# CAPACITY PREDICTION OF TWO-LANE TWO-WAY ROAD SEGMENT AT TOKARAWA KANO-HADEJIA HIGHWAY

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## DECLARATION

I hereby declare that this work is the product of my own research efforts; undertaken under the supervision and guidance of Prof. Hashim M. Alhassan and has not been presented and will not be presented elsewhere for the award of a degree or certificate. Author's whose work has been referred to; in this dissertation has been duly acknowledged accordingly.

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## CERTIFICATION

This is to certify that the research work for this dissertation and the subsequent preparation were carried out by (Yaminu, Ojeifo Abdullahi (SPS/14/MCE/00006)) under my supervision.

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**APPROVAL PAGE**

This is to certify that this research study has been examined and approved for the award of MASTERS IN CIVIL ENGINEERING Department of Bayero University, Kano.

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## DEDICATION

To my parents: my loving wife, and my children. “That my children may be inspired and know the value of education.” Also this work is dedicated to road traffic administrators over the world whose good management of road facility led to its sustainability.

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## LIST OF ABBREVIATION

ADTAnnual Daily Traffic

ATC Automatic Traffic Counter

ART Articulated Rigid Trunk

AUSTROAD Australian Association of State and Federal Road Authority

CRRL Central Road Research Institute India

CBD Central Business District

DRT Double Rigid Trunk

FD Fundamental Diagram

FHWA Federal Highway Authority

FMW Federal Ministry of Works

FRSC Federal Road Safety Corp

GVW Gross Vehicle Weight

HCM Highway Capacity Manual

HGV Heavy Goods Vehicle

LGV Light Goods Vehicle

LOS Level of Service

MFD Macroscopic Fundamental Diagram

MTE Metro count Traffic Executive

MCSetupMetro count Setup

| | |
|---|---|
| MCReport | Metro count Report |
| NAASRA | National Association of Australian State Road Authority |
| N-HDM | Nigeria Highway Design Manual |
| PC | Passenger Car |
| PCE | Passenger Car Equivalent |
| PCU | Passenger Car Unit |
| RSU | Road Side Unit |
| SMS | Space Mean Speed |
| TRB | Transportation Research Board |
| TMS | Time Mean Speed |
| TRRL | Transport and Road Research Laboratory |
| TRT | Triple Rigid Trunk |
| YOA | Yaminu Ojeifo Abdullahi |

## ABSTRACT

The study aimed at highway capacity prediction for two-lane two-way Yankaba-Tokarawa road segment of Kano-Hadejia road in Nigeria. Traffic data was collected with an automatic traffic counter installed on the road location. Based on the collected data, the traffic was evaluated for weekdays and weekend traffic, and the traffic streams were classified into three categories, namely cars, light goods vehicles (LGVs) and heavy goods vehicles (HGVs). The total traffic observed was estimated to be 477,620 vehicles according to the day light traffic. Cars dominated the traffic stream with a share of 93%, LGVs and HGVs shared 5% and 2% respectively. The ADT for the road section was 8,684vehicles per day. Traffic volume were converted to flow rate in PCE/hr using the static PCE values of Car =1.0 and LGVs and HGVs =3.0 adopted from Federal Ministry of Works design manual and dynamic PCE values of Cars = 1.0, LGVs =1.82 and HGVs = 2.44 obtained from the study. Comparison was made on the basis of traffic flow characteristics at capacity.The state of traffic for site 1was 362 veh/hr, 55.26km/hr and 7 veh/kmrepresenting observed volume, speed and density respectively. Site-2 traffic statewas;306veh/hr,63.43km/hr, and6 veh/km for the volume, speed and density respectively. The predicted capacity states for the two sites are Site-1: 2,025PCE/hr, 31.78km/hr and 33 veh/km. For Site-2, the predicted capacity state was 1,911 PCE/hr, 27.7km/hr, and 34veh/km using the static PCE. The traffic state for the predicted capacity using the dynamic PCE values were: Site-1: 1,734PCE/hr, 26.23km/hr and 33 veh/km. For Site-2, the predicted capacity state was; 1,367PCE/hr, 22.02km/hr and 24 veh/km respectively. The capacity values obtained from the study for both static and dynamic conditions were however lower than the TRB (2010) value of 3,200 PCE/hr for two-lane rural road. This means that capacity of 3,200 PCE/hr in HCM, TRB (2010) may be consider as conservative. The variation between the HCM capacity values and the study values could be linked to traffic compositions, decrease in number of heavy vehicles in the traffic stream, and influence of heavy vehicles large headways in the traffic mix which make them less interactive with cars. The PCE values computed in the study for the three traffic categories of PC, LGV and HGV are 1.0; 1.82 and 2.44 respectively. This is at variance with the values in the highway design manual of Nigeria, suggesting that PCE values should not be applied without regard to traffic situations. Further research on PCE value and capacity for different flow regimes is suggested.