The papers in this set are brief summaries of fuller treatments of these topics. The interested reader can contact the authors for the full versions (under the same titles).

SADAT CITY: TRANSPORTATION PLANNING FOR MAJOR NEW TOWNS IN DEVELOPING COUNTRIES.

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New towns continue to be planned and constructed world-wide, though centers of activities in new town building shift from location to location. New towns place in sharp focus the contemporary capabilities in service systems, attitudes toward urban amenities and needs, and thoughts of city life. New towns thus illustrate basic concepts much more than any other civil or public works improvements; for example, it is possible to trace decade by decade the frontier of transportation planning paradigms in this context.

Furthermore, new town planning requires a clear--usually explicit--statement about national and urban land development and use policies and the definition of transportation and land use relationships to the level that they are understood. In a developing country, all these elements are relevant plus those of resource availability, state of technology, local life styles, and climate.

These concerns related to urban transportation planning are illustrated in the case of Sadat City, Egypt. This new town, with a possible population of over one million, is planned on the edge of the Nile Delta, halfway between Cairo and Alexandria. The preliminary planning phase has just been completed; it is the latest, but certainly not the last, example of a concentrated and comprehensive planning effort of a single large urban unit. Sadat City and its designers are not divorced from what was planned and done before them, and, therefore, the current work can be contrasted with the transportation features of comparable endeavors, namely Chandigarh (India), Brasilia (Brazil), Islamabad (Pakistan) Ciudad Guayana (Venezuela) and Tenth of Ramadan new city (also outside Cairo).

The first three -- planned during the 1950's --represented one-man visions that the designers had carried with them for some of what a contemporary city should be: a finely composed setting for urban images, a symbolic physical expression of culture and societal values, or a dynamic organism that can expand freely.

With the 1960s came rationality, teamwork, and calculations. This allowed precise justification of locations, dimensions, loads, and impacts. Presumably it did not preclude imagination and vision, but a longer time will be necessary to judge this. Ciudad Guayana and the Egyptian new towns, as well as many others, fall within this group.

Transportation considerations were among the principal determinants of Sadat City location, macroform, and the detailed physical plan. Early phases of the study included exhaustive review of a number of alternative sites and patterns for the city. The evaluation criteria placed major emphasis on transportation factors in recognition of their critical importance to industrial development and overall efficiency, convenience, and liveability of the city. Other aspects, such as environmental impact and infrastructure economy received intensive consideration as well. In the master plan selected, all major factors generally reinforced each other, yielding a city location and macroform which should satisfy all transportation requirements.

The plan of Sadat City reflects several key concepts interrelating city form, overall land use pattern, and the transportation system plan. In particular, the relatively high density and compact city shape tend to make all activities more accessible, reduce total trip distances, and increase the potential for short walking and cycling trips.

Employment and other urban activity are arranged along a series of hierarchical spines at the neighborhood, district, and city-wide levels. These spines form an interconnected network of public transportation, pedestrian and bicycle routes which cover the entire area of the city; they are designed to maximize accessibility to activities at every level within the city. The spines are located centrally with respect to their residential catchment areas, thereby making the activities equally convenient to all residents, which, in turn, provides short total trip lengths and an inducement for walking and cycling.

At a population of 500,000, the city's public transportation system is designed to operate buses within exclusive rights-of-way. The proposed transitways can be operated efficiently through a wide range of traffic loads which gives the system excellent staging characteristics and the flexibility to respond to natural traffic growth and to unforseen patterns of development. The geometric features of the right-of-way are designed to accommodate a range of vehicle types, thus allowing future conversion to new hardware as it becomes technically and economically feasible and functionally necessary.

A hierarchical system of streets is planned for Sadat City, differentiated by functional classifications. This network is similar to that of many other designs, but in Sadat City the physical dimensions tend to be reduced because of the relocated public vehicles and the desire to provide a compact environment.

An exclusive system for pedestrians and cyclists is provided in the neighborhood spines, each of which connects those neighborhood centers to a district center. Pedestrian and bicycle traffic is also accommodated on both the public transit routes and surface streets with major pedestrian ways located within the district and central spines.

While the planning approach accepts the inevitability of animal-drawn cart traffic within Sadat City, measures have been taken in the plan to minimize the volume and its impact. The major sources of such activity are goods movement (produce and finished products) and refuse collection.

CAN TRANSPORT POLICY DECISIONS CHANGE URBAN STRUCTURE?

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The Need for Mobility

It is generally believed that compact cities, such as typically found in developing countries, require comparatively little motorized travel, since more opportunities in them are within walking distance than in dispersed, low-density cities. This belief can easily lead to the conclusion that changing dispersed cities into compact ones would result in less motorized travel and gasoline savings. However, available observations do not appear to substantiate all the implications of such a belief.

The first example deals with the observed characteristics of car travel in a selection of cities in developing countries versus a selection of cities in the U.S., for which the required data were available, as detailed in Table 1. In order to base the inter-city comparisons on a common denominator, and as household size is markedly different in the two city groups, all the following relationships are for car travel only, where the car is the basic unit for comparison.

Figure 1 presents the relationship between car daily trip rate and city size. The surprising result is that although cities in developing countries are more compact than in the U.S., and hence are expected to generate fewer motorized trips per average car, the actual car trip rates are significantly higher in the former cities than in the U.S. For instance, the car trip rate in a city of 1 million people in developing countries is found to be about 6.5 per day versus only 4 in comparable cities in the U.S., namely higher by about 60 percent. One possible explanation for the above result is that trip distances are expected to be shorter in compact cities than in dispersed cities. Indeed, this expectation is borne out by the data in Table 1, where the car trip distances in cities of developing countries are observed to be significantly shorter than in cities of the U.S.

The product of the daily trip rate and the daily average trip distance is the total daily travel distance. Such total daily distances per average car were compared in relation to population size and (as shown in Figure 2) in relation to the physical size of the study area. The remarkable result is that the car daily travel distance is similar in all cities, within a range of 25-35 kilometers per average car per day, where cities of both groups intermingle. The same results are also found in Europe. For example, the daily travel distance per average car in Kingston-upon-Hull (1967) and in London (1961) were 26 and 24 kilometers respectively, although the study area of the former city was only 4 percent that of the latter city.

It may tentatively be inferred at this stage that:

1. Cars in urban areas are used to travel a certain minimum distance per day, regardless of population size, city spread, or speed.
2. The car minimum network daily travel time within U.S. cities of over 0.5 million is about 0.8 hours. If speeds are higher than is necessary to cover the minimum distance in 0.8 hours, then cars travel more than 30 kilometers per day. For example, in the Los Angeles region in 1960, with over 7.5 million people residing in a large area of 23,300 sq. km., the average car still traveled 0.8 hours per day; but as the network speed was 52.8 kph., the average car covered a daily distance of 42 kilometers. However, if speeds are low, such as in compact and congested cities in developing countries, the average daily distance traveled does not seem to fall; car drivers have to spend appreciably more time and money than is spent in the U.S. in order to travel the same minimum distance as in the U.S. cities.
3. It appears, therefore, that gasoline savings are more likely to be obtained by a reduction in the number of cars, than by trying to induce each car to travel less. Furthermore, reducing the number of cars by encouraging or imposing congestion (thus making car travel more expensive in both time and money terms) may not save much gasoline. For example, it has been shown that the gasoline consumption and travel time of 100 cars traveling at a speed of 25 kph. is equivalent to those of approximately 160 cars at a speed of 40 kph.
4. The belief that fewer cars in compact U.S. cities will make the environment better is not substantiated; while motorization levels in compact cities in developing countries may be only 1/10 the levels in dispersed cities in the U.S., traffic congestion, pollution and noise levels are much higher in the former cities than in the latter cities of comparable size.
5. While the cost of car travel in many cities of developing countries is about 3 to 4 times the cost in the U.S., the rapid increase in motorization in the former cities suggests that the need for a higher mobility (as expressed by the daily travel distance per traveler) is still far from being satisfied even in these compact cities.
6. The available data also suggest that travel demand should be measured by the daily travel distance (within which trip rates inter-act with trip distances) rather than by trip rates only.

Urban Structure

1. An Equilibrium condition between travel demand, transportation system supply and urban structure can be defined as the case where travelers are able to travel their desired daily distance within their desired allocation of time and money for travel (the