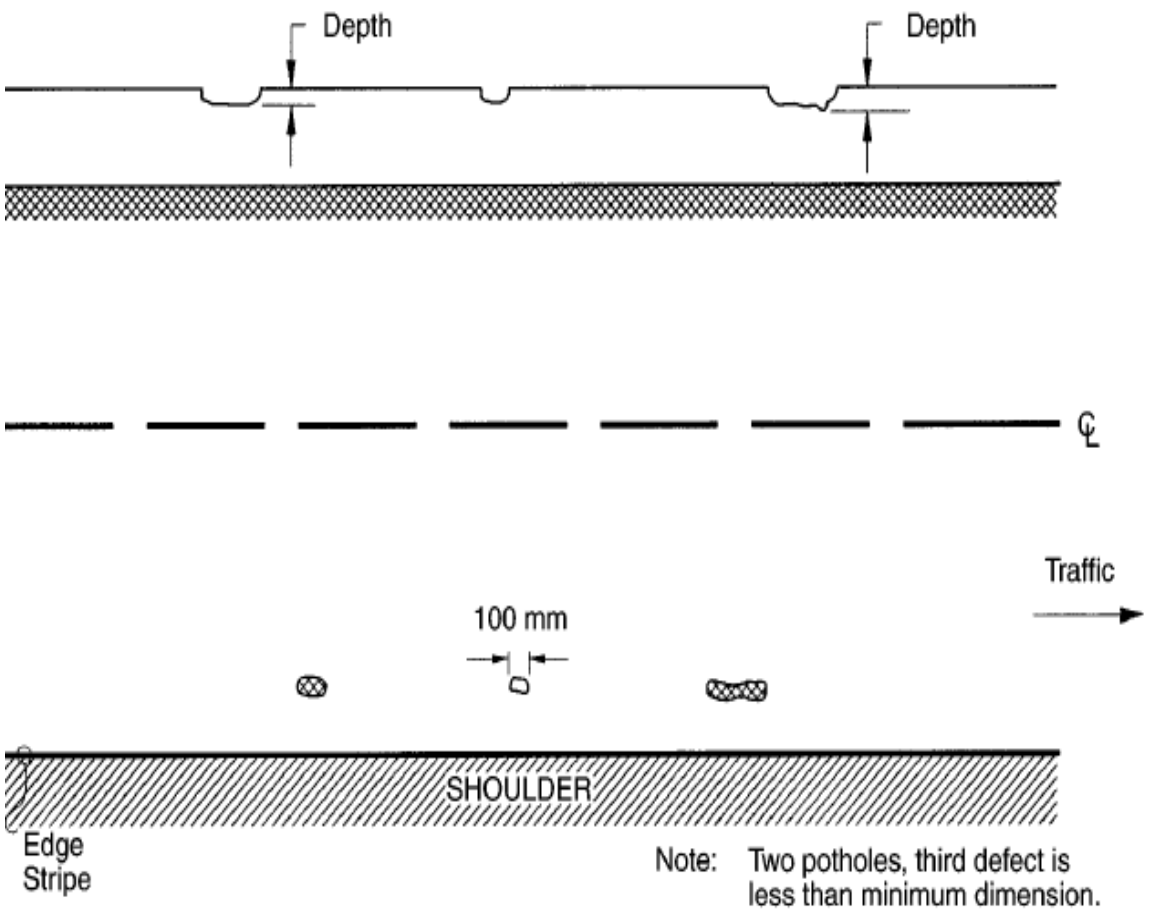


Figure 5.10: Pothole detection Illustration

5.7.4 Rutting Data

Rutting refers to the coverage of ruts over a pavement, and is a pavement condition parameter that characterises the transverse profile of a road surface.

A rut is defined as a longitudinal depression that forms in a wheel path of a road. Rutting may occur in one or both wheel paths of a lane.

Rut depth is the maximum vertical pavement displacement in the transverse profile, either across a wheel path (wheel path rut depth), or across a lane width (lane rut depth), measured from a reference datum taken at 90 degrees to the road edge.

Both traffic loading and environmental influences can cause or contribute to rutting. Traffic loading causes rutting when the passage of loaded wheels, particularly heavy trucks, results in a longitudinal depression in a road surface along a wheel path, due to deformation or abrasion or a combination of both. When moisture causes deformation of a road pavement, subgrade or shoulder (e.g. heaving of the road shoulder or pavement edge), this can result in a longitudinal depression that is reported as rutting.

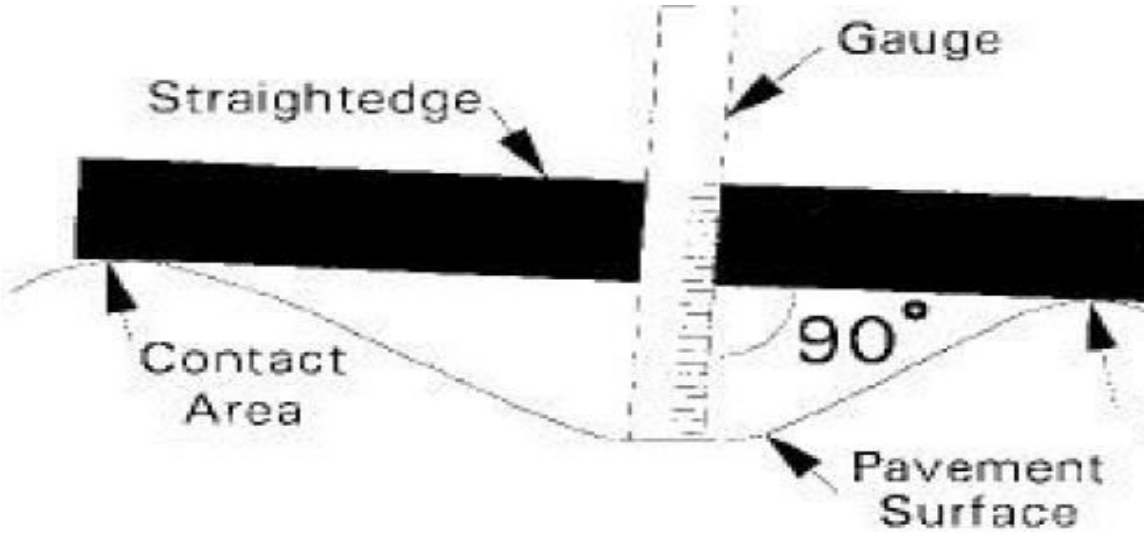


Figure 5.11: 3m Straight Edge Method used for rutting calculation

(As per IRC: SP 84-2014)

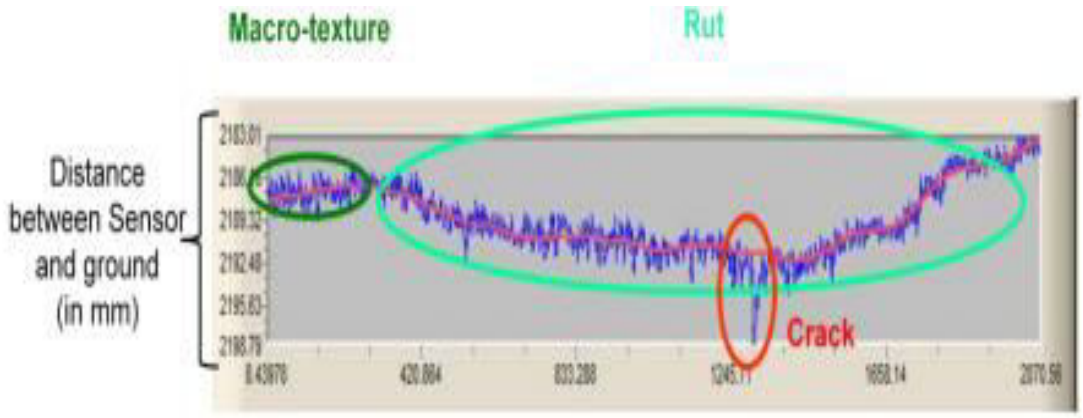
- Chainage of Road
- Left Wheel Path Rut Depth and Width (in mm)
- Right Wheel Path Rut Depth and Width (in mm)
- Average Lane Rut Depth (in mm)
- Severity of Rut/Condition of Road: Rut Severity is defined according to IRC:82-2015 as below:
    - ✓ No rutting: Less than 4 mm depth.
    - ✓ Low: 4 mm to 10 mm depth.
    - ✓ High: More than 10 mm depth.

5.7.5 Texture Depth

- At the network level, macro-texture is commonly measured using a single point high frequency 3D laser sensor that acquires one high resolution longitudinal profile of the road.
- This profile is then processed which specifies the calculation of the mean profile depth (MPD). To calculate the MPD, the profile is divided into small (10cm) segments and for each segment a linear regression is performed on the data. The MPD is then computed as the difference between the highest point on the profile and the average fitted line for the considered portion.
- The 3D data acquired by the LCMS system measures the distance from the sensor to the surface for every sampled point on the road. In a range image the height can vary

along the cross section of the road. The areas in the wheel path can be deeper than the sides and would correspond to the presence of ruts.

- Height variations can also be observed in the longitudinal direction due to variations in longitudinal profiles of the road causing movements in the suspension of the vehicle holding the sensors. These large-scale height variations correspond to the low-spatial frequency content of the range information in the longitudinal direction.
- Most features that need to be detected are located in the high-spatial frequency portion of the range data. The Figure 7 shows a 2m (half lane) transverse profile where the general depression of the profile corresponds to the presence of a rut, the sharp drop in the centre of the profile corresponds to a crack point and the height variations (in blue) around the red line correspond to the macro-texture of the road surface shown in Figure



5.12.

Figure 5.12: Macro-texture of the road surface

5.7.6 Roughness Data from Laser Profilometer

Roughness parameters which are presented in RIS Template of the corresponding project for all lanes (L1, L2, R1, R2) of Main Carriageway using LCMS raw data Processing software namely ROMDAS and post processing software namely DATAVIEW as

- Left Wheel Path IRI in m/km for each lane
- Right Wheel Path IRI in m/km for each lane
- Lane IRI (Average of both wheels IRI) in m/km for each lane
- Roughness Index in mm/km for each lane
- Condition of Road as per ***IRC: SP:16-2019***

Image Overlay Color Codes Used for Surface Defects

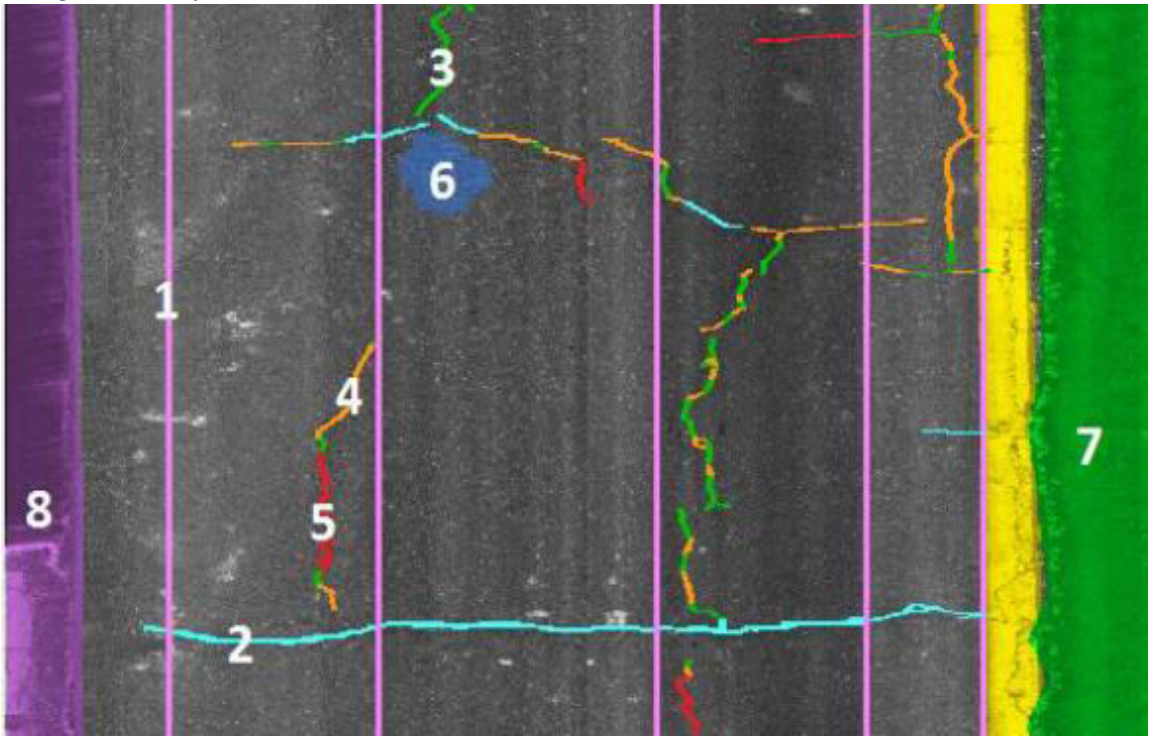


Figure 5.13: Image Overlay Colour Coding for Surface Defects

Table 5.4:Color Coding Description for Surface Defects

	Colour	Description
1		Lane and Macro-Texture Band markings
2		Very weak cracks. Severity = 0
3		Weak cracks in the results images. Severity = 1
4		Medium cracks in the results images. Severity = 2
5		Major cracks in the results images. Severity = 3
6		Pothole
7		Drop Off detected
8		Curb detected

5.8 CONDITION ASSESSMENT OF EXISTING PAVEMENT

5.8.1 General

Highway pavements are layered structures comprising of combination of materials to carry traffic load in given climate for a specified time interval. The pavement structure is designed in such a way that the transmitted stresses due to wheel load are sufficiently reduced, so that they will not exceed bearing capacity of the sub-grade. It should also be able to provide a surface of acceptable riding quality under all weather conditions with the highest possible degree of safety.

The performance of any highway pavement is measured by two indicators, namely Functional Performance and Structural Performance. The functional performance includes aspects such as riding quality, surface distress and skid resistance. Whilst recognizing these functional requirements, the pavement should also have adequate strength as a load bearing structure that is required to carry the traffic load under the prevailing environmental conditions (structural performance).

Table5.5: Typical Distress types Associated with Performance

Performance Type	Performance Indicator
Functional	1. Riding Quality (Roughness)

Information about pavement condition and performance is critical to the decision-making process for successful management of highway pavements. The objective of condition assessment of the pavement is to collect accurate and timely data, analyze the level of deterioration, identify maintenance and reconstruction needs, and determine maintenance costs both routine as well as periodic (major maintenance).

In this context, series of surveys was undertaken using a combination of state-of-the-art technology-driven fully automated and semi-automated processes with high-speed data collection in field. The methodology and data collection involved in the above-mentioned surveys are elaborated in the Chapter 2. After collecting the pavement condition data from these tests, the data is analyzed to evaluate the pavement performance or condition which included the following aspects:

- Analysis of Riding Quality in terms of Roughness and Rutting parameters
- Analysis of Surface Distresses

5.9 Analysis of Network Survey Vehicle (NSV) Data

The analysis of various performance parameter data as collected during NSV survey is presented in this section.

Roughness Analysis

Roughness is one of the important parameters for determining the functional characteristics of pavements. According to American Society for Testing and Materials (ASTM), roughness is defined as “the deviations of a pavement surface from a true planar surface with characteristic dimensions that affect vehicle dynamics, ride quality, dynamic loads, and drainage, for example, longitudinal profile, transverse profile and cross slope”.

The International Roughness Index (IRI), Bump Integrator Roughness (BI) is used to define the characteristics of a longitudinal road profile and constitutes a standardized roughness measurement. IRI & BI is measured in meters per kilometer (m/km) & millimeters per kilometer (mm/km) respectively.

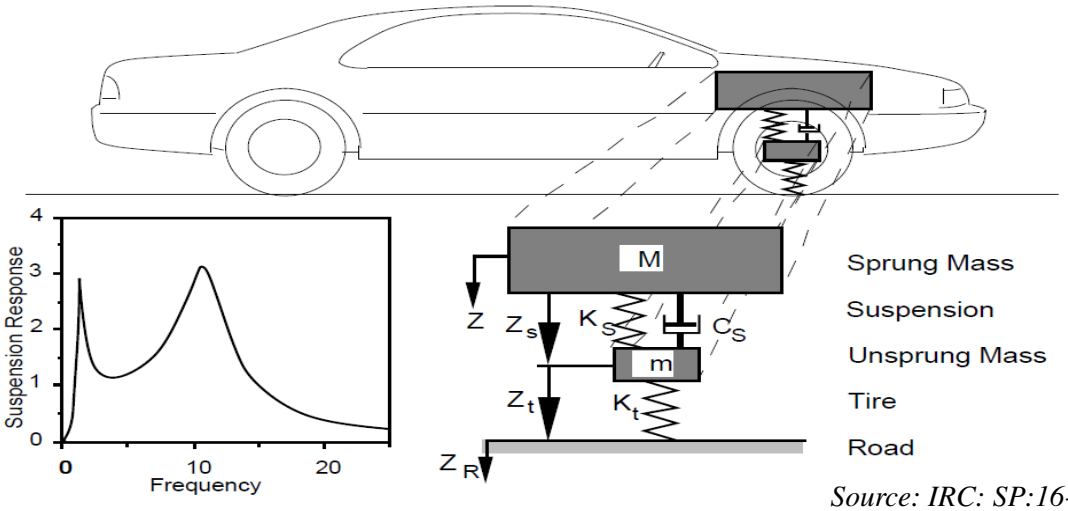
The roughness of road surfaces is measured using different equipment/techniques such as rod and level survey, dip stick profiler, profile-graphs, response type road roughness meters and profiling devices.

The International Roughness Index (IRI) is a scale for roughness based on the response of a generic motor vehicle (called the Golden car or the quarter-car model) to roughness of the road

surface. Its true value is determined by obtaining a suitably accurate measurement of the profile of the road, processing it through an algorithm that simulates the way a reference vehicle would respond to the roughness inputs, and accumulating the suspension travel.

IRI is the accumulation of motion between the sprung mass and un-sprung mass normalized by length of the road file.

The underlying IRI model is a series of differential equations which relate the motions of a simulated quarter-car to the road profile.



Source: IRC: SP:16-2019

Figure 5.14: IRI Model Simulating motions of Quarter-car to the road Profile

Characteristics of IRI

- Reproducible
- Portable
- Stable with time

Defined as property of the true profile and therefore can be measured by any valid profiler

IRI summarizes the impact vehicle response, and is therefore appropriate when a roughness measure is desired that relates to

- Overall vehicle operating costs
- Ride quality
- Dynamic wheel loads
- Surface condition

Correlation between Bump Integrator Roughness (BI)/ Unevenness Index (UI) and International Roughness Index (IRI) (As per IRC:SP:16-2019)

The accepted world standard for Roughness is the International Roughness Index (IRI). The IRI was an outcome of the International Road Roughness Experiment conducted in Brazil (Sayers et al., 1986a) and is reproducible, portable and stable with time. The equipment is included with

software to calculate and print various profile statistics including the IRI as well as the individual point elevation and local surface curvatures. For correlation with BI/UI values, the following relation mentioned in **Annexure-1 Page No. 12 of IRC: SP:16-2019 Guidelines for the Surface Evenness of Highway Pavements as:**

$$BI = 630\ (IRI)^{1.12}$$

Where,

BI= Bump Integrator Roughness or Unevenness Index in mm/km

IRI= International Roughness Index

Length wise summarized Roughness condition details for both the directions are given in Table 5.6 below. Detail roughness data are presented in RIS Template for all lanes of LHS & RHS.

Table 5.6: Lane Wise Roughness Distribution in IRI (LHS)

Roughness Range (m/km)	Condition	Length (km)	
		L1	L2
Less than 2.81	Good	27.445	2.200
2.81-3.30	Fair	9.900	1.300
More than 3.30	Poor	0.000	0.000
Total		**37.345**	**3.500**

Table 5.7: Lane Wise Roughness Distribution in IRI (RHS)

Roughness Range (m/km)	Condition	Length (km)	
		R1	R2
Less than 2.81	Good	29.745	2.355
2.81-3.30	Fair	7.600	1.145
More than 3.30	Poor	0.000	0.000
Total		**37.345**	**3.500**

5.9.1 Recommended Standard for Roughness Values

The maximum permissible value of surface roughness for different surface is given in table below as per **IRC-SP:16-2019**

Table 5.8: Maximum Permissible Roughness Values for different pavement surfaces

S.NO	Type of Surface	Condition of road surface					
		Good		Fair		Poor	
		RI	IRI	RI	IRI	RI	IRI
1	Bituminous (BC,SMA, SDBC)	<1800	<2.55	1800-2400	2.55-3.30	>2400	>3.30
2	Cemented	<2000	<2.81	2000-2400	2.81-3.30	>2400	>3.30

Note: In case of four lane divided and above corridors, roughness measurements shall be carried out using Class1' equipment. For other corridors, the roughness measurement shall be carried out using Class1 /Class 2 or Class 3 equipment depending upon survey speed/geometric suitability.

Newly constructed surface is expected to give roughness values corresponding to GOOD category while the value under FAIR and POOR category indicates level-of-service and intervention level for maintenance.

5.9.2 Recommended Standard for Texture Value

The maximum permissible value of surface texture for different surface is given below as per IRC 15-2017:

Longitudinal tining shall be done, if specified in the Contract. The texturing bridge shall be wide enough to cover the entire width of the carriageway but within 75 mm from the pavement edge. The center to center spacing between the tines shall be 18 to 21 mm. The width of tine texture shall be 3 mm and **depth shall be 3 to 4 mm.**

5.9.3 Rutting Analysis

Rutting is one of the important factors which determine the functional performance of pavement. Rutting is characterized by permanent deformation of the pavement in wheel path due to heavy load vehicles. It is one of the main modes of failure in asphalt mixes. The detail of the rut measured is given in Annexure-I for lanes of LHS & RHS

Length wise summary of Rut depth condition details for both the directions is given in table 5.9 below:

Table 5.9: Standard Rutting Depth Range and Severity

Rut Depth Range (mm)	**Severity**
Less than 4mm	No Rutting
Between 4mm & 10mm	Low
Greater than 10mm	High

Table 5.10: Rut depth distribution (Length-wise in Km) for LHS

Severity	Length in Km	
	L1	L2
No Rutting	37045	3500
Low	0	0
High	0	0
Total	**37045**	**3500**

Table 5.11: Rut depth distribution (Length-wise in Km) for RHS

Severity	Length in Km	
	R1	R2
No Rutting	37045	3500
Low	0	0

High	0	0
Total	**37045**	**3500**

5.10 Project Road 2

Work of Strengthening of Road from Km. 24.500 to Km 46.950 including improvement of service road in Sohna and Nuh City of NH-248A in the state of Haryana

1.2 Survey Conducted for Project Stretch

The carrying out of road condition surveys be one of the most important and crucial field tasks under the project. A team of M/s G-Eng Advisory Services Pvt. Ltd. Carried out condition surveys using equipment as defined under:

Table 5.12: List Road Condition Surveys Conducted

Sr. No.	Key metrics of Asset	Equipment Used	Condition Survey Date
1	Surface defects of pavement	Laser Crack Measurement System (LCMS)	25th January 2023
2	Roughness of pavement	Laser Profilometer	25th January 2023

Correlation between Bump Integrator Roughness (BI)/ Unevenness Index (UI) and International Roughness Index (IRI) (As per IRC: SP:16-2019)

The accepted world standard for Roughness is the International Roughness Index (IRI). The IRI was an outcome of the International Road Roughness Experiment conducted in Brazil (Sayers et al., 1986a) and is reproducible, portable and stable with time. The equipment is included with software to calculate and print various profile statistics including the IRI as well as the individual point elevation and local surface curvatures. For correlation with BI/UI values, the following relation mentioned in Annexure-1 Page No. 12 of ***IRC: SP:16-2019*** Guidelines for the Surface Evenness of Highway Pavements as:

$$BI=630(IRI)^{1.12}$$

Where,

BI= Bump Integrator Roughness or Unevenness Index in mm/km

IRI= International Roughness Index

Length wise summarized Roughness condition details for both the directions are given in Table below. Detail roughness data are presented in the excel sheets provided with the report for all lanes.

Table 5.13: Lane Wise Roughness Distribution in Length (Km)

Roughness Range (m/km)	Severity	Length in Km			
		L1	L2	R1	R2
Less than 2.55	Good	17.100	17.100	9.900	14.500
2.55-3.30	Fair	1.600	1.700	5.900	3.800
More than 3.30	Poor	3.750	3.650	6.650	4.150
Total		22450	22.450	22.450	22.450

5.10.1 Recommended Standard for Roughness Values

The maximum permissible value of surface roughness for different surface is given in table 5.14 below as per ***IRC-SP: 16-2019.***

Table 5.14: Maximum Permissible Roughness Values for different pavement surfaces

S.NO	Type of Surface	Condition of road surface					
		Good		Fair		Poor	
		RI	IRI	RI	IRI	RI	IRI
1	Bituminous (BC,SMA, SDBC)	<1800	<2.55	1800-2400	2.55-3.30	>2400	>3.30
2	Cemented	<2000	<2.81	2000-2400	2.81-3.30	>2400	>3.30

Note: In case of four lane divided and above corridors, roughness measurements shall be carried out using Class1' equipment. For other corridors, the roughness measurement shall be carried out using Class1 /Class 2 or Class 3 equipment depending upon survey speed/geometric suitability.

Newly constructed surface is expected to give roughness values corresponding to GOOD category while the value under AVERAGE and POOR category indicates level-of-service and intervention level for maintenance.

5.10.2 Rutting Analysis

Rutting is one of the important factors which determine the functional performance of pavement. Rutting is characterized by permanent deformation of the pavement in wheel path due to heavy load vehicles. It is one of the main modes of failure in asphalt mixes. The detail of the rut measured is given in Annexure I.

Length wise summary of Rut depth condition details for both the directions is given in table below:

Table 5.15: Standard Rutting Depth Range and Severity

Rut Depth Range (mm)	Severity
Less than 4mm	No Rutting
Between 4mm & 10mm	Low
Greater than 4mm	High

Table 5.16: Rut depth distribution (Length-wise in Km)

Severity	Length in km			
	L1	L2	R1	R2
No Rutting	2.450	18.450	0.000	4.500
Low	19.500	4.000	16.450	17.450
High	0.500	0.000	6.000	0.500
Total	22450	22450	22.450	22.450

NOTE: Annexure-III is also provided in excel sheets format separately

5.11 Project Road 3

Four Laning of Rajauli - Bakhtiyarpur section of NH-31 (New NH-20) From Km 54+405 to Km 101+630 (Package II) on Hybrid Annuity Mode in the State of Bihar.

Road condition surveys is one of the most important and crucial field tasks under the project. A team of G-Engineering Advisory Services Private Limited. Carried out condition surveys using equipment as defined under Table 5.17:

Table 5.17: List Road Condition Surveys Conducted

Sr. No.	Key metrics of Asset	Equipment Used	Condition Survey Date
1	Roughness of pavement	Laser Profilometer	26th April 2023
2	Condition Survey	Laser Crack Measurement System	26th April 2023

Correlation between Bump Integrator Roughness (BI)/ Unevenness Index (UI) and International Roughness Index (IRI) (As per IRC:SP:16-2019)

The accepted world standard for Roughness is the International Roughness Index (IRI). The IRI was an outcome of the International Road Roughness Experiment conducted in Brazil (Sayers et al., 1986a) and is reproducible, portable and stable with time. The equipment is included with software to calculate and print various profile statistics including the IRI as well as the individual point elevation and local surface curvatures. For correlation with BI/UI values, the following relation mentioned in **Annexure-1 Page No. 12 of IRC: SP:16-2019 Guidelines for the Surface Evenness of Highway Pavements as:**

$$BI = 630\ (IRI)^{1.12}$$

Where,

BI= Bump Integrator Roughness or Unevenness Index in mm/km

IRI= International Roughness Index

Length wise summarized Roughness condition details for NH-20 Rajauli to Bakhtiyarpur for both the directions are given in Tables 5.18-5.19 below. Detail roughness data are presented in RIS Template for all lanes of LHS & RHS.

Table 5.18:Lane Wise Roughness Distribution in IRI (LHS)

Roughness Range (m/km)	Condition	Length (km)		REMARKS
		L1	L2	
Less than 2.81	Good	37.725	35.125	Acceptable
2.81-3.30	Fair	9.500	12.100	Acceptable
More than 3.30	Poor	0.000	0.000	
Total		**47.225**	**47.225**	

Table 5.19: Lane Wise Roughness Distribution in IRI (RHS)

Roughness Range (m/km)	Condition	Length (km)		REMARKS
		R1	R2	
Less than 2.81	Good	36.925	33.525	Acceptable
2.81-3.30	Fair	10.300	13.700	Acceptable
More than 3.30	Poor	0.000	0.000	
Total		**47.255**	**47.225**	

Note:
As per the file no. RW/NH-33044/88/2021-S&R(P&B)/DNT (215840) dated 29th March 2023 (attached below), the maximum riding quality value (Roughness) i.e BI for Rigid Pavement is acceptable till 2400mm/km (i.e IRI value = 3.3m/km)

5.11.1 Recommended Standard for Roughness Values

The maximum permissible value of surface roughness for different surface is given in table below as per **IRC-SP:16-2019**

Table 5.20: Maximum Permissible Roughness Values for different pavement surfaces

S.NO	Type of Surface	Condition of road surface					
		Good		Fair		Poor	
		RI	IRI	RI	IRI	RI	IRI
1	Bituminous BC,SMA, SDBC)	<1800	<2.55	1800-2400	2.55-3.30	>2400	>3.30

2	Cemented	<2000	<2.81	2000-2400	2.81-3.30	>2400	>3.30

Note: In case of four lane divided and above corridors, roughness measurements shall be carried out using Class1' equipment. For other corridors, the roughness measurement shall be carried out using Class1 /Class 2 or Class 3 equipment depending upon survey speed/geometric suitability.

Newly constructed surface is expected to give roughness values corresponding to GOOD category while the value under FAIR and POOR category indicates level-of-service and intervention level for maintenance.

5.12 CALIBRATION CERTICATES OF NETWORK SURVEY VEHICLES (NSV) COMPONENTS

romdas

DATA COLLECTION LIMITED
Post: PO Box 348 | Motueka 7143 | NEW ZEALAND
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Manufacturers of ROMDAS Ph: +64 9 8277703 Fax: +64 9 827 7704 E-mail: info@romdas.com Website: www.romdas.com

data collection limited

Date: 04 April 2023

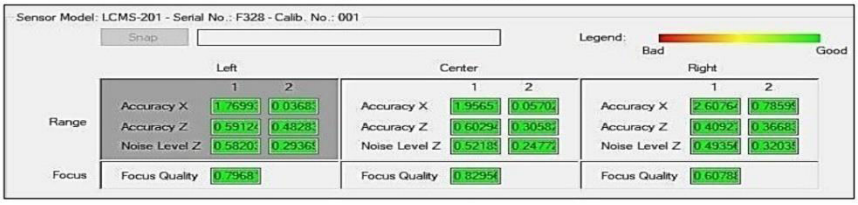
Certificate of LCMS Calibration Validation

Customer: **G-Eng Advisory services Pvt Ltd, India**

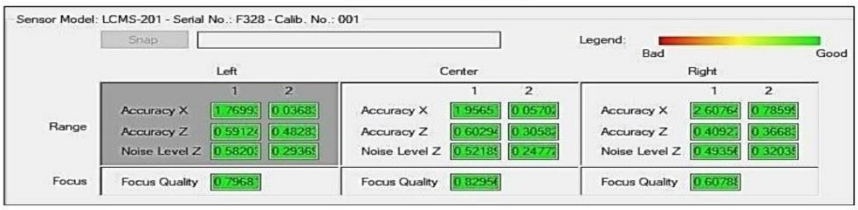
System Installation Date: May 2019

LCMS model:	LCMS-201	LCMS-201
LCMS sensors s/n:	**F327(RHS)**	**F328(LHS)**
Date of calibration validation:	2023/04/04	2023/04/04

LCMS-201-F327(RHS)



LCMS-201-F328(LHS)



LCMS Calibration Validation

Please note that the LCMS calibration validation should be done every 6 months to validate the sensors. If the validation results are not satisfactory, then LCMS must be sent to the factory for recalibration.

For Data Collection Limited

DATA COLLECTION LIMITED The Common Seal of

Paul hunter
Chief Technology Officer

romdas
Manufacturers of ROMDAS

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data collection limited

Date: 04 February, 2023

Certificate of Calibration

The ROMDAS Dual Laser Profilometer System, owned by G-Eng Advisory services Pvt Ltd, was installed by ROMDAS Engineers in Haryana, India between 6th May 2019 and 17th May 2019.

During this installation time period, the calibration of the following module/devices was performed successfully and passed –

- Odometer

Laser Calibration

Please note that the lasers for the Profilometer do not require annual calibration. These laser profilers are designed specifically to not require any annual calibration. Instead, we recommend performing a field validation annually (or more regularly if required) and as per the local validation procedures, to confirm that the laser, accelerometer, installation and all system components are working correctly and accurately. We believe this is a more robust method to prove the equipment is working, as it considers installation and other factors that may not be checked during a laser profiler calibration process, which in turn can influence the quality of roughness data.

We confirm that the above-mentioned system has passed the required calibrations at the factory.

We also confirm that the ROMDAS Laser Profilometer System will comply with the relevant data standards listed below –

ASTM E950, ASTM E1926, ASTM E13473, ASTM E1845

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Krishna Jammalamadaka
Chief Technology Officer

Annexure-III-A

Road Type													
As per Old NH number			New NH number		As per New NH number				Start			End	
NH Number Old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Road Type	Survey Date	Latitude	Longitude	Year	Latitude	Longitude
NH-21	0	0	NH-03	KUL-MAN	272+000	285+500	2	03-06-2023	31.97262806	77.12394052		32.21537840	77.19125083
NH-21	0	0	NH-03	KUL-MAN	285+500	285+800	TOLL	03-06-2023	32.07083176	77.13086895		32.07313679	77.12923116
NH-21	0	0	NH-03	KUL-MAN	285+800	305+845	2	03-06-2023	32.07313679	77.12923116		32.21537840	77.19125083
NH-21	0	0	NH-03	KUL-MAN	305+845	309+345	4	03-06-2023	32.21537840	77.19125083		32.24810699	77.19106037

Pavement Type													
As per Old NH number			New NH number		As per New NH number					Start		End	
NH Number Old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	Pavement Type	Survey Date	Latitude	Longitude	Latitude	Longitude
NH-21	0	0	NH-03	KUL-MAN	272+000	285+500	Increasing	Asphalt	03-06-2023	31.97262806	77.12394052	32.07083176	77.13086895
NH-21	0	0	NH-03	KUL-MAN	285+500	285+800	Increasing	Cement Concrete	03-06-2023	32.07083176	77.13086895	32.07313679	77.12923116
NH-21	0	0	NH-03	KUL-MAN	285+800	309+345	Increasing	Asphalt	03-06-2023	32.07313679	77.12923116	32.24810699	77.19106037
NH-21	0	0	NH-03	KUL-MAN	309+345	285+800	Decreasing	Asphalt	03-06-2023	32.24810699	77.19106037	32.07313679	77.12923116
NH-21	0	0	NH-03	KUL-MAN	285+800	285+500	Decreasing	Cement Concrete	03-06-2023	32.07313679	77.12923116	32.07083176	77.13086895
NH-21	0	0	NH-03	KUL-MAN	285+500	272+000	Decreasing	Asphalt	03-06-2023	32.07083176	77.13086895	31.97262806	77.12394052

Pavement Width														
As per Old NH number			New NH number		As per New NH number						Start		End	
NH Number Old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	Pavement Width (m)	Pavement Width Value (m)	Survey Date	Latitude	Longitude	Latitude	Longitude
NH-21	0	0	NH-03	KUL-MAN	272+000	305+845	Increasing	3.5 - 5.5	3.5	03-06-2023	31.97262806	77.12394052	32.21910278	77.19297316

NH-21	0	0	NH-03	KUL-MAN	305+845	309+345	Increasing	7.0 - 10.5	7.0	03-06-2023	32.21910278	77.19297316	32.24810699	77.19106037
NH-21	0	0	NH-03	KUL-MAN	309+345	305+845	Decreasing	7.0 - 10.5	7.0	03-06-2023	32.24810699	77.19106037	32.21910278	77.19297316
NH-21	0	0	NH-03	KUL-MAN	305+845	272+000	Decreasing	3.5 - 5.5	3.5	03-06-2023	32.21910278	77.19297316	32.21910278	77.19297316

Shoulder Type

As per Old NH number			New NH number		As per New NH number					Start		End	
NH Number Old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	Shoulder Type	Survey Date	Latitude	Longitude	Latitude	Longitude
NH-21	0	0	NH-03	KUL-MAN	272+000	208+500	Increasing	Paved	03-06-2023	31.97262806	77.12394052	32.07083176	77.13086895
NH-21	0	0	NH-03	KUL-MAN	208+500	285+800	Increasing	TOLL	03-06-2023	32.07083176	77.13086895	32.07313679	77.12923116
NH-21	0	0	NH-03	KUL-MAN	285+800	309+345	Increasing	Paved	03-06-2023	32.07313679	77.12923116	32.24810699	77.19106037
NH-21	0	0	NH-03	KUL-MAN	309+345	285+800	Decreasing	Paved	03-06-2023	32.24810699	77.19106037	32.07313679	77.12923116
NH-21	0	0	NH-03	KUL-MAN	285+800	208+500	Decreasing	TOLL	03-06-2023	32.07313679	77.12923116	32.07083176	77.13086895
NH-21	0	0	NH-03	KUL-MAN	208+500	272+000	Decreasing	Paved	03-06-2023	32.07083176	77.13086895	31.97262806	77.12394052

Shoulder Width

As per Old NH number			New NH number		As per New NH number					Start		End	
NH Number Old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	Shoulder Width (m)	Survey Date	Latitude	Longitude	Latitude	Longitude
NH-21	0	0	NH-03	KUL-MAN	272+000	285+500	Increasing	1.5 - 2.5	03-06-2023	31.97262806	77.12394052	32.07083176	77.13086895
NH-21	0	0	NH-03	KUL-MAN	285+500	285+800	Increasing	TOLL	03-06-2023	32.07083176	77.13086895	32.07313679	77.12923116
NH-21	0	0	NH-03	KUL-MAN	285+800	309+345	Increasing	1.5 - 2.5	03-06-2023	32.07313679	77.12923116	32.24810699	77.19106037
NH-21	0	0	NH-03	KUL-MAN	309+345	285+800	Decreasing	1.5 - 2.5	03-06-2023	32.24810699	77.19106037	32.07313679	77.12923116
NH-21	0	0	NH-03	KUL-MAN	285+800	285+500	Decreasing	TOLL	03-06-2023	32.07313679	77.12923116	32.07083176	77.13086895
NH-21	0	0	NH-03	KUL-MAN	285+500	272+000	Decreasing	1.5 - 2.5	03-06-2023	32.07083176	77.13086895	31.97262806	77.12394052

Topography													
As per Old NH number			New NH number		As per New NH number					Start		End	
NH Number Old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	Topography	Survey Date	Latitude	Longitude	Latitude	Longitude
NH-21	0	0	NH-03	KUL-MAN	272+000	309+345	Increasing	Hilly	03-06-2023	31.97262806	77.12394052	32.21537840	77.19125083
NH-21	0	0	NH-03	KUL-MAN	309+345	272+000	Decreasing	Hilly	03-06-2023	32.21537840	77.19125083	32.24810699	77.19106037

Cross Section														
As per Old NH number			New NH number		As per New NH number						Start		End	
NH Number Old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	Cross Section	Embankment Height	Cut Height	Survey Date	Latitude	Longitude	Latitude	Longitude
NH-21	0	0	NH-03	KUL-MAN	272+000	285+500	Increasing	Cut			03-06-2023	31.97262806	77.12394052	32.07083176	77.13086895
NH-21	0	0	NH-03	KUL-MAN	285+500	285+800	Increasing	TOLL			03-06-2023	32.07083176	77.13086895	32.07313679	77.12923116
NH-21	0	0	NH-03	KUL-MAN	285+800	309+345	Increasing	Cut			03-06-2023	32.07313679	77.12923116	32.24810699	77.19106037
NH-21	0	0	NH-03	KUL-MAN	309+345	285+800	Decreasing	Cut			03-06-2023	32.24810699	77.19106037	32.07313679	77.12923116
NH-21	0	0	NH-03	KUL-MAN	285+800	285+500	Decreasing	TOLL			03-06-2023	32.07313679	77.12923116	32.07083176	77.13086895
NH-21	0	0	NH-03	KUL-MAN	285+500	272+000	Decreasing	Cut			03-06-2023	32.07083176	77.13086895	31.97262806	77.12394052

Drain Type													
As per Old NH number			New NH number		As per New NH number					Start		End	
NH Number Old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	Drain Type	Survey Date	Latitude	Longitude	Latitude	Longitude
NH-21	0	0	NH-03	KUL-MAN	272+370	274+240	Increasing	Open Lined	03-06-2023	31.97532535	77.12490409	31.97532535	77.12490409
NH-21	0	0	NH-03	KUL-MAN	274+335	274+540	Increasing	Open Lined	03-06-2023	31.98979221	77.13255275	31.98979221	77.13255275
NH-21	0	0	NH-03	KUL-MAN	275+325	276+990	Increasing	Open Lined	03-06-2023	31.99534409	77.12697545	31.99534409	77.12697545
NH-21	0	0	NH-03	KUL-MAN	277+595	278+340	Increasing	Open Lined	03-06-2023	32.01259228	77.12696474	32.01259228	77.12696474

NH-21	0	0	NH-03	KUL-MAN	278+860	279+140	Increasing	Open Lined	03-06-2023	32.02293289	77.12842961	32.02293289	77.12842961
NH-21	0	0	NH-03	KUL-MAN	279+350	279+600	Increasing	Open Lined	03-06-2023	32.02632403	77.13120003	32.02632403	77.13120003
NH-21	0	0	NH-03	KUL-MAN	279+760	280+990	Increasing	Open Lined	03-06-2023	32.02465506	77.12795846	32.02465506	77.12795846
NH-21	0	0	NH-03	KUL-MAN	281+270	282+350	Increasing	Open Lined	03-06-2023	32.03652882	77.12616825	32.03652882	77.12616825
NH-21	0	0	NH-03	KUL-MAN	282+550	283+340	Increasing	Open Lined	03-06-2023	32.04732518	77.12880480	32.04732518	77.12880480
NH-21	0	0	NH-03	KUL-MAN	283+780	284+200	Increasing	Open Lined	03-06-2023	32.05603663	77.13544513	32.05603663	77.13544513
NH-21	0	0	NH-03	KUL-MAN	284+760	285+470	Increasing	Open Lined	03-06-2023	32.06440039	77.13270669	32.06440039	77.13270669
NH-21	0	0	NH-03	KUL-MAN	285+870	287+680	Increasing	Open Lined	03-06-2023	32.07365376	77.12880376	32.07365376	77.12880376
NH-21	0	0	NH-03	KUL-MAN	292+900	394+500	Increasing	Open Lined	03-06-2023	32.12302148	77.14875359	32.12302148	77.14875359
NH-21	0	0	NH-03	KUL-MAN	295+600	296+080	Increasing	Open Lined	03-06-2023	32.14356309	77.15621303	32.14356309	77.15621303
NH-21	0	0	NH-03	KUL-MAN	296+550	297+760	Increasing	Open Lined	03-06-2023	32.14993007	77.16234101	32.14993007	77.16234101
NH-21	0	0	NH-03	KUL-MAN	299+500	300+325	Increasing	Open Lined	03-06-2023	32.17000400	77.17937142	32.17000400	77.17937142
NH-21	0	0	NH-03	KUL-MAN	300+575	304+415	Increasing	Open Lined	03-06-2023	32.17938112	77.18015604	32.17938112	77.18015604
NH-21	0	0	NH-03	KUL-MAN	304+785	305+980	Increasing	Open Lined	03-06-2023	32.21218611	77.18717217	32.21218611	77.18717217
NH-21	0	0	NH-03	KUL-MAN	306+250	308+000	Increasing	Open Lined	03-06-2023	32.22237777	77.19100735	32.24347064	77.19108256

Median Opening															
As per Old NH number			New NH number		As per New NH number							Start		End	
NH Number Old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	Median Type	Median Width	Kerb Height	Construction Year	Survey Date	Latitude	Longitude	Latitude	Longitude
NH-21	0	0	NH-03	KUL-MAN	272+000	305+845	Increasing	No Median	0.0	0.0		03-06-2023	31.97262806	77.12394052	32.24540589	77.19086388
NH-21	0	0	NH-03	KUL-MAN	309+020	309+080	Increasing	Median	1.5	0.0		03-06-2023	32.24540589	77.19086388	32.24594090	77.19075483
NH-21	0	0	NH-03	KUL-MAN	309+080	309+150	Increasing	No Median	0.0	0.0		03-06-2023	32.24594090	77.19075483	32.24725088	77.19091251
NH-21	0	0	NH-03	KUL-MAN	309+150	309+180	Increasing	Median	1.5	0.0		03-06-2023	32.24725088	77.19091251	32.24748031	77.19107864
NH-21	0	0	NH-03	KUL-MAN	309+180	309+345	Increasing	No Median	0.0	0.0		03-06-2023	32.24748031	77.19107864	32.24810699	77.19106037

Right Of Way														
As per Old NH number			New NH number		As per New NH number						Start		End	
NH Number Old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	ROW Width (m)	Remarks	Survey Date	Latitude	Longitude	Latitude	Longitude
NH-21	0	0	NH-03	KUL-MAN	272+000	285+500	Increasing	24.0	Full ROW	03-06-2023	31.97262806	77.12394052	31.97262806	77.12394052
NH-21	0	0	NH-03	KUL-MAN	285+500	285+800	Increasing	TOLL	Full ROW	03-06-2023	32.07083176	77.13086895	32.07083176	77.13086895
NH-21	0	0	NH-03	KUL-MAN	285+800	292+200	Increasing	24.0	Full ROW	03-06-2023	32.07313679	77.12923116	32.07313679	77.12923116
NH-21	0	0	NH-03	KUL-MAN	292+200	292+450	Increasing	40.0	Full ROW	03-06-2023	32.11906468	77.14794198	32.11906468	77.14794198
NH-21	0	0	NH-03	KUL-MAN	292+450	308+900	Increasing	24.0	Full ROW	03-06-2023	32.12115685	77.14706814	32.24433627	77.19087911
NH-21	0	0	NH-03	KUL-MAN	308+900	309+060	Increasing	45.0	Full ROW	03-06-2023	32.24433627	77.19087911	32.24575989	77.19078242
NH-21	0	0	NH-03	KUL-MAN	309+060	309+345	Increasing	24.0	Full ROW	03-06-2023	32.24575989	77.19078242	32.24810699	77.19106037

Carriageway Type												
As per Old NH number			New NH number		As per New NH number				Start		End	
NH Number Old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Carriageway Type	Survey Date	Latitude	Longitude	Latitude	Longitude
NH-21	0	0	NH-03	KUL-MAN	272+000	208+500	Undivided	03-06-2023	31.97262806	77.12394052	32.07083176	77.13086895
NH-21	0	0	NH-03	KUL-MAN	208+500	285+800	TOLL	03-06-2023	32.07083176	77.13086895	32.07313679	77.12923116
NH-21	0	0	NH-03	KUL-MAN	285+800	309+345	Divided	03-06-2023	32.07313679	77.12923116	32.24810699	77.19106037

Visual Condition																																
As per Old NH number			New NH number		As per New NH number																								Start		End	
NH Number Old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	Lane Number	Structural Cracks	Wide Cracks	Thermal Tranverse Cracks	Ravelling	Pot Holes	Edge Break	Faulting	Spalled Joint	Crack Slab	Poor Cracks	Faillures	Cracking	Disintegration	Depression	Bleeding	Patching	Drain Condition	Shoulder Condition	Survey Date	Latitude	Longitude	Latitude	Longitude
NH-21	0	0	NH-03	KUL-MAN	272+000	272+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	31.97262806	77.12394052	31.97635344	77.12469618
NH-21	0	0	NH-03	KUL-MAN	272+500	273+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	31.97635344	77.12469618	31.98069824	77.12606264
NH-21	0	0	NH-03	KUL-MAN	273+000	273+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	31.98069824	77.12606264	31.98517957	77.12643868
NH-21	0	0	NH-03	KUL-MAN	273+500	274+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	31.98517957	77.12643868	31.98828900	77.12974629
NH-21	0	0	NH-03	KUL-MAN	274+000	274+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	31.98828900	77.12974629	31.98970087	77.13113112
NH-21	0	0	NH-03	KUL-MAN	274+500	275+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	31.98970087	77.13113112	31.99296273	77.12850977
NH-21	0	0	NH-03	KUL-MAN	275+000	275+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	31.99296273	77.12850977	31.99690727	77.12673703
NH-21	0	0	NH-03	KUL-MAN	275+500	276+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	31.99690727	77.12673703	32.00125738	77.12717543
NH-21	0	0	NH-03	KUL-MAN	276+000	276+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.00125738	77.12717543	32.00532313	77.12935501
NH-21	0	0	NH-03	KUL-MAN	276+500	277+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.00532313	77.12935501	32.00942123	77.13148455
NH-21	0	0	NH-03	KUL-MAN	277+000	277+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.00942123	77.13148455	32.01210561	77.12778494
NH-21	0	0	NH-03	KUL-MAN	277+500	278+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.01210561	77.12778494	32.01584446	77.12525466
NH-21	0	0	NH-03	KUL-MAN	278+000	278+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.01584446	77.12525466	32.02012763	77.12652075
NH-21	0	0	NH-03	KUL-MAN	278+500	279+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.02012763	77.12652075	32.02369645	77.12962080
NH-21	0	0	NH-03	KUL-MAN	279+000	279+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.02369645	77.12962080	32.02572593	77.13007165
NH-21	0	0	NH-03	KUL-MAN	279+500	280+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.02572593	77.13007165	32.02634471	77.12901084
NH-21	0	0	NH-03	KUL-MAN	280+000	280+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.02634471	77.12901084	32.03059374	77.12998705
NH-21	0	0	NH-03	KUL-MAN	280+500	281+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.03059374	77.12998705	32.03447942	77.12754924
NH-21	0	0	NH-03	KUL-MAN	281+000	281+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.03447942	77.12754924	32.03856271	77.12598913
NH-21	0	0	NH-03	KUL-MAN	281+500	282+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.03856271	77.12598913	32.04294763	77.12622161
NH-21	0	0	NH-03	KUL-MAN	282+000	282+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.04294763	77.12622161	32.04689270	77.12866104
NH-21	0	0	NH-03	KUL-MAN	282+500	283+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.04689270	77.12866104	32.05094592	77.13023973
NH-21	0	0	NH-03	KUL-MAN	283+000	283+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.05094592	77.13023973	32.05378295	77.13428519

NH-21	0	0	NH-03	KUL-MAN	283+500	284+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.05378295	77.13428519	32.05800562	77.13519449
NH-21	0	0	NH-03	KUL-MAN	284+000	284+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.05800562	77.13519449	32.06222354	77.13369688
NH-21	0	0	NH-03	KUL-MAN	284+500	285+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.06222354	77.13369688	32.06642281	77.13180463
NH-21	0	0	NH-03	KUL-MAN	285+000	285+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.06642281	77.13180463	32.07083176	77.13086895
NH-21	0	0	NH-03	KUL-MAN	285+500	286+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.07083176	77.13086895	32.07476460	77.12836876
NH-21	0	0	NH-03	KUL-MAN	286+000	286+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.07476460	77.12836876	32.07854469	77.12552400
NH-21	0	0	NH-03	KUL-MAN	286+500	287+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.07854469	77.12552400	32.08290515	77.12526523
NH-21	0	0	NH-03	KUL-MAN	287+000	287+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.08290515	77.12526523	32.08705965	77.12525388
NH-21	0	0	NH-03	KUL-MAN	287+500	288+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.08705965	77.12525388	32.09139519	77.12576235
NH-21	0	0	NH-03	KUL-MAN	288+000	288+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.09139519	77.12576235	32.09554245	77.12471526
NH-21	0	0	NH-03	KUL-MAN	288+500	289+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.09554245	77.12471526	32.09750114	77.12934963
NH-21	0	0	NH-03	KUL-MAN	289+000	289+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.09750114	77.12934963	32.10062300	77.13315532
NH-21	0	0	NH-03	KUL-MAN	289+500	290+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.10062300	77.13315532	32.10385526	77.13684498
NH-21	0	0	NH-03	KUL-MAN	290+000	290+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.10385526	77.13684498	32.10722735	77.14031280
NH-21	0	0	NH-03	KUL-MAN	290+500	291+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.10722735	77.14031280	32.11056945	77.14368633
NH-21	0	0	NH-03	KUL-MAN	291+000	291+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.11056945	77.14368633	32.11352313	77.14739616
NH-21	0	0	NH-03	KUL-MAN	291+500	292+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.11352313	77.14739616	32.11733802	77.14853138
NH-21	0	0	NH-03	KUL-MAN	292+000	292+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.11733802	77.14853138	32.12160733	77.14699988
NH-21	0	0	NH-03	KUL-MAN	292+500	293+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.12160733	77.14699988	32.12325098	77.14974518
NH-21	0	0	NH-03	KUL-MAN	293+000	293+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.12325098	77.14974518	32.12671250	77.15296746
NH-21	0	0	NH-03	KUL-MAN	293+500	294+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.12671250	77.15296746	32.13101267	77.15429348
NH-21	0	0	NH-03	KUL-MAN	294+000	294+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.13101267	77.15429348	32.13391514	77.15434963
NH-21	0	0	NH-03	KUL-MAN	294+500	295+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.13391514	77.15434963	32.13841761	77.15443456
NH-21	0	0	NH-03	KUL-MAN	295+000	295+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.13841761	77.15443456	32.14267045	77.15608444
NH-21	0	0	NH-03	KUL-MAN	295+500	296+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.14267045	77.15608444	32.14675239	77.15804562
NH-21	0	0	NH-03	KUL-MAN	296+000	296+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.14675239	77.15804562	32.14971448	77.16187567
NH-21	0	0	NH-03	KUL-MAN	296+500	297+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.14971448	77.16187567	32.15157814	77.16663809
NH-21	0	0	NH-03	KUL-MAN	297+000	297+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.15157814	77.16663809	32.15470292	77.16995895
NH-21	0	0	NH-03	KUL-MAN	297+500	298+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.15470292	77.16995895	32.15854691	77.17267245
NH-21	0	0	NH-03	KUL-MAN	298+000	298+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.15854691	77.17267245	32.16240662	77.17538486

NH-21	0	0	NH-03	KUL-MAN	298+500	299+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.16240662	77.17538486	32.16648284	77.17613368
NH-21	0	0	NH-03	KUL-MAN	299+000	299+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.16648284	77.17613368	32.17000400	77.17937142
NH-21	0	0	NH-03	KUL-MAN	299+500	300+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.17000400	77.17937142	32.17435194	77.17998250
NH-21	0	0	NH-03	KUL-MAN	300+000	300+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.17435194	77.17998250	32.17877794	77.17981267
NH-21	0	0	NH-03	KUL-MAN	300+500	301+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.17877794	77.17981267	32.18236757	77.18292218
NH-21	0	0	NH-03	KUL-MAN	301+000	301+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.18236757	77.18292218	32.18624906	77.18556441
NH-21	0	0	NH-03	KUL-MAN	301+500	302+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.18624906	77.18556441	32.18907398	77.18927633
NH-21	0	0	NH-03	KUL-MAN	302+000	302+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.18907398	77.18927633	32.19325574	77.18895835
NH-21	0	0	NH-03	KUL-MAN	302+500	303+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.19325574	77.18895835	32.19766947	77.18805959
NH-21	0	0	NH-03	KUL-MAN	303+000	303+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.19766947	77.18805959	32.20213300	77.18844556
NH-21	0	0	NH-03	KUL-MAN	303+500	304+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.20213300	77.18844556	32.20632205	77.19017857
NH-21	0	0	NH-03	KUL-MAN	304+000	304+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.20632205	77.19017857	32.21071150	77.18960126
NH-21	0	0	NH-03	KUL-MAN	304+500	305+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.21071150	77.18960126	32.21377455	77.18828501
NH-21	0	0	NH-03	KUL-MAN	305+000	305+500	Increasing	L1	0	0	0	5	4	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.21377455	77.18828501	32.21674356	77.19146017
NH-21	0	0	NH-03	KUL-MAN	305+500	306+000	Increasing	L1	0	0	0	5	4	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.21674356	77.19146017	32.22053093	77.19248279
NH-21	0	0	NH-03	KUL-MAN	306+000	306+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.22053093	77.19248279	32.22285404	77.19077859
NH-21	0	0	NH-03	KUL-MAN	306+500	307+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.22285404	77.19077859	32.22285404	77.19077859
NH-21	0	0	NH-03	KUL-MAN	307+000	307+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.22285404	77.19077859	32.22285404	77.19077859
NH-21	0	0	NH-03	KUL-MAN	307+500	308+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.22285404	77.19077859	32.22285404	77.19077859
NH-21	0	0	NH-03	KUL-MAN	308+000	308+500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.22285404	77.19077859	32.24079579	77.19106977
NH-21	0	0	NH-03	KUL-MAN	308+500	309+000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.24079579	77.19106977	32.24522510	77.19089959
NH-21	0	0	NH-03	KUL-MAN	309+000	309+345	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	5	5	5	5	3	3	03-06-2023	32.24522510	77.19089959	32.24810699	77.19106037

Roughness																	
As per Old NH number			New NH number		As per New NH number									Start		End	
NH Number Old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	Lane No.	LWP IRI	RWP IRI	Lane IRI	Speed	Survey Date	Latitude	Longitude	Latitude	Longitude
NH-21	0	0	NH-03	KUL-MAN	272+000	272+100	Increasing	L1	2.21	1.79	2.00	26	03-06-2023	31.97262806	77.12394052	31.97333704	77.12461505
NH-21	0	0	NH-03	KUL-MAN	272+100	272+200	Increasing	L1	1.95	2.06	2.01	29	03-06-2023	31.97333704	77.12461505	31.97408323	77.12520494
NH-21	0	0	NH-03	KUL-MAN	272+200	272+300	Increasing	L1	2.30	2.06	2.18	27	03-06-2023	31.97408323	77.12520494	31.97490095	77.12545534
NH-21	0	0	NH-03	KUL-MAN	272+300	272+400	Increasing	L1	1.69	2.13	1.91	27	03-06-2023	31.97490095	77.12545534	31.97550243	77.12467106
NH-21	0	0	NH-03	KUL-MAN	272+400	272+500	Increasing	L1	1.93	1.76	1.84	25	03-06-2023	31.97550243	77.12467106	31.97635344	77.12469618
NH-21	0	0	NH-03	KUL-MAN	272+500	272+600	Increasing	L1	1.81	1.64	1.72	40	03-06-2023	31.97635344	77.12469618	31.97718790	77.12509302
NH-21	0	0	NH-03	KUL-MAN	272+600	272+700	Increasing	L1	2.32	1.70	2.01	44	03-06-2023	31.97718790	77.12509302	31.97805923	77.12534558
NH-21	0	0	NH-03	KUL-MAN	272+700	272+800	Increasing	L1	1.94	1.92	1.93	44	03-06-2023	31.97805923	77.12534558	31.97894160	77.12558613
NH-21	0	0	NH-03	KUL-MAN	272+800	272+900	Increasing	L1	1.94	2.12	2.03	45	03-06-2023	31.97894160	77.12558613	31.97982256	77.12583679
NH-21	0	0	NH-03	KUL-MAN	272+900	273+000	Increasing	L1	3.12	3.17	3.15	46	03-06-2023	31.97982256	77.12583679	31.98069824	77.12606264
NH-21	0	0	NH-03	KUL-MAN	273+000	273+100	Increasing	L1	2.17	2.72	2.45	46	03-06-2023	31.98069824	77.12606264	31.98160587	77.12602214
NH-21	0	0	NH-03	KUL-MAN	273+100	273+200	Increasing	L1	1.61	2.00	1.81	45	03-06-2023	31.98160587	77.12602214	31.98249406	77.12621128
NH-21	0	0	NH-03	KUL-MAN	273+200	273+300	Increasing	L1	1.96	2.34	2.15	46	03-06-2023	31.98249406	77.12621128	31.98338228	77.12638587
NH-21	0	0	NH-03	KUL-MAN	273+300	273+400	Increasing	L1	2.99	3.22	3.10	49	03-06-2023	31.98338228	77.12638587	31.98427341	77.12648330
NH-21	0	0	NH-03	KUL-MAN	273+400	273+500	Increasing	L1	2.66	2.62	2.64	49	03-06-2023	31.98427341	77.12648330	31.98517957	77.12643868
NH-21	0	0	NH-03	KUL-MAN	273+500	273+600	Increasing	L1	2.52	2.80	2.66	49	03-06-2023	31.98517957	77.12643868	31.98606080	77.12660601
NH-21	0	0	NH-03	KUL-MAN	273+600	273+700	Increasing	L1	1.75	2.47	2.11	49	03-06-2023	31.98606080	77.12660601	31.98687567	77.12707023
NH-21	0	0	NH-03	KUL-MAN	273+700	273+800	Increasing	L1	2.13	2.52	2.33	51	03-06-2023	31.98687567	77.12707023	31.98746042	77.12787349
NH-21	0	0	NH-03	KUL-MAN	273+800	273+900	Increasing	L1	2.19	2.75	2.47	52	03-06-2023	31.98746042	77.12787349	31.98786780	77.12880011
NH-21	0	0	NH-03	KUL-MAN	273+900	274+000	Increasing	L1	2.41	1.58	1.99	56	03-06-2023	31.98786780	77.12880011	31.98828900	77.12974629
NH-21	0	0	NH-03	KUL-MAN	274+000	274+100	Increasing	L1	2.04	1.80	1.92	53	03-06-2023	31.98828900	77.12974629	31.98856493	77.13074890
NH-21	0	0	NH-03	KUL-MAN	274+100	274+200	Increasing	L1	1.97	2.32	2.15	49	03-06-2023	31.98856493	77.13074890	31.98883282	77.13175300
NH-21	0	0	NH-03	KUL-MAN	274+200	274+300	Increasing	L1	1.99	2.02	2.01	47	03-06-2023	31.98883282	77.13175300	31.98949650	77.13246076
NH-21	0	0	NH-03	KUL-MAN	274+300	274+400	Increasing	L1	2.07	1.63	1.85	36	03-06-2023	31.98949650	77.13246076	31.99009659	77.13203288
NH-21	0	0	NH-03	KUL-MAN	274+400	274+500	Increasing	L1	2.55	2.65	2.60	33	03-06-2023	31.99009659	77.13203288	31.98970087	77.13113112

NH-21	0	0	NH-03	KUL-MAN	274+500	274+600	Increasing	L1	3.08	2.75	2.92	33	03-06-2023	31.98970087	77.13113112	31.98992553	77.13028424
NH-21	0	0	NH-03	KUL-MAN	274+600	274+700	Increasing	L1	2.96	2.96	2.96	33	03-06-2023	31.98992553	77.13028424	31.99081563	77.13013140
NH-21	0	0	NH-03	KUL-MAN	274+700	274+800	Increasing	L1	2.14	2.16	2.15	33	03-06-2023	31.99081563	77.13013140	31.99170353	77.12997046
NH-21	0	0	NH-03	KUL-MAN	274+800	274+900	Increasing	L1	2.19	2.50	2.35	41	03-06-2023	31.99170353	77.12997046	31.99243450	77.12935821
NH-21	0	0	NH-03	KUL-MAN	274+900	275+000	Increasing	L1	2.20	2.63	2.42	49	03-06-2023	31.99243450	77.12935821	31.99296273	77.12850977
NH-21	0	0	NH-03	KUL-MAN	275+000	275+100	Increasing	L1	2.38	2.19	2.28	49	03-06-2023	31.99296273	77.12850977	31.99345689	77.12764803
NH-21	0	0	NH-03	KUL-MAN	275+100	275+200	Increasing	L1	1.53	1.75	1.64	49	03-06-2023	31.99345689	77.12764803	31.99423768	77.12711612
NH-21	0	0	NH-03	KUL-MAN	275+200	275+300	Increasing	L1	2.13	1.78	1.95	49	03-06-2023	31.99423768	77.12711612	31.99511332	77.12697084
NH-21	0	0	NH-03	KUL-MAN	275+300	275+400	Increasing	L1	1.86	2.02	1.94	55	03-06-2023	31.99511332	77.12697084	31.99601821	77.12693285
NH-21	0	0	NH-03	KUL-MAN	275+400	275+500	Increasing	L1	2.24	1.85	2.05	54	03-06-2023	31.99601821	77.12693285	31.99690727	77.12673703
NH-21	0	0	NH-03	KUL-MAN	275+500	275+600	Increasing	L1	2.43	2.30	2.37	53	03-06-2023	31.99690727	77.12673703	31.99778325	77.12652328
NH-21	0	0	NH-03	KUL-MAN	275+600	275+700	Increasing	L1	2.17	1.62	1.89	49	03-06-2023	31.99778325	77.12652328	31.99866645	77.12631582
NH-21	0	0	NH-03	KUL-MAN	275+700	275+800	Increasing	L1	2.06	1.74	1.90	37	03-06-2023	31.99866645	77.12631582	31.99955918	77.12643501
NH-21	0	0	NH-03	KUL-MAN	275+800	275+900	Increasing	L1	1.52	2.23	1.87	43	03-06-2023	31.99955918	77.12643501	32.00039135	77.12683473
NH-21	0	0	NH-03	KUL-MAN	275+900	276+000	Increasing	L1	2.41	1.77	2.09	45	03-06-2023	32.00039135	77.12683473	32.00125738	77.12717543
NH-21	0	0	NH-03	KUL-MAN	276+000	276+100	Increasing	L1	1.83	2.37	2.10	46	03-06-2023	32.00125738	77.12717543	32.00206149	77.12764991
NH-21	0	0	NH-03	KUL-MAN	276+100	276+200	Increasing	L1	1.60	2.35	1.98	37	03-06-2023	32.00206149	77.12764991	32.00281747	77.12822173
NH-21	0	0	NH-03	KUL-MAN	276+200	276+300	Increasing	L1	2.20	2.61	2.41	37	03-06-2023	32.00281747	77.12822173	32.00359938	77.12876467
NH-21	0	0	NH-03	KUL-MAN	276+300	276+400	Increasing	L1	2.61	2.23	2.42	46	03-06-2023	32.00359938	77.12876467	32.00443288	77.12912854
NH-21	0	0	NH-03	KUL-MAN	276+400	276+500	Increasing	L1	1.84	1.99	1.92	42	03-06-2023	32.00443288	77.12912854	32.00532313	77.12935501
NH-21	0	0	NH-03	KUL-MAN	276+500	276+600	Increasing	L1	1.61	1.58	1.60	39	03-06-2023	32.00532313	77.12935501	32.00618965	77.12963898
NH-21	0	0	NH-03	KUL-MAN	276+600	276+700	Increasing	L1	1.86	1.90	1.88	41	03-06-2023	32.00618965	77.12963898	32.00701665	77.13006055
NH-21	0	0	NH-03	KUL-MAN	276+700	276+800	Increasing	L1	1.58	1.70	1.64	41	03-06-2023	32.00701665	77.13006055	32.00778217	77.13062201
NH-21	0	0	NH-03	KUL-MAN	276+800	276+900	Increasing	L1	2.45	1.86	2.16	49	03-06-2023	32.00778217	77.13062201	32.00857926	77.13109336
NH-21	0	0	NH-03	KUL-MAN	276+900	277+000	Increasing	L1	2.48	1.70	2.09	52	03-06-2023	32.00857926	77.13109336	32.00942123	77.13148455
NH-21	0	0	NH-03	KUL-MAN	277+000	277+100	Increasing	L1	1.90	1.93	1.92	43	03-06-2023	32.00942123	77.13148455	32.01024358	77.13138266
NH-21	0	0	NH-03	KUL-MAN	277+100	277+200	Increasing	L1	1.90	2.40	2.15	48	03-06-2023	32.01024358	77.13138266	32.01074739	77.13052730
NH-21	0	0	NH-03	KUL-MAN	277+200	277+300	Increasing	L1	2.07	1.60	1.84	45	03-06-2023	32.01074739	77.13052730	32.01108383	77.12953662
NH-21	0	0	NH-03	KUL-MAN	277+300	277+400	Increasing	L1	1.69	2.02	1.86	45	03-06-2023	32.01108383	77.12953662	32.01156458	77.12864511
NH-21	0	0	NH-03	KUL-MAN	277+400	277+500	Increasing	L1	1.70	2.18	1.94	49	03-06-2023	32.01156458	77.12864511	32.01210561	77.12778494

NH-21	0	0	NH-03	KUL-MAN	277+500	277+600	Increasing	L1	3.28	2.51	2.90	48	03-06-2023	32.01210561	77.12778494	32.01261894	77.12691717
NH-21	0	0	NH-03	KUL-MAN	277+600	277+700	Increasing	L1	3.03	2.73	2.88	42	03-06-2023	32.01261894	77.12691717	32.01328529	77.12622868
NH-21	0	0	NH-03	KUL-MAN	277+700	277+800	Increasing	L1	2.55	3.14	2.84	42	03-06-2023	32.01328529	77.12622868	32.01411513	77.12578164
NH-21	0	0	NH-03	KUL-MAN	277+800	277+900	Increasing	L1	2.61	2.67	2.64	42	03-06-2023	32.01411513	77.12578164	32.01495395	77.12538801
NH-21	0	0	NH-03	KUL-MAN	277+900	278+000	Increasing	L1	2.69	3.02	2.86	41	03-06-2023	32.01495395	77.12538801	32.01584446	77.12525466
NH-21	0	0	NH-03	KUL-MAN	278+000	278+100	Increasing	L1	1.94	2.19	2.07	51	03-06-2023	32.01584446	77.12525466	32.01675004	77.12530069
NH-21	0	0	NH-03	KUL-MAN	278+100	278+200	Increasing	L1	2.24	1.54	1.89	54	03-06-2023	32.01675004	77.12530069	32.01763893	77.12542472
NH-21	0	0	NH-03	KUL-MAN	278+200	278+300	Increasing	L1	1.89	2.43	2.16	49	03-06-2023	32.01763893	77.12542472	32.01853106	77.12554942
NH-21	0	0	NH-03	KUL-MAN	278+300	278+400	Increasing	L1	1.57	2.26	1.92	41	03-06-2023	32.01853106	77.12554942	32.01933390	77.12602241
NH-21	0	0	NH-03	KUL-MAN	278+400	278+500	Increasing	L1	1.79	1.80	1.79	29	03-06-2023	32.01933390	77.12602241	32.02012763	77.12652075
NH-21	0	0	NH-03	KUL-MAN	278+500	278+600	Increasing	L1	2.13	2.26	2.19	22	03-06-2023	32.02012763	77.12652075	32.02093968	77.12700204
NH-21	0	0	NH-03	KUL-MAN	278+600	278+700	Increasing	L1	2.14	2.23	2.19	35	03-06-2023	32.02093968	77.12700204	32.02174243	77.12747149
NH-21	0	0	NH-03	KUL-MAN	278+700	278+800	Increasing	L1	1.92	2.18	2.05	36	03-06-2023	32.02174243	77.12747149	32.02251169	77.12803666
NH-21	0	0	NH-03	KUL-MAN	278+800	278+900	Increasing	L1	2.21	1.58	1.90	45	03-06-2023	32.02251169	77.12803666	32.02314863	77.12876347
NH-21	0	0	NH-03	KUL-MAN	278+900	279+000	Increasing	L1	1.95	1.63	1.79	51	03-06-2023	32.02314863	77.12876347	32.02369645	77.12962080
NH-21	0	0	NH-03	KUL-MAN	279+000	279+100	Increasing	L1	1.79	1.87	1.83	53	03-06-2023	32.02369645	77.12962080	32.02434084	77.13033585
NH-21	0	0	NH-03	KUL-MAN	279+100	279+200	Increasing	L1	2.38	2.31	2.35	53	03-06-2023	32.02434084	77.13033585	32.02507070	77.13094120
NH-21	0	0	NH-03	KUL-MAN	279+200	279+300	Increasing	L1	2.55	2.88	2.72	49	03-06-2023	32.02507070	77.13094120	32.02589993	77.13133187
NH-21	0	0	NH-03	KUL-MAN	279+300	279+400	Increasing	L1	2.98	3.30	3.14	41	03-06-2023	32.02589993	77.13133187	32.02642715	77.13072577
NH-21	0	0	NH-03	KUL-MAN	279+400	279+500	Increasing	L1	2.90	2.50	2.70	41	03-06-2023	32.02642715	77.13072577	32.02572593	77.13007165
NH-21	0	0	NH-03	KUL-MAN	279+500	279+600	Increasing	L1	2.57	3.26	2.92	45	03-06-2023	32.02572593	77.13007165	32.02496659	77.12949679
NH-21	0	0	NH-03	KUL-MAN	279+600	279+700	Increasing	L1	3.27	2.83	3.05	31	03-06-2023	32.02496659	77.12949679	32.02458086	77.12854501
NH-21	0	0	NH-03	KUL-MAN	279+700	279+800	Increasing	L1	2.80	2.94	2.87	26	03-06-2023	32.02458086	77.12854501	32.02499254	77.12780273
NH-21	0	0	NH-03	KUL-MAN	279+800	279+900	Increasing	L1	2.81	2.71	2.76	24	03-06-2023	32.02499254	77.12780273	32.02567587	77.12838254
NH-21	0	0	NH-03	KUL-MAN	279+900	280+000	Increasing	L1	2.87	2.78	2.82	27	03-06-2023	32.02567587	77.12838254	32.02634471	77.12901084
NH-21	0	0	NH-03	KUL-MAN	280+000	280+100	Increasing	L1	2.92	3.14	3.03	35	03-06-2023	32.02634471	77.12901084	32.02723932	77.12895459
NH-21	0	0	NH-03	KUL-MAN	280+100	280+200	Increasing	L1	2.85	2.61	2.73	40	03-06-2023	32.02723932	77.12895459	32.02804670	77.12934936
NH-21	0	0	NH-03	KUL-MAN	280+200	280+300	Increasing	L1	3.11	2.54	2.82	38	03-06-2023	32.02804670	77.12934936	32.02887819	77.12974262
NH-21	0	0	NH-03	KUL-MAN	280+300	280+400	Increasing	L1	3.23	3.18	3.20	35	03-06-2023	32.02887819	77.12974262	32.02976258	77.12996340
NH-21	0	0	NH-03	KUL-MAN	280+400	280+500	Increasing	L1	2.82	2.85	2.84	32	03-06-2023	32.02976258	77.12996340	32.03059374	77.12998705

NH-21	0	0	NH-03	KUL-MAN	280+500	280+600	Increasing	L1	3.29	2.81	3.05	36	03-06-2023	32.03059374	77.12998705	32.03127995	77.12929758
NH-21	0	0	NH-03	KUL-MAN	280+600	280+700	Increasing	L1	2.74	2.52	2.63	39	03-06-2023	32.03127995	77.12929758	32.03199390	77.12864760
NH-21	0	0	NH-03	KUL-MAN	280+700	280+800	Increasing	L1	2.98	2.58	2.78	40	03-06-2023	32.03199390	77.12864760	32.03287223	77.12850608
NH-21	0	0	NH-03	KUL-MAN	280+800	280+900	Increasing	L1	2.62	3.20	2.91	42	03-06-2023	32.03287223	77.12850608	32.03368359	77.12800994
NH-21	0	0	NH-03	KUL-MAN	280+900	281+000	Increasing	L1	3.07	2.56	2.82	46	03-06-2023	32.03368359	77.12800994	32.03447942	77.12754924
NH-21	0	0	NH-03	KUL-MAN	281+000	281+100	Increasing	L1	2.36	1.67	2.01	39	03-06-2023	32.03447942	77.12754924	32.03516089	77.12685465
NH-21	0	0	NH-03	KUL-MAN	281+100	281+200	Increasing	L1	2.42	2.49	2.46	40	03-06-2023	32.03516089	77.12685465	32.03590479	77.12624834
NH-21	0	0	NH-03	KUL-MAN	281+200	281+300	Increasing	L1	2.28	2.18	2.23	43	03-06-2023	32.03590479	77.12624834	32.03680580	77.12619492
NH-21	0	0	NH-03	KUL-MAN	281+300	281+400	Increasing	L1	1.58	2.45	2.01	45	03-06-2023	32.03680580	77.12619492	32.03766991	77.12603986
NH-21	0	0	NH-03	KUL-MAN	281+400	281+500	Increasing	L1	2.19	1.92	2.05	46	03-06-2023	32.03766991	77.12603986	32.03856271	77.12598913
NH-21	0	0	NH-03	KUL-MAN	281+500	281+600	Increasing	L1	1.75	1.91	1.83	44	03-06-2023	32.03856271	77.12598913	32.03943904	77.12606183
NH-21	0	0	NH-03	KUL-MAN	281+600	281+700	Increasing	L1	2.13	1.71	1.92	49	03-06-2023	32.03943904	77.12606183	32.04035018	77.12606449
NH-21	0	0	NH-03	KUL-MAN	281+700	281+800	Increasing	L1	2.46	1.51	1.99	44	03-06-2023	32.04035018	77.12606449	32.04117309	77.12648235
NH-21	0	0	NH-03	KUL-MAN	281+800	281+900	Increasing	L1	2.15	2.47	2.31	40	03-06-2023	32.04117309	77.12648235	32.04205625	77.12638156
NH-21	0	0	NH-03	KUL-MAN	281+900	282+000	Increasing	L1	2.13	1.62	1.88	44	03-06-2023	32.04205625	77.12638156	32.04294763	77.12622161
NH-21	0	0	NH-03	KUL-MAN	282+000	282+100	Increasing	L1	2.06	1.92	1.99	40	03-06-2023	32.04294763	77.12622161	32.04381084	77.12648043
NH-21	0	0	NH-03	KUL-MAN	282+100	282+200	Increasing	L1	2.32	2.12	2.22	45	03-06-2023	32.04381084	77.12648043	32.04452595	77.12712216
NH-21	0	0	NH-03	KUL-MAN	282+200	282+300	Increasing	L1	2.05	2.22	2.13	54	03-06-2023	32.04452595	77.12712216	32.04527103	77.12773955
NH-21	0	0	NH-03	KUL-MAN	282+300	282+400	Increasing	L1	2.26	1.92	2.09	47	03-06-2023	32.04527103	77.12773955	32.04607129	77.12821617
NH-21	0	0	NH-03	KUL-MAN	282+400	282+500	Increasing	L1	1.70	1.66	1.68	39	03-06-2023	32.04607129	77.12821617	32.04689270	77.12866104
NH-21	0	0	NH-03	KUL-MAN	282+500	282+600	Increasing	L1	1.61	1.85	1.73	43	03-06-2023	32.04689270	77.12866104	32.04776241	77.12870789
NH-21	0	0	NH-03	KUL-MAN	282+600	282+700	Increasing	L1	1.52	2.31	1.92	48	03-06-2023	32.04776241	77.12870789	32.04866501	77.12868908
NH-21	0	0	NH-03	KUL-MAN	282+700	282+800	Increasing	L1	2.13	2.05	2.09	57	03-06-2023	32.04866501	77.12868908	32.04953813	77.12896109
NH-21	0	0	NH-03	KUL-MAN	282+800	282+900	Increasing	L1	2.59	2.39	2.49	61	03-06-2023	32.04953813	77.12896109	32.05029538	77.12952704
NH-21	0	0	NH-03	KUL-MAN	282+900	283+000	Increasing	L1	1.96	2.05	2.01	48	03-06-2023	32.05029538	77.12952704	32.05094592	77.13023973
NH-21	0	0	NH-03	KUL-MAN	283+000	283+100	Increasing	L1	2.17	2.16	2.17	31	03-06-2023	32.05094592	77.13023973	32.05158422	77.13099577
NH-21	0	0	NH-03	KUL-MAN	283+100	283+200	Increasing	L1	1.96	1.77	1.86	27	03-06-2023	32.05158422	77.13099577	32.05230152	77.13164267
NH-21	0	0	NH-03	KUL-MAN	283+200	283+300	Increasing	L1	1.50	1.88	1.69	33	03-06-2023	32.05230152	77.13164267	32.05287618	77.13245123
NH-21	0	0	NH-03	KUL-MAN	283+300	283+400	Increasing	L1	1.59	2.40	2.00	31	03-06-2023	32.05287618	77.13245123	32.05328642	77.13338571
NH-21	0	0	NH-03	KUL-MAN	283+400	283+500	Increasing	L1	1.52	2.22	1.87	41	03-06-2023	32.05328642	77.13338571	32.05378295	77.13428519

NH-21	0	0	NH-03	KUL-MAN	283+500	283+600	Increasing	L1	2.24	1.71	1.97	40	03-06-2023	32.05378295	77.13428519	32.05449240	77.13491913
NH-21	0	0	NH-03	KUL-MAN	283+600	283+700	Increasing	L1	1.71	1.87	1.79	37	03-06-2023	32.05449240	77.13491913	32.05532615	77.13530037
NH-21	0	0	NH-03	KUL-MAN	283+700	283+800	Increasing	L1	2.14	2.14	2.14	33	03-06-2023	32.05532615	77.13530037	32.05621967	77.13542819
NH-21	0	0	NH-03	KUL-MAN	283+800	283+900	Increasing	L1	1.95	2.16	2.06	39	03-06-2023	32.05621967	77.13542819	32.05712340	77.13538848
NH-21	0	0	NH-03	KUL-MAN	283+900	284+000	Increasing	L1	1.81	2.33	2.07	35	03-06-2023	32.05712340	77.13538848	32.05800562	77.13519449
NH-21	0	0	NH-03	KUL-MAN	284+000	284+100	Increasing	L1	1.51	2.28	1.89	21	03-06-2023	32.05800562	77.13519449	32.05884097	77.13483074
NH-21	0	0	NH-03	KUL-MAN	284+100	284+200	Increasing	L1	2.16	1.89	2.02	27	03-06-2023	32.05884097	77.13483074	32.05965067	77.13434716
NH-21	0	0	NH-03	KUL-MAN	284+200	284+300	Increasing	L1	1.97	2.17	2.07	40	03-06-2023	32.05965067	77.13434716	32.06054264	77.13434794
NH-21	0	0	NH-03	KUL-MAN	284+300	284+400	Increasing	L1	1.95	2.08	2.01	43	03-06-2023	32.06054264	77.13434794	32.06141009	77.13417065
NH-21	0	0	NH-03	KUL-MAN	284+400	284+500	Increasing	L1	2.18	1.83	2.00	40	03-06-2023	32.06141009	77.13417065	32.06222354	77.13369688
NH-21	0	0	NH-03	KUL-MAN	284+500	284+600	Increasing	L1	2.04	1.87	1.96	46	03-06-2023	32.06222354	77.13369688	32.06304684	77.13325776
NH-21	0	0	NH-03	KUL-MAN	284+600	284+700	Increasing	L1	1.84	2.44	2.14	44	03-06-2023	32.06304684	77.13325776	32.06388588	77.13288143
NH-21	0	0	NH-03	KUL-MAN	284+700	284+800	Increasing	L1	1.98	2.08	2.03	46	03-06-2023	32.06388588	77.13288143	32.06472833	77.13252834
NH-21	0	0	NH-03	KUL-MAN	284+800	284+900	Increasing	L1	1.55	2.48	2.01	47	03-06-2023	32.06472833	77.13252834	32.06555678	77.13208949
NH-21	0	0	NH-03	KUL-MAN	284+900	285+000	Increasing	L1	2.24	1.93	2.08	47	03-06-2023	32.06555678	77.13208949	32.06642281	77.13180463
NH-21	0	0	NH-03	KUL-MAN	285+000	285+100	Increasing	L1	2.02	2.36	2.19	49	03-06-2023	32.06642281	77.13180463	32.06733215	77.13170689
NH-21	0	0	NH-03	KUL-MAN	285+100	285+200	Increasing	L1	2.38	2.05	2.22	46	03-06-2023	32.06733215	77.13170689	32.06822115	77.13169978
NH-21	0	0	NH-03	KUL-MAN	285+200	285+300	Increasing	L1	1.77	2.09	1.93	46	03-06-2023	32.06822115	77.13169978	32.06910565	77.13148145
NH-21	0	0	NH-03	KUL-MAN	285+300	285+400	Increasing	L1	2.36	2.49	2.43	47	03-06-2023	32.06910565	77.13148145	32.06997329	77.13119836
NH-21	0	0	NH-03	KUL-MAN	285+400	285+500	Increasing	L1	1.85	2.35	2.10	39	03-06-2023	32.06997329	77.13119836	32.07083176	77.13086895
NH-21	0	0	NH-03	KUL-MAN	285+500	285+600	Increasing	L1	1.72	1.59	1.65	37	03-06-2023	32.07083176	77.13086895	32.07158173	77.13028206
NH-21	0	0	NH-03	KUL-MAN	285+600	285+700	Increasing	L1	2.33	2.22	2.27	38	03-06-2023	32.07158173	77.13028206	32.07236901	77.12977418
NH-21	0	0	NH-03	KUL-MAN	285+700	285+800	Increasing	L1	2.36	2.34	2.35	30	03-06-2023	32.07236901	77.12977418	32.07313679	77.12923116
NH-21	0	0	NH-03	KUL-MAN	285+800	285+900	Increasing	L1	1.81	2.00	1.90	46	03-06-2023	32.07313679	77.12923116	32.07390157	77.12867185
NH-21	0	0	NH-03	KUL-MAN	285+900	286+000	Increasing	L1	2.37	1.69	2.03	52	03-06-2023	32.07390157	77.12867185	32.07476460	77.12836876
NH-21	0	0	NH-03	KUL-MAN	286+000	286+100	Increasing	L1	2.34	2.12	2.23	54	03-06-2023	32.07476460	77.12836876	32.07556303	77.12787019
NH-21	0	0	NH-03	KUL-MAN	286+100	286+200	Increasing	L1	2.50	1.51	2.00	59	03-06-2023	32.07556303	77.12787019	32.07636275	77.12738257
NH-21	0	0	NH-03	KUL-MAN	286+200	286+300	Increasing	L1	2.33	1.68	2.00	55	03-06-2023	32.07636275	77.12738257	32.07708827	77.12677196
NH-21	0	0	NH-03	KUL-MAN	286+300	286+400	Increasing	L1	2.04	1.50	1.77	51	03-06-2023	32.07708827	77.12677196	32.07779206	77.12610540
NH-21	0	0	NH-03	KUL-MAN	286+400	286+500	Increasing	L1	2.43	2.33	2.38	52	03-06-2023	32.07779206	77.12610540	32.07854469	77.12552400

NH-21	0	0	NH-03	KUL-MAN	286+500	286+600	Increasing	L1	1.62	1.71	1.67	57	03-06-2023	32.07854469	77.12552400	32.07939323	77.12516903
NH-21	0	0	NH-03	KUL-MAN	286+600	286+700	Increasing	L1	2.37	2.45	2.41	57	03-06-2023	32.07939323	77.12516903	32.08026448	77.12491928
NH-21	0	0	NH-03	KUL-MAN	286+700	286+800	Increasing	L1	2.33	2.02	2.17	48	03-06-2023	32.08026448	77.12491928	32.08116507	77.12493116
NH-21	0	0	NH-03	KUL-MAN	286+800	286+900	Increasing	L1	1.84	1.50	1.67	42	03-06-2023	32.08116507	77.12493116	32.08200774	77.12530647
NH-21	0	0	NH-03	KUL-MAN	286+900	287+000	Increasing	L1	2.22	2.09	2.15	37	03-06-2023	32.08200774	77.12530647	32.08290515	77.12526523
NH-21	0	0	NH-03	KUL-MAN	287+000	287+100	Increasing	L1	2.40	2.61	2.51	32	03-06-2023	32.08290515	77.12526523	32.08379598	77.12525303
NH-21	0	0	NH-03	KUL-MAN	287+100	287+200	Increasing	L1	2.50	2.30	2.40	19	03-06-2023	32.08379598	77.12525303	32.08467446	77.12551103
NH-21	0	0	NH-03	KUL-MAN	287+200	287+300	Increasing	L1	2.07	1.92	1.99	21	03-06-2023	32.08467446	77.12551103	32.08542200	77.12607506
NH-21	0	0	NH-03	KUL-MAN	287+300	287+400	Increasing	L1	1.98	1.94	1.96	28	03-06-2023	32.08542200	77.12607506	32.08623552	77.12571073
NH-21	0	0	NH-03	KUL-MAN	287+400	287+500	Increasing	L1	2.29	2.29	2.29	27	03-06-2023	32.08623552	77.12571073	32.08705965	77.12525388
NH-21	0	0	NH-03	KUL-MAN	287+500	287+600	Increasing	L1	1.78	2.00	1.89	27	03-06-2023	32.08705965	77.12525388	32.08790447	77.12497219
NH-21	0	0	NH-03	KUL-MAN	287+600	287+700	Increasing	L1	1.97	1.90	1.93	37	03-06-2023	32.08790447	77.12497219	32.08879431	77.12513723
NH-21	0	0	NH-03	KUL-MAN	287+700	287+800	Increasing	L1	2.12	2.36	2.24	42	03-06-2023	32.08879431	77.12513723	32.08968352	77.12531092
NH-21	0	0	NH-03	KUL-MAN	287+800	287+900	Increasing	L1	2.06	2.32	2.19	51	03-06-2023	32.08968352	77.12531092	32.09055353	77.12561248
NH-21	0	0	NH-03	KUL-MAN	287+900	288+000	Increasing	L1	2.46	2.40	2.43	43	03-06-2023	32.09055353	77.12561248	32.09139519	77.12576235
NH-21	0	0	NH-03	KUL-MAN	288+000	288+100	Increasing	L1	2.08	2.46	2.27	44	03-06-2023	32.09139519	77.12576235	32.09220690	77.12536950
NH-21	0	0	NH-03	KUL-MAN	288+100	288+200	Increasing	L1	2.20	1.68	1.94	47	03-06-2023	32.09220690	77.12536950	32.09308856	77.12515038
NH-21	0	0	NH-03	KUL-MAN	288+200	288+300	Increasing	L1	1.73	1.73	1.73	51	03-06-2023	32.09308856	77.12515038	32.09384811	77.12459478
NH-21	0	0	NH-03	KUL-MAN	288+300	288+400	Increasing	L1	1.66	2.43	2.05	46	03-06-2023	32.09384811	77.12459478	32.09472107	77.12438957
NH-21	0	0	NH-03	KUL-MAN	288+400	288+500	Increasing	L1	2.45	1.62	2.04	49	03-06-2023	32.09472107	77.12438957	32.09554245	77.12471526
NH-21	0	0	NH-03	KUL-MAN	288+500	288+600	Increasing	L1	2.29	1.83	2.06	51	03-06-2023	32.09554245	77.12471526	32.09612472	77.12551926
NH-21	0	0	NH-03	KUL-MAN	288+600	288+700	Increasing	L1	1.59	2.12	1.86	37	03-06-2023	32.09612472	77.12551926	32.09642075	77.12651659
NH-21	0	0	NH-03	KUL-MAN	288+700	288+800	Increasing	L1	2.18	2.12	2.15	25	03-06-2023	32.09642075	77.12651659	32.09656300	77.12755970
NH-21	0	0	NH-03	KUL-MAN	288+800	288+900	Increasing	L1	1.70	2.29	2.00	36	03-06-2023	32.09656300	77.12755970	32.09702049	77.12846221
NH-21	0	0	NH-03	KUL-MAN	288+900	289+000	Increasing	L1	2.18	1.83	2.00	40	03-06-2023	32.09702049	77.12846221	32.09750114	77.12934963
NH-21	0	0	NH-03	KUL-MAN	289+000	289+100	Increasing	L1	2.49	2.02	2.25	43	03-06-2023	32.09750114	77.12934963	32.09799383	77.13024908
NH-21	0	0	NH-03	KUL-MAN	289+100	289+200	Increasing	L1	2.14	1.63	1.88	44	03-06-2023	32.09799383	77.13024908	32.09859595	77.13103269
NH-21	0	0	NH-03	KUL-MAN	289+200	289+300	Increasing	L1	2.07	1.91	1.99	46	03-06-2023	32.09859595	77.13103269	32.09926703	77.13173686
NH-21	0	0	NH-03	KUL-MAN	289+300	289+400	Increasing	L1	2.32	1.70	2.01	46	03-06-2023	32.09926703	77.13173686	32.09995272	77.13244053
NH-21	0	0	NH-03	KUL-MAN	289+400	289+500	Increasing	L1	1.87	2.20	2.03	43	03-06-2023	32.09995272	77.13244053	32.10062300	77.13315532

NH-21	0	0	NH-03	KUL-MAN	289+500	289+600	Increasing	L1	1.69	1.84	1.77	43	03-06-2023	32.10062300	77.13315532	32.10128564	77.13386533
NH-21	0	0	NH-03	KUL-MAN	289+600	289+700	Increasing	L1	2.48	1.73	2.11	47	03-06-2023	32.10128564	77.13386533	32.10196933	77.13455643
NH-21	0	0	NH-03	KUL-MAN	289+700	289+800	Increasing	L1	1.96	1.81	1.89	51	03-06-2023	32.10196933	77.13455643	32.10264427	77.13526854
NH-21	0	0	NH-03	KUL-MAN	289+800	289+900	Increasing	L1	1.55	1.87	1.71	47	03-06-2023	32.10264427	77.13526854	32.10326126	77.13604379
NH-21	0	0	NH-03	KUL-MAN	289+900	290+000	Increasing	L1	2.29	1.84	2.06	36	03-06-2023	32.10326126	77.13604379	32.10385526	77.13684498
NH-21	0	0	NH-03	KUL-MAN	290+000	290+100	Increasing	L1	2.32	1.78	2.05	24	03-06-2023	32.10385526	77.13684498	32.10446843	77.13761872
NH-21	0	0	NH-03	KUL-MAN	290+100	290+200	Increasing	L1	2.09	1.96	2.03	29	03-06-2023	32.10446843	77.13761872	32.10511637	77.13834437
NH-21	0	0	NH-03	KUL-MAN	290+200	290+300	Increasing	L1	1.71	2.16	1.94	39	03-06-2023	32.10511637	77.13834437	32.10580731	77.13904315
NH-21	0	0	NH-03	KUL-MAN	290+300	290+400	Increasing	L1	1.96	1.96	1.96	46	03-06-2023	32.10580731	77.13904315	32.10653709	77.13966972
NH-21	0	0	NH-03	KUL-MAN	290+400	290+500	Increasing	L1	2.18	1.97	2.08	38	03-06-2023	32.10653709	77.13966972	32.10722735	77.14031280
NH-21	0	0	NH-03	KUL-MAN	290+500	290+600	Increasing	L1	1.73	2.50	2.11	37	03-06-2023	32.10722735	77.14031280	32.10806999	77.14069605
NH-21	0	0	NH-03	KUL-MAN	290+600	290+700	Increasing	L1	2.45	2.61	2.53	37	03-06-2023	32.10806999	77.14069605	32.10881661	77.14129305
NH-21	0	0	NH-03	KUL-MAN	290+700	290+800	Increasing	L1	1.76	2.29	2.02	49	03-06-2023	32.10881661	77.14129305	32.10951711	77.14196974
NH-21	0	0	NH-03	KUL-MAN	290+800	290+900	Increasing	L1	1.75	1.84	1.80	52	03-06-2023	32.10951711	77.14196974	32.11007663	77.14281154
NH-21	0	0	NH-03	KUL-MAN	290+900	291+000	Increasing	L1	2.02	2.48	2.25	57	03-06-2023	32.11007663	77.14281154	32.11056945	77.14368633
NH-21	0	0	NH-03	KUL-MAN	291+000	291+100	Increasing	L1	2.48	2.47	2.47	48	03-06-2023	32.11056945	77.14368633	32.11102020	77.14461589
NH-21	0	0	NH-03	KUL-MAN	291+100	291+200	Increasing	L1	2.19	1.64	1.91	52	03-06-2023	32.11102020	77.14461589	32.11162236	77.14537361
NH-21	0	0	NH-03	KUL-MAN	291+200	291+300	Increasing	L1	2.12	2.15	2.14	55	03-06-2023	32.11162236	77.14537361	32.11227240	77.14611471
NH-21	0	0	NH-03	KUL-MAN	291+300	291+400	Increasing	L1	1.78	2.42	2.10	49	03-06-2023	32.11227240	77.14611471	32.11307592	77.14661447
NH-21	0	0	NH-03	KUL-MAN	291+400	291+500	Increasing	L1	1.52	2.30	1.91	34	03-06-2023	32.11307592	77.14661447	32.11352313	77.14739616
NH-21	0	0	NH-03	KUL-MAN	291+500	291+600	Increasing	L1	2.09	1.66	1.88	41	03-06-2023	32.11352313	77.14739616	32.11390421	77.14830802
NH-21	0	0	NH-03	KUL-MAN	291+600	291+700	Increasing	L1	2.33	2.18	2.25	41	03-06-2023	32.11390421	77.14830802	32.11466440	77.14886332
NH-21	0	0	NH-03	KUL-MAN	291+700	291+800	Increasing	L1	1.69	2.09	1.89	37	03-06-2023	32.11466440	77.14886332	32.11555546	77.14883716
NH-21	0	0	NH-03	KUL-MAN	291+800	291+900	Increasing	L1	2.16	1.90	2.03	50	03-06-2023	32.11555546	77.14883716	32.11643449	77.14861893
NH-21	0	0	NH-03	KUL-MAN	291+900	292+000	Increasing	L1	2.31	1.84	2.08	50	03-06-2023	32.11643449	77.14861893	32.11733802	77.14853138
NH-21	0	0	NH-03	KUL-MAN	292+000	292+100	Increasing	L1	1.74	1.81	1.77	49	03-06-2023	32.11733802	77.14853138	32.11822015	77.14830836
NH-21	0	0	NH-03	KUL-MAN	292+100	292+200	Increasing	L1	2.40	2.37	2.39	42	03-06-2023	32.11822015	77.14830836	32.11906468	77.14794198
NH-21	0	0	NH-03	KUL-MAN	292+200	292+300	Increasing	L1	2.08	1.73	1.90	43	03-06-2023	32.11906468	77.14794198	32.11986879	77.14747080
NH-21	0	0	NH-03	KUL-MAN	292+300	292+400	Increasing	L1	2.17	2.44	2.30	46	03-06-2023	32.11986879	77.14747080	32.12071903	77.14712586
NH-21	0	0	NH-03	KUL-MAN	292+400	292+500	Increasing	L1	1.73	2.24	1.98	38	03-06-2023	32.12071903	77.14712586	32.12160733	77.14699988

NH-21	0	0	NH-03	KUL-MAN	292+500	292+600	Increasing	L1	2.44	1.71	2.07	29	03-06-2023	32.12160733	77.14699988	32.12250442	77.14688131
NH-21	0	0	NH-03	KUL-MAN	292+600	292+700	Increasing	L1	2.46	2.28	2.37	33	03-06-2023	32.12250442	77.14688131	32.12338962	77.14694290
NH-21	0	0	NH-03	KUL-MAN	292+700	292+800	Increasing	L1	2.75	2.51	2.63	33	03-06-2023	32.12338962	77.14694290	32.12355590	77.14792108
NH-21	0	0	NH-03	KUL-MAN	292+800	292+900	Increasing	L1	3.27	2.64	2.96	40	03-06-2023	32.12355590	77.14792108	32.12302148	77.14875359
NH-21	0	0	NH-03	KUL-MAN	292+900	293+000	Increasing	L1	2.87	2.79	2.83	48	03-06-2023	32.12302148	77.14875359	32.12325098	77.14974518
NH-21	0	0	NH-03	KUL-MAN	293+000	293+100	Increasing	L1	3.09	2.67	2.88	58	03-06-2023	32.12325098	77.14974518	32.12379120	77.15058332
NH-21	0	0	NH-03	KUL-MAN	293+100	293+200	Increasing	L1	2.74	2.76	2.75	64	03-06-2023	32.12379120	77.15058332	32.12441321	77.15136339
NH-21	0	0	NH-03	KUL-MAN	293+200	293+300	Increasing	L1	3.19	2.54	2.86	64	03-06-2023	32.12441321	77.15136339	32.12507896	77.15205614
NH-21	0	0	NH-03	KUL-MAN	293+300	293+400	Increasing	L1	3.13	3.12	3.13	60	03-06-2023	32.12507896	77.15205614	32.12589596	77.15252110
NH-21	0	0	NH-03	KUL-MAN	293+400	293+500	Increasing	L1	2.91	3.29	3.10	56	03-06-2023	32.12589596	77.15252110	32.12671250	77.15296746
NH-21	0	0	NH-03	KUL-MAN	293+500	293+600	Increasing	L1	2.93	2.92	2.93	52	03-06-2023	32.12671250	77.15296746	32.12750300	77.15346577
NH-21	0	0	NH-03	KUL-MAN	293+600	293+700	Increasing	L1	2.69	2.85	2.77	51	03-06-2023	32.12750300	77.15346577	32.12832302	77.15389222
NH-21	0	0	NH-03	KUL-MAN	293+700	293+800	Increasing	L1	3.28	3.26	3.27	44	03-06-2023	32.12832302	77.15389222	32.12921436	77.15404491
NH-21	0	0	NH-03	KUL-MAN	293+800	293+900	Increasing	L1	2.66	2.68	2.67	47	03-06-2023	32.12921436	77.15404491	32.13010899	77.15416667
NH-21	0	0	NH-03	KUL-MAN	293+900	294+000	Increasing	L1	2.85	3.22	3.03	51	03-06-2023	32.13010899	77.15416667	32.13101267	77.15429348
NH-21	0	0	NH-03	KUL-MAN	294+000	294+100	Increasing	L1	1.72	2.36	2.04	51	03-06-2023	32.13101267	77.15429348	32.13031604	77.15420191
NH-21	0	0	NH-03	KUL-MAN	294+100	294+200	Increasing	L1	2.31	2.45	2.38	49	03-06-2023	32.13031604	77.15420191	32.13121172	77.15431392
NH-21	0	0	NH-03	KUL-MAN	294+200	294+300	Increasing	L1	2.43	2.46	2.45	49	03-06-2023	32.13121172	77.15431392	32.13211439	77.15434505
NH-21	0	0	NH-03	KUL-MAN	294+300	294+400	Increasing	L1	1.51	2.47	1.99	47	03-06-2023	32.13211439	77.15434505	32.13301385	77.15434591
NH-21	0	0	NH-03	KUL-MAN	294+400	294+500	Increasing	L1	1.95	1.91	1.93	48	03-06-2023	32.13301385	77.15434591	32.13391514	77.15434963
NH-21	0	0	NH-03	KUL-MAN	294+500	294+600	Increasing	L1	2.42	1.54	1.98	46	03-06-2023	32.13391514	77.15434963	32.13481970	77.15441433
NH-21	0	0	NH-03	KUL-MAN	294+600	294+700	Increasing	L1	2.21	1.51	1.86	46	03-06-2023	32.13481970	77.15441433	32.13571589	77.15444301
NH-21	0	0	NH-03	KUL-MAN	294+700	294+800	Increasing	L1	2.41	2.23	2.32	49	03-06-2023	32.13571589	77.15444301	32.13662259	77.15446520
NH-21	0	0	NH-03	KUL-MAN	294+800	294+900	Increasing	L1	1.97	1.85	1.91	55	03-06-2023	32.13662259	77.15446520	32.13752675	77.15448973
NH-21	0	0	NH-03	KUL-MAN	294+900	295+000	Increasing	L1	2.04	2.10	2.07	58	03-06-2023	32.13752675	77.15448973	32.13841761	77.15443456
NH-21	0	0	NH-03	KUL-MAN	295+000	295+100	Increasing	L1	1.99	2.18	2.09	56	03-06-2023	32.13841761	77.15443456	32.13929829	77.15463892
NH-21	0	0	NH-03	KUL-MAN	295+100	295+200	Increasing	L1	2.46	2.45	2.46	54	03-06-2023	32.13929829	77.15463892	32.14017312	77.15488045
NH-21	0	0	NH-03	KUL-MAN	295+200	295+300	Increasing	L1	1.60	1.87	1.73	54	03-06-2023	32.14017312	77.15488045	32.14100214	77.15532788
NH-21	0	0	NH-03	KUL-MAN	295+300	295+400	Increasing	L1	1.90	2.39	2.14	47	03-06-2023	32.14100214	77.15532788	32.14179809	77.15581959
NH-21	0	0	NH-03	KUL-MAN	295+400	295+500	Increasing	L1	1.78	2.24	2.01	38	03-06-2023	32.14179809	77.15581959	32.14267045	77.15608444

NH-21	0	0	NH-03	KUL-MAN	295+500	295+600	Increasing	L1	2.17	2.21	2.19	40	03-06-2023	32.14267045	77.15608444	32.14356309	77.15621303
NH-21	0	0	NH-03	KUL-MAN	295+600	295+700	Increasing	L1	1.83	2.33	2.08	36	03-06-2023	32.14356309	77.15621303	32.14443419	77.15651363
NH-21	0	0	NH-03	KUL-MAN	295+700	295+800	Increasing	L1	2.56	2.35	2.46	49	03-06-2023	32.14443419	77.15651363	32.14529269	77.15679114
NH-21	0	0	NH-03	KUL-MAN	295+800	295+900	Increasing	L1	3.11	3.14	3.13	52	03-06-2023	32.14529269	77.15679114	32.14603946	77.15738731
NH-21	0	0	NH-03	KUL-MAN	295+900	296+000	Increasing	L1	2.68	2.62	2.65	51	03-06-2023	32.14603946	77.15738731	32.14675239	77.15804562
NH-21	0	0	NH-03	KUL-MAN	296+000	296+100	Increasing	L1	2.52	3.23	2.87	53	03-06-2023	32.14675239	77.15804562	32.14730239	77.15886707
NH-21	0	0	NH-03	KUL-MAN	296+100	296+200	Increasing	L1	2.56	3.00	2.78	49	03-06-2023	32.14730239	77.15886707	32.14804576	77.15946375
NH-21	0	0	NH-03	KUL-MAN	296+200	296+300	Increasing	L1	2.67	3.20	2.94	45	03-06-2023	32.14804576	77.15946375	32.14878444	77.16006465
NH-21	0	0	NH-03	KUL-MAN	296+300	296+400	Increasing	L1	3.23	2.52	2.87	39	03-06-2023	32.14878444	77.16006465	32.14930199	77.16094667
NH-21	0	0	NH-03	KUL-MAN	296+400	296+500	Increasing	L1	3.09	2.90	2.99	35	03-06-2023	32.14930199	77.16094667	32.14971448	77.16187567
NH-21	0	0	NH-03	KUL-MAN	296+500	296+600	Increasing	L1	3.20	2.65	2.92	46	03-06-2023	32.14971448	77.16187567	32.15011709	77.16283438
NH-21	0	0	NH-03	KUL-MAN	296+600	296+700	Increasing	L1	2.55	3.00	2.77	45	03-06-2023	32.15011709	77.16283438	32.15039279	77.16383749
NH-21	0	0	NH-03	KUL-MAN	296+700	296+800	Increasing	L1	2.65	2.56	2.61	33	03-06-2023	32.15039279	77.16383749	32.15062110	77.16487407
NH-21	0	0	NH-03	KUL-MAN	296+800	296+900	Increasing	L1	2.94	2.96	2.95	33	03-06-2023	32.15062110	77.16487407	32.15100047	77.16582434
NH-21	0	0	NH-03	KUL-MAN	296+900	297+000	Increasing	L1	3.30	3.22	3.26	37	03-06-2023	32.15100047	77.16582434	32.15157814	77.16663809
NH-21	0	0	NH-03	KUL-MAN	297+000	297+100	Increasing	L1	2.74	2.81	2.78	37	03-06-2023	32.15157814	77.16663809	32.15197856	77.16758304
NH-21	0	0	NH-03	KUL-MAN	297+100	297+200	Increasing	L1	2.87	2.62	2.75	38	03-06-2023	32.15197856	77.16758304	32.15278474	77.16797040
NH-21	0	0	NH-03	KUL-MAN	297+200	297+300	Increasing	L1	2.85	2.88	2.86	45	03-06-2023	32.15278474	77.16797040	32.15361306	77.16827006
NH-21	0	0	NH-03	KUL-MAN	297+300	297+400	Increasing	L1	2.80	2.93	2.86	39	03-06-2023	32.15361306	77.16827006	32.15417832	77.16910795
NH-21	0	0	NH-03	KUL-MAN	297+400	297+500	Increasing	L1	2.96	2.75	2.85	35	03-06-2023	32.15417832	77.16910795	32.15470292	77.16995895
NH-21	0	0	NH-03	KUL-MAN	297+500	297+600	Increasing	L1	2.78	2.52	2.65	36	03-06-2023	32.15470292	77.16995895	32.15539229	77.17064565
NH-21	0	0	NH-03	KUL-MAN	297+600	297+700	Increasing	L1	2.76	2.91	2.84	37	03-06-2023	32.15539229	77.17064565	32.15615016	77.17120481
NH-21	0	0	NH-03	KUL-MAN	297+700	297+800	Increasing	L1	3.14	2.57	2.86	42	03-06-2023	32.15615016	77.17120481	32.15695842	77.17169515
NH-21	0	0	NH-03	KUL-MAN	297+800	297+900	Increasing	L1	2.93	3.29	3.11	46	03-06-2023	32.15695842	77.17169515	32.15771366	77.17225765
NH-21	0	0	NH-03	KUL-MAN	297+900	298+000	Increasing	L1	3.12	2.80	2.96	41	03-06-2023	32.15771366	77.17225765	32.15854691	77.17267245
NH-21	0	0	NH-03	KUL-MAN	298+000	298+100	Increasing	L1	2.76	3.14	2.95	37	03-06-2023	32.15854691	77.17267245	32.15934339	77.17317376
NH-21	0	0	NH-03	KUL-MAN	298+100	298+200	Increasing	L1	2.52	2.57	2.55	44	03-06-2023	32.15934339	77.17317376	32.16011330	77.17372997
NH-21	0	0	NH-03	KUL-MAN	298+200	298+300	Increasing	L1	2.04	1.52	1.78	48	03-06-2023	32.16011330	77.17372997	32.16084260	77.17437085
NH-21	0	0	NH-03	KUL-MAN	298+300	298+400	Increasing	L1	2.57	2.24	2.41	32	03-06-2023	32.16084260	77.17437085	32.16157841	77.17495734
NH-21	0	0	NH-03	KUL-MAN	298+400	298+500	Increasing	L1	2.16	2.48	2.32	24	03-06-2023	32.16157841	77.17495734	32.16240662	77.17538486

NH-21	0	0	NH-03	KUL-MAN	298+500	298+600	Increasing	L1	2.26	1.86	2.06	33	03-06-2023	32.16240662	77.17538486	32.16318972	77.17590330
NH-21	0	0	NH-03	KUL-MAN	298+600	298+700	Increasing	L1	1.92	1.68	1.80	33	03-06-2023	32.16318972	77.17590330	32.16402365	77.17617798
NH-21	0	0	NH-03	KUL-MAN	298+700	298+800	Increasing	L1	1.88	2.36	2.12	36	03-06-2023	32.16402365	77.17617798	32.16479372	77.17563602
NH-21	0	0	NH-03	KUL-MAN	298+800	298+900	Increasing	L1	2.30	1.55	1.92	43	03-06-2023	32.16479372	77.17563602	32.16568057	77.17565405
NH-21	0	0	NH-03	KUL-MAN	298+900	299+000	Increasing	L1	1.76	2.12	1.94	36	03-06-2023	32.16568057	77.17565405	32.16648284	77.17613368
NH-21	0	0	NH-03	KUL-MAN	299+000	299+100	Increasing	L1	1.90	2.15	2.03	51	03-06-2023	32.16648284	77.17613368	32.16729399	77.17662487
NH-21	0	0	NH-03	KUL-MAN	299+100	299+200	Increasing	L1	1.99	2.51	2.25	56	03-06-2023	32.16729399	77.17662487	32.16808511	77.17711965
NH-21	0	0	NH-03	KUL-MAN	299+200	299+300	Increasing	L1	1.96	2.03	2.00	60	03-06-2023	32.16808511	77.17711965	32.16874206	77.17785284
NH-21	0	0	NH-03	KUL-MAN	299+300	299+400	Increasing	L1	2.06	1.73	1.89	51	03-06-2023	32.16874206	77.17785284	32.16935416	77.17863005
NH-21	0	0	NH-03	KUL-MAN	299+400	299+500	Increasing	L1	1.95	2.34	2.15	44	03-06-2023	32.16935416	77.17863005	32.17000400	77.17937142
NH-21	0	0	NH-03	KUL-MAN	299+500	299+600	Increasing	L1	2.47	2.26	2.37	49	03-06-2023	32.17000400	77.17937142	32.17076650	77.17986324
NH-21	0	0	NH-03	KUL-MAN	299+600	299+700	Increasing	L1	1.84	1.80	1.82	58	03-06-2023	32.17076650	77.17986324	32.17167490	77.17992186
NH-21	0	0	NH-03	KUL-MAN	299+700	299+800	Increasing	L1	2.32	2.50	2.41	61	03-06-2023	32.17167490	77.17992186	32.17256226	77.17978673
NH-21	0	0	NH-03	KUL-MAN	299+800	299+900	Increasing	L1	1.73	1.67	1.70	60	03-06-2023	32.17256226	77.17978673	32.17346147	77.17980576
NH-21	0	0	NH-03	KUL-MAN	299+900	300+000	Increasing	L1	2.07	2.22	2.14	64	03-06-2023	32.17346147	77.17980576	32.17435194	77.17998250
NH-21	0	0	NH-03	KUL-MAN	300+000	300+100	Increasing	L1	2.31	2.03	2.17	65	03-06-2023	32.17435194	77.17998250	32.17522593	77.17970070

Rut Depth																	
As per Old NH number			New NH number		As per New NH number									Start		End	
NH Number Old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	Lane Number	Rutting Left	Rutting Right	Rutting Average	Speed	Survey Date	Latitude	Longitude	Latitude	Longitude
NH-21	0	0	NH-03	KUL-MAN	272+000	272+500	Increasing	L1	2.871	2.722	2.796	27	03-06-2023	31.97262806	77.12394052	31.97635344	77.12469618
NH-21	0	0	NH-03	KUL-MAN	272+500	273+000	Increasing	L1	3.064	2.711	2.887	44	03-06-2023	31.97635344	77.12469618	31.98069824	77.12606264
NH-21	0	0	NH-03	KUL-MAN	273+000	273+500	Increasing	L1	2.969	2.664	2.816	47	03-06-2023	31.98069824	77.12606264	31.98517957	77.12643868
NH-21	0	0	NH-03	KUL-MAN	273+500	274+000	Increasing	L1	3.428	2.623	3.026	52	03-06-2023	31.98517957	77.12643868	31.98828900	77.12974629
NH-21	0	0	NH-03	KUL-MAN	274+000	274+500	Increasing	L1	3.020	2.979	3.000	44	03-06-2023	31.98828900	77.12974629	31.98970087	77.13113112
NH-21	0	0	NH-03	KUL-MAN	274+500	275+000	Increasing	L1	2.996	2.880	2.938	38	03-06-2023	31.98970087	77.13113112	31.99296273	77.12850977
NH-21	0	0	NH-03	KUL-MAN	275+000	275+500	Increasing	L1	3.260	2.752	3.006	51	03-06-2023	31.99296273	77.12850977	31.99690727	77.12673703
NH-21	0	0	NH-03	KUL-MAN	275+500	276+000	Increasing	L1	2.851	2.839	2.845	45	03-06-2023	31.99690727	77.12673703	32.00125738	77.12717543
NH-21	0	0	NH-03	KUL-MAN	276+000	276+500	Increasing	L1	2.929	2.893	2.911	42	03-06-2023	32.00125738	77.12717543	32.00532313	77.12935501
NH-21	0	0	NH-03	KUL-MAN	276+500	277+000	Increasing	L1	3.090	2.667	2.879	45	03-06-2023	32.00532313	77.12935501	32.00942123	77.13148455
NH-21	0	0	NH-03	KUL-MAN	277+000	277+500	Increasing	L1	3.111	2.781	2.946	46	03-06-2023	32.00942123	77.13148455	32.01210561	77.12778494
NH-21	0	0	NH-03	KUL-MAN	277+500	278+000	Increasing	L1	3.302	2.663	2.983	43	03-06-2023	32.01210561	77.12778494	32.01584446	77.12525466
NH-21	0	0	NH-03	KUL-MAN	278+000	278+500	Increasing	L1	3.151	2.799	2.975	45	03-06-2023	32.01584446	77.12525466	32.02012763	77.12652075
NH-21	0	0	NH-03	KUL-MAN	278+500	279+000	Increasing	L1	3.209	2.727	2.968	38	03-06-2023	32.02012763	77.12652075	32.02369645	77.12962080
NH-21	0	0	NH-03	KUL-MAN	279+000	279+500	Increasing	L1	2.877	2.917	2.897	48	03-06-2023	32.02369645	77.12962080	32.02572593	77.13007165
NH-21	0	0	NH-03	KUL-MAN	279+500	280+000	Increasing	L1	2.923	2.968	2.946	31	03-06-2023	32.02572593	77.13007165	32.02634471	77.12901084
NH-21	0	0	NH-03	KUL-MAN	280+000	280+500	Increasing	L1	2.263	2.370	2.317	36	03-06-2023	32.02634471	77.12901084	32.03059374	77.12998705
NH-21	0	0	NH-03	KUL-MAN	280+500	281+000	Increasing	L1	3.052	2.630	2.841	40	03-06-2023	32.03059374	77.12998705	32.03447942	77.12754924
NH-21	0	0	NH-03	KUL-MAN	281+000	281+500	Increasing	L1	2.879	3.072	2.975	43	03-06-2023	32.03447942	77.12754924	32.03856271	77.12598913
NH-21	0	0	NH-03	KUL-MAN	281+500	282+000	Increasing	L1	2.743	3.114	2.929	44	03-06-2023	32.03856271	77.12598913	32.04294763	77.12622161
NH-21	0	0	NH-03	KUL-MAN	282+000	282+500	Increasing	L1	2.858	2.955	2.907	46	03-06-2023	32.04294763	77.12622161	32.04689270	77.12866104
NH-21	0	0	NH-03	KUL-MAN	282+500	283+000	Increasing	L1	3.275	2.796	3.035	52	03-06-2023	32.04689270	77.12866104	32.05094592	77.13023973
NH-21	0	0	NH-03	KUL-MAN	283+000	283+500	Increasing	L1	3.269	2.585	2.927	33	03-06-2023	32.05094592	77.13023973	32.05378295	77.13428519

NH-21	0	0	NH-03	KUL-MAN	283+500	284+000	Increasing	L1	2.927	3.235	3.081	37	03-06-2023	32.05378295	77.13428519	32.05800562	77.13519449
NH-21	0	0	NH-03	KUL-MAN	284+000	284+500	Increasing	L1	2.679	2.790	2.735	35	03-06-2023	32.05800562	77.13519449	32.06222354	77.13369688
NH-21	0	0	NH-03	KUL-MAN	284+500	285+000	Increasing	L1	2.697	2.430	2.563	46	03-06-2023	32.06222354	77.13369688	32.06642281	77.13180463
NH-21	0	0	NH-03	KUL-MAN	285+000	285+500	Increasing	L1	2.732	3.165	2.948	46	03-06-2023	32.06642281	77.13180463	32.07083176	77.13086895
NH-21	0	0	NH-03	KUL-MAN	285+800	286+000	Increasing	L1	2.645	2.640	2.643	49	03-06-2023	32.07083176	77.13086895	32.07476460	77.12836876
NH-21	0	0	NH-03	KUL-MAN	286+000	286+500	Increasing	L1	3.360	2.561	2.961	54	03-06-2023	32.07476460	77.12836876	32.07854469	77.12552400
NH-21	0	0	NH-03	KUL-MAN	286+500	287+000	Increasing	L1	3.187	2.694	2.941	49	03-06-2023	32.07854469	77.12552400	32.08290515	77.12526523
NH-21	0	0	NH-03	KUL-MAN	287+000	287+500	Increasing	L1	2.781	2.540	2.660	27	03-06-2023	32.08290515	77.12526523	32.08705965	77.12525388
NH-21	0	0	NH-03	KUL-MAN	287+500	288+000	Increasing	L1	3.061	2.597	2.829	40	03-06-2023	32.08705965	77.12525388	32.09139519	77.12576235
NH-21	0	0	NH-03	KUL-MAN	288+000	288+500	Increasing	L1	2.480	2.795	2.638	48	03-06-2023	32.09139519	77.12576235	32.09554245	77.12471526
NH-21	0	0	NH-03	KUL-MAN	288+500	289+000	Increasing	L1	3.100	2.818	2.959	38	03-06-2023	32.09554245	77.12471526	32.09750114	77.12934963
NH-21	0	0	NH-03	KUL-MAN	289+000	289+500	Increasing	L1	3.154	2.821	2.987	45	03-06-2023	32.09750114	77.12934963	32.10062300	77.13315532
NH-21	0	0	NH-03	KUL-MAN	289+500	290+000	Increasing	L1	3.013	2.772	2.892	46	03-06-2023	32.10062300	77.13315532	32.10385526	77.13684498
NH-21	0	0	NH-03	KUL-MAN	290+000	290+500	Increasing	L1	2.663	2.840	2.752	36	03-06-2023	32.10385526	77.13684498	32.10722735	77.14031280
NH-21	0	0	NH-03	KUL-MAN	290+500	291+000	Increasing	L1	2.700	2.827	2.763	47	03-06-2023	32.10722735	77.14031280	32.11056945	77.14368633
NH-21	0	0	NH-03	KUL-MAN	291+000	291+500	Increasing	L1	2.375	2.330	2.352	48	03-06-2023	32.11056945	77.14368633	32.11352313	77.14739616
NH-21	0	0	NH-03	KUL-MAN	291+500	292+000	Increasing	L1	2.860	2.621	2.740	45	03-06-2023	32.11352313	77.14739616	32.11733802	77.14853138
NH-21	0	0	NH-03	KUL-MAN	292+000	292+500	Increasing	L1	2.894	2.547	2.721	44	03-06-2023	32.11733802	77.14853138	32.12160733	77.14699988
NH-21	0	0	NH-03	KUL-MAN	292+500	293+000	Increasing	L1	2.338	2.592	2.465	37	03-06-2023	32.12160733	77.14699988	32.12325098	77.14974518
NH-21	0	0	NH-03	KUL-MAN	293+000	293+500	Increasing	L1	2.354	3.157	2.755	61	03-06-2023	32.12325098	77.14974518	32.12671250	77.15296746
NH-21	0	0	NH-03	KUL-MAN	293+500	294+000	Increasing	L1	2.954	3.039	2.997	49	03-06-2023	32.12671250	77.15296746	32.13101267	77.15429348
NH-21	0	0	NH-03	KUL-MAN	294+000	294+500	Increasing	L1	3.126	3.008	3.067	49	03-06-2023	32.13101267	77.15429348	32.13391514	77.15434963
NH-21	0	0	NH-03	KUL-MAN	294+500	295+000	Increasing	L1	2.320	2.774	2.547	51	03-06-2023	32.13391514	77.15434963	32.13841761	77.15443456
NH-21	0	0	NH-03	KUL-MAN	295+000	295+500	Increasing	L1	2.887	2.719	2.803	50	03-06-2023	32.13841761	77.15443456	32.14267045	77.15608444
NH-21	0	0	NH-03	KUL-MAN	295+500	296+000	Increasing	L1	2.773	2.876	2.825	46	03-06-2023	32.14267045	77.15608444	32.14675239	77.15804562
NH-21	0	0	NH-03	KUL-MAN	296+000	296+500	Increasing	L1	3.034	2.936	2.985	45	03-06-2023	32.14675239	77.15804562	32.14971448	77.16187567
NH-21	0	0	NH-03	KUL-MAN	296+500	297+000	Increasing	L1	2.797	3.031	2.914	39	03-06-2023	32.14971448	77.16187567	32.15157814	77.16663809

NH-21	0	0	NH-03	KUL-MAN	297+000	297+500	Increasing	L1	2.940	2.846	2.893	39	03-06-2023	32.15157814	77.16663809	32.15470292	77.16995895
NH-21	0	0	NH-03	KUL-MAN	297+500	298+000	Increasing	L1	3.058	2.666	2.862	41	03-06-2023	32.15470292	77.16995895	32.15854691	77.17267245
NH-21	0	0	NH-03	KUL-MAN	298+000	298+500	Increasing	L1	2.801	2.202	2.502	38	03-06-2023	32.15854691	77.17267245	32.16240662	77.17538486
NH-21	0	0	NH-03	KUL-MAN	298+500	299+000	Increasing	L1	2.556	2.383	2.470	37	03-06-2023	32.16240662	77.17538486	32.16648284	77.17613368
NH-21	0	0	NH-03	KUL-MAN	299+000	299+500	Increasing	L1	2.263	3.120	2.692	53	03-06-2023	32.16648284	77.17613368	32.17000400	77.17937142
NH-21	0	0	NH-03	KUL-MAN	299+500	300+000	Increasing	L1	3.008	2.772	2.890	57	03-06-2023	32.17000400	77.17937142	32.17435194	77.17998250
NH-21	0	0	NH-03	KUL-MAN	300+000	300+500	Increasing	L1	3.185	2.561	2.873	58	03-06-2023	32.17435194	77.17998250	32.17877794	77.17981267

Carriageway Furniture											
As per Old NH number		New NH number									
NH Number Old	Start Chainage	NH Number	Section Code	Chainage	Direction	Event Type	Survey Date	Latitude	Longitude	Altitude	Remarks
NH-21	0	NH-03	KUL-MAN	272+071	Increasing	Overhead Gantry	03-06-2023	31.97313669	77.12442630	1212.30	NA
NH-21	0	NH-03	KUL-MAN	272+190	Increasing	CRASH BARRIER START LHS	03-06-2023	31.97400529	77.12515753	1214.17	NA
NH-21	0	NH-03	KUL-MAN	272+443	Increasing	CRASH BARRIER END LHS	03-06-2023	31.97585625	77.12452534	1217.66	NA
NH-21	0	NH-03	KUL-MAN	272+551	Increasing	Overhead Gantry	03-06-2023	31.97678386	77.12490302	1213.45	NA
NH-21	0	NH-03	KUL-MAN	272+935	Increasing	ROAD SIGN	03-06-2023	31.98013118	77.12592704	1215.10	NA
NH-21	0	NH-03	KUL-MAN	273+479	Increasing	ROAD SIGN	03-06-2023	31.98499237	77.12645658	1222.57	NA
NH-21	0	NH-03	KUL-MAN	274+283	Increasing	ROAD SIGN	03-06-2023	31.98936974	77.13235713	1242.67	NA
NH-21	0	NH-03	KUL-MAN	274+469	Increasing	ROAD SIGN	03-06-2023	31.98987549	77.13138399	1254.54	NA
NH-21	0	NH-03	KUL-MAN	274+500	Increasing	ROAD SIGN	03-06-2023	31.98970087	77.13113112	1256.67	NA
NH-21	0	NH-03	KUL-MAN	274+522	Increasing	ROAD SIGN	03-06-2023	31.98961098	77.13092444	1258.49	NA
NH-21	0	NH-03	KUL-MAN	274+558	Increasing	ROAD SIGN	03-06-2023	31.98962907	77.13053901	1260.80	NA
NH-21	0	NH-03	KUL-MAN	274+576	Increasing	ROAD SIGN	03-06-2023	31.98972353	77.13038478	1262.04	NA
NH-21	0	NH-03	KUL-MAN	274+630	Increasing	ROAD SIGN	03-06-2023	31.99018588	77.13023169	1265.37	NA
NH-21	0	NH-03	KUL-MAN	274+651	Increasing	ROAD SIGN	03-06-2023	31.99037535	77.13019356	1266.14	NA
NH-21	0	NH-03	KUL-MAN	274+685	Increasing	ROAD SIGN	03-06-2023	31.99067935	77.13014816	1267.40	NA
NH-21	0	NH-03	KUL-MAN	274+764	Increasing	ROAD SIGN	03-06-2023	31.99138933	77.13006030	1270.38	NA
NH-21	0	NH-03	KUL-MAN	274+987	Increasing	ROAD SIGN	03-06-2023	31.99291202	77.12863818	1275.18	NA
NH-21	0	NH-03	KUL-MAN	275+076	Increasing	CRASH BARRIER START LHS	03-06-2023	31.99330713	77.12781808	1273.60	NA
NH-21	0	NH-03	KUL-MAN	275+097	Increasing	CRASH BARRIER END LHS	03-06-2023	31.99344051	77.12766511	1273.01	NA
NH-21	0	NH-03	KUL-MAN	275+156	Increasing	ROAD SIGN	03-06-2023	31.99388973	77.12733248	1270.00	NA
NH-21	0	NH-03	KUL-MAN	275+205	Increasing	ROAD SIGN	03-06-2023	31.99428137	77.12709170	1267.18	NA
NH-21	0	NH-03	KUL-MAN	275+222	Increasing	ROAD SIGN	03-06-2023	31.99441467	77.12702719	1266.25	NA
NH-21	0	NH-03	KUL-MAN	275+247	Increasing	ROAD SIGN	03-06-2023	31.99463869	77.12696676	1264.73	NA
NH-21	0	NH-03	KUL-MAN	276+181	Increasing	ROAD SIGN	03-06-2023	32.00267792	77.12811432	1252.14	NA

NH-21	0	NH-03	KUL-MAN	276+415	Increasing	ROAD SIGN	03-06-2023	32.00456359	77.12917148	1257.21	NA
NH-21	0	NH-03	KUL-MAN	276+591	Increasing	ROAD SIGN	03-06-2023	32.00610990	77.12960282	1260.18	NA
NH-21	0	NH-03	KUL-MAN	276+866	Increasing	ROAD SIGN	03-06-2023	32.00830316	77.13096628	1261.39	NA
NH-21	0	NH-03	KUL-MAN	277+501	Increasing	ROAD SIGN	03-06-2023	32.01211234	77.12777444	1273.54	NA
NH-21	0	NH-03	KUL-MAN	277+767	Increasing	ROAD SIGN	03-06-2023	32.01384063	77.12592220	1276.98	NA
NH-21	0	NH-03	KUL-MAN	277+867	Increasing	ROAD SIGN	03-06-2023	32.01466540	77.12550889	1278.84	NA
NH-21	0	NH-03	KUL-MAN	278+377	Increasing	ROAD SIGN	03-06-2023	32.01915438	77.12591166	1291.00	NA
NH-21	0	NH-03	KUL-MAN	278+742	Increasing	CRASH BARRIER START LHS	03-06-2023	32.02206937	77.12769419	1311.16	NA
NH-21	0	NH-03	KUL-MAN	278+780	Increasing	CRASH BARRIER END LHS	03-06-2023	32.02235696	77.12791653	1311.29	NA
NH-21	0	NH-03	KUL-MAN	278+973	Increasing	ROAD SIGN	03-06-2023	32.02355131	77.12938833	1317.06	NA
NH-21	0	NH-03	KUL-MAN	279+149	Increasing	ROAD SIGN	03-06-2023	32.02468952	77.13066154	1326.21	NA
NH-21	0	NH-03	KUL-MAN	279+259	Increasing	ROAD SIGN	03-06-2023	32.02554571	77.13121903	1330.70	NA
NH-21	0	NH-03	KUL-MAN	279+597	Increasing	ROAD SIGN	03-06-2023	32.02499455	77.12952363	1342.31	NA
NH-21	0	NH-03	KUL-MAN	279+630	Increasing	ROAD SIGN	03-06-2023	32.02479415	77.12924947	1343.72	NA
NH-21	0	NH-03	KUL-MAN	279+642	Increasing	CRASH BARRIER START LHS	03-06-2023	32.02474842	77.12913109	1344.20	NA
NH-21	0	NH-03	KUL-MAN	279+729	Increasing	ROAD SIGN	03-06-2023	32.02453537	77.12824115	1347.15	NA
NH-21	0	NH-03	KUL-MAN	279+768	Increasing	CRASH BARRIER END LHS	03-06-2023	32.02471993	77.12791206	1349.06	NA
NH-21	0	NH-03	KUL-MAN	279+786	Increasing	ROAD SIGN	03-06-2023	32.02487031	77.12783753	1350.24	NA
NH-21	0	NH-03	KUL-MAN	279+942	Increasing	ROAD SIGN	03-06-2023	32.02589085	77.12874500	1358.99	NA
NH-21	0	NH-03	KUL-MAN	280+266	Increasing	ROAD SIGN	03-06-2023	32.02858493	77.12964853	1375.37	NA
NH-21	0	NH-03	KUL-MAN	280+327	Increasing	ROAD SIGN	03-06-2023	32.02911137	77.12979729	1377.72	NA
NH-21	0	NH-03	KUL-MAN	280+378	Increasing	ROAD SIGN	03-06-2023	32.02956975	77.12987233	1379.66	NA
NH-21	0	NH-03	KUL-MAN	280+398	Increasing	ROAD SIGN	03-06-2023	32.02973882	77.12995064	1380.78	NA
NH-21	0	NH-03	KUL-MAN	280+566	Increasing	ROAD SIGN	03-06-2023	32.03104370	77.12952503	1387.40	NA
NH-21	0	NH-03	KUL-MAN	280+652	Increasing	ROAD SIGN	03-06-2023	32.03164237	77.12895330	1389.24	NA
NH-21	0	NH-03	KUL-MAN	280+714	Increasing	ROAD SIGN	03-06-2023	32.03212177	77.12860294	1390.59	NA
NH-21	0	NH-03	KUL-MAN	281+055	Increasing	ROAD SIGN	03-06-2023	32.03487291	77.12718281	1381.85	NA
NH-21	0	NH-03	KUL-MAN	281+082	Increasing	ROAD SIGN	03-06-2023	32.03504177	77.12698409	1380.11	NA
NH-21	0	NH-03	KUL-MAN	281+337	Increasing	ROAD SIGN	03-06-2023	32.03713380	77.12620936	1367.10	NA
NH-21	0	NH-03	KUL-MAN	281+712	Increasing	ROAD SIGN	03-06-2023	32.04045804	77.12610860	1362.97	NA
NH-21	0	NH-03	KUL-MAN	281+896	Increasing	ROAD SIGN	03-06-2023	32.04201536	77.12639385	1364.79	NA

NH-21	0	NH-03	KUL-MAN	282+124	Increasing	ROAD SIGN	03-06-2023	32.04398359	77.12663444	1366.55	NA
NH-21	0	NH-03	KUL-MAN	282+196	Increasing	ROAD SIGN	03-06-2023	32.04450389	77.12710227	1367.48	NA
NH-21	0	NH-03	KUL-MAN	282+232	Increasing	ROAD SIGN	03-06-2023	32.04476397	77.12733088	1367.25	NA
NH-21	0	NH-03	KUL-MAN	282+590	Increasing	ROAD SIGN	03-06-2023	32.04767637	77.12873225	1363.88	NA
NH-21	0	NH-03	KUL-MAN	282+682	Increasing	ROAD SIGN	03-06-2023	32.04849969	77.12865731	1358.26	NA
NH-21	0	NH-03	KUL-MAN	283+147	Increasing	ROAD SIGN	03-06-2023	32.05190499	77.13133684	1338.66	NA
NH-21	0	NH-03	KUL-MAN	283+409	Increasing	ROAD SIGN	03-06-2023	32.05332418	77.13346861	1345.00	NA
NH-21	0	NH-03	KUL-MAN	283+457	Increasing	ROAD SIGN	03-06-2023	32.05354510	77.13390552	1345.51	NA
NH-21	0	NH-03	KUL-MAN	283+494	Increasing	ROAD SIGN	03-06-2023	32.05374189	77.13422935	1345.88	NA
NH-21	0	NH-03	KUL-MAN	283+869	Increasing	ROAD SIGN	03-06-2023	32.05684063	77.13540214	1355.03	NA
NH-21	0	NH-03	KUL-MAN	284+126	Increasing	ROAD SIGN	03-06-2023	32.05905372	77.13469897	1360.06	NA
NH-21	0	NH-03	KUL-MAN	284+271	Increasing	ROAD SIGN	03-06-2023	32.06027779	77.13430555	1363.93	NA
NH-21	0	NH-03	KUL-MAN	284+299	Increasing	ROAD SIGN	03-06-2023	32.06053068	77.13434637	1363.73	NA
NH-21	0	NH-03	KUL-MAN	284+333	Increasing	CRASH BARRIER START LHS	03-06-2023	32.06082969	77.13435770	1362.72	NA
NH-21	0	NH-03	KUL-MAN	284+343	Increasing	SERVICE ROAD START	03-06-2023	32.06092004	77.13434160	1362.55	NA
NH-21	0	NH-03	KUL-MAN	284+434	Increasing	ROAD SIGN	03-06-2023	32.06168588	77.13402396	1361.41	NA
NH-21	0	NH-03	KUL-MAN	284+626	Increasing	SERVICE ROAD END	03-06-2023	32.06326126	77.13314156	1361.19	NA
NH-21	0	NH-03	KUL-MAN	285+356	Increasing	ROAD SIGN	03-06-2023	32.06959667	77.13132397	1371.81	NA
NH-21	0	NH-03	KUL-MAN	285+377	Increasing	ROAD SIGN	03-06-2023	32.06977154	77.13126646	1372.13	NA
NH-21	0	NH-03	KUL-MAN	285+443	Increasing	MEDIAN OPENING	03-06-2023	32.07034883	77.13107015	1373.73	NA
NH-21	0	NH-03	KUL-MAN	285+922	Increasing	ROAD SIGN	03-06-2023	32.07409439	77.12859929	1385.53	NA
NH-21	0	NH-03	KUL-MAN	285+965	Increasing	ROAD SIGN	03-06-2023	32.07446046	77.12849071	1388.11	NA
NH-21	0	NH-03	KUL-MAN	286+314	Increasing	ROAD SIGN	03-06-2023	32.07717471	77.12666497	1408.46	NA
NH-21	0	NH-03	KUL-MAN	286+386	Increasing	ROAD SIGN	03-06-2023	32.07768663	77.12618814	1413.45	NA
NH-21	0	NH-03	KUL-MAN	286+705	Increasing	ROAD SIGN	03-06-2023	32.08031097	77.12490998	1426.37	NA
NH-21	0	NH-03	KUL-MAN	287+069	Increasing	ROAD SIGN	03-06-2023	32.08352358	77.12521075	1436.70	NA
NH-21	0	NH-03	KUL-MAN	287+196	Increasing	ROAD SIGN	03-06-2023	32.08464459	77.12549386	1445.28	NA
NH-21	0	NH-03	KUL-MAN	287+512	Increasing	ROAD SIGN	03-06-2023	32.08715344	77.12519887	1466.82	NA
NH-21	0	NH-03	KUL-MAN	287+880	Increasing	ROAD SIGN	03-06-2023	32.09038336	77.12554032	1481.73	NA
NH-21	0	NH-03	KUL-MAN	288+121	Increasing	Overhead Gantry	03-06-2023	32.09240169	77.12536493	1482.64	NA
NH-21	0	NH-03	KUL-MAN	288+205	Increasing	ROAD SIGN	03-06-2023	32.09312907	77.12513136	1480.60	NA

NH-21	0	NH-03	KUL-MAN	288+330	Increasing	ROAD SIGN	03-06-2023	32.09408476	77.12444442	1476.86	NA
NH-21	0	NH-03	KUL-MAN	288+424	Increasing	CRASH BARRIER END LHS	03-06-2023	32.09493542	77.12438809	1476.17	NA
NH-21	0	NH-03	KUL-MAN	288+437	Increasing	ROAD SIGN	03-06-2023	32.09505536	77.12439271	1476.09	NA
NH-21	0	NH-03	KUL-MAN	288+457	Increasing	ROAD SIGN	03-06-2023	32.09522493	77.12444003	1476.16	NA
NH-21	0	NH-03	KUL-MAN	288+484	Increasing	ROAD SIGN	03-06-2023	32.09543713	77.12460101	1476.66	NA
NH-21	0	NH-03	KUL-MAN	288+507	Increasing	ROAD SIGN	03-06-2023	32.09558681	77.12476739	1477.04	NA
NH-21	0	NH-03	KUL-MAN	288+655	Increasing	CRASH BARRIER START LHS	03-06-2023	32.09634404	77.12604470	1482.58	NA
NH-21	0	NH-03	KUL-MAN	288+664	Increasing	ROAD SIGN	03-06-2023	32.09636257	77.12612661	1482.94	NA
NH-21	0	NH-03	KUL-MAN	288+698	Increasing	CRASH BARRIER END LHS	03-06-2023	32.09641870	77.12649721	1485.27	NA
NH-21	0	NH-03	KUL-MAN	289+353	Increasing	ROAD SIGN	03-06-2023	32.09963267	77.13210226	1485.00	NA
NH-21	0	NH-03	KUL-MAN	289+897	Increasing	ROAD SIGN	03-06-2023	32.10323936	77.13601388	1480.59	NA
NH-21	0	NH-03	KUL-MAN	289+988	Increasing	ROAD SIGN	03-06-2023	32.10378799	77.13674283	1481.63	NA
NH-21	0	NH-03	KUL-MAN	290+328	Increasing	ROAD SIGN	03-06-2023	32.10600426	77.13921656	1487.46	NA

Structural Details														
NH Number	Section Code	Chainage (Start)	Chainage (End)	Direction	Structure Type	Survey Date	Data Source	Remarks	Start Latitude	Start Longitude	Start Altitude	End Latitude	End Longitude	End Altitude
NH-03	KUL-MAN	272+080	272+086	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.97319260	77.12448179	1212.34	31.97319260	77.12448179	1212.34
NH-03	KUL-MAN	272+519	272+525	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.97651534	77.12476219	1214.21	31.97651534	77.12476219	1214.21
NH-03	KUL-MAN	272+754	272+760	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.97853996	77.12547170	1214.36	31.97853996	77.12547170	1214.36
NH-03	KUL-MAN	273+013	273+019	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.98080968	77.12606756	1217.32	31.98080968	77.12606756	1217.32
NH-03	KUL-MAN	273+113	273+119	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.98172272	77.12603210	1218.29	31.98172272	77.12603210	1218.29
NH-03	KUL-MAN	273+210	273+216	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.98257569	77.12623714	1217.99	31.98257569	77.12623714	1217.99
NH-03	KUL-MAN	273+340	273+346	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.98373770	77.12643382	1219.89	31.98373770	77.12643382	1219.89
NH-03	KUL-MAN	273+370	273+376	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.98400676	77.12645640	1220.30	31.98400676	77.12645640	1220.30
NH-03	KUL-MAN	273+557	273+563	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.98568430	77.12649440	1224.14	31.98568430	77.12649440	1224.14
NH-03	KUL-MAN	273+694	273+700	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.98683083	77.12703435	1225.64	31.98683083	77.12703435	1225.64
NH-03	KUL-MAN	273+982	273+988	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.98820945	77.12958019	1229.68	31.98820945	77.12958019	1229.68
NH-03	KUL-MAN	274+097	274+103	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.98855944	77.13072462	1232.30	31.98855944	77.13072462	1232.30
NH-03	KUL-MAN	275+156	275+162	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.99388973	77.12733248	1270.00	31.99388973	77.12733248	1270.00
NH-03	KUL-MAN	275+244	275+250	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.99461457	77.12697046	1264.89	31.99461457	77.12697046	1264.89
NH-03	KUL-MAN	275+355	275+361	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.99561631	77.12697404	1258.43	31.99561631	77.12697404	1258.43
NH-03	KUL-MAN	275+563	275+569	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.99746750	77.12661639	1251.15	31.99746750	77.12661639	1251.15
NH-03	KUL-MAN	275+811	275+817	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	31.99966430	77.12648630	1250.79	31.99966430	77.12648630	1250.79
NH-03	KUL-MAN	276+004	276+010	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.00128073	77.12718548	1250.89	32.00128073	77.12718548	1250.89
NH-03	KUL-MAN	276+173	276+179	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.00261324	77.12806493	1252.08	32.00261324	77.12806493	1252.08
NH-03	KUL-MAN	276+427	276+433	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.00466871	77.12920410	1257.56	32.00466871	77.12920410	1257.56
NH-03	KUL-MAN	276+620	276+626	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.00635979	77.12971829	1260.21	32.00635979	77.12971829	1260.21
NH-03	KUL-MAN	276+780	276+786	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.00762802	77.13051018	1260.26	32.00762802	77.13051018	1260.26
NH-03	KUL-MAN	276+907	276+913	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.00864849	77.13112255	1262.32	32.00864849	77.13112255	1262.32
NH-03	KUL-MAN	277+967	277+973	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.01554967	77.12528836	1284.00	32.01554967	77.12528836	1284.00
NH-03	KUL-MAN	278+007	278+013	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.01591161	77.12524946	1285.45	32.01591161	77.12524946	1285.45
NH-03	KUL-MAN	278+310	278+316	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.01861114	77.12558877	1289.50	32.01861114	77.12558877	1289.50

NH-03	KUL-MAN	278+445	278+451	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.01969493	77.12624699	1293.90	32.01969493	77.12624699	1293.90
NH-03	KUL-MAN	279+101	279+107	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.02435131	77.13034444	1324.21	32.02435131	77.13034444	1324.21
NH-03	KUL-MAN	279+259	279+265	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.02555626	77.13122440	1330.73	32.02555626	77.13122440	1330.73
NH-03	KUL-MAN	279+322	279+328	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.02609956	77.13132863	1332.72	32.02609956	77.13132863	1332.72
NH-03	KUL-MAN	279+534	279+540	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.02546164	77.12987619	1339.83	32.02546164	77.12987619	1339.83
NH-03	KUL-MAN	279+719	279+725	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.02454266	77.12835257	1346.86	32.02454266	77.12835257	1346.86
NH-03	KUL-MAN	279+834	279+840	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.02529354	77.12784470	1353.08	32.02529354	77.12784470	1353.08
NH-03	KUL-MAN	280+223	280+229	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.02822114	77.12947407	1373.41	32.02822114	77.12947407	1373.41
NH-03	KUL-MAN	280+300	280+306	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.02887819	77.12974262	1376.77	32.02887819	77.12974262	1376.77
NH-03	KUL-MAN	280+537	280+543	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.03084784	77.12972679	1386.58	32.03084784	77.12972679	1386.58
NH-03	KUL-MAN	280+700	280+706	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.03199390	77.12864760	1390.39	32.03199390	77.12864760	1390.39
NH-03	KUL-MAN	281+223	281+229	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.03610930	77.12618709	1371.25	32.03610930	77.12618709	1371.25
NH-03	KUL-MAN	281+464	281+470	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.03823482	77.12591030	1362.97	32.03823482	77.12591030	1362.97
NH-03	KUL-MAN	281+971	281+977	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.04268966	77.12622700	1363.40	32.04268966	77.12622700	1363.40
NH-03	KUL-MAN	282+055	282+061	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.04345417	77.12629844	1363.74	32.04345417	77.12629844	1363.74
NH-03	KUL-MAN	282+269	282+275	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.04504000	77.12757350	1367.10	32.04504000	77.12757350	1367.10
NH-03	KUL-MAN	282+577	282+583	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.04756740	77.12876293	1364.49	32.04756740	77.12876293	1364.49
NH-03	KUL-MAN	283+194	283+200	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.05225516	77.13161071	1338.91	32.05225516	77.13161071	1338.91
NH-03	KUL-MAN	283+249	283+255	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.05262787	77.13199105	1339.82	32.05262787	77.13199105	1339.82
NH-03	KUL-MAN	283+396	283+402	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.05327406	77.13335828	1344.65	32.05327406	77.13335828	1344.65
NH-03	KUL-MAN	283+611	283+617	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.05457660	77.13497004	1347.49	32.05457660	77.13497004	1347.49
NH-03	KUL-MAN	283+858	283+864	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.05674269	77.13540380	1354.81	32.05674269	77.13540380	1354.81
NH-03	KUL-MAN	284+000	284+006	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.05800562	77.13519449	1355.58	32.05800562	77.13519449	1355.58
NH-03	KUL-MAN	284+458	284+464	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.06188896	77.13389671	1361.40	32.06188896	77.13389671	1361.40
NH-03	KUL-MAN	284+960	284+966	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.06605971	77.13188141	1366.21	32.06605971	77.13188141	1366.21
NH-03	KUL-MAN	285+220	285+226	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.06840421	77.13169374	1369.79	32.06840421	77.13169374	1369.79
NH-03	KUL-MAN	285+326	285+332	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.06932933	77.13140892	1371.24	32.06932933	77.13140892	1371.24
NH-03	KUL-MAN	286+127	286+133	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.07577078	77.12774311	1396.33	32.07577078	77.12774311	1396.33
NH-03	KUL-MAN	286+236	286+242	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.07663783	77.12717850	1403.28	32.07663783	77.12717850	1403.28

NH-03	KUL-MAN	286+620	286+626	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.07956877	77.12511050	1421.77	32.07956877	77.12511050	1421.77
NH-03	KUL-MAN	286+909	286+915	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.08209095	77.12532498	1429.76	32.08209095	77.12532498	1429.76
NH-03	KUL-MAN	287+283	287+289	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.08528721	77.12601620	1451.04	32.08528721	77.12601620	1451.04
NH-03	KUL-MAN	287+716	287+722	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.08893985	77.12516715	1476.31	32.08893985	77.12516715	1476.31
NH-03	KUL-MAN	287+827	287+833	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.08991994	77.12537434	1480.91	32.08991994	77.12537434	1480.91
NH-03	KUL-MAN	287+898	287+904	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.09053130	77.12560272	1481.97	32.09053130	77.12560272	1481.97
NH-03	KUL-MAN	287+974	287+980	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.09118948	77.12585832	1482.97	32.09118948	77.12585832	1482.97
NH-03	KUL-MAN	288+053	288+059	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.09178968	77.12545448	1482.91	32.09178968	77.12545448	1482.91
NH-03	KUL-MAN	288+108	288+114	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.09228818	77.12536717	1482.47	32.09228818	77.12536717	1482.47
NH-03	KUL-MAN	288+958	288+964	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.09730035	77.12898072	1492.45	32.09730035	77.12898072	1492.45
NH-03	KUL-MAN	289+498	289+504	Increasing	CULVERT	03-06-2023	NSV ROW CAMERA	NA	32.10060358	77.13313461	1482.96	32.10060358	77.13313461	1482.96

Wayside Amenities												
As per Old NH number		New NH number	As per New NH number									
NH Number Old	Start Chainage	NH Number	Section Code	Chainage	Direction	Access Type	Survey Date	Data Source	Remarks	Latitude	Longitude	Altitude
NH-21	0	NH-03	KUL-MAN	273+233	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	31.98278899	77.12630191	1218.00
NH-21	0	NH-03	KUL-MAN	273+683	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	31.98674771	77.12697403	1225.54
NH-21	0	NH-03	KUL-MAN	274+212	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	31.98889682	77.13185056	1238.82
NH-21	0	NH-03	KUL-MAN	274+266	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	31.98925014	77.13225026	1241.73
NH-21	0	NH-03	KUL-MAN	274+301	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	31.98950472	77.13246706	1243.82
NH-21	0	NH-03	KUL-MAN	274+709	Increasing	BUS SHELTER	03-06-2023	NSV Cameras	NA	31.99089837	77.13012105	1268.33
NH-21	0	NH-03	KUL-MAN	274+899	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	31.99242727	77.12936607	1274.49
NH-21	0	NH-03	KUL-MAN	276+097	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	32.00203947	77.12763411	1251.41
NH-21	0	NH-03	KUL-MAN	276+266	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	32.00332089	77.12858973	1252.61
NH-21	0	NH-03	KUL-MAN	276+393	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	32.00438080	77.12911025	1256.69
NH-21	0	NH-03	KUL-MAN	277+120	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	32.01036843	77.13122444	1268.69
NH-21	0	NH-03	KUL-MAN	277+143	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	32.01049863	77.13104828	1269.35
NH-21	0	NH-03	KUL-MAN	277+414	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	32.01163781	77.12852657	1273.07
NH-21	0	NH-03	KUL-MAN	277+470	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	32.01194454	77.12803572	1273.43
NH-21	0	NH-03	KUL-MAN	277+515	Increasing	PETROL PUMP	03-06-2023	NSV Cameras	NA	32.01217994	77.12766975	1273.59
NH-21	0	NH-03	KUL-MAN	277+552	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	32.01238163	77.12734168	1273.85
NH-21	0	NH-03	KUL-MAN	278+310	Increasing	PETROL PUMP	03-06-2023	NSV Cameras	NA	32.01861114	77.12558877	1289.50
NH-21	0	NH-03	KUL-MAN	278+670	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	32.02149883	77.12732764	1307.43
NH-21	0	NH-03	KUL-MAN	281+727	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	32.04057182	77.12617157	1363.44
NH-21	0	NH-03	KUL-MAN	281+990	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	32.04286185	77.12621725	1363.48
NH-21	0	NH-03	KUL-MAN	282+400	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	32.04607129	77.12821617	1370.96
NH-21	0	NH-03	KUL-MAN	282+463	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	32.04659667	77.12849312	1370.85
NH-21	0	NH-03	KUL-MAN	283+226	Increasing	RELIGIOUS PLACE	03-06-2023	NSV Cameras	NA	32.05249188	77.13180596	1339.33
NH-21	0	NH-03	KUL-MAN	284+166	Increasing	BUS SHELTER	03-06-2023	NSV Cameras	NA	32.05936401	77.13448206	1362.06
NH-21	0	NH-03	KUL-MAN	284+643	Increasing	RESTAURANT/MOTEL	03-06-2023	NSV Cameras	NA	32.06339915	77.13307161	1361.36
NH-21	0	NH-03	KUL-MAN	285+603	Increasing	TOLL PLAZA	03-06-2023	NSV Cameras	NA	32.07160295	77.13026246	1377.05
NH-21	0	NH-03	KUL-MAN	285+764	Increasing	TOLL PLAZA	03-06-2023	NSV Cameras	NA	32.07287370	77.12945821	1378.90

Land Use													
As per Old NH number			New NH number		As per New NH number					Start		End	
NH Number Old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	Land Use	Survey Date	Latitude	Longitude	Latitude	Longitude
NH-21	0	0	NH-03	KUL-MAN	272+000	309+345	Increasing	Public/Community Use / Water Bodies	03-06-2023	31.97262806	77.12394052	32.21537840	77.19125083
NH-21	0	0	NH-03	KUL-MAN	309+345	272+000	Decreasing	Public/Community Use / Water Bodies	03-06-2023	32.21537840	77.19125083	32.24810699	77.19106037

ANNEXURE –III B

Pavement Width														
	As per Old NH number		New NH number		As per New NH number						Start		End	
NH-Number old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	Pavement Width	Pavement Width Value	Survey Date	Latitude	Longitude	Latitude	Longitude
NA	0	0	NH-248A	SOH-NUH	24500	46950	Increasing	>=7m and <10.5m	7.00	25-01-2023	28.25164034	77.06956505	28.08652689	77.0075049
NA	0	0	NH-248A	SOH-NUH	46950	24500	Decreasing	>=7m and <10.5m	7.00	25-01-2023	28.08652689	77.0075049	28.25164034	77.06956505

Carriageway Type												
	As per Old NH number		New NH number		As per New NH number				Start		End	
NH-Number old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Carriage way Type	Survey Date	Latitude	Longitude	Latitude	Longitude
NA	0	0	NH-248A	SOH-NUH	24500	46950	Divided	25-01-2023	28.25164034	77.06956505	28.08652689	77.0075049

Road Type													
	As per Old NH number		New NH number		As per New NH number				Start			End	
NH-Number old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Road Type	Survey Date	Latitude	Longitude	Year	Latitude	Longitude
NA	0	0	NH-248A	SOH-NUH	24500	46950	4	25-01-2023	28.25164034	77.06956505	2023	28.08652689	77.0075049

Pavement Type													
	As per Old NH number		New NH number		As per New NH number					Start		End	
NH number old	Start Chainage	End Chainage	NH No	Section Code	Start Chainage	End Chainage	Direction	Pavement Type	Survey Date	Latitude	Longitude	Latitude	Longitude
NA	0	0	NH-248A	SOH-NUH	24500	46950	Increasing	Asphalt	25-01-2023	28.25164034	77.06956505	28.08652689	77.0075049
NA	0	0	NH-248A	SOH-NUH	46950	24500	Decreasing	Asphalt	25-01-2023	28.08652689	77.0075049	28.25164034	77.06956505

Shoulder Type													
	As per Old NH number		New NH number		As per New NH number					Start		End	
NH number old	Start Chainage	End Chainage	NH No	Section Code	Start Chainage	End Chainage	Direction	Shoulder Type	Survey Date	Latitude	Longitude	Latitude	Longitude
NA	0	0	NH-248A	SOH-NUH	24500	46950	Increasing	Earth	25-01-2023	28.25164034	77.06956505	28.08652689	77.0075049
NA	0	0	NH-248A	SOH-NUH	46950	24500	Decreasing	Earth	25-01-2023	28.08652689	77.0075049	28.25164034	77.06956505

Shoulder Width													
	As per Old NH number		New NH number		As per New NH number					Start		End	
NH number old	Start Chainage	End Chainage	NH No	Section Code	Start Chainage	End Chainage	Direction	Shoulder Width	Survey Date	Latitude	Longitude	Latitude	Longitude
NA	0	0	NH-248A	SOH-NUH	24500	46950	Increasing	1.50	25-01-2023	28.25164034	77.06956505	28.08652689	77.0075049
NA	0	0	NH-248A	SOH-NUH	46950	24500	Decreasing	1.50	25-01-2023	28.08652689	77.0075049	28.25164034	77.06956505

Topography												
	As per Old NH number		New NH number		As per New NH number				Start		End	
NH number old	Start Chainage	End Chainage	NH No	Section Code	Start Chainage	End Chainage	Topography	Survey Date	Latitude	Longitude	Latitude	Longitude
NA	0	0	NH-248A	SOH-NUH	24500	46950	Flat	25-01-2023	28.25164034	77.06956505	28.08652689	77.0075049

Cross Section															
	As per Old NH number		New NH number		As per New NH number						Start		End	
NH number old	Start Chainage	End Chainage	NH No	Section Code	Start Chainage	End Chainage	Direction	Cross Section	Embankment Height	Cut Height	Survey Date	Latitude	Longitude	Latitude	Longitude
NA	0	0	NH-248A	SOH-NUH	24500	46950	Increasing	Fill	NA	NA	25-01-2023	28.25164034	77.06956505	28.08652689	77.0075049
NA	0	0	NH-248A	SOH-NUH	46950	24500	Decreasing	Fill	NA	NA	25-01-2023	28.08652689	77.0075049	28.25164034	77.06956505

Median Opening																
	As per Old NH number		New NH number		As per New NH number								Start		End	
NH number old	Start Chainage	End Chainage	NH No	Section Code	Start Chainage	End Chainage	Direction	Median Type	Median Width	Kerb Height	Construction Year	Survey Date	Latitude	Longitude	Latitude	Longitude
NA	0	0	NH-248A	SOH-NUH	24500	46950	Increasing	Raised	1.5	NA	NA	25-01-2023	28.25164034	77.06956505	28.08652689	77.0075049
NA	0	0	NH-248A	SOH-NUH	46950	24500	Decreasing	Raised	1.5	NA	NA	25-01-2023	28.08652689	77.0075049	28.25164034	77.06956505

Right Of Way														
	As per Old NH number		New NH number		As per New NH number						Start		End	
NH number old	Start Chainage	End Chainage	NH No	Section Code	Start Chainage	End Chainage	Direction	Row Width	Remarks	Survey Date	Latitude	Longitude	Latitude	Longitude
NA	0	0	NH-248A	SOH-NUH	24500	46950	Increasing	30	NA	25-01-2023	28.25164034	77.06956505	28.08652689	77.0075049
NA	0	0	NH-248A	SOH-NUH	46950	24500	Decreasing	30	NA	25-01-2023	28.08652689	77.0075049	28.25164034	77.06956505

Visual Condition																																
	As per Old NH number		New NH number		As per New NH number																							Start		End	
Nhnumber_old	StartChainage	EndChainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	Lane Number	Struct All Cracks	Wide Cracks	Thermal Tranverse Cracks	Ravelling	PotHoles	Edge Break	Faulting	Spalled Joint	Crack Slab	Poor Cracks	Faillures	Cracking	Disintegration	Depression	Bleeding	Patching	Drain Condition	Shoulder Condition	Survey Date	Latitude	Longitude	Latitude	Longitude
NA	0	0	NH-248A	SOH-NUH	24500	25000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.25164034	77.06956505	28.24771202	77.07195212
NA	0	0	NH-248A	SOH-NUH	25000	25500	Increasing	L1	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.24771202	77.07195212	28.24339325	77.07163758
NA	0	0	NH-248A	SOH-NUH	25500	26000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.24339325	77.07163758	28.23915083	77.06986195
NA	0	0	NH-248A	SOH-NUH	26000	26500	Increasing	L1	0	0	0	5	5	3	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.23915083	77.06986195	28.23491319	77.06809559
NA	0	0	NH-248A	SOH-NUH	26500	27000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.23491319	77.06809559	28.23066748	77.06634139
NA	0	0	NH-248A	SOH-NUH	27000	27500	Increasing	L1	0	0	0	5	3	3	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.23066748	77.06634139	28.22641841	77.06442048
NA	0	0	NH-248A	SOH-NUH	27500	28000	Increasing	L1	0	0	0	5	2	4	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.22641841	77.06442048	28.22235715	77.06236472
NA	0	0	NH-248A	SOH-NUH	28000	28500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.22235715	77.06236472	28.21811558	77.06063957
NA	0	0	NH-248A	SOH-NUH	28500	29000	Increasing	L1	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.21811558	77.06063957	28.21377722	77.06205431
NA	0	0	NH-248A	SOH-NUH	29000	29500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.21377722	77.06205431	28.20946651	77.0635102
NA	0	0	NH-248A	SOH-NUH	29500	30000	Increasing	L1	0	0	0	5	5	4	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.20946651	77.06351 02	28.20511365	77.06495228
NA	0	0	NH-248A	SOH-NUH	30000	30500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.20511365	77.06495228	28.20076681	77.06639718
NA	0	0	NH-248A	SOH-NUH	30500	31000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.20076681	77.06639718	28.19650692	77.06800178
NA	0	0	NH-248A	SOH-NUH	31000	31500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.19650692	77.06800178	28.19266312	77.07070562
NA	0	0	NH-248A	SOH-NUH	31500	32000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.19266312	77.07070562	28.1887154	77.0731551
NA	0	0	NH-248A	SOH-NUH	32000	32500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.1887154	77.0731551	28.18422522	77.07263272
NA	0	0	NH-248A	SOH-NUH	32500	33000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.18422522	77.07263272	28.17984359	77.07146878
NA	0	0	NH-248A	SOH-NUH	33000	33500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.17984359	77.07146878	28.17547854	77.07047033
NA	0	0	NH-248A	SOH-NUH	33500	34000	Increasing	L1	0	0	0	5	3	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.17547854	77.07047033	28.17099284	77.07104686
NA	0	0	NH-248A	SOH-NUH	34000	34500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.17099284	77.07104686	28.16648536	77.07091597
NA	0	0	NH-248A	SOH-NUH	34500	35000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.16648536	77.07091597	28.16200033	77.07039098
NA	0	0	NH-248A	SOH-NUH	35000	35500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.16200033	77.07039098	28.15749532	77.06986457
NA	0	0	NH-248A	SOH-NUH	35500	36000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.15749532	77.06986457	28.15298105	77.0696331
NA	0	0	NH-248A	SOH-NUH	36000	36500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.15298105	77.06963 31	28.14847516	77.06919726
NA	0	0	NH-248A	SOH-NUH	36500	37000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.14847516	77.06919726	28.14397762	77.06868715

NA	0	0	NH-248A	SOH-NUH	37000	37500	Increasing	L1	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.1439762	77.06868715	28.13949351	77.06798445
NA	0	0	NH-248A	SOH-NUH	37500	38000	Increasing	L1	0	0	0	5	2	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.13949351	77.06798445	28.13529368	77.06639358
NA	0	0	NH-248A	SOH-NUH	38000	38500	Increasing	L1	0	0	0	5	3	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.13529368	77.06639358	28.1308766	77.06563373
NA	0	0	NH-248A	SOH-NUH	38500	39000	Increasing	L1	0	0	0	5	2	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.1308766	77.06563373	28.12795333	77.06188985
NA	0	0	NH-248A	SOH-NUH	39000	39500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.12795333	77.06188985	28.12674157	77.05703717
NA	0	0	NH-248A	SOH-NUH	39500	40000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.12674157	77.05703717	28.12434526	77.05276174
NA	0	0	NH-248A	SOH-NUH	40000	40500	Increasing	L1	0	0	0	5	3	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.12434526	77.05276174	28.12214309	77.04834772
NA	0	0	NH-248A	SOH-NUH	40500	41000	Increasing	L1	0	0	0	5	3	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.12214309	77.04834772	28.121056	77.04344685
NA	0	0	NH-248A	SOH-NUH	41000	41500	Increasing	L1	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.121056	77.04344685	28.12048686	77.0384257
NA	0	0	NH-248A	SOH-NUH	41500	42000	Increasing	L1	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.12048686	77.03842057	28.11854496	77.03381239
NA	0	0	NH-248A	SOH-NUH	42000	42500	Increasing	L1	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.11854496	77.03381239	28.11690673	77.02912435
NA	0	0	NH-248A	SOH-NUH	42500	43000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.11690673	77.02912435	28.11375171	77.02553171
NA	0	0	NH-248A	SOH-NUH	43000	43500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.11375171	77.02553171	28.11177074	77.02107917
NA	0	0	NH-248A	SOH-NUH	43500	44000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.11177074	77.02107917	28.10980051	77.01654291
NA	0	0	NH-248A	SOH-NUH	44000	44500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.10980051	77.01654291	28.10737175	77.01223347
NA	0	0	NH-248A	SOH-NUH	44500	45000	Increasing	L1	0	0	0	5	3	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.10737175	77.01223347	28.10387396	77.00912442
NA	0	0	NH-248A	SOH-NUH	45000	45500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.10387396	77.00912442	28.09948194	77.00802382
NA	0	0	NH-248A	SOH-NUH	45500	46000	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.09948194	77.00802382	28.09499897	77.00739349
NA	0	0	NH-248A	SOH-NUH	46000	46500	Increasing	L1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.09499897	77.00739349	28.09050919	77.00673037
NA	0	0	NH-248A	SOH-NUH	46500	46950	Increasing	L1	0	0	0	5	3	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.09050919	77.00673037	28.08652689	77.0075049
NA	0	0	NH-248A	SOH-NUH	24500	25000	Increasing	L2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.25165911	77.06962077	28.24770852	77.07197047
NA	0	0	NH-248A	SOH-NUH	25000	25500	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.24770852	77.07197047	28.24337801	77.0716849
NA	0	0	NH-248A	SOH-NUH	25500	26000	Increasing	L2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.24337801	77.07168049	28.23891851	77.06981983
NA	0	0	NH-248A	SOH-NUH	26000	26500	Increasing	L2	0	0	0	5	5	3	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.23891851	77.06981983	28.23466632	77.06805013
NA	0	0	NH-248A	SOH-NUH	26500	27000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.23466632	77.06805013	28.23040605	77.06629065
NA	0	0	NH-248A	SOH-NUH	27000	27500	Increasing	L2	0	0	0	5	5	3	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.23040605	77.06629065	28.22622774	77.06431858
NA	0	0	NH-248A	SOH-NUH	27500	28000	Increasing	L2	0	0	0	5	5	4	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.22622774	77.06431858	28.22207084	77.0622998
NA	0	0	NH-248A	SOH-NUH	28000	28500	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.22207084	77.06229098	28.21782029	77.06074373
NA	0	0	NH-248A	SOH-NUH	28500	29000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.21782029	77.06074373	28.21346935	77.06219396
NA	0	0	NH-248A	SOH-NUH	29000	29500	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.21346935	77.06219396	28.20914012	77.06365824

NA	0	0	NH-248A	SOH-NUH	29500	30000	Increasing	L2	0	0	0	5	5	4	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.20914012	77.06365824	28.2047854	77.06509781
NA	0	0	NH-248A	SOH-NUH	30000	30500	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.2047854	77.06509781	28.2004463	77.06654133
NA	0	0	NH-248A	SOH-NUH	30500	31000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.2004463	77.06654133	28.19618005	77.06825918
NA	0	0	NH-248A	SOH-NUH	31000	31500	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.19618005	77.06825918	28.19234997	77.07095117
NA	0	0	NH-248A	SOH-NUH	31500	32000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.19234997	77.07095117	28.18833541	77.07323079
NA	0	0	NH-248A	SOH-NUH	32000	32500	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.18833541	77.07323079	28.18383859	77.07262081
NA	0	0	NH-248A	SOH-NUH	32500	33000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.18383859	77.07262081	28.17946438	77.07135352
NA	0	0	NH-248A	SOH-NUH	33000	33500	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.17946438	77.07135352	28.17506642	77.07050738
NA	0	0	NH-248A	SOH-NUH	33500	34000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.17506642	77.07050738	28.17056186	77.07116384
NA	0	0	NH-248A	SOH-NUH	34000	34500	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.17056186	77.07116384	28.16604947	77.07091564
NA	0	0	NH-248A	SOH-NUH	34500	35000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.16604947	77.07091564	28.16153963	77.07037155
NA	0	0	NH-248A	SOH-NUH	35000	35500	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.16153963	77.07037155	28.15703775	77.06987841
NA	0	0	NH-248A	SOH-NUH	35500	36000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.15703775	77.06987841	28.15251126	77.06965067
NA	0	0	NH-248A	SOH-NUH	36000	36500	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.15251126	77.06965067	28.14800112	77.06919346
NA	0	0	NH-248A	SOH-NUH	36500	37000	Increasing	L2	0	0	0	5	3	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.14800112	77.06919346	28.14347184	77.06868833
NA	0	0	NH-248A	SOH-NUH	37000	37500	Increasing	L2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.14347184	77.06868833	28.13898807	77.06793153
NA	0	0	NH-248A	SOH-NUH	37500	38000	Increasing	L2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.13898807	77.06793153	28.13453408	77.0660684
NA	0	0	NH-248A	SOH-NUH	38000	38500	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.13453408	77.0660684	28.13015015	77.06526269
NA	0	0	NH-248A	SOH-NUH	38500	39000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.13015015	77.06526269	28.12757515	77.06110576
NA	0	0	NH-248A	SOH-NUH	39000	39500	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.12757515	77.06110576	28.12640066	77.05621784
NA	0	0	NH-248A	SOH-NUH	39500	40000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.12640066	77.05621784	28.12379617	77.05202942
NA	0	0	NH-248A	SOH-NUH	40000	40500	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.12379617	77.05202942	28.12178074	77.04749346
NA	0	0	NH-248A	SOH-NUH	40500	41000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.12178074	77.04749346	28.12102296	77.04251849
NA	0	0	NH-248A	SOH-NUH	41000	41500	Increasing	L2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.12102296	77.04251849	28.12004456	77.0375614
NA	0	0	NH-248A	SOH-NUH	41500	42000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.12004456	77.03756 14	28.118251	77.03287436
NA	0	0	NH-248A	SOH-NUH	42000	42500	Increasing	L2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.118251	77.03287436	28.11639817	77.02828198
NA	0	0	NH-248A	SOH-NUH	42500	43000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.11639817	77.02828198	28.11304923	77.02485713
NA	0	0	NH-248A	SOH-NUH	43000	43500	Increasing	L2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.11304923	77.02485713	28.11144651	77.02011584
NA	0	0	NH-248A	SOH-NUH	43500	44000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.11144651	77.02011584	28.10925798	77.01566251
NA	0	0	NH-248A	SOH-NUH	44000	44500	Increasing	L2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.10925798	77.01566251	28.10670725	77.01142584

NA	0	0	NH-248A	SOH-NUH	44500	45000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.10670725	77.01142584	28.10286829	77.00871153
NA	0	0	NH-248A	SOH-NUH	45000	45500	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.10286829	77.00871153	28.09839833	77.00789044
NA	0	0	NH-248A	SOH-NUH	45500	46000	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.09839833	77.00789044	28.09390389	77.00725979
NA	0	0	NH-248A	SOH-NUH	46000	46500	Increasing	L2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.09390389	77.00725979	28.08940797	77.00678259
NA	0	0	NH-248A	SOH-NUH	46500	46950	Increasing	L2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	3	3	2	25-01-2023	28.08940797	77.00678259	28.08712 8	77.007225
NA	0	0	NH-248A	SOH-NUH	46950	46500	Decreasing	R1	0	0	0	5	5	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.08656919	77.00743761	28.09055887	77.00669476
NA	0	0	NH-248A	SOH-NUH	46500	46000	Decreasing	R1	0	0	0	5	5	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.09055887	77.00669476	28.09503697	77.00731366
NA	0	0	NH-248A	SOH-NUH	46000	45500	Decreasing	R1	0	0	0	5	3	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.09503697	77.00731366	28.09953289	77.00798883
NA	0	0	NH-248A	SOH-NUH	45500	45000	Decreasing	R1	0	0	0	5	2	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.09953289	77.00798883	28.10391958	77.00909751
NA	0	0	NH-248A	SOH-NUH	45000	44500	Decreasing	R1	0	0	0	5	5	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.10391958	77.00909751	28.10741922	77.01221037
NA	0	0	NH-248A	SOH-NUH	44500	44000	Decreasing	R1	0	0	0	5	2	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.10741922	77.01221037	28.10984069	77.01650638
NA	0	0	NH-248A	SOH-NUH	44000	43500	Decreasing	R1	0	0	0	5	5	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.10984069	77.01650638	28.11181804	77.02107238
NA	0	0	NH-248A	SOH-NUH	43500	43000	Decreasing	R1	0	0	0	5	3	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.11181804	77.02107238	28.11378246	77.02550746
NA	0	0	NH-248A	SOH-NUH	43000	42500	Decreasing	R1	0	0	0	5	3	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.11378246	77.02550746	28.11693292	77.0290676
NA	0	0	NH-248A	SOH-NUH	42500	42000	Decreasing	R1	0	0	0	5	4	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.11693292	77.02906 76	28.11859314	77.03377436
NA	0	0	NH-248A	SOH-NUH	42000	41500	Decreasing	R1	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.11859314	77.03377436	28.12053265	77.03838009
NA	0	0	NH-248A	SOH-NUH	41500	41000	Decreasing	R1	0	0	0	5	2	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.12053265	77.03838009	28.12111368	77.04338424
NA	0	0	NH-248A	SOH-NUH	41000	40500	Decreasing	R1	0	0	0	5	4	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.12111368	77.04338424	28.12217409	77.04827542
NA	0	0	NH-248A	SOH-NUH	40500	40000	Decreasing	R1	0	0	0	5	3	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.12217409	77.04827542	28.12435854	77.0526878
NA	0	0	NH-248A	SOH-NUH	40000	39500	Decreasing	R1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.12435854	77.05268 78	28.12678408	77.05697188
NA	0	0	NH-248A	SOH-NUH	39500	39000	Decreasing	R1	0	0	0	5	5	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.12678408	77.05697188	28.12798349	77.06182878
NA	0	0	NH-248A	SOH-NUH	39000	38500	Decreasing	R1	0	0	0	5	3	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.12798349	77.06182878	28.13089903	77.06559944
NA	0	0	NH-248A	SOH-NUH	38500	38000	Decreasing	R1	0	0	0	5	5	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.13089903	77.06559944	28.13529478	77.0663547
NA	0	0	NH-248A	SOH-NUH	38000	37500	Decreasing	R1	0	0	0	5	4	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.13529478	77.06635 47	28.13949652	77.06791668
NA	0	0	NH-248A	SOH-NUH	37500	37000	Decreasing	R1	0	0	0	5	5	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.13949652	77.06791668	28.14396851	77.0686273
NA	0	0	NH-248A	SOH-NUH	37000	36500	Decreasing	R1	0	0	0	5	4	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.14396851	77.06862 73	28.14847529	77.06914007
NA	0	0	NH-248A	SOH-NUH	36500	36000	Decreasing	R1	0	0	0	5	2	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.14847529	77.06914007	28.15297666	77.06957558
NA	0	0	NH-248A	SOH-NUH	36000	35500	Decreasing	R1	0	0	0	5	4	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.15297666	77.06957558	28.15749991	77.06980471
NA	0	0	NH-248A	SOH-NUH	35500	35000	Decreasing	R1	0	0	0	5	4	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.15749991	77.06980471	28.16198529	77.07032085
NA	0	0	NH-248A	SOH-NUH	35000	34500	Decreasing	R1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.16198529	77.07032085	28.16649184	77.07087237

NA	0	0	NH-248A	SOH-NUH	34500	34000	Decreasing	R1	0	0	0	5	3	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.16649184	77.07087237	28.17098953	77.07100752
NA	0	0	NH-248A	SOH-NUH	34000	33500	Decreasing	R1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.17098953	77.07100752	28.17546467	77.07042572
NA	0	0	NH-248A	SOH-NUH	33500	33000	Decreasing	R1	0	0	0	5	5	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.17546467	77.07042572	28.17986272	77.07138733
NA	0	0	NH-248A	SOH-NUH	33000	32500	Decreasing	R1	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.17986272	77.07138733	28.18421838	77.07256361
NA	0	0	NH-248A	SOH-NUH	32500	32000	Decreasing	R1	0	0	0	5	1	5	0	0	0	0	0	1	4	4	5	5	3	2	25-01-2023	28.18421838	77.07256361	28.18872049	77.07307008
NA	0	0	NH-248A	SOH-NUH	32000	31500	Decreasing	R1	0	0	0	5	1	5	0	0	0	0	0	1	4	4	5	5	3	2	25-01-2023	28.18872049	77.07307008	28.19265486	77.07063012
NA	0	0	NH-248A	SOH-NUH	31500	31000	Decreasing	R1	0	0	0	5	4	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.19265486	77.07063012	28.19648931	77.06793355
NA	0	0	NH-248A	SOH-NUH	31000	30500	Decreasing	R1	0	0	0	5	2	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.19648931	77.06793355	28.20076319	77.06628132
NA	0	0	NH-248A	SOH-NUH	30500	30000	Decreasing	R1	0	0	0	5	3	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.20076319	77.06628132	28.20510319	77.06488919
NA	0	0	NH-248A	SOH-NUH	30000	29500	Decreasing	R1	0	0	0	5	1	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.20510319	77.06488919	28.20944341	77.06346049
NA	0	0	NH-248A	SOH-NUH	29500	29000	Decreasing	R1	0	0	0	5	1	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.20944341	77.06346049	28.21377736	77.06199734
NA	0	0	NH-248A	SOH-NUH	29000	28500	Decreasing	R1	0	0	0	5	2	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.21377736	77.06199734	28.21810358	77.06058484
NA	0	0	NH-248A	SOH-NUH	28500	28000	Decreasing	R1	0	0	0	5	2	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.21810358	77.06058484	28.22236217	77.06232146
NA	0	0	NH-248A	SOH-NUH	28000	27500	Decreasing	R1	0	0	0	5	2	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.22236217	77.06232146	28.22650579	77.06436646
NA	0	0	NH-248A	SOH-NUH	27500	27000	Decreasing	R1	0	0	0	5	4	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.22650579	77.06436646	28.23068289	77.06629301
NA	0	0	NH-248A	SOH-NUH	27000	26500	Decreasing	R1	0	0	0	5	5	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.23068289	77.06629301	28.23491854	77.06803704
NA	0	0	NH-248A	SOH-NUH	26500	26000	Decreasing	R1	0	0	0	5	3	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.23491854	77.06803704	28.23915591	77.0698211
NA	0	0	NH-248A	SOH-NUH	26000	25500	Decreasing	R1	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.23915591	77.06982 11	28.24341255	77.07160523
NA	0	0	NH-248A	SOH-NUH	25500	25000	Decreasing	R1	0	0	0	5	3	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.24341255	77.07160523	28.24771663	77.07190061
NA	0	0	NH-248A	SOH-NUH	25000	24500	Decreasing	R1	0	0	0	5	2	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.24771663	77.07190061	28.25160614	77.06952265
NA	0	0	NH-248A	SOH-NUH	46950	46500	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.08640318	77.00749606	28.09036384	77.00663146
NA	0	0	NH-248A	SOH-NUH	46500	46000	Decreasing	R2	0	0	0	5	4	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.09036384	77.00663146	28.09486759	77.00726374
NA	0	0	NH-248A	SOH-NUH	46000	45500	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.09486759	77.00726374	28.09937074	77.00794125
NA	0	0	NH-248A	SOH-NUH	45500	45000	Decreasing	R2	0	0	0	5	2	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.09937074	77.00794125	28.10389614	77.00905869
NA	0	0	NH-248A	SOH-NUH	45000	44500	Decreasing	R2	0	0	0	5	3	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.10389614	77.00905869	28.10738562	77.01218545
NA	0	0	NH-248A	SOH-NUH	44500	44000	Decreasing	R2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.10738562	77.01218545	28.10983138	77.0165094
NA	0	0	NH-248A	SOH-NUH	44000	43500	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.10983138	77.01650 94	28.11180622	77.02107758
NA	0	0	NH-248A	SOH-NUH	43500	43000	Decreasing	R2	0	0	0	5	2	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.11180622	77.02107758	28.11380438	77.02551922
NA	0	0	NH-248A	SOH-NUH	43000	42500	Decreasing	R2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.11380438	77.02551922	28.11694633	77.02912157
NA	0	0	NH-248A	SOH-NUH	42500	42000	Decreasing	R2	0	0	0	5	3	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.11694633	77.02912157	28.11860253	77.03382371

NA	0	0	NH-248A	SOH-NUH	42000	41500	Decreasing	R2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.11860253	77.03382371	28.12054897	77.03844149
NA	0	0	NH-248A	SOH-NUH	41500	41000	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.12054897	77.03844149	28.12110378	77.0434537
NA	0	0	NH-248A	SOH-NUH	41000	40500	Decreasing	R2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.12110378	77.0434537	28.12219601	77.04835124
NA	0	0	NH-248A	SOH-NUH	40500	40000	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.12219601	77.04835124	28.12441958	77.05279747
NA	0	0	NH-248A	SOH-NUH	40000	39500	Decreasing	R2	0	0	0	5	3	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.12441958	77.05279747	28.12680156	77.057089
NA	0	0	NH-248A	SOH-NUH	39500	39000	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.12680156	77.057089	28.12803108	77.06194702
NA	0	0	NH-248A	SOH-NUH	39000	38500	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.12803108	77.06194702	28.13102462	77.06557644
NA	0	0	NH-248A	SOH-NUH	38500	38000	Decreasing	R2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.13102462	77.06557644	28.13543365	77.06643673
NA	0	0	NH-248A	SOH-NUH	38000	37500	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.13543365	77.06643673	28.13967353	77.06793951
NA	0	0	NH-248A	SOH-NUH	37500	37000	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.13967353	77.06793951	28.14415567	77.06862122
NA	0	0	NH-248A	SOH-NUH	37000	36500	Decreasing	R2	0	0	0	5	4	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.14415567	77.06862122	28.14867247	77.06913804
NA	0	0	NH-248A	SOH-NUH	36500	36000	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.14867247	77.06913804	28.15318849	77.06956183
NA	0	0	NH-248A	SOH-NUH	36000	35500	Decreasing	R2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.15318849	77.06956183	28.15770435	77.06979217
NA	0	0	NH-248A	SOH-NUH	35500	35000	Decreasing	R2	0	0	0	5	3	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.15770435	77.06979217	28.16223727	77.07034571
NA	0	0	NH-248A	SOH-NUH	35000	34500	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.16223727	77.07034571	28.16675062	77.07087124
NA	0	0	NH-248A	SOH-NUH	34500	34000	Decreasing	R2	0	0	0	5	3	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.16675062	77.07087124	28.17124193	77.07094439
NA	0	0	NH-248A	SOH-NUH	34000	33500	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.17124193	77.07094439	28.17575541	77.07041771
NA	0	0	NH-248A	SOH-NUH	33500	33000	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.17575541	77.07041771	28.18012615	77.07154238
NA	0	0	NH-248A	SOH-NUH	33000	32500	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.18012615	77.07154238	28.18453699	77.07259214
NA	0	0	NH-248A	SOH-NUH	32500	32000	Decreasing	R2	0	0	0	5	4	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.18453699	77.07259214	28.18903491	77.0729622
NA	0	0	NH-248A	SOH-NUH	32000	31500	Decreasing	R2	0	0	0	5	1	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.18903491	77.07296 22	28.19293245	77.07037033
NA	0	0	NH-248A	SOH-NUH	31500	31000	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.19293245	77.07037033	28.19678691	77.06767067
NA	0	0	NH-248A	SOH-NUH	31000	30500	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.19678691	77.06767067	28.20113324	77.06618637
NA	0	0	NH-248A	SOH-NUH	30500	30000	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.20113324	77.06618637	28.20547441	77.06472027
NA	0	0	NH-248A	SOH-NUH	30000	29500	Decreasing	R2	0	0	0	5	3	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.20547441	77.06472027	28.20982289	77.06326954
NA	0	0	NH-248A	SOH-NUH	29500	29000	Decreasing	R2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.20982289	77.06326954	28.21417754	77.06179718
NA	0	0	NH-248A	SOH-NUH	29000	28500	Decreasing	R2	0	0	0	5	2	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.21417754	77.06179718	28.21855452	77.0605972
NA	0	0	NH-248A	SOH-NUH	28500	28000	Decreasing	R2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.21855452	77.06059 72	28.22277226	77.06245893
NA	0	0	NH-248A	SOH-NUH	28000	27500	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.22277226	77.06245893	28.22688971	77.06458618
NA	0	0	NH-248A	SOH-NUH	27500	27000	Decreasing	R2	0	0	0	5	3	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.22688971	77.06458618	28.23112314	77.06643363

NA	0	0	NH-248A	SOH-NUH	27000	26500	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.23112314	77.06643363	28.23537256	77.06821264
NA	0	0	NH-248A	SOH-NUH	26500	26000	Decreasing	R2	0	0	0	5	3	5	0	0	0	0	0	4	4	4	5	5	3	2	25-01-2023	28.23537256	77.06821264	28.23992402	77.07010972
NA	0	0	NH-248A	SOH-NUH	26000	25500	Decreasing	R2	0	0	0	5	3	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.23992402	77.07010972	28.24426326	77.07190578
NA	0	0	NH-248A	SOH-NUH	25500	25000	Decreasing	R2	0	0	0	5	4	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.24426326	77.07190578	28.24863174	77.07110854
NA	0	0	NH-248A	SOH-NUH	25000	24500	Decreasing	R2	0	0	0	5	5	5	0	0	0	0	0	5	4	4	5	5	3	2	25-01-2023	28.24863174	77.07110854	28.24863174	77.07110854

Roughness																	
	As per Old NH number		New NH number		As per New NH number									Start		End	
Nhnumber_old	StartChainage	EndChainage	NHNumber	SectionCode	StartChainage	EndChainage	Direction	LaneNumber	LwpIri	RwpIri	LaneIri	Speed	SurveyDate	Latitude	Longitude	Latitude	Longitude
NA	0	0	NH-248A	SOH-NUH	24500	24600	Increasing	L1	5.34	6.18	5.76	28	25-01-2023	28.251640	77.069565	28.250760	77.069802
NA	0	0	NH-248A	SOH-NUH	24600	24700	Increasing	L1	1.91	1.86	1.89	41	25-01-2023	28.250760	77.069802	28.249934	77.070209
NA	0	0	NH-248A	SOH-NUH	24700	24800	Increasing	L1	14.45	13.71	14.08	20	25-01-2023	28.249934	77.070209	28.249191	77.070789
NA	0	0	NH-248A	SOH-NUH	24800	24900	Increasing	L1	7.08	7.33	7.21	21	25-01-2023	28.249191	77.070789	28.248450	77.071382
NA	0	0	NH-248A	SOH-NUH	24900	25000	Increasing	L1	2.13	2.28	2.21	26	25-01-2023	28.248450	77.071382	28.247712	77.071952
NA	0	0	NH-248A	SOH-NUH	25000	25100	Increasing	L1	3.59	3.43	3.51	30	25-01-2023	28.247712	77.071952	28.246875	77.072362
NA	0	0	NH-248A	SOH-NUH	25100	25200	Increasing	L1	6.18	10.98	8.58	20	25-01-2023	28.246875	77.072362	28.245981	77.072502
NA	0	0	NH-248A	SOH-NUH	25200	25300	Increasing	L1	4.34	7.05	5.70	20	25-01-2023	28.245981	77.072502	28.245096	77.072320
NA	0	0	NH-248A	SOH-NUH	25300	25400	Increasing	L1	2.94	3.27	3.11	33	25-01-2023	28.245096	77.072320	28.244236	77.071988
NA	0	0	NH-248A	SOH-NUH	25400	25500	Increasing	L1	3.41	3.50	3.46	38	25-01-2023	28.244236	77.071988	28.243393	77.071638
NA	0	0	NH-248A	SOH-NUH	25500	25600	Increasing	L1	8.07	6.24	7.16	20	25-01-2023	28.243393	77.071638	28.242536	77.071281
NA	0	0	NH-248A	SOH-NUH	25600	25700	Increasing	L1	8.28	9.99	9.14	20	25-01-2023	28.242536	77.071281	28.241686	77.070924
NA	0	0	NH-248A	SOH-NUH	25700	25800	Increasing	L1	2.07	2.25	2.16	32	25-01-2023	28.241686	77.070924	28.240844	77.070571
NA	0	0	NH-248A	SOH-NUH	25800	25900	Increasing	L1	1.57	1.48	1.53	36	25-01-2023	28.240844	77.070571	28.239996	77.070216
NA	0	0	NH-248A	SOH-NUH	25900	26000	Increasing	L1	3.49	3.88	3.69	34	25-01-2023	28.239996	77.070216	28.239151	77.069862
NA	0	0	NH-248A	SOH-NUH	26000	26100	Increasing	L1	2.11	2.15	2.13	39	25-01-2023	28.239151	77.069862	28.238299	77.069502
NA	0	0	NH-248A	SOH-NUH	26100	26200	Increasing	L1	1.95	2.33	2.14	43	25-01-2023	28.238299	77.069502	28.237451	77.069150
NA	0	0	NH-248A	SOH-NUH	26200	26300	Increasing	L1	2.00	2.21	2.11	44	25-01-2023	28.237451	77.069150	28.236616	77.068805
NA	0	0	NH-248A	SOH-NUH	26300	26400	Increasing	L1	2.26	2.24	2.25	45	25-01-2023	28.236616	77.068805	28.235750	77.068447
NA	0	0	NH-248A	SOH-NUH	26400	26500	Increasing	L1	1.80	1.77	1.79	39	25-01-2023	28.235750	77.068447	28.234913	77.068096
NA	0	0	NH-248A	SOH-NUH	26500	26600	Increasing	L1	1.55	1.76	1.66	37	25-01-2023	28.234913	77.068096	28.234061	77.067741

NA	0	0	NH-248A	SOH-NUH	26600	26700	Increasing	L1	6.09	5.15	5.62	23	25-01-2023	28.234061	77.067741	28.233202	77.067384
NA	0	0	NH-248A	SOH-NUH	26700	26800	Increasing	L1	2.03	2.16	2.10	38	25-01-2023	28.233202	77.067384	28.232361	77.067039
NA	0	0	NH-248A	SOH-NUH	26800	26900	Increasing	L1	3.44	4.23	3.84	41	25-01-2023	28.232361	77.067039	28.231505	77.066685
NA	0	0	NH-248A	SOH-NUH	26900	27000	Increasing	L1	4.01	4.09	4.05	40	25-01-2023	28.231505	77.066685	28.230667	77.066341
NA	0	0	NH-248A	SOH-NUH	27000	27100	Increasing	L1	1.64	1.40	1.52	33	25-01-2023	28.230667	77.066341	28.229810	77.065990
NA	0	0	NH-248A	SOH-NUH	27100	27200	Increasing	L1	22.43	21.49	21.96	20	25-01-2023	28.229810	77.065990	28.228953	77.065630
NA	0	0	NH-248A	SOH-NUH	27200	27300	Increasing	L1	14.34	5.71	10.03	21	25-01-2023	28.228953	77.065630	28.228115	77.065290
NA	0	0	NH-248A	SOH-NUH	27300	27400	Increasing	L1	4.09	2.54	3.32	28	25-01-2023	28.228115	77.065290	28.227268	77.064908
NA	0	0	NH-248A	SOH-NUH	27400	27500	Increasing	L1	1.93	2.63	2.28	36	25-01-2023	28.227268	77.064908	28.226484	77.064420
NA	0	0	NH-248A	SOH-NUH	27500	27600	Increasing	L1	5.38	6.74	6.06	26	25-01-2023	28.226484	77.064420	28.225694	77.063899
NA	0	0	NH-248A	SOH-NUH	27600	27700	Increasing	L1	2.47	2.33	2.40	23	25-01-2023	28.225694	77.063899	28.224875	77.063472
NA	0	0	NH-248A	SOH-NUH	27700	27800	Increasing	L1	8.27	8.26	8.27	20	25-01-2023	28.224875	77.063472	28.224041	77.063107
NA	0	0	NH-248A	SOH-NUH	27800	27900	Increasing	L1	1.41	1.68	1.55	29	25-01-2023	28.224041	77.063107	28.223189	77.062732
NA	0	0	NH-248A	SOH-NUH	27900	28000	Increasing	L1	7.13	6.17	6.65	21	25-01-2023	28.223189	77.062732	28.222357	77.062365
NA	0	0	NH-248A	SOH-NUH	28000	28100	Increasing	L1	1.35	1.68	1.52	37	25-01-2023	28.222357	77.062365	28.221502	77.061986
NA	0	0	NH-248A	SOH-NUH	28100	28200	Increasing	L1	1.86	2.08	1.97	38	25-01-2023	28.221502	77.061986	28.220675	77.061616
NA	0	0	NH-248A	SOH-NUH	28200	28300	Increasing	L1	1.33	1.65	1.49	38	25-01-2023	28.220675	77.061616	28.219837	77.061240
NA	0	0	NH-248A	SOH-NUH	28300	28400	Increasing	L1	1.80	1.90	1.85	38	25-01-2023	28.219837	77.061240	28.218994	77.060863
NA	0	0	NH-248A	SOH-NUH	28400	28500	Increasing	L1	8.44	6.59	7.52	25	25-01-2023	28.218994	77.060863	28.218116	77.060640
NA	0	0	NH-248A	SOH-NUH	28500	28600	Increasing	L1	2.04	2.02	2.03	35	25-01-2023	28.218116	77.060640	28.217248	77.060896
NA	0	0	NH-248A	SOH-NUH	28600	28700	Increasing	L1	1.51	1.28	1.40	41	25-01-2023	28.217248	77.060896	28.216391	77.061181
NA	0	0	NH-248A	SOH-NUH	28700	28800	Increasing	L1	1.50	1.55	1.53	45	25-01-2023	28.216391	77.061181	28.215520	77.061470
NA	0	0	NH-248A	SOH-NUH	28800	28900	Increasing	L1	1.28	1.24	1.26	46	25-01-2023	28.215520	77.061470	28.214651	77.061760
NA	0	0	NH-248A	SOH-NUH	28900	29000	Increasing	L1	1.61	1.67	1.64	39	25-01-2023	28.214651	77.061760	28.213772	77.062054
NA	0	0	NH-248A	SOH-NUH	29000	29100	Increasing	L1	7.89	7.25	7.57	29	25-01-2023	28.213772	77.062054	28.212924	77.062344
NA	0	0	NH-248A	SOH-NUH	29100	29200	Increasing	L1	1.20	1.33	1.27	44	25-01-2023	28.212924	77.062344	28.212049	77.062645
NA	0	0	NH-248A	SOH-NUH	29200	29300	Increasing	L1	1.33	1.36	1.35	46	25-01-2023	28.212049	77.062645	28.211180	77.062934
NA	0	0	NH-248A	SOH-NUH	29300	29400	Increasing	L1	1.65	1.49	1.57	48	25-01-2023	28.211180	77.062934	28.210317	77.063224
NA	0	0	NH-248A	SOH-NUH	29400	29500	Increasing	L1	2.16	1.92	2.04	49	25-01-2023	28.210317	77.063224	28.209465	77.063510

NA	0	0	NH-248A	SOH-NUH	29500	29600	Increasing	L1	1.82	1.77	1.80	49	25-01-2023	28.209465	77.063510	28.208590	77.063807
NA	0	0	NH-248A	SOH-NUH	29600	29700	Increasing	L1	2.47	2.50	2.49	49	25-01-2023	28.208590	77.063807	28.207714	77.064092
NA	0	0	NH-248A	SOH-NUH	29700	29800	Increasing	L1	2.28	2.50	2.39	48	25-01-2023	28.207714	77.064092	28.206851	77.064379
NA	0	0	NH-248A	SOH-NUH	29800	29900	Increasing	L1	2.43	1.77	2.10	49	25-01-2023	28.206851	77.064379	28.205975	77.064671
NA	0	0	NH-248A	SOH-NUH	29900	30000	Increasing	L1	2.25	1.50	1.88	47	25-01-2023	28.205975	77.064671	28.205114	77.064952
NA	0	0	NH-248A	SOH-NUH	30000	30100	Increasing	L1	3.06	2.68	2.87	39	25-01-2023	28.205114	77.064952	28.204237	77.065242
NA	0	0	NH-248A	SOH-NUH	30100	30200	Increasing	L1	1.54	1.62	1.58	44	25-01-2023	28.204237	77.065242	28.203379	77.065529
NA	0	0	NH-248A	SOH-NUH	30200	30300	Increasing	L1	1.67	1.76	1.72	50	25-01-2023	28.203379	77.065529	28.202520	77.065820
NA	0	0	NH-248A	SOH-NUH	30300	30400	Increasing	L1	1.80	1.54	1.67	48	25-01-2023	28.202520	77.065820	28.201634	77.066112
NA	0	0	NH-248A	SOH-NUH	30400	30500	Increasing	L1	4.33	4.42	4.38	36	25-01-2023	28.201634	77.066112	28.200767	77.066397
NA	0	0	NH-248A	SOH-NUH	30500	30600	Increasing	L1	1.86	2.39	2.13	43	25-01-2023	28.200767	77.066397	28.199910	77.066675
NA	0	0	NH-248A	SOH-NUH	30600	30700	Increasing	L1	1.94	1.52	1.73	48	25-01-2023	28.199910	77.066675	28.199034	77.066960
NA	0	0	NH-248A	SOH-NUH	30700	30800	Increasing	L1	2.57	1.96	2.27	47	25-01-2023	28.199034	77.066960	28.198174	77.067243
NA	0	0	NH-248A	SOH-NUH	30800	30900	Increasing	L1	1.40	1.31	1.36	47	25-01-2023	28.198174	77.067243	28.197299	77.067548
NA	0	0	NH-248A	SOH-NUH	30900	31000	Increasing	L1	1.82	1.94	1.88	47	25-01-2023	28.197299	77.067548	28.196507	77.068002
NA	0	0	NH-248A	SOH-NUH	31000	31100	Increasing	L1	1.58	1.38	1.48	42	25-01-2023	28.196507	77.068002	28.195732	77.068542
NA	0	0	NH-248A	SOH-NUH	31100	31200	Increasing	L1	8.35	7.19	7.77	26	25-01-2023	28.195732	77.068542	28.194965	77.069084
NA	0	0	NH-248A	SOH-NUH	31200	31300	Increasing	L1	1.79	1.94	1.87	42	25-01-2023	28.194965	77.069084	28.194199	77.069623
NA	0	0	NH-248A	SOH-NUH	31300	31400	Increasing	L1	1.78	1.81	1.80	47	25-01-2023	28.194199	77.069623	28.193425	77.070170
NA	0	0	NH-248A	SOH-NUH	31400	31500	Increasing	L1	1.40	1.60	1.50	48	25-01-2023	28.193425	77.070170	28.192663	77.070706
NA	0	0	NH-248A	SOH-NUH	31500	31600	Increasing	L1	1.37	1.48	1.43	51	25-01-2023	28.192663	77.070706	28.191906	77.071243
NA	0	0	NH-248A	SOH-NUH	31600	31700	Increasing	L1	1.20	1.20	1.20	53	25-01-2023	28.191906	77.071243	28.191134	77.071787
NA	0	0	NH-248A	SOH-NUH	31700	31800	Increasing	L1	1.85	1.33	1.59	54	25-01-2023	28.191134	77.071787	28.190377	77.072328
NA	0	0	NH-248A	SOH-NUH	31800	31900	Increasing	L1	2.38	2.15	2.27	50	25-01-2023	28.190377	77.072328	28.189592	77.072848
NA	0	0	NH-248A	SOH-NUH	31900	32000	Increasing	L1	2.23	2.64	2.44	51	25-01-2023	28.189592	77.072848	28.188715	77.073155
NA	0	0	NH-248A	SOH-NUH	32000	32100	Increasing	L1	1.95	1.99	1.97	51	25-01-2023	28.188715	77.073155	28.187824	77.073166
NA	0	0	NH-248A	SOH-NUH	32100	32200	Increasing	L1	1.55	2.10	1.83	51	25-01-2023	28.187824	77.073166	28.186932	77.073032
NA	0	0	NH-248A	SOH-NUH	32200	32300	Increasing	L1	1.66	1.75	1.71	52	25-01-2023	28.186932	77.073032	28.186019	77.072899
NA	0	0	NH-248A	SOH-NUH	32300	32400	Increasing	L1	1.35	1.56	1.46	52	25-01-2023	28.186019	77.072899	28.185135	77.072764

NA	0	0	NH-248A	SOH-NUH	32400	32500	Increasing	L1	2.61	2.94	2.78	52	25-01-2023	28.185135	77.072764	28.184225	77.072633
NA	0	0	NH-248A	SOH-NUH	32500	32600	Increasing	L1	2.31	2.08	2.20	51	25-01-2023	28.184225	77.072633	28.183327	77.072502
NA	0	0	NH-248A	SOH-NUH	32600	32700	Increasing	L1	2.18	2.35	2.27	52	25-01-2023	28.183327	77.072502	28.182447	77.072371
NA	0	0	NH-248A	SOH-NUH	32700	32800	Increasing	L1	2.17	2.20	2.19	53	25-01-2023	28.182447	77.072371	28.181564	77.072186
NA	0	0	NH-248A	SOH-NUH	32800	32900	Increasing	L1	1.53	1.92	1.73	46	25-01-2023	28.181564	77.072186	28.180684	77.071854
NA	0	0	NH-248A	SOH-NUH	32900	33000	Increasing	L1	5.03	5.78	5.41	26	25-01-2023	28.180684	77.071854	28.179844	77.071469
NA	0	0	NH-248A	SOH-NUH	33000	33100	Increasing	L1	4.64	5.35	5.00	25	25-01-2023	28.179844	77.071469	28.179010	77.071122
NA	0	0	NH-248A	SOH-NUH	33100	33200	Increasing	L1	2.08	2.63	2.36	37	25-01-2023	28.179010	77.071122	28.178163	77.070736
NA	0	0	NH-248A	SOH-NUH	33200	33300	Increasing	L1	1.97	2.41	2.19	44	25-01-2023	28.178163	77.070736	28.177280	77.070562
NA	0	0	NH-248A	SOH-NUH	33300	33400	Increasing	L1	2.08	2.60	2.34	47	25-01-2023	28.177280	77.070562	28.176375	77.070514
NA	0	0	NH-248A	SOH-NUH	33400	33500	Increasing	L1	1.79	1.74	1.77	47	25-01-2023	28.176375	77.070514	28.175479	77.070470
NA	0	0	NH-248A	SOH-NUH	33500	33600	Increasing	L1	2.45	2.98	2.72	42	25-01-2023	28.175479	77.070470	28.174578	77.070491
NA	0	0	NH-248A	SOH-NUH	33600	33700	Increasing	L1	2.05	2.32	2.19	38	25-01-2023	28.174578	77.070491	28.173673	77.070601
NA	0	0	NH-248A	SOH-NUH	33700	33800	Increasing	L1	1.96	2.64	2.30	25	25-01-2023	28.173673	77.070601	28.172770	77.070771
NA	0	0	NH-248A	SOH-NUH	33800	33900	Increasing	L1	22.70	24.89	23.80	20	25-01-2023	28.172770	77.070771	28.171878	77.070946
NA	0	0	NH-248A	SOH-NUH	33900	34000	Increasing	L1	2.12	2.48	2.30	21	25-01-2023	28.171878	77.070946	28.170993	77.071047
NA	0	0	NH-248A	SOH-NUH	34000	34100	Increasing	L1	2.13	2.62	2.38	29	25-01-2023	28.170993	77.071047	28.170091	77.071198
NA	0	0	NH-248A	SOH-NUH	34100	34200	Increasing	L1	1.81	2.29	2.05	28	25-01-2023	28.170091	77.071198	28.169187	77.071187
NA	0	0	NH-248A	SOH-NUH	34200	34300	Increasing	L1	1.95	2.10	2.03	32	25-01-2023	28.169187	77.071187	28.168287	77.071084
NA	0	0	NH-248A	SOH-NUH	34300	34400	Increasing	L1	1.75	2.19	1.97	36	25-01-2023	28.168287	77.071084	28.167393	77.071017
NA	0	0	NH-248A	SOH-NUH	34400	34500	Increasing	L1	1.74	2.10	1.92	38	25-01-2023	28.167393	77.071017	28.166485	77.070916
NA	0	0	NH-248A	SOH-NUH	34500	34600	Increasing	L1	1.61	2.17	1.89	39	25-01-2023	28.166485	77.070916	28.165600	77.070815
NA	0	0	NH-248A	SOH-NUH	34600	34700	Increasing	L1	2.26	2.57	2.42	42	25-01-2023	28.165600	77.070815	28.164699	77.070708
NA	0	0	NH-248A	SOH-NUH	34700	34800	Increasing	L1	1.60	1.90	1.75	41	25-01-2023	28.164699	77.070708	28.163794	77.070602
NA	0	0	NH-248A	SOH-NUH	34800	34900	Increasing	L1	1.76	1.83	1.80	42	25-01-2023	28.163794	77.070602	28.162884	77.070501
NA	0	0	NH-248A	SOH-NUH	34900	35000	Increasing	L1	1.90	2.42	2.16	44	25-01-2023	28.162884	77.070501	28.162000	77.070391
NA	0	0	NH-248A	SOH-NUH	35000	35100	Increasing	L1	2.27	2.80	2.54	43	25-01-2023	28.162000	77.070391	28.161105	77.070267
NA	0	0	NH-248A	SOH-NUH	35100	35200	Increasing	L1	1.21	1.34	1.28	43	25-01-2023	28.161105	77.070267	28.160206	77.070166
NA	0	0	NH-248A	SOH-NUH	35200	35300	Increasing	L1	1.31	1.61	1.46	45	25-01-2023	28.160206	77.070166	28.159299	77.070063

NA	0	0	NH-248A	SOH-NUH	35300	35400	Increasing	L1	1.24	1.76	1.50	45	25-01-2023	28.159299	77.070063	28.158389	77.069961
NA	0	0	NH-248A	SOH-NUH	35400	35500	Increasing	L1	1.42	1.62	1.52	46	25-01-2023	28.158389	77.069961	28.157495	77.069865
NA	0	0	NH-248A	SOH-NUH	35500	35600	Increasing	L1	1.50	1.66	1.58	47	25-01-2023	28.157495	77.069865	28.156607	77.069810
NA	0	0	NH-248A	SOH-NUH	35600	35700	Increasing	L1	1.38	1.97	1.68	46	25-01-2023	28.156607	77.069810	28.155687	77.069771
NA	0	0	NH-248A	SOH-NUH	35700	35800	Increasing	L1	1.37	1.64	1.51	45	25-01-2023	28.155687	77.069771	28.154782	77.069738
NA	0	0	NH-248A	SOH-NUH	35800	35900	Increasing	L1	1.32	1.38	1.35	45	25-01-2023	28.154782	77.069738	28.153881	77.069699
NA	0	0	NH-248A	SOH-NUH	35900	36000	Increasing	L1	1.24	1.57	1.41	46	25-01-2023	28.153881	77.069699	28.152981	77.069633
NA	0	0	NH-248A	SOH-NUH	36000	36100	Increasing	L1	1.14	1.39	1.27	48	25-01-2023	28.152981	77.069633	28.152075	77.069567
NA	0	0	NH-248A	SOH-NUH	36100	36200	Increasing	L1	1.43	1.94	1.69	50	25-01-2023	28.152075	77.069567	28.151174	77.069495
NA	0	0	NH-248A	SOH-NUH	36200	36300	Increasing	L1	1.97	2.21	2.09	48	25-01-2023	28.151174	77.069495	28.150282	77.069398
NA	0	0	NH-248A	SOH-NUH	36300	36400	Increasing	L1	1.14	1.57	1.36	47	25-01-2023	28.150282	77.069398	28.149366	77.069296
NA	0	0	NH-248A	SOH-NUH	36400	36500	Increasing	L1	1.32	2.06	1.69	47	25-01-2023	28.149366	77.069296	28.148475	77.069197
NA	0	0	NH-248A	SOH-NUH	36500	36600	Increasing	L1	1.40	1.42	1.41	47	25-01-2023	28.148475	77.069197	28.147584	77.069097
NA	0	0	NH-248A	SOH-NUH	36600	36700	Increasing	L1	1.60	2.00	1.80	48	25-01-2023	28.147584	77.069097	28.146678	77.068995
NA	0	0	NH-248A	SOH-NUH	36700	36800	Increasing	L1	1.21	1.31	1.26	51	25-01-2023	28.146678	77.068995	28.145791	77.068893
NA	0	0	NH-248A	SOH-NUH	36800	36900	Increasing	L1	1.82	1.78	1.80	51	25-01-2023	28.145791	77.068893	28.144878	77.068789
NA	0	0	NH-248A	SOH-NUH	36900	37000	Increasing	L1	1.28	1.79	1.54	49	25-01-2023	28.144878	77.068789	28.143976	77.068687
NA	0	0	NH-248A	SOH-NUH	37000	37100	Increasing	L1	1.18	1.57	1.38	49	25-01-2023	28.143976	77.068687	28.143075	77.068585
NA	0	0	NH-248A	SOH-NUH	37100	37200	Increasing	L1	1.70	2.13	1.92	49	25-01-2023	28.143075	77.068585	28.142175	77.068478
NA	0	0	NH-248A	SOH-NUH	37200	37300	Increasing	L1	1.17	2.02	1.60	46	25-01-2023	28.142175	77.068478	28.141279	77.068332
NA	0	0	NH-248A	SOH-NUH	37300	37400	Increasing	L1	1.49	2.10	1.80	45	25-01-2023	28.141279	77.068332	28.140404	77.068163
NA	0	0	NH-248A	SOH-NUH	37400	37500	Increasing	L1	1.48	1.91	1.70	45	25-01-2023	28.140404	77.068163	28.139494	77.067984
NA	0	0	NH-248A	SOH-NUH	37500	37600	Increasing	L1	0.90	1.48	1.19	34	25-01-2023	28.139494	77.067984	28.138608	77.067809
NA	0	0	NH-248A	SOH-NUH	37600	37700	Increasing	L1	6.50	7.12	6.81	20	25-01-2023	28.138608	77.067809	28.137718	77.067629
NA	0	0	NH-248A	SOH-NUH	37700	37800	Increasing	L1	2.03	2.55	2.29	35	25-01-2023	28.137718	77.067629	28.136836	77.067446
NA	0	0	NH-248A	SOH-NUH	37800	37900	Increasing	L1	2.90	3.38	3.14	37	25-01-2023	28.136836	77.067446	28.136027	77.067005
NA	0	0	NH-248A	SOH-NUH	37900	38000	Increasing	L1	2.64	3.81	3.23	39	25-01-2023	28.136027	77.067005	28.135294	77.066394
NA	0	0	NH-248A	SOH-NUH	38000	38100	Increasing	L1	10.02	9.05	9.54	21	25-01-2023	28.135294	77.066394	28.134459	77.065990
NA	0	0	NH-248A	SOH-NUH	38100	38200	Increasing	L1	2.53	3.49	3.01	30	25-01-2023	28.134459	77.065990	28.133604	77.065728

NA	0	0	NH-248A	SOH-NUH	38200	38300	Increasing	L1	1.69	2.34	2.02	43	25-01-2023	28.133604	77.065728	28.132679	77.065664
NA	0	0	NH-248A	SOH-NUH	38300	38400	Increasing	L1	4.34	4.54	4.44	24	25-01-2023	28.132679	77.065664	28.131779	77.065661
NA	0	0	NH-248A	SOH-NUH	38400	38500	Increasing	L1	2.39	3.05	2.72	34	25-01-2023	28.131779	77.065661	28.130877	77.065634
NA	0	0	NH-248A	SOH-NUH	38500	38600	Increasing	L1	7.32	9.22	8.27	20	25-01-2023	28.130877	77.065634	28.130111	77.065145
NA	0	0	NH-248A	SOH-NUH	38600	38700	Increasing	L1	2.32	3.05	2.69	37	25-01-2023	28.130111	77.065145	28.129526	77.064360
NA	0	0	NH-248A	SOH-NUH	38700	38800	Increasing	L1	2.00	2.37	2.19	42	25-01-2023	28.129526	77.064360	28.128952	77.063588
NA	0	0	NH-248A	SOH-NUH	38800	38900	Increasing	L1	2.53	3.15	2.84	45	25-01-2023	28.128952	77.063588	28.128393	77.062782
NA	0	0	NH-248A	SOH-NUH	38900	39000	Increasing	L1	1.64	2.34	1.99	50	25-01-2023	28.128393	77.062782	28.127953	77.061890
NA	0	0	NH-248A	SOH-NUH	39000	39100	Increasing	L1	1.36	1.74	1.55	52	25-01-2023	28.127953	77.061890	28.127567	77.060955
NA	0	0	NH-248A	SOH-NUH	39100	39200	Increasing	L1	1.35	2.11	1.73	52	25-01-2023	28.127567	77.060955	28.127199	77.060039
NA	0	0	NH-248A	SOH-NUH	39200	39300	Increasing	L1	1.63	2.25	1.94	52	25-01-2023	28.127199	77.060039	28.126952	77.059054
NA	0	0	NH-248A	SOH-NUH	39300	39400	Increasing	L1	1.37	2.48	1.93	52	25-01-2023	28.126952	77.059054	28.126856	77.058030
NA	0	0	NH-248A	SOH-NUH	39400	39500	Increasing	L1	1.28	2.00	1.64	52	25-01-2023	28.126856	77.058030	28.126742	77.057037
NA	0	0	NH-248A	SOH-NUH	39500	39600	Increasing	L1	1.49	1.70	1.60	52	25-01-2023	28.126742	77.057037	28.126406	77.056089
NA	0	0	NH-248A	SOH-NUH	39600	39700	Increasing	L1	1.14	1.52	1.33	51	25-01-2023	28.126406	77.056089	28.125977	77.055193
NA	0	0	NH-248A	SOH-NUH	39700	39800	Increasing	L1	1.32	1.91	1.62	52	25-01-2023	28.125977	77.055193	28.125504	77.054321
NA	0	0	NH-248A	SOH-NUH	39800	39900	Increasing	L1	1.27	1.55	1.41	52	25-01-2023	28.125504	77.054321	28.124912	77.053540
NA	0	0	NH-248A	SOH-NUH	39900	40000	Increasing	L1	1.55	2.13	1.84	52	25-01-2023	28.124912	77.053540	28.124345	77.052762
NA	0	0	NH-248A	SOH-NUH	40000	40100	Increasing	L1	3.23	3.94	3.59	52	25-01-2023	28.124345	77.052762	28.123799	77.051936
NA	0	0	NH-248A	SOH-NUH	40100	40200	Increasing	L1	1.33	1.99	1.66	50	25-01-2023	28.123799	77.051936	28.123266	77.051101
NA	0	0	NH-248A	SOH-NUH	40200	40300	Increasing	L1	1.26	1.88	1.57	49	25-01-2023	28.123266	77.051101	28.122827	77.050224
NA	0	0	NH-248A	SOH-NUH	40300	40400	Increasing	L1	1.44	1.59	1.52	51	25-01-2023	28.122827	77.050224	28.122481	77.049286
NA	0	0	NH-248A	SOH-NUH	40400	40500	Increasing	L1	1.42	1.75	1.59	53	25-01-2023	28.122481	77.049286	28.122143	77.048348
NA	0	0	NH-248A	SOH-NUH	40500	40600	Increasing	L1	1.57	1.58	1.58	53	25-01-2023	28.122143	77.048348	28.121804	77.047408
NA	0	0	NH-248A	SOH-NUH	40600	40700	Increasing	L1	1.88	2.29	2.09	52	25-01-2023	28.121804	77.047408	28.121465	77.046448
NA	0	0	NH-248A	SOH-NUH	40700	40800	Increasing	L1	1.62	2.21	1.92	51	25-01-2023	28.121465	77.046448	28.121200	77.045456
NA	0	0	NH-248A	SOH-NUH	40800	40900	Increasing	L1	1.93	2.34	2.14	50	25-01-2023	28.121200	77.045456	28.121050	77.044456
NA	0	0	NH-248A	SOH-NUH	40900	41000	Increasing	L1	1.54	2.64	2.09	49	25-01-2023	28.121050	77.044456	28.121056	77.043447
NA	0	0	NH-248A	SOH-NUH	41000	41100	Increasing	L1	1.92	2.72	2.32	49	25-01-2023	28.121056	77.043447	28.121090	77.042411

NA	0	0	NH-248A	SOH-NUH	41100	41200	Increasing	L1	1.25	2.15	1.70	49	25-01-2023	28.121090	77.042411	28.121062	77.041407
NA	0	0	NH-248A	SOH-NUH	41200	41300	Increasing	L1	1.87	2.20	2.04	49	25-01-2023	28.121062	77.041407	28.120940	77.040383
NA	0	0	NH-248A	SOH-NUH	41300	41400	Increasing	L1	1.83	2.31	2.07	49	25-01-2023	28.120940	77.040383	28.120774	77.039383
NA	0	0	NH-248A	SOH-NUH	41400	41500	Increasing	L1	1.56	1.79	1.68	48	25-01-2023	28.120774	77.039383	28.120486	77.038426
NA	0	0	NH-248A	SOH-NUH	41500	41600	Increasing	L1	3.01	3.30	3.16	28	25-01-2023	28.120486	77.038426	28.120087	77.037504
NA	0	0	NH-248A	SOH-NUH	41600	41700	Increasing	L1	1.34	1.86	1.60	34	25-01-2023	28.120087	77.037504	28.119675	77.036607
NA	0	0	NH-248A	SOH-NUH	41700	41800	Increasing	L1	1.26	1.60	1.43	39	25-01-2023	28.119675	77.036607	28.119296	77.035681
NA	0	0	NH-248A	SOH-NUH	41800	41900	Increasing	L1	2.24	2.53	2.39	31	25-01-2023	28.119296	77.035681	28.118917	77.034740
NA	0	0	NH-248A	SOH-NUH	41900	42000	Increasing	L1	1.42	2.07	1.75	40	25-01-2023	28.118917	77.034740	28.118550	77.033812
NA	0	0	NH-248A	SOH-NUH	42000	42100	Increasing	L1	4.12	4.75	4.44	26	25-01-2023	28.118550	77.033812	28.118304	77.032843
NA	0	0	NH-248A	SOH-NUH	42100	42200	Increasing	L1	2.05	2.47	2.26	35	25-01-2023	28.118304	77.032843	28.118117	77.031845
NA	0	0	NH-248A	SOH-NUH	42200	42300	Increasing	L1	2.35	3.26	2.81	36	25-01-2023	28.118117	77.031845	28.117804	77.030889
NA	0	0	NH-248A	SOH-NUH	42300	42400	Increasing	L1	4.76	3.48	4.12	26	25-01-2023	28.117804	77.030889	28.117360	77.029987
NA	0	0	NH-248A	SOH-NUH	42400	42500	Increasing	L1	2.80	2.55	2.68	30	25-01-2023	28.117360	77.029987	28.116907	77.029124
NA	0	0	NH-248A	SOH-NUH	42500	42600	Increasing	L1	1.16	1.73	1.45	40	25-01-2023	28.116907	77.029124	28.116439	77.028242
NA	0	0	NH-248A	SOH-NUH	42600	42700	Increasing	L1	1.24	1.89	1.57	45	25-01-2023	28.116439	77.028242	28.115867	77.027458
NA	0	0	NH-248A	SOH-NUH	42700	42800	Increasing	L1	1.81	2.29	2.05	47	25-01-2023	28.115867	77.027458	28.115143	77.026852
NA	0	0	NH-248A	SOH-NUH	42800	42900	Increasing	L1	1.64	2.50	2.07	44	25-01-2023	28.115143	77.026852	28.114432	77.026232
NA	0	0	NH-248A	SOH-NUH	42900	43000	Increasing	L1	1.43	2.06	1.75	41	25-01-2023	28.114432	77.026232	28.113752	77.025532
NA	0	0	NH-248A	SOH-NUH	43000	43100	Increasing	L1	1.49	2.26	1.88	38	25-01-2023	28.113752	77.025532	28.113100	77.024829
NA	0	0	NH-248A	SOH-NUH	43100	43200	Increasing	L1	1.49	2.25	1.87	35	25-01-2023	28.113100	77.024829	28.112572	77.024005
NA	0	0	NH-248A	SOH-NUH	43200	43300	Increasing	L1	1.52	2.11	1.82	35	25-01-2023	28.112572	77.024005	28.112259	77.023046
NA	0	0	NH-248A	SOH-NUH	43300	43400	Increasing	L1	1.27	1.85	1.56	36	25-01-2023	28.112259	77.023046	28.112019	77.022067
NA	0	0	NH-248A	SOH-NUH	43400	43500	Increasing	L1	1.56	1.95	1.76	30	25-01-2023	28.112019	77.022067	28.111771	77.021079
NA	0	0	NH-248A	SOH-NUH	43500	43600	Increasing	L1	4.42	4.63	4.53	21	25-01-2023	28.111771	77.021079	28.111509	77.020110
NA	0	0	NH-248A	SOH-NUH	43600	43700	Increasing	L1	2.13	3.00	2.57	39	25-01-2023	28.111509	77.020110	28.111207	77.019166
NA	0	0	NH-248A	SOH-NUH	43700	43800	Increasing	L1	1.66	2.11	1.89	45	25-01-2023	28.111207	77.019166	28.110745	77.018282
NA	0	0	NH-248A	SOH-NUH	43800	43900	Increasing	L1	1.45	2.13	1.79	44	25-01-2023	28.110745	77.018282	28.110271	77.017403
NA	0	0	NH-248A	SOH-NUH	43900	44000	Increasing	L1	1.18	1.67	1.43	43	25-01-2023	28.110271	77.017403	28.109805	77.016543

NA	0	0	NH-248A	SOH-NUH	44000	44100	Increasing	L1	1.53	2.11	1.82	46	25-01-2023	28.109805	77.016543	28.109341	77.015679
NA	0	0	NH-248A	SOH-NUH	44100	44200	Increasing	L1	0.86	1.42	1.14	46	25-01-2023	28.109341	77.015679	28.108866	77.014792
NA	0	0	NH-248A	SOH-NUH	44200	44300	Increasing	L1	0.90	1.69	1.30	46	25-01-2023	28.108866	77.014792	28.108400	77.013930
NA	0	0	NH-248A	SOH-NUH	44300	44400	Increasing	L1	1.51	2.50	2.01	43	25-01-2023	28.108400	77.013930	28.107906	77.013079
NA	0	0	NH-248A	SOH-NUH	44400	44500	Increasing	L1	7.58	7.80	7.69	27	25-01-2023	28.107906	77.013079	28.107372	77.012233
NA	0	0	NH-248A	SOH-NUH	44500	44600	Increasing	L1	2.20	2.43	2.32	32	25-01-2023	28.107372	77.012233	28.106803	77.011445
NA	0	0	NH-248A	SOH-NUH	44600	44700	Increasing	L1	1.77	1.67	1.72	40	25-01-2023	28.106803	77.011445	28.106161	77.010721
NA	0	0	NH-248A	SOH-NUH	44700	44800	Increasing	L1	1.64	1.76	1.70	37	25-01-2023	28.106161	77.010721	28.105457	77.010093
NA	0	0	NH-248A	SOH-NUH	44800	44900	Increasing	L1	8.41	8.75	8.58	20	25-01-2023	28.105457	77.010093	28.104685	77.009571
NA	0	0	NH-248A	SOH-NUH	44900	45000	Increasing	L1	3.30	3.79	3.55	26	25-01-2023	28.104685	77.009571	28.103874	77.009124
NA	0	0	NH-248A	SOH-NUH	45000	45100	Increasing	L1	2.19	2.38	2.29	34	25-01-2023	28.103874	77.009124	28.103050	77.008728
NA	0	0	NH-248A	SOH-NUH	45100	45200	Increasing	L1	1.53	1.60	1.57	40	25-01-2023	28.103050	77.008728	28.102178	77.008455
NA	0	0	NH-248A	SOH-NUH	45200	45300	Increasing	L1	2.27	2.65	2.46	37	25-01-2023	28.102178	77.008455	28.101280	77.008289
NA	0	0	NH-248A	SOH-NUH	45300	45400	Increasing	L1	2.14	2.18	2.16	25	25-01-2023	28.101280	77.008289	28.100384	77.008157
NA	0	0	NH-248A	SOH-NUH	45400	45500	Increasing	L1	1.93	2.19	2.06	25	25-01-2023	28.100384	77.008157	28.099482	77.008024
NA	0	0	NH-248A	SOH-NUH	45500	45600	Increasing	L1	1.74	1.95	1.85	31	25-01-2023	28.099482	77.008024	28.098587	77.007893
NA	0	0	NH-248A	SOH-NUH	45600	45700	Increasing	L1	2.01	2.08	2.05	32	25-01-2023	28.098587	77.007893	28.097687	77.007762
NA	0	0	NH-248A	SOH-NUH	45700	45800	Increasing	L1	2.16	2.14	2.15	33	25-01-2023	28.097687	77.007762	28.096798	77.007630
NA	0	0	NH-248A	SOH-NUH	45800	45900	Increasing	L1	1.73	1.49	1.61	33	25-01-2023	28.096798	77.007630	28.095903	77.007518
NA	0	0	NH-248A	SOH-NUH	45900	46000	Increasing	L1	1.73	2.61	2.17	34	25-01-2023	28.095903	77.007518	28.094999	77.007393
NA	0	0	NH-248A	SOH-NUH	46000	46100	Increasing	L1	1.93	1.97	1.95	45	25-01-2023	28.094999	77.007393	28.094106	77.007248
NA	0	0	NH-248A	SOH-NUH	46100	46200	Increasing	L1	1.83	1.74	1.79	46	25-01-2023	28.094106	77.007248	28.093219	77.007113
NA	0	0	NH-248A	SOH-NUH	46200	46300	Increasing	L1	3.27	2.13	2.70	42	25-01-2023	28.093219	77.007113	28.092320	77.006981
NA	0	0	NH-248A	SOH-NUH	46300	46400	Increasing	L1	1.28	1.34	1.31	28	25-01-2023	28.092320	77.006981	28.091412	77.006850
NA	0	0	NH-248A	SOH-NUH	46400	46500	Increasing	L1	2.19	1.59	1.89	20	25-01-2023	28.091412	77.006850	28.090509	77.006730
NA	0	0	NH-248A	SOH-NUH	46500	46600	Increasing	L1	1.84	1.41	1.63	31	25-01-2023	28.090509	77.006730	28.089609	77.006727
NA	0	0	NH-248A	SOH-NUH	46600	46700	Increasing	L1	1.46	1.67	1.57	31	25-01-2023	28.089609	77.006727	28.088708	77.006842
NA	0	0	NH-248A	SOH-NUH	46700	46800	Increasing	L1	1.82	1.67	1.75	23	25-01-2023	28.088708	77.006842	28.087824	77.007059
NA	0	0	NH-248A	SOH-NUH	46800	46900	Increasing	L1	6.86	7.22	7.04	20	25-01-2023	28.087824	77.007059	28.086955	77.007338

NA	0	0	NH-248A	SOH-NUH	46900	46950	Increasing	L1	3.85	4.60	4.23	26	25-01-2023	28.086955	77.007338	28.086527	77.007505
NA	0	0	NH-248A	SOH-NUH	24500	24600	Increasing	L2	3.91	3.02	3.47	21	25-01-2023	28.251659	77.069621	28.250782	77.069819
NA	0	0	NH-248A	SOH-NUH	24600	24700	Increasing	L2	2.69	2.11	2.40	33	25-01-2023	28.250782	77.069819	28.249955	77.070224
NA	0	0	NH-248A	SOH-NUH	24700	24800	Increasing	L2	7.62	7.89	7.76	20	25-01-2023	28.249955	77.070224	28.249199	77.070805
NA	0	0	NH-248A	SOH-NUH	24800	24900	Increasing	L2	3.00	2.92	2.96	24	25-01-2023	28.249199	77.070805	28.248450	77.071397
NA	0	0	NH-248A	SOH-NUH	24900	25000	Increasing	L2	2.27	2.19	2.23	25	25-01-2023	28.248450	77.071397	28.247709	77.071970
NA	0	0	NH-248A	SOH-NUH	25000	25100	Increasing	L2	2.34	2.05	2.20	23	25-01-2023	28.247709	77.071970	28.246874	77.072385
NA	0	0	NH-248A	SOH-NUH	25100	25200	Increasing	L2	2.55	2.33	2.44	23	25-01-2023	28.246874	77.072385	28.245973	77.072487
NA	0	0	NH-248A	SOH-NUH	25200	25300	Increasing	L2	2.45	2.85	2.65	21	25-01-2023	28.245973	77.072487	28.245086	77.072365
NA	0	0	NH-248A	SOH-NUH	25300	25400	Increasing	L2	2.49	2.42	2.46	31	25-01-2023	28.245086	77.072365	28.244226	77.072036
NA	0	0	NH-248A	SOH-NUH	25400	25500	Increasing	L2	3.70	3.46	3.58	33	25-01-2023	28.244226	77.072036	28.243378	77.071685
NA	0	0	NH-248A	SOH-NUH	25500	25600	Increasing	L2	3.77	4.15	3.96	22	25-01-2023	28.243378	77.071685	28.242515	77.071331
NA	0	0	NH-248A	SOH-NUH	25600	25700	Increasing	L2	7.59	8.39	7.99	20	25-01-2023	28.242515	77.071331	28.241460	77.070879
NA	0	0	NH-248A	SOH-NUH	25700	25800	Increasing	L2	2.12	1.76	1.94	33	25-01-2023	28.241460	77.070879	28.240625	77.070538
NA	0	0	NH-248A	SOH-NUH	25800	25900	Increasing	L2	2.03	1.68	1.86	33	25-01-2023	28.240625	77.070538	28.239762	77.070172
NA	0	0	NH-248A	SOH-NUH	25900	26000	Increasing	L2	6.26	4.96	5.61	24	25-01-2023	28.239762	77.070172	28.238919	77.069820
NA	0	0	NH-248A	SOH-NUH	26000	26100	Increasing	L2	1.87	1.95	1.91	38	25-01-2023	28.238919	77.069820	28.238070	77.069467
NA	0	0	NH-248A	SOH-NUH	26100	26200	Increasing	L2	2.05	1.84	1.95	39	25-01-2023	28.238070	77.069467	28.237212	77.069099
NA	0	0	NH-248A	SOH-NUH	26200	26300	Increasing	L2	2.54	1.97	2.26	36	25-01-2023	28.237212	77.069099	28.236360	77.068752
NA	0	0	NH-248A	SOH-NUH	26300	26400	Increasing	L2	1.97	1.96	1.97	44	25-01-2023	28.236360	77.068752	28.235507	77.068397
NA	0	0	NH-248A	SOH-NUH	26400	26500	Increasing	L2	1.79	1.50	1.65	43	25-01-2023	28.235507	77.068397	28.234666	77.068050
NA	0	0	NH-248A	SOH-NUH	26500	26600	Increasing	L2	1.98	1.59	1.79	38	25-01-2023	28.234666	77.068050	28.233812	77.067695
NA	0	0	NH-248A	SOH-NUH	26600	26700	Increasing	L2	5.15	4.82	4.99	24	25-01-2023	28.233812	77.067695	28.232969	77.067342
NA	0	0	NH-248A	SOH-NUH	26700	26800	Increasing	L2	2.63	2.15	2.39	36	25-01-2023	28.232969	77.067342	28.232101	77.066993
NA	0	0	NH-248A	SOH-NUH	26800	26900	Increasing	L2	3.38	3.19	3.29	31	25-01-2023	28.232101	77.066993	28.231252	77.066639
NA	0	0	NH-248A	SOH-NUH	26900	27000	Increasing	L2	2.57	2.60	2.59	24	25-01-2023	28.231252	77.066639	28.230406	77.066291
NA	0	0	NH-248A	SOH-NUH	27000	27100	Increasing	L2	4.60	4.56	4.58	27	25-01-2023	28.230406	77.066291	28.229546	77.065948
NA	0	0	NH-248A	SOH-NUH	27100	27200	Increasing	L2	27.62	22.73	25.18	20	25-01-2023	28.229546	77.065948	28.228701	77.065586
NA	0	0	NH-248A	SOH-NUH	27200	27300	Increasing	L2	5.12	3.66	4.39	30	25-01-2023	28.228701	77.065586	28.227850	77.065237

NA	0	0	NH-248A	SOH-NUH	27300	27400	Increasing	L2	2.61	1.85	2.23	40	25-01-2023	28.227850	77.065237	28.227025	77.064830
NA	0	0	NH-248A	SOH-NUH	27400	27500	Increasing	L2	2.02	1.70	1.86	40	25-01-2023	28.227025	77.064830	28.226228	77.064319
NA	0	0	NH-248A	SOH-NUH	27500	27600	Increasing	L2	6.84	6.80	6.82	27	25-01-2023	28.226228	77.064319	28.225456	77.063816
NA	0	0	NH-248A	SOH-NUH	27600	27700	Increasing	L2	4.38	5.31	4.85	29	25-01-2023	28.225456	77.063816	28.224606	77.063419
NA	0	0	NH-248A	SOH-NUH	27700	27800	Increasing	L2	4.53	3.99	4.26	30	25-01-2023	28.224606	77.063419	28.223773	77.063045
NA	0	0	NH-248A	SOH-NUH	27800	27900	Increasing	L2	4.03	3.85	3.94	29	25-01-2023	28.223773	77.063045	28.222920	77.062669
NA	0	0	NH-248A	SOH-NUH	27900	28000	Increasing	L2	1.54	1.98	1.76	37	25-01-2023	28.222920	77.062669	28.222071	77.062300
NA	0	0	NH-248A	SOH-NUH	28000	28100	Increasing	L2	1.95	1.88	1.92	48	25-01-2023	28.222071	77.062300	28.221232	77.061930
NA	0	0	NH-248A	SOH-NUH	28100	28200	Increasing	L2	2.74	2.59	2.67	49	25-01-2023	28.221232	77.061930	28.220399	77.061559
NA	0	0	NH-248A	SOH-NUH	28200	28300	Increasing	L2	1.99	1.76	1.88	55	25-01-2023	28.220399	77.061559	28.219557	77.061181
NA	0	0	NH-248A	SOH-NUH	28300	28400	Increasing	L2	2.15	1.83	1.99	48	25-01-2023	28.219557	77.061181	28.218700	77.060796
NA	0	0	NH-248A	SOH-NUH	28400	28500	Increasing	L2	7.45	6.16	6.81	26	25-01-2023	28.218700	77.060796	28.217820	77.060744
NA	0	0	NH-248A	SOH-NUH	28500	28600	Increasing	L2	2.10	1.90	2.00	44	25-01-2023	28.217820	77.060744	28.216949	77.061027
NA	0	0	NH-248A	SOH-NUH	28600	28700	Increasing	L2	1.60	1.59	1.60	55	25-01-2023	28.216949	77.061027	28.216097	77.061309
NA	0	0	NH-248A	SOH-NUH	28700	28800	Increasing	L2	2.05	1.72	1.89	57	25-01-2023	28.216097	77.061309	28.215209	77.061604
NA	0	0	NH-248A	SOH-NUH	28800	28900	Increasing	L2	1.59	1.53	1.56	62	25-01-2023	28.215209	77.061604	28.214343	77.061899
NA	0	0	NH-248A	SOH-NUH	28900	29000	Increasing	L2	8.56	7.67	8.12	37	25-01-2023	28.214343	77.061899	28.213469	77.062194
NA	0	0	NH-248A	SOH-NUH	29000	29100	Increasing	L2	3.19	2.76	2.98	38	25-01-2023	28.213469	77.062194	28.212610	77.062486
NA	0	0	NH-248A	SOH-NUH	29100	29200	Increasing	L2	1.63	1.41	1.52	46	25-01-2023	28.212610	77.062486	28.211736	77.062781
NA	0	0	NH-248A	SOH-NUH	29200	29300	Increasing	L2	1.82	1.75	1.79	52	25-01-2023	28.211736	77.062781	28.210880	77.063074
NA	0	0	NH-248A	SOH-NUH	29300	29400	Increasing	L2	1.61	1.64	1.63	56	25-01-2023	28.210880	77.063074	28.210013	77.063360
NA	0	0	NH-248A	SOH-NUH	29400	29500	Increasing	L2	2.31	2.26	2.29	59	25-01-2023	28.210013	77.063360	28.209140	77.063658
NA	0	0	NH-248A	SOH-NUH	29500	29600	Increasing	L2	1.72	1.37	1.55	60	25-01-2023	28.209140	77.063658	28.208264	77.063950
NA	0	0	NH-248A	SOH-NUH	29600	29700	Increasing	L2	3.60	2.98	3.29	60	25-01-2023	28.208264	77.063950	28.207397	77.064233
NA	0	0	NH-248A	SOH-NUH	29700	29800	Increasing	L2	1.78	1.74	1.76	61	25-01-2023	28.207397	77.064233	28.206522	77.064527
NA	0	0	NH-248A	SOH-NUH	29800	29900	Increasing	L2	2.13	1.67	1.90	61	25-01-2023	28.206522	77.064527	28.205664	77.064805
NA	0	0	NH-248A	SOH-NUH	29900	30000	Increasing	L2	1.81	1.68	1.75	56	25-01-2023	28.205664	77.064805	28.204785	77.065098
NA	0	0	NH-248A	SOH-NUH	30000	30100	Increasing	L2	5.59	3.74	4.67	27	25-01-2023	28.204785	77.065098	28.203906	77.065377
NA	0	0	NH-248A	SOH-NUH	30100	30200	Increasing	L2	1.85	1.96	1.91	41	25-01-2023	28.203906	77.065377	28.203036	77.065683

NA	0	0	NH-248A	SOH-NUH	30200	30300	Increasing	L2	2.05	1.81	1.93	48	25-01-2023	28.203036	77.065683	28.202180	77.065964
NA	0	0	NH-248A	SOH-NUH	30300	30400	Increasing	L2	3.53	3.24	3.39	45	25-01-2023	28.202180	77.065964	28.201309	77.066257
NA	0	0	NH-248A	SOH-NUH	30400	30500	Increasing	L2	2.00	2.17	2.09	42	25-01-2023	28.201309	77.066257	28.200446	77.066541
NA	0	0	NH-248A	SOH-NUH	30500	30600	Increasing	L2	1.33	1.74	1.54	50	25-01-2023	28.200446	77.066541	28.199576	77.066825
NA	0	0	NH-248A	SOH-NUH	30600	30700	Increasing	L2	1.53	1.58	1.56	53	25-01-2023	28.199576	77.066825	28.198701	77.067108
NA	0	0	NH-248A	SOH-NUH	30700	30800	Increasing	L2	1.84	1.72	1.78	46	25-01-2023	28.198701	77.067108	28.197824	77.067378
NA	0	0	NH-248A	SOH-NUH	30800	30900	Increasing	L2	1.79	1.71	1.75	42	25-01-2023	28.197824	77.067378	28.196965	77.067730
NA	0	0	NH-248A	SOH-NUH	30900	31000	Increasing	L2	1.99	3.82	2.91	42	25-01-2023	28.196965	77.067730	28.196180	77.068259
NA	0	0	NH-248A	SOH-NUH	31000	31100	Increasing	L2	6.75	7.34	7.05	34	25-01-2023	28.196180	77.068259	28.195409	77.068803
NA	0	0	NH-248A	SOH-NUH	31100	31200	Increasing	L2	2.89	2.14	2.52	24	25-01-2023	28.195409	77.068803	28.194636	77.069329
NA	0	0	NH-248A	SOH-NUH	31200	31300	Increasing	L2	2.54	1.89	2.22	24	25-01-2023	28.194636	77.069329	28.193876	77.069876
NA	0	0	NH-248A	SOH-NUH	31300	31400	Increasing	L2	1.60	2.26	1.93	40	25-01-2023	28.193876	77.069876	28.193117	77.070413
NA	0	0	NH-248A	SOH-NUH	31400	31500	Increasing	L2	1.36	1.32	1.34	49	25-01-2023	28.193117	77.070413	28.192350	77.070951
NA	0	0	NH-248A	SOH-NUH	31500	31600	Increasing	L2	1.79	1.52	1.66	52	25-01-2023	28.192350	77.070951	28.191570	77.071508
NA	0	0	NH-248A	SOH-NUH	31600	31700	Increasing	L2	1.28	1.32	1.30	51	25-01-2023	28.191570	77.071508	28.190807	77.072051
NA	0	0	NH-248A	SOH-NUH	31700	31800	Increasing	L2	2.17	2.15	2.16	39	25-01-2023	28.190807	77.072051	28.190017	77.072573
NA	0	0	NH-248A	SOH-NUH	31800	31900	Increasing	L2	2.18	2.28	2.23	47	25-01-2023	28.190017	77.072573	28.189236	77.073046
NA	0	0	NH-248A	SOH-NUH	31900	32000	Increasing	L2	2.52	2.04	2.28	54	25-01-2023	28.189236	77.073046	28.188335	77.073231
NA	0	0	NH-248A	SOH-NUH	32000	32100	Increasing	L2	2.79	2.03	2.41	43	25-01-2023	28.188335	77.073231	28.187427	77.073130
NA	0	0	NH-248A	SOH-NUH	32100	32200	Increasing	L2	1.56	1.97	1.77	41	25-01-2023	28.187427	77.073130	28.186528	77.073010
NA	0	0	NH-248A	SOH-NUH	32200	32300	Increasing	L2	1.41	1.24	1.33	49	25-01-2023	28.186528	77.073010	28.185643	77.072887
NA	0	0	NH-248A	SOH-NUH	32300	32400	Increasing	L2	2.36	1.84	2.10	53	25-01-2023	28.185643	77.072887	28.184736	77.072751
NA	0	0	NH-248A	SOH-NUH	32400	32500	Increasing	L2	2.38	2.15	2.27	54	25-01-2023	28.184736	77.072751	28.183839	77.072621
NA	0	0	NH-248A	SOH-NUH	32500	32600	Increasing	L2	2.07	1.74	1.91	49	25-01-2023	28.183839	77.072621	28.182941	77.072490
NA	0	0	NH-248A	SOH-NUH	32600	32700	Increasing	L2	2.63	2.61	2.62	45	25-01-2023	28.182941	77.072490	28.182038	77.072345
NA	0	0	NH-248A	SOH-NUH	32700	32800	Increasing	L2	1.64	1.29	1.47	45	25-01-2023	28.182038	77.072345	28.181164	77.072101
NA	0	0	NH-248A	SOH-NUH	32800	32900	Increasing	L2	2.91	1.87	2.39	34	25-01-2023	28.181164	77.072101	28.180307	77.071736
NA	0	0	NH-248A	SOH-NUH	32900	33000	Increasing	L2	11.45	11.35	11.40	20	25-01-2023	28.180307	77.071736	28.179464	77.071354
NA	0	0	NH-248A	SOH-NUH	33000	33100	Increasing	L2	2.37	2.47	2.42	31	25-01-2023	28.179464	77.071354	28.178626	77.070983

NA	0	0	NH-248A	SOH-NUH	33100	33200	Increasing	L2	2.17	1.97	2.07	41	25-01-2023	28.178626	77.070983	28.177764	77.070660
NA	0	0	NH-248A	SOH-NUH	33200	33300	Increasing	L2	1.57	1.64	1.61	45	25-01-2023	28.177764	77.070660	28.176865	77.070586
NA	0	0	NH-248A	SOH-NUH	33300	33400	Increasing	L2	2.98	2.12	2.55	49	25-01-2023	28.176865	77.070586	28.175956	77.070538
NA	0	0	NH-248A	SOH-NUH	33400	33500	Increasing	L2	2.15	2.10	2.13	49	25-01-2023	28.175956	77.070538	28.175066	77.070507
NA	0	0	NH-248A	SOH-NUH	33500	33600	Increasing	L2	2.77	2.18	2.48	43	25-01-2023	28.175066	77.070507	28.174154	77.070574
NA	0	0	NH-248A	SOH-NUH	33600	33700	Increasing	L2	2.30	2.32	2.31	33	25-01-2023	28.174154	77.070574	28.173247	77.070706
NA	0	0	NH-248A	SOH-NUH	33700	33800	Increasing	L2	8.04	8.90	8.47	20	25-01-2023	28.173247	77.070706	28.172348	77.070859
NA	0	0	NH-248A	SOH-NUH	33800	33900	Increasing	L2	10.78	12.43	11.61	20	25-01-2023	28.172348	77.070859	28.171470	77.071048
NA	0	0	NH-248A	SOH-NUH	33900	34000	Increasing	L2	1.23	1.44	1.34	33	25-01-2023	28.171470	77.071048	28.170562	77.071164
NA	0	0	NH-248A	SOH-NUH	34000	34100	Increasing	L2	1.68	2.02	1.85	39	25-01-2023	28.170562	77.071164	28.169661	77.071267
NA	0	0	NH-248A	SOH-NUH	34100	34200	Increasing	L2	2.25	1.70	1.98	48	25-01-2023	28.169661	77.071267	28.168774	77.071186
NA	0	0	NH-248A	SOH-NUH	34200	34300	Increasing	L2	1.98	1.80	1.89	54	25-01-2023	28.168774	77.071186	28.167876	77.071090
NA	0	0	NH-248A	SOH-NUH	34300	34400	Increasing	L2	1.51	1.71	1.61	54	25-01-2023	28.167876	77.071090	28.166954	77.071017
NA	0	0	NH-248A	SOH-NUH	34400	34500	Increasing	L2	1.78	1.54	1.66	53	25-01-2023	28.166954	77.071017	28.166049	77.070916
NA	0	0	NH-248A	SOH-NUH	34500	34600	Increasing	L2	1.56	1.51	1.54	37	25-01-2023	28.166049	77.070916	28.165156	77.070814
NA	0	0	NH-248A	SOH-NUH	34600	34700	Increasing	L2	1.71	1.76	1.74	40	25-01-2023	28.165156	77.070814	28.164252	77.070706
NA	0	0	NH-248A	SOH-NUH	34700	34800	Increasing	L2	1.48	1.45	1.47	48	25-01-2023	28.164252	77.070706	28.163345	77.070602
NA	0	0	NH-248A	SOH-NUH	34800	34900	Increasing	L2	1.94	1.79	1.87	55	25-01-2023	28.163345	77.070602	28.162436	77.070498
NA	0	0	NH-248A	SOH-NUH	34900	35000	Increasing	L2	2.50	2.06	2.28	56	25-01-2023	28.162436	77.070498	28.161540	77.070372
NA	0	0	NH-248A	SOH-NUH	35000	35100	Increasing	L2	1.75	1.49	1.62	58	25-01-2023	28.161540	77.070372	28.160641	77.070262
NA	0	0	NH-248A	SOH-NUH	35100	35200	Increasing	L2	2.16	1.89	2.03	57	25-01-2023	28.160641	77.070262	28.159749	77.070161
NA	0	0	NH-248A	SOH-NUH	35200	35300	Increasing	L2	1.64	1.72	1.68	45	25-01-2023	28.159749	77.070161	28.158834	77.070066
NA	0	0	NH-248A	SOH-NUH	35300	35400	Increasing	L2	1.90	1.73	1.82	47	25-01-2023	28.158834	77.070066	28.157926	77.069961
NA	0	0	NH-248A	SOH-NUH	35400	35500	Increasing	L2	1.75	1.70	1.73	54	25-01-2023	28.157926	77.069961	28.157038	77.069878
NA	0	0	NH-248A	SOH-NUH	35500	35600	Increasing	L2	1.46	1.67	1.57	53	25-01-2023	28.157038	77.069878	28.156129	77.069839
NA	0	0	NH-248A	SOH-NUH	35600	35700	Increasing	L2	1.31	1.19	1.25	52	25-01-2023	28.156129	77.069839	28.155233	77.069804
NA	0	0	NH-248A	SOH-NUH	35700	35800	Increasing	L2	1.59	1.89	1.74	51	25-01-2023	28.155233	77.069804	28.154316	77.069761
NA	0	0	NH-248A	SOH-NUH	35800	35900	Increasing	L2	1.80	1.69	1.75	51	25-01-2023	28.154316	77.069761	28.153408	77.069720
NA	0	0	NH-248A	SOH-NUH	35900	36000	Increasing	L2	1.31	1.12	1.22	54	25-01-2023	28.153408	77.069720	28.152513	77.069651

NA	0	0	NH-248A	SOH-NUH	36000	36100	Increasing	L2	2.25	1.37	1.81	60	25-01-2023	28.152513	77.069651	28.151615	77.069574
NA	0	0	NH-248A	SOH-NUH	36100	36200	Increasing	L2	2.16	2.08	2.12	62	25-01-2023	28.151615	77.069574	28.150686	77.069494
NA	0	0	NH-248A	SOH-NUH	36200	36300	Increasing	L2	2.03	1.78	1.91	57	25-01-2023	28.150686	77.069494	28.149793	77.069396
NA	0	0	NH-248A	SOH-NUH	36300	36400	Increasing	L2	1.63	1.22	1.43	58	25-01-2023	28.149793	77.069396	28.148900	77.069294
NA	0	0	NH-248A	SOH-NUH	36400	36500	Increasing	L2	1.29	1.29	1.29	60	25-01-2023	28.148900	77.069294	28.148001	77.069193
NA	0	0	NH-248A	SOH-NUH	36500	36600	Increasing	L2	1.07	0.87	0.97	59	25-01-2023	28.148001	77.069193	28.147078	77.069078
NA	0	0	NH-248A	SOH-NUH	36600	36700	Increasing	L2	1.18	1.17	1.18	56	25-01-2023	28.147078	77.069078	28.146182	77.068991
NA	0	0	NH-248A	SOH-NUH	36700	36800	Increasing	L2	3.30	2.40	2.85	51	25-01-2023	28.146182	77.068991	28.145284	77.068883
NA	0	0	NH-248A	SOH-NUH	36800	36900	Increasing	L2	1.50	1.39	1.45	46	25-01-2023	28.145284	77.068883	28.144378	77.068787
NA	0	0	NH-248A	SOH-NUH	36900	37000	Increasing	L2	1.61	1.16	1.39	47	25-01-2023	28.144378	77.068787	28.143472	77.068688
NA	0	0	NH-248A	SOH-NUH	37000	37100	Increasing	L2	1.49	1.44	1.47	40	25-01-2023	28.143472	77.068688	28.142575	77.068566
NA	0	0	NH-248A	SOH-NUH	37100	37200	Increasing	L2	1.30	1.41	1.36	42	25-01-2023	28.142575	77.068566	28.141670	77.068459
NA	0	0	NH-248A	SOH-NUH	37200	37300	Increasing	L2	1.44	1.15	1.30	45	25-01-2023	28.141670	77.068459	28.140765	77.068290
NA	0	0	NH-248A	SOH-NUH	37300	37400	Increasing	L2	1.21	1.35	1.28	34	25-01-2023	28.140765	77.068290	28.139880	77.068093
NA	0	0	NH-248A	SOH-NUH	37400	37500	Increasing	L2	1.43	1.51	1.47	38	25-01-2023	28.139880	77.068093	28.138988	77.067932
NA	0	0	NH-248A	SOH-NUH	37500	37600	Increasing	L2	3.87	4.02	3.95	20	25-01-2023	28.138988	77.067932	28.138083	77.067754
NA	0	0	NH-248A	SOH-NUH	37600	37700	Increasing	L2	2.38	2.63	2.51	25	25-01-2023	28.138083	77.067754	28.137199	77.067574
NA	0	0	NH-248A	SOH-NUH	37700	37800	Increasing	L2	2.31	2.27	2.29	39	25-01-2023	28.137199	77.067574	28.136327	77.067290
NA	0	0	NH-248A	SOH-NUH	37800	37900	Increasing	L2	2.01	1.81	1.91	33	25-01-2023	28.136327	77.067290	28.135599	77.066683
NA	0	0	NH-248A	SOH-NUH	37900	38000	Increasing	L2	5.51	3.64	4.58	20	25-01-2023	28.135599	77.066683	28.134534	77.066068
NA	0	0	NH-248A	SOH-NUH	38000	38100	Increasing	L2	3.26	2.60	2.93	30	25-01-2023	28.134534	77.066068	28.133667	77.065798
NA	0	0	NH-248A	SOH-NUH	38100	38200	Increasing	L2	1.83	1.47	1.65	42	25-01-2023	28.133667	77.065798	28.132776	77.065711
NA	0	0	NH-248A	SOH-NUH	38200	38300	Increasing	L2	5.15	3.45	4.30	23	25-01-2023	28.132776	77.065711	28.131855	77.065711
NA	0	0	NH-248A	SOH-NUH	38300	38400	Increasing	L2	2.14	1.80	1.97	33	25-01-2023	28.131855	77.065711	28.130948	77.065696
NA	0	0	NH-248A	SOH-NUH	38400	38500	Increasing	L2	5.05	4.31	4.68	23	25-01-2023	28.130948	77.065696	28.130150	77.065263
NA	0	0	NH-248A	SOH-NUH	38500	38600	Increasing	L2	1.58	2.53	2.06	37	25-01-2023	28.130150	77.065263	28.129560	77.064498
NA	0	0	NH-248A	SOH-NUH	38600	38700	Increasing	L2	1.76	1.44	1.60	47	25-01-2023	28.129560	77.064498	28.128976	77.063709
NA	0	0	NH-248A	SOH-NUH	38700	38800	Increasing	L2	2.99	2.63	2.81	53	25-01-2023	28.128976	77.063709	28.128409	77.062897
NA	0	0	NH-248A	SOH-NUH	38800	38900	Increasing	L2	1.67	1.83	1.75	44	25-01-2023	28.128409	77.062897	28.127957	77.062013

NA	0	0	NH-248A	SOH-NUH	38900	39000	Increasing	L2	1.70	1.50	1.60	54	25-01-2023	28.127957	77.062013	28.127575	77.061106
NA	0	0	NH-248A	SOH-NUH	39000	39100	Increasing	L2	1.67	1.34	1.51	58	25-01-2023	28.127575	77.061106	28.127194	77.060172
NA	0	0	NH-248A	SOH-NUH	39100	39200	Increasing	L2	1.79	1.52	1.66	60	25-01-2023	28.127194	77.060172	28.126925	77.059192
NA	0	0	NH-248A	SOH-NUH	39200	39300	Increasing	L2	1.30	1.47	1.39	56	25-01-2023	28.126925	77.059192	28.126813	77.058182
NA	0	0	NH-248A	SOH-NUH	39300	39400	Increasing	L2	2.02	1.25	1.64	57	25-01-2023	28.126813	77.058182	28.126706	77.057152
NA	0	0	NH-248A	SOH-NUH	39400	39500	Increasing	L2	2.09	1.55	1.82	57	25-01-2023	28.126706	77.057152	28.126407	77.056218
NA	0	0	NH-248A	SOH-NUH	39500	39600	Increasing	L2	1.69	1.36	1.53	53	25-01-2023	28.126407	77.056218	28.125974	77.055309
NA	0	0	NH-248A	SOH-NUH	39600	39700	Increasing	L2	1.40	1.59	1.50	53	25-01-2023	28.125974	77.055309	28.125511	77.054419
NA	0	0	NH-248A	SOH-NUH	39700	39800	Increasing	L2	1.06	1.55	1.31	53	25-01-2023	28.125511	77.054419	28.124921	77.053638
NA	0	0	NH-248A	SOH-NUH	39800	39900	Increasing	L2	1.46	1.27	1.37	54	25-01-2023	28.124921	77.053638	28.124348	77.052862
NA	0	0	NH-248A	SOH-NUH	39900	40000	Increasing	L2	3.17	2.72	2.95	55	25-01-2023	28.124348	77.052862	28.123796	77.052029
NA	0	0	NH-248A	SOH-NUH	40000	40100	Increasing	L2	1.45	1.26	1.36	56	25-01-2023	28.123796	77.052029	28.123265	77.051207
NA	0	0	NH-248A	SOH-NUH	40100	40200	Increasing	L2	1.40	1.24	1.32	54	25-01-2023	28.123265	77.051207	28.122814	77.050322
NA	0	0	NH-248A	SOH-NUH	40200	40300	Increasing	L2	1.38	1.44	1.41	55	25-01-2023	28.122814	77.050322	28.122459	77.049371
NA	0	0	NH-248A	SOH-NUH	40300	40400	Increasing	L2	1.35	1.12	1.24	60	25-01-2023	28.122459	77.049371	28.122113	77.048433
NA	0	0	NH-248A	SOH-NUH	40400	40500	Increasing	L2	1.46	1.01	1.24	61	25-01-2023	28.122113	77.048433	28.121781	77.047493
NA	0	0	NH-248A	SOH-NUH	40500	40600	Increasing	L2	1.71	1.21	1.46	61	25-01-2023	28.121781	77.047493	28.121441	77.046530
NA	0	0	NH-248A	SOH-NUH	40600	40700	Increasing	L2	1.33	1.40	1.37	57	25-01-2023	28.121441	77.046530	28.121178	77.045564
NA	0	0	NH-248A	SOH-NUH	40700	40800	Increasing	L2	1.68	1.76	1.72	57	25-01-2023	28.121178	77.045564	28.121017	77.044553
NA	0	0	NH-248A	SOH-NUH	40800	40900	Increasing	L2	1.46	1.50	1.48	59	25-01-2023	28.121017	77.044553	28.121000	77.043523
NA	0	0	NH-248A	SOH-NUH	40900	41000	Increasing	L2	2.21	1.70	1.96	61	25-01-2023	28.121000	77.043523	28.121030	77.042518
NA	0	0	NH-248A	SOH-NUH	41000	41100	Increasing	L2	2.13	1.37	1.75	62	25-01-2023	28.121030	77.042518	28.121010	77.041470
NA	0	0	NH-248A	SOH-NUH	41100	41200	Increasing	L2	2.07	1.36	1.72	61	25-01-2023	28.121010	77.041470	28.120898	77.040472
NA	0	0	NH-248A	SOH-NUH	41200	41300	Increasing	L2	2.08	1.48	1.78	61	25-01-2023	28.120898	77.040472	28.120722	77.039451
NA	0	0	NH-248A	SOH-NUH	41300	41400	Increasing	L2	1.84	1.40	1.62	58	25-01-2023	28.120722	77.039451	28.120458	77.038500
NA	0	0	NH-248A	SOH-NUH	41400	41500	Increasing	L2	4.72	3.81	4.27	26	25-01-2023	28.120458	77.038500	28.120045	77.037561
NA	0	0	NH-248A	SOH-NUH	41500	41600	Increasing	L2	1.76	1.38	1.57	37	25-01-2023	28.120045	77.037561	28.119637	77.036665
NA	0	0	NH-248A	SOH-NUH	41600	41700	Increasing	L2	1.55	1.25	1.40	42	25-01-2023	28.119637	77.036665	28.119248	77.035719
NA	0	0	NH-248A	SOH-NUH	41700	41800	Increasing	L2	3.21	2.47	2.84	22	25-01-2023	28.119248	77.035719	28.118892	77.034784

NA	0	0	NH-248A	SOH-NUH	41800	41900	Increasing	L2	1.69	1.71	1.70	33	25-01-2023	28.118892	77.034784	28.118506	77.033857
NA	0	0	NH-248A	SOH-NUH	41900	42000	Increasing	L2	2.95	2.91	2.93	26	25-01-2023	28.118506	77.033857	28.118251	77.032874
NA	0	0	NH-248A	SOH-NUH	42000	42100	Increasing	L2	2.29	1.93	2.11	35	25-01-2023	28.118251	77.032874	28.118071	77.031874
NA	0	0	NH-248A	SOH-NUH	42100	42200	Increasing	L2	2.40	2.42	2.41	31	25-01-2023	28.118071	77.031874	28.117748	77.030923
NA	0	0	NH-248A	SOH-NUH	42200	42300	Increasing	L2	4.82	3.19	4.01	26	25-01-2023	28.117748	77.030923	28.117306	77.030025
NA	0	0	NH-248A	SOH-NUH	42300	42400	Increasing	L2	6.64	6.54	6.59	28	25-01-2023	28.117306	77.030025	28.116862	77.029155
NA	0	0	NH-248A	SOH-NUH	42400	42500	Increasing	L2	1.42	1.17	1.30	44	25-01-2023	28.116862	77.029155	28.116398	77.028282
NA	0	0	NH-248A	SOH-NUH	42500	42600	Increasing	L2	1.48	1.20	1.34	49	25-01-2023	28.116398	77.028282	28.115825	77.027495
NA	0	0	NH-248A	SOH-NUH	42600	42700	Increasing	L2	1.84	1.58	1.71	45	25-01-2023	28.115825	77.027495	28.115098	77.026879
NA	0	0	NH-248A	SOH-NUH	42700	42800	Increasing	L2	1.50	1.83	1.67	45	25-01-2023	28.115098	77.026879	28.114380	77.026250
NA	0	0	NH-248A	SOH-NUH	42800	42900	Increasing	L2	1.78	1.59	1.69	50	25-01-2023	28.114380	77.026250	28.113699	77.025562
NA	0	0	NH-248A	SOH-NUH	42900	43000	Increasing	L2	1.89	1.37	1.63	51	25-01-2023	28.113699	77.025562	28.113049	77.024857
NA	0	0	NH-248A	SOH-NUH	43000	43100	Increasing	L2	1.90	1.34	1.62	52	25-01-2023	28.113049	77.024857	28.112514	77.024029
NA	0	0	NH-248A	SOH-NUH	43100	43200	Increasing	L2	1.47	1.53	1.50	47	25-01-2023	28.112514	77.024029	28.112209	77.023049
NA	0	0	NH-248A	SOH-NUH	43200	43300	Increasing	L2	1.41	1.21	1.31	47	25-01-2023	28.112209	77.023049	28.111958	77.022076
NA	0	0	NH-248A	SOH-NUH	43300	43400	Increasing	L2	1.41	1.66	1.54	45	25-01-2023	28.111958	77.022076	28.111711	77.021096
NA	0	0	NH-248A	SOH-NUH	43400	43500	Increasing	L2	3.90	3.67	3.79	25	25-01-2023	28.111711	77.021096	28.111447	77.020116
NA	0	0	NH-248A	SOH-NUH	43500	43600	Increasing	L2	2.84	2.39	2.62	40	25-01-2023	28.111447	77.020116	28.111129	77.019153
NA	0	0	NH-248A	SOH-NUH	43600	43700	Increasing	L2	2.31	1.75	2.03	46	25-01-2023	28.111129	77.019153	28.110677	77.018289
NA	0	0	NH-248A	SOH-NUH	43700	43800	Increasing	L2	1.21	1.38	1.30	44	25-01-2023	28.110677	77.018289	28.110202	77.017407
NA	0	0	NH-248A	SOH-NUH	43800	43900	Increasing	L2	1.69	1.26	1.48	47	25-01-2023	28.110202	77.017407	28.109724	77.016527
NA	0	0	NH-248A	SOH-NUH	43900	44000	Increasing	L2	1.41	1.42	1.42	48	25-01-2023	28.109724	77.016527	28.109258	77.015663
NA	0	0	NH-248A	SOH-NUH	44000	44100	Increasing	L2	1.06	0.83	0.95	47	25-01-2023	28.109258	77.015663	28.108787	77.014788
NA	0	0	NH-248A	SOH-NUH	44100	44200	Increasing	L2	1.48	1.18	1.33	42	25-01-2023	28.108787	77.014788	28.108314	77.013919
NA	0	0	NH-248A	SOH-NUH	44200	44300	Increasing	L2	1.17	1.22	1.20	43	25-01-2023	28.108314	77.013919	28.107810	77.013051
NA	0	0	NH-248A	SOH-NUH	44300	44400	Increasing	L2	6.54	5.76	6.15	30	25-01-2023	28.107810	77.013051	28.107276	77.012236
NA	0	0	NH-248A	SOH-NUH	44400	44500	Increasing	L2	2.68	2.10	2.39	36	25-01-2023	28.107276	77.012236	28.106707	77.011426
NA	0	0	NH-248A	SOH-NUH	44500	44600	Increasing	L2	1.83	1.76	1.80	46	25-01-2023	28.106707	77.011426	28.106072	77.010717
NA	0	0	NH-248A	SOH-NUH	44600	44700	Increasing	L2	1.98	1.75	1.87	38	25-01-2023	28.106072	77.010717	28.105346	77.010084

NA	0	0	NH-248A	SOH-NUH	44700	44800	Increasing	L2	9.11	8.44	8.78	20	25-01-2023	28.105346	77.010084	28.104567	77.009563
NA	0	0	NH-248A	SOH-NUH	44800	44900	Increasing	L2	2.42	2.48	2.45	20	25-01-2023	28.104567	77.009563	28.103748	77.009114
NA	0	0	NH-248A	SOH-NUH	44900	45000	Increasing	L2	3.18	4.93	4.06	20	25-01-2023	28.103748	77.009114	28.102868	77.008712
NA	0	0	NH-248A	SOH-NUH	45000	45100	Increasing	L2	1.76	1.69	1.73	33	25-01-2023	28.102868	77.008712	28.101995	77.008467
NA	0	0	NH-248A	SOH-NUH	45100	45200	Increasing	L2	2.40	2.41	2.41	31	25-01-2023	28.101995	77.008467	28.101098	77.008296
NA	0	0	NH-248A	SOH-NUH	45200	45300	Increasing	L2	1.86	1.79	1.83	27	25-01-2023	28.101098	77.008296	28.100196	77.008171
NA	0	0	NH-248A	SOH-NUH	45300	45400	Increasing	L2	1.88	1.80	1.84	29	25-01-2023	28.100196	77.008171	28.099289	77.008036
NA	0	0	NH-248A	SOH-NUH	45400	45500	Increasing	L2	1.69	1.85	1.77	35	25-01-2023	28.099289	77.008036	28.098398	77.007890
NA	0	0	NH-248A	SOH-NUH	45500	45600	Increasing	L2	2.70	2.07	2.39	28	25-01-2023	28.098398	77.007890	28.097488	77.007771
NA	0	0	NH-248A	SOH-NUH	45600	45700	Increasing	L2	2.37	2.21	2.29	38	25-01-2023	28.097488	77.007771	28.096608	77.007647
NA	0	0	NH-248A	SOH-NUH	45700	45800	Increasing	L2	1.99	1.88	1.94	46	25-01-2023	28.096608	77.007647	28.095698	77.007519
NA	0	0	NH-248A	SOH-NUH	45800	45900	Increasing	L2	2.17	1.96	2.07	39	25-01-2023	28.095698	77.007519	28.094804	77.007377
NA	0	0	NH-248A	SOH-NUH	45900	46000	Increasing	L2	2.22	2.01	2.12	39	25-01-2023	28.094804	77.007377	28.093904	77.007260
NA	0	0	NH-248A	SOH-NUH	46000	46100	Increasing	L2	2.16	2.05	2.11	40	25-01-2023	28.093904	77.007260	28.092995	77.007120
NA	0	0	NH-248A	SOH-NUH	46100	46200	Increasing	L2	2.62	2.39	2.51	41	25-01-2023	28.092995	77.007120	28.092093	77.006989
NA	0	0	NH-248A	SOH-NUH	46200	46300	Increasing	L2	1.62	1.35	1.49	42	25-01-2023	28.092093	77.006989	28.091200	77.006865
NA	0	0	NH-248A	SOH-NUH	46300	46400	Increasing	L2	1.64	1.68	1.66	47	25-01-2023	28.091200	77.006865	28.090303	77.006751
NA	0	0	NH-248A	SOH-NUH	46400	46500	Increasing	L2	2.02	1.88	1.95	41	25-01-2023	28.090303	77.006751	28.089408	77.006783
NA	0	0	NH-248A	SOH-NUH	46500	46600	Increasing	L2	1.85	1.89	1.87	44	25-01-2023	28.089408	77.006783	28.088502	77.006918
NA	0	0	NH-248A	SOH-NUH	46600	46700	Increasing	L2	3.49	3.25	3.37	36	25-01-2023	28.088502	77.006918	28.087603	77.007145
NA	0	0	NH-248A	SOH-NUH	46700	46800	Increasing	L2	5.76	5.05	5.41	25	25-01-2023	28.087603	77.007145	28.086740	77.007425
NA	0	0	NH-248A	SOH-NUH	46800	46900	Increasing	L2	4.39	4.27	4.33	25	25-01-2023	28.086740	77.007425	28.086740	77.007425
NA	0	0	NH-248A	SOH-NUH	46900	46950	Increasing	L2	5.85	5.39	5.62	20	25-01-2023	28.086740	77.007425	28.086740	77.007425
NA	0	0	NH-248A	SOH-NUH	46950	46900	Decreasing	R1	9.74	12.97	11.36	21	25-01-2023	28.086569	77.007438	28.087005	77.007273
NA	0	0	NH-248A	SOH-NUH	46900	46800	Decreasing	R1	7.01	9.35	8.18	24	25-01-2023	28.087005	77.007273	28.087867	77.006991
NA	0	0	NH-248A	SOH-NUH	46800	46700	Decreasing	R1	2.50	2.85	2.68	32	25-01-2023	28.087867	77.006991	28.088756	77.006788
NA	0	0	NH-248A	SOH-NUH	46700	46600	Decreasing	R1	2.45	4.53	3.49	33	25-01-2023	28.088756	77.006788	28.089656	77.006681
NA	0	0	NH-248A	SOH-NUH	46600	46500	Decreasing	R1	3.90	4.64	4.27	29	25-01-2023	28.089656	77.006681	28.090559	77.006695
NA	0	0	NH-248A	SOH-NUH	46500	46400	Decreasing	R1	1.88	1.95	1.92	26	25-01-2023	28.090559	77.006695	28.091450	77.006815

NA	0	0	NH-248A	SOH-NUH	46400	46300	Decreasing	R1	2.38	2.41	2.40	30	25-01-2023	28.091450	77.006815	28.092344	77.006942
NA	0	0	NH-248A	SOH-NUH	46300	46200	Decreasing	R1	2.27	2.33	2.30	34	25-01-2023	28.092344	77.006942	28.093241	77.007072
NA	0	0	NH-248A	SOH-NUH	46200	46100	Decreasing	R1	1.72	1.75	1.74	35	25-01-2023	28.093241	77.007072	28.094137	77.007202
NA	0	0	NH-248A	SOH-NUH	46100	46000	Decreasing	R1	2.95	5.10	4.03	31	25-01-2023	28.094137	77.007202	28.095037	77.007314
NA	0	0	NH-248A	SOH-NUH	46000	45900	Decreasing	R1	5.86	6.29	6.08	20	25-01-2023	28.095037	77.007314	28.095938	77.007440
NA	0	0	NH-248A	SOH-NUH	45900	45800	Decreasing	R1	3.48	3.12	3.30	37	25-01-2023	28.095938	77.007440	28.096835	77.007587
NA	0	0	NH-248A	SOH-NUH	45800	45700	Decreasing	R1	3.17	2.84	3.01	36	25-01-2023	28.096835	77.007587	28.097723	77.007725
NA	0	0	NH-248A	SOH-NUH	45700	45600	Decreasing	R1	2.40	2.66	2.53	32	25-01-2023	28.097723	77.007725	28.098622	77.007860
NA	0	0	NH-248A	SOH-NUH	45600	45500	Decreasing	R1	2.44	2.60	2.52	24	25-01-2023	28.098622	77.007860	28.099533	77.007989
NA	0	0	NH-248A	SOH-NUH	45500	45400	Decreasing	R1	2.28	3.02	2.65	20	25-01-2023	28.099533	77.007989	28.100425	77.008123
NA	0	0	NH-248A	SOH-NUH	45400	45300	Decreasing	R1	2.97	3.57	3.27	20	25-01-2023	28.100425	77.008123	28.101320	77.008254
NA	0	0	NH-248A	SOH-NUH	45300	45200	Decreasing	R1	3.98	7.24	5.61	25	25-01-2023	28.101320	77.008254	28.102206	77.008418
NA	0	0	NH-248A	SOH-NUH	45200	45100	Decreasing	R1	2.75	3.65	3.20	25	25-01-2023	28.102206	77.008418	28.103087	77.008704
NA	0	0	NH-248A	SOH-NUH	45100	45000	Decreasing	R1	4.51	4.34	4.43	20	25-01-2023	28.103087	77.008704	28.103920	77.009098
NA	0	0	NH-248A	SOH-NUH	45000	44900	Decreasing	R1	7.79	8.36	8.08	20	25-01-2023	28.103920	77.009098	28.104741	77.009516
NA	0	0	NH-248A	SOH-NUH	44900	44800	Decreasing	R1	2.59	3.21	2.90	32	25-01-2023	28.104741	77.009516	28.105493	77.010065
NA	0	0	NH-248A	SOH-NUH	44800	44700	Decreasing	R1	4.65	4.41	4.53	30	25-01-2023	28.105493	77.010065	28.106201	77.010697
NA	0	0	NH-248A	SOH-NUH	44700	44600	Decreasing	R1	6.26	7.32	6.79	26	25-01-2023	28.106201	77.010697	28.106841	77.011421
NA	0	0	NH-248A	SOH-NUH	44600	44500	Decreasing	R1	3.37	3.90	3.64	23	25-01-2023	28.106841	77.011421	28.107419	77.012210
NA	0	0	NH-248A	SOH-NUH	44500	44400	Decreasing	R1	2.22	2.71	2.47	36	25-01-2023	28.107419	77.012210	28.107928	77.013047
NA	0	0	NH-248A	SOH-NUH	44400	44300	Decreasing	R1	2.07	2.14	2.11	39	25-01-2023	28.107928	77.013047	28.108422	77.013897
NA	0	0	NH-248A	SOH-NUH	44300	44200	Decreasing	R1	1.43	1.73	1.58	40	25-01-2023	28.108422	77.013897	28.108897	77.014774
NA	0	0	NH-248A	SOH-NUH	44200	44100	Decreasing	R1	1.83	1.88	1.86	42	25-01-2023	28.108897	77.014774	28.109361	77.015629
NA	0	0	NH-248A	SOH-NUH	44100	44000	Decreasing	R1	3.18	2.47	2.83	39	25-01-2023	28.109361	77.015629	28.109841	77.016506
NA	0	0	NH-248A	SOH-NUH	44000	43900	Decreasing	R1	3.32	3.39	3.36	37	25-01-2023	28.109841	77.016506	28.110303	77.017383
NA	0	0	NH-248A	SOH-NUH	43900	43800	Decreasing	R1	1.93	1.91	1.92	43	25-01-2023	28.110303	77.017383	28.110770	77.018251
NA	0	0	NH-248A	SOH-NUH	43800	43700	Decreasing	R1	3.74	4.30	4.02	38	25-01-2023	28.110770	77.018251	28.111240	77.019130
NA	0	0	NH-248A	SOH-NUH	43700	43600	Decreasing	R1	5.04	8.51	6.78	22	25-01-2023	28.111240	77.019130	28.111559	77.020096
NA	0	0	NH-248A	SOH-NUH	43600	43500	Decreasing	R1	1.80	2.24	2.02	40	25-01-2023	28.111559	77.020096	28.111818	77.021072

NA	0	0	NH-248A	SOH-NUH	43500	43400	Decreasing	R1	2.71	2.59	2.65	44	25-01-2023	28.111818	77.021072	28.112062	77.022053
NA	0	0	NH-248A	SOH-NUH	43400	43300	Decreasing	R1	1.27	2.11	1.69	40	25-01-2023	28.112062	77.022053	28.112304	77.023032
NA	0	0	NH-248A	SOH-NUH	43300	43200	Decreasing	R1	1.23	2.62	1.93	42	25-01-2023	28.112304	77.023032	28.112611	77.023991
NA	0	0	NH-248A	SOH-NUH	43200	43100	Decreasing	R1	1.03	1.39	1.21	48	25-01-2023	28.112611	77.023991	28.113125	77.024796
NA	0	0	NH-248A	SOH-NUH	43100	43000	Decreasing	R1	1.17	1.72	1.45	52	25-01-2023	28.113125	77.024796	28.113782	77.025507
NA	0	0	NH-248A	SOH-NUH	43000	42900	Decreasing	R1	1.76	2.17	1.97	51	25-01-2023	28.113782	77.025507	28.114456	77.026195
NA	0	0	NH-248A	SOH-NUH	42900	42800	Decreasing	R1	2.47	2.52	2.50	49	25-01-2023	28.114456	77.026195	28.115183	77.026807
NA	0	0	NH-248A	SOH-NUH	42800	42700	Decreasing	R1	2.71	2.12	2.42	43	25-01-2023	28.115183	77.026807	28.115904	77.027400
NA	0	0	NH-248A	SOH-NUH	42700	42600	Decreasing	R1	2.06	3.50	2.78	46	25-01-2023	28.115904	77.027400	28.116473	77.028192
NA	0	0	NH-248A	SOH-NUH	42600	42500	Decreasing	R1	1.75	3.15	2.45	43	25-01-2023	28.116473	77.028192	28.116933	77.029068
NA	0	0	NH-248A	SOH-NUH	42500	42400	Decreasing	R1	2.69	3.43	3.06	37	25-01-2023	28.116933	77.029068	28.117403	77.029954
NA	0	0	NH-248A	SOH-NUH	42400	42300	Decreasing	R1	1.59	1.78	1.69	40	25-01-2023	28.117403	77.029954	28.117853	77.030844
NA	0	0	NH-248A	SOH-NUH	42300	42200	Decreasing	R1	2.35	3.89	3.12	38	25-01-2023	28.117853	77.030844	28.118165	77.031795
NA	0	0	NH-248A	SOH-NUH	42200	42100	Decreasing	R1	1.95	2.64	2.30	44	25-01-2023	28.118165	77.031795	28.118359	77.032800
NA	0	0	NH-248A	SOH-NUH	42100	42000	Decreasing	R1	2.13	3.09	2.61	44	25-01-2023	28.118359	77.032800	28.118593	77.033774
NA	0	0	NH-248A	SOH-NUH	42000	41900	Decreasing	R1	4.03	4.37	4.20	40	25-01-2023	28.118593	77.033774	28.118957	77.034701
NA	0	0	NH-248A	SOH-NUH	41900	41800	Decreasing	R1	1.90	2.77	2.34	43	25-01-2023	28.118957	77.034701	28.119326	77.035625
NA	0	0	NH-248A	SOH-NUH	41800	41700	Decreasing	R1	1.75	2.11	1.93	37	25-01-2023	28.119326	77.035625	28.119708	77.036558
NA	0	0	NH-248A	SOH-NUH	41700	41600	Decreasing	R1	2.08	2.04	2.06	33	25-01-2023	28.119708	77.036558	28.120138	77.037445
NA	0	0	NH-248A	SOH-NUH	41600	41500	Decreasing	R1	2.49	3.22	2.86	42	25-01-2023	28.120138	77.037445	28.120533	77.038380
NA	0	0	NH-248A	SOH-NUH	41500	41400	Decreasing	R1	1.82	2.06	1.94	47	25-01-2023	28.120533	77.038380	28.120817	77.039331
NA	0	0	NH-248A	SOH-NUH	41400	41300	Decreasing	R1	2.02	2.12	2.07	44	25-01-2023	28.120817	77.039331	28.120995	77.040343
NA	0	0	NH-248A	SOH-NUH	41300	41200	Decreasing	R1	1.23	2.05	1.64	48	25-01-2023	28.120995	77.040343	28.121113	77.041341
NA	0	0	NH-248A	SOH-NUH	41200	41100	Decreasing	R1	2.19	2.62	2.41	49	25-01-2023	28.121113	77.041341	28.121149	77.042361
NA	0	0	NH-248A	SOH-NUH	41100	41000	Decreasing	R1	2.47	1.89	2.18	51	25-01-2023	28.121149	77.042361	28.121114	77.043384
NA	0	0	NH-248A	SOH-NUH	41000	40900	Decreasing	R1	2.44	3.08	2.76	53	25-01-2023	28.121114	77.043384	28.121105	77.044390
NA	0	0	NH-248A	SOH-NUH	40900	40800	Decreasing	R1	2.20	2.03	2.12	52	25-01-2023	28.121105	77.044390	28.121249	77.045420
NA	0	0	NH-248A	SOH-NUH	40800	40700	Decreasing	R1	1.67	1.95	1.81	53	25-01-2023	28.121249	77.045420	28.121505	77.046388
NA	0	0	NH-248A	SOH-NUH	40700	40600	Decreasing	R1	2.31	2.94	2.63	53	25-01-2023	28.121505	77.046388	28.121835	77.047330

NA	0	0	NH-248A	SOH-NUH	40600	40500	Decreasing	R1	1.90	2.57	2.24	54	25-01-2023	28.121835	77.047330	28.122174	77.048275
NA	0	0	NH-248A	SOH-NUH	40500	40400	Decreasing	R1	1.75	2.62	2.19	53	25-01-2023	28.122174	77.048275	28.122519	77.049234
NA	0	0	NH-248A	SOH-NUH	40400	40300	Decreasing	R1	2.07	3.47	2.77	53	25-01-2023	28.122519	77.049234	28.122857	77.050153
NA	0	0	NH-248A	SOH-NUH	40300	40200	Decreasing	R1	1.49	1.95	1.72	53	25-01-2023	28.122857	77.050153	28.123293	77.051047
NA	0	0	NH-248A	SOH-NUH	40200	40100	Decreasing	R1	1.53	2.31	1.92	52	25-01-2023	28.123293	77.051047	28.123829	77.051890
NA	0	0	NH-248A	SOH-NUH	40100	40000	Decreasing	R1	2.11	2.89	2.50	52	25-01-2023	28.123829	77.051890	28.124359	77.052688
NA	0	0	NH-248A	SOH-NUH	40000	39900	Decreasing	R1	2.05	2.91	2.48	51	25-01-2023	28.124359	77.052688	28.124945	77.053495
NA	0	0	NH-248A	SOH-NUH	39900	39800	Decreasing	R1	2.44	2.97	2.71	49	25-01-2023	28.124945	77.053495	28.125533	77.054269
NA	0	0	NH-248A	SOH-NUH	39800	39700	Decreasing	R1	2.25	3.18	2.72	49	25-01-2023	28.125533	77.054269	28.126004	77.055121
NA	0	0	NH-248A	SOH-NUH	39700	39600	Decreasing	R1	1.73	2.87	2.30	51	25-01-2023	28.126004	77.055121	28.126428	77.056019
NA	0	0	NH-248A	SOH-NUH	39600	39500	Decreasing	R1	2.74	4.31	3.53	49	25-01-2023	28.126428	77.056019	28.126784	77.056972
NA	0	0	NH-248A	SOH-NUH	39500	39400	Decreasing	R1	2.31	3.16	2.74	47	25-01-2023	28.126784	77.056972	28.126904	77.057990
NA	0	0	NH-248A	SOH-NUH	39400	39300	Decreasing	R1	1.87	3.28	2.58	47	25-01-2023	28.126904	77.057990	28.126997	77.058995
NA	0	0	NH-248A	SOH-NUH	39300	39200	Decreasing	R1	2.96	2.57	2.77	47	25-01-2023	28.126997	77.058995	28.127229	77.059986
NA	0	0	NH-248A	SOH-NUH	39200	39100	Decreasing	R1	1.75	2.20	1.98	48	25-01-2023	28.127229	77.059986	28.127599	77.060894
NA	0	0	NH-248A	SOH-NUH	39100	39000	Decreasing	R1	2.05	2.74	2.40	50	25-01-2023	28.127599	77.060894	28.127983	77.061829
NA	0	0	NH-248A	SOH-NUH	39000	38900	Decreasing	R1	2.69	3.13	2.91	50	25-01-2023	28.127983	77.061829	28.128427	77.062729
NA	0	0	NH-248A	SOH-NUH	38900	38800	Decreasing	R1	3.62	4.12	3.87	49	25-01-2023	28.128427	77.062729	28.128964	77.063533
NA	0	0	NH-248A	SOH-NUH	38800	38700	Decreasing	R1	2.60	3.10	2.85	48	25-01-2023	28.128964	77.063533	28.129539	77.064311
NA	0	0	NH-248A	SOH-NUH	38700	38600	Decreasing	R1	4.50	4.58	4.54	31	25-01-2023	28.129539	77.064311	28.130122	77.065100
NA	0	0	NH-248A	SOH-NUH	38600	38500	Decreasing	R1	3.08	4.73	3.91	31	25-01-2023	28.130122	77.065100	28.130890	77.065599
NA	0	0	NH-248A	SOH-NUH	38500	38400	Decreasing	R1	2.11	2.67	2.39	41	25-01-2023	28.130890	77.065599	28.131781	77.065620
NA	0	0	NH-248A	SOH-NUH	38400	38300	Decreasing	R1	2.20	3.08	2.64	42	25-01-2023	28.131781	77.065620	28.132688	77.065618
NA	0	0	NH-248A	SOH-NUH	38300	38200	Decreasing	R1	2.02	3.41	2.72	38	25-01-2023	28.132688	77.065618	28.133600	77.065685
NA	0	0	NH-248A	SOH-NUH	38200	38100	Decreasing	R1	2.17	2.53	2.35	34	25-01-2023	28.133600	77.065685	28.134467	77.065950
NA	0	0	NH-248A	SOH-NUH	38100	38000	Decreasing	R1	6.13	8.64	7.39	23	25-01-2023	28.134467	77.065950	28.135295	77.066355
NA	0	0	NH-248A	SOH-NUH	38000	37900	Decreasing	R1	11.23	10.65	10.94	20	25-01-2023	28.135295	77.066355	28.136031	77.066963
NA	0	0	NH-248A	SOH-NUH	37900	37800	Decreasing	R1	10.34	3.17	6.76	23	25-01-2023	28.136031	77.066963	28.136823	77.067406
NA	0	0	NH-248A	SOH-NUH	37800	37700	Decreasing	R1	2.05	2.62	2.34	32	25-01-2023	28.136823	77.067406	28.137720	77.067579

NA	0	0	NH-248A	SOH-NUH	37700	37600	Decreasing	R1	1.89	2.60	2.25	35	25-01-2023	28.137720	77.067579	28.138614	77.067729
NA	0	0	NH-248A	SOH-NUH	37600	37500	Decreasing	R1	1.67	1.58	1.63	45	25-01-2023	28.138614	77.067729	28.139497	77.067917
NA	0	0	NH-248A	SOH-NUH	37500	37400	Decreasing	R1	2.67	3.03	2.85	46	25-01-2023	28.139497	77.067917	28.140383	77.068105
NA	0	0	NH-248A	SOH-NUH	37400	37300	Decreasing	R1	2.24	2.70	2.47	46	25-01-2023	28.140383	77.068105	28.141275	77.068276
NA	0	0	NH-248A	SOH-NUH	37300	37200	Decreasing	R1	2.07	2.27	2.17	47	25-01-2023	28.141275	77.068276	28.142172	77.068422
NA	0	0	NH-248A	SOH-NUH	37200	37100	Decreasing	R1	1.80	2.17	1.99	49	25-01-2023	28.142172	77.068422	28.143070	77.068526
NA	0	0	NH-248A	SOH-NUH	37100	37000	Decreasing	R1	1.37	1.92	1.65	51	25-01-2023	28.143070	77.068526	28.143969	77.068627
NA	0	0	NH-248A	SOH-NUH	37000	36900	Decreasing	R1	2.24	2.41	2.33	52	25-01-2023	28.143969	77.068627	28.144872	77.068729
NA	0	0	NH-248A	SOH-NUH	36900	36800	Decreasing	R1	1.76	2.31	2.04	53	25-01-2023	28.144872	77.068729	28.145771	77.068833
NA	0	0	NH-248A	SOH-NUH	36800	36700	Decreasing	R1	2.34	2.62	2.48	54	25-01-2023	28.145771	77.068833	28.146658	77.068934
NA	0	0	NH-248A	SOH-NUH	36700	36600	Decreasing	R1	2.01	2.66	2.34	53	25-01-2023	28.146658	77.068934	28.147572	77.069038
NA	0	0	NH-248A	SOH-NUH	36600	36500	Decreasing	R1	1.79	2.60	2.20	51	25-01-2023	28.147572	77.069038	28.148475	77.069140
NA	0	0	NH-248A	SOH-NUH	36500	36400	Decreasing	R1	1.50	2.28	1.89	50	25-01-2023	28.148475	77.069140	28.149379	77.069242
NA	0	0	NH-248A	SOH-NUH	36400	36300	Decreasing	R1	1.82	2.45	2.14	51	25-01-2023	28.149379	77.069242	28.150265	77.069338
NA	0	0	NH-248A	SOH-NUH	36300	36200	Decreasing	R1	2.09	2.69	2.39	54	25-01-2023	28.150265	77.069338	28.151182	77.069434
NA	0	0	NH-248A	SOH-NUH	36200	36100	Decreasing	R1	2.72	3.12	2.92	51	25-01-2023	28.151182	77.069434	28.152072	77.069511
NA	0	0	NH-248A	SOH-NUH	36100	36000	Decreasing	R1	2.27	2.66	2.47	49	25-01-2023	28.152072	77.069511	28.152977	77.069576
NA	0	0	NH-248A	SOH-NUH	36000	35900	Decreasing	R1	1.99	2.04	2.02	51	25-01-2023	28.152977	77.069576	28.153878	77.069638
NA	0	0	NH-248A	SOH-NUH	35900	35800	Decreasing	R1	2.13	1.88	2.01	52	25-01-2023	28.153878	77.069638	28.154780	77.069677
NA	0	0	NH-248A	SOH-NUH	35800	35700	Decreasing	R1	2.74	2.62	2.68	52	25-01-2023	28.154780	77.069677	28.155696	77.069713
NA	0	0	NH-248A	SOH-NUH	35700	35600	Decreasing	R1	2.29	2.42	2.36	53	25-01-2023	28.155696	77.069713	28.156592	77.069750
NA	0	0	NH-248A	SOH-NUH	35600	35500	Decreasing	R1	3.18	2.74	2.96	54	25-01-2023	28.156592	77.069750	28.157500	77.069805
NA	0	0	NH-248A	SOH-NUH	35500	35400	Decreasing	R1	2.38	2.65	2.52	52	25-01-2023	28.157500	77.069805	28.158405	77.069903
NA	0	0	NH-248A	SOH-NUH	35400	35300	Decreasing	R1	2.48	2.81	2.65	50	25-01-2023	28.158405	77.069903	28.159304	77.070006
NA	0	0	NH-248A	SOH-NUH	35300	35200	Decreasing	R1	2.16	2.82	2.49	48	25-01-2023	28.159304	77.070006	28.160187	77.070104
NA	0	0	NH-248A	SOH-NUH	35200	35100	Decreasing	R1	3.57	3.36	3.47	47	25-01-2023	28.160187	77.070104	28.161094	77.070206
NA	0	0	NH-248A	SOH-NUH	35100	35000	Decreasing	R1	1.83	2.20	2.02	50	25-01-2023	28.161094	77.070206	28.161985	77.070321
NA	0	0	NH-248A	SOH-NUH	35000	34900	Decreasing	R1	2.01	2.82	2.42	53	25-01-2023	28.161985	77.070321	28.162893	77.070452
NA	0	0	NH-248A	SOH-NUH	34900	34800	Decreasing	R1	2.01	2.79	2.40	55	25-01-2023	28.162893	77.070452	28.163785	77.070562

NA	0	0	NH-248A	SOH-NUH	34800	34700	Decreasing	R1	1.57	1.58	1.58	56	25-01-2023	28.163785	77.070562	28.164693	77.070666
NA	0	0	NH-248A	SOH-NUH	34700	34600	Decreasing	R1	2.26	2.28	2.27	56	25-01-2023	28.164693	77.070666	28.165588	77.070768
NA	0	0	NH-248A	SOH-NUH	34600	34500	Decreasing	R1	2.03	2.54	2.29	56	25-01-2023	28.165588	77.070768	28.166492	77.070872
NA	0	0	NH-248A	SOH-NUH	34500	34400	Decreasing	R1	2.12	2.11	2.12	56	25-01-2023	28.166492	77.070872	28.167393	77.070966
NA	0	0	NH-248A	SOH-NUH	34400	34300	Decreasing	R1	1.98	2.76	2.37	53	25-01-2023	28.167393	77.070966	28.168298	77.071042
NA	0	0	NH-248A	SOH-NUH	34300	34200	Decreasing	R1	2.56	2.05	2.31	49	25-01-2023	28.168298	77.071042	28.169189	77.071145
NA	0	0	NH-248A	SOH-NUH	34200	34100	Decreasing	R1	3.61	3.18	3.40	48	25-01-2023	28.169189	77.071145	28.170083	77.071154
NA	0	0	NH-248A	SOH-NUH	34100	34000	Decreasing	R1	3.92	2.68	3.30	45	25-01-2023	28.170083	77.071154	28.170990	77.071008
NA	0	0	NH-248A	SOH-NUH	34000	33900	Decreasing	R1	16.90	14.21	15.56	20	25-01-2023	28.170990	77.071008	28.171894	77.070893
NA	0	0	NH-248A	SOH-NUH	33900	33800	Decreasing	R1	8.69	9.59	9.14	23	25-01-2023	28.171894	77.070893	28.172780	77.070685
NA	0	0	NH-248A	SOH-NUH	33800	33700	Decreasing	R1	2.84	3.18	3.01	39	25-01-2023	28.172780	77.070685	28.173668	77.070557
NA	0	0	NH-248A	SOH-NUH	33700	33600	Decreasing	R1	2.48	3.58	3.03	45	25-01-2023	28.173668	77.070557	28.174566	77.070449
NA	0	0	NH-248A	SOH-NUH	33600	33500	Decreasing	R1	2.35	2.58	2.47	47	25-01-2023	28.174566	77.070449	28.175465	77.070426
NA	0	0	NH-248A	SOH-NUH	33500	33400	Decreasing	R1	1.40	2.23	1.82	47	25-01-2023	28.175465	77.070426	28.176385	77.070459
NA	0	0	NH-248A	SOH-NUH	33400	33300	Decreasing	R1	2.06	2.79	2.43	43	25-01-2023	28.176385	77.070459	28.177273	77.070503
NA	0	0	NH-248A	SOH-NUH	33300	33200	Decreasing	R1	3.42	3.29	3.36	39	25-01-2023	28.177273	77.070503	28.178165	77.070674
NA	0	0	NH-248A	SOH-NUH	33200	33100	Decreasing	R1	6.07	6.77	6.42	23	25-01-2023	28.178165	77.070674	28.178993	77.071051
NA	0	0	NH-248A	SOH-NUH	33100	33000	Decreasing	R1	3.66	6.26	4.96	34	25-01-2023	28.178993	77.071051	28.179863	77.071387
NA	0	0	NH-248A	SOH-NUH	33000	32900	Decreasing	R1	2.65	3.35	3.00	43	25-01-2023	28.179863	77.071387	28.180693	77.071783
NA	0	0	NH-248A	SOH-NUH	32900	32800	Decreasing	R1	2.76	3.16	2.96	48	25-01-2023	28.180693	77.071783	28.181554	77.072108
NA	0	0	NH-248A	SOH-NUH	32800	32700	Decreasing	R1	2.28	2.55	2.42	52	25-01-2023	28.181554	77.072108	28.182449	77.072295
NA	0	0	NH-248A	SOH-NUH	32700	32600	Decreasing	R1	2.72	2.42	2.57	55	25-01-2023	28.182449	77.072295	28.183335	77.072431
NA	0	0	NH-248A	SOH-NUH	32600	32500	Decreasing	R1	3.52	2.57	3.05	56	25-01-2023	28.183335	77.072431	28.184218	77.072564
NA	0	0	NH-248A	SOH-NUH	32500	32400	Decreasing	R1	4.27	3.15	3.71	57	25-01-2023	28.184218	77.072564	28.185116	77.072701
NA	0	0	NH-248A	SOH-NUH	32400	32300	Decreasing	R1	2.68	2.74	2.71	57	25-01-2023	28.185116	77.072701	28.186019	77.072836
NA	0	0	NH-248A	SOH-NUH	32300	32200	Decreasing	R1	3.12	2.75	2.94	53	25-01-2023	28.186019	77.072836	28.186911	77.072964
NA	0	0	NH-248A	SOH-NUH	32200	32100	Decreasing	R1	2.66	3.73	3.20	48	25-01-2023	28.186911	77.072964	28.187807	77.073098
NA	0	0	NH-248A	SOH-NUH	32100	32000	Decreasing	R1	4.61	3.81	4.21	41	25-01-2023	28.187807	77.073098	28.188720	77.073070
NA	0	0	NH-248A	SOH-NUH	32000	31900	Decreasing	R1	3.65	2.85	3.25	40	25-01-2023	28.188720	77.073070	28.189578	77.072761

NA	0	0	NH-248A	SOH-NUH	31900	31800	Decreasing	R1	2.83	2.33	2.58	45	25-01-2023	28.189578	77.072761	28.190353	77.072262
NA	0	0	NH-248A	SOH-NUH	31800	31700	Decreasing	R1	2.54	2.14	2.34	50	25-01-2023	28.190353	77.072262	28.191123	77.071718
NA	0	0	NH-248A	SOH-NUH	31700	31600	Decreasing	R1	2.31	1.80	2.06	50	25-01-2023	28.191123	77.071718	28.191897	77.071168
NA	0	0	NH-248A	SOH-NUH	31600	31500	Decreasing	R1	3.56	3.17	3.37	48	25-01-2023	28.191897	77.071168	28.192655	77.070630
NA	0	0	NH-248A	SOH-NUH	31500	31400	Decreasing	R1	2.95	2.37	2.66	48	25-01-2023	28.192655	77.070630	28.193426	77.070083
NA	0	0	NH-248A	SOH-NUH	31400	31300	Decreasing	R1	1.97	1.53	1.75	47	25-01-2023	28.193426	77.070083	28.194199	77.069545
NA	0	0	NH-248A	SOH-NUH	31300	31200	Decreasing	R1	6.10	5.69	5.90	25	25-01-2023	28.194199	77.069545	28.194964	77.069006
NA	0	0	NH-248A	SOH-NUH	31200	31100	Decreasing	R1	2.17	2.40	2.29	37	25-01-2023	28.194964	77.069006	28.195730	77.068470
NA	0	0	NH-248A	SOH-NUH	31100	31000	Decreasing	R1	4.39	4.55	4.47	38	25-01-2023	28.195730	77.068470	28.196489	77.067934
NA	0	0	NH-248A	SOH-NUH	31000	30900	Decreasing	R1	3.28	3.33	3.31	39	25-01-2023	28.196489	77.067934	28.197304	77.067473
NA	0	0	NH-248A	SOH-NUH	30900	30800	Decreasing	R1	2.15	2.72	2.44	42	25-01-2023	28.197304	77.067473	28.198173	77.067179
NA	0	0	NH-248A	SOH-NUH	30800	30700	Decreasing	R1	2.07	3.68	2.88	37	25-01-2023	28.198173	77.067179	28.199052	77.066895
NA	0	0	NH-248A	SOH-NUH	30700	30600	Decreasing	R1	12.11	8.81	10.46	20	25-01-2023	28.199052	77.066895	28.199915	77.066612
NA	0	0	NH-248A	SOH-NUH	30600	30500	Decreasing	R1	24.90	20.84	22.87	20	25-01-2023	28.199915	77.066612	28.200763	77.066281
NA	0	0	NH-248A	SOH-NUH	30500	30400	Decreasing	R1	6.24	4.32	5.28	26	25-01-2023	28.200763	77.066281	28.201646	77.066042
NA	0	0	NH-248A	SOH-NUH	30400	30300	Decreasing	R1	1.95	2.47	2.21	36	25-01-2023	28.201646	77.066042	28.202506	77.065757
NA	0	0	NH-248A	SOH-NUH	30300	30200	Decreasing	R1	2.89	6.70	4.80	32	25-01-2023	28.202506	77.065757	28.203375	77.065463
NA	0	0	NH-248A	SOH-NUH	30200	30100	Decreasing	R1	9.55	13.40	11.48	21	25-01-2023	28.203375	77.065463	28.204252	77.065170
NA	0	0	NH-248A	SOH-NUH	30100	30000	Decreasing	R1	2.73	5.11	3.92	31	25-01-2023	28.204252	77.065170	28.205103	77.064889
NA	0	0	NH-248A	SOH-NUH	30000	29900	Decreasing	R1	2.73	2.54	2.64	37	25-01-2023	28.205103	77.064889	28.205972	77.064607
NA	0	0	NH-248A	SOH-NUH	29900	29800	Decreasing	R1	3.10	3.28	3.19	42	25-01-2023	28.205972	77.064607	28.206840	77.064320
NA	0	0	NH-248A	SOH-NUH	29800	29700	Decreasing	R1	3.90	4.57	4.24	42	25-01-2023	28.206840	77.064320	28.207705	77.064035
NA	0	0	NH-248A	SOH-NUH	29700	29600	Decreasing	R1	3.72	2.59	3.16	41	25-01-2023	28.207705	77.064035	28.208587	77.063744
NA	0	0	NH-248A	SOH-NUH	29600	29500	Decreasing	R1	2.29	2.82	2.56	40	25-01-2023	28.208587	77.063744	28.209443	77.063460
NA	0	0	NH-248A	SOH-NUH	29500	29400	Decreasing	R1	4.04	2.89	3.47	41	25-01-2023	28.209443	77.063460	28.210323	77.063161
NA	0	0	NH-248A	SOH-NUH	29400	29300	Decreasing	R1	2.72	2.25	2.49	42	25-01-2023	28.210323	77.063161	28.211189	77.062873
NA	0	0	NH-248A	SOH-NUH	29300	29200	Decreasing	R1	2.50	2.57	2.54	41	25-01-2023	28.211189	77.062873	28.212041	77.062589
NA	0	0	NH-248A	SOH-NUH	29200	29100	Decreasing	R1	10.46	8.66	9.56	27	25-01-2023	28.212041	77.062589	28.212920	77.062289
NA	0	0	NH-248A	SOH-NUH	29100	29000	Decreasing	R1	2.26	1.85	2.06	35	25-01-2023	28.212920	77.062289	28.213777	77.061997

NA	0	0	NH-248A	SOH-NUH	29000	28900	Decreasing	R1	2.06	1.53	1.80	38	25-01-2023	28.213777	77.061997	28.214656	77.061698
NA	0	0	NH-248A	SOH-NUH	28900	28800	Decreasing	R1	2.94	2.08	2.51	43	25-01-2023	28.214656	77.061698	28.215523	77.061407
NA	0	0	NH-248A	SOH-NUH	28800	28700	Decreasing	R1	2.24	1.83	2.04	41	25-01-2023	28.215523	77.061407	28.216375	77.061120
NA	0	0	NH-248A	SOH-NUH	28700	28600	Decreasing	R1	2.67	3.05	2.86	34	25-01-2023	28.216375	77.061120	28.217258	77.060826
NA	0	0	NH-248A	SOH-NUH	28600	28500	Decreasing	R1	12.26	13.65	12.96	20	25-01-2023	28.217258	77.060826	28.218136	77.060585
NA	0	0	NH-248A	SOH-NUH	28500	28400	Decreasing	R1	4.70	7.29	6.00	26	25-01-2023	28.218136	77.060585	28.219010	77.060813
NA	0	0	NH-248A	SOH-NUH	28400	28300	Decreasing	R1	1.52	2.41	1.97	41	25-01-2023	28.219010	77.060813	28.219837	77.061188
NA	0	0	NH-248A	SOH-NUH	28300	28200	Decreasing	R1	2.09	1.96	2.03	44	25-01-2023	28.219837	77.061188	28.220673	77.061565
NA	0	0	NH-248A	SOH-NUH	28200	28100	Decreasing	R1	2.03	2.26	2.15	49	25-01-2023	28.220673	77.061565	28.221512	77.061943
NA	0	0	NH-248A	SOH-NUH	28100	28000	Decreasing	R1	2.15	3.39	2.77	38	25-01-2023	28.221512	77.061943	28.222362	77.062321
NA	0	0	NH-248A	SOH-NUH	28000	27900	Decreasing	R1	8.47	8.15	8.31	22	25-01-2023	28.222362	77.062321	28.223216	77.062695
NA	0	0	NH-248A	SOH-NUH	27900	27800	Decreasing	R1	2.07	2.37	2.22	41	25-01-2023	28.223216	77.062695	28.224047	77.063058
NA	0	0	NH-248A	SOH-NUH	27800	27700	Decreasing	R1	2.84	4.16	3.50	40	25-01-2023	28.224047	77.063058	28.224903	77.063435
NA	0	0	NH-248A	SOH-NUH	27700	27600	Decreasing	R1	13.34	16.80	15.07	20	25-01-2023	28.224903	77.063435	28.225722	77.063851
NA	0	0	NH-248A	SOH-NUH	27600	27500	Decreasing	R1	21.36	21.03	21.20	20	25-01-2023	28.225722	77.063851	28.226506	77.064366
NA	0	0	NH-248A	SOH-NUH	27500	27400	Decreasing	R1	7.32	5.23	6.28	20	25-01-2023	28.226506	77.064366	28.227297	77.064853
NA	0	0	NH-248A	SOH-NUH	27400	27300	Decreasing	R1	3.66	4.99	4.33	23	25-01-2023	28.227297	77.064853	28.228135	77.065232
NA	0	0	NH-248A	SOH-NUH	27300	27200	Decreasing	R1	14.23	10.62	12.43	20	25-01-2023	28.228135	77.065232	28.228982	77.065588
NA	0	0	NH-248A	SOH-NUH	27200	27100	Decreasing	R1	30.00	30.00	30.00	20	25-01-2023	28.228982	77.065588	28.229840	77.065942
NA	0	0	NH-248A	SOH-NUH	27100	27000	Decreasing	R1	9.89	10.22	10.06	20	25-01-2023	28.229840	77.065942	28.230683	77.066293
NA	0	0	NH-248A	SOH-NUH	27000	26900	Decreasing	R1	2.59	3.19	2.89	39	25-01-2023	28.230683	77.066293	28.231530	77.066639
NA	0	0	NH-248A	SOH-NUH	26900	26800	Decreasing	R1	2.87	3.43	3.15	45	25-01-2023	28.231530	77.066639	28.232363	77.066995
NA	0	0	NH-248A	SOH-NUH	26800	26700	Decreasing	R1	3.92	4.06	3.99	38	25-01-2023	28.232363	77.066995	28.233225	77.067352
NA	0	0	NH-248A	SOH-NUH	26700	26600	Decreasing	R1	2.46	2.91	2.69	41	25-01-2023	28.233225	77.067352	28.234060	77.067701
NA	0	0	NH-248A	SOH-NUH	26600	26500	Decreasing	R1	3.40	6.65	5.03	37	25-01-2023	28.234060	77.067701	28.234919	77.068037
NA	0	0	NH-248A	SOH-NUH	26500	26400	Decreasing	R1	2.26	2.37	2.32	43	25-01-2023	28.234919	77.068037	28.235767	77.068392
NA	0	0	NH-248A	SOH-NUH	26400	26300	Decreasing	R1	3.88	3.66	3.77	38	25-01-2023	28.235767	77.068392	28.236610	77.068745
NA	0	0	NH-248A	SOH-NUH	26300	26200	Decreasing	R1	3.12	2.45	2.79	41	25-01-2023	28.236610	77.068745	28.237456	77.069109
NA	0	0	NH-248A	SOH-NUH	26200	26100	Decreasing	R1	2.99	2.50	2.75	47	25-01-2023	28.237456	77.069109	28.238296	77.069460

NA	0	0	NH-248A	SOH-NUH	26100	26000	Decreasing	R1	3.07	3.16	3.12	35	25-01-2023	28.238296	77.069460	28.239159	77.069821
NA	0	0	NH-248A	SOH-NUH	26000	25900	Decreasing	R1	1.96	2.53	2.25	30	25-01-2023	28.239159	77.069821	28.240005	77.070181
NA	0	0	NH-248A	SOH-NUH	25900	25800	Decreasing	R1	2.33	2.59	2.46	33	25-01-2023	28.240005	77.070181	28.240848	77.070529
NA	0	0	NH-248A	SOH-NUH	25800	25700	Decreasing	R1	14.40	11.73	13.07	20	25-01-2023	28.240848	77.070529	28.241712	77.070894
NA	0	0	NH-248A	SOH-NUH	25700	25600	Decreasing	R1	3.70	5.84	4.77	20	25-01-2023	28.241712	77.070894	28.242560	77.071248
NA	0	0	NH-248A	SOH-NUH	25600	25500	Decreasing	R1	1.68	2.21	1.95	34	25-01-2023	28.242560	77.071248	28.243413	77.071605
NA	0	0	NH-248A	SOH-NUH	25500	25400	Decreasing	R1	3.36	4.46	3.91	37	25-01-2023	28.243413	77.071605	28.244260	77.071955
NA	0	0	NH-248A	SOH-NUH	25400	25300	Decreasing	R1	4.79	6.20	5.50	20	25-01-2023	28.244260	77.071955	28.245120	77.072286
NA	0	0	NH-248A	SOH-NUH	25300	25200	Decreasing	R1	2.70	7.57	5.14	20	25-01-2023	28.245120	77.072286	28.246014	77.072435
NA	0	0	NH-248A	SOH-NUH	25200	25100	Decreasing	R1	2.79	4.44	3.62	20	25-01-2023	28.246014	77.072435	28.246899	77.072313
NA	0	0	NH-248A	SOH-NUH	25100	25000	Decreasing	R1	1.81	1.88	1.85	25	25-01-2023	28.246899	77.072313	28.247717	77.071901
NA	0	0	NH-248A	SOH-NUH	25000	24900	Decreasing	R1	19.79	17.34	18.57	20	25-01-2023	28.247717	77.071901	28.248468	77.071318
NA	0	0	NH-248A	SOH-NUH	24900	24800	Decreasing	R1	2.63	3.21	2.92	20	25-01-2023	28.248468	77.071318	28.249203	77.070734
NA	0	0	NH-248A	SOH-NUH	24800	24700	Decreasing	R1	2.02	1.82	1.92	28	25-01-2023	28.249203	77.070734	28.249942	77.070157
NA	0	0	NH-248A	SOH-NUH	24700	24600	Decreasing	R1	3.69	3.81	3.75	20	25-01-2023	28.249942	77.070157	28.250778	77.069751
NA	0	0	NH-248A	SOH-NUH	24600	24500	Decreasing	R1	4.22	4.43	4.33	20	25-01-2023	28.250778	77.069751	28.251661	77.069523
NA	0	0	NH-248A	SOH-NUH	46950	46900	Decreasing	R2	4.98	5.52	5.25	22	25-01-2023	28.086403	77.007496	28.086827	77.007316
NA	0	0	NH-248A	SOH-NUH	46900	46800	Decreasing	R2	8.42	8.83	8.63	22	25-01-2023	28.086827	77.007316	28.087683	77.006982
NA	0	0	NH-248A	SOH-NUH	46800	46700	Decreasing	R2	4.13	3.89	4.01	27	25-01-2023	28.087683	77.006982	28.088572	77.006776
NA	0	0	NH-248A	SOH-NUH	46700	46600	Decreasing	R2	3.25	3.20	3.23	22	25-01-2023	28.088572	77.006776	28.089469	77.006662
NA	0	0	NH-248A	SOH-NUH	46600	46500	Decreasing	R2	2.82	3.40	3.11	30	25-01-2023	28.089469	77.006662	28.090364	77.006631
NA	0	0	NH-248A	SOH-NUH	46500	46400	Decreasing	R2	3.22	2.85	3.04	40	25-01-2023	28.090364	77.006631	28.091268	77.006768
NA	0	0	NH-248A	SOH-NUH	46400	46300	Decreasing	R2	2.07	2.31	2.19	44	25-01-2023	28.091268	77.006768	28.092163	77.006890
NA	0	0	NH-248A	SOH-NUH	46300	46200	Decreasing	R2	1.97	2.19	2.08	45	25-01-2023	28.092163	77.006890	28.093063	77.007018
NA	0	0	NH-248A	SOH-NUH	46200	46100	Decreasing	R2	1.61	2.06	1.84	30	25-01-2023	28.093063	77.007018	28.093978	77.007146
NA	0	0	NH-248A	SOH-NUH	46100	46000	Decreasing	R2	2.71	2.07	2.39	25	25-01-2023	28.093978	77.007146	28.094868	77.007264
NA	0	0	NH-248A	SOH-NUH	46000	45900	Decreasing	R2	3.75	3.85	3.80	23	25-01-2023	28.094868	77.007264	28.095777	77.007395
NA	0	0	NH-248A	SOH-NUH	45900	45800	Decreasing	R2	3.03	2.81	2.92	30	25-01-2023	28.095777	77.007395	28.096659	77.007531
NA	0	0	NH-248A	SOH-NUH	45800	45700	Decreasing	R2	2.36	2.56	2.46	42	25-01-2023	28.096659	77.007531	28.097571	77.007670

NA	0	0	NH-248A	SOH-NUH	45700	45600	Decreasing	R2	2.10	2.52	2.31	39	25-01-2023	28.097571	77.007670	28.098468	77.007803
NA	0	0	NH-248A	SOH-NUH	45600	45500	Decreasing	R2	1.89	2.78	2.34	33	25-01-2023	28.098468	77.007803	28.099371	77.007941
NA	0	0	NH-248A	SOH-NUH	45500	45400	Decreasing	R2	1.77	3.59	2.68	26	25-01-2023	28.099371	77.007941	28.100266	77.008079
NA	0	0	NH-248A	SOH-NUH	45400	45300	Decreasing	R2	2.22	4.24	3.23	20	25-01-2023	28.100266	77.008079	28.101174	77.008215
NA	0	0	NH-248A	SOH-NUH	45300	45200	Decreasing	R2	3.60	6.57	5.09	20	25-01-2023	28.101174	77.008215	28.102187	77.008386
NA	0	0	NH-248A	SOH-NUH	45200	45100	Decreasing	R2	2.24	4.18	3.21	20	25-01-2023	28.102187	77.008386	28.103050	77.008673
NA	0	0	NH-248A	SOH-NUH	45100	45000	Decreasing	R2	2.84	4.18	3.51	21	25-01-2023	28.103050	77.008673	28.103896	77.009059
NA	0	0	NH-248A	SOH-NUH	45000	44900	Decreasing	R2	6.07	7.51	6.79	24	25-01-2023	28.103896	77.009059	28.104699	77.009510
NA	0	0	NH-248A	SOH-NUH	44900	44800	Decreasing	R2	5.12	4.91	5.02	32	25-01-2023	28.104699	77.009510	28.105485	77.010038
NA	0	0	NH-248A	SOH-NUH	44800	44700	Decreasing	R2	2.61	2.74	2.68	28	25-01-2023	28.105485	77.010038	28.106185	77.010678
NA	0	0	NH-248A	SOH-NUH	44700	44600	Decreasing	R2	3.68	5.01	4.35	36	25-01-2023	28.106185	77.010678	28.106826	77.011394
NA	0	0	NH-248A	SOH-NUH	44600	44500	Decreasing	R2	4.73	5.39	5.06	31	25-01-2023	28.106826	77.011394	28.107386	77.012185
NA	0	0	NH-248A	SOH-NUH	44500	44400	Decreasing	R2	2.28	2.30	2.29	44	25-01-2023	28.107386	77.012185	28.107915	77.013030
NA	0	0	NH-248A	SOH-NUH	44400	44300	Decreasing	R2	1.68	2.88	2.28	40	25-01-2023	28.107915	77.013030	28.108411	77.013888
NA	0	0	NH-248A	SOH-NUH	44300	44200	Decreasing	R2	1.81	2.01	1.91	37	25-01-2023	28.108411	77.013888	28.108877	77.014753
NA	0	0	NH-248A	SOH-NUH	44200	44100	Decreasing	R2	1.25	1.65	1.45	44	25-01-2023	28.108877	77.014753	28.109358	77.015637
NA	0	0	NH-248A	SOH-NUH	44100	44000	Decreasing	R2	1.55	1.15	1.35	50	25-01-2023	28.109358	77.015637	28.109831	77.016509
NA	0	0	NH-248A	SOH-NUH	44000	43900	Decreasing	R2	1.96	1.87	1.92	51	25-01-2023	28.109831	77.016509	28.110294	77.017372
NA	0	0	NH-248A	SOH-NUH	43900	43800	Decreasing	R2	1.30	1.41	1.36	51	25-01-2023	28.110294	77.017372	28.110761	77.018237
NA	0	0	NH-248A	SOH-NUH	43800	43700	Decreasing	R2	4.10	3.34	3.72	48	25-01-2023	28.110761	77.018237	28.111230	77.019139
NA	0	0	NH-248A	SOH-NUH	43700	43600	Decreasing	R2	3.88	5.68	4.78	32	25-01-2023	28.111230	77.019139	28.111542	77.020096
NA	0	0	NH-248A	SOH-NUH	43600	43500	Decreasing	R2	1.44	1.51	1.48	41	25-01-2023	28.111542	77.020096	28.111806	77.021078
NA	0	0	NH-248A	SOH-NUH	43500	43400	Decreasing	R2	1.69	1.49	1.59	48	25-01-2023	28.111806	77.021078	28.112052	77.022052
NA	0	0	NH-248A	SOH-NUH	43400	43300	Decreasing	R2	1.74	2.29	2.02	46	25-01-2023	28.112052	77.022052	28.112295	77.023021
NA	0	0	NH-248A	SOH-NUH	43300	43200	Decreasing	R2	2.25	1.55	1.90	57	25-01-2023	28.112295	77.023021	28.112604	77.023981
NA	0	0	NH-248A	SOH-NUH	43200	43100	Decreasing	R2	1.09	1.09	1.09	56	25-01-2023	28.112604	77.023981	28.113154	77.024818
NA	0	0	NH-248A	SOH-NUH	43100	43000	Decreasing	R2	1.73	1.35	1.54	53	25-01-2023	28.113154	77.024818	28.113804	77.025519
NA	0	0	NH-248A	SOH-NUH	43000	42900	Decreasing	R2	1.85	1.84	1.85	52	25-01-2023	28.113804	77.025519	28.114458	77.026199
NA	0	0	NH-248A	SOH-NUH	42900	42800	Decreasing	R2	1.79	2.08	1.94	55	25-01-2023	28.114458	77.026199	28.115191	77.026804

NA	0	0	NH-248A	SOH-NUH	42800	42700	Decreasing	R2	1.77	1.30	1.54	55	25-01-2023	28.115191	77.026804	28.115917	77.027416
NA	0	0	NH-248A	SOH-NUH	42700	42600	Decreasing	R2	1.88	1.65	1.77	55	25-01-2023	28.115917	77.027416	28.116486	77.028223
NA	0	0	NH-248A	SOH-NUH	42600	42500	Decreasing	R2	2.26	2.42	2.34	46	25-01-2023	28.116486	77.028223	28.116946	77.029122
NA	0	0	NH-248A	SOH-NUH	42500	42400	Decreasing	R2	3.16	3.59	3.38	24	25-01-2023	28.116946	77.029122	28.117403	77.030000
NA	0	0	NH-248A	SOH-NUH	42400	42300	Decreasing	R2	2.00	1.73	1.87	39	25-01-2023	28.117403	77.030000	28.117855	77.030879
NA	0	0	NH-248A	SOH-NUH	42300	42200	Decreasing	R2	2.49	1.90	2.20	31	25-01-2023	28.117855	77.030879	28.118168	77.031834
NA	0	0	NH-248A	SOH-NUH	42200	42100	Decreasing	R2	1.60	1.45	1.53	44	25-01-2023	28.118168	77.031834	28.118352	77.032824
NA	0	0	NH-248A	SOH-NUH	42100	42000	Decreasing	R2	1.81	1.58	1.70	56	25-01-2023	28.118352	77.032824	28.118603	77.033824
NA	0	0	NH-248A	SOH-NUH	42000	41900	Decreasing	R2	1.84	1.45	1.65	57	25-01-2023	28.118603	77.033824	28.118965	77.034737
NA	0	0	NH-248A	SOH-NUH	41900	41800	Decreasing	R2	3.30	2.76	3.03	45	25-01-2023	28.118965	77.034737	28.119343	77.035673
NA	0	0	NH-248A	SOH-NUH	41800	41700	Decreasing	R2	1.39	1.15	1.27	51	25-01-2023	28.119343	77.035673	28.119728	77.036612
NA	0	0	NH-248A	SOH-NUH	41700	41600	Decreasing	R2	1.96	1.84	1.90	54	25-01-2023	28.119728	77.036612	28.120142	77.037516
NA	0	0	NH-248A	SOH-NUH	41600	41500	Decreasing	R2	1.79	1.90	1.85	57	25-01-2023	28.120142	77.037516	28.120549	77.038441
NA	0	0	NH-248A	SOH-NUH	41500	41400	Decreasing	R2	1.80	1.48	1.64	58	25-01-2023	28.120549	77.038441	28.120818	77.039388
NA	0	0	NH-248A	SOH-NUH	41400	41300	Decreasing	R2	1.96	2.05	2.01	61	25-01-2023	28.120818	77.039388	28.120987	77.040406
NA	0	0	NH-248A	SOH-NUH	41300	41200	Decreasing	R2	1.87	1.38	1.63	61	25-01-2023	28.120987	77.040406	28.121108	77.041404
NA	0	0	NH-248A	SOH-NUH	41200	41100	Decreasing	R2	1.54	1.54	1.54	60	25-01-2023	28.121108	77.041404	28.121130	77.042457
NA	0	0	NH-248A	SOH-NUH	41100	41000	Decreasing	R2	1.66	1.51	1.59	58	25-01-2023	28.121130	77.042457	28.121104	77.043454
NA	0	0	NH-248A	SOH-NUH	41000	40900	Decreasing	R2	1.69	1.45	1.57	59	25-01-2023	28.121104	77.043454	28.121104	77.044489
NA	0	0	NH-248A	SOH-NUH	40900	40800	Decreasing	R2	2.23	1.64	1.94	61	25-01-2023	28.121104	77.044489	28.121255	77.045472
NA	0	0	NH-248A	SOH-NUH	40800	40700	Decreasing	R2	2.01	1.24	1.63	62	25-01-2023	28.121255	77.045472	28.121527	77.046475
NA	0	0	NH-248A	SOH-NUH	40700	40600	Decreasing	R2	2.38	2.05	2.22	64	25-01-2023	28.121527	77.046475	28.121861	77.047414
NA	0	0	NH-248A	SOH-NUH	40600	40500	Decreasing	R2	2.42	1.74	2.08	66	25-01-2023	28.121861	77.047414	28.122196	77.048351
NA	0	0	NH-248A	SOH-NUH	40500	40400	Decreasing	R2	1.86	1.51	1.69	68	25-01-2023	28.122196	77.048351	28.122545	77.049325
NA	0	0	NH-248A	SOH-NUH	40400	40300	Decreasing	R2	2.42	2.00	2.21	69	25-01-2023	28.122545	77.049325	28.122900	77.050264
NA	0	0	NH-248A	SOH-NUH	40300	40200	Decreasing	R2	2.31	1.64	1.98	67	25-01-2023	28.122900	77.050264	28.123357	77.051153
NA	0	0	NH-248A	SOH-NUH	40200	40100	Decreasing	R2	1.80	1.59	1.70	63	25-01-2023	28.123357	77.051153	28.123881	77.051968
NA	0	0	NH-248A	SOH-NUH	40100	40000	Decreasing	R2	1.68	1.72	1.70	62	25-01-2023	28.123881	77.051968	28.124420	77.052797
NA	0	0	NH-248A	SOH-NUH	40000	39900	Decreasing	R2	2.32	1.97	2.15	63	25-01-2023	28.124420	77.052797	28.125002	77.053564

NA	0	0	NH-248A	SOH-NUH	39900	39800	Decreasing	R2	2.46	1.97	2.22	64	25-01-2023	28.125002	77.053564	28.125588	77.054348
NA	0	0	NH-248A	SOH-NUH	39800	39700	Decreasing	R2	3.03	2.55	2.79	65	25-01-2023	28.125588	77.054348	28.126057	77.055240
NA	0	0	NH-248A	SOH-NUH	39700	39600	Decreasing	R2	2.34	2.01	2.18	66	25-01-2023	28.126057	77.055240	28.126476	77.056128
NA	0	0	NH-248A	SOH-NUH	39600	39500	Decreasing	R2	2.73	2.42	2.58	65	25-01-2023	28.126476	77.056128	28.126802	77.057089
NA	0	0	NH-248A	SOH-NUH	39500	39400	Decreasing	R2	2.48	2.37	2.43	64	25-01-2023	28.126802	77.057089	28.126906	77.058107
NA	0	0	NH-248A	SOH-NUH	39400	39300	Decreasing	R2	1.70	1.91	1.81	64	25-01-2023	28.126906	77.058107	28.127007	77.059124
NA	0	0	NH-248A	SOH-NUH	39300	39200	Decreasing	R2	2.04	2.54	2.29	58	25-01-2023	28.127007	77.059124	28.127264	77.060099
NA	0	0	NH-248A	SOH-NUH	39200	39100	Decreasing	R2	1.74	1.89	1.82	56	25-01-2023	28.127264	77.060099	28.127645	77.061019
NA	0	0	NH-248A	SOH-NUH	39100	39000	Decreasing	R2	1.72	1.32	1.52	55	25-01-2023	28.127645	77.061019	28.128031	77.061947
NA	0	0	NH-248A	SOH-NUH	39000	38900	Decreasing	R2	2.19	2.01	2.10	56	25-01-2023	28.128031	77.061947	28.128485	77.062829
NA	0	0	NH-248A	SOH-NUH	38900	38800	Decreasing	R2	2.89	2.62	2.76	56	25-01-2023	28.128485	77.062829	28.129037	77.063632
NA	0	0	NH-248A	SOH-NUH	38800	38700	Decreasing	R2	2.25	2.12	2.19	53	25-01-2023	28.129037	77.063632	28.129618	77.064429
NA	0	0	NH-248A	SOH-NUH	38700	38600	Decreasing	R2	1.55	2.20	1.88	31	25-01-2023	28.129618	77.064429	28.130226	77.065217
NA	0	0	NH-248A	SOH-NUH	38600	38500	Decreasing	R2	4.41	3.51	3.96	25	25-01-2023	28.130226	77.065217	28.131025	77.065576
NA	0	0	NH-248A	SOH-NUH	38500	38400	Decreasing	R2	1.96	1.94	1.95	42	25-01-2023	28.131025	77.065576	28.131941	77.065592
NA	0	0	NH-248A	SOH-NUH	38400	38300	Decreasing	R2	1.65	1.39	1.52	46	25-01-2023	28.131941	77.065592	28.132842	77.065587
NA	0	0	NH-248A	SOH-NUH	38300	38200	Decreasing	R2	2.29	2.87	2.58	32	25-01-2023	28.132842	77.065587	28.133757	77.065698
NA	0	0	NH-248A	SOH-NUH	38200	38100	Decreasing	R2	2.84	2.35	2.60	32	25-01-2023	28.133757	77.065698	28.134611	77.065992
NA	0	0	NH-248A	SOH-NUH	38100	38000	Decreasing	R2	3.30	2.61	2.96	35	25-01-2023	28.134611	77.065992	28.135434	77.066437
NA	0	0	NH-248A	SOH-NUH	38000	37900	Decreasing	R2	3.06	3.28	3.17	36	25-01-2023	28.135434	77.066437	28.136164	77.067046
NA	0	0	NH-248A	SOH-NUH	37900	37800	Decreasing	R2	14.27	12.56	13.42	20	25-01-2023	28.136164	77.067046	28.136991	77.067422
NA	0	0	NH-248A	SOH-NUH	37800	37700	Decreasing	R2	1.84	1.79	1.82	40	25-01-2023	28.136991	77.067422	28.137874	77.067595
NA	0	0	NH-248A	SOH-NUH	37700	37600	Decreasing	R2	2.58	2.30	2.44	43	25-01-2023	28.137874	77.067595	28.138779	77.067760
NA	0	0	NH-248A	SOH-NUH	37600	37500	Decreasing	R2	1.33	1.08	1.21	50	25-01-2023	28.138779	77.067760	28.139674	77.067940
NA	0	0	NH-248A	SOH-NUH	37500	37400	Decreasing	R2	1.95	2.08	2.02	52	25-01-2023	28.139674	77.067940	28.140552	77.068123
NA	0	0	NH-248A	SOH-NUH	37400	37300	Decreasing	R2	2.35	2.62	2.49	53	25-01-2023	28.140552	77.068123	28.141454	77.068281
NA	0	0	NH-248A	SOH-NUH	37300	37200	Decreasing	R2	1.70	1.96	1.83	55	25-01-2023	28.141454	77.068281	28.142360	77.068415
NA	0	0	NH-248A	SOH-NUH	37200	37100	Decreasing	R2	2.34	2.13	2.24	57	25-01-2023	28.142360	77.068415	28.143252	77.068514
NA	0	0	NH-248A	SOH-NUH	37100	37000	Decreasing	R2	1.34	1.28	1.31	60	25-01-2023	28.143252	77.068514	28.144157	77.068621

NA	0	0	NH-248A	SOH-NUH	37000	36900	Decreasing	R2	1.51	1.54	1.53	63	25-01-2023	28.144157	77.068621	28.145070	77.068724
NA	0	0	NH-248A	SOH-NUH	36900	36800	Decreasing	R2	1.31	1.75	1.53	63	25-01-2023	28.145070	77.068724	28.145953	77.068829
NA	0	0	NH-248A	SOH-NUH	36800	36700	Decreasing	R2	1.63	1.91	1.77	56	25-01-2023	28.145953	77.068829	28.146850	77.068929
NA	0	0	NH-248A	SOH-NUH	36700	36600	Decreasing	R2	1.91	2.72	2.32	57	25-01-2023	28.146850	77.068929	28.147755	77.069032
NA	0	0	NH-248A	SOH-NUH	36600	36500	Decreasing	R2	1.35	1.76	1.56	57	25-01-2023	28.147755	77.069032	28.148672	77.069138
NA	0	0	NH-248A	SOH-NUH	36500	36400	Decreasing	R2	1.37	1.30	1.34	58	25-01-2023	28.148672	77.069138	28.149568	77.069227
NA	0	0	NH-248A	SOH-NUH	36400	36300	Decreasing	R2	1.76	1.63	1.70	61	25-01-2023	28.149568	77.069227	28.150487	77.069333
NA	0	0	NH-248A	SOH-NUH	36300	36200	Decreasing	R2	1.88	1.65	1.77	64	25-01-2023	28.150487	77.069333	28.151391	77.069421
NA	0	0	NH-248A	SOH-NUH	36200	36100	Decreasing	R2	1.85	1.99	1.92	67	25-01-2023	28.151391	77.069421	28.152266	77.069487
NA	0	0	NH-248A	SOH-NUH	36100	36000	Decreasing	R2	1.98	1.85	1.92	68	25-01-2023	28.152266	77.069487	28.153185	77.069562
NA	0	0	NH-248A	SOH-NUH	36000	35900	Decreasing	R2	1.98	1.67	1.83	62	25-01-2023	28.153185	77.069562	28.154098	77.069615
NA	0	0	NH-248A	SOH-NUH	35900	35800	Decreasing	R2	1.99	1.61	1.80	60	25-01-2023	28.154098	77.069615	28.155010	77.069658
NA	0	0	NH-248A	SOH-NUH	35800	35700	Decreasing	R2	1.80	2.23	2.02	62	25-01-2023	28.155010	77.069658	28.155918	77.069699
NA	0	0	NH-248A	SOH-NUH	35700	35600	Decreasing	R2	2.05	1.97	2.01	63	25-01-2023	28.155918	77.069699	28.156808	77.069726
NA	0	0	NH-248A	SOH-NUH	35600	35500	Decreasing	R2	2.19	2.05	2.12	64	25-01-2023	28.156808	77.069726	28.157704	77.069792
NA	0	0	NH-248A	SOH-NUH	35500	35400	Decreasing	R2	2.39	1.73	2.06	65	25-01-2023	28.157704	77.069792	28.158613	77.069897
NA	0	0	NH-248A	SOH-NUH	35400	35300	Decreasing	R2	2.15	1.73	1.94	65	25-01-2023	28.158613	77.069897	28.159520	77.070000
NA	0	0	NH-248A	SOH-NUH	35300	35200	Decreasing	R2	2.20	1.90	2.05	64	25-01-2023	28.159520	77.070000	28.160413	77.070098
NA	0	0	NH-248A	SOH-NUH	35200	35100	Decreasing	R2	2.85	2.44	2.65	58	25-01-2023	28.160413	77.070098	28.161320	77.070217
NA	0	0	NH-248A	SOH-NUH	35100	35000	Decreasing	R2	2.08	1.99	2.04	57	25-01-2023	28.161320	77.070217	28.162237	77.070346
NA	0	0	NH-248A	SOH-NUH	35000	34900	Decreasing	R2	1.62	1.74	1.68	62	25-01-2023	28.162237	77.070346	28.163132	77.070458
NA	0	0	NH-248A	SOH-NUH	34900	34800	Decreasing	R2	2.62	1.92	2.27	64	25-01-2023	28.163132	77.070458	28.164037	77.070557
NA	0	0	NH-248A	SOH-NUH	34800	34700	Decreasing	R2	1.48	1.23	1.36	65	25-01-2023	28.164037	77.070557	28.164920	77.070657
NA	0	0	NH-248A	SOH-NUH	34700	34600	Decreasing	R2	2.02	1.76	1.89	65	25-01-2023	28.164920	77.070657	28.165827	77.070763
NA	0	0	NH-248A	SOH-NUH	34600	34500	Decreasing	R2	1.65	1.49	1.57	61	25-01-2023	28.165827	77.070763	28.166751	77.070871
NA	0	0	NH-248A	SOH-NUH	34500	34400	Decreasing	R2	1.97	1.70	1.84	57	25-01-2023	28.166751	77.070871	28.167633	77.070958
NA	0	0	NH-248A	SOH-NUH	34400	34300	Decreasing	R2	2.17	2.19	2.18	51	25-01-2023	28.167633	77.070958	28.168552	77.071050
NA	0	0	NH-248A	SOH-NUH	34300	34200	Decreasing	R2	1.95	2.16	2.06	49	25-01-2023	28.168552	77.071050	28.169440	77.071130
NA	0	0	NH-248A	SOH-NUH	34200	34100	Decreasing	R2	3.24	3.77	3.51	54	25-01-2023	28.169440	77.071130	28.170354	77.071106

NA	0	0	NH-248A	SOH-NUH	34100	34000	Decreasing	R2	2.71	4.00	3.36	54	25-01-2023	28.170354	77.071106	28.171242	77.070944
NA	0	0	NH-248A	SOH-NUH	34000	33900	Decreasing	R2	4.77	9.24	7.01	26	25-01-2023	28.171242	77.070944	28.172159	77.070813
NA	0	0	NH-248A	SOH-NUH	33900	33800	Decreasing	R2	11.98	15.64	13.81	20	25-01-2023	28.172159	77.070813	28.173039	77.070634
NA	0	0	NH-248A	SOH-NUH	33800	33700	Decreasing	R2	2.38	3.62	3.00	25	25-01-2023	28.173039	77.070634	28.173949	77.070480
NA	0	0	NH-248A	SOH-NUH	33700	33600	Decreasing	R2	1.94	3.00	2.47	36	25-01-2023	28.173949	77.070480	28.174847	77.070409
NA	0	0	NH-248A	SOH-NUH	33600	33500	Decreasing	R2	1.81	1.92	1.87	38	25-01-2023	28.174847	77.070409	28.175755	77.070418
NA	0	0	NH-248A	SOH-NUH	33500	33400	Decreasing	R2	1.64	1.66	1.65	46	25-01-2023	28.175755	77.070418	28.176658	77.070437
NA	0	0	NH-248A	SOH-NUH	33400	33300	Decreasing	R2	1.81	1.30	1.56	49	25-01-2023	28.176658	77.070437	28.177563	77.070498
NA	0	0	NH-248A	SOH-NUH	33300	33200	Decreasing	R2	2.72	2.36	2.54	46	25-01-2023	28.177563	77.070498	28.178440	77.070765
NA	0	0	NH-248A	SOH-NUH	33200	33100	Decreasing	R2	3.28	4.39	3.84	36	25-01-2023	28.178440	77.070765	28.179288	77.071141
NA	0	0	NH-248A	SOH-NUH	33100	33000	Decreasing	R2	6.61	6.71	6.66	21	25-01-2023	28.179288	77.071141	28.180126	77.071542
NA	0	0	NH-248A	SOH-NUH	33000	32900	Decreasing	R2	2.16	2.44	2.30	36	25-01-2023	28.180126	77.071542	28.180962	77.071889
NA	0	0	NH-248A	SOH-NUH	32900	32800	Decreasing	R2	1.92	1.76	1.84	50	25-01-2023	28.180962	77.071889	28.181827	77.072162
NA	0	0	NH-248A	SOH-NUH	32800	32700	Decreasing	R2	2.41	1.71	2.06	54	25-01-2023	28.181827	77.072162	28.182741	77.072321
NA	0	0	NH-248A	SOH-NUH	32700	32600	Decreasing	R2	2.31	1.64	1.98	58	25-01-2023	28.182741	77.072321	28.183643	77.072449
NA	0	0	NH-248A	SOH-NUH	32600	32500	Decreasing	R2	1.72	1.77	1.75	62	25-01-2023	28.183643	77.072449	28.184537	77.072592
NA	0	0	NH-248A	SOH-NUH	32500	32400	Decreasing	R2	2.26	4.70	3.48	56	25-01-2023	28.184537	77.072592	28.185437	77.072732
NA	0	0	NH-248A	SOH-NUH	32400	32300	Decreasing	R2	2.17	3.79	2.98	54	25-01-2023	28.185437	77.072732	28.186325	77.072852
NA	0	0	NH-248A	SOH-NUH	32300	32200	Decreasing	R2	2.17	2.19	2.18	56	25-01-2023	28.186325	77.072852	28.187240	77.072990
NA	0	0	NH-248A	SOH-NUH	32200	32100	Decreasing	R2	2.42	2.72	2.57	57	25-01-2023	28.187240	77.072990	28.188131	77.073100
NA	0	0	NH-248A	SOH-NUH	32100	32000	Decreasing	R2	2.28	2.55	2.42	57	25-01-2023	28.188131	77.073100	28.189035	77.072962
NA	0	0	NH-248A	SOH-NUH	32000	31900	Decreasing	R2	2.15	3.43	2.79	52	25-01-2023	28.189035	77.072962	28.189859	77.072563
NA	0	0	NH-248A	SOH-NUH	31900	31800	Decreasing	R2	2.21	3.71	2.96	49	25-01-2023	28.189859	77.072563	28.190617	77.072006
NA	0	0	NH-248A	SOH-NUH	31800	31700	Decreasing	R2	1.87	2.38	2.13	56	25-01-2023	28.190617	77.072006	28.191385	77.071462
NA	0	0	NH-248A	SOH-NUH	31700	31600	Decreasing	R2	1.31	2.40	1.86	61	25-01-2023	28.191385	77.071462	28.192164	77.070918
NA	0	0	NH-248A	SOH-NUH	31600	31500	Decreasing	R2	1.88	2.41	2.15	62	25-01-2023	28.192164	77.070918	28.192932	77.070370
NA	0	0	NH-248A	SOH-NUH	31500	31400	Decreasing	R2	1.62	1.61	1.62	63	25-01-2023	28.192932	77.070370	28.193686	77.069837
NA	0	0	NH-248A	SOH-NUH	31400	31300	Decreasing	R2	1.55	1.92	1.74	60	25-01-2023	28.193686	77.069837	28.194458	77.069293
NA	0	0	NH-248A	SOH-NUH	31300	31200	Decreasing	R2	5.51	5.82	5.67	26	25-01-2023	28.194458	77.069293	28.195251	77.068745

NA	0	0	NH-248A	SOH-NUH	31200	31100	Decreasing	R2	1.92	1.85	1.89	42	25-01-2023	28.195251	77.068745	28.196008	77.068211
NA	0	0	NH-248A	SOH-NUH	31100	31000	Decreasing	R2	3.00	2.51	2.76	50	25-01-2023	28.196008	77.068211	28.196787	77.067671
NA	0	0	NH-248A	SOH-NUH	31000	30900	Decreasing	R2	2.16	2.00	2.08	56	25-01-2023	28.196787	77.067671	28.197623	77.067308
NA	0	0	NH-248A	SOH-NUH	30900	30800	Decreasing	R2	1.98	1.88	1.93	59	25-01-2023	28.197623	77.067308	28.198505	77.067021
NA	0	0	NH-248A	SOH-NUH	30800	30700	Decreasing	R2	2.76	3.79	3.28	45	25-01-2023	28.198505	77.067021	28.199374	77.066741
NA	0	0	NH-248A	SOH-NUH	30700	30600	Decreasing	R2	5.97	10.73	8.35	22	25-01-2023	28.199374	77.066741	28.200263	77.066463
NA	0	0	NH-248A	SOH-NUH	30600	30500	Decreasing	R2	25.37	11.59	18.48	20	25-01-2023	28.200263	77.066463	28.201133	77.066186
NA	0	0	NH-248A	SOH-NUH	30500	30400	Decreasing	R2	6.73	9.87	8.30	25	25-01-2023	28.201133	77.066186	28.201992	77.065882
NA	0	0	NH-248A	SOH-NUH	30400	30300	Decreasing	R2	1.63	2.30	1.97	39	25-01-2023	28.201992	77.065882	28.202856	77.065586
NA	0	0	NH-248A	SOH-NUH	30300	30200	Decreasing	R2	2.12	3.76	2.94	43	25-01-2023	28.202856	77.065586	28.203737	77.065291
NA	0	0	NH-248A	SOH-NUH	30200	30100	Decreasing	R2	5.96	6.63	6.30	28	25-01-2023	28.203737	77.065291	28.204594	77.065003
NA	0	0	NH-248A	SOH-NUH	30100	30000	Decreasing	R2	3.15	2.58	2.87	37	25-01-2023	28.204594	77.065003	28.205474	77.064720
NA	0	0	NH-248A	SOH-NUH	30000	29900	Decreasing	R2	2.15	2.81	2.48	50	25-01-2023	28.205474	77.064720	28.206346	77.064429
NA	0	0	NH-248A	SOH-NUH	29900	29800	Decreasing	R2	2.82	2.89	2.86	54	25-01-2023	28.206346	77.064429	28.207208	77.064142
NA	0	0	NH-248A	SOH-NUH	29800	29700	Decreasing	R2	2.95	3.28	3.12	51	25-01-2023	28.207208	77.064142	28.208076	77.063855
NA	0	0	NH-248A	SOH-NUH	29700	29600	Decreasing	R2	2.16	2.14	2.15	48	25-01-2023	28.208076	77.063855	28.208953	77.063559
NA	0	0	NH-248A	SOH-NUH	29600	29500	Decreasing	R2	1.81	2.04	1.93	43	25-01-2023	28.208953	77.063559	28.209829	77.063270
NA	0	0	NH-248A	SOH-NUH	29500	29400	Decreasing	R2	1.93	3.27	2.60	45	25-01-2023	28.209829	77.063270	28.210695	77.062980
NA	0	0	NH-248A	SOH-NUH	29400	29300	Decreasing	R2	2.70	2.26	2.48	47	25-01-2023	28.210695	77.062980	28.211558	77.062696
NA	0	0	NH-248A	SOH-NUH	29300	29200	Decreasing	R2	2.58	3.25	2.92	37	25-01-2023	28.211558	77.062696	28.212429	77.062401
NA	0	0	NH-248A	SOH-NUH	29200	29100	Decreasing	R2	13.02	11.19	12.11	21	25-01-2023	28.212429	77.062401	28.213309	77.062096
NA	0	0	NH-248A	SOH-NUH	29100	29000	Decreasing	R2	2.31	2.13	2.22	37	25-01-2023	28.213309	77.062096	28.214175	77.061797
NA	0	0	NH-248A	SOH-NUH	29000	28900	Decreasing	R2	1.72	1.50	1.61	46	25-01-2023	28.214175	77.061797	28.215039	77.061506
NA	0	0	NH-248A	SOH-NUH	28900	28800	Decreasing	R2	1.75	1.59	1.67	49	25-01-2023	28.215039	77.061506	28.215922	77.061220
NA	0	0	NH-248A	SOH-NUH	28800	28700	Decreasing	R2	3.26	2.76	3.01	35	25-01-2023	28.215922	77.061220	28.216794	77.060947
NA	0	0	NH-248A	SOH-NUH	28700	28600	Decreasing	R2	2.39	2.73	2.56	32	25-01-2023	28.216794	77.060947	28.217655	77.060640
NA	0	0	NH-248A	SOH-NUH	28600	28500	Decreasing	R2	14.19	13.01	13.60	20	25-01-2023	28.217655	77.060640	28.218555	77.060597
NA	0	0	NH-248A	SOH-NUH	28500	28400	Decreasing	R2	4.31	7.36	5.84	30	25-01-2023	28.218555	77.060597	28.219396	77.060959
NA	0	0	NH-248A	SOH-NUH	28400	28300	Decreasing	R2	1.50	1.27	1.39	43	25-01-2023	28.219396	77.060959	28.220233	77.061335

NA	0	0	NH-248A	SOH-NUH	28300	28200	Decreasing	R2	1.51	1.84	1.68	49	25-01-2023	28.220233	77.061335	28.221087	77.061721
NA	0	0	NH-248A	SOH-NUH	28200	28100	Decreasing	R2	2.25	2.00	2.13	52	25-01-2023	28.221087	77.061721	28.221915	77.062086
NA	0	0	NH-248A	SOH-NUH	28100	28000	Decreasing	R2	2.24	2.00	2.12	45	25-01-2023	28.221915	77.062086	28.222772	77.062459
NA	0	0	NH-248A	SOH-NUH	28000	27900	Decreasing	R2	8.09	5.11	6.60	31	25-01-2023	28.222772	77.062459	28.223620	77.062839
NA	0	0	NH-248A	SOH-NUH	27900	27800	Decreasing	R2	1.83	1.89	1.86	46	25-01-2023	28.223620	77.062839	28.224458	77.063207
NA	0	0	NH-248A	SOH-NUH	27800	27700	Decreasing	R2	2.34	2.26	2.30	51	25-01-2023	28.224458	77.063207	28.225288	77.063586
NA	0	0	NH-248A	SOH-NUH	27700	27600	Decreasing	R2	11.55	13.91	12.73	23	25-01-2023	28.225288	77.063586	28.226110	77.064079
NA	0	0	NH-248A	SOH-NUH	27600	27500	Decreasing	R2	20.19	19.86	20.03	20	25-01-2023	28.226110	77.064079	28.226890	77.064586
NA	0	0	NH-248A	SOH-NUH	27500	27400	Decreasing	R2	8.61	8.84	8.73	20	25-01-2023	28.226890	77.064586	28.227712	77.065016
NA	0	0	NH-248A	SOH-NUH	27400	27300	Decreasing	R2	6.26	6.83	6.55	26	25-01-2023	28.227712	77.065016	28.228564	77.065373
NA	0	0	NH-248A	SOH-NUH	27300	27200	Decreasing	R2	10.28	13.57	11.93	20	25-01-2023	28.228564	77.065373	28.229415	77.065739
NA	0	0	NH-248A	SOH-NUH	27200	27100	Decreasing	R2	22.45	20.85	21.65	20	25-01-2023	28.229415	77.065739	28.230275	77.066082
NA	0	0	NH-248A	SOH-NUH	27100	27000	Decreasing	R2	7.65	5.16	6.41	31	25-01-2023	28.230275	77.066082	28.231123	77.066434
NA	0	0	NH-248A	SOH-NUH	27000	26900	Decreasing	R2	2.88	2.35	2.62	44	25-01-2023	28.231123	77.066434	28.231975	77.066791
NA	0	0	NH-248A	SOH-NUH	26900	26800	Decreasing	R2	2.53	2.56	2.55	50	25-01-2023	28.231975	77.066791	28.232826	77.067161
NA	0	0	NH-248A	SOH-NUH	26800	26700	Decreasing	R2	3.05	3.05	3.05	48	25-01-2023	28.232826	77.067161	28.233670	77.067506
NA	0	0	NH-248A	SOH-NUH	26700	26600	Decreasing	R2	1.82	2.13	1.98	49	25-01-2023	28.233670	77.067506	28.234522	77.067861
NA	0	0	NH-248A	SOH-NUH	26600	26500	Decreasing	R2	1.91	2.00	1.96	50	25-01-2023	28.234522	77.067861	28.235373	77.068213
NA	0	0	NH-248A	SOH-NUH	26500	26400	Decreasing	R2	1.51	2.32	1.92	50	25-01-2023	28.235373	77.068213	28.236229	77.068573
NA	0	0	NH-248A	SOH-NUH	26400	26300	Decreasing	R2	3.09	3.37	3.23	53	25-01-2023	28.236229	77.068573	28.237078	77.068924
NA	0	0	NH-248A	SOH-NUH	26300	26200	Decreasing	R2	1.82	2.28	2.05	53	25-01-2023	28.237078	77.068924	28.237935	77.069278
NA	0	0	NH-248A	SOH-NUH	26200	26100	Decreasing	R2	2.93	3.49	3.21	22	25-01-2023	28.237935	77.069278	28.239076	77.069749
NA	0	0	NH-248A	SOH-NUH	26100	26000	Decreasing	R2	2.25	2.39	2.32	24	25-01-2023	28.239076	77.069749	28.239924	77.070110
NA	0	0	NH-248A	SOH-NUH	26000	25900	Decreasing	R2	2.43	2.50	2.47	28	25-01-2023	28.239924	77.070110	28.240781	77.070476
NA	0	0	NH-248A	SOH-NUH	25900	25800	Decreasing	R2	10.33	10.11	10.22	20	25-01-2023	28.240781	77.070476	28.241680	77.070816
NA	0	0	NH-248A	SOH-NUH	25800	25700	Decreasing	R2	3.20	2.93	3.07	24	25-01-2023	28.241680	77.070816	28.242569	77.071202
NA	0	0	NH-248A	SOH-NUH	25700	25600	Decreasing	R2	2.66	1.95	2.31	22	25-01-2023	28.242569	77.071202	28.243419	77.071561
NA	0	0	NH-248A	SOH-NUH	25600	25500	Decreasing	R2	2.26	2.52	2.39	33	25-01-2023	28.243419	77.071561	28.244263	77.071906
NA	0	0	NH-248A	SOH-NUH	25500	25400	Decreasing	R2	10.47	9.98	10.23	20	25-01-2023	28.244263	77.071906	28.245134	77.072250

NA	0	0	NH-248A	SOH-NUH	25400	25300	Decreasing	R2	1.98	2.15	2.07	23	25-01-2023	28.245134	77.072250	28.246115	77.072385
NA	0	0	NH-248A	SOH-NUH	25300	25200	Decreasing	R2	2.49	2.41	2.45	23	25-01-2023	28.246115	77.072385	28.246999	77.072205
NA	0	0	NH-248A	SOH-NUH	25200	25100	Decreasing	R2	2.29	2.16	2.23	33	25-01-2023	28.246999	77.072205	28.247795	77.071753
NA	0	0	NH-248A	SOH-NUH	25100	25000	Decreasing	R2	5.78	5.28	5.53	20	25-01-2023	28.247795	77.071753	28.248632	77.071109
NA	0	0	NH-248A	SOH-NUH	25000	24900	Decreasing	R2	2.67	2.68	2.68	30	25-01-2023	28.248632	77.071109	28.249378	77.070536
NA	0	0	NH-248A	SOH-NUH	24900	24800	Decreasing	R2	2.49	2.43	2.46	43	25-01-2023	28.249378	77.070536	28.250130	77.069960
NA	0	0	NH-248A	SOH-NUH	24800	24700	Decreasing	R2	9.02	7.73	8.38	43	25-01-2023	28.250130	77.069960	28.250973	77.069620
NA	0	0	NH-248A	SOH-NUH	24700	24600	Decreasing	R2	2.16	2.44	2.30	36	25-01-2023	28.250973	77.069620	28.250973	77.069620
NA	0	0	NH-248A	SOH-NUH	24600	24500	Decreasing	R2	1.92	1.76	1.84	50	25-01-2023	28.250973	77.069620	28.250973	77.069620

Rut Depth

	As per Old NH number		New NH number		As per New NH number									Start		End	
Nhnumber_old	StartChainage	EndChainage	NHNumber	SectionCode	StartChainage	EndChainage	Direction	LaneNumber	RuttingLeft	RuttingRight	RuttingAvg	Speed	SurveyDate	Latitude	Longitude	Latitude	Longitude
NA	0	0	NH-248A	SOH-NUH	24500	25000	Increasing	L1	2.85	5.67	4.26	28	25-01-2023	28.251640	77.069565	28.247712	77.071952
NA	0	0	NH-248A	SOH-NUH	25000	25500	Increasing	L1	2.81	5.90	4.35	26	25-01-2023	28.247712	77.071952	28.243393	77.071638
NA	0	0	NH-248A	SOH-NUH	25500	26000	Increasing	L1	4.89	8.44	6.67	29	25-01-2023	28.243393	77.071638	28.239151	77.069862
NA	0	0	NH-248A	SOH-NUH	26000	26500	Increasing	L1	4.03	5.72	4.87	42	25-01-2023	28.239151	77.069862	28.234913	77.068096
NA	0	0	NH-248A	SOH-NUH	26500	27000	Increasing	L1	4.32	7.24	5.78	36	25-01-2023	28.234913	77.068096	28.230667	77.066341
NA	0	0	NH-248A	SOH-NUH	27000	27500	Increasing	L1	11.34	8.89	10.12	27	25-01-2023	28.230667	77.066341	28.226484	77.064420
NA	0	0	NH-248A	SOH-NUH	27500	28000	Increasing	L1	6.30	8.63	7.46	26	25-01-2023	28.226484	77.064420	28.222357	77.062365
NA	0	0	NH-248A	SOH-NUH	28000	28500	Increasing	L1	3.69	6.36	5.03	36	25-01-2023	28.222357	77.062365	28.218116	77.060640
NA	0	0	NH-248A	SOH-NUH	28500	29000	Increasing	L1	3.47	4.16	3.81	42	25-01-2023	28.218116	77.060640	28.213772	77.062054
NA	0	0	NH-248A	SOH-NUH	29000	29500	Increasing	L1	4.03	5.62	4.83	44	25-01-2023	28.213772	77.062054	28.209465	77.063510
NA	0	0	NH-248A	SOH-NUH	29500	30000	Increasing	L1	4.10	5.20	4.65	49	25-01-2023	28.209465	77.063510	28.205114	77.064952
NA	0	0	NH-248A	SOH-NUH	30000	30500	Increasing	L1	4.74	5.80	5.27	44	25-01-2023	28.205114	77.064952	28.200767	77.066397
NA	0	0	NH-248A	SOH-NUH	30500	31000	Increasing	L1	3.59	6.49	5.04	46	25-01-2023	28.200767	77.066397	28.196507	77.068002
NA	0	0	NH-248A	SOH-NUH	31000	31500	Increasing	L1	5.01	6.92	5.97	41	25-01-2023	28.196507	77.068002	28.192663	77.070706
NA	0	0	NH-248A	SOH-NUH	31500	32000	Increasing	L1	4.00	6.61	5.30	52	25-01-2023	28.192663	77.070706	28.188715	77.073155

NA	0	0	NH-248A	SOH-NUH	32000	32500	Increasing	L1	4.03	6.87	5.45	52	25-01-2023	28.188715	77.073155	28.184225	77.072633
NA	0	0	NH-248A	SOH-NUH	32500	33000	Increasing	L1	4.08	7.01	5.55	46	25-01-2023	28.184225	77.072633	28.179844	77.071469
NA	0	0	NH-248A	SOH-NUH	33000	33500	Increasing	L1	4.85	6.22	5.54	40	25-01-2023	28.179844	77.071469	28.175479	77.070470
NA	0	0	NH-248A	SOH-NUH	33500	34000	Increasing	L1	5.29	7.65	6.47	28	25-01-2023	28.175479	77.070470	28.170993	77.071047
NA	0	0	NH-248A	SOH-NUH	34000	34500	Increasing	L1	4.64	5.84	5.24	33	25-01-2023	28.170993	77.071047	28.166485	77.070916
NA	0	0	NH-248A	SOH-NUH	34500	35000	Increasing	L1	4.84	7.26	6.05	42	25-01-2023	28.166485	77.070916	28.162000	77.070391
NA	0	0	NH-248A	SOH-NUH	35000	35500	Increasing	L1	4.99	5.73	5.36	45	25-01-2023	28.162000	77.070391	28.157495	77.069865
NA	0	0	NH-248A	SOH-NUH	35500	36000	Increasing	L1	4.29	5.66	4.98	46	25-01-2023	28.157495	77.069865	28.152981	77.069633
NA	0	0	NH-248A	SOH-NUH	36000	36500	Increasing	L1	3.76	5.98	4.87	48	25-01-2023	28.152981	77.069633	28.148475	77.069197
NA	0	0	NH-248A	SOH-NUH	36500	37000	Increasing	L1	5.61	6.70	6.15	49	25-01-2023	28.148475	77.069197	28.143976	77.068687
NA	0	0	NH-248A	SOH-NUH	37000	37500	Increasing	L1	5.35	6.89	6.12	47	25-01-2023	28.143976	77.068687	28.139494	77.067984
NA	0	0	NH-248A	SOH-NUH	37500	38000	Increasing	L1	5.01	8.28	6.65	33	25-01-2023	28.139494	77.067984	28.135294	77.066394
NA	0	0	NH-248A	SOH-NUH	38000	38500	Increasing	L1	6.38	9.19	7.78	33	25-01-2023	28.135294	77.066394	28.130877	77.065634
NA	0	0	NH-248A	SOH-NUH	38500	39000	Increasing	L1	6.65	8.03	7.34	40	25-01-2023	28.130877	77.065634	28.127953	77.061890
NA	0	0	NH-248A	SOH-NUH	39000	39500	Increasing	L1	4.40	6.07	5.23	52	25-01-2023	28.127953	77.061890	28.126742	77.057037
NA	0	0	NH-248A	SOH-NUH	39500	40000	Increasing	L1	4.31	6.32	5.32	52	25-01-2023	28.126742	77.057037	28.124345	77.052762
NA	0	0	NH-248A	SOH-NUH	40000	40500	Increasing	L1	4.90	6.77	5.84	51	25-01-2023	28.124345	77.052762	28.122143	77.048348
NA	0	0	NH-248A	SOH-NUH	40500	41000	Increasing	L1	5.53	8.32	6.92	51	25-01-2023	28.122143	77.048348	28.121056	77.043447
NA	0	0	NH-248A	SOH-NUH	41000	41500	Increasing	L1	4.23	5.72	4.97	49	25-01-2023	28.121056	77.043447	28.120486	77.038426
NA	0	0	NH-248A	SOH-NUH	41500	42000	Increasing	L1	3.63	6.04	4.83	36	25-01-2023	28.120486	77.038426	28.118550	77.033812
NA	0	0	NH-248A	SOH-NUH	42000	42500	Increasing	L1	5.38	7.25	6.31	32	25-01-2023	28.118550	77.033812	28.116907	77.029124
NA	0	0	NH-248A	SOH-NUH	42500	43000	Increasing	L1	3.74	6.03	4.88	44	25-01-2023	28.116907	77.029124	28.113752	77.025532
NA	0	0	NH-248A	SOH-NUH	43000	43500	Increasing	L1	4.60	7.08	5.84	35	25-01-2023	28.113752	77.025532	28.111771	77.021079
NA	0	0	NH-248A	SOH-NUH	43500	44000	Increasing	L1	3.45	5.97	4.71	39	25-01-2023	28.111771	77.021079	28.109805	77.016543
NA	0	0	NH-248A	SOH-NUH	44000	44500	Increasing	L1	3.87	6.55	5.21	42	25-01-2023	28.109805	77.016543	28.107372	77.012233
NA	0	0	NH-248A	SOH-NUH	44500	45000	Increasing	L1	4.60	5.81	5.21	31	25-01-2023	28.107372	77.012233	28.103874	77.009124
NA	0	0	NH-248A	SOH-NUH	45000	45500	Increasing	L1	2.17	5.40	3.79	33	25-01-2023	28.103874	77.009124	28.099482	77.008024
NA	0	0	NH-248A	SOH-NUH	45500	46000	Increasing	L1	2.21	4.83	3.52	33	25-01-2023	28.099482	77.008024	28.094999	77.007393
NA	0	0	NH-248A	SOH-NUH	46000	46500	Increasing	L1	2.41	4.65	3.53	36	25-01-2023	28.094999	77.007393	28.090509	77.006730
NA	0	0	NH-248A	SOH-NUH	46500	46950	Increasing	L1	3.12	4.22	3.67	27	25-01-2023	28.090509	77.006730	28.086527	77.007505

NA	0	0	NH-248A	SOH-NUH	24500	25000	Increasing	L2	2.68	2.64	2.66	26	25-01-2023	28.251659	77.069621	28.247709	77.071970
NA	0	0	NH-248A	SOH-NUH	25000	25500	Increasing	L2	1.85	2.39	2.12	27	25-01-2023	28.247709	77.071970	28.243378	77.071685
NA	0	0	NH-248A	SOH-NUH	25500	26000	Increasing	L2	2.64	3.98	3.31	28	25-01-2023	28.243378	77.071685	28.238919	77.069820
NA	0	0	NH-248A	SOH-NUH	26000	26500	Increasing	L2	1.89	2.00	1.95	40	25-01-2023	28.238919	77.069820	28.234666	77.068050
NA	0	0	NH-248A	SOH-NUH	26500	27000	Increasing	L2	3.78	2.62	3.20	32	25-01-2023	28.234666	77.068050	28.230406	77.066291
NA	0	0	NH-248A	SOH-NUH	27000	27500	Increasing	L2	6.35	5.13	5.74	32	25-01-2023	28.230406	77.066291	28.226228	77.064319
NA	0	0	NH-248A	SOH-NUH	27500	28000	Increasing	L2	3.56	5.74	4.65	32	25-01-2023	28.226228	77.064319	28.222071	77.062300
NA	0	0	NH-248A	SOH-NUH	28000	28500	Increasing	L2	1.38	2.28	1.83	46	25-01-2023	28.222071	77.062300	28.217820	77.060744
NA	0	0	NH-248A	SOH-NUH	28500	29000	Increasing	L2	1.81	1.75	1.78	53	25-01-2023	28.217820	77.060744	28.213469	77.062194
NA	0	0	NH-248A	SOH-NUH	29000	29500	Increasing	L2	2.63	2.37	2.50	51	25-01-2023	28.213469	77.062194	28.209140	77.063658
NA	0	0	NH-248A	SOH-NUH	29500	30000	Increasing	L2	2.53	2.15	2.34	60	25-01-2023	28.209140	77.063658	28.204785	77.065098
NA	0	0	NH-248A	SOH-NUH	30000	30500	Increasing	L2	3.09	2.71	2.90	41	25-01-2023	28.204785	77.065098	28.200446	77.066541
NA	0	0	NH-248A	SOH-NUH	30500	31000	Increasing	L2	1.84	2.68	2.26	47	25-01-2023	28.200446	77.066541	28.196180	77.068259
NA	0	0	NH-248A	SOH-NUH	31000	31500	Increasing	L2	4.11	3.33	3.72	36	25-01-2023	28.196180	77.068259	28.192350	77.070951
NA	0	0	NH-248A	SOH-NUH	31500	32000	Increasing	L2	2.42	2.30	2.36	49	25-01-2023	28.192350	77.070951	28.188335	77.073231
NA	0	0	NH-248A	SOH-NUH	32000	32500	Increasing	L2	2.45	2.51	2.48	49	25-01-2023	28.188335	77.073231	28.183839	77.072621
NA	0	0	NH-248A	SOH-NUH	32500	33000	Increasing	L2	5.58	3.45	4.51	39	25-01-2023	28.183839	77.072621	28.179464	77.071354
NA	0	0	NH-248A	SOH-NUH	33000	33500	Increasing	L2	3.99	3.81	3.90	43	25-01-2023	28.179464	77.071354	28.175066	77.070507
NA	0	0	NH-248A	SOH-NUH	33500	34000	Increasing	L2	4.37	4.54	4.45	30	25-01-2023	28.175066	77.070507	28.170562	77.071164
NA	0	0	NH-248A	SOH-NUH	34000	34500	Increasing	L2	3.16	2.83	3.00	50	25-01-2023	28.170562	77.071164	28.166049	77.070916
NA	0	0	NH-248A	SOH-NUH	34500	35000	Increasing	L2	3.36	1.96	2.66	48	25-01-2023	28.166049	77.070916	28.161540	77.070372
NA	0	0	NH-248A	SOH-NUH	35000	35500	Increasing	L2	3.08	1.99	2.54	53	25-01-2023	28.161540	77.070372	28.157038	77.069878
NA	0	0	NH-248A	SOH-NUH	35500	36000	Increasing	L2	3.98	1.82	2.90	53	25-01-2023	28.157038	77.069878	28.152513	77.069651
NA	0	0	NH-248A	SOH-NUH	36000	36500	Increasing	L2	4.32	2.25	3.28	60	25-01-2023	28.152513	77.069651	28.148001	77.069193
NA	0	0	NH-248A	SOH-NUH	36500	37000	Increasing	L2	4.75	2.57	3.66	52	25-01-2023	28.148001	77.069193	28.143472	77.068688
NA	0	0	NH-248A	SOH-NUH	37000	37500	Increasing	L2	3.25	2.84	3.05	40	25-01-2023	28.143472	77.068688	28.138988	77.067932
NA	0	0	NH-248A	SOH-NUH	37500	38000	Increasing	L2	3.33	4.91	4.12	28	25-01-2023	28.138988	77.067932	28.134534	77.066068
NA	0	0	NH-248A	SOH-NUH	38000	38500	Increasing	L2	4.74	3.53	4.14	32	25-01-2023	28.134534	77.066068	28.130150	77.065263
NA	0	0	NH-248A	SOH-NUH	38500	39000	Increasing	L2	3.36	3.91	3.63	47	25-01-2023	28.130150	77.065263	28.127575	77.061106
NA	0	0	NH-248A	SOH-NUH	39000	39500	Increasing	L2	4.01	2.45	3.23	58	25-01-2023	28.127575	77.061106	28.126407	77.056218

Structural Details

NA	0	0	NH-248A	SOH-NUH	39500	40000	Increasing	L2	4.81	2.47	3.64	54	25-01-2023	28.126407	77.056218	28.123796	77.052029
NA	0	0	NH-248A	SOH-NUH	40000	40500	Increasing	L2	3.99	2.23	3.11	58	25-01-2023	28.123796	77.052029	28.121781	77.047493
NA	0	0	NH-248A	SOH-NUH	40500	41000	Increasing	L2	4.16	2.75	3.46	59	25-01-2023	28.121781	77.047493	28.121030	77.042518
NA	0	0	NH-248A	SOH-NUH	41000	41500	Increasing	L2	4.12	2.69	3.40	56	25-01-2023	28.121030	77.042518	28.120045	77.037561
NA	0	0	NH-248A	SOH-NUH	41500	42000	Increasing	L2	5.54	2.59	4.06	34	25-01-2023	28.120045	77.037561	28.118251	77.032874
NA	0	0	NH-248A	SOH-NUH	42000	42500	Increasing	L2	6.41	3.11	4.76	35	25-01-2023	28.118251	77.032874	28.116398	77.028282
NA	0	0	NH-248A	SOH-NUH	42500	43000	Increasing	L2	4.33	2.61	3.47	48	25-01-2023	28.116398	77.028282	28.113049	77.024857
NA	0	0	NH-248A	SOH-NUH	43000	43500	Increasing	L2	4.71	2.26	3.49	44	25-01-2023	28.113049	77.024857	28.111447	77.020116
NA	0	0	NH-248A	SOH-NUH	43500	44000	Increasing	L2	3.98	2.47	3.22	45	25-01-2023	28.111447	77.020116	28.109258	77.015663
NA	0	0	NH-248A	SOH-NUH	44000	44500	Increasing	L2	4.62	2.27	3.44	40	25-01-2023	28.109258	77.015663	28.106707	77.011426
NA	0	0	NH-248A	SOH-NUH	44500	45000	Increasing	L2	2.51	2.49	2.50	28	25-01-2023	28.106707	77.011426	28.102868	77.008712
NA	0	0	NH-248A	SOH-NUH	45000	45500	Increasing	L2	1.61	1.78	1.70	31	25-01-2023	28.102868	77.008712	28.098398	77.007890
NA	0	0	NH-248A	SOH-NUH	45500	46000	Increasing	L2	1.46	1.83	1.65	39	25-01-2023	28.098398	77.007890	28.093904	77.007260
NA	0	0	NH-248A	SOH-NUH	46000	46500	Increasing	L2	1.87	1.69	1.78	43	25-01-2023	28.093904	77.007260	28.089408	77.006783
NA	0	0	NH-248A	SOH-NUH	46500	46950	Increasing	L2	3.42	2.99	3.21	34	25-01-2023	28.089408	77.006783	28.087128	77.007225

NH Number	Section Code	Chainage (Start)	Chainage (End)	Direction	Structure Type	Survey Date	Data Source	Remarks	Start Latitude	Start Longitude	Start Altitude	End Latitude	End Longitude	End Altitude
NH-248A	SOH-NUH	28525	28525	Increasing	Culvert	25-01-2023	NSV Row Camera	NA	28.21790146	77.060681	194.37	28.21790146	77.060681	194.37
NH-248A	SOH-NUH	29635	29635	Increasing	Culvert	25-01-2023	NSV Row Camera	NA	28.20828121	77.06391039	189.42	28.20828121	77.06391039	189.42
NH-248A	SOH-NUH	30925	30925	Increasing	Culvert	25-01-2023	NSV Row Camera	NA	28.19709998	77.06763686	185.35	28.19709998	77.06763686	185.35
NH-248A	SOH-NUH	32685	32685	Increasing	Culvert	25-01-2023	NSV Row Camera	NA	28.18257668	77.0723913	185.78	28.18257668	77.0723913	185.78
NH-248A	SOH-NUH	34915	34915	Increasing	Culvert	25-01-2023	NSV Row Camera	NA	28.16275381	77.07048555	185.09	28.16275381	77.07048555	185.09
NH-248A	SOH-NUH	36380	36380	Increasing	Culvert	25-01-2023	NSV Row Camera	NA	28.14955351	77.06931793	184.4	28.14955351	77.06931793	184.4
NH-248A	SOH-NUH	37285	37285	Increasing	Culvert	25-01-2023	NSV Row Camera	NA	28.1414128	77.06835867	184.16	28.1414128	77.06835867	184.16
NH-248A	SOH-NUH	39300	39300	Increasing	Culvert	25-01-2023	NSV Row Camera	NA	28.12695198	77.05905376	182.03	28.12695198	77.05905376	182.03
NH-248A	SOH-NUH	43195	43190	Decreasing	Culvert	25-01-2023	NSV Row Camera	NA	28.1125969	77.02405601	182.74	28.11262205	77.0241062	182.76
NH-248A	SOH-NUH	40746	40740	Decreasing	Culvert	25-01-2023	NSV Row Camera	NA	28.12133937	77.04600667	182.56	28.12135367	77.04606183	182.57
NH-248A	SOH-NUH	38936	38930	Decreasing	Culvert	25-01-2023	NSV Row Camera	NA	28.12822338	77.0624772	182.04	28.12824877	77.06252552	182.13
NH-248A	SOH-NUH	36491	36485	Decreasing	Culvert	25-01-2023	NSV Row Camera	NA	28.1485686	77.06920801	184.46	28.14861542	77.06921324	184.43
NH-248A	SOH-NUH	34131	34125	Decreasing	Culvert	25-01-2023	NSV Row Camera	NA	28.16981546	77.07121434	185.63	28.1698699	77.07121258	185.63
NH-248A	SOH-NUH	31546	31540	Decreasing	Culvert	25-01-2023	NSV Row Camera	NA	28.19230077	77.07096014	185.46	28.19236554	77.07091464	185.47

Wayside Amenities

	As per Old NH number	New NH number		As per New NH number								
NH number old	Start Chainage	NH Number	Section Code	Chainage	Direction	Access Type	Survey Date	Data Source	Remarks	Latitude	Longitude	Altitude
NA	0	NH-248A	SOH-NUH	25315	Increasing	Petrol Pump	25-01-2023	NSV Row Camera	NA	28.24495994	77.07227691	198.25
NA	0	NH-248A	SOH-NUH	25340	Increasing	Petrol Pump	25-01-2023	NSV Row Camera	NA	28.24475885	77.07220385	198.08
NA	0	NH-248A	SOH-NUH	26305	Increasing	Petrol Pump	25-01-2023	NSV Row Camera	NA	28.23655305	77.06877892	198.9
NA	0	NH-248A	SOH-NUH	26985	Increasing	Petrol Pump	25-01-2023	NSV Row Camera	NA	28.23077931	77.06638865	197.38
NA	0	NH-248A	SOH-NUH	27315	Increasing	Petrol Pump	25-01-2023	NSV Row Camera	NA	28.22797994	77.0652338	197.6
NA	0	NH-248A	SOH-NUH	32550	Increasing	Petrol Pump	25-01-2023	NSV Row Camera	NA	28.18378801	77.07256937	185.55
NA	0	NH-248A	SOH-NUH	35100	Increasing	Petrol Pump	25-01-2023	NSV Row Camera	NA	28.16110499	77.07026664	185.21
NA	0	NH-248A	SOH-NUH	35385	Increasing	Petrol Pump	25-01-2023	NSV Row Camera	NA	28.15852382	77.06997571	184.44
NA	0	NH-248A	SOH-NUH	40255	Increasing	Petrol Pump	25-01-2023	NSV Row Camera	NA	28.12300732	77.05062748	182.62
NA	0	NH-248A	SOH-NUH	46130	Increasing	Petrol Pump	25-01-2023	NSV Row Camera	NA	28.09385148	77.00720632	182.87

NA	0	NH-248A	SOH-NUH	46045	Decreasing	Petrol Pump	25-01-2023	NSV Row Camera	NA	28.09460321	77.00733593	182.8
NA	0	NH-248A	SOH-NUH	43765	Decreasing	Petrol Pump	25-01-2023	NSV Row Camera	NA	28.11090834	77.01859427	182.77
NA	0	NH-248A	SOH-NUH	39545	Decreasing	Petrol Pump	25-01-2023	NSV Row Camera	NA	28.12661492	77.05659061	181.84
NA	0	NH-248A	SOH-NUH	36515	Decreasing	Petrol Pump	25-01-2023	NSV Row Camera	NA	28.14833499	77.06918062	184.41

Land Use													
	As per Old NH number		New NH number		As per New NH number					Start		End	
NH number old	Start Chainage	End Chainage	NH Number	Section Code	Start Chainage	End Chainage	Direction	Land Use	Survey Date	Latitude	Longitude	Latitude	Longitude
NA	0	0	NH-248A	SOH-NUH	24500	46950	Increasing	Commercial	25-01-2023	28.25164034	77.06956505	28.08652689	77.0075049
NA	0	0	NH-248A	SOH-NUH	46950	24500	Decreasing	Commercial	25-01-2023	28.08652689	77.0075049	28.25164034	77.06956505

CHAPTER -6

PAVEMENT DESIGN

6.1 INTRODUCTION

6.1.1 PROJECT BACKGROUND

The Indian institute of Technology, Jammu (IIT J) ‘‘the Owner’’ & Central Public Works Department, Govt. of India ‘‘the Project Management Consultant (PMC)’’ has been engaged in the development of Internal Roads at Permanent campus of IIT Jammu, the Owner’’ & Central Public Works Department, Govt. of India ‘‘the Project Management Consultant (PMC) has awarded the project to **M/s Rama Civil India Construction Pvt. Ltd.**, **M/s Rama Civil India Construction Pvt. Ltd** as EPC Contractor. **M/s Rama Civil India Construction Pvt. Ltd**, (Here after referred as Client) has appointed **M/s G-Engineering Advisory Services Private Limited**, Gurugram, as the “Road Design consultant” to carry out the Details engineering services for the project corridor.

6.1.2 Project Location

Development of Internal Roads at Permanent campus of IIT Jammu

6.1.3 OBJECTIVE AND SCOPE

The detailed scope for pavement design includes:

- Existing Soil Investigations
- Traffic Volume
- Design of Rigid Pavement

6.2 TRAFFIC SURVEY ANALYSIS

6.2.1 Introduction

6.2.2 Traffic Survey Locations

The primary objective of traffic studies is to estimate the number of commercial vehicles that would likely to ply on the proposed road for the purpose of pavement design. The first step is to determine the base year traffic (ADT in 2022) and for this purpose CVC surveys have been conducted at IIT Jammu as shown in Table 6.1.

Table 6.1: Traffic Survey Locations & Period of Survey

Sl. No	Type of Survey	Duration	Location	Period	
				From	To
1	Classified Volume Count	7 Days	IIT Jammu	06-08-2022	13-08-2022
2	Axle Load Survey	2 Days	IIT Jammu	06-08-2022	08-08-2022

SURVEY METHODOLOGY

All the traffic surveys have been carried out in accordance with the guidelines specified by IRC: 9-1972 and IRC: 102-1988.

6.2.3 Classified Traffic Volume Count

The classified traffic volume count is carried out manually at one location. The count was done 24X7, 24 hours a day continuously for 7 days. Traffic data has been recorded in 15 minutes' interval using tally marks. The classified traffic volume count data is presented in **Appendix IV.** The vehicle classification was done as per IRC-108 2015 and IRC: 9-1972 code requirements. The vehicle classification is presented in **Table 6.2.**

Table 6.2:Classification of vehicles for traffic surveys

Motorized Vehicle
2-Wheeler & 3-Wheeler
Car/Taxi/Jeep
Bus (mini bus, standard bus)
Light Commercial Vehicle (freight)
Truck
2-axle
3-axle
Multi Axle
Agricultural Tractors (with trailer/without trailer)

Non-Motorised Vehicle
Cycle
Cycle Rickshaw
Animal Drawn Vehicle
Other

6.2.4 Axle Load Spectrum

Expected number of applications of different axle load groups has been estimated using the details of commercial traffic volume, expected rate of growth of commercial traffic given in preceding sections. As per the axle load surveys conducted, the loading pattern in the direction of UP & Down Direction to is more critical and the same has been considered in the design of Rigid Pavement thickness. The axle load along both the carriageways is given below:

Table 6.3: Axle load spectrum

Rear Single Axles		**Rear Tandem Axles**		**Rear Tridem Axles**	
Axle Load Class KN	**Frequency (% of Single Axles)**	**Axle Load Class KN**	**Frequency (% of Tandem Axles)**	**Axle Load Class KN**	**Frequency (% of Tridem Axles)**
265-275	0.00	540-560	0.00	770-800	0.00
255-265	0.00	520-540	0.00	740-770	0.00
245-255	0.00	500-520	0.00	710-740	0.00
235-245	0.00	480-500	0.00	680-710	0.00
225-235	0.00	460-480	0.00	650-680	0.00

Rear Single Axles		Rear Tandem Axles		Rear Tridem Axles	
Axle Load Class KN	**Frequency (% of Single Axles)**	**Axle Load Class KN**	**Frequency (% of Tandem Axles)**	**Axle Load Class KN**	**Frequency (% of Tridem Axles)**
215-225	0.00	440-460	0.00	620-650	0.00
205-215	0.00	420-440	0.00	590-620	0.00
195-205	0.00	400-420	0.00	560-590	0.00
185-195	0.00	380 - 400	0.00	530-560	0.00
175-185	0.00	360 - 380	0.00	500-530	0.00
165-175	0.00	340 - 360	0.00	470-500	0.00
155-165	0.00	320 - 340	0.00	440-470	0.00
145-155	0.00	300 - 320	0.00	410-440	0.00
135-145	0.00	280 - 300	0.00	380-410	0.00
125-135	0.00	260 - 280	0.00	350-380	0.00
115-125	3.85	240 - 260	0.00	320-350	0.00
105-115	0.00	220 - 240	0.00	290-320	0.00
95-105	1.92	200 - 220	0.00	260-290	0.00
85-95	1.92	180 - 200	0.00	230-260	0.00
< 85	92.31	< 180	100.00	< 230	0.00
	100.00		**100.00**		**0.00**

More details given in Anexure-1

Table 6.4: Traffic CVPD

Design Traffic as per Investigation		
CVPD as per Traffic Survey	***Adopted CVPD for Slab design***	***Design Traffic (CVPD) – 30Year***
4	**400**	**9700072**

More details given in Anexure-1

6.3 METHODOLOGY OF PAVEMENT DESIGN

6.3.1 PAVEMENT DESIGNINTRODUCTION

While the following sections of this chapter deal with Subgrade and pavement investigations carried out for the project, an appreciation of the domain and its relevance is briefed first Although maximum information of the thickness and composition of the existing pavement, which often can be retrieved from design and as-built records of previous construction, is important in any exercise for assessment

Pavement design forms an integral part of a highway project. Pavement construction cost constitutes the substantial project cost. An adequate and economical design for a pavement structure is just as important as a design for any other engineering structure. Pavement performance under prevailing environmental conditions and projected traffic is considered to be crucial as it has a direct bearing on the economic returns from the project developments. An under-designed pavement will fail prematurely, costing more money for repairs. A wasteful over-design will unnecessarily deplete a limited budget. It should also be emphasised that pavement design is only one aspect associated with the achievement of sound pavement performance. A global and integrated approach of **DESIGN**

(materials assessment and pavement composition), **CONSTRUCTION** (to meet design requirements, including tolerances and drainage) and **MAINTENANCE** (to maintain pavement integrity) is required for high level of pavement performance. The objective in the design of the road pavement is to select apposite pavement, layer thicknesses and configurations to ensure that the pavement performs adequately and requires minimal maintenance under the anticipated traffic loading for the design life adopted. To achieve this objective and thereby to predict the performance of any pavement structure, it is necessary to analyze material characteristics, traffic, local environment an d its impacts, modes of failure of existing pavement and technology available for construction. In addition, it is also necessary to presume what level of performance and what pavement condition will be considered satisfactory. Because of the many variables and their interactions with the pavement, which influence the result, it is apposite to adopt a systematic approach to design the pavement. Depending upon the type of data collected and analyzed or, conversely the number of assumptions to be made, a pavement design procedure may be very complex at one extreme or very simple at the other. A present chapter deal with the design methodology adopted for pavement design by the consultants and also highlights the final pavement crust thickness recommended.

6.3.2 Selection of Type of Pavement

Introduction

The process of selecting the proper pavement type is complex and hard to define. The selection of pavement type is not an exact science but one in which pavement engineer or administrator make a judgment on many varying factors such as traffic, soils, weather, materials, construction, maintenance and environment. The pavement type selection may be dictated by an overriding consideration for one or more of these factors.

Stipulation of Contract agreement

Main road network of the campus shall be Pavement Quality Cement Concrete roads as per tendered Architectural drawing IIM J/SAA/A/S-01. Based on the Vertical alignment and the topographic conditions of the site, the road may be constructed over an embankment, cut or almost at the ground level itself. Roads shall be designed as per MORTH Specification and parameters given in the particular specification. Details area as under:

a) Length 3500 meter, 7.0meter-wide with 1.25meter wide foot path including kerb stone on both side.

6.3.3 APPLICATION MANUAL, PAVEMENT DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

The adopted pavement design standard and construction specifications are presented next:

- Guidelines for Design and Construction of cement Concrete Pavements for Low Volume Roads, IRC: SP:62-2014
- Manual of Specifications and Standards for 2-Laning of Highways (IRC: SP:73-2019)
- MORT&H Specifications for Road and Bridge Works (Fifth Revision), 2013
- Guidelines for Design and Construction of Fibre Reinforced Concrete Pavement (IRC: SP:46-2013)

6.3.4 PRINCIPLES FOR DESIGN OF PLAIN JOINTED RIGID PAVEMENT

Fatigue Behaviour of Cement Concrete

Due to repeated application of flexural stresses by the traffic loads, progressive fatigue damage takes place in the cement concrete slab in the form of gradual development of micro-cracks especially when

ratio between the applied flexural stress and the flexural strength of concrete is high. This ratio is termed as Stress Ratio (SR). If the SR is less than 0.45, the concrete is expected to sustain infinite number of repetitions. As the stress ratio increases, the number of load repetitions required to cause cracking decreases. The relation between fatigue life (N) and stress ratio is given as:

N=unlimited for SR< 0.45

N= [4.2577/ (SR-0.4325)] ^3.268 hen 0.45≤SR ≤0.55

Log10 N= (0.9718-SR)/0.0828 for S R>0.55

These fatigue criteria have been used for the analysis of bottom-up and top-down cracking and checking the adequacy of the pavement slab on the basis of Miner's hypothesis. It is assumed that the fatigue resistance not consume d by repetitions of one load is available for repetitions of other loads.

Critical Stress Condition

Critical Stress condition considered for design of rigid pavement is the flexural stress due to the simultaneous application of traffic loads and temperature differentials between the top and bottom fibres of a concrete slab.

Bottom-up Cracking

Flexural stress at the bottom layer of concrete slab is the maximum during the day hours when the axle loads act midway on the pavement slab along with positive temperature differential. This condition causes Bottom-Up Cracking (BUC) This critical stress condition for bottom-up cracking and locations of maximum flexural stress when the tyre imprints are tangential to the longitudinal edge due to single, tandem and tridem axles are presented next:

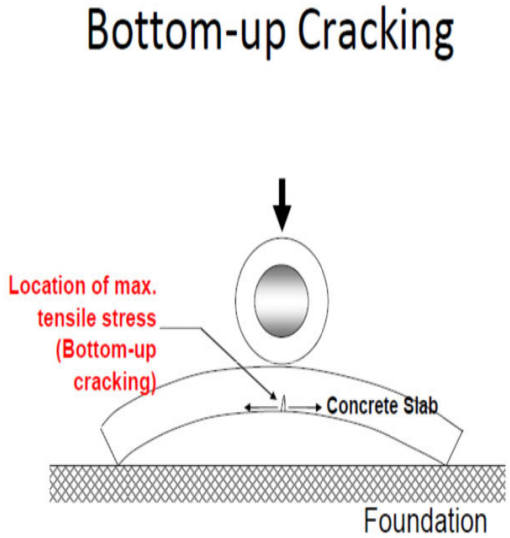
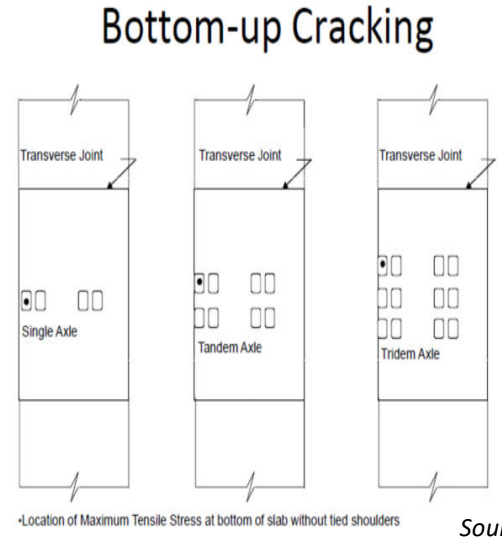


Figure 6.1: Axle load Placed in the Middle Slab during Mid-Day



Source: IRC: 58-2015

Figure 6.2: Placement of Axles for Maximum Edge Flexural Stress at Bottom of the Slab without/with Tied Concrete Shoulder

Top-down Cracking

During the night hours, the top surface is cooler than the bottom surface and the ends of the slab curl up in a concave shape resulting in loss of support for the slab. Due to the restraint provided by the self-weight of concrete and by the dowel connections, temperature stresses are caused at the top. Figure 6-3 shows the placement of axle loads close to transverse joints when there is negative temperature gradient during night period causing high flexural s tresses in the top layer lea ding to top-down cracking. Positioning of axles of different configurations on the slab with successive axles

placed close to the transverse joints is shown in Figure 6-4. These axle positions ca n initiate Top-Down Cracking (TDC) during the night hours when the pavement has tendency to curl up. Built-up permanent curl induced during the curing of the concrete slab further aggravates the problem.

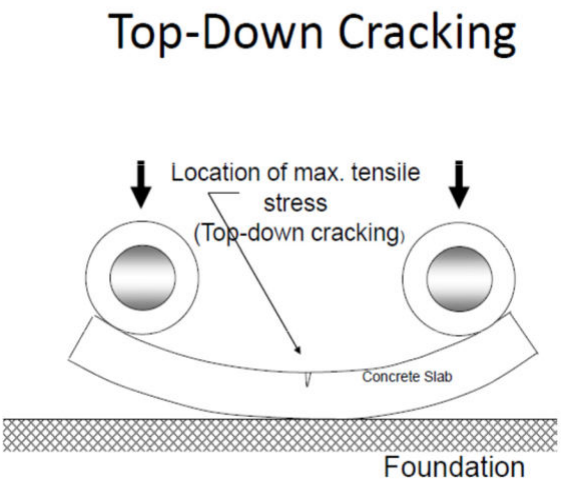
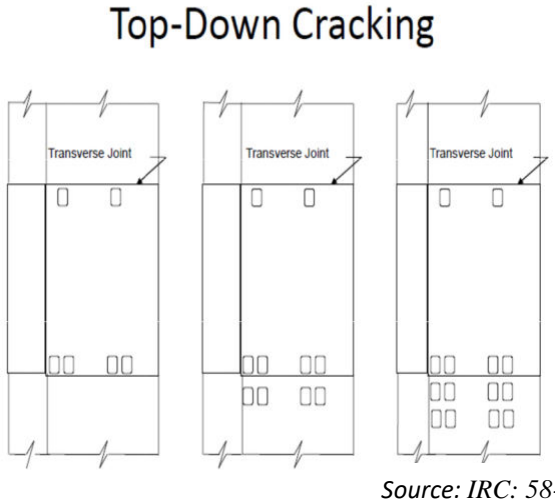


Figure 6.3: Placement of Two Axle of a Commercial Curled During Night Hours



Source: IRC: 58-2015

Figure 6.4: Different axle load positions Vehicle on a Slab Causing Tensile Stress at the Top Fibre of the Slab with Tied Concrete Shoulder.

6.3.5 Design Criteria of Rigid Pavements

If the sum of cumulative fatigue damages (i) due to wheel load and curling stresses at the bottom and (ii) wheel load and curling stresses at the top is less than 1, the pavement is safe. In other words, a pavement is deemed to have failed if sum of cumulative damages is greater than one.

Thus,

If CFD (BUC) + CFD (TDC) <= 1; DESIGN IS SAFE

The design thickness may be increased by 10mm to (i) to permit two retexturing and (ii) grinding to rectify faulting during the service life.

6.4 INPUTS PARAMETERS FOR RIGID PAVEMENT DESIGN

The main factors governing design of concrete pavements are design period, design commercial traffic volume, composition of commercial traffic in terms of single, tandem, tridem and multi-axles, axle load spectrum, tyre pressure, lateral placement characteristics, directional distribution, strength of foundation and climatic considerations. Sub-section presents the inputs parameters considered for the rigid pavement design.

1.4.1 Axle Load Characteristics

Axle load survey has been carried out near both the proposed toll plaza locations. Survey has been conducted for continuous 48-hour period. Details are given in **6.2 2 of this Report**. An axle load spectrum (Give n in Appendix 5-1) for single rear axles, tandem axles and tridem axles have been prepared using the data collected during axle load survey.

The extract of the axle load survey analysis which are the inputs for rigid pavement design are presented next:

Table 6-5: Extract of Axle Load Data Analysis

Number of Axles	At Km. IIT Jammu
Number of Front single (steering) Axles	56

Number of Axles	At Km. IIT Jammu
Number of Rear single Axles	52
Number of Tandem Axles	4
Number of Tridem Axles	0
Total Number of Axles	112
Proportion of Axles	
Proportion of Front single (steering) Axles, K1	0.500
Proportion of Rear single Axles, K2	0.464
Proportion of Tandem Axles, K3	0.036
Proportion of Tridem Axles, K4	0.000
Total no of Axles	112
Total no of Commercial vehicles	56
Avg no of axles per commercial vehicle	2.0
Proportion of vehicles with axle spacing less than 4.5m	0.66

6.4.2 Wheel Base Characteristics

Spacing between the front and first rear axles have been recorded during axle load survey. In adherence to clause 7.1.3 of IRC: 58-2015, the proposed spacing of transverse contraction joint is 4.5m.

The calculated proportion of axles having spacing between the front and first rear axle less than 4.5m have been considered for estimating design traffic for top-down fatigue cracking damage caused by axle loads during night.

6.4.3 Design Period

In adherence with clause 5.4.2 (i) of IRC: SP: 73-2018, a design period of 30 years has been considered for the design of rigid pavement. Considering construction period of 730 days i.e. 2.0 years the Project Road will be opened to traffic from start of the year 2024. Thus, the 30 years' design period is 2024-2053

6.4.4 Traffic Consideration

Design Lane

In adherence to clause 5.5.1 of IRC: 58-2015, the outer lane has been considered as design lane.

Design Traffic

Classified traffic volume count surveys have been carried out at one location in the section where rigid pavement is proposed. Estimated average annual daily traffic (AADT) of the commercial vehicles for the base year 2022 is presented next. The table also includes the % of commercial vehicles in each direction, during 10 A.M. to 4.0 P.M. time period in day time and 0.00 A.M to 6.00 A.M. time period in night time.

Table 6.6: Day & Night Traffic

Location	Vehicle Type	% Day Time Traffic	% Night Time Traffic
IIT Jammu	Mini Bus, Bus, LCV, 2-Axle, 3-Axle, 4-6 Axle	**50.0**	**50.0**

Table 6.7: Design Traffic (in CVPD)

Location	*Design Traffic as per Investigation*	
	CVPD	*Design Traffic (CVPD) – 30Year*
IIT Jammu	400	**9700072**

Detail given in Annexure 1 of this report

Clause 5.5.2.7 of IRC: 58-2015 stipulates that the cumulative number of commercial vehicles during the design period may be estimated from the following expression.

$$C = \frac{365 \times [(1+r)^n - 1]}{r} \times A$$

Where,

C Cumulative number of Commercial Vehicles during the design period.

A Initial Traffic in The Year of completion of construction in terms of the number of commercial Vehicles per day (CVPD)

n Design life in years.

r Annual growth rate of commercial vehicles in decimal

The traffic in the Year of Completion is estimated using the formula:

$$A = P(1+r)^x$$

P = Number of Commercial Vehicles as per last count.

x = Number of years between the last count and the year of completion of construction.

Cumulative No of Commercial vehicles during design period **C= 9700072**

Traffic Consideration

Temperature differential between the top and bottom fibres of concrete pavements causes the concrete slab to curl, giving rise to stresses. The temperature differential is a function of solar radiation received by the pavement surface, wind velocity, thermal diffusivity of concrete, latitude, longitude and elevation of the place and is thus affected by geographical features of the pavement location. The variation of temperature with dep this non-linear during the day time and nearly linear during night hours. The maximum temperature differential during the night is nearly half of the day time maximum temperature differentia.

Temperature differentials are positive when the top surface of a pavement slab has the tendency to have a convex shape during the day hours and negative with a concave shape during the night. The axle load stresses have been computed for fatigue analysis when the slab is in a curled state due to the temperature differential during the d ay as well as night hours.

Zero stress Temperature Gradient

Research on in-service concrete pavements indicates that exposure of fresh concrete to sun and high air temperature during the hardening stage causes building of permanent curl in the concrete pavements which is nearly equivalent to the curl caused by a negative temperature differential of about 5°**C**.This equivalent negative temperature differential has to be added algebraically to the actual temperature differential prevailing at any time. This 5°**C** reduction is not made for the conservative design for bottom-up cracking. However, this 5°**C** increment is made for the safer de sign for top-down cracking.

The project stretch IIT Jammu lies in the state of Jammu. The temperature differential as per Table-1 of IRC: 58-2015 for these places under Zone-I, considered for concrete pavement design is presented in given below

Table 6.8: Recommended temperature differentials for Concrete Slab

Zone	State/Region	Max. temperature differential, for a slab thickness of (°C)			
		150mm	200mm	250mm	300mm to 400mm
II	Jammu	12.5	13.1	14.3	15.8

Temperature differential for six-hour period in between 10 AM and 4 PM during the day =14.3°C.

Temperature differential for six hour period in between 0 AM and 6 AM during the night = (14.3°C/2)+ 5.0°C =12.15°C .

6.4.5 Embankment Soil and Characteristics of Subgrade

Calculation of Effective Subgrade CBR

The modulus of selected subgrade materials is dependent not only on the intrinsic characteristics of these materials, but also on the stiffness of the underlying in-situ subgrade. It is critical that the nominal subgrade strength is available to a reasonable depth in order that the pavement structure performs satisfactorily. Evaluation of the actual support provided to the pavement structure by the subgrade can be complicated by the strength variations that often occur with depth. It is essential that the potential effects of any weak layers below the design subgrade level are considered in the pavement design process, particularly for low-strength materials occurring to depths of about 1 metre.

Clause 5.7.1 of IRC: 58-2015 stipulates that "CBR of embankment soil placed below the 500mm select Subgrade should be determined for estimating the effective CBR of Sub grade and its 'k' value for design".

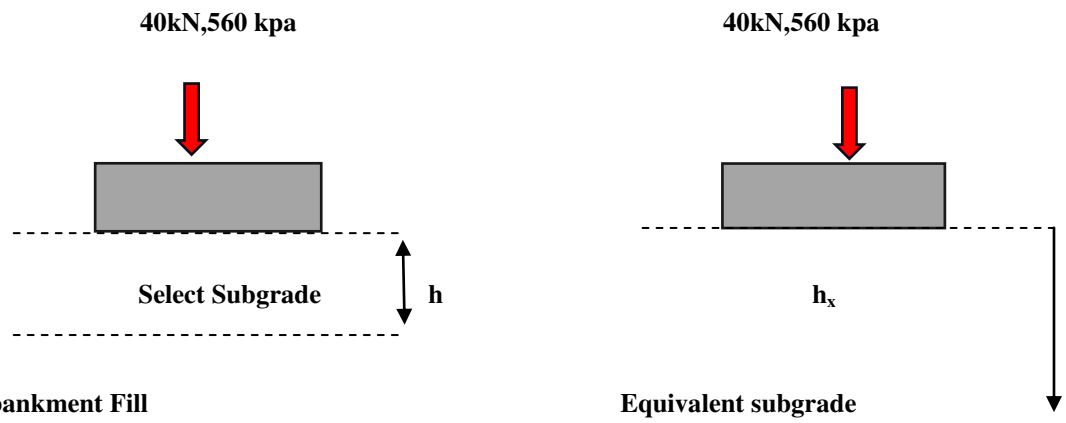
Further, clause 5.7.3.6 of IRC: 58-2015 stipulates that "A minimum CBR of 8% is recommended for the 500mm of the selected soil used as Subgrade".

In view of above and as discussed in section 4.7 & 4.8 of the chapter 4, 4days soaked CBR @ 97% MDD of 500 select Subgrade and 4 days soaked CBR@95% MDD of embankment just below select subgrade are selected as 10.0% and 10.0% respectively for the calculation of effective Subgrade CBR.

The procedure for determination of effective subgrade strength is detailed below:

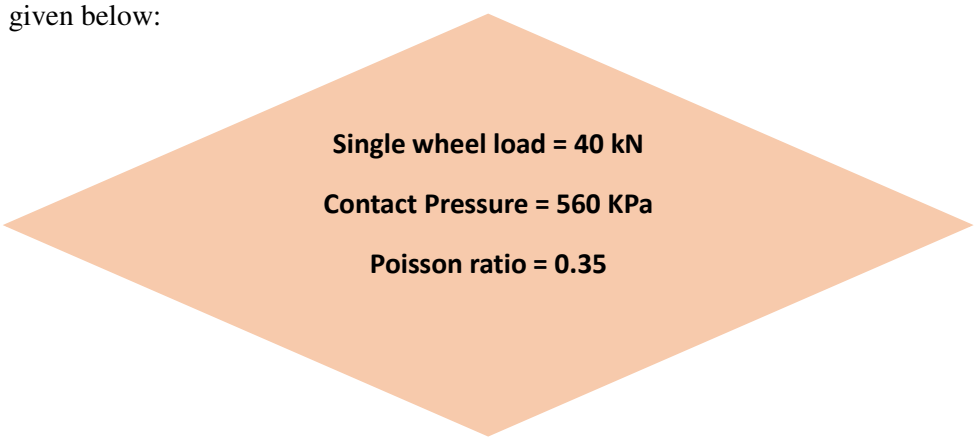
Design depth of subgrade has been considered as 1.0 m (500 mm select subgrade and 500mm embankment fill just below it) for determination of the effective CBR of the Subgrade.

Subgrade surface deflection under the action of a single wheel load computed using layered elastic theory has been used as the parameters to assess the equivalence. The loading arrangement considered is a single wheel load of magnitude 40 kN acting over circular contact area at a pressure of 560 kPa. The two-layer and the equivalent subgrade systems with loading considerations are shown in Figure 6-5.



5) Figure 6.5: Two layer and Equivalent Subgrade System

The two-layer system has been analysed using ELAYER computer program for which the inputs are selected as given below:



Resilient modulus values of select subgrade and embankment fill are estimated from their CBR values using:

Hence, the effective CBR of subgrade for design of new rigid pavement has been considered as 10.0%.

Granular Subbase

Clause 5.4.2 v) of IRC: SP: 78-2018 stipulates that "Below DLC layer, a properly designed drainage layer of 150 mm thickness shall be provided throughout the road width. It shall be designed to obtain a drainage coefficient of not less than 30 m per day".

Clause 5.7.3.9 of IRC: 58-2015 stipulates that "the Subgrade needs to be protected by providing separation and drainage layers of granular sub base (GSB) above it to prevent (i) excessive softening of Subgrade and (ii) erosion of the Subgrade and sub base particularly under adverse moisture condition and heavy dynamic loads. GSB Gr I/II/V/VI (MORT&H 5th Revision) may be used as a separation layer to prevent fines from migrating to the drainage layer and choke it".

Clause 6.5.2 of IRC: 58-2015 stipulates that" It is essential to design the drainage layer appropriately for major highways in areas having annual rainfall in excess of 1000mm".

Further, sub-clause 401.2.1 of MOR T&H stipulates that "Grading V and VI shall be used as a sub-base -cum-drainage layer".

Stabilised Subbase

The main purpose of the subbase is to provide a uniform, stable and permanent support to the concrete slab laid over it. It must have sufficient strength so that it is not subjected to disintegration and erosion under heavy traffic and adverse environmental conditions such as excessive moisture.

Further, Clause 5.7.4. 1 of IRC: 58-2015 stipulates that "a subbase of Dry Lean Concrete (DLC) having a 7-day average compressive strength of 7MPa determined as per IRC: SP:49 over GSB is recommended for highways. Minimum recommended thickness of DLC for major Highways is 150mm" other road 100mm.

In adherence to above, a 100mm thick DLC layer of 7-days average compressive strength of 7MPa has been considered for the design of new rigid pavement and it will be extended beyond the PQC by 0.75m on either side.

Effective Modulus of Subgrade reaction, K

The Subgrade is considered as a Winkler foundation, also known as dense liquid foundation. In Winkler foundation, it is assumed that the foundations made up of springs supporting the concrete slab. The strength of Subgrade is expressed in terms of modulus of Subgrade reaction, k, which is defined as the pressure per unit deflection of the foundation.

k-value of Subgrade with effective soaked CBR 10.0% as determined from Table 2 of IRC: 58-2015 is 55 MPa/m.

Effective k value of Subgrade and 100mm DLC subbase combination as determined from Table 4 of IRC: 58-20 15 considering 55 MPa/m k-value of Subgrade is 278 MPa/m and same has been considered for the design of new rigid pavement.

Separation layer between DLC and Concrete slab

The interface layer between the concrete slab and the DLC layer can be made smooth to reduce the inter layer friction thereby allowing relative movement between the slab and DLC layer and prevent reflection cracking in the pavement slab.

Clause 5.4.2 iii) & iv) of IRC: SP: 78 -2018 stipulates that "A separation membrane shall be used between the PQC and the DLC as per clause 602.5 of MORT&H Specifications".

In adherence to the same, a de-bonding interlayer of polythene sheet white or transparent having a minimum thickness of 125 micro n has been considered for un-bounded interface.

Concrete Strength

Flexural strength of concrete is required for the purpose of design of concrete slab. Clause 5.8.2 of IRC: 58-201 5 stipulates that "In the case of concrete pavement, 90 days' strength for thickness design can be permitted in view of the fact that

(I) The concrete pavement is opened to traffic long after the construction

(II) The number of repetitions of load is very small during initial period of 90days even if the pavement is opened to traffic after 28days

(III) Cumulative fatigue damage of concrete is very low during the first 90days and

(IV) The stress analysis is done for a terminal condition of the pavement slab when load transfer efficiencies of transverse and tied concrete shoulder joints are low.

Increasing the 28 days' flexural strength by a factor of 1.10 may be used to get 90 days' strength. In no case 28 days' flexural strength of pavement quality concrete should be less than 4.5MPa". Therefore, it is prudent to design the rigid pavement based on 28 days' strength.

In adherence to above, 90 days' flexural strength of pavement quality concrete has been considered for design of new rigid pavement is 4.95 MPa.

Modulus of Elasticity and Poisson's Ratio of concrete
In adherence with clause 5.8.4.1 of IRC:58-2015, modulus of elasticity, E and Poisson's ratio μ, of pavement quality concrete have been considered for new rigid pavement design is 30,000 MPa and 0.15 respectively.

Coefficient of Thermal Expansion of Concrete
In adherence with clause 5.8.5 of IRC: 58-2015, coefficient of thermal expansion, α of concrete has been considered for pavement design is 10x10-6/°C.

6.5 DESIGN OF SLAB THICKNESS

6.5.1 Tied Concrete Shoulder
Clause 6.6.1 of IRC:58-2015 stipulates that "Tied cement concrete shoulders are recommended to protect the edge of high-volume highway pavements. Widening of outer lanes of concrete pavement by 0.5m to 0.6m can be adopted to reduce the flexural stress by 20 to 30% This will result in reduction of pavement thickness. Thicknesses of pavements with wide ned outer lane as well as tied concrete shoulder are almost the same".

6.5.2. Calculation of Flexure Stress
Flexural tensile stresses for bottom-up as well as top-down cracking cases have been computed using the regression equations given in Appendix V of IRC: 58-2015.Regression equations are presented next:

- **Bottom-up Cracking**

Maximum Tensile Stress at the bottom of the slab, S

For Single axle pavement with tied concrete shoulder, k>150MPa/m

$S = 0.042 + 3.26*(\gamma h2/kl2) + 1.62\ Ph/(kl4) + 0.05\ 22\ \Delta T$

For Tandem axle pavement with tied concrete shoulder, k>150MPa/m

$S = -0.210 + 3.88*(\gamma h2/kl2) + 0.73Ph/(kl4) + 0.0506\ \Delta T$

- **Top-down Cracking**

Maximum Tensile Stress at the top of the slab, S

For Single axle

$S = -0.2191 + 1.6\ 86BPh/(kl4) + 168.48h2/kl2 + 0.1089\ \Delta T$

The symbols in the above equations have the following meaning:

S =flexural stress in slab, MPa

ΔT= maximum temperature differential in °C during day time for bottom-up cracking

=sum of the maximum night time negative temperature differential and built-in negative temperature differential in °C for top-down cracking

h = thickness of slab, m

k=effective modulus of Subgrade re action of foundation, MPa/m

l=radius of relative stiffness= {Eh3/(12k(1-μ2)}^0.2 5

E=elastic modulus of concrete, MPa

μ=Poisson's ratio of concrete

γ=unit weight of concrete(24kN/m3)

P=For Bottom-up cracking analysis-single/tandem rear axle load(kN)

=For Top-down cracking analysis-100% of rear single axle,50 % of rear tandem axle,33% of rear tridem axle

B=0.66 f or transverse joint with dowel bars

The above equations have been used to obtain the edge flexural stress caused by a Specified magnitude of single/tandem/tridem axle in combination with a specified positive temperature differential for a given pavement structure.

Cumulative Fatigue Damage Analysis
With trial slab thickness and other design para meters, the pavement has been checked for cumulative bottom-up and top- down fatigue damages. It is evident that cumulative fatigue damage (CFD) is only significant during:

- For BUC: 10AM to 4PM (6hrs-during day)
- For TDC: 0AM to 6AM (6hrs-dring night)

As the thicknesses i.e. stresses of pavements with widened outer lane as well as tied concrete shoulder are a most the same.

The maximum positive and negative temperature differentials respectively may be assumed to be constant for the six-hour period during the day between 10AM and 4PM and for the six-hour period between 0 AM to 6 AM during night hours. The slab may be assumed to be free of curling s tresses for the remaining 12 hours for the purpose of fatigue damage analysis as the fatigue damage caused by the combined action of load and temperature differential will be insignificant du ring this period.

The cumulative Fatigue Damage (CFD) expressions utilized for BUC and TDC are presented

Next from ***IRC 58-2015***:

$$CFD(BUC) = \sum_i^j \frac{n_i}{N_i}(10AM\ to\ 4PM)$$

$$CFD(TDC) = \sum_i^j \frac{n_i}{N_i}(0AM\ to\ 6AM)$$

Where,

N_i= allowable number of load repetitions for the i^{th} load group during the specified six-hour period

n_i = predicted number of load repetitions for the i^{th} load group during the specified six-hour period

j= total number of loads

6.5.3 Extract of Design Parameters
The design parameters used are as follows:

Carriageway Details

- Four-Lane Divided carriage way with tied concrete shoulders since left side has 1.5m to paved shoulder and right side has 0.50m to 0.60m paved median edge strip, which satisfy the requirement of clause 6.6.1 of IRC: 58-2015.
- Length of Slab: **4.5** m
- Width of slab: **3.5** m
- With Tied Concrete Shoulders

Design Traffic Estimation

- Design Period:30 years. (2023-2053)
- Traffic Growth rate: Derived based on traffic surveys
- Cumulative No. of commercial vehicles during design period (2-way): Derived based on traffic projection
- Average No. of Axles per commercial vehicle: as per Axle-load Survey
- Proportion of traffic in predominant traffic direction: Derived based on traffic surveys
- Lateral Placement Factor: **0.25**
- Factor for selection of traffic for BUC analysis: Derived based on traffic surveys
- Factor for selection of traffic for TDC analysis: Derived based on traffic surveys
- Proportion of vehicles with spacing between front and the first rear axle less than the spacing of transverse joints: as per Axle-load Survey
- Proportion of single/tandem and tridem axles: As per Axle-load Survey
- Load Transfer Efficiency Factor for TDC: **0.66**
- Tyre pressure: **0.8 MPa**

Characteristics of Subgrade

- Effective Design CBR: **10%**
- Adopted Design CBR: **10.0%**
- Provision of Dry Lean Concrete Subbase of thickness: **150 mm**
- Effective Modulus of Subgrade reaction (k) of Subgrade and DLC: **278 MPa/m** (as per Table 4, IRC:58)

Properties of Pavement Quality Concrete (PQC)

- Grade:**M40**
- 28 days' Flexural strength: **4.5 MPa**
- 90 days' Flexural strength: **4.95 MPa**
- Unit Weight of Concrete: **24 kN/m3**

- Mod ulus of Elasticity: **$3x10^5$ M Pa**
- Poisson ratio: **0.15**

Temperature Differential

- Temperature Differential=14.3°**C** (as per Table 1 of IRC-58)

6.5.4 Analysis Results

The entire design process has been programmed on an excel sheet. Analysis has been carried out for each direction. The analysis results of rigid pavement design are given in Annexure-*1*.

Designed Slab Thickness

Based on the above design parameters along with axle load spectrum, the slab thickness is designed for combined Bottom- Up Cracking as well as Top-Down Cracking criteria. The design calculation is given in the Annexure 1. The designed PQC slab thickness is **210 mm** respectively. Keeping a provision of additional 10mm for retexturing/grinding during service life as recommended by clause 6.3.4.1 of IRC: 58-2015, the thickness to be provided is 10mm more i.e. 220 m respectively. Also a 100 mm DLC sub-base has been considered in the design of rigid pavement and the same has been adopted.

6.5 RECOMMENDED PAVEMENT CROSS SECTION OF RIGID PAVEMENT

The recommended rigid pavement composition based on detailed is given in the table below:

Table 6.9:Composition of Rigid Pavement

LAYER TYPE	LAYER THICKNESS (mm)
Pavement Quality Concrete, PQC (With 90 days flexural strength of 4.95 MPa)	220
Dry Lean Concrete, DLC (With characteristic 7-day compressive strength of 7 MPa)	100
Granular Sub-base Drainage-cum-Filter Layer, Grading V of Table 400-1 of MORT&H, Fifth Edition	150
Select Sub-Grade (With minimum 4-days soaked CBR@97%MDD,10.0%)	500

Joint Details Length of Panel-2500mm, Width of panel -2500mm.

Note: Design of crust composition for cement concrete pavement

Polymer Synthetic Fiber@0.25% *of weight of Cement*

Load Transfer at Transverse Joints

Note: As per clause **7.2.6 of *IRC:58:2015*,** For heavy traffic, greater than 450 CVPD, dowels are to be provided at the contraction joints since aggregate inter-lock cannot be relied upon to effect load transfer across the joint to prevent faulting due to the repeated loading of heavy axles. Joint widths of 5 mm and 20 mm may be taken for stress computation in dowel bar at contraction and expansion joint respectively.

As per ***IRC:SP:62:2014*** clause 5.3, since low volume roads have lower wheel loads, the slab thickness can be in the range from 150 to 250mm. The aggregate interlock at the Contraction joints with discontinuity up to the one third/one fourth of the depth is itself adequate for load transfer and no dowel bars are necessary.

SUMMARY

This chapter deals with the summary of pavement design are shown in Table 6.9-6.12.

Table 6.10: Proposed Thickness of Cement Concrete Pavement

Rigid Pavement Design as per (IRC:SP:62:2014)					
TCS	**Design CBR (%)**	**PQC (mm) (M-40) with Steel Fibres**	**WMM/ WBM/ DLC (mm) (M-10)**	**GSB (mm)**	**Sub Grade**
As per Design					
As Applicable	8	210	100	150	500
As per Tender					
TCS	**Minimum Design CBR (%)**	**PQC (mm) (M-40) with Polymer Synthetic Fiber**	**DLC (mm) (M-10)**	**GSB (mm)**	**Sub Grade**
As Applicable	8	220	100	150	500
Adopted Crust Thickness					
TCS	**Design CBR (%)**	**PQC (mm) (M-40) with Polymer Synthetic Fiber**	**DLC (mm) (M-10)**	**GSB (mm)**	**Sub Grade**
As Applicable	8	220	100	150	500

Separation layer Between DLC and Concrete Slab provided as Polythene sheet white or transparent having a minimum thickness of 125 Micron.

Table 6.11: Proposed Crust Thickness of Pedestrian Movement

As per Tender Document				
TCS	**fibre reinforced heavy duty CC Tiles (mm)**	**Cement Sand Mortar 1:3 (mm)**	**PCC (mm) M-10**	**Hard-core**
As Applicable	20		150	-
Adopted Crust Thickness				
TCS	**CC Tiles (mm)**	**Cement Sand Mortar 1:3 (mm)**	**PCC (mm) M-10**	**Hard-core (GSB)**
As Applicable	20	25	150	-

Table 6.12: Crust thickness of Footpath & Cycle Track

As per Tender Document

TCS	Design CBR (%)	CC Pavers M-30	Sand	DLC-M10 (mm)	WMM (mm)	Sub Grade
As Applicable	8	80	-	150	-	500
As per Tender Drawing						
TCS	**Design CBR (%)**	**CC Pavers**	**Sand**	**DLC-M10 (mm)**	**PCC (1:5:10)**	**Sub Grade**
As Applicable	8	60	50	-	100	500
Adopted Crust Thickness						
TCS	**Design CBR (%)**	**CC Pavers M-30**	**Sand**	**DLC-M10 (mm)**	**PCC (1:5:10)**	**Sub Grade**
As Applicable	8	80	30	-	100	500

Table 6.13: Proposed Crust Thickness of Connecting path from Building to Main Road and around shall be building.

As per Tender Document				
TCS	**Cement Concrete M-40 (mm)**	**PCC (mm) M-10**	**GSB**	**Remarks**
As Applicable	150	150		-
Adopted Crust Thickness				
TCS	**Cement Concrete M-40 (mm)**	**PCC (mm) M-10**	**GSB**	**Remarks**
As Applicable	150	150	-	

7. CONCLUSION

In conclusion, geometric design using civil 3D and pavement design and evaluation techniques are fundamental components of civil engineering, crucial for developing efficient and sustainable transportation networks. The integration of advanced software tools like Civil 3D has revolutionized the design process, enabling engineers to create accurate and comprehensive geometric models. Simultaneously, pavement design and evaluation techniques play a vital role in ensuring the longevity and performance of road surfaces. By employing these methodologies, civil engineers can effectively plan, design, construct, and maintain transportation infrastructure, contributing to the safe and efficient movement of people and goods in our modern world.

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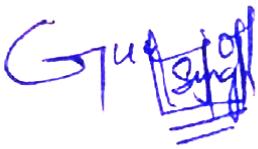

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