

SB-I-[N1]H

Composer/researcher:

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Composition:

SB-I-[N1]:H

[Sections 1-21]

Composed:

[2011-2013]

Duration:

4 min 06 sec

for

two amplified harps

Tracking regular and irregular behaviour of vehicles
in free flowing uni-directional traffic congestion

Index

Page

Examining behaviour of traffic in a four lane system during free flowing uni-directional congestion	4
Aim	5
Calculations made	6
Composition	9
Performance layout	9
Reference	11

Examining behaviour of traffic in a four lane system during free flowing uni-directional congestion:

SB-I [Sandton / Buccleuch Interchange] (N1):H (N1-Highway)

Date- 16 – 21 October 2011

Time – 7H30 – 9H30 and 16H00 – 18H00

Weather – clear – sunny.

Regular and irregular behavioural patterns caused by vehicle traffic during a free flow unidirectional traffic congestion in a four lane system.

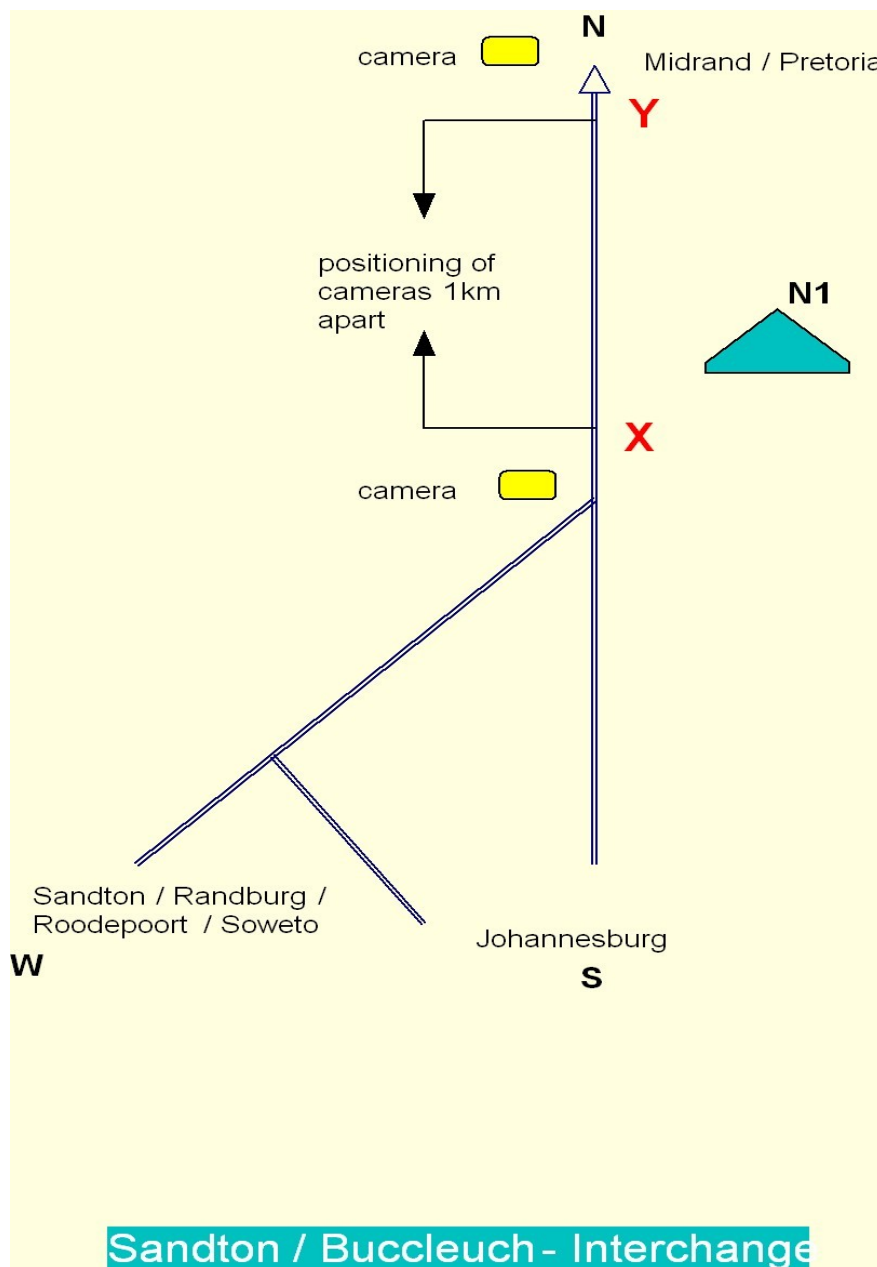


Fig 1

Aim:

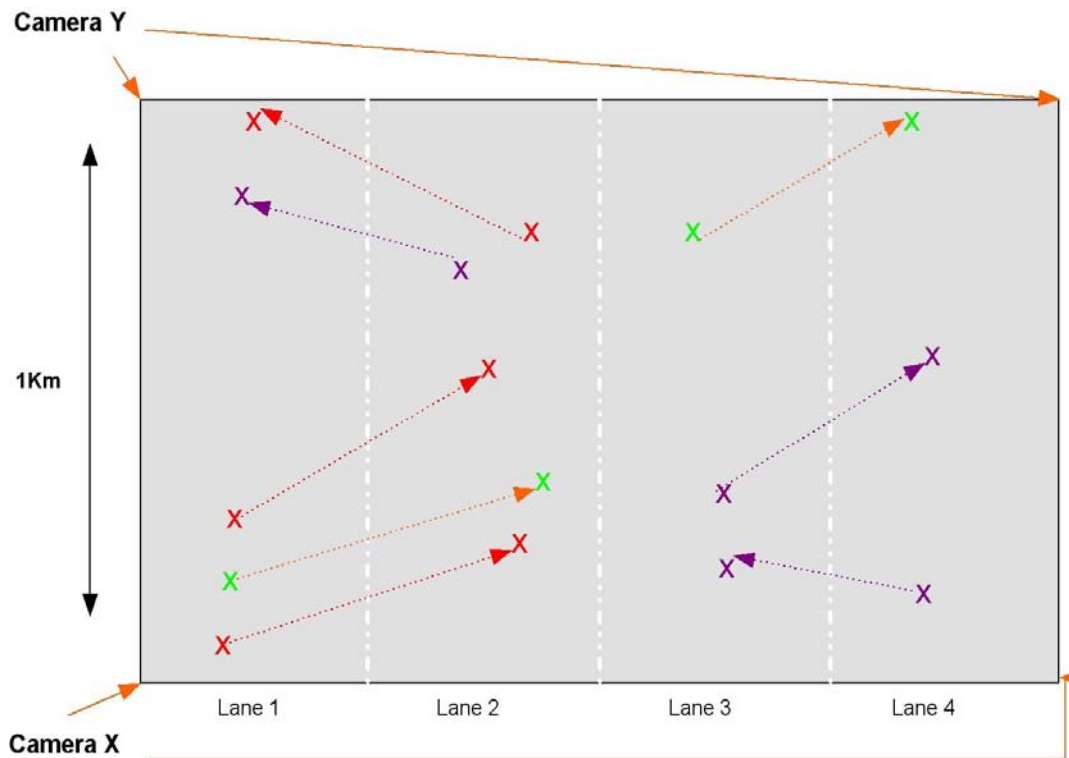
It is to numerically count the number of vehicles passing certain marked areas in the road and the behaviour of vehicles [mobility (that includes observations in regular and irregular behaviour of motor vehicles) the changing of../ alternating lanes between 1 , 2 / lane 3 , 4 and visa versa] in a free flowing congestive system.

The given information will be calculated , graphically represented and converted into notation whilst taking into account the alterations in pitch, tempo, dynamics over given time duration intervals.

The following [mobility of vehicles between lanes] observations were conducted in accordance to the table below -

A	
left to right lane - regular manner right to left lane - regular manner	
left to right lane - irregular manner right to left lane - irregular manner	Two unidirectional left lanes Lanes - 1 & 2.
B	
left to right lane- regular manner right to left lane - regular manner	
left to right lane - irregular manner right to left lane - irregular manner	Two unidirectional right lanes Lanes – 3 & 4
Camera at point X Camera at point Y	Number vehicles and position Number vehicles and position

Fig 2



Behaviour of vehicles in four lane unidirectional system -
 [were particular observations focused on the manoeuvrability
 of vehicles between Lane 1&2 and Lane 3&4.]

Fig 3

Calculations made:

The flow rate -The number of vehicles (n) passing some designated roadway point X & Y in a given time interval (t) : $q = n/t$. Units are typically vehicles/hour and flow rate is different than volume.

Spacing - The distance (ft) between successive vehicles in a traffic stream, as measured from front bumper to front bumper.

Headway (h) - The time (in seconds) between successive vehicles, as their front bumpers pass a given point.

$$t = \sum_{i=1}^n h_i \dots \dots q = \frac{n}{\sum_{i=1}^n h_i} = \frac{1}{h}$$

Time mean speed (spot speed) –Arithmetic mean of all instantaneous vehicle speeds at a given “spot” on a roadway section

Space mean speed (u) –The mean travel speed of vehicles traversing a roadway segment of a known distance (d):

It is the harmonic mean (1/H = 1/a + 1/b + ...)

$$u = \frac{1}{\frac{1}{n} \sum_{i=1}^n \frac{l_i}{t_i}} \dots \dots t = \frac{1}{n} (t_1 l_1 + t_2 l_2 + \dots + t_n l_n)$$

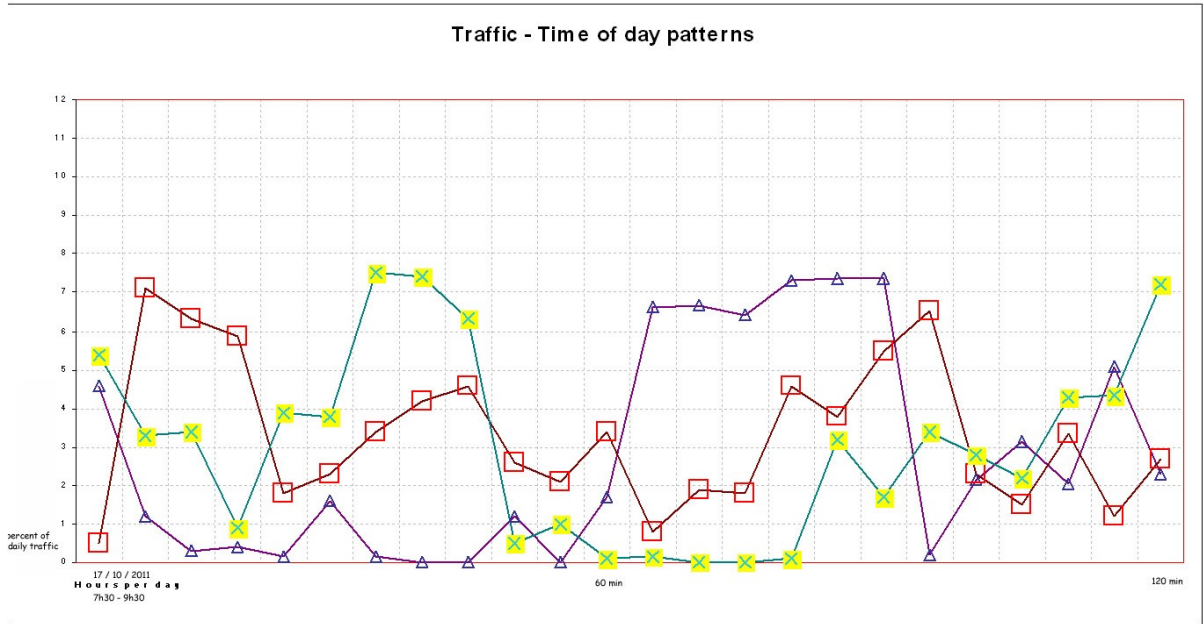
A harmonic mean is just another way to describe a set of data . In this case it is more descriptive for vehicle speeds . Space mean speed is always less than time mean speed

Density -The number of vehicles (n) occupying a given length (l) of a lane or roadway at a particular instant .

Unit of density is vehicles per Kilometer (Km). **K=n/l=q/u.**

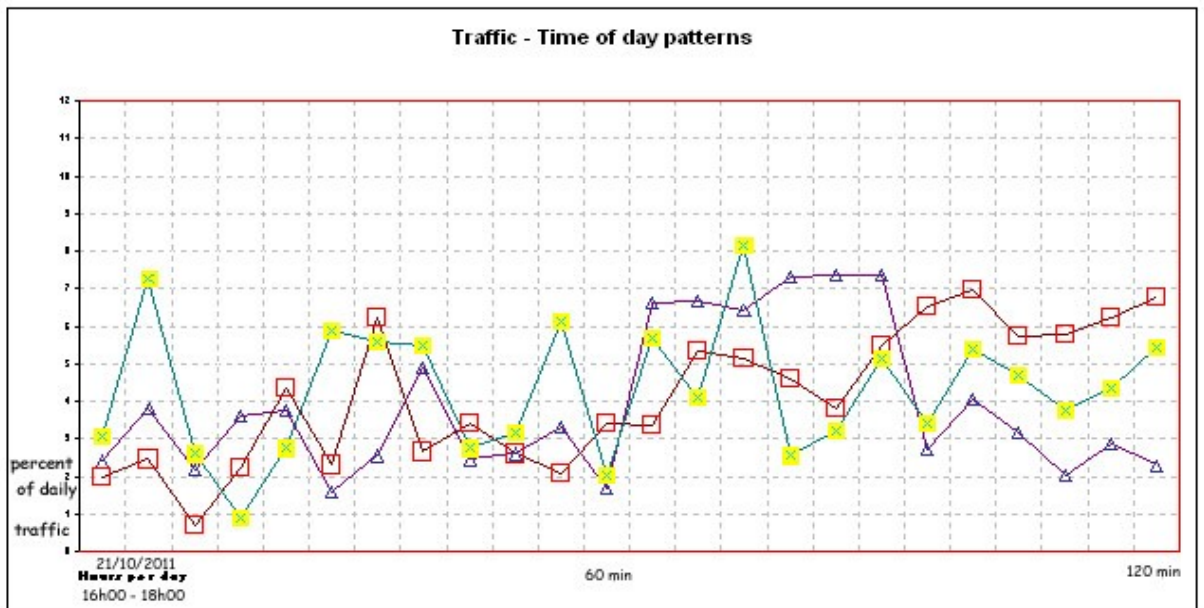
Occupancy often used as a surrogate to density because it’s easier to measure . Density is difficult to measure because you have to essentially image a long stretch of road.

Changing lanes - between lanes marked : 1-2 and 2-1 , lanes marked : 3-4 and 4-3 from point **X** to point **Y**



----- vehicles ----- motorcycles ----- trucks

Fig 6



----- vehicles ----- motorcycles ----- trucks

Fig 7

Composition

A harp has two rows of strings for left and right hands:

Harp 1 that represents lanes 1 and 2 focuses on:

- 1] The mobility of vehicles between lane 1 and 2 and visa versa – split into two audible sections by two microphones each representing activity in a particular lane **see fig 6.**
- 2] The amount of vehicles traveling past a given marked area. The vehicles are grouped into different categories noting size , speed this allows for formulation of notation [not disturbing the sequence of audible results calculated in representing the precision of the free flowing congestion] representing the mechanics of motion in this micro environment.
- 3] Pitch, tempo, dynamics over given time duration intervals are also of ultra importance in determining the criteria of motion .

The similar three points are imposed on the composition for **Harp 2** that represents lanes 3 and 4.

Performance layout:

1] 21 sections were composed for each of the two harps. The harpists will perform each of the 21 sections simultaneously e. g. harp 1 [performing the translated happenings in lane 1 & 2] is connected stereophonically with two mics [that should indicate mobility between the two lanes] similarly with harp 2 [performing the translated happenings in lane 3 & 4] is connected stereophonically with two mics [that should indicate mobility between the two lanes] e.g. *The duration of the composition is ideally 4 min 06sec in 21 sections for Harp 1 and another 4 min 06sec for Harp 2. The length of each of the 21 sections are mirror images of one another , thus commencement of each section should start simultaneously. If the choice of one of the performers is to start playing in any other way than noted by the composer i.e. the one harpist decided to start playing sections 3,7,20 first etc. he is to communicate with the other harpist to also plays similar sections 3,7,20 in that particular order, precise commencement of each section is necessary.*

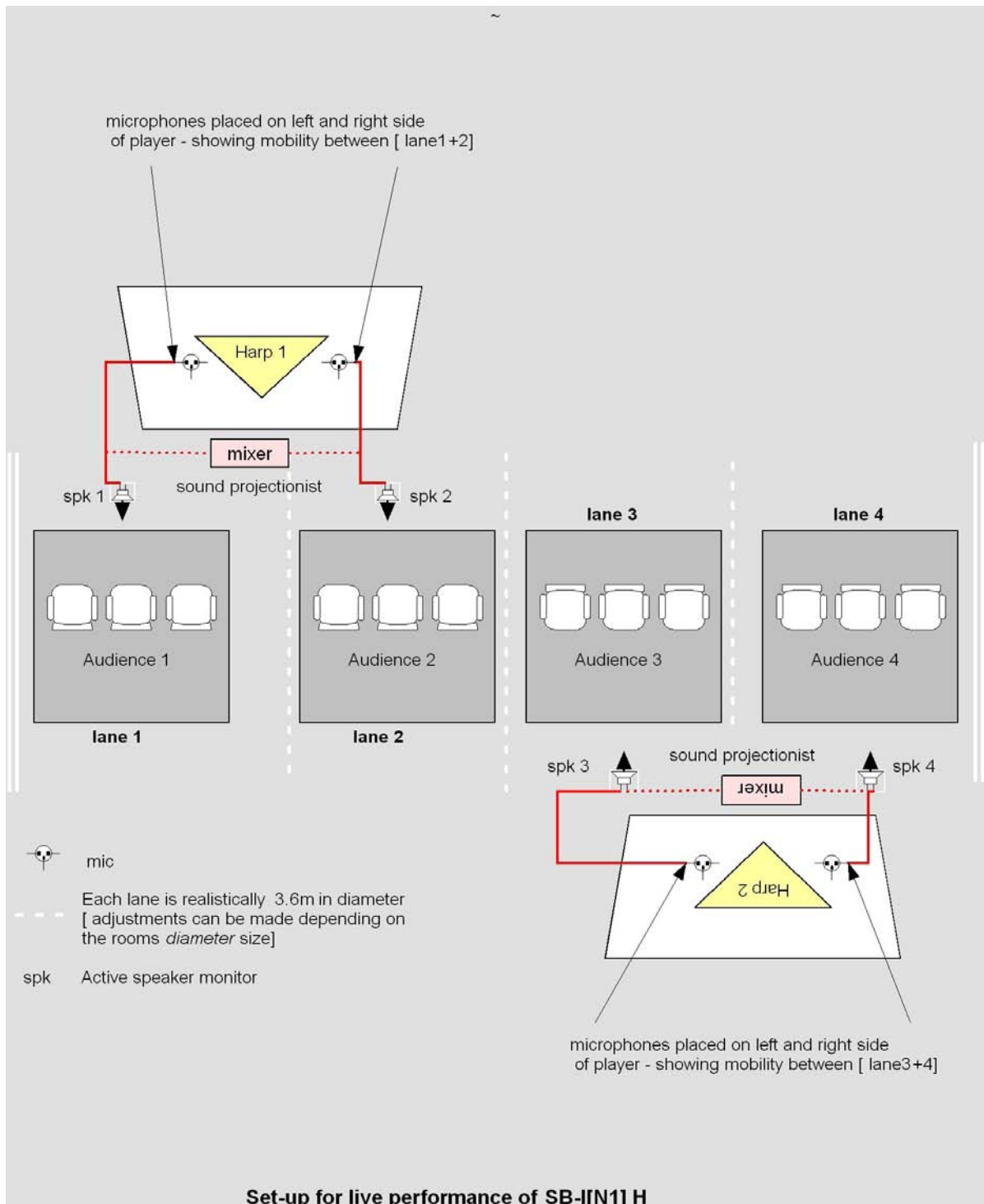


Fig 6

- 2] The audience will be seated in accordance to the diagram
- 3] Four allocated sitting positions [representing lanes 1-4] in front of each speaker monitor – the sound range is to be determined by sound engineer / projectionist in accordance of the sound acoustics of the space.
- 4] The performance of SB-I-[N1]:H is to executed in total darkness.
- 5] Only slight illumination for the performers and sound projectionist is allowed.

Reference:

- Mannering, F.L.; Kilareski, W.P. and Washburn, S.S. (2005). *Principles of Highway Engineering and Traffic Analysis*, Third Edition. Chapter 5
- Transportation Research Board. (2000). *Highway Capacity Manual 2000*. National Research Council, Washington, D.C.