

This is really a question of criteria for the allocation of limited resources in order to arrive at a transportation system which has benefits of a particular magnitude in proportion to the outlays involved.

We don't know the answer to this. We have only come to this position by starting with benefit-cost studies and discovering how inadequate they are to give the complete answer. In these analyses the service of the facility is compared with its investment cost, thus you can see what you are dealing with in a limited framework.

The early studies done in California compared the actual cost of driving over a mile of expressway as compared with driving over a mile of city streets. They showed that expressways were something like two and a half times as efficient in terms of direct user costs. We all recognize, however, that those who use an expressway must also use additional portions of city streets to get on and off it; moreover, persons using expressways travel farther to reach the same destination, so that the appropriate consideration must be the whole journey—not just one mile on expressway as opposed to one mile on city streets. Therefore, we began to measure the entire cost of the trip over the alternate routes.

This really did not give an immediate answer to location problems because when the entire benefit-cost picture was assembled it was found that it did not measure the effect of relative location. A shift in the location of one route might, in effect, reduce the vehicle miles of travel, but what the shift in location would do to the balance of the network could not be determined without a tremendous amount of new calculation.

Moreover, one link in a highway system might make all the others more productive because it provided greater route choice and longer stretches of freeway to drive on. The ultimate answer could really only be achieved by the crudest kind of calculation in which an entire design was tested against the growth of the community at a mid-point in its development. It became a self-defeating problem to consider doing this by conventional methods.

We are attempting a unique experiment; namely, to relate the entire land use pattern envisioned to the entire highway network through use of the memory device of the electronic computer, and then to measure the actual costs to the driver of using various alternate routes of travel.

As far as the indirect benefits go, we have not been able to measure them. We do have a means of calculating the mean accessibility of every point in the metropolitan area in terms of time and distance to every other point in the metropolis both with and without this network. It is our assumption that as this accessibility enlarges, or as time-distances shrink, we thereby increase the benefits to each site in the metropolitan area. This represents a social benefit, but we don't know yet how to measure it.

Method of Analyzing Agricultural Land Impact

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Let us begin with a concrete situation of the economic impact on agricultural land. I am thinking now of high-priced cash grain land in the middle of the cash grain area. Here are broad 200- to 300-ft highway rights-of-way located through the center of the land sections and avoiding

the section lines rather consistently. There is a great deal of concern as to what effect this may have. In one community, for example, there is quite a struggle as to whether the highway should go east or west of town because of its potential impact on agricultural values.

People who feel themselves more or less displaced, because their places are cut into segments by highways, are tending to take their indemnities and try to acquire property elsewhere. Since they have been doing that on a narrow market—and we probably have never seen such small offerings as there are at the present time—we have seen an increase of something like \$75 and acre in the price of land.

In Champaign County, Illinois, during 1956 we didn't see the shrinkage in the net returns from farming that we have seen in previous years, partly because of almost perfect weather and partly as a result of the use of present and prospective funds to buy land at some distance on the part of the persons practically displaced from certain tracts of land by highway development. I do not think that it is going to modify the land-use pattern greatly, but it is going to have an upward influence in the price of land, largely because of the scarcity of land offered for sale. Farms are being enlarged, and it is only as people are willing to bid up a segment of a farm, to add to what they have, that they can get some relief from the high cost per unit of product experienced in small acreages. Because of this trend toward larger farms, land values have become very sensitive.

With respect to measuring the impact of highway improvements on land use in agricultural areas, there are two major approaches, both quite standard. One would be to make a study in terms of the characteristics of the farms that are sold, reducing them by indexes so as to apply correlation analysis. Another method is to work with comparable areas. The comparable-area approach has been found to be as fruitful as the correlation analysis approach.

Alternatives Confronting the Highway Planner **Louis B. Wetmore, Department of City Planning and** **Landscape Architecture** **University of Illinois**

There are some significant alternatives in the kinds of road systems which might be built. As we look at the rate at which this nation has been growing for the last 10 or 15 years and which gives promise of continuing, consideration of what might be called minor adjustments in this total system is not realistic. If we are talking about doubling the total economic activities of the many sizable metropolitan areas (introducing new units into the metropolitan constellations as smaller areas grow to this size) we get into real questions of choice among the alternatives to be faced as to the kind of highway or street systems that would give the best service.

In many areas land is a key resource and there is a serious question as to its capacity to meet out total needs. We already know that land for industrial purposes is very scarce in a great many areas. In many cases, use of land for highways or for urban uses is in competition with agricultural use. Increments of 10 percent can be handled but increments of 100 percent cause serious problems and pressures.