

City Development and Planning Related to Traffic Congestion.

広島大学

正員

WILLIAM O. BACKHOUSE, M.A., B.Sc.

Mistakes have been made and are still being made, all over the world, because planners of cities, regions and even small extensions to them, make wrong initial approach and frequently act alone.

There never has been and there never will be, anywhere in the world, a person who is an expert in all the professions which are necessary in National, Regional or City Planning.

The Planner should be the co-ordinator in addition to being the designer and should balance the many desires and recommendations of other professional persons, such as Highway Engineers, Architects, Experts in Transport, Commerce, Industry, Education, Law, Recreation, Amenities, Administration and Economics. For special areas other experts such as those engaged in Shipping, Dock and Harbours, Aviation etc. may be necessary.

In this short paper I can only deal with a very small, but possibly a most important aspect of Planning and have selected that aspect of development which wastes such large amounts of the National and Local monetary turn-over i.e. "City Development and Planning Related to Traffic Congestion."

First we must consider "What is the reason for Traffic Congestion?"

Generally Traffic Congestion is caused by any or all of the following:-

- (a) Lack of Balance between Traffic Induced by Development and the Highway Capacity;
- (b) Lack of Parking Facilities for standing vehicles, making Street Parking necessary;
- (c) The increase in the Number of Motor Vehicles, which number is increasing annually and the greater number of trip made by each vehicle;
- (d) Unscientific Signalization, Road Marking, Speed Limits; The slow moving traffic keeping to the centre of the road, Pedestrians crossing roads, Traffic Turning at Intersections; Too Few and Too Narrow Traffic Lanes;
- (e) Intermixing of unrelated Traffic Flows, i.e. Traffic which only desires to pass an area mixing with Traffic incidental to that Area;
- (f) Changes in use of development Floor Areas which induce more Traffic and Parking;
- (g) Permitting the Increase in Floor Areas and/or their Use, beyond the capacities of the abutting streets.

Traffic Congestion Costs Money, It is a Waste of Money and in many cities through the world property values have decreased considerably because people avoid congested areas and migrate to new areas which have been planned and developed ensuring a balance between the Floor Areas and their Use, on the one hand and the Street Capacity and Parking Facilities on the other hand, Not Only for Present Day Conditions but for the Anticipated Conditions of the Future.

Fifty years ago the City of New York Authorities calculated that traffic congestion, in the region, cost approximately \$1,000,000 per day: In 1953 the Citizens Traffic Safety Board set the cost at \$1 Billion Annually: I have no figures for the present time but with the very large increase in motor vehicles and their use during those 17 years the cost may well be double the 1953 figure, today.

Sixteen years ago the American Automobile Manufacturers Association set the yearly loss, due to congestion and unsafe highways at \$3 billion, broken down roughly as follows: \$1.25 billion for Accidents; \$750 million wasted Gasoline and needless wear on tyres and breaks and \$1 billion on increased trucking costs. Today the annual losses will be much greater.

In the U.S.A. highway transportation produces \$65 billion in goods and services annually (approximately one-sixth of the gross National Production) and provides employment for some 10,000,000 persons (more than one-seventh of all workers) The U.S.A. produces its own motor fuel.

Imagine what must be the economic loss, due to the wastage of fuel alone, in a country which has to import its fuel and oils and how that monetary loss affects the country's International Balance of Trade.

Not only is the International Balance of Trade seriously affected by the wastage of fuel and oil but traffic congestion also wastes a considerable amount of time (man/hours) and there is the wear and tear of vehicles, all of which increase production costs of goods, both for export and home consumption, seriously affecting the country's International Balance of Trade.

It has been stated, on very high authority, that the economy of the Edens Expressway, Cooks County, Illinois which was completed in 1951 over which the motorist covers 14 miles (22.4 km), without a stop in 17 minutes; (on the old, now by-passed road the trip took 30 minutes under the most favourable conditions) in terms of Time, Gasoline and Tyre savings, the estimated benefits total \$3,000,000 a year. The Expressway cost \$22 million to construct. It will be seen that the total cost of constructing the Expressway was recovered in less than 8 years.

Also the Hollywood Freeway which is 10 miles (16 km) long and is used daily by 120,000 motorists. The California State Highway Commission estimates that the motorist saves a minimum of 1 cent per mile (£360 per 1.6 km) or (£225 per km) vehicle operating costs, excluding the value of time concerned.

These savings total \$4,380,000 a year— which capitalized at 4% demonstrates that the real worth of the freeway is nearer \$109,250,000 than the \$55,000,000 it cost to construct it.

So much for the Economics of Traffic Congestion: I have mentioned this aspect to indicate that alleviating traffic congestion "Is Not an Expense But an Investment" and it is an investment which pays high dividends both to the Government and the Private Citizen.

The obvious questions asked are:-

- (1) What Causes Traffic Congestion?
- (2) In Controlling Future Development what Controls should be exercised to Prevent the Development Causing Traffic Congestion?

I have previously mentioned the major causes of traffic congestion so I shall now deal with the aspect of Building Bulk and Use; Position of Buildings in Relation to Streets; Ingress and Egress of Vehicles and Pedestrians; Loading and Off-Loading of Merchandise into and from Buildings; Parking of Vehicles Incidental Building Uses; Vehicular Traffic Induced by the Uses and Areas for Each Use of Buildings; The Width, Traffic Capacity and Obstructions to Free Traffic Flow in the Street or Streets onto which the Buildings Abut;

Under City and Regional Planning Schemes certain provisions can be made, to control new developments and alterations and extensions to existing developments, road widths, alignments of roads (both horizontal and vertical), visibility at corners and bends, by Zoning for the Bulk and Height of the Building; The Use or Uses of the Building; The Percentage of the Plot which May be Covered By Buildings; The Set Back (Building Line) from the Abutting Road Boundaries; Positions of Vehicular Ingress and Egress, the Amount of On-site Parking which must be provided for occupants and Visitors.

To be able to Forecast the future conditions, Surveys should be made of the Increases or Decreases in Residential, Industrial, Commercial, Educational etc. Populations and the Ratio of Motor Vehicles to Population and the Economics of the Population for the area or a similar area, and many other surveys.

From the surveys mentioned and others which may be desirable for the particular scheme, especially any others relating to large Residential, Commercial, Industrial, Educational etc. extensions or new areas a Balanced City Planning Zoning Plan can be prepared for future development and such a Zoning Plan should provide for a proper balance between the traffic inducement of the development plus the passing traffic on the one hand and the street capacity, to ensure free traffic flow on the other.

Where Traffic Congestion is serious consideration can be given to an Urban Renewal Scheme.

Under an Urban Renewal Scheme a survey is made to ascertain all the Causes of Traffic Congestion, the Cost of Entire or Partial Re-development to ensure free traffic flow, the Financial Benefits to be Gained by the Urban Renewal Scheme should be equated against the Losses Sustained by the Traffic Congestion, and the time it would take to complete the Scheme.

An Urban Renewal Scheme involves either the promoters of the scheme buying all the land and buildings or the various owners of the land pooling their interests and being allocated a percentage area, as near as possible to their previous site on re-distribution.

The Urban Renewal Plan is then prepared as a Balanced Scheme which will be in the best economic interests of the owners and the Community as a whole.

YOU WOULDN'T EXPECT A
MAN TO WEAR THE SUIT
HE WORE WHEN HE WAS
10 YEARS OLD — IT WOULDN'T
FIT!

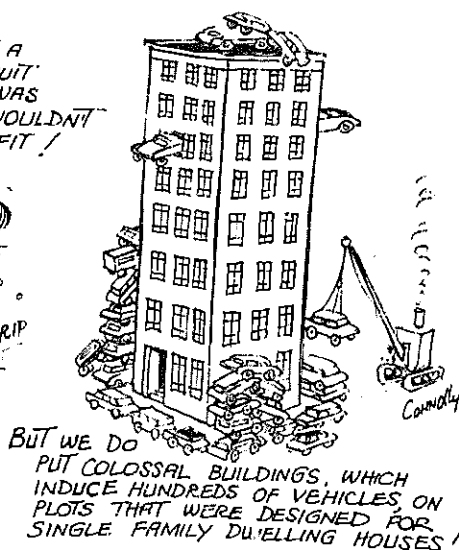
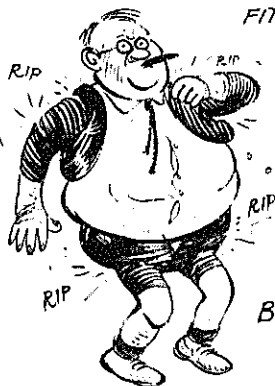


Diagram "A" and Slide No. 1, indicate the method of design of the street pattern in the Residential Areas of part of the new town of Welkom which I designed in South Africa.

Each Residential Suburb is surrounded by fast, safe, Traffic Collecting Roads, and the Residential Development Streets are either Loop Roads or Culs-de-Sac. The Residential Streets only take the traffic incidental to the frontage development of houses. They join the Traffic Collecting Roads at safe, splayed intersections.

The Traffic Collecting Roads are 44.2 metres and the Development Streets 18.7 metres wide.

They also indicate the system of Horizontal Separation of Pedestrians and Vehicles in the Residential Suburbs. In the centre of each Residential Suburb there is a Green Park Wedge converging from the outside of each suburb towards the Town Centre. The Schools and Nursery Schools are located adjoining the Green Park Wedge.

The Traffic scheme is that Vehicular traffic converges to the Traffic Collecting Roads on the Outside of Each Suburb and Pedestrians and School Children converge to the Green Park Wedge in the centre of the suburb - This is HORIZONTAL SEPARATION of PEDISTRIANS and VEHICLES.

Diagrams "B" and "C" and Slides Nos. 2 and 3, Show the provisions made in the Shopping Centre for VERTICAL SEPARATION of PEDISTRIANS and VEHICLES and for On-Site Parking of Motor Vehicles balanced against the TRAFFIC INDUCEMENT of the BUILDINGS.

In the design of Welkom I predetermined the level of the Second Floor and the projecting Canopy which becomes the Footpath.

The buildings are limited in Bulk, Floor Areas and Floor Uses so that there is sufficient ON-SITE PARKING, for two levels of parking between the first and second floor levels, for all the motor vehicles incidental to each building.

Diagram "D" shows the Traffic Inducement of a Building Survey I made in the Shopping area of Welkom in 1959. The survey indicates that there was One Motor Vehicle parked for every 24.7 square metres of net floor area of shops and offices.

Diagram "E" and Slide No. 5, show the Traffic Inducement of an Office Building I made in South African City of Johannesburg. It indicates that the ratio of Motor Vehicles Induced and Parked was One Vehicle to every 24.7 square metres of net floor area.

Diagram "F" and Slide No. 6, is a series of Graphs indicating (1) Population Trends (2) Number of Registered Four Wheel and Over Motor Vehicles and the Ratio of Motor Vehicles to the Population in Johannesburg during the years 1947-1959.

Graph "A" Indicates a Population Growth of 15.71%

Graph "B" Indicates Motor Vehicle Increase of 112.99%

Graph "C" Indicates Ratio of Persons per Motor Vehicle, 4.91 in 1947 and 2.67 in 1956.

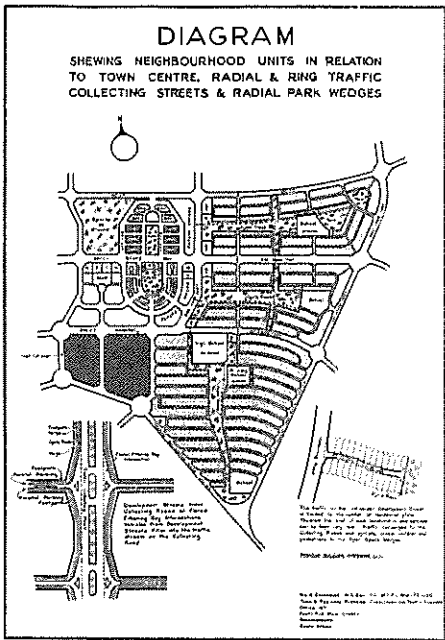


Diagram "A"

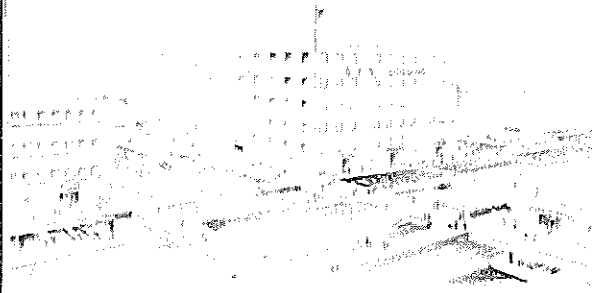


Diagram "B"

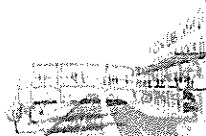


Diagram "C"

TRAFFIC REQUIREMENT OF VARIOUS SECTORS

BASED ON 1950 CENSUS DATA

SECTOR OF POPULATION IN RELATION TO THE TOTAL POPULATION OF THE CITY

The following table shows the population of the various sectors of the city, and the traffic requirements of each sector. The traffic requirements are based on the 1950 census data.

SECTOR	POPULATION	TRAFFIC REQUIREMENT
1. Central Business District	10,000	100,000
2. Downtown Office District	5,000	50,000
3. Downtown Residential District	15,000	150,000
4. Downtown Commercial District	10,000	100,000
5. Downtown Industrial District	5,000	50,000
6. Downtown Entertainment District	5,000	50,000
7. Downtown Government District	5,000	50,000
8. Downtown Religious District	5,000	50,000
9. Downtown Educational District	5,000	50,000
10. Downtown Health District	5,000	50,000
11. Downtown Cultural District	5,000	50,000
12. Downtown Sports District	5,000	50,000
13. Downtown Parks District	5,000	50,000
14. Downtown Shopping District	5,000	50,000
15. Downtown Entertainment District	5,000	50,000
16. Downtown Government District	5,000	50,000
17. Downtown Religious District	5,000	50,000
18. Downtown Educational District	5,000	50,000
19. Downtown Health District	5,000	50,000
20. Downtown Cultural District	5,000	50,000
21. Downtown Sports District	5,000	50,000
22. Downtown Parks District	5,000	50,000
23. Downtown Shopping District	5,000	50,000
24. Downtown Entertainment District	5,000	50,000
25. Downtown Government District	5,000	50,000
26. Downtown Religious District	5,000	50,000
27. Downtown Educational District	5,000	50,000
28. Downtown Health District	5,000	50,000
29. Downtown Cultural District	5,000	50,000
30. Downtown Sports District	5,000	50,000
31. Downtown Parks District	5,000	50,000
32. Downtown Shopping District	5,000	50,000
33. Downtown Entertainment District	5,000	50,000
34. Downtown Government District	5,000	50,000
35. Downtown Religious District	5,000	50,000
36. Downtown Educational District	5,000	50,000
37. Downtown Health District	5,000	50,000
38. Downtown Cultural District	5,000	50,000
39. Downtown Sports District	5,000	50,000
40. Downtown Parks District	5,000	50,000
41. Downtown Shopping District	5,000	50,000
42. Downtown Entertainment District	5,000	50,000
43. Downtown Government District	5,000	50,000
44. Downtown Religious District	5,000	50,000
45. Downtown Educational District	5,000	50,000
46. Downtown Health District	5,000	50,000
47. Downtown Cultural District	5,000	50,000
48. Downtown Sports District	5,000	50,000
49. Downtown Parks District	5,000	50,000
50. Downtown Shopping District	5,000	50,000

Diagram "D"

TRAFFIC REQUIREMENT OF VARIOUS SECTORS

BASED ON 1950 CENSUS DATA

SECTOR OF POPULATION IN RELATION TO THE TOTAL POPULATION OF THE CITY

The following table shows the population of the various sectors of the city, and the traffic requirements of each sector. The traffic requirements are based on the 1950 census data.

SECTOR	POPULATION	TRAFFIC REQUIREMENT
1. Central Business District	10,000	100,000
2. Downtown Office District	5,000	50,000
3. Downtown Residential District	15,000	150,000
4. Downtown Commercial District	10,000	100,000
5. Downtown Industrial District	5,000	50,000
6. Downtown Entertainment District	5,000	50,000
7. Downtown Government District	5,000	50,000
8. Downtown Religious District	5,000	50,000
9. Downtown Educational District	5,000	50,000
10. Downtown Health District	5,000	50,000
11. Downtown Cultural District	5,000	50,000
12. Downtown Sports District	5,000	50,000
13. Downtown Parks District	5,000	50,000
14. Downtown Shopping District	5,000	50,000
15. Downtown Entertainment District	5,000	50,000
16. Downtown Government District	5,000	50,000
17. Downtown Religious District	5,000	50,000
18. Downtown Educational District	5,000	50,000
19. Downtown Health District	5,000	50,000
20. Downtown Cultural District	5,000	50,000
21. Downtown Sports District	5,000	50,000
22. Downtown Parks District	5,000	50,000
23. Downtown Shopping District	5,000	50,000
24. Downtown Entertainment District	5,000	50,000
25. Downtown Government District	5,000	50,000
26. Downtown Religious District	5,000	50,000
27. Downtown Educational District	5,000	50,000
28. Downtown Health District	5,000	50,000
29. Downtown Cultural District	5,000	50,000
30. Downtown Sports District	5,000	50,000
31. Downtown Parks District	5,000	50,000
32. Downtown Shopping District	5,000	50,000
33. Downtown Entertainment District	5,000	50,000
34. Downtown Government District	5,000	50,000
35. Downtown Religious District	5,000	50,000
36. Downtown Educational District	5,000	50,000
37. Downtown Health District	5,000	50,000
38. Downtown Cultural District	5,000	50,000
39. Downtown Sports District	5,000	50,000
40. Downtown Parks District	5,000	50,000
41. Downtown Shopping District	5,000	50,000
42. Downtown Entertainment District	5,000	50,000
43. Downtown Government District	5,000	50,000
44. Downtown Religious District	5,000	50,000
45. Downtown Educational District	5,000	50,000
46. Downtown Health District	5,000	50,000
47. Downtown Cultural District	5,000	50,000
48. Downtown Sports District	5,000	50,000
49. Downtown Parks District	5,000	50,000
50. Downtown Shopping District	5,000	50,000

Diagram "E"

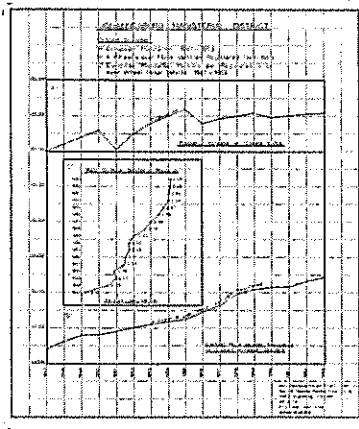


Diagram "F"