

Title: INFRASTRUCTURE SOLUTIONS TO IMPROVE PEDESTRIAN SAFETY

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Abstract:

Pedestrians present more than a third of the fatalities and nine percent of total road accident injuries in Israel. The share of pedestrian fatalities out of the total road fatalities in Israel is higher than in most industrialized countries (according to OECD data). This finding and its over-time stability arouse concerns, especially when dealing with basic road safety indicators, e.g. fatality rate per population, which are relatively low in Israel in comparison with other countries, and decreasing general fatality and injury trends recently observed. The pedestrian safety problem is well known in many countries, where in the research and professional literature extensive data and knowledge have accumulated regarding the efficiency of various infrastructure and other treatments to deal with the problem. Thus, a comprehensive study was initiated aiming at:

- (a) Characteristic and conducting a detailed analysis of pedestrian accidents in Israel, including international comparisons, detailed analyses on national statistics and development of accident typology;
- (b) A diagnosis of infrastructure problems in a wide range of locations where high concentrations of pedestrian accidents were observed;
- (c) Assembling a collection of proven and innovative infrastructure solutions from the international experience, and conducting an examination of their applicability and potential efficiency for local conditions.

A detailed analysis of pedestrian fatalities over the years 2003-2006 revealed that high proportions of these fatalities are associated with several accident patterns such as: an accident occurring not at a pedestrian crossing, on an urban street section (35% of fatalities); an accident on a dual-carriageway rural road section (16%); an accident at a pedestrian crossing on an urban junction (12%); an accident not at a pedestrian crossing on an urban junction (10%); an accident in an Arab town (9%).

To diagnose the infrastructure characteristics and deficiencies associated with pedestrian accidents, detailed field studies, observations and measurements were carried out at 95 locations with high accident frequencies. Among the accident locations, six categories of sites were recognized which are: pedestrian crossings at signalized intersections; pedestrian crossings at roundabouts; pedestrian crossings at non-signalized intersections; pedestrian crossings at "half-intersections" (without left turns); mid-block crossings; and street sections without crossings. The majority of sites are situated on arterial multi-lane streets belonging to city centres. Among typical safety problems observed on the sites were: high vehicle speeds on road sections; split crossings and long waiting times at signalized junctions; pedestrians crossing on red; visibility problems and missing pedestrian signs over the crossings. Besides, among the locations with high accident numbers some features were overrepresented such as roundabouts on multi-lane roads; non-signalized crossings situated near signalized junctions; a common phase for turning vehicles and pedestrians at signalized junctions.

Based on the literature study, a comprehensive classification of pedestrian safety related solutions was constructed. This includes about 80 measures, subdivided into six categories which are: physical arrangements for pedestrians on street sections; physical arrangements for pedestrians near mid-block crossings; along-street traffic arrangements; junctions' design; traffic calming; and traffic control. For each measure, a summary of its safety efficiency was prepared, in terms of the associated pedestrian accident reduction, reduction in vehicle-pedestrian conflicts and/or vehicle

speeds. A potential applicability of each measure for local conditions was estimated based on an expert opinion survey.

Finally, a cross-checking between safety problems identified at pedestrian accident sites and appropriate infrastructure solutions was performed. The research findings showed that, on the one hand, pedestrian safety can be improved by increasing the use of known infrastructure solutions, and conversely, a need in examination of advanced infrastructure solutions which are accepted in other countries is indicated. However, in order to generate a significant change in the state of pedestrian injury in urban areas, a different approach is required, i.e. a transfer from a spot treatment to a systemic treatment of the problem. A systemic inquiry and transformation of the urban road network is required in order to diminish the areas of vehicle-pedestrian contacts and/or to significantly reduce the vehicle speeds in pedestrian presence and activity areas. The study recommended a list of infrastructure solutions for examination by controlled field experiments in Israeli conditions.