Traffic Flow
Are Traffic Jams Necessary?
Oysterbay Secondary School

Locations:

What is Traffic?

Traffic can be defined as the movement of pedestrians and goods along a route, and in the 21st century the biggest problem and challenge for the traffic engineer is often the imbalance between the amount of traffic and the capacity of the route, leading to congestion. Traffic congestion is not a new phenomenon. Roman history records that the streets of Rome were so clogged with traffic, that at least one emperor was forced to issue a proclamation threatening the death penalty to those whose chariots and carts blocked the way!

Aim:

Our school is in an area with one of the main arteries into the city centre.

It is known for its high traffic volume. Our aim is to calculate and compare the load factor for junctions of different designs, determine which is the best design and try and understand drivers travel habits.

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Loading factors:

Traffic flow is expressed in passenger car units/hour (PCU/h). vehicle types at traffic signals are as follows:[4]

Cars and light goods vehicles	1.0
Medium goods vehicles	1.5
Heavy goods vehicles	2.3
Buses and coaches	2.0
Motorcycles	0.4
Pedal cycles	0.2

$$\text{Density } (D) = \frac{\text{Average number of vehicles in a length of highway } (L)}{L}$$

Dala: efficient compact with low road footprint

Pij = 0.75 car

Bagamoyo

Oysterbay

Density: D = 0.9 m^{-1}
Average total:
truck: 14 X 2.3 =32.2
cars: **1220** X 1 = 1220
bus: 26 X 2=56
pij: 35 X 0.75=26
Total load: **1334**

Posta

Density: D = 0.75 m^{-1}
Average total:
truck: 5 X 2.3 =11
cars: **1750** X 1 = 1750
bus: 20X 2= 40
pij: 52X 0.75= 39
Total load: **1841**

UDSM

Density: D = 0.5 m^{-1}
Average total:
truck: 132 X 2.3 =304
cars: 1350 X 1 = 1350
bus: 89 X 2= 178
pij: 55 X 0.75= 41
Total load: **1873**

Flow Capacity:

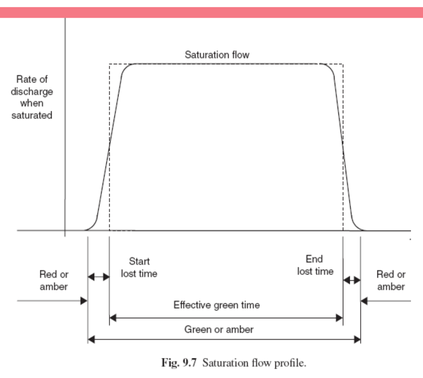
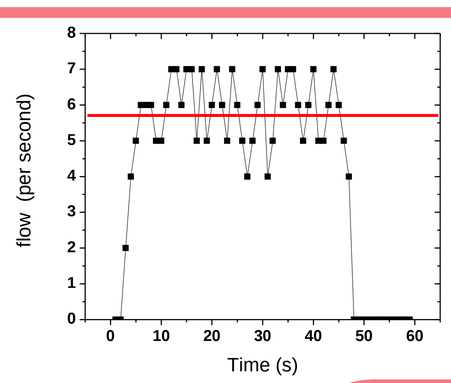


Fig. 9.7 Saturation flow profile.



T-Junction:
green: 45 s
effective green: 40 s
start lost time: 4 s
end lost time: 1.5 s
saturation flow: 5.7 s^{-1}

Conclusions:

- Roundabouts (RB) considered most efficient junction design by engineers
- Relatively few RB's in Dar
- Mlimani RB had the highest total load but the lowest density, indicating high flow and its efficiency
- Crossroad has higher load than t-junction but lower density. This is probably due to design of Kenyatta drive and its flow toward Posta.
- Each traffic light sequence loses 6 s of flow (34 cars)
- Using traffic police reduces this percentage loss

Origin & Destination Survey:

1. Where did your trip begin prior to receiving this card?
   Home____ Work/School ____ Shopping/Store____
   Recreation/Social ____ Airport ____ Other ____
2. What was your immediate destination when you were handed this card?
   Home____ Work/School ____ Shopping/Store ____
   Recreation/Social ____ Airport ____ Other ____
   If your destination is the city center, what is the street name? _____
3. What was the approximate travel time of this trip? _____
4. Including yourself, how many people were in your vehicle? _____
5. What time of the day did you receive this card?
   Morning _____ Mid-Day _____ Evening _____
6. Would you consider car-sharing? Yes_____ No _____

Response rate 70 / 150 **47%**

Origin:
- Home 24 / 70 **34%**
- Work 17/70 **24%**

Destination:
- City 28 / 70 **40%**

Average travel time **65 mins**

Single Drivers 13 / 70 **19%**

Positive to sharing 50 / 70 **71%**
- 3 / 50 single drivers **6%**

References:

Traffic Engineering Design by M. Slinn, P. Matthews and P. Guest. Elsevier, 2005

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