Expanding Responsibilities of the Design Professions

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Previous speakers at these luncheons have been authorities on their subjects. Last year, Mr. Alan Boyd, now Secretary of the Department of Transportation, discussed the future of highway transportation. Today I feel like an interloper—like a "sheep in wolf's clothing"—for I have little specific knowledge and no experience in the area of professional work which I will discuss. I have assumed in preparing these notes that your program chairman had such a situation in mind and that the viewpoint of "an outsider"—a layman in your field—would be appropriate, and possibly provocative. I can lay claim at least to a considerable interest in my topic and to some experience as an educational administrator in appraising promising fields of future professional practice.

The title I chose was "The Expanding Responsibilities of the Design Professions"—but my remarks will deal more specifically with the growing public demand for betterment of our cities, and with the opportunities and responsibilities of those who will plan and design the structures and systems for the communities of the future.

Design is a creative process which starts from a concept—a mental image of a result to be achieved—and ends with details for implementation. It is an unfortunate fact that in engineering practice, the term "design" has come to connote the details only and to exclude the most important phase of the process—the synthesis of the basic concept. Initially qualitative, and often fuzzy, the concept is refined through a series of approximations into quantitative terms, by the interplay of "what is needed" on the one hand and "what is possible" on the other. "Possible" here refers to the whole range of effective constraints, including the physical, financial, and political limitations and others. The identification of worthwhile and achievable design objectives and the synthesis of design concepts which will realize these objectives is the highest level of professional practice. The men who perform this essential function effectively must be sensitive to the changing needs and desires of society, must be creative in conceiving means of implementation, and must be sound in judgment to select, for detailed analysis from among alternatives, those concepts most likely to prove feasible and economical

Design, defined in the broad sense in which I have used the term here, should apply to a "top-down" approach—proceeding from qualitative concept down to quantitative detail. In other terms, the overall system should be defined first, then the subsystems, the components and the parts, to assure a coordinated and optimum result. When this is not the case—when interacting

subsystems are designed and installed without coordination—the result may be like the horse designed by a committee; the result was a "camel." Such "camel-like" designs are encountered in all fields of engineering design—but they seem to be most numerous in public works. Not only the physical and operational interfaces with other systems and subsystems must be coordinated but consideration must also be given to the social, aesthetic, cultural and other intangible but important consequences which may follow.

The aim of design is to create a physical entity having specified characteristics, and to do so at minimum cost. When the purpose is utilitarian and when the benefits can be measured in dollars, the usual objective is not only to minimize the cost but also to bring about benefits which exceed the cost by an acceptable margin. In the past, this criterion was deeply embedded in the decision-making process, and sometimes forced designers to make quantitative estimates of benefits which were inherently intangible and immeasurable—and thus achieve a favorable though fictitious benefit-cost ratio.

The last two decades have produced a marked change in the thinking regarding the justification of public works projects—which is perhaps less a change in fundamental principle than a change in the definition of the costs and of the benefits. For example, not long ago the cost of an urban freeway could be expressed directly as dollars paid for wages, materials, land, and so forth; the cost should, if I read the signs correctly, include the intangible sociological "costs" of dislocating the people living in the right-of-way. Similarly, what is admitted as "benefit" is being expanded beyond what can be measured in dollars; the benefits of a day at the beach or a drive through the Adirondacks in October are not measurable in dollars, but an increasing segment of public opinion favors such benefits and seems willing to pay for them.

With specific reference to transportation, these altered attitudes have been aptly described by H. E. Davis as follows:

> Let us turn now to examine, in a general way, how those who have been responsible for providing the means of transportation have responded to the needs of their times. I should like to characterize the response of the transportation engineering profession in terms of three evolutionary stages. The three stages differ in their design philosophy, or better, in their ruling design criteria; they may overlap or co-exist in time.
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> In the first stage, the emphasis is on getting a minimal facility that will permit, somehow, movement to take place. A pioneer or frontier society is doing the best it can with limited capital, and many urgent things must be done to make existence even tolerable. Man is expected to endure a variety of "hardships." In transport, travelers or vehicles have to make the best of what can be provided; they have to adjust to whatever physical limitations the facility might have. Just to get something to permit people and goods to "get there" somehow, is all that can be expected. A bridge may be three miles upstream where it is easiest and cheapest to construct a crossing; circuity of travel is secondary, human time is cheap. Design focuses on selection of available materials; and upon structures strong enough to carry then feasible loads. Least capital cost of a facility or system of physical facilities is a ruling criterion. The road builder, the bridge builder, the railroad builder, the canal builder, spring to meet society's needs.
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> In the second stage the emphasis is upon acceptable standards of transport service. Society is able and willing to pay for more convenience, and perhaps more safety. Design criteria reflect increasing levels of efficiency in the movement of traffic and of comfort and amenity for the traveler. The costs to be emphasized are not the capital costs of each element, but the user's total transportation costs. It is a stage of adjusting the facility to the traveler. In one mode of transport,

> for example, the highway and the traffic engineers rise to provide better pavement surfaces, gentler curves, wider lanes, smoother traffic flow. It is an age of traffic engineering as we know it.
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> The setting for the third stage is one in which society has acquired a considerable affluence. Among other things, society has generally developed a concern over controlling, to some degree, its environment. And it has the scientific and technologic potentials to do at least something about the urban environment where it tends to spend much of its time. It worries about the arrangement of the physical plant (sometimes called "land use") in which it functions as an urban organism and argues about how various arrangements improve or detract from "community values," "urban amenity," etc.

Specific recognition of this trend came in the 1964 directive of the Bureau of Public Roads which declared that highway planners in comparing alternative locations give full consideration to "social and human values as well as to defense, economic, and safety factors." These "social and human values" included recreation, aesthetics, residential character and location, religious institutions and practices, rights and freedoms of individuals, conduct and financing of government, conservation, replacement housing, education and disruption of school district operations, and specific numbers of families displaced.

In the same vein, Secretary Connor stated at the Highway Transportation Congress in 1966 that:

> In the first category are the problems of highway construction and maintenance costs and financing, of urban congestion, of traffic safety, and of producing efficient and effective transport services.
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> In the second are problems of land use, of dislocation of people and businesses, of beautification, of pollution of our environment, and of our cultural and recreational aspirations.

The quotations regarding highway transportation are representative of the changed attitude of the public towards improvement of the whole environment in which we live, work, and play, and public officials at all levels of government are keenly aware of this change. There have always been some farsighted and public-spirited individuals and public officials who advocated such improvements but, until recent years, they have been a minority, whose efforts did achieve some success—in spite of public apathy, the opposition of interests adversely affected by change, and limited funds. Today, it seems that all elements of our society are inspired by a vision of a greatly improved environment—embracing not only physical facilities, but also all the other elements conducive to the good life. There is also the conviction that we will have the resources necessary to this end. There will be delays; funds will not be immediately available for every worthy project—but the momentum gained is so great that substantial progress seems assured.

The lively discussion of the last decade regarding the future characteristics of our society, and the legislative and administrative actions already taken, seem to indicate national objectives, priorities and problems, about as follows:

1. The city—in all its aspects—will be the major problem of public concern.
2. There is a conviction that cities can be comfortable, enjoyable, beautiful, safe—and even inspiring to their inhabitants. The physical environment alone will not assure this character in a city, but it will help to bring it about.
3. Each city must plan in terms of its going situation, and its limitations, aspirations, and political environment. The plans must be up-dated frequently and realization of them will take time.

4. The nature of the job to be done requires the power of government—BUT
5. The scope of the task is such that government alone cannot achieve the results desired. Public expenditures will be large—but the greatest effect will be produced by individuals, corporations, and public agencies making their normal expenditures in accordance with the criteria and the provisions of a community plan.
6. Transportation—in its several modes—is necessarily a major feature of an urban plan; in fact, the transportation systems are the framework which supports the other elements of a plan.
7. The decision-making process is extremely complex in most cities; the major obstacles to progress will almost certainly arise here. Plans which do not give attention to decision-making—and to the personalities and interests of the decision-makers—are not likely to be realized.

Such, in very brief outline, is the character of one of the major design jobs of our times. The task is not new—and some cities have already made substantial progress—but the emphasis and momentum have been stepped up and the ultimate goal envisioned has become more comprehensive and ambitious in the last few years. Some estimates of the cost place it in the trillions of dollars to provide the necessities and amenities desired by the 140 million people now living in our cities—and the 100 million to join them in the next 25 years; whatever the correct figure may be, it will be very large and a tremendous amount of planning and design will be required if these expenditures are to bring the hoped-for results.

You may well ask at this point, why give thought to city planning when almost every city has a planning agency, plans have been adopted, and some cities have been transformed already as a result of their planning efforts. The answer is, I believe, that there has been something missing in the past or our cities would not face the problems they do today. One missing element has been strong support from the public, which I have already discussed. Planners can now think seriously about programs of improvement which would have been regarded as ridiculous and visionary in most cities not many years ago. Another factor is the realization that a city embraces many interacting functions which must be understood in some detail before a sound plan can be developed. On this point, J. P. Eberhard stated recently that:

> What is becoming clear is that we need to recognize the "systems" character of the city. I know this term "system" is overworked, but the concept is so powerful that it is displacing earlier notions of how to view the city. It is particularly useful if we want to look at technological opportunities, because it shifts the emphasis from city components—such as a house, an automobile, or a garbage dump—to the larger context in which these components are placed. For example, improving the means of consuming garbage at a "dump" will not affect the larger system of storage at the house, collection from this place of storage, transportation means from storage to dump, etc. The aggregate of the men, material, and facilities associated with a reasonably well defined function need to be viewed in toto. The system can then be examined from three points of view: its technological sophistication, its contribution to the effectiveness of our cities, and the cost of providing this capability. In order to do this, we first will need to put into perspective what a city system is, and then we will need measures of effectiveness. The first task is relatively easy, but the second is very difficult because it involves value analysis for what we might consider "the good life" or "a worthy civilization" or a "Great Society."

Plans for our cities will evolve through the interaction of many individuals and groups—community associations, industry, commerce, labor, operating agencies of government and others—as well as the planning agencies, and among these groups there will be found diverse, and often conflicting, interests. Many types of specialists, including engineers, architects, and others, will be required to provide the essential expertise, but the basic decisions will be made through the decision-making process effective in each community and not by these experts.

A plan should lead to coordinated action, but coordination requires centralized review and decision. Here lies a fundamental difficulty because the experts who are knowledgeable technically do not have the authority to decide the basic questions; the decision-makers, who have the authority, will, in most communities, be laymen who have neither the background nor the time to understand the technical basis of a plan. Furthermore, even if the experts have the authority to decide, their design will be a "camel" unless their work is coordinated. Whatever may be the decision-making process by means of which the elements of a plan are to be realized, it is essential first, that the proposals fed into this process are internally consistent and are compatible with both the elements of the plan in being or previously approved and with the effective constraints imposed by law, money, politics, local customs or whatever; and second, that there be an effective mechanism for converting these plans into realities. Leadership—competent, effective leadership—will be required if the benefits desired are to justify the cost.

The character and magnitude of the job contemplated, the number of communities involved, and the time span over which the work will continue, all combine to make the availability of enough competent, effective leaders the central problem of this program. We cannot base our plans nationwide on the assumption that in each community a Robert Moses will appear to plan and to execute the plans made. Individuals of such imagination, energy and persuasive powers are rare and randomly distributed in the population—and communities must look to professionals in this field for guidance and leadership.

Writing job specifications is in some respects a futile activity because no individual ever fully meets the ideal requirements stated—but it is a useful starting point. The qualities and qualifications of the professional specialists needed to plan the facilities and other physical aspects of the cities of the future are, I believe, about as follows:

1. Knowledge and experience in the design and construction of the components and systems making up the physical plan.
2. Open-minded sensitivity to the ideas of others—to sense what is really desired and what will be supported.
3. Imagination to synthesize, from what is physically and financially possible, a plan which will achieve the objectives desired.
4. Ability to forecast with acceptable accuracy the cost and the time required to carry out a program.
5. Ability to predict all the major consequences—desirable and undesirable—of the elements of a plan.
6. Ability to present facts and opinions clearly, to persuade the decision-makers to action, and to coordinate the execution of a plan. This phase is the pay-off of planning; without it the effort will be wasted.

In this list of qualifications, "knowledge and experience in design and construction" was the first item—because it seems highly desirable, but I must confess that the record does not show that it is an absolute requirement for leadership in city planning. This, and most of the other qualifications, can be

brought to bear on the problem through a team effort, but the last one mentioned—the ability to present clearly, to persuade, and to coordinate the execution—is essential in the leader of this work in each community.

An educator should, I suppose, close a talk of this character with remarks about educational programs to develop these leaders—but I will not do so primarily because my thoughts here are pretty hazy. Maturity and experience will play such an important part in their development that the subject matter of their formal education may prove of secondary importance. As an engineer, I hope that the engineering profession will supply a substantial share of this leadership. The work will certainly require many engineers as members of the team.

If the nation persists in its present mood regarding our cities and I think it will, there will be an urgent need for men who possess the requisite skill and personality, and who will make this work their profession. Without such men, much money and time will be wasted and our cities will be denied the full realization of their dreams.

On the face of the statehouse in Sacramento there is this quotation from a poem in which a personified California says, "Send me men to match my mountains." Paraphrasing this quotation, we might well make the appeal on behalf of our cities, "Send us men to match our vision of the future."