Reports on NCHRP Project on the Impacts of Highways Upon Environmental Values

NCHRP stands for the National Cooperative Highway Research Program. It is a program established in 1962 and supported by the states through the American Association of State Highway Officials and the Bureau of Public Roads of the Department of Transportation. It is administered by the Highway Research Board.

The next two reports are about a project selected by the states and titled, "The Impacts of Highways Upon Environmental Values." It is in two phases and the reports presented are on Phase I only, which is a methodology study or a proposal of how the two research agencies would go about determining these values.

The Project Advisory Committee received 28 proposals for this study, which is the largest amount ever received by any of the NCHRP projects and is indicative of the interest of the highway community in this problem. The Project Advisory Committee selected two agencies with the hope that two different approaches to this problem would develop. The first research agency is Daniel, Mann, Johnson and Mendenhall; Abraam Krushkhov reports for this agency. The second research agency is MIT; Prof. Marvin Manheim reports for them.

Abraam Krushkhov

One investigation we made had to do with the functional concept of value. We found that values are abstract thoughts or ideas that are shared with other members of society about ideal modes of conduct or ultimate goals. Their primary functions seem to be to control the organization of society by defining expected behavioral responses of society's individual members.

Another very important part of the investigation had to do with the impact of highways on environmental values. It exposed how little has been done in relating urban transportation to environmental values. With respect to the impact of highways on aesthetic values in the environment, we found that the design of freeways by highway engineers backed up by specialists schooled in urban design would have avoided much of the aesthetic pitfalls and the environmental insults for which the whole freeway system is presently being criticized. We also found that a freeway or a highway does not in itself create an aesthetic good per se, due to the tremendous amount of traffic it brings into a community. What does promise benefits is the spin-off in the creation of urban space and structure, particularly if the freeway can be made to fit unobtrusively within an environmental context.

With respect to the impact of highways on social values, we found that the control of one's destiny in his environment is clearly one of the most important factors in today's highway planning process. We also found that, like few other major public improvements, a freeway can test the quality of homeostasis in a community—that is, the ability of an individual, a group, or a community to adapt itself to its changing environment. The best illustration of the impact of highways upon political values in the environment, of course, is this Conference, at least in my terms.

Many people are familiar with the long history of Baltimore's freeway planning troubles and the sequence of events that brought about the formation of the Baltimore Urban Design Concept Team. And without getting involved with the details of actual freeway planning in that city, I would like to comment on what our analysis taught us about the joint urban design concept approach. The idea of the concept team combining many skills and devoted to improving environmental concepts is a laudable one. It is

self-defeating, however, to establish such goals without insisting on a total analysis of urban growth, social structure, and political institutions. It is nearly impossible to inject an ad hoc organization into a delicate and complex structure such as a city and expect it to come up with organic solutions to long-term problems. What is needed is both a methodology for attacking urban design problems and a long-term commitment to live with the process of their resolution.

The main feature of our proposed research plan to carry out the design study will be the use of a pre-project and a post-project analysis in terms of historical and in-process field investigations. A substantial amount of methodology already exists for measuring the impact of highways on environmental values; these range from conventional data collection, analysis of projection techniques, questionnaires, interviews, and attitude surveys to new methods utilizing user panel techniques, route location planning simulation, games theory, and audio-visual devices and modeling techniques, among others.

After reviewing all the findings of the design study, we conceived of a research hypothesis that would permit a comprehensive approach to all the major aspects of environmental values and the impact of highways upon those. Our aim was to prepare the kind of program that would involve and serve both the people for whom highways are built and those who design and build highways.

The research hypothesis foresees the development of four major tools. Our first tool is a checklist composed of important environmental values. The next tool would be a descriptive encyclopedia of each item on the environmental values checklist. There also would be a rating chart. The last part of our hypothesis would be a program of instruction for highway planners, administrators, and educators and it would be implemented by the consultant to ensure that all parties understand the use of all tools devised in the program. To make any tool of this nature valuable it must be updated at regular intervals.

Although our research hypothesis may appear to be a simplistic approach to one of the most complex urban problems of our time, it is our belief that it would provide a basic format for communication, understanding, and improved highway design.

Our orientation is basically humanistic, in that we recognize that man has to move away from his perpetual preoccupation with controlling the physical environment in the direction of better understanding and totally relating himself to that organism called his community and his environment. The program is designed to be objective, ensure maximum involvement of all concerned parties, stay on top of the technology and the state of the art, and move directly into the highway design program right where the human needs, the raw data, and the social action are with a minimum of delay. The approach is that of a multi-disciplinary team of practicing professionals who can work quickly and effectively with practicing professionals in all the design fields.

Marvin L. Manheim

In evaluation we are concerned with things that appear to be incommensurable: money, construction, vehicle operating costs, versus families displaced, parkland removed, noise pollution effects. We are also engaged with balancing the short-run versus the long-run. We operate as professional engineers and planners precisely to find the balance between the short-run perception of needs and options in the community and the long-term perception that no individual really grabs hold of and fights for. The essential issue in evaluation is which groups gain and which groups lose as a consequence of each alternative policy.

How did we get the predictions of impacts in the first place? How did we measure the impact on a family of being relocated or the perceived aesthetics of the driver moving over the highway, someone seeing the highway from his neighborhood playground, and so forth? Where did we ever get those weights from? Whose numbers are they? How do we decide what value each group in the community places on its impacts versus the values that should be placed on impacts on different groups?

What we have learned about benefit-cost analysis and standard economic criteria is that they hide the issues, they do not display them. Do we really want to treat evaluation as something that comes at the end of the design process, when we have two or three alternatives relatively preconceived and then we are concerned with choosing among them? Or, maybe we want evaluation to play a more positive role in the process. And one of the things we want to do clearly in evaluation is not hide the issues by computing a total score, such as a benefit-cost ratio, but explicitly trace out the differential impacts on each group in the community.

What must be evaluated? We want to evaluate all the impacts, whether quantifiable or intangible. If they are intangible and hard to get hold of that probably means that they are the most significant impacts.

Our conclusion is that it is impractical to try to find a consistent complete operational statement of community values because the individuals in the community do not know their own values. Their values are continuously changing over time. They only get an idea of what their values are or clarify them when they are forced to make choices, when they buy something or when they are forced to take a position or when they are forced to vote on an issue. Individuals cannot express their values abstractly.

In the surrogate approach, the engineer tries to estimate what value a group or an individual in the community places on a particular set of impacts. He is projecting the preferences of an individual or group vicariously...when people do not know their own preferences themselves. And, if the engineer is to get support for a recommended highway based on an approach in which he has projected preferences vicariously, there needs to be substantial public confidence in his ability.

In the interactive approach we try to get people to make choices about alternatives and thus provide direct information on their preferences. Not only does this provide direct information on their preferences, but it also creates an informed public that begins to have some perception of the difficult choice, the difficult design issues, the highway team is trying to deal with.

We are concerned not with an evaluation method for its own sake but an evaluation method whose basic objective is to achieve substantial agreement on a course of action. The real issue is: Can we develop some kind of solution behind which we can mobilize support in the community in order to get something done?

Evaluation can be a very positive force in the way it catalyzes and drives the design process. Evaluation can help to pinpoint the crucial trade-offs and the issues of equity—which groups are being hurt in order to benefit others—as well as trying to stimulate the search for imaginative solutions. Evaluation should also serve to provide a basis for negotiation among the interest groups affected. It should allow us to find that range of options around which negotiation can most fruitfully take place. It should allow us to explore how much we can provide in compensation. It should allow us to get participation of those affected directly in the process of reaching an agreement....And, it should produce a ranking over the alternatives when we need one.

We have a list of all the interest groups in the community who might be potentially affected. For each interest group we try to identify each possible way in which that interest group might be affected—each impact type. We try to identify for each alternative action what its impacts will be on each of the groups in the community. This then represents the basic information on which we need to operate with evaluation. The role of an evaluation technique now is to operate on the data represented in this impact matrix together with whatever value information we have. The objective is to produce a tentative or final ranking of the actions plus an identification of the crucial issues.

What we need are a series of manuals and techniques. A first group of orientation manuals could include discussion of case studies of highway location problems and the solutions that have been developed; checklists of design features that impact on environmental values; checklists of the environmental values that might be impacted by locations; and training aides to help sensitize the engineers and planners to these issues in this context.

A second type of manual would describe community interaction techniques: Techniques for trying to identify the different interest groups in the community; techniques for making inferences about values based on a whole variety of social science-behavioral

science research techniques; techniques for displaying information to the community in ways that communicate to the community what the location team is concerned about as well as help to clarify the choice issues to the community.

The third manual would describe what we call location team strategy: How the location team, for example, might initially go into a community for a while just trying to get a feel for the local issues. After background study the team could begin developing alternative designs, not so much as final solutions but to have something to talk about to different groups in the community, to get their reactions, to see what people might prefer—and not prefer—by being able to present explicit alternatives to them. The third phase of strategy might be to try to change details of designs in a negotiating process, to come up with new joint development packages as the location team acts positively to produce an agreement among the diverse community interests.

I think it is very clear that there is a wide variety of techniques for getting various kinds of direct and indirect expression of preferences. What is important from the point of view of the pragmatic engineer is not statements of abstract values but statements of values sufficiently clear for the engineer to be able to predict the response of an individual or group to a small number of alternatives. The kind of approach needed is not a single survey technique or a single intensive interview technique. Instead it involves a substantial portion of the location team, whose role it is to interact with the community, continuously using a wide variety of formal and informal techniques, trying to get information about peoples' preferences and needs in the context of a general understanding of the community, as well as being able to translate that general understanding into specific operational indications. Then the location and design team—people generating alternative alignments, joint development plans, and so forth—can use these indications as a basis for reaching conclusions.