Improving the Design Quality of Federal Buildings

Committee on Improving the Design Quality of Federal Buildings, Building Research Board, Commission on Engineering and Technical Systems, National Research Council

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Building Research Board
Commission on Engineering and Technical Systems
National Research Council

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This report was prepared as part of the technical program of the Federal Construction Council (FCC). The FCC is a continuing activity of the Building Research Board, which is a unit of the Commission on Engineering and Technical Systems of the National Research Council. The purpose of the FCC is to promote cooperation among federal construction agencies and between such agencies and other elements of the building community in addressing technical issues of mutual concern. The FCC program is supported by 14 federal agencies: the Department of the Air Force, the Department of the Army, the Department of Commerce, the Department of Energy, the Department of the Navy, the Department of State, the General Services Administration, the National Aeronautics and Space Administration, the National Endowment for the Arts, the National Science Foundation, the U.S. Postal Service, the U.S. Public Health Service, the Smithsonian Institution, and the Veterans Administration.

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PREFACE

> But though genius cannot be learn'd, it may be improv'd: And though the Gift of **Designing** is born with a Man, it may be methodized by Study and Observation.
>
> The principal Points, therefore, that the **Designer** should have in view, are first Convenience. . . . , and then Beauty and Magnificence. With regard to Convenience, few Directions can be given, since it means no more than contriving all the requisites belonging to your Plan, in the most clear and elegant Manner, and then laying out the Space they are to be ranged in with the most perfect Order and Economy. As to Beauty and Magnificence, they are Themes never to be exhausted; and though many Volumes have been written on them already, as many more might still be added.
>
> ---from the Builder's Dictionary or, Gentleman and Architect's Companion, January 1734

More than two and one half centuries later, we are still learning how to "methodize" design, and still actively debating how to balance the demands of Convenience, Beauty, and Magnificence in building design. This document reports on the work of a committee of professionals who found themselves embroiled in that debate.

We were asked by the Federal Construction Council (FCC)[1] to review how government design policies and practices influence the quality of design of federal construction projects, and to make recommendations for how federal agencies might better ensure receipt of high quality design in the future. Our discussions--to define the meaning of quality in design, the sources of impediments to obtaining quality, and how to ensure quality--were often lively.

[1] Fourteen federal government agencies with major interests in building and facilities research, construction, operation, and maintenance comprise the Federal Construction Council. These agencies had a combined construction budget in FY 1988 exceeding $12 billion.

Some of our members, sharing the view expressed some years ago, by Senator Moynihan, that ". . . twentieth-century America has seen a steady, persistent decline in the visual and emotional power of its public buildings,"[2] argued that getting higher quality meant reversing this decline. Others, reflecting on the constraints of government budgets and unavoidably bureaucratic procedures, suggested that our discussions would be more fruitful if focused on producing appropriate and error-free building programs, plans, drawings and specifications.

Our effort to achieve a balanced consensus was constrained by our own budgets of time and resources. We have, in the end, been both less forceful with regard to the need for strong federal support of the best that our nation's designers have to offer, and less detailed and specific with regard to the policies and procedures that the government can use to accomplish this end, than any of us might have wished. There is more to be done.

We nevertheless believe that identifying these issues in our committee's meetings and the spirited discussion of our Woods Hole workshop, and our resulting recommendations, are useful steps toward a worthy goal. We hope this report will not be an ending, but rather a marker in a continuing effort by the Building Research Board and others to enhance the quality of our nation's built environment.

-- Clifton D. Wright, Jr., Chairman, Committee on Improving the Design Quality of Federal Buildings

Andrew C. Lemer, Director, Building Research Board

[2] Daniel P. Moynihan, introduction, Ada Louise Huxtable, Will They Ever Finish Bruckner Boulevard?, Macmillan Publishing Co., New York, N.Y. 1971.

EXECUTIVE SUMMARY

Each year the U.S. government builds or renovates hundreds of thousands of square feet of building space to accommodate a diverse array of civilian and military activities.[3] These buildings are part of the essential infrastructure of government and the public good that our government seeks to serve. Even more, because they house our government, these buildings are symbols of the strength and purpose of the nation.

The public agencies responsible for constructing and managing federal buildings seek to improve the quality of building design they receive from the private architecture and engineering firms they employ. Agencies of the Federal Construction Council (FCC) are concerned about recurring problems of errors in drawings and specifications, poorly formulated designs, and mediocre appearance of their new and renovated buildings. While recognizing that the process of building design is very complex and depends on the ability of design professionals to make judgments balancing disparate and often conflicting factors, these agencies are concerned that federal policies and agency management practices are failing to deliver the quality of design that the government and the nation need and deserve.

While the Committee on Improving the Design Quality of Federal Buildings found it unclear whether design quality on the whole is significantly lower on design projects for federal government agencies, as compared to projects for private clients, there is no question that quality can and should be improved. The committee recommends that there are five general areas in which changes in federal agencies' practices could bring about improvement in the quality of design delivered to these agencies:

- The pre-design planning and programming stages of building procurement can have important consequences for quality. Budgets set at these early stages may constrain the designer's options in the building's design and influence his decision-making during design development. Congressional involvement at these early stages tends to fix budgets more firmly than is appropriate for the high uncertainty in forecasts of costs. Agencies

[3] The committee did not attempt to document the government's total annual building program. However, total federal government construction spending for buildings and other facilities in 1986 was approximately $48 billion.

should be allowed greater internal budget management flexibility to accommodate variations in single projects, subject to maintaining budget stability in their overall building program, and spending authorization should be given longer periods of time.

- Agencies have adopted A/E selection procedures, contracting arrangements, and design management mechanisms that can make it difficult for the agency to select best qualified design firms and to communicate the agency's needs most effectively to the designer. Agencies should rely less on standardized rating procedures for judging design firms' qualifications, and should consider increased use of outside reviewers working with agency personnel in the contract selection process.
- Improved participation is needed during design and construction by knowledgeable personnel of both agencies and A/E firms providing design services to these agencies. Increased peer review throughout the duration of the design process--conducted by personnel within the design firm and the client agencies, and with reference to clearly and explicitly stated design objectives--would not only improve quality control but would also enhance the profession's ability to learn by experience and thereby achieve longer term improvements in quality of design.
- Agencies and the private A/E firms are missing opportunities to learn by experience through post-design evaluation, both pre-construction and post-occupancy. Design awards programs and reporting on users' experience with buildings in operation could be effectively used to foster improved understanding of what characteristics define good quality of design.
- Overall building program management practices of agencies sometimes run counter to the interests of achieving quality, particularly when procurement is based too heavily on a desire to minimize costs. Agencies should insure that their design criteria and guidelines are not restricting opportunities for designers to achieve quality design.

The committee considered the merits of establishing more centralized federal advocacy for quality in design. Workshop participants proposed creation of an executive council on design quality in federal buildings, and designation of a senior professional within each agency responsible for representing the agency on the council and for serving as the focus and advocate for design quality within that agency.

The committee noted that centralization of design and design advocacy has precedents in the government's building programs or models in such activities as President Kennedy's Ad Hoc Committee on Federal Office Space (convened in 1961), the Advisory Council on Historic Preservation, the Council on Environmental Quality, and the Office of the Surgeon General. The committee found that the workshop's suggestion warrants further investigation, and commends the idea to the Congress and its committees that oversee federal design and construction.

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1

INTRODUCTION

Good buildings are essential to the economic health of the nation and the well being of its people. Good buildings provide safe and productive environments for people and their activities. These buildings integrate well with the service systems upon which they depend and are appropriate for their surroundings. While good construction, operation and maintenance are essential, good design is the starting point in achieving good buildings.

Good design must have high quality. “Design” and “quality” are words of broad meaning to the architects and engineers of the built environment. Taken together, these words become a Pandora's box of issues that are often poorly defined, interrelated, and hotly debated outside as well as within the building professions. The federal government, arguably the most significant single builder and manager of the facilities that comprise our built environment, is a frequent subject of and participant in much of the debate. This report, addressed to one particular issue of design quality, inevitably touches upon many others: How can federal government agencies, acting as the prospective owners of buildings and stewards of the public's investment, assure that the work done to design those buildings is of the highest possible quality?

The fourteen federal agency sponsors of the Federal Construction Council requested that the Building Research Board (BRB) address this question. To that end, the BRB assembled an expert committee that deliberated on the issues of quality and design and then conducted a workshop[4] to discuss these issues within a broader professional context.

Quickly recognizing the complexity and contentiousness of the issues facing them, the committee identified two areas in which they focused their attention in this study:

[4] The workshop was held July 14 through 17, 1987 at the Woods Hole Study Center of the National Academy of Sciences. A list of attendees is included in Appendix B.

- The nature and value of quality of design, and how quality of design develops during the design process;
- Federal agencies' policies and procedures for selection and management of A/Es that can affect quality of design.

The following chapters present the committee's work as a chronological development of conclusions and recommendations. Chapter 2 is a review of background information and the committee's discussions framing the issue of quality of design in federal building.[5] Chapter 3 summarizes the workshop. Chapter 4 presents the committee's principal findings and recommends ways federal agencies might improve their ability to assure high quality in their buildings' design.

[5] The committee restricted its attention to buildings, and primarily those, such as offices, hospitals, or courts, that house substantial human activity. However, much of the committee's discussion can apply to the full range of public works facilities.

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ISSUES OF QUALITY OF DESIGN IN FEDERAL BUILDINGS

The Federal Design Improvement Program, begun in 1972 under the sponsorship of the National Endowment for the Arts, "aspired to improve the quality of design throughout the federal government at scales ranging from the redesign of federal publications to the programming of multimillion-dollar federal facilities."[6] One part of the program was the Federal Architecture Project, which over the course of the subsequent five years conducted a historical study of federal architecture, reviewed and proposed revision of the federal government's design procurement procedures, and laid the groundwork for the 1976 Public Buildings Cooperative Use Act, the first major public buildings legislation since 1949. This study is in a sense a reflection of federal agencies' continuing concern with issues raised in the Federal Architecture Project, and these agencies' recognition of the importance of their building programs for the nation's built environment.

THE SCALE AND CONSEQUENCE OF DESIGN ACTIVITY IN FEDERAL BUILDINGS

Federal government construction-related spending in 1986 was approximately $48 billion (Department of Commerce, 1987). Roughly $13.4 billion of this amount was spent for construction or major reconstruction of facilities owned by the federal government.[7] The value of new federal buildings put in place was approximately $4.5 billion. Federal construction is very big business, accounting for about one-eighth of all construction spending in the United States.

[6] Michael John Pittas, Director, Design Arts Program, National Endowment for the Arts, 1978-1984.

[7] See Appendix A. The balance of construction-related expenditure was for facilities such as highways or housing that are owned by state or local governments or non-governmental interests.

The importance of federal architecture is greater than even these substantial figures suggest "The Government. . .enjoys in its building operations a tremendous opportunity for good in the judgment of all who regard architecture as one of the important factors of the higher civilization."[8] Whether or not the federal government has taken full and proper advantage of this opportunity in recent decades is a matter of debate. The committee noted that the Federal Architecture Project and subsequent programs of the National Endowment for the Arts--as well as budget set-asides for purchase of art--have enhanced the concern for design excellence within federal building programs, but that the subjective values reflected in building design assure that debate will continue. The committee felt that recommendations may be made for improving the government's ability to achieve higher quality of design without becoming embroiled in questions of how to measure explicitly the level of current quality.

Buildings are built to serve the particular purposes of the buildings' owners and users. These purposes are often diverse, sometimes not clearly defined, and may spring from sources throughout the society of which builder, owner, and user are part. As one of the documents from the Federal Architecture Project stated,

> Buildings and landscapes express subjective values. Particularly in its public works--its architecture and land planning--a society projects its views of the world and of the good life. From the beginning of the American nation such design choices have embodied many forces, political and economic as well as cultural. Government building, then, must be understood in the context of the American experience, which has been encompassed in the dimensions of American space. (Craig et al., 1972)

A building's designer seeks to reflect purposes and values in the physical elements of the building. In the end it is the service these physical elements provide--oservice in support of the building's users and neighbors--that will become the basis for judging whether a building's design is "good." That judgment will inevitably depend on the outcome of many stages in the building process: how well the designer comprehended the building's purposes, how this comprehension was reflected in drawings and written specifications that presented the design to builders, how these builders responded to the designer's guidance and the uncertainties of construction procedure, how the owners and users of the finished building operate and maintain the building. The judgment will also depend frequently on the opinions of the individual or group making the judgment.

[8] Secretary of the Treasury, Annual Report on the State of the Finances, 1912.

DESIGN QUALITY AND THE DESIGN DEVELOPMENT PROCESS

According to the dictionary, Quality means “a degree of excellence. . .superiority in kind.” (Mish, ed., 1985) For many people, “quality” design means “good” design, and “design quality” is a value-laden term that depends--as the preceding paragraph outlines--on the participation of many people. The committee found it impossible to devise a concise and complete definition of design quality that would be likely to find general acceptance within the building professions. In broad terms, “design quality” encourages buildings whose characteristics create an environment where the occupant or user can accomplish his purpose effectively, efficiently, and comfortably. Implied in this working definition are factors of economics, social and psychological characteristics of users, flexibility to accommodate changes in users and uses, aesthetics, community standards of safety and health, building technology, environmental concerns, and the tradeoffs among such factors that must be made in the process that results ultimately in a building in use.

Figure 1 illustrates the building process and indicates schematically the distribution of involvement of parties to the process. The initial owner may be building for his or her own use or acting as a developer who will sell the finished building to others. The designer, often a team of professions operating through one or a group of firms, works with the owner to understand the building's intended purposes and the constraints of budget and site that influence how those purposes will be realized. The designer develops a functional program (formally or informally) and then a set of drawings and written specifications that communicate the building's design to the potential builders who may construct the building. To communicate more effectively with the owner, the designer may also prepare scale models and artist's renderings of how the finished building is expected to look.

Up to this point in the process, the quality of the building's design depends primarily on the designer's ability to understand the owner's needs and desires, and to respond to those needs and desires in developing the building's design. The roles and responsibilities of the owner and designer, working with one another within the design development process, are complex and often depend on the personalities of the individuals involved. Selecting a designer who recognizes the needs of the owner and is adept at making the tradeoffs among conflicting needs and constraints is an important decision that can have significant impact on quality of design.

In contrast to practices in private construction, the designer of a government building generally has little part in making the decision to select a builder. The builder, typically a complex team of contractors and sub-contractors, responds to the designer's drawings and specifications in deciding how to go about producing the building, often without substantial recourse to the design personnel. The clarity and accuracy of the drawings and specifications are crucial to the builder's delivery of a finished facility that is within budget and an effective realization of the design. Thus, before the building is constructed and during

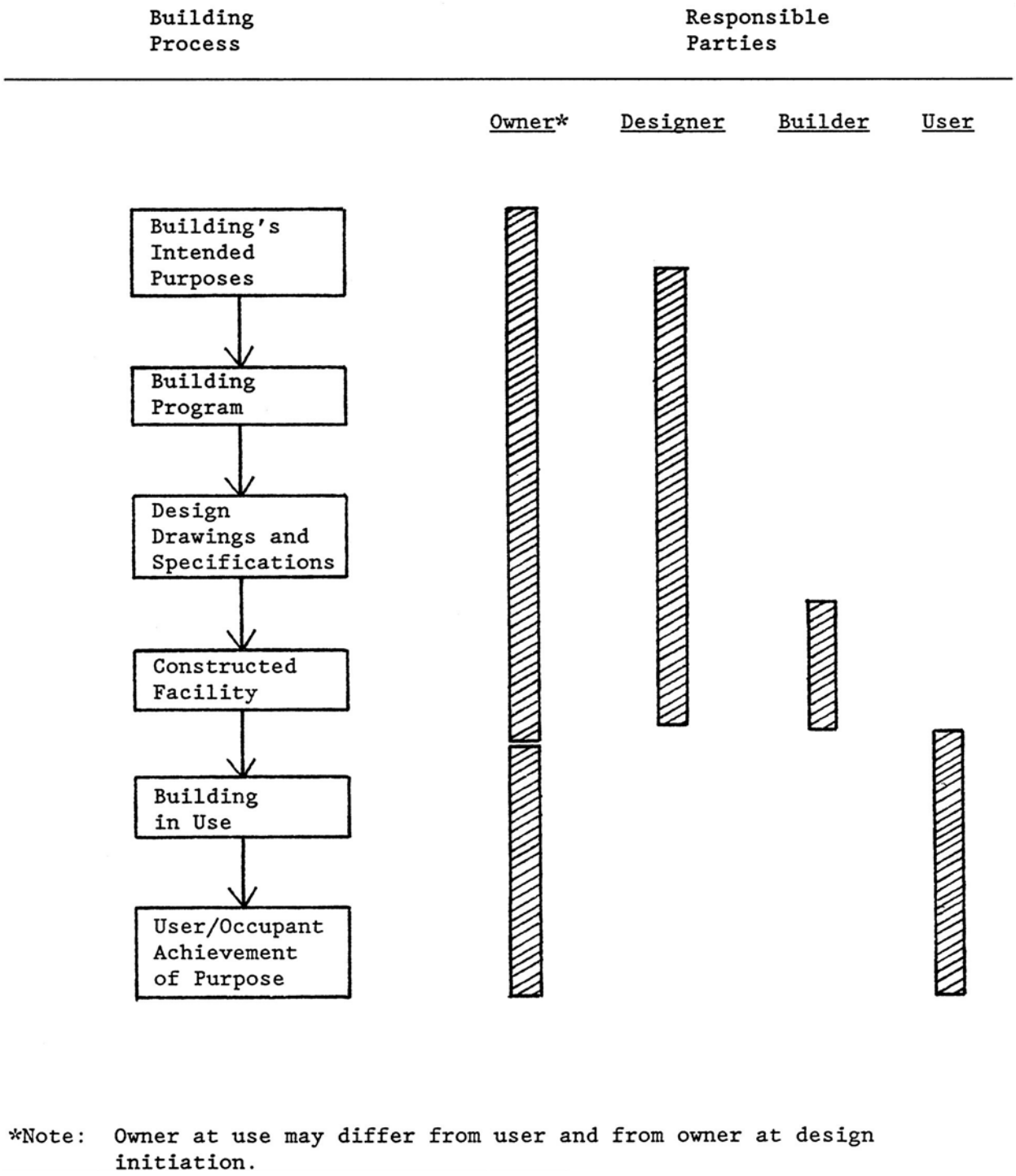

FIGURE 1 Generic Stages and Responsibilities in the Building Process

construction, the quality of these drawings and specifications directly affects the quality of the finished product.

During the construction process, the designer (and the owner) may give guidance to the builder or make design changes. Together, the builder, designer, and owner respond to changes in conditions such as user requirements, availability of materials, labor costs, discoveries of unsuspected environmental conditions, or changes in the financial markets. The quality of the finished constructed facility is influenced by only or all of these factors, as well as by the builder's initial ability to comprehend and respond effectively to the design reflected in the drawings and specifications. It is often difficult to distinguish between the influences of designer or builder when the quality of design of the finished facility is assessed.

The operation and maintenance of a building in use will influence significantly how well the constructed facility performs to serve the purposes of the owner or occupants of the facility. Quite often a building's purpose or use will change from what was originally intended. During the life of the building, which may span 50 or more years, the occupants and their uses of the building may change several times. Advances in technology, changes in community standards, availability of alternate accommodations, and changes in taste may also influence the owner's and occupant's assessment of a building's quality. The judged quality of design, with regard to the building in use, may thereby change as well.

CHALLENGES IN ACHIEVING QUALITY OF DESIGN IN FEDERAL BUILDINGS

While quality of design is achieved progressively at all stages throughout the design development process, the committee focused its attention on the characteristics of owner and designer that are important early in the process:

- The owner's understanding of his or her purposes for building and ability to communicate those purposes to the designer
- The designer's recognition of the purposes of the owner and the user, and his foresight and ability to make effective tradeoffs among conflicting purposes and constraints in conceiving a design that can be realized
- The designer's skill in communicating the design to the builder through drawings and specifications and assuring that the design is effectively realized

Even though the building's purpose or use may change, the owner and user of a federal building generally remain the same throughout the life of the building. The federal agencies might then be expected to have two particular advantages that can enhance quality of design: a good understanding of users' needs the building is to serve, and experience in selecting and communicating to designers who can deliver high quality design.

However, the committee observed that the size of government agencies, the diversity of missions within and among agencies, and the variations of conditions from one geographic region to another make it difficult for federal agencies to realize these potential advantages. On the other hand, the continuity of federal agencies' building programs gives them an opportunity to assess design quality throughout a building's life. Practically speaking, this should enable agencies to learn lessons that can be used to improve the quality of design of subsequent buildings. In any case, the committee concluded that **federal agencies can achieve improved quality of design by strengthening their ability to assess and communicate effectively their program requirements and design objectives.**

The committee observed that federal agencies' buildings must respond to a broad range of symbolic requirements as well as the scrutiny of the Congress and the public. The judgment of quality in federal building design frequently involves a much larger and more diverse set of opinions than might be encountered in the private sector. The committee also observed that this scrutiny may be more sharply focused on building costs and budgets than upon aesthetics or performance, an emphasis that is sometimes argued to distort the federal design development process in ways that adversely influence design quality. Finally, the committee observed that the designer's role in balancing the many functional, aesthetic, economic, and other factors that influence a building's design is especially important to the final quality of design. The committee concluded therefore that **federal agencies can achieve improved quality of design by selecting designers who are skilled at translating program requirements and design objectives into buildable designs that meet realistic budgets.**[9]

A WORKSHOP ON QUALITY OF DESIGN

To explore these conclusions further, the committee organized a workshop to involve a larger number of participants in the discussion of how federal agencies can improve the quality of design of their buildings. The workshop's agenda and participants are presented in Appendix B.

The workshop participants divided themselves into five working groups (Appendix C) to discuss in detail areas where improvements might be made in federal agency practices: pre-design programming and planning, the A/E selection process, agency and A/E participation during the design and construction process, design evaluation, and building program management. Chapter 3 summarizes the principal findings and conclusions of the workshop discussions.

[9] The committee, and subsequently workshop participants, felt there is a need for greater attention by schools of architecture and engineering to the specific issues of design in the public sector. Such attention over the longer term will yield a cadre of design professionals who are more aware of the meaning and need for quality in federal buildings, and better prepared to provide quality design.

3

A WORKSHOP ON OPPORTUNITIES FOR IMPROVING QUALITY OF DESIGN

The participants at the Woods Hole workshop identified five areas of federal agency building practices that can have important impact on design quality:

- Pre-design planning and programming[10] are activities that define the specific purposes for the building project, the anticipated users, and relationships among users and functional needs. Strategic mission planning, resource allocation and budget development, environmental impact analyses, master planning, and project programming are included in these activities, which in aggregate are the principal guidance given to the designers employed by a federal agency.
- A/E selection is accomplished through a process that varies from agency to agency but conforms generally to a uniform framework intended to assure that designers are selected on the bases of qualifications rather than price, while assuring that all qualified firms are given opportunities to undertake federal design projects.[11]

[10] Planning, programming, and budgeting activities occur throughout design development. As used in this report, pre-design plans, programs, and budgets are based on strategic assumptions and estimates by agencies, and include relatively little physical design information. Design plans, programs, and budgets are subsequently developed primarily by the responsible designer of a specific facility, and include details of a building's siting, layout, and materials. Congressional authorization to construct a building is typically requested on the basis of partially completed design plans, programs, and budgets that are anticipated to forecast future costs with sufficient accuracy to permit firm commitment to these plans, programs, and budgets.

[11] P.L. 92-582, referred to as the Brooks Act, describes the process, which requires that discussions be held with no fewer than three firms considered qualified for a particular assignment.

- Agency and A/E participation during the design process is essential so that problems and opportunities that inevitably occur during a project's design development are addressed in a timely manner. This participation should continue through the construction phase as well.
- Design evaluation is an opportunity to learn from experience as well as to monitor quality. Awards programs and post-occupancy evaluation of buildings are examples of activities in this area that could be used more effectively to influence design quality.
- Building approval and general management practices in federal agencies include interactions with Congress and the public at large. Agency personnel most often deal with interest groups that can influence pre-design planning and programming procedures, the A/E process, and eventually on the quality of the finished product.

In each of these five areas, workshop participants discussed agencies' concerns as well as comparable experience in the private sector. Proposals for changes in agency practices to improve design quality were then considered by the committee in drawing their conclusions.

PRE-DESIGN PLANNING AND PROGRAMMING[12]

Pre-design phases of the decision-making process are critical because it is during these phases that the size, function, general character, location and budget for a building are established. Errors made at this stage are usually embodied in the completed facility, in such forms as inappropriate space allocations or inadequate equipment capacity. These pre-design phases include long-term planning, programming, management planning, and budgeting.

There are three essential elements of long-term or master planning for a building: 1. inventory, assessment, and evaluation of existing facilities; 2. analysis of future needs, with alternative scenarios described in terms of varying degrees of probability; and 3. development of alternative plans for each scenario, using existing or modified facilities and/or new construction. A successful master plan contains an integrated series of documents that present in graphic, narrative, and tabular form the present situation and the plan for an orderly and comprehensive solution to anticipated future problems. The master plan allows for the future accomplishment of the stated mission and objectives in an efficient and economic manner over a specified time frame.

Based on a master plan, agencies normally develop long-, intermediate-, and short-range construction programs. Specific projects are identified and quantified, and usually given a priority. A specific anticipated

[12] The term “pre-design” is meant to refer to all stages prior to final design. A building's design is actually accomplished over several stages of increasing detail and certainty. Interim stages may be termed “preliminary,” “schematic,” or “35 percent” designs.

cost is assigned based on preliminary design work, and on this basis congressional authorizations and appropriations are sought.

An earlier BRB study[13] noted that "In many agencies it is difficult to pinpoint where programming. . .begins and where it ends. Terminology differs among agencies and within agencies themselves. Programming is carried out with differing levels of efficiency and success. Programming is reviewed, in general, as a discrete, front-end or preliminary stage in the building process in which requirements are set out in isolation from subsequent trade-offs of funding, design, and construction. Programs are seen as definitive documents rather than as ongoing processes of discussion, negotiation and decision making. . ." Yet at this early stage in design, uncertainties require a more flexible outlook.

While the programming process differs among agencies, it generally begins during formulation of the budget, often one or two years prior to the start of actual design. Estimates used to support agency submissions to Congress may be inaccurate because at this point in the project development process, requirements and criteria are often not specifically defined. Methods are evolving (such as a parametric estimating system developed by the Air Force) to improve the accuracy of project estimates early in the programming process; however, where user requirements are not well defined, accurate cost estimates are still elusive. This ambiguity continues to be a major complicating factor in the plan/program/budget sequence.

Prior to the start of design, more detailed documents are prepared and provided to the designer. These documents go by many names, such as the Army's "Project Development Brochure." The program document may be quite inclusive or narrowly limited, but regardless of scope, it is a key component in the design process. The quality of this document, as well as how it is used, has a direct and significant impact on the quality of design.

Project management procedures and the ability to integrate all elements of a project effectively and in a timely manner affect the quality of the finished project. A management plan will ideally include the objectives, schedule, and budget for a proposed project. The plan should also include the organization required for project execution, with clearly delineated decision procedures. Because of personnel turnover and long lead-times inherent in federal projects, the plan should document project background and include information on the assumptions and judgments reflected in previous decisions.

To be effective, management plans should be developed in advance of, or at least concurrent with, the project programming process and with the same care devoted to various technical aspects. Because of their dynamic nature, they also should be revised as needed during the programming process. Approvals for the management plan and for subsequent modifications should be done formally, and disseminated to all critical participants in the project delivery system.

[13] Programming Practices in the Building Process: Opportunities for Improvement. National Academy Press, Washington, D.C., 1986.

The quality of a project can be adversely affected by the length of time required in the early stages of the process. It is not uncommon for a project to take five years from the beginning of the pre-design decision-making to award of the construction contract. During this cycle the budget and program are progressively refined, but early estimates tend to become firmer commitments with each successive approval. The initial budget estimate may become less accurate with respect to the actual need as more and more about the project objectives and necessary design solutions become known. The problem is further complicated by personnel turnover and consequent loss of management continuity that occurs during a project's development.

Project budget estimates are sometimes refined during the Congressional agency hearing process. When this occurs, individual project estimates should be adjusted to reflect current estimates if that can be done without affecting the overall agency budget. If arrangements cannot be made to adjust individual estimates, projects may be authorized and appropriated at amounts different than actually required. If approvals are less than those required to award the construction contract the agency is faced with several alternatives: The project can be cancelled; it can be withdrawn, redesigned and readvertised; or it can be reprogrammed. Procedures vary among agencies, but delays of twelve months are not uncommon.

More importantly, however, the quality of a project can be affected by scope reductions, criteria changes or other actions that may be taken to reduce the cost of a project to fit it into the approved program. “Fit,” in this case, is determined by the budget.

A “cost variation” occurs when an acceptable low bid for a specific project exceeds the Congressional authorization by a specified percentage or dollar amount, and such a variation often attracts congressional scrutiny. The workshop participants observed that there is excessive Congressional involvement in project decision-making, or “micro-management,” resulting in delays, scope changes or redesigns that can affect the quality of a project. Cost variation procedures should be changed to give each agency authority to reprogram funds within its total annual authorization rather than basing reprogramming thresholds on individual projects. However, more care in review of total program budgets and budget contingency estimates may then be warranted.

The committee recommends that rules governing reprogramming and authorization periods for design and construction funds be liberalized. Authority to reprogram internally and/or carry some authorization for extended periods on selected programs or projects would enhance agency planning and delivery procedures. The workshop participants felt also that there should be greater flexibility regarding single- versus multi-year appropriations. Decisions regarding multi-year funding should be made case by case, based on the nature, scope, and complexity of the particular project.

Currently most agencies follow nearly identical procedures in planning and budgeting for both small and large projects. The oversight process generally required for highly complex projects (usually the larger ones) is the same as for smaller, more routine buildings. For example, with roughly 1200 projects in the 1987 fiscal year military construction program,

half were budgeted at less than $2 million. Together, these 600 or so projects constituted only about 10% of the total construction budget. These smaller projects require administrative and technical staff work that might better be applied on larger projects that are generally more complex and difficult to manage. Workshop participants proposed that procedures should be established to allow for lump-sum authorizations and appropriations on an annual basis for small projects (i.e., less than $2 million).

ARCHITECT/ENGINEER SELECTION

Most federal construction projects of any significance are accomplished by contract. The single most important factor in achieving quality of design in federal buildings is often the selection of the A/E firm that will develop the design.

The selection process--carried out within the framework established by the Brooks Act--generally begins with the posting of a notice in the Commerce Business Daily (CBD), and the subsequent submission by an A/E firm of Standard Forms 254 and 255. The workshop participants felt that procedures, within the framework established by the Brooks Act, should be improved. First, the respondent is usually not asked to address specific design expectations for the proposed project. Second, the open-ended nature of the SF 255 encourages voluminous responses. Such expanded and often extravagant submissions may give competitive advantage to large firms that have both the resources to commit to their preparation and a large portfolio of previous projects to submit. The most significant problem, however, is that the persons reviewing the various initial submissions often have very little basis on which to make assessments (particularly regarding capability to perform quality design) of an individual firm's work. Comparisons of relative competence among applicants is very difficult because of such wide variety in the content and quality of submitted materials. Smaller or regional firms that can produce high quality work may be lost in the initial screening process.

To offset the advantages of larger firms, agencies with substantial building programs often follow the practice of rotating contract awards among qualified A/E firms to avoid accusations of favoritism or unfair competitive advantage. While such a policy may occasionally allow A/E contracts to be awarded to otherwise unknown firms who can produce good quality work, such strategies generally make it more difficult for the government to benefit from the learning experience of designers who have performed well on previous assignments. Although such “pass-around” or distribution-of-work policies may have positive political results, workshop participants suggested that they are not in the best interests of achieving quality of design.

Workshop participants agreed that A/E selection for a specific project should be based on the evaluation of three fundamental factors, and acknowledged that these factors are in principle incorporated in the present selection process:

(1) The quality of past projects directly attributable to members of the design team for the project contemplated;
(2) The experience and qualifications of the design team members; and
(3) The proposed design approach for arriving at a final solution.

Another factor that is more difficult to evaluate is the "chemistry" or fit anticipated between the design team and the individuals representing the client or agency.

Different types of building projects may require different selection procedures and emphases. Design selection criteria, the program objectives outlined in the request for proposals (RFP), and the selection panels should be tailored to each building project. The workshop participants concluded that there is some value in the fact that various agencies have a procurement system unique and responsive to their mission, and rejected completely measures that would attempt to standardize or centralize A/E selection without regard to the specific needs of each project or agency. However, the participants suggested that the agencies are not always particularly effective in their individual selection processes and noted mixed results in quality of selections, not only among agencies, but also among projects within a single agency.

While most large federal projects receive adequate publicity to stimulate a broad response from the A/E community, this is not necessarily true for projects that are smaller in scope and that might be more appropriate for a large number of smaller firms unaccustomed to doing business with the federal government. In order to ensure that the best firms are given a chance to compete, the agency may need to make sure that such firms are aware of the opportunity. To this end, agencies should develop and maintain a data base on outstanding projects and their respective designers, and use this data base when developing lists of prospective design candidates of a particular assignment.

Workshop participants agreed that maintaining the continuity of the original design team to the success of design is crucial. An agency-wide effort to minimize the time that elapses between the beginning of the application and interview process and the completion of contract negotiations would significantly increase the chances of working with the original design team. Additionally, to ensure that the commitment to design quality is sustained, a member of the selection committee should be assigned to the agency negotiating team to monitor and/or participate in negotiations.

Although the workshop participants did not attempt to analyze each agency, some contended that the rating sheets used to compare A/E firms may have an inherent bias toward very large organizations and those with an extended history of building design. Questions or criteria that ask for an "evaluation" of the various firms' project histories, number and types of in-house specialists, and specific projects that demonstrate the performance characteristics sought may, in fact, provide useful insight, but since the largest firms have greater flexibility because of their larger portfolios, only those projects that are highly successful need be shown.

The workshop participants supported agencies' use of designers who are not federal employees in the selection and/or interview process for selected projects. The precise composition of a selection group (which should also include in-house expertise and user representatives) should vary depending on the scope and type of project. The State Department and General Services Administration have both utilized panels of outside reviewers. The State Department has reported favorably on experience with such panels in selecting designers for overseas embassies, while the GSA's Public Advisory Panel is said to have yielded mixed results.

One form of A/E selection seldom used by federal agencies is the professional design competition. Unlike other countries (such as Germany, where nearly all private A/E involvement in public buildings results from government-sponsored design competitions), there does not exist an obligatory management or review process in the U.S. to oversee the design competition process. Workshop participants noted that a properly managed competition can greatly enhance the probability that a higher level of design quality will be achieved.

Participants cited some of this country's most notable historic and contemporary public buildings which have resulted from various types of design competitions: the U.S. Capitol, the White House, the Washington Monument, the Nebraska State Capitol, the Pan American Union (now Organization of American States), the Library of Congress, the New York Public Library, Boston City Hall and the adaptive re-use plan for the Old Post Office in Washington, D.C. Competitions have also provided the basic schemes and the basis of selection for the A/Es for such private undertakings as the Chicago Tribune Building, the highly sophisticated Intelsat Headquarters in Washington, D.C., and the Humana Tower in Louisville, Kentucky.

There are commonly voiced criticisms of design competitions: The process necessitates an increase in the length of time devoted to a project. Competitions add to the cost of the project. The process limits or restricts designer/client interchange during the important conceptual phase of the design process. Compensation for competing firms seldom covers the actual costs of the formal submissions. The focus is often more on the visual qualities of the design than functional aspects. However, workshop participants felt that with proper management, the cost of design competitions and any additional time in the process can be minimized, and are in any case marginal compared to the total life and cost of the proposed project. Generally speaking, design competitions are far more publicized and visible than other procurement methods and often receive more attention from the public. Such visibility would help foster quality of design within federal programs and appreciation within the design profession, and the public at large of the government's commitment to quality.

Appropriate compensation may be the single most important incentive for an A/E firm to consider federal work. Some workshop participants believed that the current statutory limitation that design fees not exceed six percent of project construction cost may be counter-productive in terms of both attracting reputable firms and providing fair and reasonable incentives for quality work. The complexity of various projects

often has little relationship to a pre-established fee that is now virtually an industry standard. The design services for many projects should be accomplished for an amount less than six percent, while in some instances, a higher percentage of the construction cost may be needed to solve complex building problems or issues. The best firms can afford to be selective about their projects, and will be attracted to those projects, almost exclusively in the private sector, that will provide a measure of compensation directly related to the effort involved. The disincentive of a fee that is arbitrarily low will almost guarantee that a firm's best and most talented people will be assigned to projects other than those of the federal government. .

Some agency procurement personnel assert that many qualified firms are willing to undertake federal design at amounts well below the statutory limits. Further, the limit applies only to preparation of drawings and specifications. If the design team is called upon to perform other services such as geotechnical exploration, materials testing, or background research, the total fees received by an A/E firm may exceed six percent of the construction cost.

PARTICIPATION IN DESIGN AND CONSTRUCTION

Workshop participants noted that the A/E called upon to design federal facilities responds directly to the guidance from agency personnel participating in the selection and technical management process. If these personnel understand and appreciate design quality and are prepared to represent the agency's interests as both users and owners, the quality of design is more likely to be high. Workshop participants cited the Park Service as an agency that has been successful in recruiting effective personnel and subsequently achieving high quality in design.

Various public agencies and large private entities have substantial experience in using predominantly in-house design staff rather than contracting for services. It has been argued that by using in-house staff for at least a portion of the design work, the staff are able to maintain their professional currency and are more highly motivated. Similarly, the ability to recruit top entry-level professionals is greatly enhanced.[14] However, there is understandable reluctance on the part of private sector firms and established professional organizations to accept any change in policy that would direct a greater percentage of federal work to be done in-house.

Workshop participants felt that quality of design can be achieved with either in-house staff or contract services, but without the guidance

[14] Workshop participants cited specific examples, particularly in Australia and Great Britain, that support the contention that buildings of obvious quality can be produced by an agency professional staff. Participants could not determine whether such cases demonstrate specific management practices that could be adapted to federal agency design.

of competent agency staff and a clear mandate to produce quality design, the ability of private-sector contractors to perform optimally will be seriously impaired. If the in-house staff are not at a level of competence similar to that found in the private sector, A/E firms cannot be expected to achieve the level of design quality that they are capable of performing. And if the A/E firm is selected for reasons only tangentially related to issues of design quality, the agency's objectives will not be achieved. Since the A/E selection process, as well as the program and the review process, is usually directly affected by the agency staff, the need for recruiting the “best and the brightest” must not be underestimated, and may warrant review of the civil service rating system for design professions.

Presuming that the agency has done a thorough job in soliciting, selecting and contracting with the best available A/E firm, the role of the agency during the design process phase is still critical to achieving design quality. Fundamental to this role is the development of an understanding, on record, of the quality objectives intended for the project. If not clearly articulated in the appropriate program document or agency design guidelines, the A/E should be invited to work with the agency staff and the end-user to define the level of quality desired.

The expectations of the agency and the end-user must be explicit if the design team is to perform at an optimal level. Obviously, the quality of agency personnel directing the effort is important for developing and maintaining an appropriate level of communication with the design consultants. Promulgation of formal design guidelines stating the agency's policies and expectations will also be helpful.

Workshop participants asserted that very early in the process the agency staff should designate qualified and responsible persons representing both the agency and end-users to be members of the design team, and insist on continuity of both these personnel and the A/E staff through design and construction of the facility.

Agency staff should be guided by explicit design guidelines and criteria that address issues of design quality. Workshop participants felt that there should be a clear distinction between guidelines and criteria and that this is not always the case. Design guidelines should be broad and general in nature so as not to restrict the design team or stifle creativity. Design criteria, on the other hand, should be more project specific and be focused on establishing specific needs and levels of performance expected in a given project.

The method and timing of reviews during the design process is also a significant factor in achieving quality. The stages and frequency of such reviews, the individuals involved in the reviews, and the method and timeliness of feedback to the design team are important considerations in structuring the design phase. The type and completeness of information developed by the design team for each review should also be clearly delineated if these sessions are to have maximum value. (For example, models, full-scale mock-ups, and computer-based systems simulation may be used to augment drawings to improve communication among participants.) Prior to entering the construction stage, a thorough review of all

construction documents should be made. All user agency representatives should be invited to participate, along with the design and construction agent (e.g., GSA, Corps of Engineers, or other agencies) designated, to oversee construction.

While experience varies from agency to agency and from project to project even within a single agency, workshop participants felt that additional agency reviews were necessary to improve design quality, particularly in the preliminary and schematic phases of design. Typically, this is the time to make decisions or changes that later in the design process will be costly to alter. Detection and correction of design deficiencies become more difficult as the design stage nears completion.

Workshop participants felt it important to emphasize that design quality is largely determined prior to the commencement of construction. During the construction process, the focus must be on maintaining the integrity of the design by insuring that construction documents are followed. Where omissions or errors exist or when new information suggests the need for revisions of the documents (i.e., "change orders"), care is required to assure that design quality reflected in the documents is not lost, and that opportunities for improvement are recognized.

Participants at the Woods Hole workshop identified several actions preparatory to or during construction that could directly contribute to maintaining or enhancing quality of design:

- Individual agencies should be given authority to pre-qualify construction contractors and major subcontractors, at least on selected projects. Federal agencies should cooperate in maintaining and sharing performance data on contractors.
- Agencies should require a qualified, full-time A/E job site representative (i.e., "clerk of works") or third party manager for all construction projects in excess of $2.5 million.
- Agencies and their contractors should establish acceptable levels of quality prior to start of construction, with mutual understanding of what is required to assure quality is maintained throughout construction.
- Agencies should insure they know who is accountable for quality assurance throughout construction, and should establish specific levels of authority and lines of communication for reporting on quality among designer, contractor, and agency representatives.

For some projects, a "design-build" strategy[15] may be appropriate to ensure continuous project responsibility. The purpose of the design-build strategy is to acquire, through a single contractual instrument, both design and construction services. While arguments can be made both for and against design-build, the committee was not able to determine that

[15] With this strategy, a single firm or team is selected to design and construct a facility. Such a procurement method is also termed "turnkey." The agency or an independently commissioned A/E may perform initial project planning, programming, and budgeting.

such an approach would necessarily increase design quality. However, the workshop participants believed that there is nothing inherent in the design-build process that would necessarily preclude a higher level of quality design, and the more rapid pace of activity may discourage loss of quality through simple delay and indecision.

A variation on the design-build process that has recently gained considerable attention in the private sector has been design-build competitions. In such a competition, typically three or more teams are invited (and paid) to submit conceptual plans for the facility along with a guaranteed maximum price for construction. For some projects, particularly those for public use or those to be located on a highly visible site, such a process may present significant advantages to a government agency. The Pennsylvania Avenue Development Corporation (PADC) in Washington, D.C., has conducted two very successful design-build competitions, one for the Willard Hotel and one for Market Square. Again, there is nothing inherent in this process that either promises or limits quality design. Yet, it is possible that properly conceived and executed design-build competitions can, in some instances, increase the probability of achieving design quality because of certain advantages implicit in the competition process, and by specifically focusing the competition on quality issues.

DESIGN EVALUATION

Quality design yields buildings that perform well throughout their service lives. A building's user evaluates the performance of the building in terms of its ability to satisfy both the organization's mission and the physical and psychological needs of the people who occupy the building. People's productivity and happiness depend on the healthfulness, safety, and aesthetic qualities of their environment, which depend on design. Analyses of a building's effectiveness with respect to users' needs and interests are generally termed post-occupancy evaluation (POE). A POE is dependent upon a set of pre-defined functional values and objectives related to these users' needs and interests. For the POE to be valid and meaningful, these values and objectives should have been clearly specified early in design or in the initial program document.

Energy consumption, mechanical system and sub-system performance, and maintenance costs are important elements of POE. An evolving discipline sometimes referred to as “building diagnostics” attempts to draw upon available knowledge, techniques, and instruments in order to predict a building's likely performance over a given period of time, usually without regard to the specific user productivity within the facility. While subjective judgments and values will always be present, building diagnostics attempts to limit its evaluation to measurable or quantifiable physical aspects of the building and its component systems.

The fields of building diagnostics and post-occupancy evaluation provide two of the most direct means of assessing design quality of federal buildings. Upon completion, the building may be analyzed in relation to its performance (operating costs, indoor air quality, noise elimination or

isolation, etc.), or in relation to the performance of any number of sub-systems, assemblies, or products.

Workshop participants proposed that such post-construction evaluation procedures should be more frequently used by federal agencies. Knowledge gained from building diagnostics and post-occupancy evaluations can have a positive impact on the programming and design of future facilities with similar characteristics.[16] POE results also allow the agency and A/E consultants an opportunity to learn how decisions made in the design process turn out to influence building performance.

The Woods Hole workshop participants also examined the role that various design awards programs might have on improving design quality. It was noted that federal buildings seldom receive recognition through established design awards programs operated under the auspices of the national professional societies at either regional and national levels.

The participants agreed that properly conducted awards programs could have a major position impact on design quality. Awards programs foster understanding of design excellence among both the professional design community and the public. The central issue of "design quality" in building construction is also made more accessible for comment and debate. The potential for recognition by peers provide a clear incentive to both designers and their clients to achieve quality.

It was proposed that a national design awards program, limited to completed federal buildings, be established and conducted every two years. Project submissions would be reviewed in three stages: first by technical assessors (representative of various federal agencies not directly involved with the submitted project); second by a team of external professionals with exemplary design credentials, who have available the earlier technical assessments; and third, by site visits by at least two members of the second stage evaluator team, who would interview with users and agency administrators as well as inspect the building.

Awards would be presented at an appropriate ceremony, documented and published biennially, thereby institutionalizing the process and publicizing exemplary projects representing the best of federal architecture. Formal recognition of distinguished federal buildings will encourage senior agency officials to address design quality as an agency objective in future projects, and will help to spread understanding of what is meant by quality.

The proposed awards program would supplement the Presidential Design Awards Program, established in 1983 by Presidential memorandum. Administered by the Design Arts Program of the National Endowment for the Arts, this quadrennial program is intended to recognize outstanding contributions to federal design in the fields of architecture, engineering, landscape architecture, planning/urban design, interior, graphic and product design, and historic preservation. The first awards were announced in the fall of 1984. Workshop participants felt that this existing program is

[16] Refer to "Post-Occupancy Evaluation Practices in the Building Process--Opportunities for Improvement." Building Research Board, National Academy Press, Washington, D.C. 1987.

commendable and valuable, but that a greater emphasis on design quality for federal buildings is needed.

BUILDING APPROVAL AND GENERAL MANAGEMENT

Workshop participants noted that each federal agency has a number of institutionalized general management practices, more or less specific to that agency, that may have significant impact on quality of design of individual building projects. These program-level management practices are expressed in the extensive array of general design criteria or guideline manuals of the agency. These general criteria typically apply to design of all buildings an agency may commission.

The need for agency design guidelines and criteria would seem to be based on the assumption that the agency has unique or special requirements that need to be made a part of each building's design. The workshop participants acknowledged that for some special types of facilities, such unique guidelines and criteria may be warranted. Indeed many private sector owners of very large building portfolios also have their own guidelines and criteria. However, participants noted that overly extensive and specific guidelines and criteria imply that the designer, left to his own devices, may very well not be motivated to produce quality, and that his flexibility design should be restricted. In effect, the criteria serve as insurance of certain aspects of performance, but reduce or eliminate altogether opportunities for the A/E or in-house designer to create something better. Given the complexity of buildings, the pace of technology development in the building industry, such criteria are useful, efficient, and often necessary, but agency design managers must assure that they do not serve to constrain productive creativity and quality of design.

At a broader level, workshop participants noted that there is currently no agency or individual within the federal government whose exclusive job it is to act as an advocate for quality of design in federal buildings. No single entity provides direction or assistance related to design quality to the various agencies directly involved in building design and construction. While the National Endowment for the Arts, National Trust for Historic Preservation, and a number of other government or government-enabled agencies include architecture within their scopes of interest, workshop participants felt the scope and magnitude of the federal buildings program warrants greater leadership and advocacy at the national level for enhancement of federal design quality. Virtually every aspect of the design-delivery process can affect design quality, and at every stage there must exist a desire and encouragement to improve quality.

Virtually all workshop participants felt that high level advocate for design quality in federal buildings is needed, and that a unit of government should be established to fulfill this role, perhaps with the title of Council on the Design Quality of Federal Buildings. Workshop participants did not attempt to develop the Council's structure, operations, or jurisdiction, but suggested that its membership should be composed of a “super

vising architect" from each agency with design and construction responsibilities.[17] An appointed design professional would head the body.

The proposed body would be responsible for advising the Congress and the President on legislative or executive actions that would enhance federal building design quality, and for assessing the design quality of federal construction in an annual report to the Congress and the President. Through these activities and ongoing advocacy the council would seek to ensure a basic commitment to quality of federal design.

[17] Precedents for "supervising architects" and a centralized design advocacy may be cited in past federal building practice. Refer to Chapter 4.

4

ANALYSIS AND RECOMMENDATIONS: IMPROVING THE QUALITY OF FEDERAL BUILDING DESIGN

In view of the inherent complexity of building design, the essentially subjective way that judgments about design quality are made, and the variations among agencies' design procurement and management practices, the Committee on Improving the Design Quality of Federal Buildings found it unclear whether the quality of design for federal agencies differs significantly from that delivered to the private sector. Nevertheless, responsible management of public resources and the importance of the federal presence in the nation's built environment mandate that the government continually strive to attain the highest possible quality of design in its buildings. The committee found that many of the suggestions of the Woods Hole workshop merit the attention of staff of the agencies and the Congress.

These recommendations are of two types: First, there are suggestions that may be considered by individual agencies that do not have input on other agencies. Second, there are those that may require congressional action, including a proposal to establish a centralized institutional focus for design quality advocacy in the federal sector.

RECOMMENDATIONS FOR AGENCY ACTION

Many of the actions proposed in the Woods Hole workshop to enhance quality of design in federal buildings can be taken by individual agencies operating within the scope of their current programs. Some of the actions involve Congress' oversight and appropriations procedures. The committee proposes that each agency and the Congress consider and appropriately adapt the following recommendations.

Pre-design Planning and Programming

The current methods and policies that tie funding appropriations to specific federal buildings impose excessive constraints on agencies at

earlier stages of the design process, when budget estimates are generally uncertain and functional requirements are subject to change. Agencies should be allowed greater internal budget management flexibility to accommodate variations in single projects, subject to maintaining stability in their overall building program. Spending authorization should be for a multi-year period, perhaps as much as five years.

Architect/Engineer Selection

Panels responsible for evaluation, interview, and selection of designers for federal projects could in many cases benefit by the participation of professionals who are not employees of the federal government. These professionals should have established records achieving design quality.

The A/E evaluations and interviews should be conducted in such a manner as to eliminate initially all firms that do not demonstrate the base level of design competence expected for the facility designed. Agency selection procedures should depend less on standardized rating schemes and should be flexible to respond to the specific character of each project. Design competitions warrant more frequent consideration as a way of selecting designers for a range of federal projects.

Competence of A/E firms is not demonstrated necessarily by prior experience designing the same type of facility, although that is one valid criterion. Rather, design experience should demonstrate successful resolution of conflicts of scope and complexity similar to those involved in the project to be designed.

Participation in Design and Construction

Agencies should have explicit design guidelines and criteria that address issues of quality expected in design. Effective reviews of ongoing design activity should be made by experienced and knowledgeable agency personnel, including representatives of the user organization. Especially significant projects may warrant the use of reviewers who are not agency employees. The validity of the design program and the design objectives should be thoroughly examined in these reviews. The initial design concepts and considerations affecting design quality should be examined relative to the explicitly stated design objectives.

Design Evaluation

The federal government could improve the efficiency of its design and construction programs by developing and implementing appropriate methods of post-occupancy design evaluation. The knowledge gained in these post-occupancy evaluations, conducted by teams that include the original programmers and designers, agency staff, and independent consultants should

be incorporated into the A/E selection and design processes for future projects.

Expanded national design awards programs for federal buildings are needed to promote and reward quality design. The existing National Endowment for the Arts' Presidential Design Awards and the Department of Defense's Awards for Design Excellence programs are commendable, but the need for greater emphasis on quality warrants additional awards programs.

Building Approval and General Management

Overly restrictive design criteria and guidelines limit designers' flexibility and may inhibit achievement of design quality in federal buildings. Federal agencies should review carefully their building design criteria and guidelines documents to determine whether they impose excessive constraint on options available for designers attempting to resolve unavoidable conflict among design objectives. The role of building management and maintenance practices in determining quality may warrant further attention.

CONGRESSIONAL ACTION AND CENTRALIZED ADVOCACY FOR DESIGN

The committee noted that congressional action may be required to enable greater agency budget flexibility. Even where current legislation may permit such flexibility, attitudes that lead to detailed congressional review of line item budget estimates and design decisions may often inhibit an agency's ability to maintain a commitment to quality. The concern to control or reduce costs may lead to reduction in budgets without regard to the associated restrictions in program or design options that are typically required.

The committee concluded in particular that creation of a centralized institutional focus for design quality in federal buildings warrants further investigation. Such a focus would aid the efforts of individual agencies to improve quality, and would help to enlighten the public and their representatives regarding the meaning and importance of design quality.

The committee noted that there are historic precedents for greater centralization of quality advocacy as well as current models for an institutional focus of the type envisioned by participants at the Woods Hole Workshop.

Historic Perspective

Government building activities during the early decades of the nation expanded rapidly with the nation's expanding borders and growing population. Most of these activities were conducted by the Treasury Department, although

the Army Corps of Engineers was building fortifications and other military facilities, and the Congress maintained avid interest in many large projects. Placing a new emphasis on construction and in an effort to foster management efficiency, an Office of Construction was created within the Treasury, headed by an Army engineer officer, Captain Alexander H. Bowman. Capt. Bowman was assisted by the first designated "Supervising Architect," Ammi B. Young, whose title became legislatively established a decade later, in 1864. Professionals employed within the Office of Construction directly performed much of the government's building design.

By 1892, the burgeoning scale of the government's design activities and private designers' desire to participate led the American Institute of Architects (AIA) to seek successfully the passage of legislation to permit (but not to require) the Treasury to acquire outside architectural services through competition. The Tarnsey Act, from 1893 until its repeal in 1912, fostered design of some 35 buildings by some of the nation's best-known private architects. Suspicions of higher design costs and bias in favor of AIA members led to the Act's repeal.

While the Treasury continued to control and execute the major share of federal building designs, the activities of other agencies were growing. By 1914, at least seven government agencies were constructing buildings for themselves.[18] World War I and the rapid growth in western states gave powerful impetus to this trend of decentralization of design influence. A group of government architects in Washington founded the Association of Federal Architects in 1927, to encourage an exchange of ideas among the various construction agencies, enhance design and technical standards, and boost morale of civil servant architects. The organization's first president, Louis A. Simon, became in 1933 the government's last Supervising Architect.

The Public Building Acts of 1926 and 1930 again authorized the Treasury Department to acquire private design services, and Depression spurred demands by private architects for a share of the government's design work. Administrative turmoil and retrenchment under the New Deal led in 1939 to creation of the Public Buildings Administration (PBA) within the Federal Works Agency. The title of Supervising Architect disappeared and the PBA absorbed much of what the 1850s Office of Construction had become. For the first time, some design supervision was delegated to regional offices. The government's centralized concern and capability in building design declined.

In 1949 the General Services Administration (GSA) was formed and incorporated the PBA. The GSA has since its establishment relied almost exclusively on private providers of design services. Agencies with

[18] As documented in a Report of the Public Buildings Commission, 1914, cited in the Federal Presence, op cit, p. 241.

specialized building needs continue to maintain their own distinct building operations.[19]

Centralized attention to issues of design was motivated by President Kennedy's strong interests in art and architecture. His Ad Hoc Committee on Federal Office Space produced a 1962 report, "Guiding Principles for Federal Architecture," that espoused quality in government architecture but asserted--perhaps ironically for those who equate quality with particular stylistic characteristics of design--that development of a single official style must be avoided. A decade later, the National Endowment for the Arts' (NEA)[20] Federal Architecture project started its five-year effort to improve the quality of design throughout the federal government.

The NEA's ongoing Federal Design Improvement Program continues the effort to foster quality in federal design. The Presidential Design Awards were established by President Reagan in 1983, under NEA's administration as part of that program, to honor and encourage outstanding design achievements in federal projects and programs.

Reflecting on this history of federal activities in building design, the committee doubts that any new federal institution can assume centralized design policy authority or that any existing institution can expand its scope of interest to encompass all of the agencies responsible for producing federal buildings. At the same time, the committee endorses the Woods Hole workshop's sentiment that there is a need for more visible advocacy for design quality in federal building programs. The committee therefore considered agencies that might serve as models or the basis for an institution with active responsibility to shape policy to enhance quality of design in federal buildings.

Current Alternative Models

The Surgeon General of the United States, for example, serves as the principal advisor to the President on public health matters and advises the Assistant Secretary for Health on all policy matters pertaining to the Public Health Service. This officer also serves as the focal point for dialogue with professional societies from which the Surgeon General can receive, solicit and channel concerns regarding health policy. A

[19] These agencies have increased in number from the four active when the GSA was established (Department of Defense, Veterans Administration, State Department, and National Park Service) to more than thirty today. See Appendix A.

[20] The NEA was established as part of the National Foundation on the Arts and Humanities, to foster professional excellence in the arts in America, to nurture and sustain the arts, and to help create a climate in which they may flourish and be experienced and enjoyed by the widest possible public.

design official serving in a similar position[21] would deal with broad issues of federal policy that relate to design of the built environment and would coordinate the policies, regulations, and procedures of the federal agencies undertaking building design and construction.

The Advisory Council on Historic Preservation represents a different model. This agency, established by the National Historic Preservation Act of 1966, has two principal duties: to advise the President and the Congress on matters concerning the national program to preserve the nation's history, and to oversee the specific process[22] established to protect historic properties from needless harm by Federal activities. Nineteen members drawn from federal, state, and local government and the public at large comprise the Council, which is supported by a professional staff and funded by Congress. A design-oriented agency might have a similar mission to review and comment on major federal building design activities and to advise the President and Congress on policy and legislation that may influence quality of design.

The Council on Environmental Quality (CEQ) was established by the National Environmental Quality Act of 1969[23] as a part of the Executive Office of the President, to formulate and recommend national policies to promote the improvement of the quality of the environment. The three presidentially-appointed members of the Council and a small professional staff review trends in the nation's environmental quality, appraise the environmental consequences of the federal government's various programs and policies, and prepare an annual report on their findings and recommendations for national policy. The CEQ also serves as the central coordinating agency for processing of environmental impact statements required to assess and document the likely consequences of major federal actions having significant impact on the environment. A design-oriented unit of the CEQ or a separate agency might play a similar role, focusing particularly on design and the built environment.

The workshop's proposed “Council on Design Quality of Federal Buildings” appears to the committee to be analogous in constitution and responsibilities to the Advisory Council on Historic Preservation. The committee did

[21] Such an official might perhaps come within the General Services Administration. The Department of Housing and Urban Development, which has no construction responsibilities, but does deal with matters having important design components, might be an alternative home for such an official.

[22] Section 106 of the National Historic Preservation Act requires federal agencies to consider the impact of their actions on historic properties and provides for comment by the Advisory Council on all such actions. The process of review and comment extends to activities to attempt to avoid or mitigate adverse impacts that may occur.

[23] 83 Stat. 852; 42 USC 4321 et seq.

not explore fully the costs, administrative difficulties, and potential benefits of creating such an agency concerned with federal building design quality, but concluded that the idea merits attention. The committee commends the idea to the Congress.

Competence of A/E firms is not demonstrated necessarily by prior experience designing the same type of facility, although that is one valid criterion. Rather, design experience should demonstrate successful resolution of conflicts of scope and complexity similar to those involved in the project to be designed.

Participation in Design

Effective agency reviews of ongoing design activity should include, for significant projects, the use of external evaluators. The validity of the design program and the design objectives should be thoroughly examined by agency professionals, including representatives of the building's intended ultimate users. The initial design concepts and considerations affecting design quality should be evaluated relative to the explicitly stated design objectives.

Post-Design Evaluation

The federal government could improve the efficiency of its design and construction programs by developing and implementing appropriate methods of post-design evaluation. The knowledge gained from pre-construction, post-construction, and post-occupancy evaluations could be incorporated into future projects, making it easier to achieve design quality. The evaluations should be accomplished by teams that include the original programmers and designers, agency staff, and independent consultants.

National design awards programs for federal buildings should be expanded and held with regular frequency. Evaluation and selection of facilities for award should be based on criteria fundamental to the definition of design quality. The evaluation criteria should be widely publicized and the programs could be administered by the government or by organizations representing design professionals, such as the American Institute of Architects, the American Society of Civil Engineers, and the American Society of Landscape Architects. The committee notes that the existing Presidential Design Awards and the Department of Defense's Awards for Design Excellence are outstanding examples to be emulated by other agencies.

General Management of Design

Inappropriate design criteria and poorly constructed guidelines have negative impact on the design quality of federal buildings. Federal agencies should review carefully their building design criteria documents

to determine whether they impose excessive constraint on options available for designers attempting to resolve unavoidable conflict among design objectives.

IMPROVING THE QUALITY OF DESIGN

The committee found in discussions of the practices that influence design of federal buildings a widespread attitude of trying to achieve minimum acceptable standards of performance at the lowest possible cost. The committee did not feel this attitude is entirely unwarranted. However, there are great difficulties inherent in defining all aspects of a building's desired performance in terms of clear minimum acceptable standards. Further, complex patterns of construction, operating, and maintenance costs must be paid over the course of a building's service life, and will influence both a building's performance and the building owner's satisfaction with that performance. The committee recommends that greater attention be given to the tradeoffs between performance and costs. Design quality is achieved when the balance between performance and costs reflects effectively the needs of the building's owner and users and the best that current building technology and creative designers can deliver.

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APPENDIX A

FEDERAL AGENCIES THAT ARE RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF GOVERNMENT FACILITIES[1]

DEPARTMENT OF AGRICULTURE

The Soil Conservation Service

The Forest Service

Agricultural Research Service

Farmers Home Administration

DEPARTMENT OF DEFENSE

Office of the Assistant Secretary for Installations

Department of the Air Force - Directorate of Engineering and Services

Department of the Army - Office of the Assistant Secretary for Civil Works; Office of the Assistant Secretary for Installations and Logistics; U.S. Army Corps of Engineers

Department of the Navy - Office of Installations and Facilities; Naval Facilities Engineering Command

DEPARTMENT OF ENERGY

Office of the Assistant Secretary for Management and Administration

Bonneville Power Administration

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Office of the Assistant Secretary for Management and Budget

Public Health Service - Office of Management

[1] There are a number of other federal agencies that have an interest in construction. Some, like the National Science foundation, give grants for construction-related research. Other agencies, like the National Institute of Standards and Technology of the Department of Commerce, conduct construction-related research themselves. Still others, like the Federal Highway Administration of the Department of Transportation, provide funding for construction undertaken by other public and private organizations.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Office of the Assistant Secretary for Public and Indian Housing

DEPARTMENT OF THE INTERIOR

National Park Service

Office of the Assistant Secretary for Indian Affairs

Office of the Assistant Secretary for Land and Minerals Management

Bureau of Reclamation

DEPARTMENT OF JUSTICE

Bureau of Prisons

DEPARTMENT OF STATE

Office of the Deputy Assistant Secretary for Foreign Buildings

DEPARTMENT OF TRANSPORTATION

Office of the Assistant Secretary for Administration

United States Coast Guard - Office of Engineering

ENVIRONMENTAL PROTECTION AGENCY

Office of Administration

FEDERAL EMERGENCY ADMINISTRATION

Office of Facilities Management

GENERAL SERVICES ADMINISTRATION

Public Buildings Service

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Office of Facilities Management

UNITED STATES INFORMATION AGENCY

Office of Management

Voice of America

VETERANS ADMINISTRATION[2]

Office of Facilities

SMITHSONIAN INSTITUTION

Office of Facilities Services

TENNESSEE VALLEY AUTHORITY
Office of Power
UNITED STATES POSTAL SERVICE
Office of Facilities
UNITED STATES CONGRESS
Architect of the Capitol

[2] Soon to be Department of Veterans Affairs

APPENDIX B

NATIONAL RESEARCH COUNCIL BUILDING RESEARCH BOARD

Improving the Design Quality of Federal Facilities Workshop, July 14-17, 1987 National Academy of Sciences Woods Hole Study Center Woods Hole, MA

WORKSHOP PARTICIPANTS

Committee Members

Mr. Clifton D. Wright, Hon. AIA, Chairman
Chairman and CEO
3DI
Mr. George M. Notter, Jr.
President
Notter, Finegold & Alexander
Mr. Tom Lewis Peyton, Jr., P.E.
Leo A. Daly
Professor Wolfgang F.E. Preiser, Ph.D.
Director, Center for Research & Development
University of New Mexico
Ms. Belinda Reeder, Architect and Principal
ARCHETYPE
Mr. James Rich
Assistant Vice President
Sigal/Zuckerman Company
Mr. James A. Schemmer
The Schemmer Associates
Mr. Peter N. Steigerwald
Director, Facilities and Administrative Services
TRW, Inc.

Speakers

Brig. General Joseph A. Ahearn
The Pentagon
Captain Michael M. Dallam
Office of Assistant Secretary of Defense
The Pentagon
Mr. Robert A. Peck
Vice President for Real Estate and Financial Services
Walker and Dunlop, Inc.
Professor Lois Craig
School of Architecture and Planning
Massachusetts Institute of Technology

Invited Participants

Mr. Steve Swain
Professional Staff Member
Senate Committee on Environment and Public Works
Mr. James Franklin
Executive Director of Professional Services
American Institute of Architects
Ms. Carole Olshavsky
State Architect
State of Ohio
Mr. J.B. Cole
USAF Regional Civil Engineer
Mr. Cy Merkezas, Architect and Principal
ARCHETYPE
Mr. Joseph Esherick, FAIA
Esherick Homsey Dodge
Mr. Lew Whitney
U.S. Army Corps of Engineers
Mr. Tom Nichols
U.S. Army Corps of Engineers
Mr. Stephen Margulis
Seidman School of Business
Grand Valley State College (MI)

Ms. Margot Villecco
Architecture Journalist/Consultant

Federal Construction Council Liaison Members

Mr. Donald D. Boyle, P.E., AIA
U.S. Public Health Service
Mr. James Enloe, R.A.
Air Force Directorate of Engineering and Services
Mr. Louis E. Childers
U.S. Postal Service
Mr. Everett B. Franks, AIA
U.S. Public Health Service, Seattle
Mr. Thomas Gallegos, P.E.
U.S. Public Health Service
Ms. Rachel James
U.S. Army Corps of Engineers
Mr. William Quade
Naval Facilities Engineering Command

Public Facilities Council Liaison Members

Mr. Narinder S. Jolly
Dade County General Services Administration
Mr. Henry Preisendorfer, Architect
Department of Facilities and Services
Montgomery County Government (MD)
Mr. Richard Thomas
Division of Design
State of New York

Staff

Mr. John P. Eberhard, Director, Building Research Board
Professor Roger L. Schluntz, Arizona State University, Project Director
Ms. Gretchen G. Bank, Staff Consultant

APPENDIX C

NATIONAL RESEARCH COUNCIL BUILDING RESEARCH BOARD

Improving the Design Quality of Federal Facilities Workshop, July 14-17, 1987 National Academy of Sciences Woods Hole Study Center Woods Hole, MA

AGENDA

Tuesday, July 14	
4:00 - 6:00 p.m.	Arrival in Woods Hole
6:00 - 6:30	Informal reception at NAS Study Center
6:30 - 7:30	Dinner/Clambake at Study Center
7:45 - 8:45	Welcome by John Eberhard and Duke Wright * GENERAL BUD AHEARN: "Quality: A User's Perspective"
Wednesday, July 15	
7:30 - 8:30 a.m.	Breakfast at Study Center
8:45 - 10:00	* LOIS CRAIG and BOB PECK: "Past Initiatives - The Federal Architecture Project"
10:00 - 10:30	Coffee
10:30 - 11:30	* CAPTAIN MICHAEL DALLAM: "Design Stepping Stones on the Path to Quality Facilities"
11:30 - 12:30 p.m.	Discussion
12:30 - 1:30	Lunch at Study Center
1:30 - 6:30	Afternoon free
6:30 - 9:00	First session of subcommittees, during or after dinner
Thursday, July 16	
7:30 - 8:30 a.m.	Breakfast at Study Center
8:30 - 9:30	General session: Overview of subcommittee directions
9:30 - 11:30	Second session of subcommittees
11:45 - 1:00 p.m.	Lunch at Study Center
1:15 - 2:30	Third session of subcommittees
2:30 - 3:00	Coffee
3:00 - 4:30	Fourth session of subcommittees
6:30 - 7:30	Dinner at Study Center
7:30 - 8:30	* ADDRESS: ROBERT A. PECK, WALKER & DUNLOP

Friday, July 17	
7:30 - 8:30 a.m.	Breakfast at Study Center
8:30 - 10:00	General session: Reports of the five subcommittees
10:00 - 10:15	Coffee
10:15 - 12:00	General session: Debate on recommendations
12:00 noon	ADJOURN
12:30 - 3:00	Committee meeting and luncheon

SUBCOMMITTEE 1: Pre-design/Programming, Planning

Mr. Tom Lewis Peyton, Co-chairman
Mr. James Rich, Co-chairman
Captain Michael Dallam, Speaker
Mr. J.B. Cole
Mr. John Eberhard
Mr. Lew Whitney

SUBCOMMITTEE 2: Selection Process

Mr. James Schemmer, Chairman
Mr. Robert Peck, Speaker
Ms. Carol Olshazski
Mr. Harry Stevens
Mr. Roger Schluntz
Mr. Everett Franks
Ms. Margot Villecco

SUBCOMMITTEE 3: Participation during Design and Construction Process

Mr. Peter Steigerwald, Chairman
Professor Lois Craig, Speaker
Mr. Cy Merkezas
Mr. Louis Childers
Mr. William Quade
Mr. Henry Preisendorfer
Mr. Narinder Jolly

SUBCOMMITTEE 4: Evaluation

Professor Wolfgang Preiser, Chairman
Ms. Belinda Reeder
Mr. James Franklin
Mr. Joseph Esherick
Mr. Stephen Margolis
Mr. Donald Boyle
Ms. Gretchen Bank

SUBCOMMITTEE 5: Management Process

Mr. George Notter, Chairman
Brig. General Joseph Ahearn, Speaker
Mr. Clifton Wright
Mr. Steve Swain
Mr. Tom Nichols
Mr. James Enloe
Mr. Thomas Gallegos

APPENDIX D

BIOGRAPHICAL SKETCHES OF COMMITTEE MEMBERS

DAVID P. BILLINGTON is Professor of Civil Engineering at Princeton University, where he is also a member of the faculty of the School of Architecture. He has been teaching at Princeton since 1958. Prior to beginning his teaching career, Mr. Billington studied postwar innovations in construction, structural design theory, and research on a Fulbright Fellowship, and worked as a structural designer for the Roberts and Schaefer Company, Consulting Engineers. In 1958 he was a member of a six-man delegation to the Soviet Union to observe concrete construction. He is a Fellow of both the American Society of Civil Engineers and the American Concrete Institute and has been named a member of the National Academy of Engineering. During 1984 and 1985 he served as Phi Beta Kappa Visiting Scholar. He received his B.S.E. from Princeton University.

GEORGE M. NOTTER, JR., 1984 President of the American Institute of Architects, is a founding principal of the architecture firm, Notter Finegold & Alexander, Inc. The firm has been a leader in planning for urban areas, the design of new structures in urban areas, and the adaptive use and preservation of historic buildings and districts. Mr. Notter was principal in charge of design for projects that included the restoration of the Main Immigration Building at Ellis Island, New York City; Old City Hall, Boston; and Intelsat World Headquarters, Washington, D.C. He is a Fellow of the American Institute of Architects, the historic preservation consultant to the Pennsylvania Avenue Development Corporation, and the architectural member of the Advisory Committee on the West Front of the U.S. Capitol. He holds an A.B. from Harvard University and a Masters of Architecture in Urban Design Studies from the Harvard Graduate School of Design.

TOM LEWIS PEYTON, JR., is currently Assistant to the President of Leo A. Daly, an international architect engineering firm. From 1979 to 1986 he was Director of Facilities Services at the Smithsonian Institution, with responsibilities in facilities planning, programming, design and construction, operations and maintenance, and a host of other areas. Before that he was at the Public Buildings Service of the General

Services Administration, where he served as Deputy Commissioner from 1975-1978. From 1947 to 1965 he was a career officer with the U.S. Army Corps of Engineers. He is a registered professional engineer in Maryland and Kansas and served as the U.S. Chairman of the U.S.-USSR Working Group on Building Design and Construction under the Nixon-Kosygin Agreement, 1975-1979. He holds a B.S. in Civil Engineering from Virginia Military Institute and a Masters in Industrial Engineering from New York University.

WOLFGANG F.E. PREISER is Professor of Architecture and Director of the Center for Research and Development at the School of Architecture and Planning, University of New Mexico. He is a partner and director of research with Architectural Research Consultants, Inc., and founding President of Planning Research Institute, Inc., in Albuquerque. Dr. Preiser's wide-ranging research interests include programming to meet occupant needs, especially facilities for the elderly, children, and low-cost housing; and evaluation methodology and design applications of behavior research. He holds a Ph.D. in Man-Environment Relations from Pennsylvania State University, as well as Masters in Architecture from Virginia Tech and the University of Karlsruhe in Germany. His bachelor's degree in architecture is from the Technical University in Vienna, Austria.

BELINDA C. REEDER is principal architect and partner in ARCHETYPE, a Washington, D.C. architecture firm that specializes in commercial, housing, and community design with emphasis on historic restoration and appropriate infill construction. From 1976 to 1978 Ms. Reeder was a research associate at the American Institute of Architects Research Corporation; at the same time, she served as educational consultant to the National Architectural Accreditation Board. Prior to that, she worked at Arthur Cotton Moore Associates and at Doxiadis Associates. Between 1972 and 1977 she was lecturer with the design faculty at Rensselaer Polytechnic Institute, Virginia Tech, George Washington University, and Northern Virginia Community College. She was also an assistant professor in the Department of Architecture at the Catholic University of America. Ms. Reeder received her B.Arch. and M.Arch. degrees from Virginia Polytechnic Institute and State University (now Virginia Tech).

JAMES RICH is currently Assistant Vice President at Sigal/Zuckerman Company, a development firm in Washington, D.C. From 1983 to 1987 he was Director of Development at the Pennsylvania Avenue Development Corporation, where he was responsible for all development, planning, design, and real estate activities. He directed a $1.4 billion mixed-use private-sector development program and coordinated it with a $100 million public-improvement program of parks and landscaping funded directly by the Corporation. Prior to that, he was Director of Planning and Urban Design of the Washington office of Skidmore, Owings and Merrill. He holds a B.Arch. from the University of Florida, an M.S.

in Architecture from Columbia University, and a Master of Urban Planning degree from New York University.

JAMES A SCHEMMER is a registered civil engineer in 26 states and has over 28 years of experience in the fields of architecture and engineering. He founded the Schemmer Associates, Inc., in 1959 in Omaha, Nebraska. The firm currently has offices in Bellevue, Washington; Moline, Illinois; Davenport, Iowa; and Tampa and Orlando, Florida, in addition to the Omaha office. Mr. Schemmer has been involved in both private and public sector work and has served on the boards of directors of a number of professional and community organizations. He received a B.S. in Civil Engineering from Marquette University.

PETER N. STEIGERWALD is Director for Facilities and Administrative Services for TRW, Inc., where since 1982 he has been responsible for all corporate facilities, including operations, security, purchasing, office services, and real estate activities for company headquarters. He is also deputy project manager for the design and construction of TRW's World headquarters in Cleveland. Prior to that, he was corporate architect for the Harris Corporation, and from 1970 to 1974 he was corporate director of architecture and construction at Addressograph Multigraph Corporation. Other experience includes full partnership in Steigerwald and Steigerwald; project architect at Osborn Engineering; and city architect and advisor to the planning commission for the city of Fairview Park, Ohio. Mr. Steigerwald is a corporate member of the American Institute of Architects and a member of the Business Roundtable of Northern Ohio. He received his Bachelor of Architectural Engineering degree from the University of Detroit.

CLIFTON D. WRIGHT, JR., retired from the U.S. Air Force as a Major General and is currently Board Chairman and CEO of 3DI, a subsidiary of 3D/International. Before his retirement, he was Director of Engineering and Services, responsible for the entire multibillion-dollar USAF construction and maintenance program. Before that, he served in a variety of positions around the world, such as Commander of the Air Force Engineering and Services Center and Deputy Chief of Staff for Engineering and Services for both the Strategic Air Command and U.S. Air Forces in Europe. He was recognized in 1984 by the American Institute of Architects for his advocacy of quality design for Air Force and Department of Defense projects. He received a B.S. in Architectural Engineering from Clemson University and an M.S. in Public Administration from the George Washington University.