Making liveable and sustainable major urban streets: the case of Begin Road in Tel-Aviv – Jaffa

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Abstract

This paper tells the story of the struggle to create a new major urban street that will help liveability and sustainability in the city of Tel-Aviv. Begin Road used to be a major inter-urban road linking the center of Tel-Aviv with its eastern and northern suburbs. With the construction of the Ayalon Freeway, the new suburban rail system, sharing the same corridor, and the planned light rail subway that will run underneath it, this road is undergoing a process of change. It is being transformed into the future main street of the Tel-Aviv CBD. This paper discusses the functions of major urban streets, the detrimental effects of modern traffic engineering practices and the resultant need to revive these streets. This theoretical background guided the design of alternatives for Begin Road. Each alternative has its merits and drawbacks with regard to creating complex major streets and a functioning pedestrian realm. Furthermore, this paper discusses some of the problems of creating such streets in the current regulatory and professional context.
Keywords: traffic and transportation, major urban streets, boulevards, street – design, liveability, sustainable transportation, urban design, pedestrian movement.

1 Introduction

One of the major issues in creating more liveable and sustainable cities is to make them less reliant on automobiles, and base them around public transit systems and pedestrian oriented environments (Newman and Kenworthy [1]).


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While techniques for achieving this in residential areas, or historic districts are fairly developed, using limitations on car movement and traffic calming schemes, there is much less experience in transforming major urban streets into more pedestrian friendly environments. This paper presents an attempt to achieve this transformation in Begin Road, a street that is becoming the spine of Tel-Aviv's Metropolitan Central Business District (CBD). In the following pages we discuss the functions of major urban streets, and why, as a consequence of traffic engineering doctrine, they have declined in the latter part of the 20th century. We discuss two solution types recently proposed to design such streets: a couplet of parallel streets, and boulevards. We show boulevard design alternatives for Begin Road in Tel-Aviv, and conclude with some lessons from the process of planning and designing it.

2 The functions of a major urban street

Major urban streets are the structuring elements of cities. A city's character and uniqueness is often brought about as a result of the nature of its main streets. As such they need to fulfill complex functions. They need to have identity, and allow orientation in the city. Therefore their connections to other main streets and areas of the city should be clear. They need to provide a safe and interesting pedestrian environment. They usually contain the main public transportation services, and should be made a part of a city's bicycle path system. They also need to serve through car traffic, as they are a part of the city's major circulation system. Often these roads serve as truck routes, with the intention of limiting truck movements on smaller roads. In order for them to have a friendly and interesting pedestrian environment, they usually need to have an active street front, served by stores on the ground floor and allowing direct access to buildings from the street. This means also that there is a need for some short term and delivery parking that will serve and be attracted by these uses.

3 The destruction of major urban streets in modern times

In an effort to adapt cities to automobiles and trucks, traffic engineers introduced the functional analysis of streets. Duplicated in many street design manuals, it takes the form of a graph analysing streets as having two functions: mobility or the movement of traffic through an area, and access to land uses along them. The more a street is dedicated to through traffic, the less it should allow access to adjacent land uses.

The functional analysis of streets misses completely the social function of the street as a place for human encounter. As shown by Hillier [2], the street fulfils a social function as a result of the potential for encounter between passers-by and between them and the inhabitants of the street. This potential is in fact the product of the movement function and the access function of the street. Traditional major urban streets were places where both movement and access were maximised. As streets converged on the center, the distance between intersections became shorter, entrances more frequent, and ground floors were

aligned with shops. Within modern practice however, the opposite holds: the distance between intersections becomes longer along major streets, and buildings are turned away from them and accessed in a circuitous way. The result is the destruction of the city's social space: as Marshall concludes [3], where there is movement there is no accessibility, where there is accessibility, usually, there isn't enough movement to sustain economic and social life.

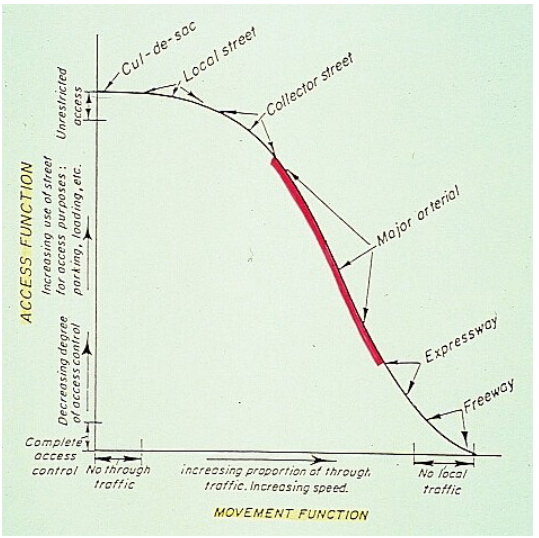

Figure 1: The functional analysis of streets as practiced in traffic engineering.

The development of hierarchical functional analysis was not an arbitrary notion. It had two key aims. The first was to expedite through traffic from getting bogged down in congestion caused by frequent intersections, or by cars pulling out of parking and private lots. The second was to improve safety by reducing the number of possible conflict points between cars, and between cars and pedestrians. This entailed the reduction in the frequency of intersections, and the reduction of free access to major roads, where many cars were expected.

With hindsight, it is possible to say that these efforts may have succeeded in reducing conflicts, but in the process created urban areas devoid of life, with poor orientation, unfriendly for pedestrians, and lacking in character (Murrain [4]). It seems that the pedestrian realm and the need to allow a mixture of accessibility and mobility, is at the heart of successful city streets.

4 Solution types for major urban streets

4.1 Parallel streets – couplets

To resolve the inherent conflict between through movement of vehicles, and the need to provide accessibility on major urban streets two types of solutions are under review. The first is the separation of vehicular traffic, as it enters the city,

and particularly on reaching urban centres, into two parallel streets. Thus allowing streets of smaller width to carry more traffic, and reducing the complexity of intersections without sacrificing turn movements nor reducing the number of intersections. This solution has been proposed by Alexander and his colleagues [5], and recently by Peter Calthorpe in his Urban Network concept [6]. It has been implemented in the structural axes of Curitiba, where a central street carries the public transit system, with access roads flanking it, and a pair of streets one block away from it on each side, carry fast moving traffic, one in the direction of the city's centre, and one away from it. Another possibility is to combine this pair with a pedestrian street in the middle.

Both of these solutions, however, still embody a separation between vehicular and pedestrian oriented streets. Although the parallel streets on which traffic flows allow frequent intersections, and do not necessarily inhibit immediate access to land uses along them, they do not form by themselves pleasant urban environments, and do not welcome pedestrian activity.

4.2 Boulevards

Boulevards have evolved in the 19th century from their origins in the late Renaissance and Baroque periods into complex streets that allow a diversity of traffic flows and activities, and help resolve the conflicts between them. All are characterized by containing within them strong rows of trees that delineate between different realms of movement.

Jacobs et al. [7] describe essentially three types of boulevards: the *"street boulevard"*, which has a similar cross section to an ordinary street, but is somewhat wider, and has a wider sidewalk, the *"centre median boulevard"* which has a wide pedestrian median in its centre, and the *"multi-way boulevard"*, which has a central roadway, flanked by tree lined medians of variable width, and with access lanes allowing vehicular access to land-uses.

The centre median boulevard is an excellent choice for a street where pedestrian activity dominates (such as the Ramblas in Barcelona, or Tel-Aviv's Rothschild Ave.). However, in streets where there is more traffic, and the central median is separated from the sidewalks by two or three lanes of fast moving vehicles, it becomes inaccessible and remains unused for pedestrian activity and socializing. The median becomes solely decorative. The street boulevard may provide more grace and room for the complex traffic movements of a major urban street, but it doesn't resolve the conflicts between access and through movement. Jacobs et al. (op. cit.) show, that the multi-way boulevard, because of its complex cross-section, provides both a pleasant pedestrian environment (see also Bosselman and Macdonald [8]), and an adequate fast moving realm for car movement.

5 Begin Road in its urban context

Begin Road, previously named Petah-Tikva Rd., is a thoroughfare in the heart of the Metropolitan CBD. It is part of the historical road that connected Jaffa and

Tel-Aviv to the first North-eastern suburbs of Ramat-Gan, Bnei-Brak and Petah-Tikvah. At the north end of the project area, it is joined by Namir Road, which connects the CBD with Tel-Aviv's northern neighbourhoods and suburbs.

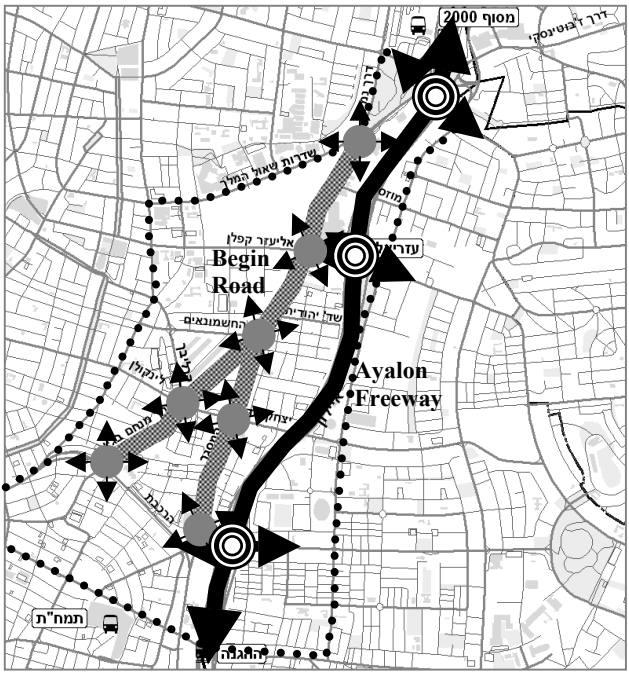

Figure 2: The project area – Begin Road's role in its urban context.

The construction of the "Ayalon Freeway" in the early 1970's relocated much of the inter-urban movement from Begin Road. Begin Road's role began to change as a distributor road, partly for traffic from the Ayalon Freeway, to the many commercial uses now attracted to the area because of its increased accessibility by road and rail. It also continues to serve as an intra-urban arterial street, connecting the northern and southern parts of Tel-Aviv – Jaffa, and connecting Tel-Aviv to its immediate neighbouring towns: Ramat Gan, and Givattayim. It continues to serve major bus traffic: inter-urban, metropolitan and local. The land uses around the street are changing from a light industrial district into a metropolitan central business area, which will include in the future also a significant amount of new residential buildings.

6 The vision of a boulevard

It took some convincing to get the authorities to consider a boulevard solution for Begin Road. The initial project presented by the Netivei Ayalon Highway Company (NAHC), called for increased car capacity and underpasses at every major intersection. Concerns were raised by NTA, the company in charge of

developing Metropolitan Tel-Aviv's light rail system (the first line of which will pass under Begin Road), and by the public transit division of NAHC, which is promoting a plan to improve the metropolitan bus system. Their concerns were that providing more vehicle capacity on Begin Road will create a duplication of the Ayalon Freeway, that the street was becoming even less congenial to the many pedestrians who will use it as the way from public transit stations to their destinations, and that the initial design did not provide priority to the large volume of buses that will continue to use it, even after the development of the light rail line. Furthermore, designing the street mainly for cars, will necessitate limiting access from it to the buildings along it, and will cause these projects to look inward, projecting a hostile face to the street, contrary to the city's policy. It was also pointed out, that even with all road improvements in place, an increase of only 6% in car movement was projected, as the problem of the area was not so much congestion on Begin Road, as the congestion of the Ayalon Freeway, which limits the amount of cars that can reach the area.

Figure 3: The Avigunda Liberdades in Lisbon showing the two aspects of a successful boulevard: the thoroughgoing realm (right), and the pedestrian realm.

We argued that an alternative paradigm to the street was needed, and that the boulevard provided an appropriate paradigm for this street. In this paradigm, one starts from the pedestrian realm of the street. Research by Jacobs et al. [9] suggests that for a boulevard to function well, and to feel safe, at least 50% of the right of way (ROW) has to be at the scale and speed of the pedestrian. Having insured the integrity of the pedestrian realm, one continues to provide for all other uses of the street, as allowed for by available space.

We examined alternatives of all three different types of boulevard (with variations) outlined below.

6.1.1 Street boulevard

This design contains a "pedestrian realm" (in light grey) which is typically 11.20 meters (7.70+1.50+2.0) on each side. It contains a wide sidewalk for pedestrians, and a bicycle lane between two rows of trees that separate the pedestrian realm from the thoroughgoing traffic area. The traffic facility contains a designated bus lane (in darker grey), and two lanes for private vehicles. The major drawback of this kind of boulevard is that it does not allow for short term

parking, and therefore there is a risk of blockage of the bus lane by illegal stopping, parking and delivery vehicles.

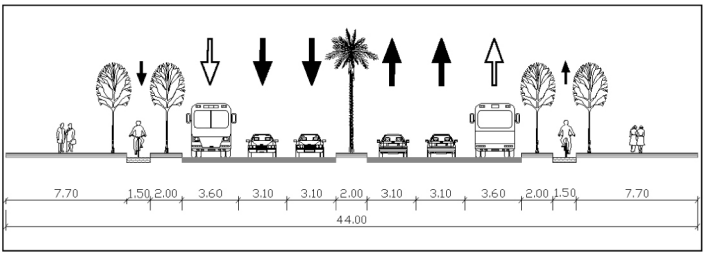

Figure 4: A street boulevard typical cross-section. Pedestrian Realm/ROW = 0.51; Transit Realm/ROW = 0.16

6.1.2 Multi-way boulevard

The "pedestrian realm" of the multi-way boulevard contains within it the sidewalk and a service street. This street is planned according to traffic calming standards, recently approved in Israel. Its reduced width and a discontinuous design allow only very slow car movement. It is compatible with cycling and it provides for convenient pedestrian crossing to the bus stops on the medians. The thoroughgoing traffic lanes have a designated right-hand side bus lane, and two lanes for private vehicles. In this case disruption of the bus lanes is minimized, because the access street allows for short term parking and deliveries.

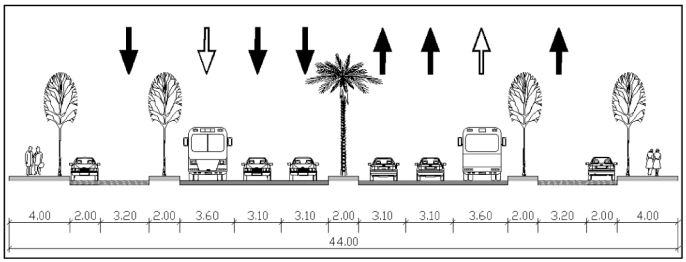

Figure 5: A multi-way boulevard typical cross-section. Pedestrian Realm/ROW = 0.51; Transit Realm/ROW = 0.16.

6.2 Design variations

Officials at the MOT felt that the multi-way boulevard did not give enough priority to the heavy bus volumes expected on Begin Road. Thus, they asked the Study Team to develop three additional alternatives that provide exclusive and separate right of way for buses.

6.2.1 Multi-way boulevard with busways and parking

In this cross-section the pedestrian realm contains the sidewalk, an exclusive busway (3.6 meter wide) and a bicycle lane (1.5 meter wide). In case of

emergency, buses can utilize the bicycle lane to pass a stalled bus. The central lanes include two thoroughgoing traffic lanes and may include a short term parking lane. This type of boulevard provides more preference to bus transit, using a physically separate lane, but disrupts through traffic more, because of interference from cars pulling out of parking with the right moving lane.

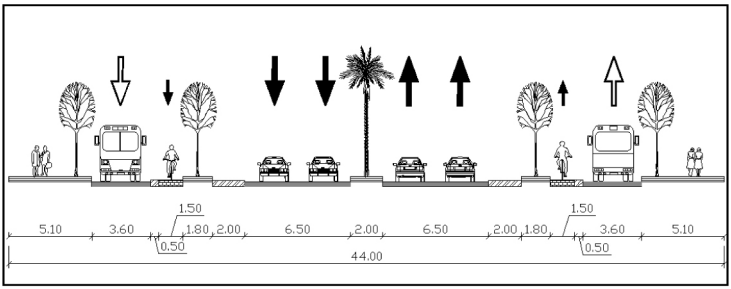

Figure 6: A multi-way boulevard with side bus-way typical cross-section. Pedestrian Realm/ROW = 0.23; Transit Realm/ROW = 0.34.

6.2.2 Multi-way boulevard with central busway

The Study Team also examined a cross-section, which provides the highest priority to bus traffic. The "pedestrian realm" in this kind of boulevard, contains a sidewalk and a bicycle lane. The thorough traffic area contains two lanes for vehicles and a centrally located exclusive busway. This can be seen as a variation of the central island boulevard, where instead of a central promenade there is a busway. Experience shows that it works well when the car traffic ways are narrow and serve only access traffic. Otherwise, crossing from the sidewalk to the bus stops on the medians across two lanes of moving traffic is dangerous to pedestrians. This kind of boulevard, does not provide short term parking, and while illegally stopped and parked cars on one of the through lanes may decrease vehicle speed and improve pedestrian safety, they may also grossly reduce the street's capacity to handle through traffic.

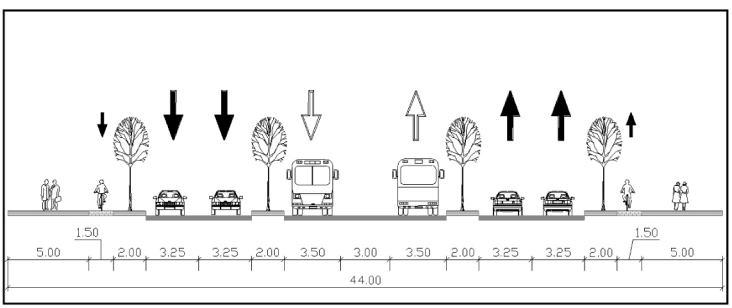

Figure 7: A central bus-way boulevard typical cross-section. Pedestrian Realm/ROW = 0.39; Transit Realm/ROW = 0.32.

6.2.3 A couplet of one way boulevards – resolving the problem of insufficient ROW width

As Begin road approaches the older centre of Tel-Aviv, its ROW becomes limited by existing development, and instead of the 44 meters necessary for a multi-way boulevard, it becomes 35 meters. To resolve this problem, while maintaining the character of the street, the boulevard is split into a couplet of parallel boulevards, each with access and thoroughgoing ways in one direction, while busways are continuous in both directions.

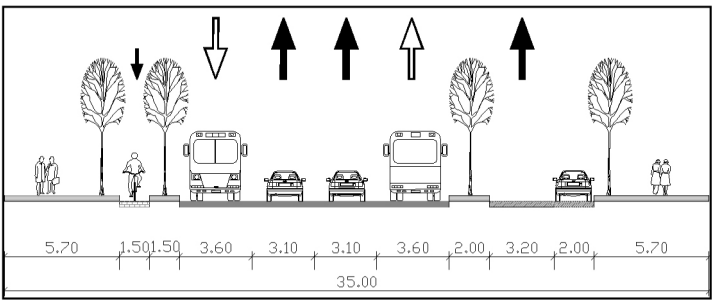

Figure 8: A one-way boulevard with contra-flow busway where ROW is limited. Pedestrian Realm/ROW = 0.59; Transit Realm/ROW = 0.21.

7 Conclusions

The vision of the boulevard has won over Ministry of Transportation's officials and the public transit administration of the NAHC. The city was more hesitant fearing that reduced car capacity on Begin Road will create worse congestion, and delay the development projects in the area. We are now, however, progressing to the design development stage, and it seems that the boulevard concept is gaining acceptance.

Working on this project and during discussions of design alternatives, we have found that the most difficult idea to convey is the sense of the wholeness of the street. Streets in general, and boulevards in particular, succeed or fail as entire wholes. While not providing the best solution to any one of the requirements of a major urban street, the multi-way boulevard is able to provide for all of them in a balanced way; and while there may be conflicts between uses and movements, if the environment accommodates them, and provides clear information, people are able to resolve these conflicts with ease. This is one of the points that is hardest to get across to engineers and public officials who tend to insist on "fool proof" and "conflict free" designs.

The design of Begin Road as a multi-way boulevard is one of several recent attempts in reviving this street form, which has fallen into disfavour in the last 50 years. The design shows it to be an excellent solution where many competing and conflicting uses need to be accommodated on the street, and where there is

sufficient right of way. When right of ways are limited, one can combine it with the parallel roads couplet to create streets with a sizable traffic capacity, but which maintain liveability. Multi-way boulevards are flexible and adaptable, and will be successful as long as the principle of the "pedestrian realm" is maintained. They serve as an optimal solution for the design of major urban streets, for which solutions must be found if we are to make our cities more liveable and sustainable.

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