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Channelized Road Intersection & Highway andTraffic Management System

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Abstract:- Pune, India's eighth-largest metropolis, is rapidly growing as an economic and educational powerhouse. In Pune, traffic congestion are a major problem that cause significant delays, increased fuel waste, and financial losses. If not managed effectively, intersections are one of the most important elements of the route that cause significant traffic congestion. Longer traffic congestion could result from poor traffic management around intersections with heavy traffic density. The main cause of prolonged periods of traffic congestion worldwide is poor road traffic management. Over time, various alternatives were put forth. A "Traffic Signal" is the most typical of them all. A traffic signal's function is to ensure the orderly flow of traffic by allocating right-of-way at intersections.One of the most effective and efficient way of controlling traffic on a highway is the adoption of high intersection geometric standards in form Channelization. Various channelization techniques or models have been evolved during the past years. But, all none of these are capable to withstand a traffic of a right-angled intersection with one road having three-or-more lanes. This is the reason why; channelization has never been adopted on multilane dense traffic highway intersection. In this project, an attempt will bemade to design a channelized right angled intersection with one road having three-lanes.

Keywords:- *Proposal Plan for Khadi Machine Chowk to Control Traffic.*

I. INTRODUCTION

Ideally, plans for urban transport should be created with the understanding that congestion is related to both: traffic behaviour as it gets close to the limits of the road system's physical capacity. Congestion is a condition where demand for road space exceeds supply, which is the gap between road users' expectations of the system's performance. Congestion is the impediment that moving traffic creates for one another when demand for a transport system approaches its capacity. In essence, congestion is a relative phenomena that is related to the gap between the performance of the roadway system as expected by users and the actual performance of the system. His system really works.

We can't move around without being constrained by traffic, which also slows down and adversely disturbs business within recognized as a degree. In these situations, cities have learned to live with some degree of congestion and continue to function reasonably effectively so long as accessibility is generally high. In this background, it is not difficult to understand how congestion in economically vibrant metropolitan regions can or should be eliminated. Additionally, there is little evidence that urban road users anticipate to drive during peak hours without experiencing congestion. This is not to argue that cities shouldn't aggressively and enthusiastically work to reduce congestion; they should, particularly in situations when this is possible given the existence of cost-effective solutions and specific traffic bottlenecks. However, managing congestion so that the positive effects of agglomeration may be realised in the long run is what matters most for policy.The geometry of Khadimachine square is in convenient for smooth traffic flow.

II. LITERATURE REVIEW

Ilia’s leontiasis et al (5) presented a paper in which they studied that road congestion results in a huge waste of time and productivity for millions of people. A possible deal this problem is to have transportation authorities distribute traffic information to drivers. which in turn can decide. to route around congested area. Such traffic information can be gathered by relying on static sensors placed at specific road location.

Abdulrahman al-kandari, Imad Al-shaikhli and Anas Najaa, in their paper made an attempt to study intelligent traffic light control system using the methods of webster, dynamic webster, Equal interval and optimum equal. A stimulation software will run those methods in typical four-phase intersection and generate a report about their result. They compared these methods with emphasis on cycle interval time and flow rate.

Luis et al (8) in their paper described an intelligent traffic management system applied o road intersections, namely round- about and cross roads. A microscopic traffic simulator was developed to study intelligent traffic management techniques and evaluate their performance. The intelligent management techniques are aimed to minimize accidents, traffic congestion and Consequently the environmental costs of road traffic.

➢ *Objective*

The study has following objectives:

- Separation of roads which requires skillful and careful movement.
- Reduction of excessive large paved areas.
- Protection for turning and crossing

➢ *Problem Statement*

A traffic jam is a condition on a road network that occurs due to increased use and is characterized by slow speeds, long trip times and increased queuing of vehicles. Traffic congestion is a major problem at Khadi Machine Chowk. Inadequate width and cross section of roads is increasing the number of accidents.

Increase in the number of two-wheelers and cars during peak hours obstructs the Khadi Machine Chowk, resulting in people wasting time in traffic jams. During peak hours' traffic police can't manage this situation in control.

The study of the project focuses on the intersection at the Khadi Machine Square. This area has developed fast and its population also increasing. And there will be huge increase in traffic so effective traffic management is necessary.

➢ *Selection of Area*

The area selected is "Khadi Machine Chowk", which is a right-angle intersection located near Kondhwa-Katraj Road. This area has been selected, because of rapid increase in the traffic on Katraj road. Traffic signals are already installed atthis intersection, which are causing major time delays and excessive fuel consumption. In peak hours, the traffic gets tremendously high. No alternate roads are available for goods carrying vehicles which cause long stretching of vehicles. Ultimate this resulting in increase in travel time, fuel consumption From the future point of view, it is necessary to control the traffic pattern on this particular intersection as well road.The details of the intersecting roads are shown in the map below.

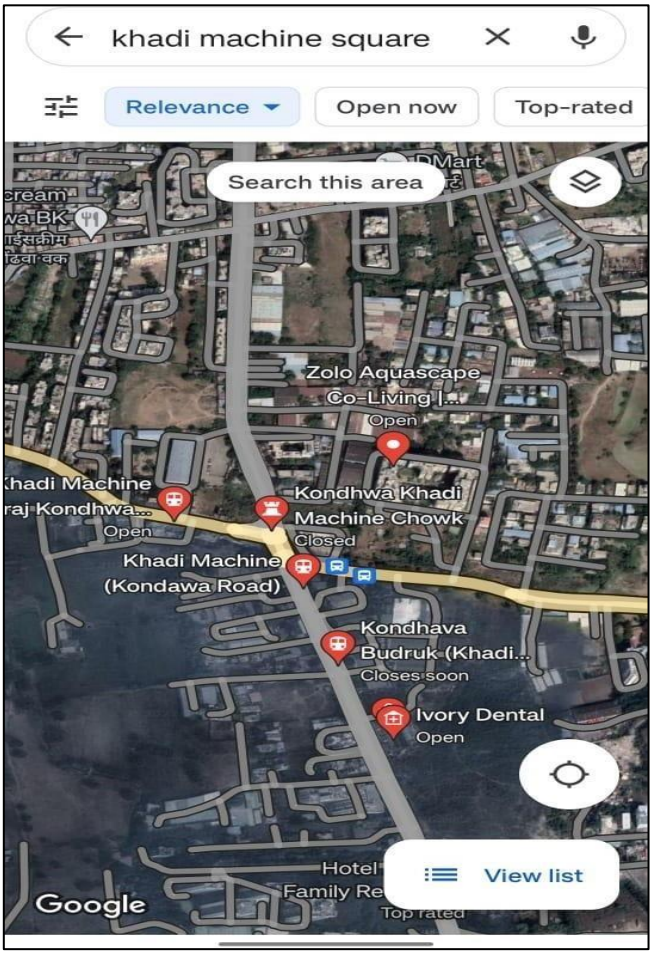

Fig 1Google Image of Study Area

III. METHODOLOGY

So as to achieve the objectives of this project, and to arrive at a best possible solution some preliminary investigation and studies were carried out.

➢ *Following are the Parameters which were Considered in this Study:*

- Selection of a particular intersection vulnerable to traffic congestion
- Traffic volume studies
- Design of Channelized intersections

➢ *Traffic Survey*

Traffic survey is another name for the engineering studies conducted to gather traffic statistics. An analysis of the traffic characteristics and their movement along the designated red roadways was done using traffic engineering. These research' findings were put to use in the creation of geometric features and traffic-control strategies for secure and effective traffic flow. The evaluation of the findings from these studies can also be used to justify the need for the proposed road improvement.

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Table 1 Traffic Survey Data

TRAFFIC SURVEY DATA

Motorised Traffic																		Non Motorised Traffic			
Time (Kondhwa road)	Cars Jeep Vans Three Wheelers	Motorised two Wheelers	Light Commercial Vehicle	Trucks						Agricultural Tractors Trailers					Buses			Cycles	Cycle Rickshaw	Animal Drawn Vechicle	
				Laden		Unladen		Overladen												SWC	Num Tyred
				SA	TaA	SA	TaA	SA	TaA	L	U	OL	Tractors with Trailers Loaded	Tractors with Trailers Unloaded	L	U	OL				
08.00 am to 09.00 am	832	1336	126	56	12	56	0	16	0	12	9	0	12	9	36	24	12	18	0	0	0
09.00 am to 10.00 am	1134	2491	203	35	9	49	0	2	0	0	8	0	0	8	47	0	0	0	0	0	0
10.00 am to 11.00	712	1168	366	10	32	42	42	0	0	0	0	0	5	0	10	0	6	13	0	0	0
11.00 am to 12.00	525	1095	150	15	30	8	20	0	2	1	0	0	0	1	18	7	0	2	0	0	0
12.00 am to 01.00 pm	708	1245	78	9	18	38	1	0	3	0	1	0	4	2	28	15	7	9	0	0	0
01.00 pm to 02.00 pm	607	1024	101	40	7	18	0	17	3	1	0	0	0	0	37	17	3	2	0	0	0
02.00 pm to 03.00 pm	635	1275	145	28	6	21	4	5	2	2	0	0	2	1	23	27	4	4	0	0	0
03.00 pm to 04.00 pm	673	1356	266	37	14	34	2	10	1	7	5	0	3	2	21	1	9	8	0	0	0
04.00 pm to 05.00 pm	702	1270	85	32	8	25	0	12	2	3	2	0	1	2	33	14	2	5	0	0	0
05.00 pm to 06.00 pm	417	1800	96	24	13	32	1	0	0	2	4	0	2	0	42	3	0	0	0	0	0
06.00 pm to 07.00 pm	932	1321	89	47	9	33	0	11	0	4	1	0	4	1	29	12	17	12	0	0	0
07.00 pm to 08.00 pm	560	1595	70	12	5	18	0	0	0	0	0	0	2	1	28	0	2	2	0	0	0
TOTAL	8437	16976	1775	345	163	374	70	73	13	32	30	0	35	27	352	120	62	75	0	0	0
Average	703	1415	148	29	14	31	6	6	1	3	3	0	3	2	29	10	5	6	0	0	0
Factor	1	0.5	1.5	3	4.5	3	4.5	3	4.5	1.5	1.5	1.5	4.5	4.5	3		3	0.5	2	8	8
P.C.U	703	707	222	86	61	94	26	18	5	5	4	0	13	10	88	0	16	3	0	0	0
																	Total PCU =		2060.292		

Table 2 Traffic Survey Data

1.Kondhwa road

TRAFFIC SURVEY DATA

Motorised Traffic																		Non Motorised Traffic				
Time	Cars Jeep Vans Three Wheelers	Motorised two Wheelers	Light Commercial Vehicle	Trucks						Agricultural Tractors Trailers					Buses			Cycles	Cycle Rickshaw	Animal Drawn		Total
				Laden		Unladen		Overladen												SWC	Num Tyred	
				SA	TaA	SA	TaA	SA	TaA	L	U	OL	Tractors with	Tractors with	L	U	OL					
towards Kondhwa	614	1327	83	13	3	21	0	0	0	0	5	0	0	5	26	0	0	13	0	0	0	2110
from Kondhwa	520	1164	120	22	6	28	0	2	0	0	3	0	0	3	21	0	0	0	0	0	0	1889
Total	1134	2491	203	35	9	49	0	2	0	0	8	0	0	8	47	0	0	13	0	0	0	3999
Average	1134	2491	203	35	9	49	0	2	0	0	8	0	0	8	47	0	0	13	0	0	0	
Factor	1	0.5	1.5	3	4.5	3	4.5	3	4.5	1.5	1.5	1.5	4.5	4.5	3		3	0.5	2	8	8	
P.C.U	1134	1246	305	105	41	147	0	6	0	0	12	0	0	36	141	0	0	7	0	0	0	3178
																		Total PCU =		3178.000		

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2.Yewalewadi road

TRAFFIC SURVEY DATA

Time	Motorised Traffic: Cars Jeep Vans Three Wheelers	Motorised two Wheelers	Light Commercial Vehicle	Trucks: Laden SA	Trucks: Laden TaA	Trucks: Unladen SA	Trucks: Unladen TaA	Trucks: Overladen SA	Trucks: Overladen TaA	Agricultural Tractors Trailers: L	U	OL	Tractors with	Tractors with	Buses: L	U	OL	Non Motorised Traffic: Cycles	Cycle Rickshaw	Animal Drawn: SWC	Num Tyred	Total
towards Yewalewadi	486	984	148	13	2	19	0	0	0	0	0	0	0	0	29	0	3	3	0	0	0	1687
from Yewalewadi	453	1129	108	7	4	12	0	0	0	0	3	0	1	0	24	0	0	2	0	0	0	1743
Total	939	2113	256	20	6	31	0	0	0	0	3	0	1	0	53	0	3	5	0	0	0	3430
Average	939	2113	256	20	6	31	0	0	0	0	3	0	1	0	53	0	3	5	0	0	0	
Factor	1	0.5	1.5	3	4.5	3	4.5	3	4.5	1.5	1.5	1.5	4.5	4.5	3		3	0.5	2	8	8	
P.C.U	939	1057	384	60	27	93	0	0	0	0	5	0	5	0	159	0	9	3	0	0	0	2739
																		Total PCU =		2739.000		

3.Pisoli road

TRAFFIC SURVEY DATA

Time	Motorised Traffic: Cars Jeep Vans Three Wheelers	Motorised two Wheelers	Light Commercial Vehicle	Trucks: Laden SA	Trucks: Laden TaA	Trucks: Unladen SA	Trucks: Unladen TaA	Trucks: Overladen SA	Trucks: Overladen TaA	Agricultural Tractors Trailers: L	U	OL	Tractors with	Tractors with	Buses: L	U	OL	Non Motorised Traffic: Cycles	Cycle Rickshaw	Animal Drawn: SWC	Num Tyred	Total
towards Pisoli	513	1029	96	29	4	31		1	0		5	0	2	3	27	0	0	0	0	0	0	1740
from Pisoli	468	824	78	16	9	26	0	0	0	0	2	0	2	0	16	0	2	0	0	0	0	1443
Total	981	1853	174	45	13	57	0	1	0	0	7	0	4	3	43	0	2	0	0	0	0	3183
Average	981	1853	174	45	13	57	0	1	0	0	7	0	4	3	43	0	2	0	0	0	0	
Factor	1	0.5	1.5	3	4.5	3	4.5	3	4.5	1.5	1.5	1.5	4.5	4.5	3		3	0.5	2	8	8	
P.C.U	981	927	261	135	59	171	0	3	0	0	11	0	18	14	129	0	6	0	0	0	0	2713
																		Total PCU =		2713.000		

4. Katraj road

TRAFFIC SURVEY DATA

Time	Motorised Traffic: Cars Jeep Vans Three Wheelers	Motorised two Wheelers	Light Commercial Vehicle	Trucks: Laden SA	Trucks: Laden TaA	Trucks: Unladen SA	Trucks: Unladen TaA	Trucks: Overladen SA	Trucks: Overladen TaA	Agricultural Tractors Trailers: L	U	OL	Tractors with	Tractors with	Buses: L	U	OL	Non Motorised Traffic: Cycles	Cycle Rickshaw	Animal Drawn: SWC	Num Tyred	Total
towards Katraj	613	1167	118	10	4	8	9	3	0	0	7	0	1	2	30	0	3	3	0	0	0	1978
from Katraj	543	1222	151	9	3	4	6	0	0	0	5	0	0	5	26	0	0	1	0	0	0	1975
Total	1156	2389	269	19	7	12	15	3	0	0	12	0	1	7	56	0	3	4	0	0	0	3953
Average	1156	2389	269	19	7	12	15	3	0	0	12	0	1	7	56	0	3	4	0	0	0	
Factor	1	0.5	1.5	3	4.5	3	4.5	3	4.5	1.5	1.5	1.5	4.5	4.5	3		3	0.5	2	8	8	
P.C.U	1156	1195	404	57	32	36	68	9	0	0	18	0	5	32	168	0	9	2	0	0	0	3188
																		Total PCU =		3188.000		

IV. DIRECTIONAL FLOW DURING PEAK HOUR

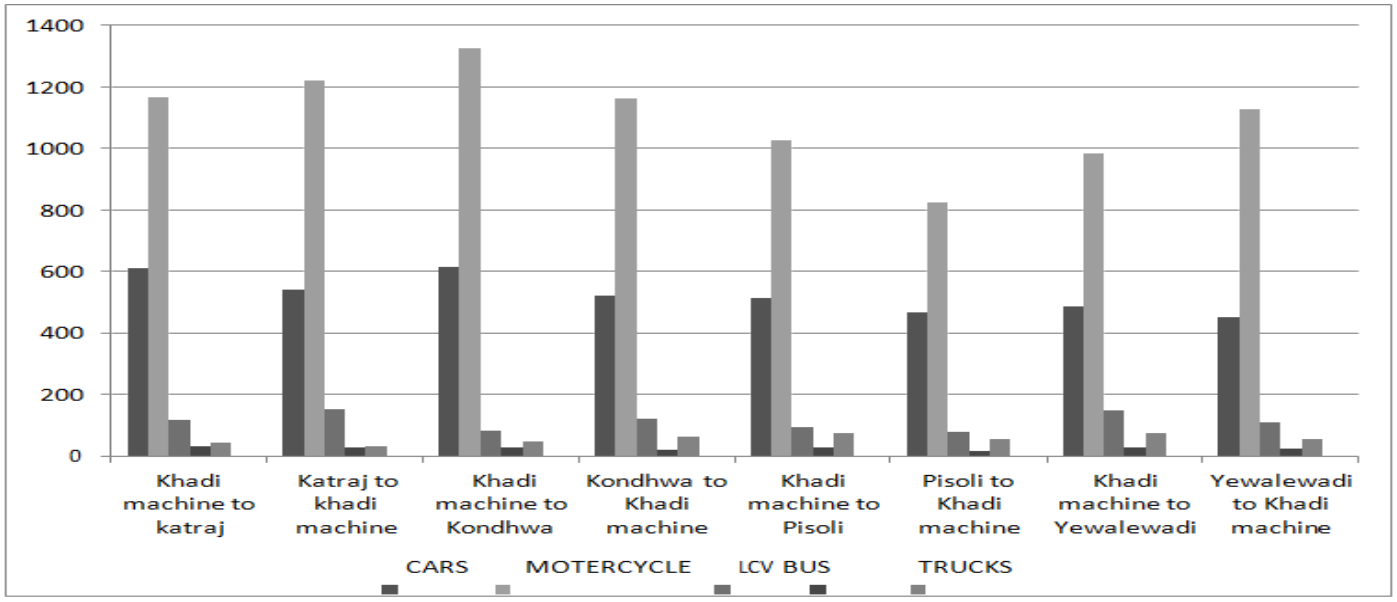

Fig 2 Directional Flow During Peak Hour

V. PROPOSAL PLAN TO CONTROL TRAFFIC

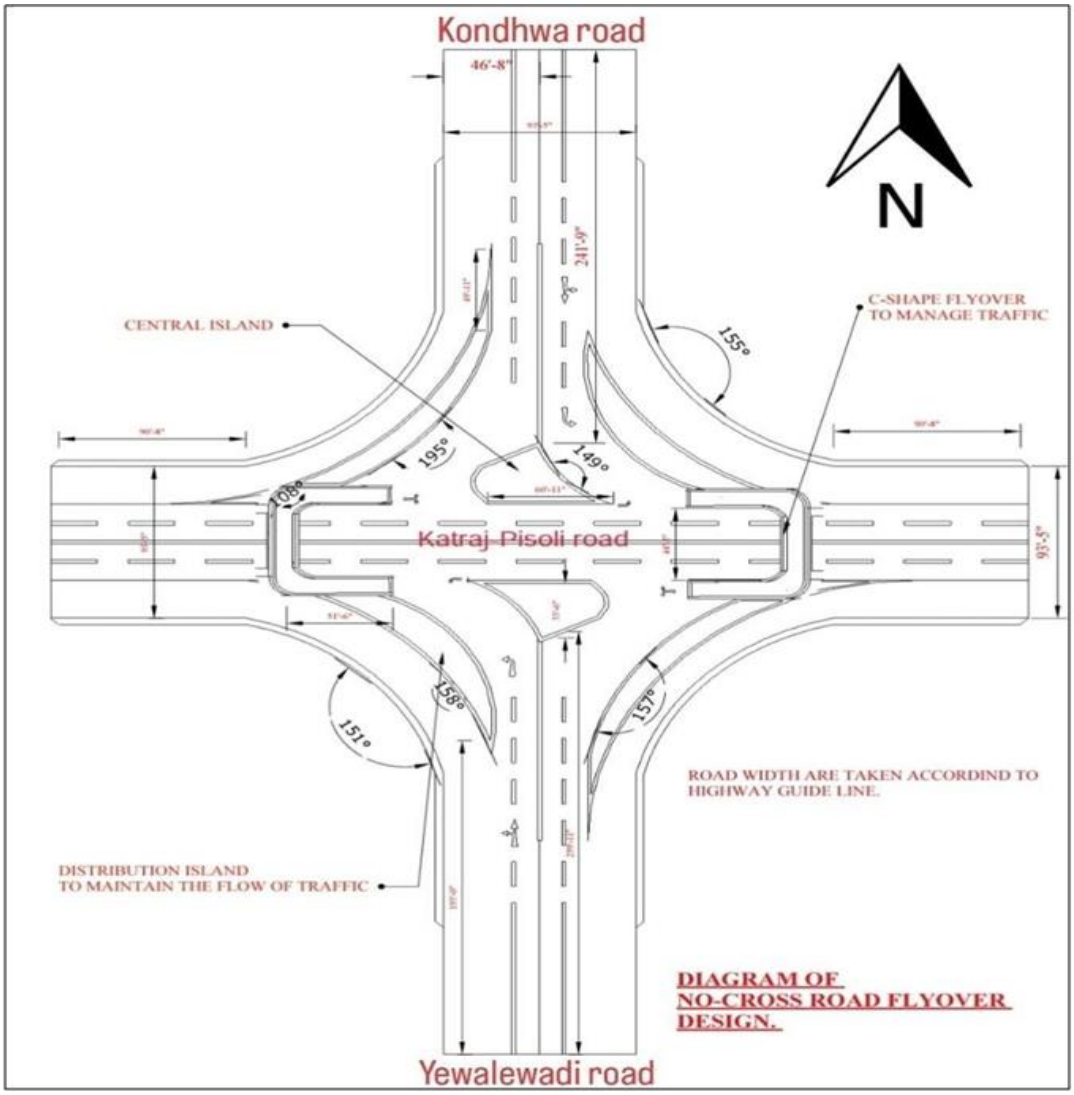

Fig 3 Proposal Plan for Khadi Machine Chowk

VI. 3D MODEL OF THIS PROPOSAL PLAN

Fig 4 Left Hand Side View of 3D Model

VII. SIDE VIEW

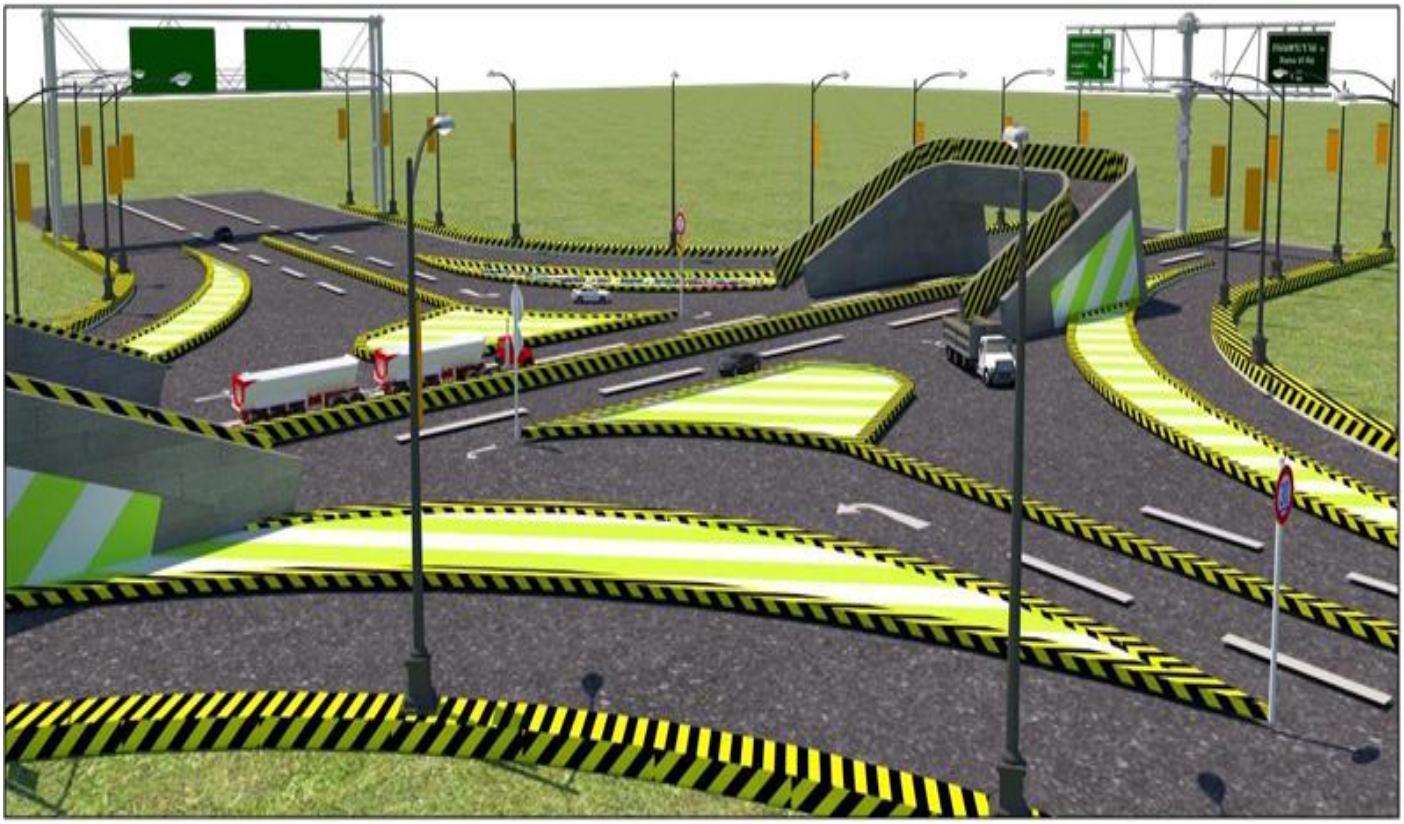

Fig 5 Right Hand Side View of 3D Model

VIII. TOP VIEW

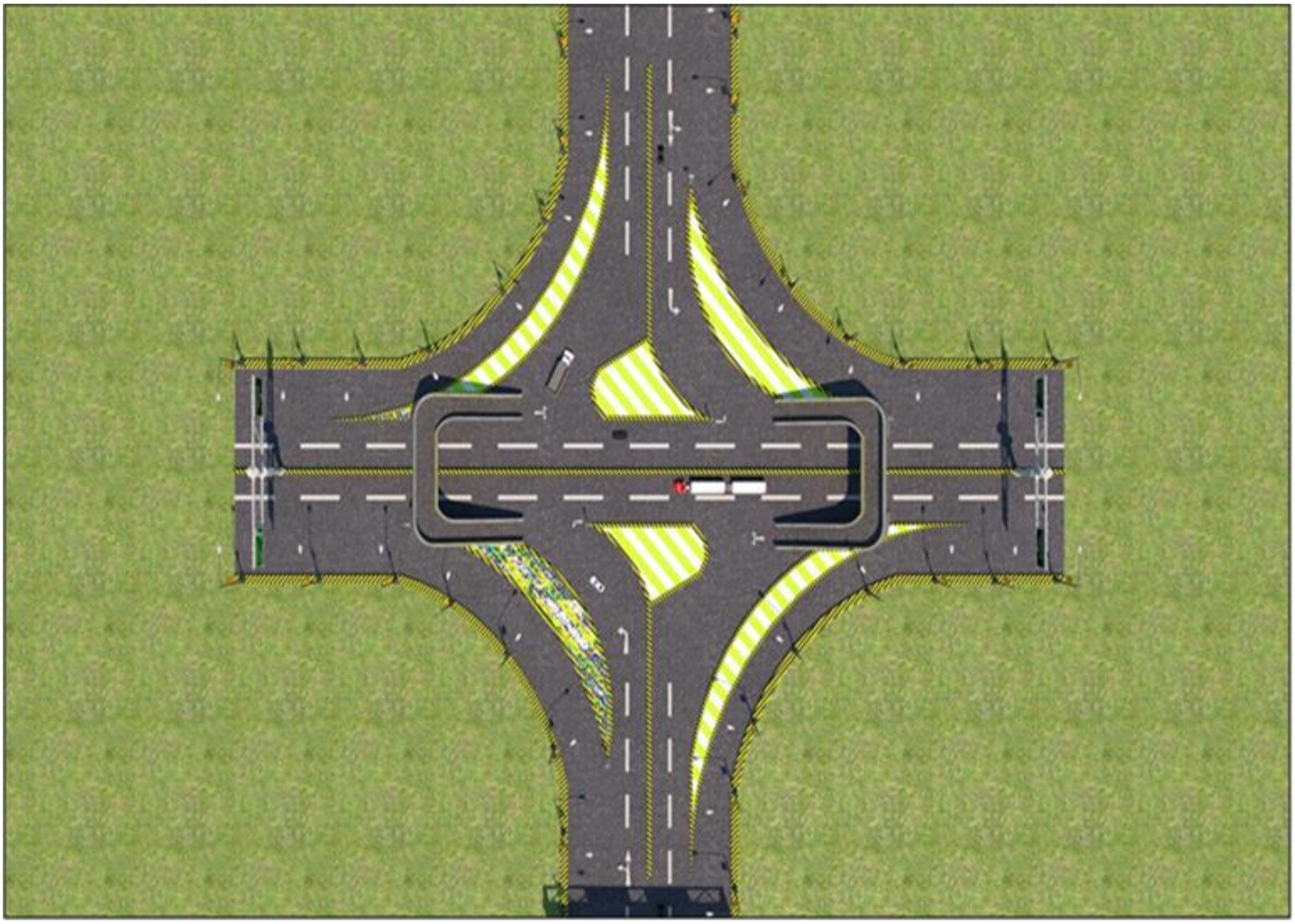

Fig 6 Top View of 3D Model

IX. CONCLUSION

Due compactness of the locality at "Khadi Machine" square the proposal plan be implemented to reduce traffic jam. The proposal plan of channelization will be feasible. The limitation is that two wheelers, cars and LCV can go through C type bridge. Thus by our project we can reduce traffic density, avoid vehicle conflicts and protection for turning and crossing

In conclusion, the channelization of road intersections is essential for ensuring safe and efficient traffic flow on roads and highways. It organizes traffic by providing designated lanes, signals, signs, and markings, reducing the chances of accidents and conflicts. Channelization enhances safety by separating conflicting traffic streams and using physical barriers or medians to minimize the risk of collisions. It also improves traffic flow by optimizing transitions between lanes and reducing congestion at intersections. Additionally, channelization considers the safety of pedestrians and cyclists by providing dedicated crosswalks and bike lanes. It ensures compliance with accessibility requirements and takes into account the local context of the intersection. Overall, channelization is crucial for promoting a well- functioning transportation system that benefits motorists, pedestrians, and cyclists alike.

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