Causes of Present-day Traffic Congestion

The principal sources of present-day traffic congestion are:

- (a) Unco-ordinated traffic control: Much more effective use could be made of the existing road system by a systematic expert study of the causes of traffic interruption and the development of a co-ordinated scheme for routing and controlling the movement of traffic.
- (b) *Inadequate width:* Many of the main traffic routes are one chain in width. Within this reserve the road is often expected to serve for both road and fixed rail transport, for pedestrians, to service shops and to accommodate parked vehicles.
- (c) Fixed-rail transport: The use of roads by public transport on fixed rails has, with the growth of motor transport, been a world-wide problem. In the 66 ft. streets owing to the insufficient space between trams and vehicles parked at the kerbside, other vehicles have difficulty in passing moving trams, and are prevented by law from passing them when stationary. The net result is that a large proportion of the motor traffic is forced to follow trams in single file, moving at the speed of the tram and stopping as the tram dictates. Another factor arising from the same source is the reduction in road capacity at intersections by the loading and unloading of trams. The need at lightcontrolled suburban intersections is for an increase in the width of road available for road vehicles near the intersection to provide additional lanes for storing vehicles waiting to cross, and thus enable more efficient use to be made of the roadway.
- (d) Intersections: Intersections are by far the most common cause of present-day congestion. The advent of the traffic light as a means of reducing accidents usually results in a reduction of traffic capacity. At the same time, the safety of nearby residents has been reduced as more vehicles make use of adjacent residential streets to avoid the frustrating effects of the lights. Only by the use of channelised and free-flowing movements can the interests of the motorists and pedestrians be properly served. The ultimate solution at points of extreme congestion is for pedestrians to cross by subways or bridges. Meanwhile many intersections could be improved by greater use of pedestrian islands which serve to direct the traffic into more orderly movements.
- (e) Shopping Centres: The growth of shopping centres along main traffic routes has been a natural phenomenon. By separating shops from traffic routes, each would be capable of discharging its functions more effectively. Obviously the solution is not an easy one. Shops must be reasonably accessible to those motorists interested in them and yet should be physically separated from the main traffic stream. Provisions should therefore be made to set new shops back beyond the road-aligment



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and new roads should be located around rather than through large groups of existing shops.

Reference to the costs of vehicle operation given earlier will show that delays to traffic impose an economic burden upon the community. Economically the cost to the community continues to mount at road transport assumes a greater role in the communications of the city. Only when the cost of fixed rail vehicle operation and the cost of road transport are viewed together having regard to the total cost to the community, will the correct solution be obtained.

ROAD ENGINEERING PRACTICE

In planning a road system regard must be paid to the latest developments in road engineering practice. The higher the standard of road design, the more exacting are the requirements for grades, curvature, sight-distance and the like. These factors will largely determine what land should be reserved to accommodate the road. The most important factors to be considered are:

Operating Speed: It is an established fact, determined from extensive studies by the Bureau of Public Roads of the United States, that the maximum traffic capacity of a road occurs when all vehicles are travelling at a constant speed in the range from 30 to 35 miles an hour. Either above or

below this speed the capacity of the road is somewhat less. It was therefore decided that, in determining road crosssections as the basis of road reservations in the planning scheme, a speed of 30 m.p.h. would be assumed for calculating road capacity. However, at times when traffic would not impose a maximum demand upon the road, the design should, if economically practicable, permit higher operating speeds. Bearing in mind that most roads in the metropolitan area would require intersections at intervals of not more than one-half to two-thirds of a mile, it was decided generally to adopt 40 m.p.h. as the minimum design speed for the purposes of defining road reservations.

Curvature: On curves, the assumed design speed of 40 m.p.h. indicated that a minimum radius of 500 ft: would be adequate for metropolitan operation. This was considered a reasonable compromise between ideal conditions and the values of the properties to be affected.

Grades: Investigations were made on the power of modern road vehicles and their relation to weight and road grades. In the selection of a maximum design grade, regard must be paid to the type of transport and the conditions existing in the metropolitan area. The power output of modern vehicles is increasing with time and grades which were a problem twenty years ago are no longer a handicap. In particular, the use of horse transport, on future arterial roads will be so small that it can be neglected. Thus the most exacting grade conditions will be those necessary to provide for a heavily ladened truck. Unlike some rural conditions where long and steep climbs are encountered, the topography of Melbourne is such that rarely would any metropolitan road require a single grade of more than 100 feet rise. Therefore, the momentum of a vehicle at the bottom of a steep grade would play a more significant part in the climb up a hill under metropolitan conditions than in conditions encountered in steeper country. Easy grades may be ideal but are more expensive. It is considered that the adoption of maximum grades of about 3% would exclude many projects because of the additional cost involved. Therefore a maximum grade compatible with cost and vehicle operation, namely $5\frac{1}{2}$ %, has been assumed for design purposes. Reservations have been made, however, such that variations from this grade will be possible.

Clearances: As the type of vehicles in use in this country follows the pattern of those in the United States, it was considered that practices in that country would be a reasonable guide in determining the clearances required between road and overhead structures. Consequently a 16 ft. clearance has been assumed. Where extreme difficulty would be encountered by the use of this clearance, 15 feet has been used as this would affect less than one per cent. of the traffic using the road.

Type Cross-sections: From the foregoing paragraphs the methods of predicting future traffic have been outlined. The purpose of those investigations is to obtain the most accurate means of determining road reservations required for future

use. With the high property values prevailing in a metropolitan area it is only reasonable to avoid unnecessarily wide reservations. Extensive investigations were made into the selection of road cross-sections capable of carrying the traffic predicted. It was decided to adopt two types of cross-section, "desirable" and "minimum." Desirable crosssections provide for traffic requirements with features such as median strip and a wide footpath. Minimum crosssections provide for traffic requirements and a minimum-sized footpath, but do not provide for a median strip separating opposing traffic flows. Such a section is used where the acquisition of additional property is not justified.

Following modern overseas practice it was decided to adopt the following widths of components of road-sections:

Main lanes: 12 feet wide with a reduction to 11 feet where expensive structures are involved.

Speed-change lanes: 10 feet wide, to serve the various functions of acceleration, deceleration, stationary vehicles and bus-bays. At expensive structures this lane has been omitted.

Median Strips: On desirable cross-sections a width of 24 feet has been adopted. This width, equivalent to two lanes each 12 feet wide, is capable of providing increased traffic capacity if future flows substantially exceed the predicted volumes.

Outer Separator: This separating strip is used between the main roadway and adjacent service roads. In conjunction with the speed-change lane, it could form a loading platform, clear of the main traffic lanes, for passengers boarding buses. A width of 5 feet is considered to be the minimum practicable for an outer separator.

Service Roads and Footpaths: A width of 18 feet has been assumed for service roads. As service roads have to serve properties on only one side, this width is considered to reasonably conform with the recommended width of 22 feet for private streets. In conjunction with a minimum footpath width of 9 feet, this width is sufficient for large vehicles to turn from or into abutting properties and to permit two-way operation of the service road.

Intersections: As the traffic junctions of today are a frequent source of congestion, the survey has embraced types of intersections used in other countries to prevent this congestion and to make better use of the capacity of the road. The general types considered are the "flared intersections" to be used with traffic control, the "roundabout," a crossing of major and minor roads involving no interruption to the major road traffic, and various forms involving grade separation. Many of these types of intersection are capable of progressive development.

Structures: In comparing the costs of some structures, current local costs have not always been available. Recourse has therefore been made to overseas information and the costs of construction have been converted to local costs by the use of construction indices, which relate costs of engineering works to time of construction.