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Research Paper

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Enactment Measure of Midblock under Existing Condition by Adopting Sidra Intersection 5.1 Software

Dagimwork Asele Manuka

Department of Civil Engineering, Wolaita Sodo University, Wolaita Sodo, Ethiopia

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***Abstract*— the main objective of this paper is to compute flow appearances of the selected midblock and evaluate with various performance measures both in current and future condition conditions with basic considerations. Sidra Intersection 5.1 software used for the analysis and the result indicate that in average travel speed, variations perceived for all midblock. In future condition, South star-Godegohada midblock shows high deviation, which is 25.15% extra than Mobile-Areb sefer and 64.34% than Alamura-SNNPR Health Bureau midblock due to average delay, and cruise speed of the section. The degree of saturation, between 0.73-1.76 values for all midblock. In future condition, Mobile-Areb sefer midblock displays 50% increment in degree of saturation, which is 27.16% more than South star-Godegohada, and 31.69% than Alamura-SNNPR Health Bureau. In practical spare capacity, Mobile-Areb sefer and South star-Godegohada display negative value, which demand of flow is exceeding than the traffic flow carrying capacity. The future condition of Mobile-Areb sefer requires less in demand flow rate to equalize the above degree of saturation, which 102.52% lower than South star-Godegohada and 221.25% than Alamura-SNNPR Health Bureau midblock. In total effective capacity, based on adjusting total demand of flow and degree of saturation are declines for all midblock gradually. Mobile-Areb sefer is more 2.37 times than South star-Godegohada and 4.03 times than Alamura-SNNPR Health Bureau, midblock will decline in future condition. In demand of flow, deviation observed due to location of section, surrounding activities, condition of the road, configuration in traffic and pattern of traffic movement along those corridors.

Keywords*— *Capacity, Demand of flow, Degree of saturation, Midblock, Performance measure

I. INTRODUCTION

[1] Stated that study of the various road traffic characteristics is essential for plan, design, and operation, regulation and control of traffic roadway facilities. These characteristics studied by observing various aspects of traffic flow in the field, which are difficult and time consuming. When different categories of vehicles share the same road space without any physical separation, the extent of vehicular interactions differs widely with variation in traffic mix. Vehicles, under heterogeneous traffic conditions, different types of vehicles moving on the same road system may enjoy different levels of service. For instance, at higher traffic flow, a large proportion of motorized two wheelers able to move with speeds closer to their free speeds because of their ability for utilizing smaller gaps in the stream, while the large-size vehicles are subjected to considerable speed reduction. This complex traffic scenario, prevailing particularly on urban roads in developing countries, poses a serious encounter to traffic planners and engineers who are on search out for suitable solutions. Solutions to the traffic problem found through systematic study of all the relevant characteristics of mixed traffic as much as possible [1].

Flow, speed, density and headway are the critical parameters used to describe the characteristics of traffic flow at macroscopic and microscopic level. A traffic flow fundamental diagram is use to characterize the relation between these three macroscopic parameters, and plays an important role in traffic flow theory and traffic engineering, as well as distinguishing traffic flow from other fluid modelling. In traffic flow dynamics, flow-density relation models used are to analyse shock wave propagation characteristics and traffic flow stability. In capacity analysis, speed-flow relation models use to determine the level of service. Vehicle time and space headway are used in distribution models widely applied in traffic engineering fields, since they reflect the fundamental uncertainty in drivers' car-following manoeuvres and meanwhile provide a concise way to describe the stochastic feature of traffic flows [2].

Finally, the organization of the paper is as follows, Section-I contains the general introduction of traffic flow characteristics at macroscopic and microscopic perspective, Section -II contain the related work of transportation system, parameters of flow characteristics and urban street facilities from global to specific perception. Section-III contains the method, material of the article, Section -IV designates results and discussion of the paper and Section- V concludes research work with future directions.

A. Study Area

Hawassa city is one of the reform cities in the country of Ethiopia and it has a city administration consisting of eight sub cities and urban as well as rural kebelles. Hawassa city is fast growing city and have large industry parks, construction of Ethiopia-Kenya trunk road and Hawassa-Mojo express freeway roads in transport aspect, which enhance movement along the city. The total population for the city of Hawassa is exceeding 315,000 and annual population growth rate is 4.02% based on 2016 census data of Ethiopian statistical agency. Enormous increase in traffic flow activity time to time along the various corridors with in city is highly observed due to the above activities.

II. Related Work

According to [3] in plan, design and operation of the transportation system, traffic characteristics define the quantitative and qualitative natures of the vehicular flows are being accommodated on that system. The interaction of facility, driver and vehicle will expressed in various measurable parameters of traffic flow and understanding traffic characteristics is basic and fundamental to the development of any transportation system and traffic engineering activity [3].

Along with [4] transportation is generally concerned with efficient, safe, and sustainable movement of people and goods. Transportation engineers work on various aspects of five stages essential in the life cycle of a transportation facility, which are planning, designing, building, operating, and maintaining. In the planning stage, typically forecast traffic demands for a future year or analysis period will done and perform a preliminary evaluation of alternative solutions or identify priorities for system improvements. In design stage, interested in specific geometric elements of the selected alternative, such as horizontal and vertical alignment for the proposed facility. After building the facility, focus shifts to operations and maintenance. In the operations stage, it concerned with control algorithms (such as ramp metering), traffic management, and other aspects of operations such as incident removal. The maintenance stage, involves regular upkeep and repairs such as resurfacing and re stripping as well as traffic signal control maintenance. Traffic flow theory relates primarily to operations stage, but its tools and methods used throughout the spectrum of transportation analysis. Traffic flow theory is part of transportation that concerned with the capacity and traffic operational quality of transportation facilities. The traffic flow theory and their relationship in to the infrastructure is show below in the Figure 1 below.

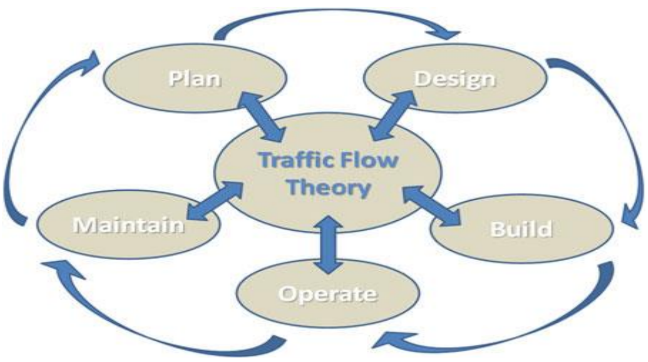

Figure 1. *Traffic flow theory and its relationship to transportation infrastructure* [4]

The traffic and transportation engineering are to control traffic stream on set of road network, to improve the flow without inducing undesirable side effect to society at large [5]. In order to be capable of developing effective system designs and control strategies, engineers must understand how the system may respond to possible engineering changes. In particular, they should be able to predict any figures of merit that are relevant to the affected public, and should have an intuitive feel for likely response of the system to control or redesign, which is good when the time comes to develop a short list of potential improvements for further evaluation [5].

Analysis of these parameters will directly influence the scale and layout of proposed highway, together with type and quantity of materials used in its construction. This process of examination is termed as traffic analysis and the sub-sections below deal with relationships between the parameters, which lie at its basis. In addition to this, the space between consecutive vehicles is important to observe delivery of gap between vehicles [6]. A given flow of traffic through street and highways varies in both time and direction. Describing this traffic flow stream in quantitative term both to understand the variability in their flow characteristics and to define normal rage of behavior, to do the key traffic flow parameters should be define and measured. Based on quantitative data, traffic engineer will evaluate, analyze and plan improvements of traffic and transportation facilities [7].

The macroscopic parameters of traffic flow characteristics are flow rate, speed and density and from this volume and flow rate are two measures that quantify amount of traffic passing a point on a lane or roadway during a designated time interval. Volume is total number of vehicles that pass over a given point or section of a lane or roadway during a given time interval and volumes may be expressed in terms of annual, daily, hourly, or sub hourly periods. While flow rate is equivalent hourly rate at which vehicles pass over a given point or section of a lane or roadway during a given time interval less than one hour, usually 15 minutes [8].

A. Parameters of flow characteristics

Volume of traffic is count by using persons involved, which called as enumerators in the manual counting method. It is required to count the traffic data in a particular mid- block of a corridor. In that case, a base line is to be draw at the selected mid- block location and the enumerators will stand nearer to the base line. Enumerators have to prepare a traffic volume, data sheet consisting of all types of vehicles moving along that road as per time with 15 minutes consecutive intervals of time [9]. Whereas in the automatic method, detectors used to recognize the occurrence of vehicle on the road and they to place below the base line and that machine will automatically record number of vehicles. Advantage of this method, it needs less man power and major disadvantage of this method it counts only all the vehicles count but will not record the composition of traffic [9]. In the video-grammetric method is a video shoot conducted focusing the traffic moving along the selected road and later traffic volume and its composition can be evaluate. This method used for traffic speed, data collection [9].

Traffic speed is the second macroscopic traffic flow characteristics that describing state of traffic stream, and defined as the rate of motion in distance per unit time and travel time is time taken to traverse a defined section of roadway. Traffic speed is influence by volume, capacity, design, weather condition, traffic control devices, posted speed limit, and individual driver preference and it have two category. Design speed is a selected speed used to determine the various geometric design features of roadway. It is important to design facilities with all elements in balance and consistent with an appropriate design speed. Design elements such as sight distance, vertical and horizontal alignment, lane and shoulder widths, roadside clearances, super elevation have influenced by design speed. Selection of design speed for a given functionally classified roadway has influenced primarily by character of terrain, economic consideration, extent of roadside development and highway type [10].

Density is the third measure of traffic flow characteristics, which defined as number of vehicles occupying a given length of highway or lane, expressed as vehicles per mile (veh mi^{-1}) or vehicles per mile per lane. Density is difficult to measure directly from elevated vantage point from which the highway section under study and may be observed is required, often computed from flow rate and speed measurements. However, it is most important of the three primary traffic stream parameters, because it is the measure directly related to traffic demand [7].

Consequently, road traffic flows are composed of drivers associated with individual vehicles, each of them having their own characteristics. These characteristics are call microscopic when a traffic flow is to consider as being composed of such a stream of vehicles. This are largely determine by the behavior of each driver, as well as the physical characteristics of the vehicles [11]. [11] Provides that the process of participating in a traffic flow heavily based on the behavioral aspects associated with human drivers, it would seem important to include these human factors into modelling equations. However, this leads to a severe increase in complexity, which is not always a desired artefact. [7] Reported that microscopic measures are useful for many traffic analysis purposes, because headway may obtain for every pair of vehicles. Microscopic measures also allow various vehicles type to be isolated in the traffic stream. Passenger car has flows and densities be derived from isolating spacing and headway for pairs of passenger cars following each other. Heavy vehicles are could be similarly isolated and studied for specific characteristics.

B. Urban street facilities

Urban street facilities describe an integrated multimodal methodology for evaluating the quality of service provided for road users travelling along an urban street. An urban street is unique among road types because it typically serves multiple travel modes. Four, common travel mode of urban streets include automobile, pedestrian, bicycle and transit [12]. Travelers associated with each of this mode use different criteria to evaluate the service provided to them when they travel along an urban street. For purpose of analysis, urban street is separate in to individual elements that are physically adjacent and operate as a single entity. Serving travellers two elements commonly found on urban street systems, which are points and links. Point represents the boundary between links and usually represented by intersection or ramp terminal. Link represents a length of road-way between two points and its boundary intersection are referred as segment .An urban street facilities is a length off road-way that is composed of contiguous urban street segments [12].

III. METHODOLOGY

Assortment of data and analysis focused on three midblocks for evaluating flow parameters within four sub-cities. The data taken were for three weekdays and for one weekends, this are Monday, Wednesday, Thursday and Saturday. The days were taken based on several field visits and evaluation of thematic area that means the first and third stated days were local market day whereas the second and last stated day were representative to observe the flow characteristics. For analysis, Thursday taken as representative and design day from four designated days, due to efficient number of traffic, more inclusive for study of traffic flow parameters and mixed type of traffic observed.

A. Assortment of Data

The collected data were more of primary data that are practical gathering of the parameter done on filed for the road corridors in different location with considerable procedures and guidelines. Traffic volume, Traffic speed, Time headway and Road width collected for selected road corridors in different sub-city with in Hawassa city. The tools that adopted for collection of filed data were data collection format, plastic tape, chuck, digital camera and stopwatch respectively. Sidra Intersection 5.1 tool is use for analysis. The location details for all road sections were described in Table 1 below.

Table 1. Location detail for road sections

S.No	Name of locations	Designation	Road width(m)
1	Alamura-SNNPR Health Bureau	Road-I	11.6
2	South star-Godegohada	Road-II	9.4
3	Mobile-Areb sefer	Road-III	11.0

IV. RESULTS AND DISCUSSION

The analyses under Sidra Intersection 5.1 tool described for all midblock below. For analysis, the period in which the data taken is 2019 and the future condition done from the current base by assuming constant growth rate for coming six year.

A. Alamura-SNNPR Health Bureau Midblock

Alamura-SNNPR Health Bureau road section (Road-I) is considered and the outputs are presented as movement summary, lane summary, flow displays and movement displays. Demand of flow, degree of saturation, practical spare capacity and level of service (LOS) shows major changes both for current and future condition. Movement summary and lane summary are described in Table 2 and Table 3 below. The movement summary shows that demand of flow for both directions separately are 1064 veh h^{-1} and 516 veh h^{-1} in Alamura and SNNPR Health Bureau respectively. Degree of saturation is 0.748 for Alamura direction and 0.266 for SNNPR Health Bureau direction. Average travel speed for all vehicles for this midblock is 29.9 km hr-1 shown below in Table-2.

Table 2. Movement summary for Alamura-SNNPR Health Bureau Midblock

Movement Performance-Vehicles						
Mov ID Turn	**Demand flow (veh/h)**	**HV (%)**	**Deg.Satn (v/c)**	**delay (sec)**	**LOS**	**travel speed (km.hr)**
East: Alamura						
R-I T	1064	0.8	0.748	7.9	C	23.1
Approach	1064	0.8	0.748	7.9	C	23.1
West: SNNPR Health Bureau						
r-I T	516	1.1	0.266	0.0		54.8
Approach	516	1.1	0.266	0.0		54.8
All vehicles	1580	0.9	0.748	5.4	C	29.9

Average travel speed is the interrupted travel speed of all vehicles with including all kind of delay, which is medium for this midblock. Average travel speed value depends on total travel distance, average delay and cruise speed of the section. Cruise speed is average speed which was taken without considering any kind of delay when measuring on spot and this value for both directions are 47.37 km hr-1and 54.83 km hr-1 respectively. The overall level of service (LOS) of this midblock based on the performance measures is LOS C.

In the lane summary report displayed in Table 3, the capacity is mention based on degree of saturation and adjusting the basic saturation flow for heavy vehicles, demand of flow, and turning vehicle effects. Whereas, in current condition flow displays, the number of heavy vehicles in percent from total demand of flow are 0.8% and 1.1% for each direction in The other parameter is practical spare capacity, which is increment in demand flow rate in percent required to equalize the calculated degree of saturation to practical degree of saturation and for this midblock in movement displays are 6.9% and 200.2% for Alamura and SNNPR Health Bureau directions respectively.

Table 3. Lane summary for Alamura-SNNPR Health Bureau Midblock

Lane use and performance								
Mov ID	**Demand flow(veh/hr)**				**HV (%)**	**Deg.Satn (v/c)**	**Cap (veh/hr)**
	L	**T**	**R**	**Total**			
East: Alamura							
Lane-1	0	1064	0	1064	0.8	0.748	1422
Approach	0	1064	0	1064	0.8	0.748	
West: SNNPR Health Bureau							
Lane-2	0	516	0	516	1.1	0.266	1937
Approach	0	516	0	516	1.1	0.266	
Intersection	1580				0.9	0.748	

The future condition of Alamura-SNNPR Health Bureau midblock is analyzed from current base with constant growth rate for coming six years. In the Figure 2 below five parameters are used for description, this are demand of flow, average travel speed, degree of saturation, practical spare capacity and total effective capacity. The average travel speed with including all kind of delays and became in chart on current condition is 29.9 km hr-1 and in the future this value became 25.83 km hr-1 and results decline in average travel speed in this midblock is by 13.61%.

The second parameter used for this analysis is degree of saturation and display increment by 18.31% from the base condition and which is not significant variation. Both the practical spare capacity and effective capacity also displays declines by 249.13% and 5.23% from current condition and from this, the increase in demand of flow to equalize the degree of saturation shows more than 200% increment, which is significant.

The effective capacity, which is the ratio of total demand of flow to the degree of saturation is minimum in the condition that is less than 10%.The demand of flow shows persistent increment (which is 2% per year) in each year due to the growth rate value for all midblock are constant then at start of six year, the flow of demand in this midblock became 12% increase from the base. The performance of the route in terms of (LOS) in future condition in this midblock goes to LOS D.

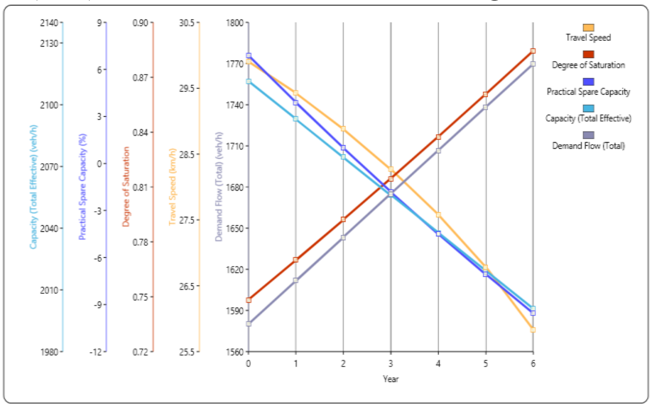

Figure 2. *Future condition analysis for Alamura-SNNPR Health Bureau Midblock*

B. South star-Godegohada Midblock

South star-Godegohada midblock (Road-II) evaluated and the outputs are present as movement summary, lane summary, flow displays and movement displays. Demand of flow, degree of saturation, average travel speed, practical spare capacity and LOS shows major changes both for current and future condition. The movement summary and lane summary are designate in Table 4 and Table 5 below separately. The movement summary shows that demand of flow are 1368 veh h^{-1} in south star direction and 845 veh h^{-1} in Godegohada direction respectively.

Table 4. Movement summary for South star-Godegohada Midblock

Movement Performance-Vehicles						
Mov ID Turn	**Demand flow (veh/h)**	**HV (%)**	**Deg.Satn (v/c)**	**delay (sec)**	**LOS**	**travel speed (km.hr)**
South: Godegohada						
r-II T	845	2.3	0.620	6.2	B	27.6
Approach	845	2.3	0.620	6.2	B	27.6
North: South star						
R-II T	1368	3.7	0.915	11.2	E	14.9
Approach	1368	3.7	0.915	11.2	E	14.9
All vehicles	2213	3.2	0.915	9.5	E	19.5

Again, the degree of saturation was 0.915 and 0.620 for each direction separately. The overall level of service of this midblock is LOS E which the capacity of the road less able to support the demand of flows, but with considerations. The average travel speed for all vehicles for this midblock is 19.5 km hr-1 shown below in Table 5 and the cruise speeds in the South star and Godegohada directions are 40.01 km h^{-1} and 52.51 km h^{-1} respectively. In the lane, summary report in Table 5 below which capacity is mention based on degree of saturation and adjusting the basic saturation flow for heavy vehicles, demand of flows and turning vehicle effects. In flow displays, the numbers of heavy vehicles in percent from total demand of flow are 3.7% in South star and 2.3% in Godegohada directions in current condition.

Table 5. Lane summary for South star-Godegohada Midblock

Lane use and performance								
Mov ID	**Demand flow(veh/hr)**				**HV (%)**	**Deg.Satn (v/c)**	**Cap (veh/hr)**
	L	**T**	**R**	**Total**			
South: Godegohada							
Lane 1	0	845	0	845	2.3	0.620	1363
Approach	0	845	0	845	2.3	0.620	
North: South star							
Lane 2	0	1368	0	1368	3.7	0.915	1495
Approach	0	1368	0	1368	3.7	0.915	
Intersection		2213			3.2	0.915	

The practical spare capacity, which is the increment in demand flow rate for this midblock in movement displays, is -12.5% and 29.0% in South star and Godegohada directions respectively. The negative value in practical spare capacity shows that demand of flow is more than capacity of in a given section of the road (demand of flow was higher than capacity) and in this South star direction displays significant increment in demand of flow. The future condition of South star-Godegohada midblock is evaluated with constant growth rate. Five parameters are adopted for description in the Figure 3 below in detail and average travel speed is stated in chart on current condition it is 19.5 km hr-1 and for future condition became 4.3 km hr-1 that displays significant dropdown 77.95% from the base.

Similarly, degree of saturation for current and future condition are 0.915 and 1.124 respectively and shows increment by 22.84% and practical spare capacity displays increment to 130.4% are observed that actual demand of flow are exceeding the carrying capacity of this route gradually and the total effective capacity also shows decline by 8.87% from existing condition. The demand of flow also shows upgrade by 12% at start of six years from the base condition. Finally, the overall performance of midblock in terms of level of service (LOS) in future condition became LOS F.

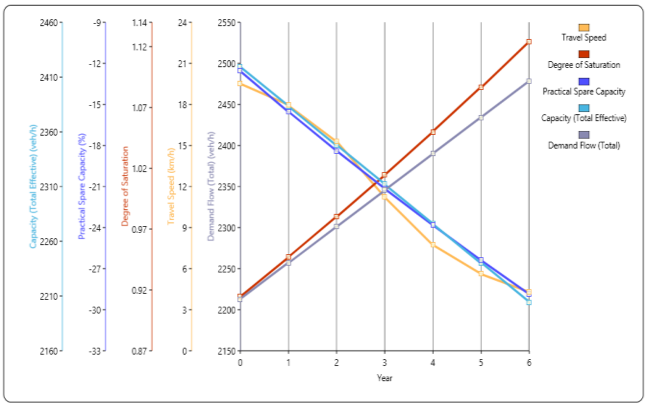

Figure 3. *Future condition analysis for South star-Godegohada Midblock*

C. Mobile-Areb sefer Midblock

Mobile-Areb sefer road section (RIII) is evaluate and the outputs are précised as movement summary, lane summary, movement displays and flow displays. Significant changes are observed in demand of flows, Average travel speed, degree of saturation, and practical spare capacity both for current and future condition. The movement summary and lane summary is described below in Table 6 and Table 7 respectively.

Table 6. Movement summary for Mobile-Areb sefer Midblock

Movement Performance-Vehicles						
Mov Id Turn	**deman d flow (veh/h)**	**HV (%)**	**deg.Satn (v/c)**	**delay (sec)**	**Los**	**travel speed (km.hr)**
South: Mobile						
R-III T	1727	3.6	1.765	693.5	F	0.4
approach	1727	3.6	1.765	693.5	F	0.4
North: Areb sefer						
r-III T	1364	3.6	0.716	0.0	C	38.4
approach	1364	3.6	0.716	0.0	C	38.4
vehicles	3092	3.6	1.765	387.5	F	0.7

Movement summary of this road section shows that demand of flow are 1727 veh h^{-1} for Mobile direction and 1364 veh h^{-1} for Areb sefer direction on current condition. Again, degrees of saturation are 1.765 and 0.716 for each direction. This values shows that demand of flow was increasing throughout the year and the capacity declines to support this demand of flow, which have direct impact on level of service and performance of this midblock.

Cruise speed is average speed which is taken without considering any kind of delay when measuring on spot and this value for both directions are 37.33 km hr-1and 38.40 km hr-1 in Mobile and Areb sefer directions respectively. The overall LOS of this road sections based on the performance measures is LOS F. In the lane, summary report displayed in

Table 7 that capacity is mention based on degree of saturation and adjusting the basic saturation flow for heavy vehicles, demand of flow, and turning vehicle effects. The flow display is 3.6% for each direction in current condition.

Table 7. Lane summary for Mobile-Areb sefer Midblock

Lane use and performance							
Mov ID	**demand flow(veh/hr)** L	T	R	Total	**HV (%)**	**Deg.Sat (v/c)**	**Cap (veh/hr)**
South: Mobile							
Lane 1	0	1727	0	1727	3.6	1.765	981
approach	0	1727	0	1727	3.6	1.765	
North: Areb sefer							
Lane 2	0	1364	0	1364	3.6	0.716	1906
approach	0	1364	0	1364	3.6	0.716	
intersection	3092				3.6	1.765	

The other parameter is practical spare capacity which is increment in demand flow rate in percent required to equalize the calculated degree of saturation to practical degree of saturation and for this road section in movement displays are -54.5% and 11.8% for Mobile and Areb sefer direction respectively. The negative value in practical spare capacity shows the increment of demand of flow compare with capacity of the route.

The future condition of Mobile-Areb sefer road section was analyses from current base with constant growth rate for coming six years. In the Figure 4 below, five parameters used for description; these are average travel speed, degree of saturation, practical spare capacity, total effective capacity and demand flow. The average travel speed stated in chart on current condition the value is 0.716 km hr-1 and for future condition, the value is 0.338 km hr-1 and result dropdown by 52.80% from base. Similarly, degree of saturation for future condition is 2.64 and shows increment by 50.0 % and practical spare capacity display increment by 27.88%. The total effective capacity of this midblock shows decline to 21.08% from current condition compare with the existing condition and demand of flow also display increment to 12% in future condition.

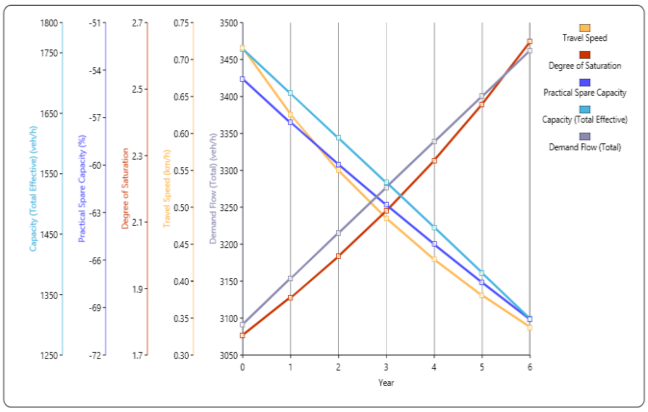

Figure 4. *Future condition analysis for Mobile-Areb sefer Midblock*

D. Summary of the output of Sidra Intersection 5.1 Software

In average travel speed, variations perceived both in current and future condition for Mobile-Areb sefer to Alamura-SNNPR Health Bureau midblock. Compare to the other section high value in average travel speed is observed in Alamura-SNNPR Health Bureau because this section have less number of movement of flow, mixed type of traffic and wider approach road width along the corridor. In future condition, South star-Godegohada midblock shows high deviation in travel speed, which is 25.15% extra than Mobile-Areb sefer and 64.34% than Alamura-SNNPR Health Bureau midblock due to the result of average delay, and cruise speed of the section.

In degree of saturation, again high variations observed between 0.73-1.76 values for all midblock. Both South star-Godegohada and Mobile-Areb sefer results capacity would declines to support incoming in demand of flows from both directions due to higher value of degree of saturation. The increment in degree of saturation nearer to one and above, results to decline of capacity of the section. Again, Alamura-SNNPR Health Bureau almost has the same value in degree of saturation, which is moderate. In future condition, Mobile-Areb sefer road section displays half- percent increment in degree of saturation, which is 27.16% more than South star-Godegohada, and 31.69% than Alamura-SNNPR Health Bureau road sections.

In practical spare capacity, from all road sections Mobile-Areb sefer and South star-Godegohada are negative which mean that demand of flow in this corridors are exceeding than the traffic flow carrying capacity. In future condition, the roads Mobile-Areb sefer requires less in demand flow rate to equalize this degree of saturation to practical degree of saturation that means 102.52% lower than South star-Godegohada and 221.25% than Alamura-SNNPR Health Bureau road sections.

In total effective capacity, based adjusting total demand of flow and degree of saturation are declines for all road sections gradually. In terms of total effective capacity, Mobile-Areb sefer road section is more 2.37 times than South star-Godegohada and 4.03 times than Alamura-SNNPR Health Bureau will decline in future condition.

In demand of flow, variation perceived from section to section detected due to location of section, surrounding activities, condition of the road, configuration in traffic and pattern of traffic movement along these corridors. Less number of volumes of traffic observed in Alamura-SNNPR Health Bureau section than, the others section at peak time.

Average delay, which is additional travel time experienced by a vehicle with reference to a base travel time for all road sections perceived but not highly influence the movement of traffic flow in urban road facilities. Delay is not incorporated in this analysis for intersection level of service (LOS) and major road approach level of service (LOS) because in free-way roads the average delay is not a good LOS measure due to zero delays associated with major road lanes and will alters the out of the analysis.

Minimum average delay value is displays in all midblock both in current and future condition except in Mobile-Areb sefer road section. In overall performance all midblock are evaluate in terms of level of service (LOS) which displays change both in existing and future conditions.

Summary for all midblock in current condition (CC) and future condition (FC) are describe in Table 8 below.

Table 8 Summary for all routes in current and future condition

Midblock	Travel speed(km hr^{-1})		Degree .satu(v/c)		Practical spare capacity (%)	
	CC	FC	CC	FC	CC	FC
Road-I	29.9	25.83	0.75	0.88	6.9	-9.6
Road-II	19.5	4.3	0.915	1.12	-12.5	-28.8
Road-III	0.72	0.34	1.76	2.64	-54.5	-69.7

Midblock	effective capacity (veh hr^{-1})		Demand of flow(veh hr^{-1})		LOS	
	CC	FC	CC	FC	CC	FC
Road-I	2111.4	2000.9	1580.2	1769.8	C	D
Road-II	2419.1	2204.4	2212.9	2478.5	E	F
Road-III	1756.4	1386	3091.5	3462.5	F	F

V. CONCLUSION AND FUTURE SCOPE

Based on the analysis done in all midblock the following deduction is outlined, at peak time the traffic flow rate in both directions are 1528 veh h^{-1}, 2212 veh h^{-1} and 3092 veh h^{-1} for Alamura-SNNPR Health Bureau, South star-Godegohada and Mobile-Areb sefer midblock respectively. In Mobile-Areb sefer, the flow rate is two times exceeding than Alamura-SNNPR Heath Bureau midblock and again, almost 1.4 times more than the South star-Godegohada midblock correspondingly. The effects of heavy vehicles (HV) also on their surrounding traffic are greater than passenger cars and have a potential to have a substantial impact on macroscopic and microscopic traffic flow characteristics. Because of the interference effect they have on surrounding motorized vehicles and their percentage in average is 4.2% in all midblock at existing condition and displays increment in the future condition. The output of the Sidra Intersection 5.1 software indicate that all parameters which are operating speed, flow rate and percent of heavy vehicles have impact on their serviceability, to entertain their design speed, maneuvering prospect of drivers, capacity and performance of this roads in terms of level of service (LOS) highly perceived for all midblock.

Moreover, All midblock in future conditions are studied and the result indicate that average travel speed, degree of saturation, practical spare capacity, demand of flow and LOS have major changes both in current and future condition. This road in terms of capacity also shows change in 5.23%, 8.87% and 21.08% for Alamura-SNNPR Health Bureau, South star-Godegohada and Mobile-Areb sefer midblock are declines in the future condition with in the design period. This all considerations mentioned above have major impact on normal functioning of this road system. It possible to accomplish that, this midblock are proper and major task to analyse in service and operation period in order to evaluate their status in current conditions with major performance measure to check their enactment in future using tools of current situations.

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