REFORMATION OF A REGION BY EFFECTIVE PLANNING AND TECHNIQUE

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ABSTRACT

Due to rapid urbanization there is a need of efficient solutions to the urban mobility, which will help to minimize traffic problems. And, for the reformation of a city, it is important to use appropriate tools and technology which will help to manage the rapid work progress. Building Information Modeling (BIM) is such a technology which provides rapid enhancement of city model related to traffic management. In the current research, by collecting data from various Government and Municipal authorities of Narhe region, Pune city concentrating on trafficproblems, BIM is used forfinding its solutions in terms of suitable models for developing the region as a smart city.Further providing these suitable models to smart city development authorities for recommendation.

Keywords: *BIM, Infraworks360, Revit,etc.*

1. INTRODUCTION

This project is the study of Effectiveness of Autodesk BIM (Building Information Modelling) Technology for urban planning of old city infrastructure to develop BIM city model and to provide ease of services to the citizen. Due to rapid urbanization it becomes necessary to study and plan infrastructure of the old city, and to serve and improve the standard of living of the growing population, it is required to develop infrastructure of old cities to smart cities using appropriate tools and technologies, BIM Technology is One of the technology which helps for the effective planning, rehabilitation and infrastructure management of old city and buildings through various BIM techniques like Infraworks 360, Naviswork, Revit, Etc.

1.1 What is BIM?

While many people intuitively think of BIM as software, in reality BIM is the process of creating and using digital models for design, construction and/or operations of building projects. Any Software is simply the mechanism by which the BIM process is accomplished.

The BIM process involves participants from the entire project life cycle (architect, engineer, contractor, owner, facilities management, etc.) who all contribute and communicate through the shared models. These models combine intelligent 2D and 3D objects used to define a construction design, along with external factors such as geographic location and local conditions, into a virtual construction database that provides a single, integrated source for all information associated with that construction design.

The "intelligence" attributed to the objects includes parametrically-defined graphical and non-graphical information, giving the architects,engineers, and contractors the ability to represent geometric and functional relationships between construction elements.

This information feeds an integrated database, which in turn feeds all design documents and schedules for the construction project. When a change is made to the model, all graphical views (plan, elevation, detail, and other construction drawings), as well as non-graphical views such as the design documents and schedules, automatically reflect the change.

1.2 Key advantages of BIM

1. Improved information flow
2. Better design visualization
3. Improved cost estimating
4. Change Management
5. Data management
6. Sustainable Design

7. Improved energy analysis
8. Reduced construction costs
9. Building history

1.3 Problem statement

In 2015, the government of India, launched a scheme for the development of major cities in the country by converting them into smart cities to ease the life of people in thosecities. Most metropolitan areas are facing significant transportation-related challenges,due to increasing population and travel demands, as well as sometimes century-old transportation infrastructure.Larger cities of today are confronted with immense problems in terms of development, inclusion, housing, transport, climate, infrastructure, security and many more. Pune city is one of the cities government has selected in first stage of scheme. Transportation is the vital part for the development of the smart city. So, we have focused on the transportation related problems in our project.

1.4 Objectives

1. To evaluate existing design.
2. To study the causes of accidents and suggest corrective measures at potential location
3. To provide suggestion for efficient urban mobility and public transport using BIM.
4. To provide solutions for safety and security of citizens reducing road accidents due to traffic problem.

1.5 Scope of project work

Building Information Modelling (BIM) process is a rapidly growing technology in the field of architecture, town planning and engineering, with the ease of planning and design of the BIM model. Currently, the Building Information Modelling (BIM) methods are used greatly to capture the information of variousfeilds such as buildings, transportation etc.

Due to rapid urbanization, there is a need to find out efficient solutions for the urban mobility, which will enhance the quality of city in terms of traffic problems. And for the planning or the reformation of city it is important to use appropriate tools and technology which will help for the easy and rapid work progress in terms of management and model of the city.

There is need to find out such technologies for the rapid enhancement of city model for traffic problem for its management with economy as a constraint of design and model making.

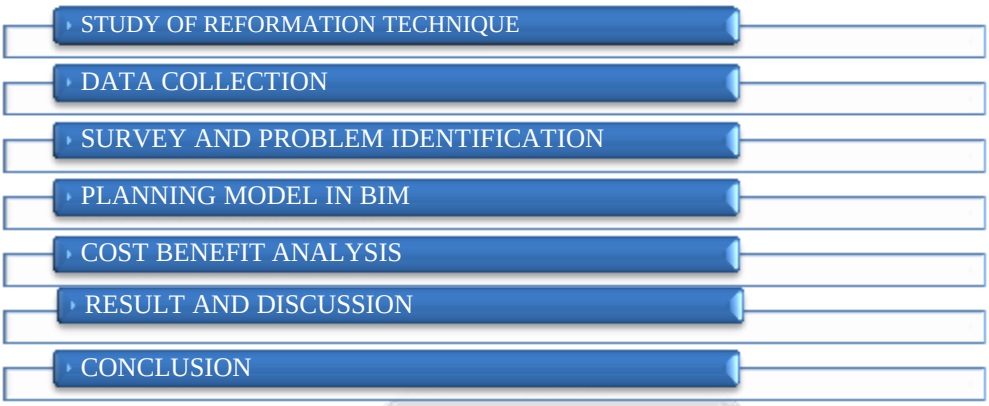
Our focus is to use BIM technology in the development of city model, due to constraints of time and collection of data from various government and Municipal authorities we have concentrated on the problem of traffic, and its solutions.

Traffic congestion is a condition on road networks that occurs as use increases, and is characterized by slower speeds, longer trip times, and increased vehicular queuing. The most common example is the physical use of roads by vehicles. When traffic demand is great enough that the interaction between vehicles slows the speed of the traffic stream, this results in some congestion of traffic. Traffic congestion occurs when a volume of traffic or modal split generates Demand for space greater than the available road capacity; this point is commonly termed saturation.

In this research we have concentrated on the problems causing the traffic for the selected city area and in the same sense providing suggestions for its solution using BIM technology. BIM technology is being used for the developinga region as a smart city model for the traffic solutions.

2. METHODOLOGY

2.1 Methodology includes following process:



2.2 Technique:

Development of models:

1st phase:

- Geographical data collection.

2nd phase:

- Interpretation data
- Analysis
- Application of solution and its effectiveness

3rd phase:

- Final model making using BIM.

2.3Traffic analysis and finding of actual problems:

In regards to study the areas which were selected through Google maps the actual site visit was done at Narhe Region of the Pune city. Various problems regarding traffic congestion were discussed with local residents, Traffic police officers,and traffic head office of Narhe region.

At Nawale bridge region we found there is huge traffic which reduces the time efficiency and making the traffic problems. Major traffic causing vehicles travels from Katraj to Sinhagad road. Due Educational Institutes around the area and industries in warje region the traffic flow is increasing day by day in those areas. There are lot of problems which cause the traffic congestion, land availability, acquisition of space by unauthorized works, traffic rules, etc. The traffic problems can be solved by using appropriate planning, sometimes by flyover bridges at junction, using maximum public transport. and visualizing the models by using the advanced technologies.

2.4 Model making using BIM:

Building information modeling solutions create and operate on digital databases for collaboration, manage change throughout those databases so that a change to any part of the database is coordinated in all other parts, and capture and preserve information for reuse by additional industry-specific applications. Through the application of information technology to the problem of describing a building in software, they enable higher quality work, greater speed, and improved cost effectiveness for the design, construction, and operation of infrastructure.

2.5 Steps for development of model:

Step 1: Creating Basic Environment

In the first step,We have indentified the roads the maps and changed them to the design roads from conventional roads.

Step 2: Building the Bridge model

To design the bridge we have used the bridge tool, in this with basic Infraworks we made part of a road which look like a bridge by applying a different style, With Bridge Design for InfraWorks 360, engineering principles are applied to size and configure the major components such as the deck, superstructure (girders) and substructure (piers and abutments).

The goal is not to fully design the bridge but to get a really good idea what is possible and what the sizes and spans of the major components will be. With this information, the feasibility of a bridge can be assessed very early in the project so that important decisions can be made.

Step 3: Exposure conditions

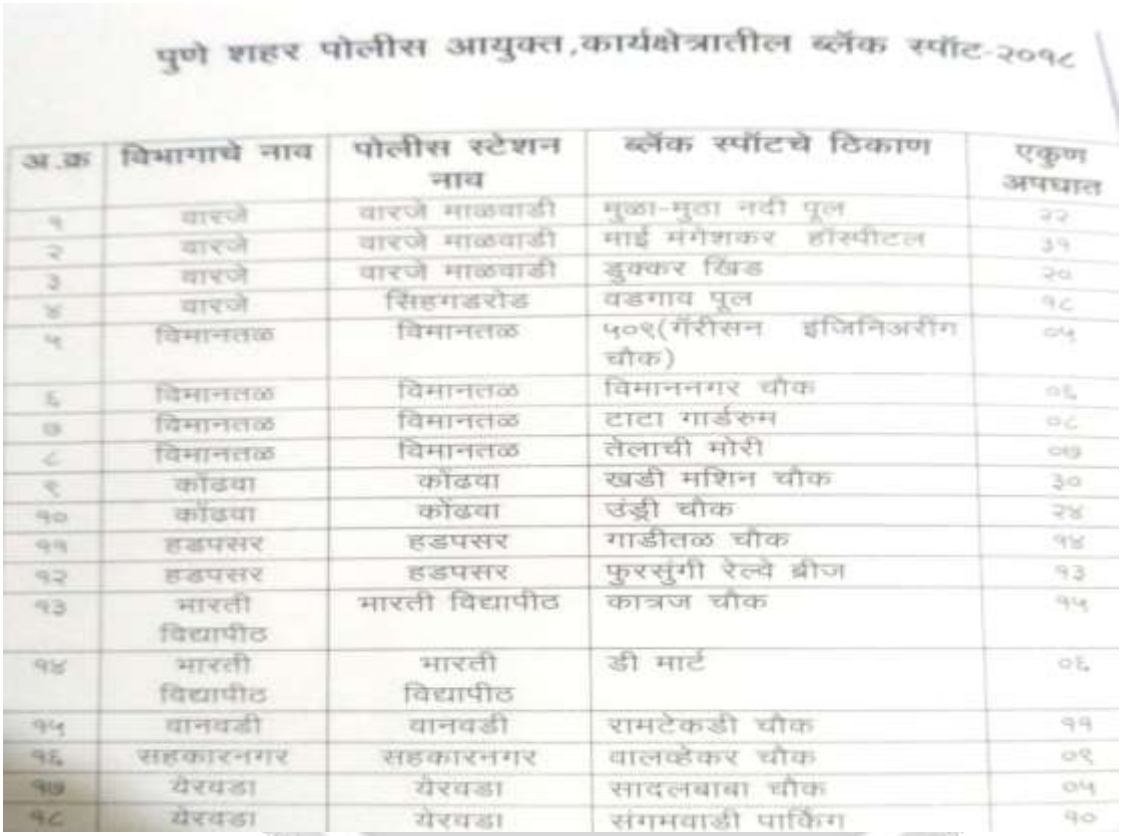
After developing bridge model various weather conditions wind analysis is done.

Step 4: Analysis of quantities

We also calculated the quantities of material required for the bridge model using quantities tool in infraworks, and extracting the model in Revit software for scheduling and quantities determination.

3. DATA ANALYSIS

In this chapter all accidents data ofPune cityis analysed and following results are obtained.



पुणे शहर पोलीस आयुक्त,कार्यक्षेत्रातील ब्लॅक स्पॉट-२०१८

अ.क्र	विभागाचे नाव	पोलीस स्टेशन नाव	ब्लॅक स्पॉटचे ठिकाण	एकुण अपघात
१	वारजे	वारजे माळवाडी	मुळा-मुठा नदी पूल	२२
२	वारजे	वारजे माळवाडी	माई मंगेशकर हॉस्पीटल	३१
३	वारजे	वारजे माळवाडी	डुक्कर खिंड	२०
४	वारजे	सिंहगडरोड	वडगाव पूल	१८
५	विमानतळ	विमानतळ	५०९(गॅरीसन इंजिनिअरींग चौक)	०५
६	विमानतळ	विमानतळ	विमाननगर चौक	०६
७	विमानतळ	विमानतळ	टाटा गार्डरुम	०८
८	विमानतळ	विमानतळ	तेलाची मोरी	०७
९	कोंढवा	कोंढवा	खडी मशिन चौक	३०
१०	कोंढवा	कोंढवा	उंड्री चौक	२४
११	हडपसर	हडपसर	गाडीतळ चौक	१४
१२	हडपसर	हडपसर	फुरसुंगी रेल्वे ब्रीज	१३
१३	भारती विद्यापीठ	भारती विद्यापीठ	कात्रज चौक	१५
१४	भारती विद्यापीठ	भारती विद्यापीठ	डी मार्ट	०६
१५	वानवडी	वानवडी	रामटेकडी चौक	११
१६	सहकारनगर	सहकारनगर	वालव्हेकर चौक	०९
१७	येरवडा	येरवडा	सादलबाबा चौक	०५
१८	येरवडा	येरवडा	संगमवाडी पार्किंग	१०

Fig No. 3.1: Accident data collected from Pune Police

Table No. 3.1 : ROAD ACCIDENTS FORMAT – YEAR 2018

SR. No	MONTH	NUMBER OF ACCIDENTS					NO. OF PERSONS		
		FATAL	GRIEVOUS INJRY (GI)	MINOR INJURY (MI)	NON INJURY (NI)	TOTAL NO OF ACCI.	Number of persons		
							Killed	Grevious Injured	Minor Injured
1	January	16	28	6	2	**52**	16	36	7
2	February	17	32	8	0	**57**	17	45	17
3	March	16	29	5	1	**51**	16	33	12
4	April	20	28	8	0	**56**	21	45	27
5	May	15	24	7	0	**46**	15	34	19
6	June	17	19	3	3	**42**	17	24	6
7	July	19	19	4	1	**43**	21	29	12
8	August	15	17	4	0	**36**	16	25	13
9	September	16	22	10	1	**49**	17	27	17
10	October	10	19	7	0	**36**	10	34	8
11	November	28	26	7	0	**61**	29	38	11
12	December	20	24	7	1	**52**	22	26	12
	TOTAL	**209**	**287**	**76**	**9**	**581**	**217**	**396**	**161**

Source – Pune City Police Commissioner office.

Table No. 3.2 : CAUSES OF ACCIDENTS – YEAR 2018

	JAN 18 TO DEC 18							
SR. NO.	NATURE OF ACCIDENTS	NUMBER OF ACCIDENTS					NUMBER OF PERSONS	
		F	GI	MI	NI	Total	Killed	Injured
1	Overturning	8	12	2	0	22	44	97
2	Head on collision	23	12	15	1	51	51	124
3	Rear & collision	22	47	8	2	79	6	28
4	Collision brush/side swipe	17	48	12	1	78	2	36
5	Hit fixed objects	15	7	4	0	26	3	18
6	Skidding	7	9	5	2	23	7	20
7	Right turn collision	20	3	4	0	27	3	11
8	Hit & run	37	73	8	0	118	36	78
9	Others	60	76	18	3	157	65	145
	TOTAL	**209**	**287**	**76**	**9**	**581**	**217**	**557**

Source : Pune City Police Commissioner office.

Fig. No. 3.2: Creation of Infraworks Model For Nawale Bridge

Fig. No. 3.3: Completion of Infraworks Model For Nawale Bridge

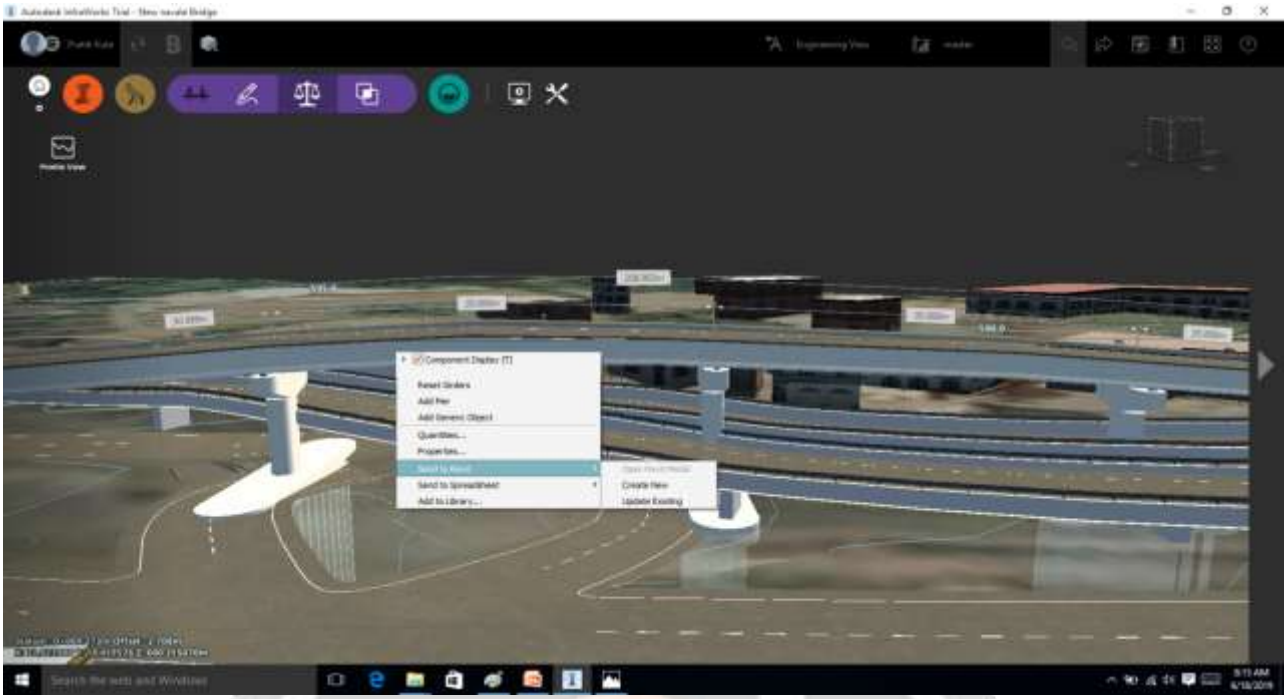


Fig No. 3.4 : Model Componant Saving As Revit Model

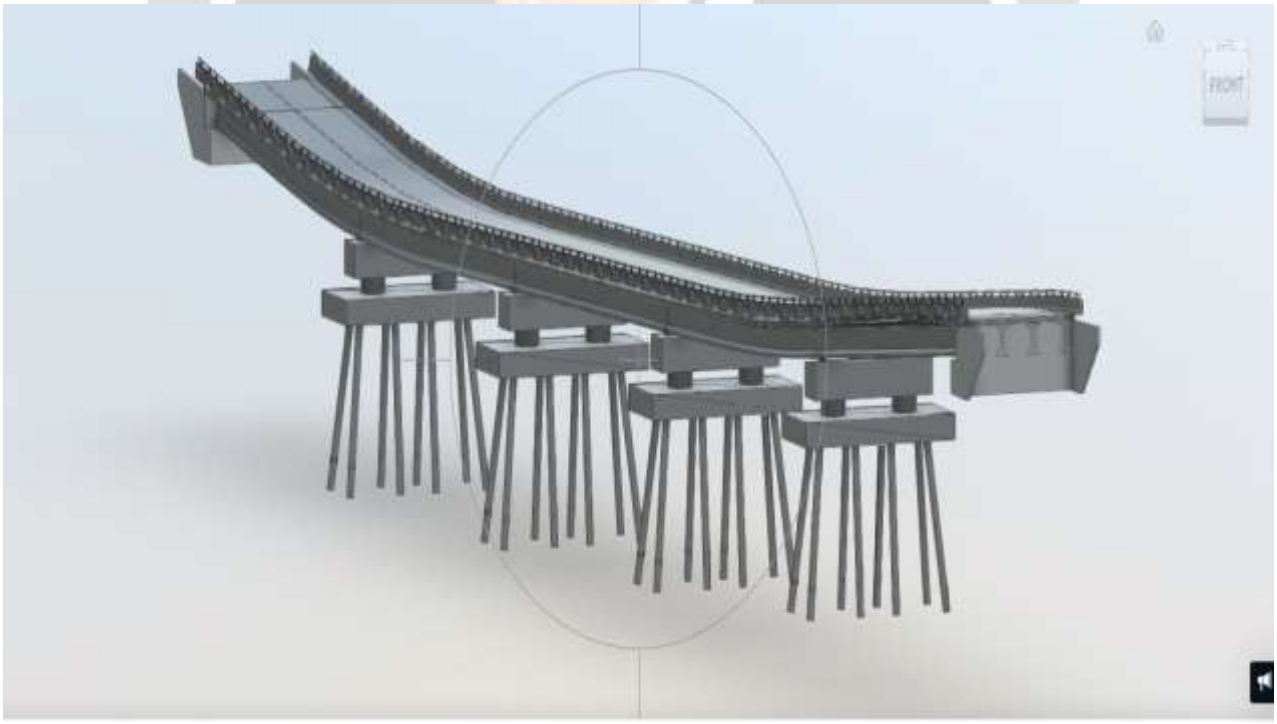
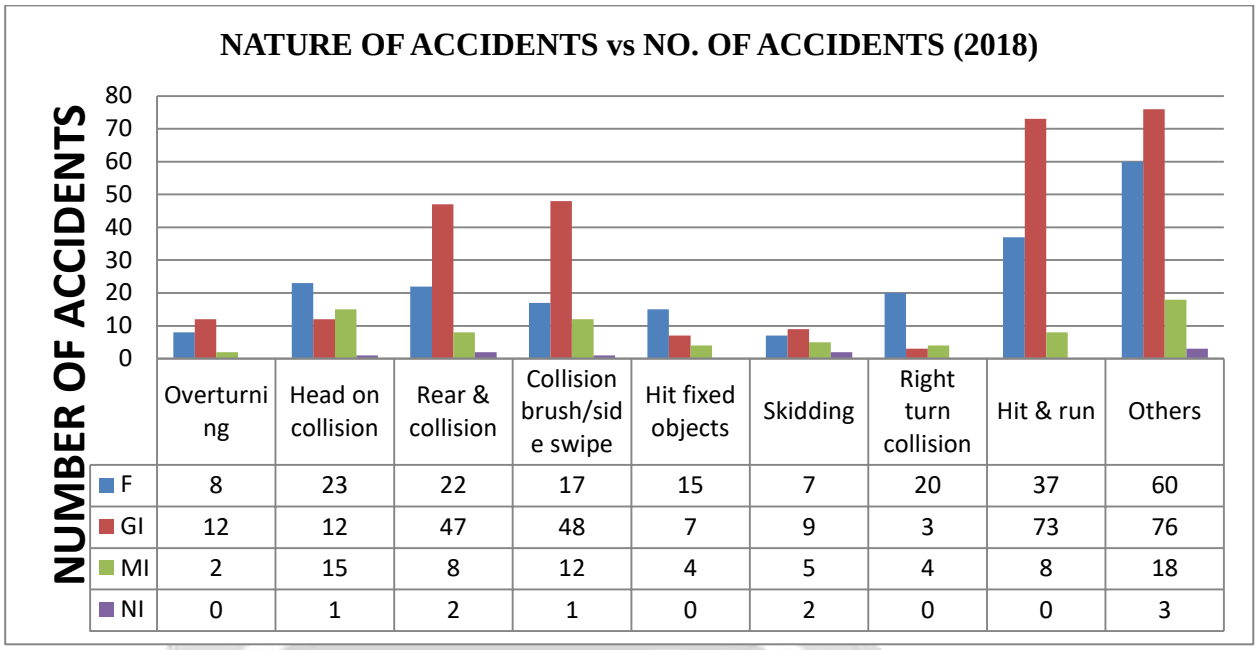


Fig. No. 3.5 : Concept Revit Model For Nawale Bridge

4. RESULTS AND DISCUSSION:

We have studied the Smart city norms and try to implement it in the selected city area regarding traffic congestion.

- Graphical representation of causes of accidents



	Overturning	Head on collision	Rear & collision	Collision brush/side swipe	Hit fixed objects	Skidding	Right turn collision	Hit & run	Others
F	8	23	22	17	15	7	20	37	60
GI	12	12	47	48	7	9	3	73	76
MI	2	15	8	12	4	5	4	8	18
NI	0	1	2	1	0	2	0	0	3

Chart No. 4.1 : Causes of Accidents for Year 2018

- From graphical representation it can be observed that gravious injuries are more occurring than other injuries.
- It is also observed that hit &run and others which includes mechanical failures, drunk and drive and skidding etc.
- InfraWorks infrastructure design software supports Building Information Modeling (BIM) processes and gives the solutions with ease to transportation related problems.
- It helps us to visualize road infrastructure and possible ways to modify it.
- It helps to use the better solutions with cost benefit analysis to save the project cost.

5 . CONCLUSION:

- From graphical representation we can identify the causes and can provide the models using BIM to overcome problem.
- Using Building Information Modelling and by collecting data from authoritieswe can create more than one solution for the traffic problem of selected area.
- By comparing the 3D models with each other we can refer the smart city authority to use the best of them.

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