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"Identification and Improvementation of problems in a Surli ghat section (Western Maharashtra, India) by using various Construction Techniques".

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Abstract : Ghat roads are access routes into the mountainous with number of curves, which is very risky as compare to normal routes. So chances of accidents in ghat section are more because of narrow road width, sharp bends, improper camber, valley side etc. Accidents due to poor development of national highways and hazard zone. This study includes important issues like road accidents and their impacts, causes of these accidents, effects of accidents, prevention and control that we can improve this situation. Numbers of reasons in Surli ghat section are for these types of accidents such as speed, improper design of hilly roads, and width of road. While driving on roads at ghat section many drivers faces accident which results them into serious injuries or even death the main reason behind this accident is curves and bends of roads while turning in ghats. It becomes difficult to see vehicles coming from other lane and turning drivers usually have to assume a way for turning at such critical section this creates a great risk of life other reason for accident in ghat section is that only one vehicle can turn at turnings at a time. So it is first important to control this scenario and have some safety measures in ghat area..

Keywords —- Road accident, Ghat section, Road safety, traffic, curve road, surli ghat.

I. INTRODUCTION

A ghat road is one that passes through terrain with a cross slope of 25% or more and is distinguished by widely varying elevations, deep gorges, numerous watercourses, and steep slopes. These are also known as ghat roads in some places. It entails things like parapets to demarcate the roadway boundary, rock cuttings in difficult areas, erosion control measures, a greater number of drainage crossings, and so on. The planning of roads in hilly areas differs significantly from that in plain areas. Landslides, soil erosion, land degradation, and steep terrain are some of the key ecological issues that control the development of roadways in mountainous terrains, necessitating greater design.This work used for solutions and ideas to improve safety in Surli ghat section. The problem of accident is a very acute in highway transportation due to complex flow pattern of vehicular traffic, presence of mixed traffic along with pedestrians. Traffic accident leads to loss of life and property. Thus the traffic engineers have to undertake a big responsibility of providing safe traffic movements to the road users and ensure their safety. The problem at mountain road is also occurred by falling of mountains, trees and the big rocks. The major issue in curve roads is that the other end of the curve road cannot be seen by the driver because of the obstacles like trees present in the middle which causes number of accidents.

Problem Statement

Surli ghat joints two important district Satara and Sangli in Western Maharashtra India ,so there is two way flow of traffic in this ghat section. There are repeatedly accidents occur ,so it need improvemental solution.

II. OBJECTIVES

This work is a develop for a improvemental suggestion plan for Surli ghat section Western Maharashtra India.

1. To minimize the construction, accidental problems in the Surli ghat section.
2. To identify locations which have both high risk of crash losses and justifiable opportunity for reducing the risk.
3. To adopt advanced techniques & materials for existing ghat Section for better performance.
4. To prepare best suitable plan and suggestions for improvement in Surli ghat section.
5. To make cost analysis of road widening in surli ghat for improvement purpose.
6. To make Construction Scheduling plan for road widening in surli ghat by using MSP Software.

III .Literature Review

[10]

I. Athira Mohan (2017).

This paper describe that the identification and analysis of accident black spots help in identifying the stretches where accidents are more and these spots reduce the road safety in general. The spot on the road where traffic accidents frequently occur is termed as black spots

. [8]

II. Govindarajulu Preethi & Dr. P. Ezhumalai (2018).

This paper implementing the Intelligent Transport System in the vehicle by using internet of things will improve the road safety and provide safe and comfort to the vehicle user. The speed breaker detection module helps the users to drive the car in safe mode and prevents the car damages and human lives.

[6]

III. Greeshma & Krithi K J. etal (2020).

The purpose of this paper is to decrease the number of accidents in the ghat section. This is done by alerting the driver by means of LED lights which glows when a vehicle comes from the other side of the curved road. The vehicle is detected by the help of Infrared sensors which is interfaced to the microcontroller Arduino board. By this we can save thousands of lives in the curved roads in ghat section.

[1]

IV. K. Aravinda Shilpa, & R. Krishnaveni . etal (2022) .

The aim of this work is to save lots of thousands of individual's lives, and reduce the amount of accidents in curved roads or mountain roads. This can happen only by alerting the motive force by means of led light which glows only vehicle comes from opposite s side of the curve.

[7]

V. Khan Sohail & Bhagwat Soham (2020).

This paper highlights on the need for cost effective road safety investments using 'rolling barrier' systems which can redirect the deviated automobiles onto the right path and also prevent the overturning of vehicles. The Road accidents are an outcome of the interplay of various factors, some of which are length of road networks, vehicle population, in case of our paper the topography of ghat and curvature of turns also plays a part along with human population adherence/enforcement of road safety regulations etc.

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IV..Survey and alignment of ghat roads

In this section, guidelines for carrying out survey work to fix the alignment of hill roads situated primarily in a rural or non-urban area are given. The requirement of the road is decided based on administrative, developmental, strategic, other needs and the obligatory points to be connected by the road. Control points between obligatory points are governed by saddles, passes, valleys, river crossings, vertical and over-hanging cliffs, forest and cultivated land and other natural features like escarpments, slide prone, avalanche-prone and other unstable areas 4.1 Survey Methods and Sequence for Fixing of Alignment

With the guidelines enumerated under parameters the activities, right from the initial survey to fixing final alignment of a hill road, shall follow sequence as under

a) Reconnaissance of Routes
b) Determination of Centre line
c) Preliminary Survey of Routes
d) Choosing the possible alternative alignments from the surveyed routes
e) Ground verification and preliminary survey of the alternative alignments
f) Final detailed Location Survey for one of the selected alignments.

To facilitate the survey team in the tentative selection of alternative routes for subsequent detailed ground reconnaissance, the available topographical survey data shall be studied from the satellite

or remote sensing data and topographical survey sheets.

V.1.Google Earth Software.

Topographic data are essential to many Civil Engineering projects including construction of canal, dams, bridges, highways, large industrial and township development and many more. Elevation is

one of the most sought data in topographic information. The success of the project sometimes required highly accurate elevation data with sufficient detail. Currently, several methods are being available and practiced for obtaining the terrain elevation data of a given topography. Some of the most common practices being the conventional surveying using total station, aerial photogrammetry, satellite photogrammetry, radar inter fermometry , Lidar scanning, global positioning system (GPS) etc. Some of the global elevation data obtained using any of these methods are available publically .Google Earth Pro was originally the business-oriented upgrade to Google Earth, with features such as a movie maker and data importer. Up until late January 2015, it was available for $399/year, though Google decided to make it free to the public.[67][68] Google Earth Pro is currently the standard version of the Google Earth desktop application as of version 7.3.[69] The Pro version includes add-on software for movie making, advanced printing, and precise measurements, and is currently available for Windows, macOS, and Linux.

VI.Topographic data of surli ghat

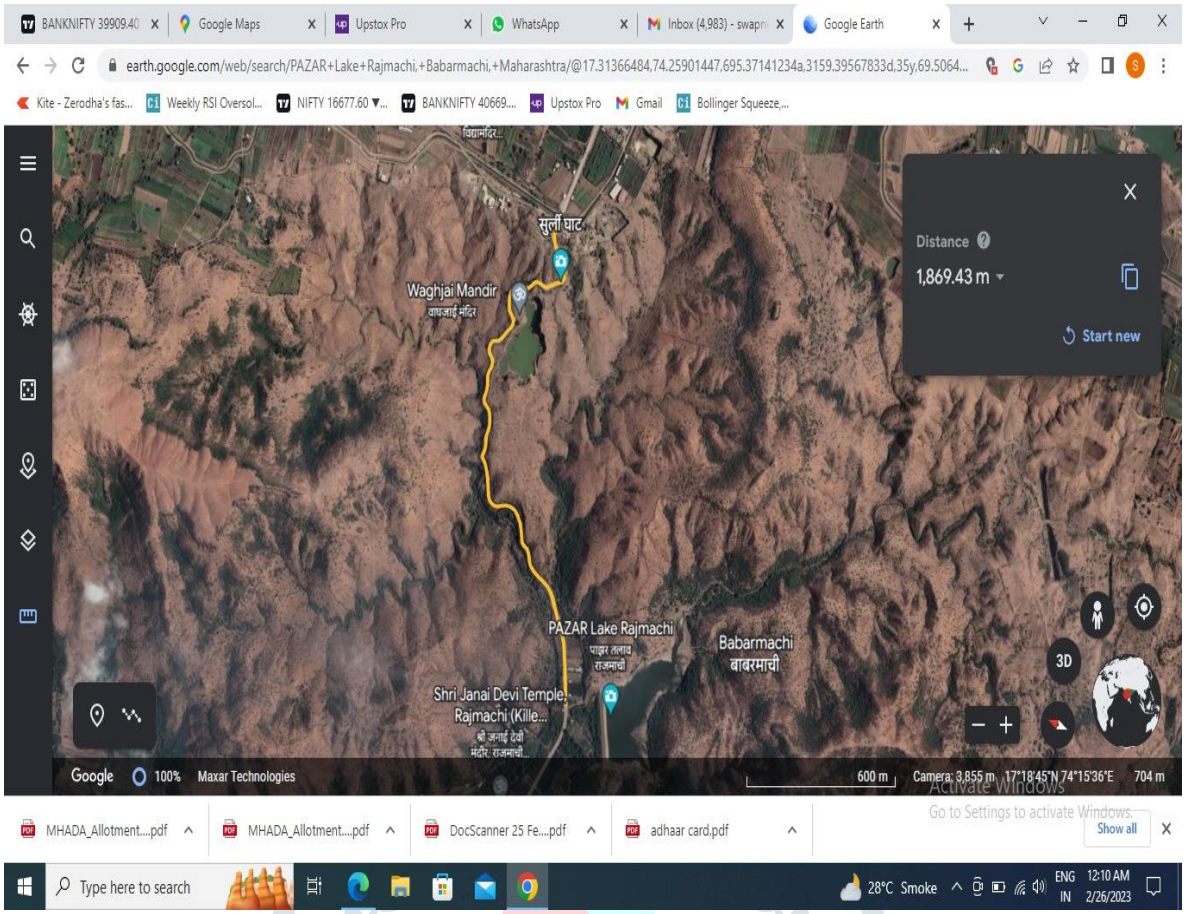


Image no.1-Image shown Google Earth view of surli Ghat

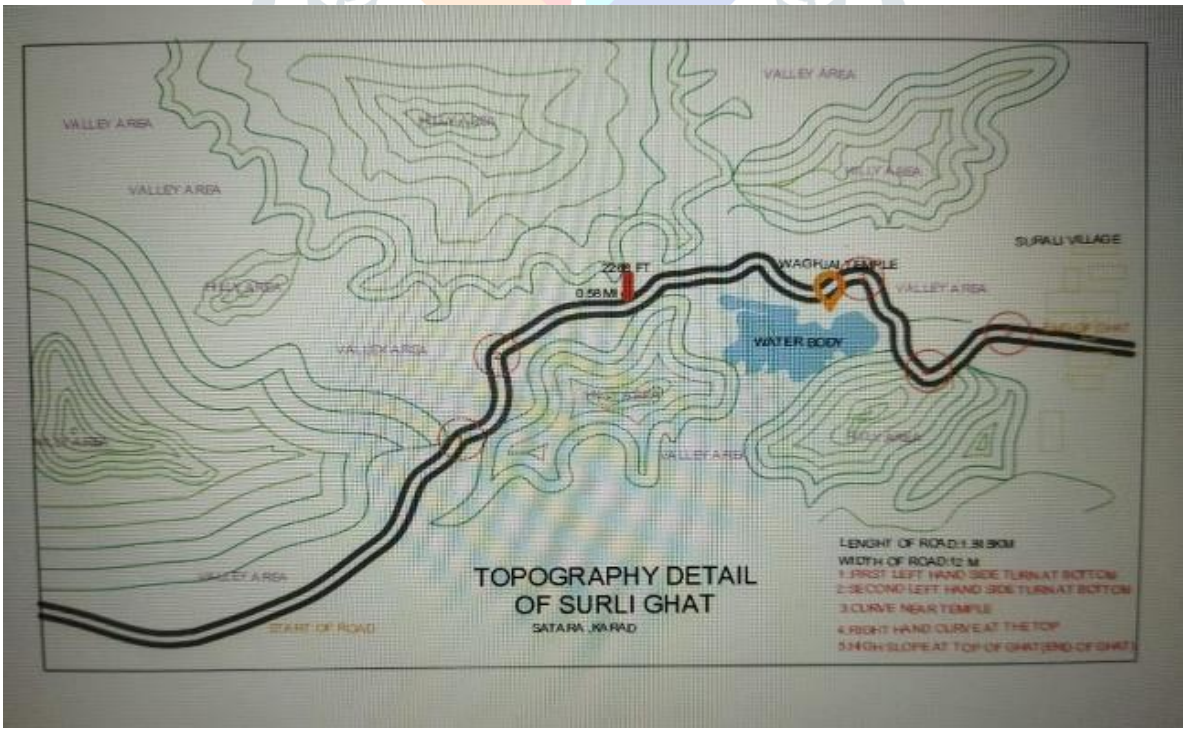
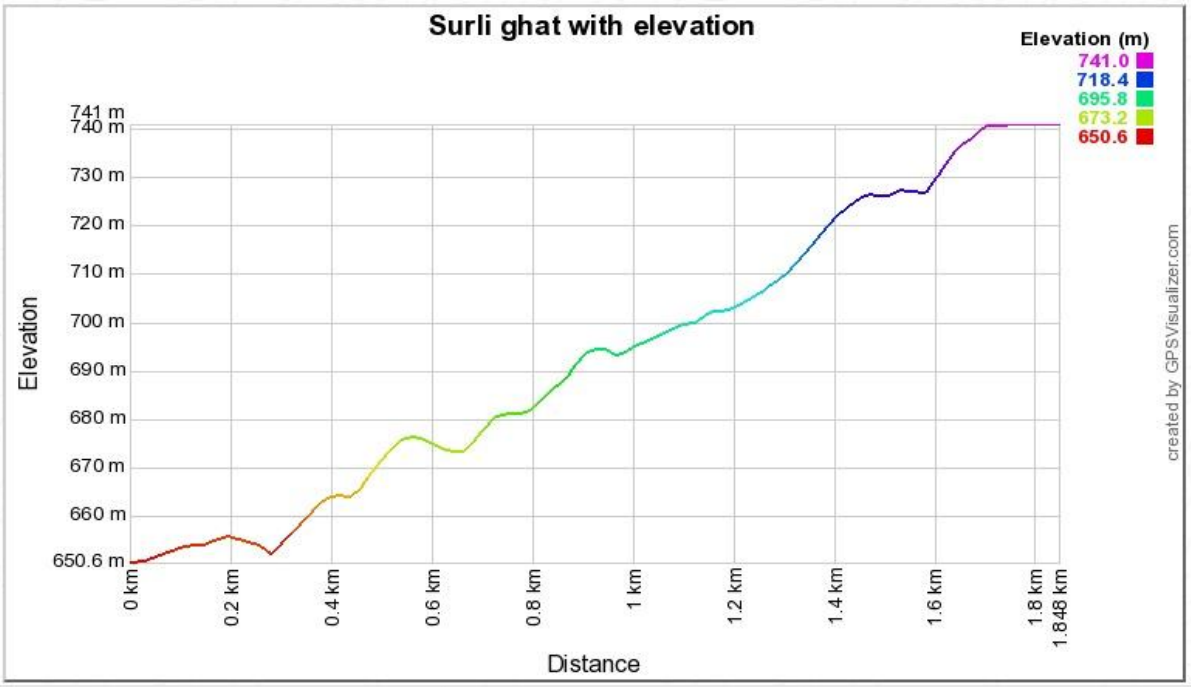


Image no.2-Topographic details Cad Drawing of surli ghat



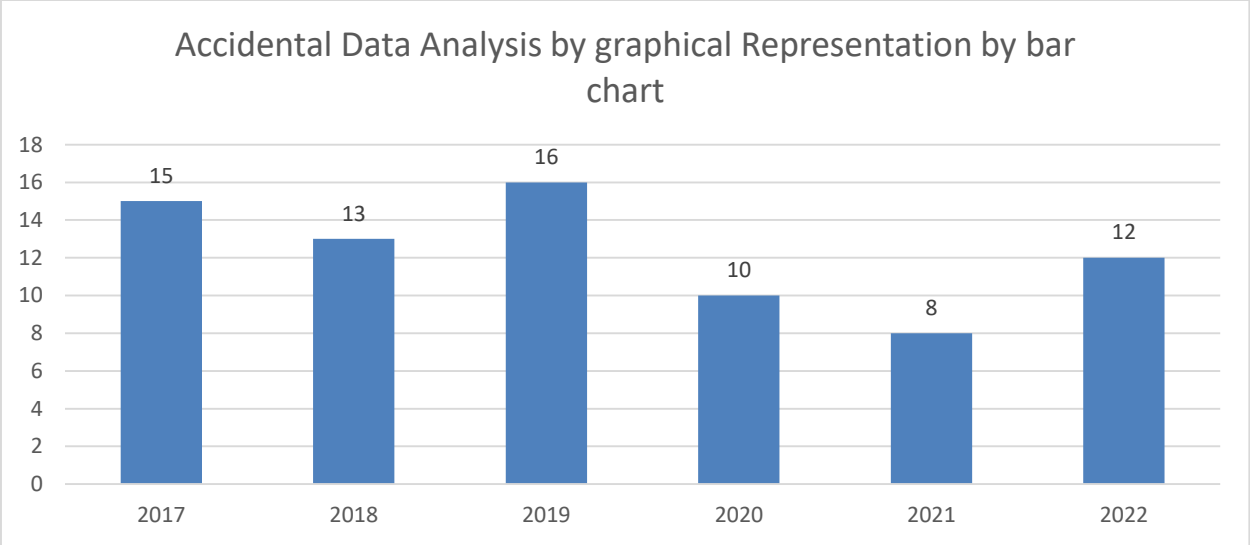
Graph no.1-Graph showing the Elevation details of Surli Ghat.

After studied topographical details of surli ghat .Total Length of ghat road ios 1.848km,width of road -10.5 m I am understanding the there are sharp horizontal curves ,steep slopes ,hair pin curves and elevation increases bottom to top ,so it required improvemental suggestion plan.

VII.Accidental data According to years 2017 to 2022 From police station.

YEAR	2017	2018	2019	2020	2021	2022
NO OF ACCIDENTS	15	16	13	10	8	12
NO OF DEATHS	11	7	9	8	12	7

Table no.1



Graph no.1

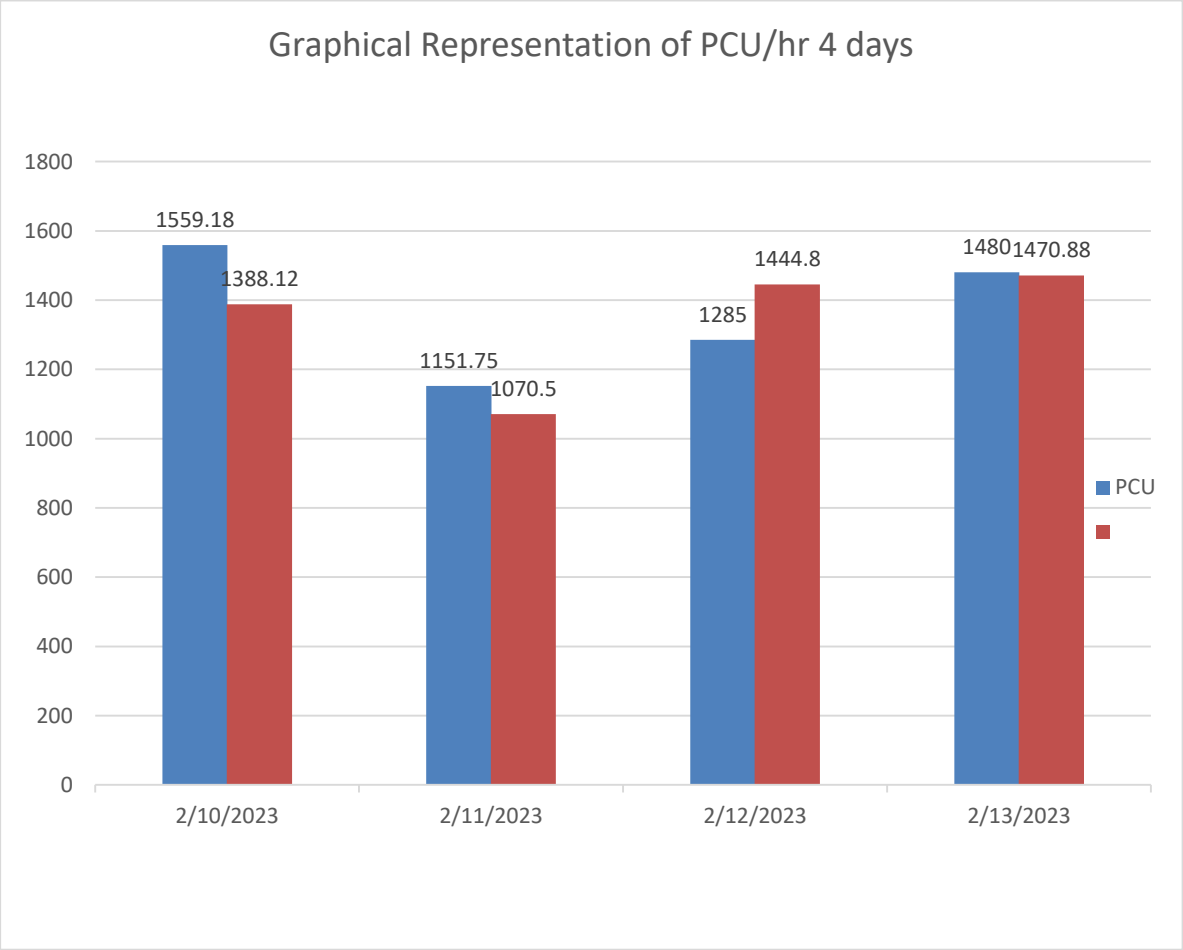
After studied a accidental data I am understating a no of accidents are done in surli ghat, average rate of accidents 15 per year . the reason of accidents is more construction problems**,** defects in roads construction so there required improvement solution plan.

VIII.Traffice Volume Study

I am taking a 10 days Traffice Volume Study of surli ghat by manual counting method with different time intervals.

Dates	Karad to Kadegaon(PCU /Hr)	Kadegaon to Karad (PCU/Hr)
2/10/2023	1559.18	1388.12
2/11/2023	1151.75	1070.5
2/12/2023	1285	1444.8
2/13/2023	1480	1470.88

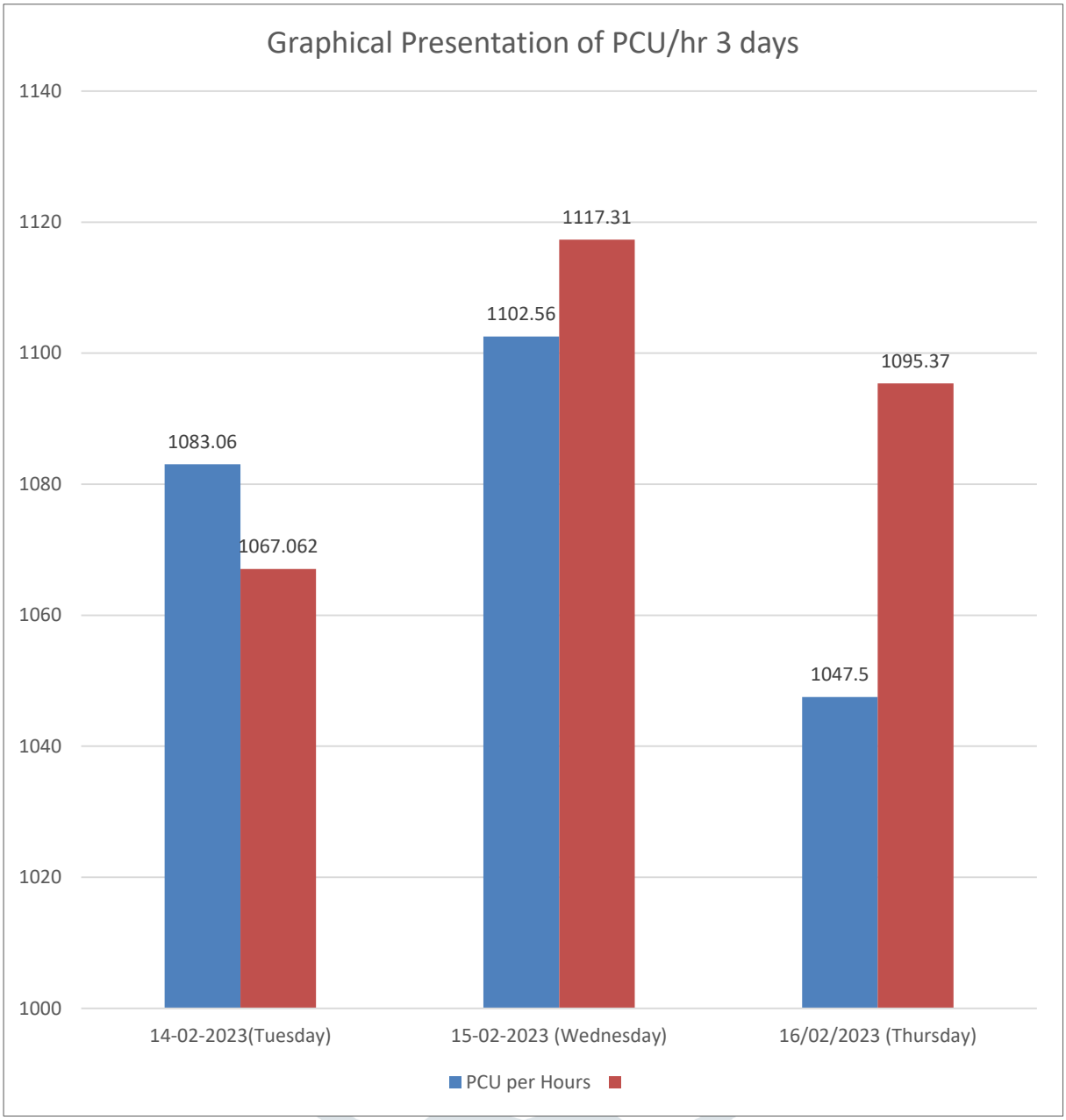
Table no.2



Graph no.2

Dates	Karad to Kadegaon(PCU /Hr)	Kadegaon to Karad (PCU/Hr)
14-02-2023	1083.06	1067.062
15-022023)	1102.56	1117.31
16/02/2023	1047.5	1095.37

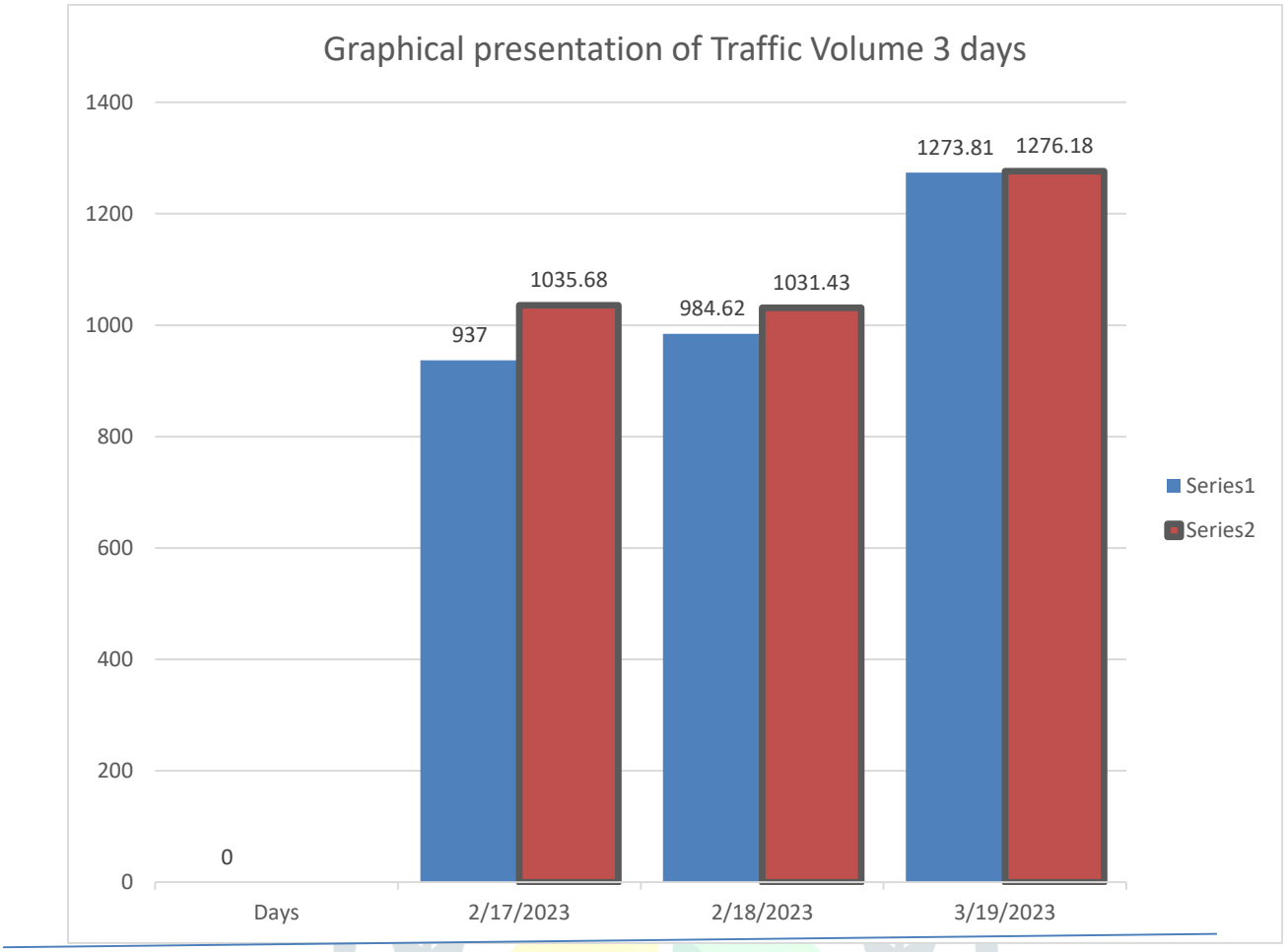
Table No.3



Graph no.3

Dates	Karad to Kadegaon(PCU /Hr)	Kadegaon to Karad (PCU/Hr)
2/17/2023	937	1035.68
2/18/2023	984.62	1031.43
3/19/2023	1273.81	1276.18

Table no.4



Graph no.4

After studied traffic volume study of surli ghat I am understanding the details of traffic flow of surli ghat there are average 1085.47 PCU / hr flow of traffic 10 days. There are traffic density is more so it required improvemental solution.

Image No.3-Actual Condition of surli ghat road

IX.Constructional Problems in Surli Ghat

1.No of pot holes- In surli ghat no of pot holes are done (dia- 20,30 Cm)
2. Cracks- cracks lengths 2.5m,3m in horizontal,diagonal etc.
3. Drainage- not proper provision of drainage .
4. Barrier Provision- stone masonary barrier provided there but there are made cracks are formed.
5. Road sign – Not proper provision road sign.
6. Land Slide- Not proper provision made at curve places to prevent landslide problems.
7. Road Marking –Not provision Road Marking .
8. Sholder – Not provision of shoulder as per road guidelines.
9. Camber- Not provision of camber on the road.
10. Gradient- Not proper provision of gradient at steep slope places.
11. Pavement- pavement condition in detoriation form or in decay form.

X. Accident Prone (Black Spots) Zones Identification.

By using Topographical data, Accidental data and Traffic volume study the following Blacks points are identified.

1. First Right hand turn curve from bottom of ghat .
2. Second Right hand turn curve bottom of ghat.
3. Near temple
4. First slope at start ghat at top.
5. First left turn at top of ghat.

XI.Improvemental Suggestion plan to surli ghat road by using Advanced Construction techniques.

1.Road widening Total road width 7.56m widening is required 2.44 m .details are made in estimate. Use construction equipment's like JCB power shovel, drag line , Clamshells ,dumpers, tractors ,bulldozers etc for land excavation ,compaction ,levelling purpose. Potholes are filled by using Cold mix asphalts techniques.

3. Cracks

Cracks are filled by Bitumen crack sealing materials techniques .

4. Drainage

Provide at First Right hand turn curve from bottom of ghat .and Second Right hand turn curve bottom of ghat Catch water drain provision.

5. Land slide

Provide at First Right hand turn curve from bottom of ghat .and Second Right hand turn curve bottom of ghat soil nailing techniques

6.Barrier Provision-

Provide Rolling Barriers at First Right hand turn curve from bottom of ghat Second Right hand turn curve bottom of ghat. And First left turn at top of ghat.

7. Road Sign- There Provide Speed limit sign, not overtaking sign, not stopping sign, right /left hand curve sign, steep slope sign ,go slow sign to surli ghat area.

8.Lighting –

There Provide Lighting LED Lamps at curve places

9.Road Marking

Road Markings are the colored paintings on the roads.

XII Overview of Improve mental suggestion planning sheet

Sr No	Name Of problem	Description of problem	Location of problem in Surli Ghat	Used construction techniques and material
1.	Road widening	There are mostly problems arises for overtaking.	Total road width 7.56m widening is required 2.44 m .details are made in estimate. Use construction equipment's like JCB power shovel, drag line , Clamshell ,dumpers, tractors ,bulldozers etc for land excavation ,compaction ,levelling purpose.	Use construction equipment's like JCB power shovel, drag line ,Claimeshell ,dumpers, tractors ,bulldozers etc for land excavation ,compaction ,levelling purpose.
2	Potholes	No of pot holes (30 to50 Cm diameter)	Overall Ghat	Cold mix asphalts techniques Provision of pothole detectors at curve places.

3	cracks	Cracks are formed 1.5to 3m	Overall Ghat	Bitumen crack sealing materials techniques
4.	Drainage	Not proper provision of drainage .	1.First Right hand turn curve from bottom of ghat . 2.Second Right hand turn curve bottom of ghat. 6. First left turn at top of ghat.	Provision of side gutter and catch water drain
5.	Land slide	There are hill in sloping form and there strata is in soft soil forms, in rainy seasons stones are fallen due to not proper provision of landslide minimize techniques.	1.First Right hand turn curve from bottom of ghat . . 2 .First left turn at top of ghat.	Provision of soil nailing techniques
6.	Road Sign	Not proper provision of Road Sign.	1.First Right hand turn curve from bottom of ghat . 2.Second Right hand turn curve bottom of ghat. 3.Near temple 4.First slope at start ghat at top. 5.First left turn at top of ghat.	There are Provide Speed limit sign, not overtaking sign, not stopping sign, right /left hand curve sign, steep slope sign ,go slow sign to surli ghat area.
7.	Barrier	Not proper provision of Barrier.	All Valley side only	Provide Rolling barrier at valley side .
8.	Road Marking	Not provision of road marking	Overall Ghat	Provide block road marking
9.	Lighting	Not provision of road Lighting	at all curve places	Provide Lighting LED Lamps at curve places

Justification

After studied a accidental data I am understating a no of accidents are done in surli ghat, average rate of accidents 15 per year . the reason of accidents is more construction problems**,** defects in roads construction ,less road width so there required improvement solution plan.

After studied traffic volume study of surli ghat I am understanding the details of traffic flow of surli ghat there are average 1085.47 PCU / hr flow of traffic 10 days. There are traffic density is more so it required improvemental solution.After studied topographical details of surli ghat ,I am understanding the there are sharp horizontal curves ,steep slopes ,hair pin curves and elevation increases bottom to top ,so it required improve mental suggestion plan. All those data guideline shows the this surli ghat

1.there are more accidents are done

2.,high density of traffic

3. Road width is not sufficient.

4.topographical problems.

Above all those problems are solved by only road widening . construction of single lane to double lane as per IRC guidelines.

By Using Hill Road Manual IRC : 52-2019
In Mountainous and steep terrain MDR road
Double lane- 7m
Width of shoulder =1.hill side = 0.9m
2.vallry side =0.9m

Total =1.8 m
Drainage = 0.6 m
Parapet wall = 0.6m
Total length required for hill road = 7+1.8+1.2=3m
Actual width of surli ghat road is

1. Carriage way =5.66 m
2. Shoulder = 2*0.5 =1m
3. Prapet wall = 0.4m
4. Drainage =0.5 m

Total length =5.66+1+0.4+0.5=7.56m
Total Widening = 10-7.56 = 2.44 M
Surli Ghat Road widening project Details

- **Total Quantity of Cutting - 29948.708 Cu.m**
- **Total Road Widening Project Cost With GST - 71,197,552.13 RS**
- **Tentative Schedule of Project - 1 November 2023 To 14 April 2024**

XIV Results

After the study of the surli ghat area I Understanding the information is Surli ghat connect two Distict in Sangli and Satara so there are traffic density is high, accidental zones are more ,topography of ghat is highly elevated with steeps slopes ,many defects, lot of constructional problems. So these are sloved using Advanced Construction technology listed in Improvementation suggestion plan.

Following points are observed after studied all data of surli ghat.

1. After studied traffic volume study of surli ghat I am understanding the details of traffic flow of surli ghat there are average 1085.47 PCU / hr flow of traffic 10 days. There are traffic density is more so it required improvemental solution.
2. After studied topographical details of surli ghat ,I am understanding the there are sharp horizontal curves ,steep slopes ,hair pin curves and elevation increases bottom to top ,so it required improve mental suggestion plan.
3. Using solution plan minimize the construction, accidental problems in the Surli ghat section.

4 . .After studied Topographical data, Accidental data and Traffic volume study the following Blacks points are identified.

1 .First Right hand turn curve from bottom of ghat .
2. Second Right hand turn curve bottom of ghat.
3. Near temple
4. First slope at start ghat at top.
5. First left turn at top of ghat.

These all black spots improved by various construction techniques and materials. These all black spots improved by various construction techniques and materials.

1. All the Problems are solving purpose use Improvemental suggestion plan sheet to overall surli ghat .(made above)
2. All problems are solved by using solution of double lane road construction (road widening) in surli ghat. these short details

1.Total Quantity of Cutting - 29948.708 Cu.m
2.Total Road Widening Project Cost With GST - 71,197,552.13 RS
3. Tentative Schedule of Project - 1 November 2023 To 14 April 2024

All the project data or knowledge (Improvemental suggestion ,solution plan of Road Widening Project) is helpful for Solving the problems in Surli Ghat and in civil engg field

XV Conclusion

I am understanding the all details related to Surli Ghat and I got a lot of knowledge like

1. Data collection
2. Topographical details by Google earth software.
3. Surveying work of ghat section
4. Traffic Volume Study
5. Ghat road construction details
6. level calculation, Estimation ,Scheduling on MSP software Knowledge are received.
7. Advanced technique s like Rolling Barrier, Soil Nailing , Cold mix asphalts techniques, Bitumen crack sealing materials techniques , block road marking, Lighting LED Lamps etc
8.. Software Knowledge like Auto Cad,2D/3D, MSP, Google Earth Software etc.
9. All the project data or knowledge (Improvemental suggestion ,solution plan of Road Widening Project) is helpful for Solving the problems in Surli Ghat and in civil engg field are following

1. Accidental road problems
2. Road Constructional problems
3. Transportation problems
4. Environmental problems

5. Geological problems

XVI .References

1. Mrs. K. Aravind Shilpa, R. Krishnaveni, P. Bhashini Deepika, & M. Vijayalakshm 'smart safety and accident prevention system for mountain roads ''International Journal

of Application or Innovation in Engineering & Management (IJAIEM) Web Site: www.ijaiem.org Email: editor@ijaiem.orgVolume 11, Issue 5, May 2022.

2. Prof. Khultej Gurav,Saurabh Palve ,Siddhant Jadhav, Abhishek Jadhav & Prathamesh Dalvi 'Implementation of rolling barrier and plastic road concept in ghat section''© 2022 JETIR January 2022, Volume 9, Issue 1.

3. Prof. Sachin B. Kajabe, Prof. Sachin L. Desale,Pranali B. Chaudhari, Sharad B Patil & Gayatri R. Waghchaure, 'Road Accident Prediction and Prevention for Ghat Area in Nashik City''International Journal of Trend in Scientific Research and Development (IJTSRD),Volume 6 Issue 4, May-June 2022 Available Online: www.ijtsrd.com e- ISSN: 2456 – 6470.

4. Shailendra Singh, & Shivam Singh Patel , ''black spot on highway and remedial measures: a review''© 2020 IJCRT | Volume 8, Issue 3 March 2020 | ISSN: 23202882

5. Ni Luh Putu Shinta Eka Setyarini, Leksmono suryo Putranto & Najid ISSN: 0453219 Volume 62, Issue 08, September, 2020, Factors Affecting the Road Safety Audit Operational Stage.

6. Greeshma, Krithi K J, Sahana ,Sudhakara B & Thirthashree Shetty,'Road safety in ghat section''© 2020 IJCRT | Volume 8, Issue 5 May 2020 | ISSN: 2320-28820.

7. Khan Sohail & Bhagwat Soham,'Safety in Ghat Section using Rolling Barrier''National Conference (6th and 7th March 2020) International Journal Engineering Research & Science (IJOER).

8. Govindarajulu Preethi & Dr. P. Ezhumalai In-Vehicle Intelligent Transport System for Preventing Road Accidents using Internet of Things International Journal of Applied Engineering Research ISSN 0973-4562 Volume 13, Number 8 (2018) . 5661-5664 © Research India Publications. http://www.ripublication.com .

9. Sandeep Verma, 2018, Identification and Improvement of Accident Black Spots N.H.86 District Sagar, Madhya Pradesh, International Research Journal of Engineering and Technology, 5(2), 225-232 .

10. Athira Mohan, 2017, Identification Of Accident Black Spots On National Highway , International Journal of Civil Engineering and Technology,8(4), 588-596 .

11. Maen Ghadi,2017,Comparison Different Black Spot Identification Methods, Transportation Research Procedia 27 (2017) ,1105–1112 .

12. K. Chandrasekhar Reddy, 2017 , Identification of Accident Black Spots on Puttur to Ramagiri Road and Remedial Road Engineering & Traffic Calming Measures, International Journal for Research in Applied Science & Engineering Technology ,5 (9),239-244 .

13. Yashaswini Rajendra Bhat ,''Reasons And Solutions For The Road Traffic Accidents in India'' (ijitr) international journal of innovative technology and research volume no.4, issue no .Volume No.4, Issue No.6, October – November 2016, 4985-4988

14. Bačkalić, T., Jovanović, D., & Bačkalić, S. (2016). Effort Allocation in Rural Road Safety Analysis under Data-Limited Conditions. Journal of Transportation Engineering, 142(2), 1–9.

15. Vikas Desai, "Design and Implementation of GSM and GPS Based Vehicle Accident Detection System", IJIT, vol. 01, Issue-3,2013.

16. Wang, X. Wu, M. Abdel-Aty, and P. J. Tremont,—Investigation of road network Feature and safety performance, Accident Analysis & Prevention, vol.56, 2013.

17. Guido, G., Saccomanno, F., Vitale, A., Astarita, V., &Festa, D. (2011). Comparing safety performance measures obtained from video capture data. Journal of Transportation Engineering, 137(7), 481–491.