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Traffic Impact Assessment, Diversion and Management Plan for Surat Metro Line 1, Package –CS3, Surat

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Abstract: ***Package CS3 of Metro Line 1 in Surat City includes 3 stations i.e. Surat railway station, Maskati Hospital and Chowk Bazar. As per proposed Metro plan of Surat city, this line will originate from Sarthana station and will terminate at Dream City. The length of Line 1 is 21.61KM of which 14.59km is elevated whereas 7.02km is Underground and consists of 20 Stations. This metro line envisages use of public transport system in Surat city and shall cater the present and future travel demand of the catchment area and shall also reduce load from road based transport system of the corridor. During the construction phase of any Mass Rapid Transit System (MRTS) running along the Right of Way (ROW) of existing roadway system, Traffic diversion and management plan implementation becomes absolute mandatory to reduce congestion, conflicts increase level of safety and ease construction process. Similarly, for package CS3 of Surat Metro line 1, there is need of preparing an implementing Traffic Diversion and Management plan to create a synergy amongst construction activities, traffic flow, safety of pedestrian and construction worker with minimal impact on surrounding catchment. This study shall provide Traffic diversion and management plan which may help to cater the existing traffic and stir them in a smooth and non-congested flow with the help of signage's, road markings, etc.***

I. INTRODUCTION

Traffic Impact Assessment (TIA) is a process of compiling and analyzing information on the impacts that a specific development proposal is likely to have on the operation of roads and transport networks. The assessment not only includes general impacts relating to transport management (road efficiency and safety) but should also consider specific impacts on all road users, including on-road public transport, pedestrians, cyclists and heavy vehicles. Every land use generates home and non-home based trips over the period of day which ply on the access roads and main arterial roads connecting the proposed / planned development. Also as any infrastructure construction activity shall reduce the available capacity of transport network which will affect the level of service. These roads have specific capacity in terms of number of vehicle (PCU) handling in peak hour as per IRC 106-1990. To provide satisfactory riding quality on this rods, specific level of service shall be maintained by maintaining volume and ease of flow with proper diversion and management plans for the traffic plying on these roads. It is necessary to maintain both quality and quantity of road infrastructure continuously to maintaining good Level of Service and safety on roads. Most importantly when it comes to Tier 1 & 2 cities where, percentage trip generation every year is increasing due to urban migration, transportation infrastructure facilities become the backbone of the city. However, due to lack of Mass Ttransit / Transit Oriented Developments and improper transportation planning, commuters have to face major traffic issues during peak hour. For any infrastructure project, a proper traffic diversion and management plan is also mandatory to cater the needs, ease the movement and managing a good safety level during execution.

II. OBJECTIVES OF STUDY

The primary objective of this study is to prepare Traffic Diversion plan with the help of Primary and Secondary data collected for the corridor (CS3) and the catchment area so that congestion, conflicts can be ignored to the maximum extent with increase in safety of pedestrians and workers along with improved workability at site.

To achieve the above objectives, following scope is prepared which includes:

1) Reconnaissance survey to understand the existing traffic scenario, proposed construction plan (phasing if any) and bottlenecks in the traffic flow of study area.

2) Reconnaissance survey will be followed by collection primary data from the site which will include but not limited to:

a) Road inventory survey (Study Delineated Area)

b) Classified Traffic Volume Count at Mid-blocks (Between intersection)

c) Turning Movement Survey at Intersections (All intersection in study area)

d) Land Use Mapping (Study Delineated Area)

e) Speed and Delay Survey (Study Delineated Area including diverted route)Spot Speed Survey (at midblock of study area)

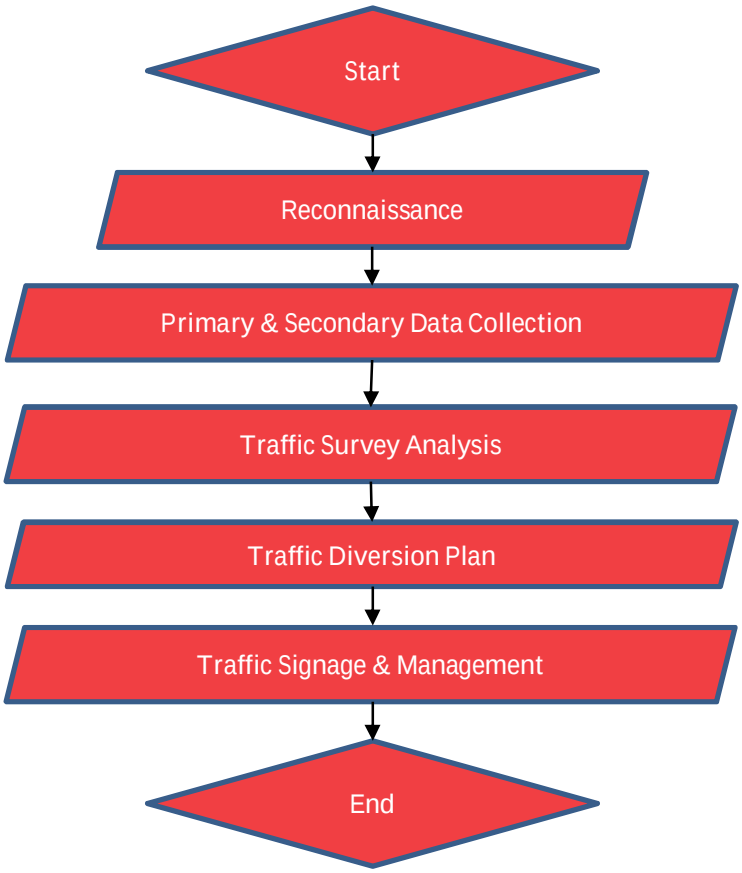
f) Origin-Destination Survey (Strategic location around study area)

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3) Along with primary survey data collection, available data required for the study will be collected from the client.
4) Detailed traffic analysis was done based on the data collected, rectified and scrutinized. This traffic analysis will provide results like current LOS of study area, potential routes for traffic diversion, travel characteristics of road users, bottlenecks on the road network, LOS of road network considering proposed diversion plan, increase in travel time (man hours) etc.
5) Further, the estimation of extra man-hours to be spent by the road users due to longer travel time due to diversion will be determined.
6) Taking in account the required space for construction of metro corridor, traffic movement plan for remaining area at the junction will be prepared with detailing like available space for vehicular maneuvering with adequate turning radius, barricading plan, temporary signage plan etc.
7) Conceptual temporary signage plan for diverted route is prepared.
8) Traffic issues and their solutions in the study corridor are identified.

III. APPROACH & METHODOLOGY

In line with the scope of work methodology for preparing diversion plan for package CS3 has been prepared and approached accordingly. Reconnaissance survey was conducted to understand the existing traffic scenario, proposed construction plan (phasing if any) and bottlenecks in the traffic flow of study area followed by primary data collection from site through various traffic surveys as mentioned in the scope. Along with primary survey data collection, available data required and available for the study like Topographical survey of the corridor and GFC for stations are collected from the contractor. Traffic survey was done based on the primary data collected and the results and observations are provided in the subsequent chapters. After acceptance of the Traffic survey analysis report, traffic diversion plan for the junction will be prepared in detail. Signage plan for diverted route shall also be prepared at this stage of the study. Study approach and methodology is shown in the following flow chart to understand the chronology of work.



IV. TRAFFIC SURVEYS ANALYSIS

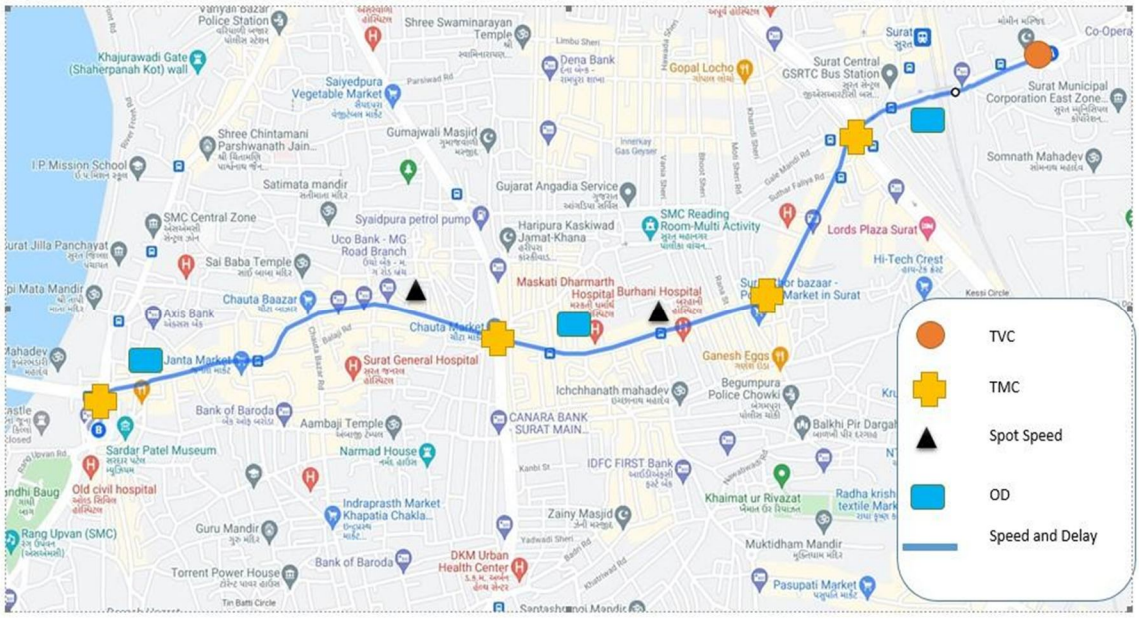
In order to arrive at the present traffic scenario and appreciate the travel characteristics of the road users in this area, primary studies were organized. The observations from the field studies have been presented below.

A. *Methodology Adopted for the Traffic Study*

To measure the impact on the CS3 Package road network, the current traffic characteristics need to be assessed. Package CS3 of Metro line 1 starts from Surat Railway station and ends at Chowk Bazar which consist of three stations i.e. Surat railway station, Maskati Hospital and Chowk Bazar and is about 3.56Km long and consist Majorly of Market area in the vicinity of the city's railway station. In order to get a better and clear understanding of the existing traffic conditions, the flow of traffsic, utilization of road ROW and some other technical details of the road Primary traffic survey were planned and conducted.

These surveys include.

1) Traffic Volume count – 1 Location
2) Turning movement Survey – 4 Locations
3) Speed and delay survey – Study Corridor
4) Spot Speed survey – 2 Locations
5) Road Network Inventory – Study Corridor



B. *Traffic Volume Count (TVC)*

Traffic Volume Count is counting of the number of vehicles passing through a road over a period of time. It is defined as the procedure to determine mainly volume of traffic moving on the roads at a particular section during a particular time. Traffic volume count was conducted in the beginning of the package CS3 on Lambe Hanuman Road, opposite the office of J. Kumar Infraprojects for Surat Metro. This survey was done for 24 hours by counting traffic in two directions As per the data collected at the location, it can be clearly seen that the road is dominated by the movement of Two Wheelers followed by auto rickshaw. Also the peak hour of the Mid-block is from 19.00 to 20.00 in the evening

C. *Turning Movement Count*

Turning Movement Count or most popularly known as Intersection count is used to count vehicles which are moving inward and outward of an intersection in number of directions. The main purpose is to gather the vehicle data to determine the traffic flow in particular direction. Traffic Movement count was done at 4 Junctions to determine the directional flow in peak hours which will be helpful to decide the diverted route required for the study area. The survey was conducted 4 hours in the morning peak and 4 hours in the evening peak

1) *Delhi Gate:* Turning Movement count conducted at Delhi Gate Junction again shows that alignment stretch is dominated by two wheelers followed by auto rickshaw Also the morning peak i.e. 10.00 to 11.00 and evening peak i.e. 17.00 to 18.00 is almost same around 7200 PCUs/hr.
2) *Maskati Hospital:* The Turning Movement count conducted at Maskati Hospital Junction again shows that the alignment stretch is dominated by two wheelers followed by auto rickshaw Also PCUs/Hr from the morning peak is between 11:00 to 12:00 and evening peak hour i.e. 18.00 to 19.00 increases by around 300 PCUs/hr
3) *Swami Narayan Square:* The Turning Movement count conducted at Swami Narayan Junction again shows that the alignment stretch is dominated by two wheelers followed by auto rickshaw Also PCUs/Hr from the morning peak is between 11:00 to 12:00 and evening peak hour i.e. 18.00 to 19.00 increases by around 200 PCUs/hr.
4) *Chowk Bazar:* Turning Movement count conducted at Chowk Bazar Junction again shows that the alignment stretch is dominated by two wheelers followed by auto rickshaw Also PCUs/Hr from the morning peak is between 11:00 to 12:00 and evening peak hour i.e. 18.00 to 19.00 increases by around 2000 PCUs/hr.

D. Speed & Delay Survey

The average travel time from Surat Railway Metro to Chowk Bazar is about 16 minutes and from Chowk Bazar to Surat Railway Metro Station is about 14 minutes in peak hour while using Car as mode of travel. The distance between these two end stations of Package CS3 is about 3 km and average journey speed varies from 10 km / hr to 12 km / hr. Spot speed of vehicle shall be higher as intersection delay which increase the journey time and reduce journey speed does not come in account. Mild traffic congestion and standstill situation was identified near SMV hospital area. Remaining length of the corridor provides slow moving traffic condition which is also because of the land use like commercial & retail in the area.

E. Spot Speed Survey

Spot speed survey data at these two locations suggests that the average speed of any vehicle is between 20-30 Km/Hr. Speed of Two Wheeler is little higher than the other modes which is understood considering the driving conditions in the market area. As mentioned earlier in speed & delay analysis, spot speed of vehicles is higher (20-30 km /hr) than Journey speed (10-12 km/ hr).

F. Origin and Destination Study

1) Majority of Trips are dominated by work purpose and followed by business purpose.
2) Average trip length for work and business purpose varies from 1.2 to 1.6 km. However, a very few trips have travel length 8 km-10 km.
3) Average Travel time for the commuters varies from 12 minutes - 15 minutes. However, travel time for few trips having longer trip length varies from 20 m - 30 m
4) Average travel cost varies from Rs.7 to Rs.20 depending upon the mode of travel
5) Willingness to shift to metro and therefore diverting their current route with longer trip length and higher travel time is accepted by the commuters for temporary basis.
6) However, commuters are expecting lesser travel time with more comfort once metro system implemented.
7) For this reason, commuters are ready to pay 20-25% extra from present travel cost.
8) Almost 100% students are willing to transfer to metro from their current mode.
9) Arguably, as average trip length at the package CS3 corridor is less than 2 km with average travel time lesser than 20 minutes, it is understood that the diverted route with tolerance of 50% extra travel time and travel distance may be acceptable by the commuters subjected to various conditions including Traffic Management plan implementation.

V. TRAFFIC CONGESTION ANALYSIS FOR PACKAGE CS3

It is important to analyse the traffic congestion based on the data collected for the package CS3 corridor along with the diverted route as it will provide the present Level of Service of the corridor along with Level of Service available after traffic diversion on alternate routes. Level of Service is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by drivers/passengers. Level of Service definition generally describes these conditions in terms of factors such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort, convenience and safety. Six levels of service are recognised commonly, designated from A to F, with Level of Service A representing the best operating condition (i.e. free flow) and Level of Service F the worst (i.e. forced or break-down flows. On urban roads, the Level of Service is affected due to roadside commercial activities, construction activities, diverted traffic, pedestrian volumes etc.

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A. Surat Railway Station Metro Section

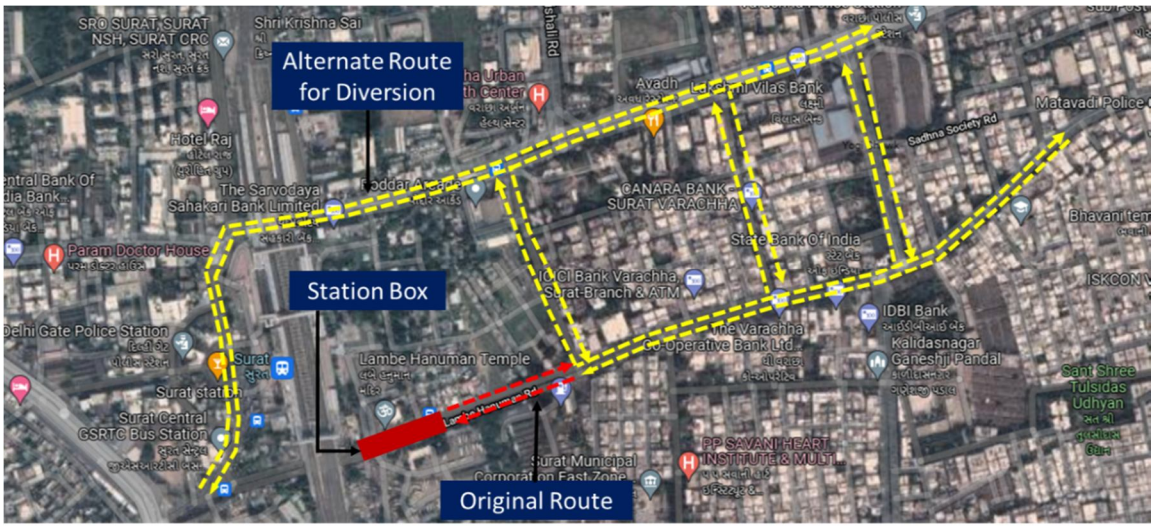
Surat Railway station metro is the first among three metro station and lies underneath lambe hanuman road just south east to Surat Railway Station and south of lambe hanuman temple. This is 4 lane divided arterial road with capacity of 3600 PCU in peak hour. Actual site photograph representing traffic flow situation is attached below.

Peak hour volume in PCU for this road is about 3144 dominated by two wheelers with about 60% of mode share. Volume to Capacity ratio (V/C) for this road section is 3144/5142 = 0.66 in PCU which represents Level of Service C (a zone of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream).

As per the construction plan, complete Right of Way of Lambe Hanuman Road in front of Lambe Hanuman Temple will be acquired for construction and traffic movement will be restricted. However, multiple roads are available to divert the traffic at original route to alternate route as shown in figures below. These alternate routes need to cater 3144 PCU diverted traffic along with their existing traffic. Therefore, it is recommended to use multiple parallel subarterial roads as shown in figure 2 to reduce the load on diverted route by spreading the diverted traffic. All these spurs then further shall meet at Lal Darwaja Station Road with varying ROW but having carriageway of 3+3 lanes divided two ways and a BRTS corridor having design service volume of 5400 PCU and capacity of 7714 PU in peak hour. Present theoretical Volume to Capacity ratio (V/C) of Lal Darwaja Station Road is 3100/7714 = 0.40 which is however hugely impacted with encroachment and unutilization of carriageway with leads to congestion like scenario in peak hour.

If the Lambe Hanuman road traffic is diverted to Lal Darwaja road, then the combined traffic (existing & diverted) will be around 6200 PCU in peak hour which can be cater as the capacity of Lal Darwaja road is 7714 PCU which spells V/C ratio to 0.80 and LOS D. However, multiple bottlenecks including underpass with reduced carriageway will result in vehicle queuing in peak hours.





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As shown in figure 1, diverted traffic have to travel 700 m extra than existing trip length in order to reach destination at this section. Extra man hours required due to traffic diversion is calculated and presented below.

Extra Man Hours at diverted route in Peak Hour							
Sr No	Mode	No. of Vehicles	Average Occupancy	Person Trip	Extra length at diverted route	Average Journey Speed	Extra Man Hours
1	Two Wheeler	3479	1.2	4175	700 m	15 km/ hr	195
2	Auto Rick	822	2.5	2055	700m	12 km /hr	96
3	Car + Taxi	422	2.6	1097	700m	10 km /hr	77
4	Bus	60	18	1080	700m	10 km /hr	76
5	Bicycle	137	1	137	700m	5 km /hr	19
Total							462

B. Maskati Metro Section

Maskati Metro station is the second metro station among three metro station on Package CS3 and lies underneath station road just in front of Maskati Hospital. This is 4 lane undivided subarterial road with design service volume of 2400 PCU and capacity of 3428 PCU in peak hour. Actual site photograph representing traffic flow situation is attached below.

Peak hour volume in PCU for for station road in this section is about 1756 PCU dominated by two wheelers with more than 60% of mode share. Volume to Capacity ratio (V/C) for this road section is 1756/3428 = 0.51 which represents Level of Service C (zone of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream). As per the construction plan, complete Right of Way of Station road in front of Lambe Maskati Hospital will acquired for construction and traffic movement will be restricted. However, multiple roads are available to divert the traffic at original route to alternate route as shown in figures below. These alternate routes need to cater 1756 PCU diverted traffic along with their existing traffic. Major junction before maskati hospital is begampura road junction which is 4 arm junction and provides possibility for diverting station road traffic to begampur road and darukhana road. Both of these roads have varying right of way but practically these roads shall be considered as two ways undivided sub arterial roads with design service volume of 1200 PCU and capacity of 1714 PCU. Present theoretical Volume to Capacity ratio (V/C) of Darukhana road is 1472/1714 =0.85 which is however hugely impacted with encroachment with leads to congestion like scenario in peak hour. Present theoretical Volume to Capacity ratio (V/C) of Begampura road is 1520/1714 =0.88 which is however hugely impacted with encroachment with leads to congestion like scenario in peak hour. If the station road traffic is diverted to Darukhana road and Begampura road, then the combined traffic (existing & diverted) will be around 2329 PCU in peak hour at Darukhana road and 2377 PCU at Begampura road which implies V/C ratio = >1 at both of these roads which represents LOS F and saturated non-moving traffic. Therefore, it is mandatory to provide multiple diversions along with begampura junction to disperse the station road traffic with minimum impact on multiple diverted route. Multiple possible routes before and after Maskati Hospital has been suggested in the figure below.

As shown in figure 1, diverted traffic have to travel 700 m extra than existing trip length in order to reach destination at this section. Extra man hours required due to traffic diversion is calculated and presented below.

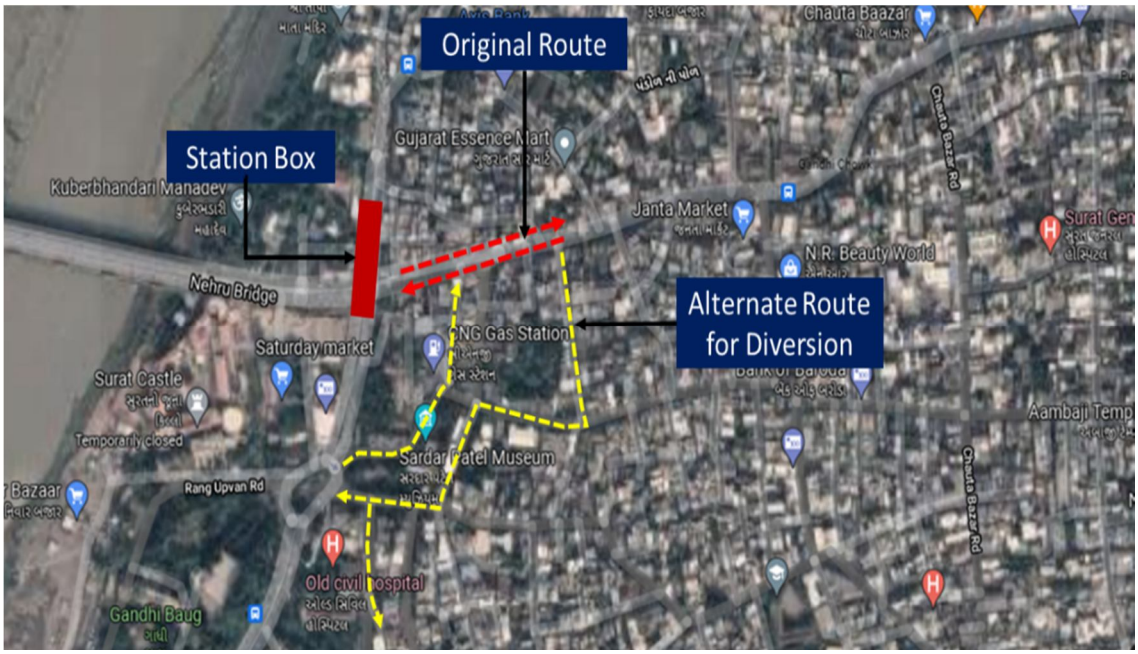


Extra Man Hours at diverted route in Peak Hour							
Sr No	Mode	No. of Vehicles	Average Occupancy	Person Trip	Average extra length at diverted route	Average Journey Speed	Extra Man Hours
1	Two Wheeler	2059	1.2	2470.8	400 m	15 km/ hr	66
2	Auto Rick	636	2.5	1590	400 m	12 km /hr	42
3	Car + Taxi	121	2.6	314.6	400 m	10 km /hr	13
4	Bus	24	18	432	400 m	10 km /hr	17
5	Bicycle	5	1	5	400 m	5 km /hr	0.40
Total							139

C. Chowk Bazar Metro Section

Chowk Bazar Metro station is the third metro station among three metro station on Package CS3 and lies underneath the junction of Bhaga Talav Main Road and Muglisara Main Road (Chowk Bazar Junction) just east of tapti River and on the verge of Nehru Bridge. Bhaga talav road is 4 lane undivided sub arterial road with design service volume of 2400 PCU and capacity of 3428 PCU in peak hour and Muglisara road is a 6 lane divided two-way arterial road with design service volume of 5400 PCU and capacity of 7714 PCU. Actual site photograph representing traffic flow situation is attached below.

As mentioned in the summary of turning movement count of Chowk Bazar Intersection, peak hour volume in PCU for for station road in this section is about 3278 PCU dominated by two wheelers with more than 60% of mode share. Volume to Capacity ratio (V/C) for this road section is 3278/3428 = 0.95 which represents Level of Service E (traffic volumes at or close to the capacity level). As per the construction plan, complete Right of Way of Chowk bazar juntion will be acquired for construction and traffic movement will be restricted and diverted. However, multiple roads are available to divert the traffic from original route to alternate route as shown in figures below. These alternate routes need to cater 3278 PCU diverted traffic along with their existing traffic. Kamal Gali two lane road and Ansuian two lane road provides possibility for diverting station road traffic to Muglisara road. Both of these roads have varying right of way but practicaly these roads shall be considered as two lane undivided subarterial roads with design service volume of 1900 PCU and capacity of 2714 PCU.

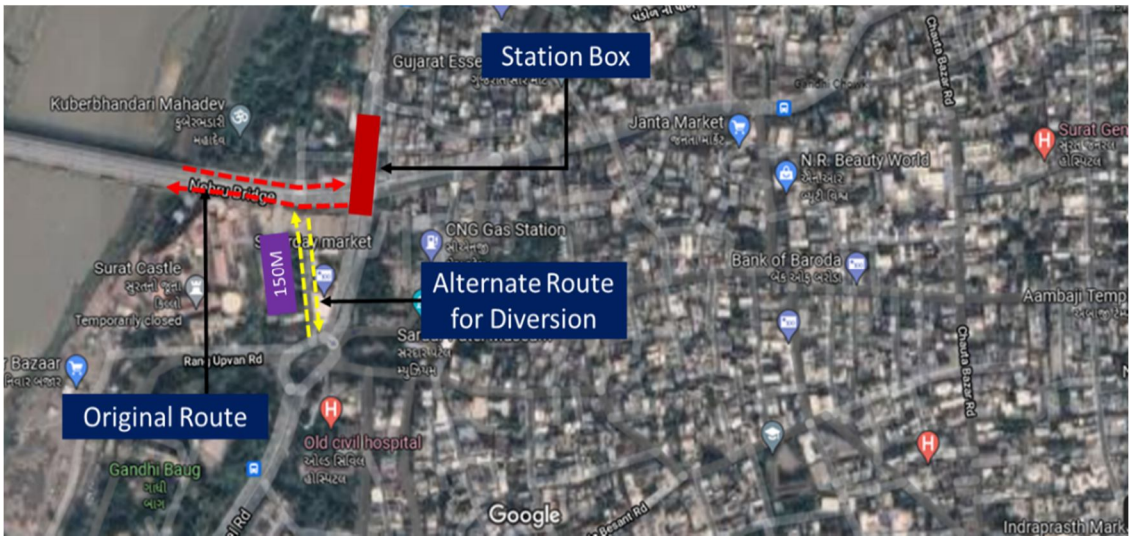


Critical section at this location is traffic coming and going to Nehru bridge as there is only one major access to Nehru bridge via chowk bazar which will be restricted during construction.

Time interval	Palasia to Nehru Bridge		Nehru Bridge to Palasia	Total (PCU)
8	9	1076	1712	2789
9	10	1662	2392	4054
10	11	1977	2540	4516
11	12	2289	2554	4843
17	18	2638	2340	4978
18	19	2920	2548	5468
19	20	2700	1915	4615
20	21	2898	1745	4642

Present theoretical Volume to Capacity ratio (V/C) of Nehru Bridge road is 5468/7714 =0.70 in peak hour. Traffic lands from Nehru bridge and moves towards chowk bazar junction and vice versa. However, Chowk bazar station box lies underneath chowk bazar intersection which suggests traffic coming or going to Nehru bridge will be restricted and a diverted route is mandatory. From the site condition it was understood that there is no other link available which connects Nehru Bridge with Chowk bazar junction. However, a partially constructed road is available as marked in the figures below near Petrol pump which can be connected to Nehru bridge by constructing the missing link. This rod needs to cater the traffic of 5468 PCU and therefore it is suggested to construct 3+3 lane road connecting Nehru bridge and Muglisara road. The combined both way traffic at Muglisara road near the channelizer is about 6279 PCU as shown in the table below.

Time interval		Palasia to Gandhi Baug	Gandhi Baug to Palasia	Total (PCU)
8	9	1279	1076	2356
9	10	1696	1662	3358
10	11	1945	1977	3922
11	12	1976	2289	4265
17	18	2262	3618	5879
18	19	2419	3860	6279
19	20	2151	3462	5613
20	21	2230	3839	6069



This chanelizer working as a rotary can cater the traffic of 5000-7000 PCU in peak hour. Therefore, if the missing link is constructed to connect Nehru bridge with Muglisara road and the diverted traffic from station road also channelized at this rotary then actuated traffic signal becomes mandatory requirement at this location. Space consumed by this channlizer can be utilise for a traffic signalised intersection. It is found that on an average every vehicle diverted from station road to Muglisara road and vice versa have to travel approximately 150 m extra (Diverted route – original route) diverted in order to reach destination at this section. Extra man hours required due to traffic diversion at station road is calculated and presented below.

Extra Man Hours at diverted route from and to Station road in Peak Hour							
Sr No	Mode	No. of Vehicles	Average Occupancy	Person Trip	Average extra length at diverted route	Average Journey Speed	Extra Man Hours
1	Two Wheeler	3233	1.2	3879.6	150 m	15 km/ hr	39
2	Auto Rick	1452	2.5	3630	150 m	12 km /hr	45
3	Car + Taxi	296	2.6	769.6	150 m	10 km /hr	12
4	Bus	63	18	1134	150 m	10 km /hr	17
5	Bicycle	42	1	42	150 m	5 km /hr	1
Total							114

It is found that on an average every vehicle diverted from Nehru Bridge to Muglisara road and vice versa have to travel approximately 150 m extra (Diverted route – original route) diverted in order to reach destination at this section. Extra man hours required due to traffic diversion at station road is calculated and presented below.

Extra Man Hours at diverted route from and to Nehru Road in Peak Hour							
Sr No	Mode	No. of Vehicles	Average Occupancy	Person Trip	Average extra length at diverted route	Average Journey Speed	Extra Man Hours
1	5783	1.2	6939.6	250 m	15 km/ hr	116	5783
2	2213	2.5	5532.5	250 m	12 km /hr	115	2213
3	489	2.6	1271.4	250 m	10 km /hr	32	489
4	90	18	1620	250 m	10 km /hr	41	90
5	64	1	64	250 m	5 km /hr	1	64
Total							304

Total additional man hours for travelling on diverted route due to construction of chowk bazar metro station is 114+304 =418 hours in peak hours.

VI. CONCLUSION

Majority of Trips are dominated by work purpose and followed by business purpose with average trip length for work and business purpose varies from 1.2 to 1.6 km. Average Travel time for the commuters varies from 12 minutes -15 minutes. However, travel time for few trips having longer trip length varies from 20 m -30 m also average travel cost varies from Rs.7 to Rs.20 depending upon the mode of travel Willingness to shift to metro and therefore diverting their current route with longer trip length and higher travel time is accepted by the commuters for temporary basis. However, commuters are expecting lesser travel time with more comfort once metro system implemented. For this reason, commuters are ready to pay 20-25% extra from present travel cost. Also, almost 100% students are willing to transfer to metro from their current mode.

Arguably, as average trip length at the package CS3 corridor is less than 2 km with average travel time lesser than 20 minutes, it is understood that the diverted route with tolerance of 50% extra travel time and travel distance may be acceptable by the commuters

As per the construction plan, complete Right of Way of Lambe Hanuman Road in front of Lambe Hanuman Temple will acquired for construction and traffic movement will be restricted. However, multiple roads are available to divert the traffic at original route to alternate route. These alternate routes need to cater 3144 PCU diverted traffic along with their existing traffic. Therefore, it is recommended to use multiple parallel sub-arterial roads to reduce the load on diverted route by spreading the diverted traffic. All these spurs then further shall meet at Lal Darwaja Station Road but having carriageway of 3+3 lanes divided two ways and a BRTS corridor having design service volume of 5400 PCU and capacity of 7714 PU in peak hour.

At Maskati Hospital Metro Station, if traffic is diverted to Darukhana road and Begampura road, then the combined traffic (existing & diverted) will be around 2329 PCU in peak hour at Darukhana road and 2377 PCU at Begampura road which implies V/C ratio = >1 at both of these roads which represents LOS F and saturated non-moving traffic. Therefore, it is mandatory to provide multiple diversions along with begampura junction to disperse the station road traffic with minimum impact on multiple diverted route.

For Chowk Bazar Metro Station, as per the construction plan, complete Right of Way of Chowk bazar junction will be acquired for construction and traffic movement will be restricted and diverted. However, multiple roads are available to divert the traffic from original route to alternate route as shown in figures below. These alternate routes need to cater 3278 PCU diverted traffic along with their existing traffic. Kamal Gali two lane road and Ansuian two lane road provides possibility for diverting station road traffic to Muglisara road. Both of these roads have varying right of way but practically these roads shall be considered as two lanes undivided sub arterial roads with design service volume of 1900 PCU and capacity of 2714 PCU. Chowk bazar station box lies underneath Chowk bazar intersection which suggests traffic coming or going to Nehru bridge will be restricted and a diverted route is mandatory. From the site condition it was understood that there is no other link available which connects Nehru Bridge with Chowk bazar junction. However, a partially constructed road is available as marked in the figures below near Petrol pump which can be connected to Nehru bridge by constructing the missing link. This rod needs to cater the traffic of 5468 PCU and therefore it is suggested to construct 3+3 lane road connecting Nehru bridge and Muglisara road.

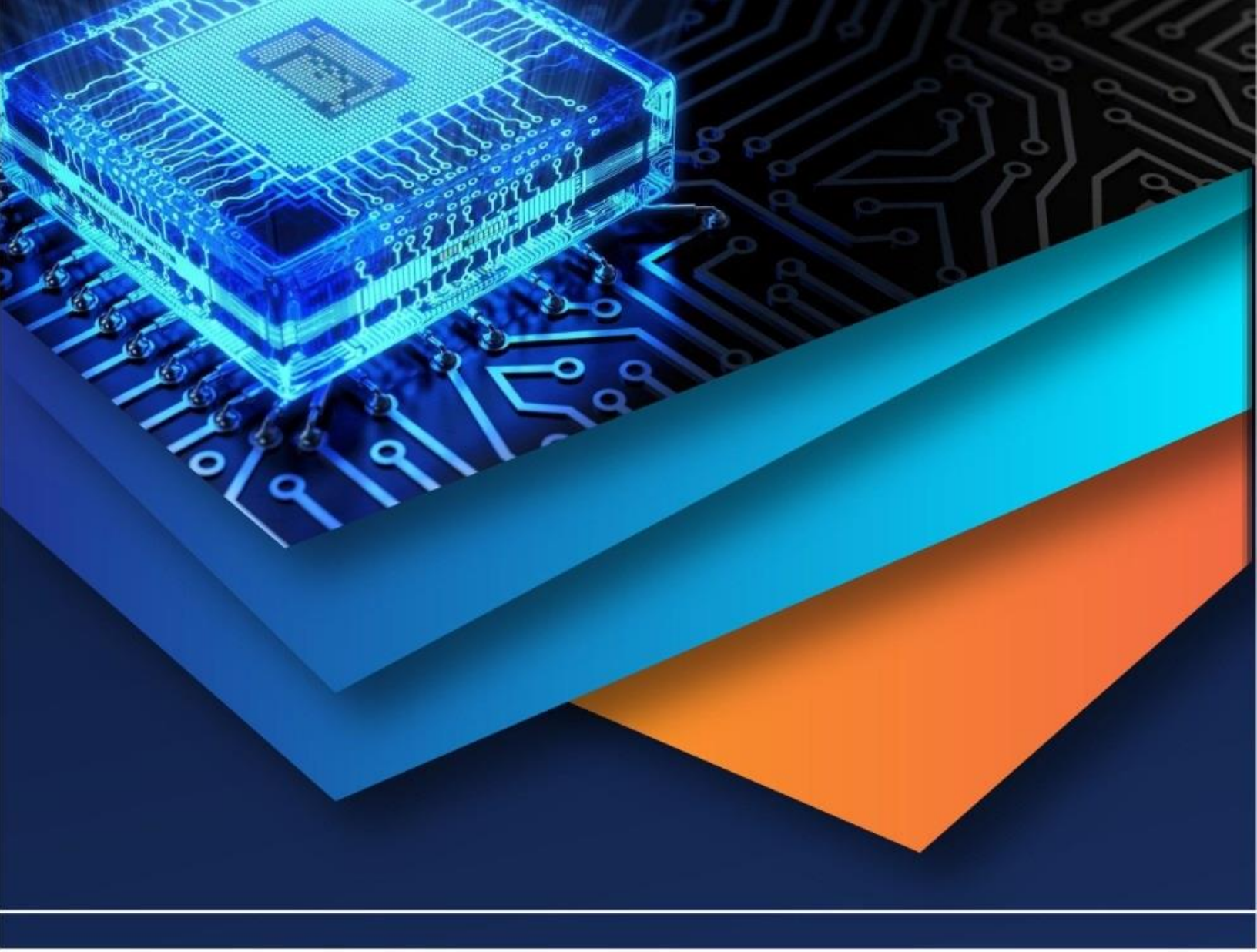
This chanelizer working as a rotary near chowk bazar junction which can cater the traffic of 5000-7000 PCU in peak hour. Therefore, if the missing link is constructed to connect Nehru bridge with Muglisara road and the diverted traffic from station road also channelized at this rotary then actuated traffic signal becomes mandatory requirement at this location.

Extra man hour required for travelling on the diverted route are :

1) Surat Railway Metro Station – 462 person hours in peak hour
2) Maskati Hospital Metro Station – 139 person hours in peak hour
3) Chowk Bazar Metro Station – 418 person hours in peak hour
4) While diverting the traffic for construction of these three station, parking management and signage plan becomes mandatory as about 30-40 % of the road capacity are not utilized because of encroachment and illegal parking.

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[6] Traffic Impact Assessment and Land Use Development and Decision Making (Jayantha Withanaarachchi, Sujeeva Setunge and Shamas Bajwa).
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[8] Other research papers published for Traffic Impact assessment of large scale infrastructure developments



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