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Environmental Law and Construction Project Management

Michael S. Baram*

Construction project management generally proceeds through sequential stages of project conception, planning, site acquisition, design and construction. Traditionally, citizens and public officials have relied on various elements of American common law to prevent, abate or get compensation for injuries resulting from the *final* construction stage of project management. Common law concepts of nuisance, negligence and trespass have been applied by the courts to situations where essentially private rights have been infringed by debris, runoff, noise, vibrations, structural damage and other byproducts of the construction process. The common law has therefore indirectly served as an environmental control on construction activities in those few cases where assertion of private rights coincides with environmental protection. The concept of public nuisance has also been invoked infrequently by public officials to more directly protect environmental qual-

ity and community quality of life from the impacts of construction activities.¹

Some measure of environmental control has also been brought about by the use of local ordinances and state laws which influence the design and siting of constructed facilities. State and local authorities have "police powers" to protect and enhance public health, safety and welfare by means such as zoning, noise, building, and health ordinances.² Traditionally, both common law and constitutional concepts have indirectly and unsystematically provided the major bases for environmental control over project decision-making.

Federal and state authority to protect the environment and community quality of life from construction programs has also been exercised in the form of limited enactments to control specific resources such as navigable rivers, wetlands, historic areas, and wildlife.³ Finally, Government procurement and permit processes have been used to bring about contractor compliance with design, siting and performance specifications; and clauses promoting numerous government objectives including environmental quality to a limited ex-

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¹For a comprehensive review of common law applications, see SWEET, *LEGAL ASPECTS OF ARCHITECTURE, ENGINEERING AND THE CONSTRUCTION PROCESS*, West Publ. (1970).

²*Id.*

³See, for example, Staff of House Committee on Merchant Marine and Fisheries, 92d Cong., *A Compilation of Federal Laws Relating To Conservation and Development of Our Nation's Fish and Wildlife Resources, Environmental Quality, and Oceanography* (Comm. Print 1972).

tent have been employed in construction contracts.⁴

These elements of the legal system have, until recently, constituted the environmental control framework in which construction project decision-making occurs.

However, in the last few years, federal and state legislatures, agencies, and an environmentally aggressive judiciary have moved beyond these limited approaches to develop and enforce major pollution control programs. This recent development is, in turn, rapidly being superseded by new programs with broader objectives of bringing about coherent resource and land management and more responsible project decision-making, programs which inevitably are bringing about greater citizen roles in all stages of project management. The effects of these new developments are now being felt by public and private sector parties involved in the funding and management of construction projects and programs.

Major Developments in Environmental Law

Pollution Control

The federal Water Pollution Control program, the first major federal effort at pollution control, was initiated in 1948, and strengthened by major amendments in 1956, 1965,

and 1970. Under these enactments, public reliance was placed on state initiatives to establish standards and objectives for the quality of interstate bodies of water, criteria for discharges, implementation schedules, and enforcement proceedings. Results were slow to emerge and meager; and as water pollution worsened, environmentalists and the courts increasingly employed the 1899 Rivers and Harbor Act, with its simplistic provisions for immediate abatement of polluting discharges other than those of a domestic sewage nature.⁵ Chaos resulted as the diverse legislative approaches became operative over the same period of time, and the 1972 Water Pollution Control Act was designed and enacted, in large measure, to resolve these differences.⁶ The new law was also designed to cure a number of other problems in the federal program, by providing the administrator of the Environmental Protection Agency with authority and a timetable to establish national effluent criteria, to bring about use of the "best practicable" pollution control technology by 1977, the "best available" technology by 1983, and to reach a national "no pollution discharge" goal by 1985. Additionally an increased federal share of funding for wastewater treatment facilities is authorized by the law. Implementation of the new law will certainly effect the

⁴See Remarks by E. Manning Seltzer, General Counsel of U.S. Corps of Engineers, American Bar Association Meeting, Washington, D.C., 12 May 1972.

⁵See 33 U.S.C. 407 for the "Refuse Act" section.

⁶Water Pollution Control Act, Pub. L. 92-500 (1972).

siting of certain constructed facilities, the design of such facilities if their operations will produce objectionable effluent, and the construction process itself, with its attendant effects of sedimentation and erosion.

The federal Air Pollution Control program now being implemented under the 1970 Clean Air Act marks a similar approach to the control of activities and resultant constructed facilities which may impair air quality.⁷ Once again the siting and design of facilities and the construction process itself, must be undertaken in a new regulatory framework. Section 110 of the act also authorizes the federal administrator to regulate the construction of facilities which would add to the serious air quality problems of designated regions. State boards are also active: one has recently refused to issue permits for the construction of eighteen gasoline stations which would subsequently contribute to a worsening of an already degraded air quality region.⁸

The Federal Noise Control Act of 1972 marks the beginning of a similar national effort to control noise emissions from construction equipment and other products.⁹ New noise standards will be established for such products, and state and

local authorities will concurrently, and indeed more aggressively, continue to establish and enforce ordinances controlling construction and other noisome activities.¹⁰

A variety of other federal and state laws have similarly created new regulatory frameworks affecting project decision-making. For example, the 1970 Occupational Safety and Health Act is now being implemented to safeguard the worker environment, by establishing standards for noise, asbestos, heat, and other worker exposure hazards.¹¹ All of these new regulatory programs impinge on project management, particularly during the design and construction stages, and offer new bases for citizens and interest groups to challenge project management in agency and judicial proceedings.

Resource and Land Management

To some extent, federal and state authorities have carried out unsystematic resource management programs by regulating construction in wetlands, coastal zones, and other fragile ecological areas. Additionally, the realization of certain types of constructed facilities has been subject for some time, to siting criteria designed to achieve specific objectives: the Atomic Energy Commis-

⁷Clean Air Act, 42 U.S.C. 1857, *et seq.*, as amended.

⁸*Current Developments*, BNA Environment Reporter 836 (1972).

⁹Noise Control Act, Pub. L. 92-575 (1972).

¹⁰For a review of local and state efforts, see *Laws and Regulatory Schemes for Noise Abatement*, George Washington Univ., N.T.I.S. PB 206719 (1971).

¹¹Occupational Safety and Health Act, 29 U.S.C. 651, *et seq.* (1970). See also, *Impact of OSHA on the Construction Industry*, CIVIL ENGINEERING, at 84, Dec. 1972.

sion has generally discouraged the construction of reactors in densely populated areas,¹² the Housing and Urban Development Agency has prohibited the construction of subsidized housing in high-noise level areas.¹³

However, there has been a marked trend at state and federal levels to establish more coherent resource and land management programs, and such programs directly affect the planning, siting, and design stages of project management.¹⁴ The state of Vermont is now attempting to control large vacation home and commercial developments by using new regional authorities; the states of Rhode Island and Maine have established new frameworks for controlling developments such as power plants and oil refineries in coastal areas, for example. At the federal level, the passage of the 1972 Coastal Zone Management Act¹⁵ and the pending enactment of a land use management act will reinforce state-level efforts to implement coherent resource management and enforcement programs. The new federal-state programs now emerging will have the complex task of establishing and using new decision process-

es in order to resolve the intensifying and competing social demands for new facilities, which require irreversible commitments of land, water and other resources.

These new programs will eventually replace the patchwork of laws presently operative to protect wetlands, conservation and historic districts, and other resource areas; and will ultimately bring about changes in zoning and other local controls traditionally based on "home rule" politics. Finally, the presently fragmented siting and resource-related provisions employed by HUD, DOT, the AEC, and water and air pollution control authorities will presumably be integrated into these new, coherent frameworks for resource management.

Resource management will therefore have a significant impact on land acquisition and other developer "opportunities," and hence on all stages of project management. This impact can be expected to extend to the financial sources of project realization, in the sense that eligibility for funding from both public and private sector sources will eventually require project management compliance with resource management criteria and decisions.

¹²Criteria for evaluating the suitability of sites for nuclear reactors are found in 10 C.F.R. 100. Also see studies such as: ENERGY POLICY STAFF REPORT, CONSIDERATIONS AFFECTING STEAM POWER PLANT SITE SELECTION, U.S. Office of Science and Technology (1968).

¹³SCHULTZ AND McMAHON, NOISE ASSESSMENT GUIDELINES, U.S. Department of Housing and Urban Development (1971).

¹⁴See BOSSELMAN AND CALLIES, THE QUIET REVOLUTION IN LAND USE CONTROL, U.S. Council on Environmental Quality (1972).

¹⁵Coastal Zone Management Act, Pub. L. 92-583 (1972).

Agency Decision-Making

In addition to the aggregation of laws and programs which now control the siting and external effects of project activities, other laws and programs have been enacted at federal and state levels which go to the heart of project management by requiring the development and use of impact assessments in decision-making.

The National Environmental Policy Act of 1969¹⁶ requires extensive assessment of various project impacts by federal agency officials before they undertake any major action which is likely to bring about significant environmental impacts. The Airport and Airways Development Act¹⁷ and the 1966 Department of Transportation Act¹⁸ also impose assessment responsibilities on federal and state transportation officials. Legislation and executive orders in a growing number of states mandate similar procedures for state, and in some cases, for local government decision-makers. The *development* and *use* of such impact assessments in public agency decision-making thereby affects the provision of project funds, the authorization of permits, the siting and design of projects and the implementation of construction programs by both private and public sector management. Both *development* and *use* of impact assess-

ments are subject to judicial review, and citizens and interest groups have therefore been provided with several bases for litigation, which have been used to delay, redesign, re-site, and even block projects and programs.

Such impact assessment programs do not exist in a vacuum, but instead have a dynamic relationship to other federal and state laws designed to promote the availability of project management information to the public, and to laws enabling class actions and citizen suits with minimal procedural obstacles for litigation.

Environmental laws are now proliferating in what has been called a "law ridden" nation.¹⁹ Most of these laws affect project management charged with the implementation of socially important programs. To evaluate the "state of the art" of environmental law and its relationship to project management one must begin with the central feature of the legal landscape—the National Environmental Policy Act—and its implementation in the agencies and courts.

The National Environmental Policy Act

Overview

The National Environmental Policy Act (NEPA) became law on 1 Janu-

¹⁶42 U.S.C. 4321-4347 (1970).

¹⁷49 U.S.C. 1712.

¹⁸49 U.S.C. 1653 (f).

¹⁹See ch. III in *Legal Systems for Environment Protection*, UN FAO Legislative Study No. 4 (1972).

ary 1970,²⁰ and has since surpassed all expectations as to its effects on project decision-making in the federal agencies. Effects of NEPA have also extended to state-level and private sector project management.²¹

NEPA requires federal agency assessments of environmental impacts before "major actions" are to be taken. These actions range from the AEC approval of a construction license for a nuclear plant to be built by a utility, to the funding of increments of the highway program by DOT, to the authorization for the use of herbicides and pesticides by the Department of Agriculture. In other words, projects subject to federal permits, funds, or other action are generally subject to NEPA, in addition to projects actually implemented by federal agencies. The assessment responsibility is broad, and must include full consideration of five issues:

- (a) potential environmental impacts
- (b) unavoidable adverse impacts
- (c) irreversible commitments of resources
- (d) short-term use considerations v. long term resource needs
- (e) alternatives to the proposed action

Draft and final impact assessments are made available to other governmental officials and the pub-

lic for review and further development under guidelines established by the Council on Environmental Quality. Although NEPA does not provide a veto power to any official even if the project poses real environmental hazards, the act does provide new information to the public—by exposing the extent to which environmental effects are being considered by the agency—and provides an enlarged record for judicial review of agency decisions. Any obvious deficiencies in agency procedure, statement scope or content will, on the basis of experience since NEPA enactment in January 1970, result in citizen group intervention in agency processes, political opposition, and litigation. Many projects proposed and assessed have been delayed, and in some cases, projects have been abandoned. Others have proceeded after having been modified to ameliorate those environmental impacts which have generated controversy.²²

Development of Impact Assessments

Most controversy and litigation has thus far been focused on several issues relating to the *development* of impact assessments:

²⁰*Supra* note 16.

²¹For a general survey of NEPA applications, see ch. 7, Third Annual Report, U.S. Council on Environmental Quality (1972); and GREEN, *NEPA IN THE COURTS*, Conservation Foundation, Washington., D.C. (1972).

²²See *Hearings Before the Subcommittee on Fisheries and Wildlife Conservation of the Committee on Merchant Marine and Fisheries*, H.R., 92d Cong. 2d Sess., Ser. 92-24, 25; *Administration of the National Environmental Policy Act-1972* (1972) for a comprehensive survey of NEPA implementation by the federal agencies.

(1) Is the project a "major action . . ." which requires NEPA assessment?

(2) At what point in the project management process must an impact statement be developed and circulated for comment?

(3) Should the assessment scope include measurable impacts only, or should it also include largely unquantifiable project impacts on aesthetics and other aspects of the "quality of life"? Should indirect or secondary project impacts on future community development and population migration, for example, also be included?

Let us discuss these issues briefly.

"Is the project a major action?" is the threshold issue for managers of projects subject to NEPA. If yes, an impact assessment or assessments must be developed at some point or points in the planning-design-siting-construction process. So the first task for project management has generally been one of conducting an informal preliminary review to determine if the project can be expected to be of an order that will probably bring about "significant environmental impacts," and/or significant opposition from citizens and interest groups which could lead to litigation. If either result appears likely in the preliminary study, it is advisable for project management to conduct a formal NEPA assessment. Otherwise, if no formal assessment has been performed, opponents can be expected to raise the issue, intervene in agency proceedings and seek judicial re-

view in federal courts. Thus far, the courts have halted several projects even when they were well into the construction stage where stoppage is costly, until the NEPA assessments were developed, circulated and used by project management. The courts have been markedly sympathetic to claims that a housing project, short stretch of highway, student dormitory, drive-in bank, and other similarly minor constructed facilities are "major actions," where the local environment has had particularly high aesthetic and ecological qualities.²³ However, the courts have refused to stop construction of a highway where vegetation had been cleared, and any project delay due to completion of the NEPA process would result in erosion and an estimated 300 job losses;²⁴ and have refused to enjoin construction of a dam where the estimated six-month delay that the NEPA process would entail, would bring about a project cost increase of \$12.6 million.²⁵ Obviously, the issue is far from settled, and the courts will in general respond to the facts surrounding the project itself.

Some agencies have now established criteria for project managers who are either agency personnel or private developers or applicants for agency permits or funds, to provide guidelines as to whether or not their projects of certain magnitudes (*e.g.*, number of housing units) are "ma-

²³For example: *Billings v. Camp*, 4 ERC 1744 (1972); and *Goose Hollow v. Romney*, 3 ERC 1087 (1971) and 3 ERC 1457 (1971).

²⁴*Brooks v. Volpe*, 4 ERC 1532 (1972).

²⁵*E.D.F. v. Armstrong*, 4 ERC 1744 (1972).

major actions.” However, agency guidelines are also subject to judicial review in the factual context surrounding a specific project, to determine if the project, despite the guidelines, is in fact, a “major action” likely to have significant environmental effects. It is therefore more cost-effective for project management to undertake both preliminary assessment and formal NEPA assessment whenever there is any doubt, rather than risk community opposition, court injunction, and work stoppage. Such responses can greatly increase costs once the construction process has begun, damage agency image and raise future political problems.

“*At what point(s) in the project management process must an impact assessment be developed?*” is another issue that must be faced by managers of projects subject to NEPA. Here, there has been extensive litigation on the issue of whether or not projects initiated in some way prior to NEPA enactment must be assessed, but this type of problem is becoming less frequent as the inception of NEPA on 1 January 1970 recedes in time for projects now beginning.²⁶ Certainly the award of construction contracts or the beginning of construction itself constitutes a critical point at which the courts have required formal NEPA assessment, unless NEPA assessment was conducted earlier, in a planning, siting, or design stage.

However, impact assessment at

the last or construction stage of a project is deceptive and minimizes the overall intent of NEPA. A failure to conduct an assessment during the project stages of planning and design effectively precludes citizen inputs and critical review at a time when more meaningful change in project plans and consideration of alternatives could have been accomplished. In other words, effective use of impact assessment techniques and citizen feedback can be more readily achieved in the earlier, less tangible stages of a project—precisely when most agency officials and project personnel prefer to plan, design and site without public intervention.

Judicial review of agency decisions may impose NEPA assessments in the earlier project stages where feasible. For example, in *Stop H-3 Association v. Volpe*, the U.S. district court for Hawaii held that the design study and test borings for a highway project be enjoined until NEPA assessment had been conducted, circulated for review and used by project officials, since such pre-construction work, if undertaken without assessment, “. . . would increase the stake which . . . agencies already have in the . . . (project),” and reduce any subsequent consideration of alternatives.²⁷ However, it is still too early in the NEPA experience to summarize, with certainty, judicial attitudes about imposing impact assessment in planning or design

²⁶*Supra* note 21.

²⁷4 ERC 1684 (1972).

stages. One court has held that "NEPA . . . imposes no clear legal duty upon the AEC to prepare an environmental impact statement prior to an applicant's acquisition of land for a proposed site," and by implication, has deferred AEC assessment to the point at which it must consider the applicant's request for a construction permit.²⁸

Some agencies, in fact, now conduct formal assessments at each significant stage of a major project: for example, the AEC assesses at both the construction and operating permit stages of the nuclear power plant realization process. Therefore, wise project management will allay subsequent litigation and court injunction to some extent by assessing earlier, at significant project stages. Here again, management responsiveness to NEPA and citizen concerns before construction begins may well prove to be more cost-effective.

"What should the Assessment Contain?" is another major issue for project management consideration. NEPA does not expressly require consideration of social, health, or economic impacts, or of secondary effects such as subsequent population migration and land development; and these have been frequently ignored or treated in cursory fashion although they are integral to comprehensive assessment of project impacts and program decision-making. This is due,

in some sense, to the "open-endedness" of the assessment process, and limitations on the time, funds, and manpower that project managers have available for assessment purposes.

However, recent judicial decisions have called for fuller consideration of such social and secondary impacts. For example, the U.S. district court for the District of Columbia, in *McClellan Gardens v. National Capital Planning Commission*, in noting that the McClellan Gardens private redevelopment project would result in increased traffic and congestion, commercial growth, trash and sewage disposal problems, and other secondary environmental impacts, called upon the National Planning Commission to develop an environmental impact statement which would include such impacts.²⁹ Other court decisions have stressed the need for consideration of aesthetic and other largely unquantifiable, human environment impacts. Probably the most significant decision to date on the content of impact statements has been provided by the U.S. Court of Appeals (8th circuit) in *EDF v. Corps of Engineers* where the court clearly articulated that the substantive content of an agency's assessment was fully reviewable by the courts, and that NEPA thereby imposes more than just a series of reviewable procedural steps on agency decision-makers.³⁰

²⁸Gage v. Commonwealth Edison, 4 ERC 1767 (1972).

²⁹4 ERC 1708 (1972).

³⁰4 ERC 1721 (1972).

This brief survey of some of the issues which relate to the *development* of impact assessments merely outlines some of the new inputs to the management process for those projects subject to NEPA.

Use of Impact Assessments

The development of impact assessments is a meaningless exercise, unless they are actually used in decision-making. Use is difficult to accomplish because of the diversity of new factors and their essentially unquantifiable nature which the assessment brings to agency decision-making dependent on quantification of technical and economic factors. In *Calvert Cliffs Coordinating Committee v. AEC*, the federal Court of Appeals' ruling included discussion of the "balancing process" that agencies must undertake in project decision-making to comply fully with NEPA, in addition to their procedural compliance in the development of impact assessments:

The sort of consideration of environmental values which NEPA compels is clarified in Section 102 (A) and (B). In general, all agencies must use a "systematic, interdisciplinary approach" to environmental planning and evaluation "in decision-making which may have an impact on man's environment." In order to include all possible environmental factors in the decisional equation, agencies must identify and develop methods and procedures . . . which will insure that presently unquantified en-

vironmental amenities and values be given appropriate consideration in decision-making along with economic and technical considerations. To "consider" the former "along with" the latter must involve a balancing process. In some instances environmental costs may outweigh economic and technical benefits and in other instances they may not. But NEPA mandates a rather finely tuned and "systematic" balancing analysis in each instance.³¹

This most significant of all NEPA-related judicial decisions directly affects project decision-making, and federal agency officials must constantly grapple with its implications.

NEPA does not impose assessment and exposure processes on industry or the private sector, but whenever a utility, corporation or other private institution is the applicant or intended beneficiary of federal agency funds, license or other "major action," its proposal is subject to the NEPA process. There have been suggestions that NEPA be extended directly to the private sector, but as yet, these have not been seriously considered at the federal level. However, variants of the Act have been adopted by several states and more are expected to follow, bringing the habits of environmental assessment and use in decision-making, and exposure of decision-making information, to a wide variety of state agencies.³²

Because of state and local control

³¹2 ERC 1779 (1971).

³²See 1 E.L.R. 10177; and *102 Monitor*, U.S. Council on Environmental Quality, v. 1, no. 6, July 1971, for action by six jurisdictions. Since this review, Massachusetts has adopted its version of NEPA, ch. 791 of Mass. Acts of 1972, amending ch. 30 of Mass. G.L.

of land use, state versions of NEPA have the potential for directly affecting private sector land development activities. This potential has been realized thusfar in California where the state Supreme Court in *Friends of Mammoth v. Mono County* determined that the state's Environmental Quality Act requires county Boards of Supervisors to conduct environmental assessments before issuance of building permits to housing project and other private sector land developers.³³ Similar application to the private sector may be realized in Massachusetts where the new environmental assessment requirements are imposed on "political subdivisions" as well as on state agencies and officials.³⁴

Finally, the problem of dealing with unquantifiable impacts in decision-making remains. The assignment of values and weights to environmental and social amenities for use in cost-benefit type analysis is a process which may either be arbitrary or intentionally designed to produce decision-making results which have been pre-determined by agency officials.

The "Leopold Matrix" of the U.S. Geological Survey is a useful mechanism for promoting rational discussion and systemic resolution of project impacts by the proponents and opponents of a project in a non-adversarial setting.³⁵ The matrix disaggregates impacts, calls for

designation of probability of magnitude and significance of each impact, and can be completed by each of the interested parties in a project controversy. Comparative analysis of the results reveals important areas of difference of opinion, and enables consideration of a variety of strategies to reduce such differences, such as design change or the need for concurrent projects to offset specific impacts. For example, waste water and solid wastes from a housing project may be among the bases for community opposition, yet state and federal funds and programs may be available to reduce the problems.

Despite these difficulties and the numerous conflicts and increased costs which now attend agency programs, NEPA is slowly forcing wiser environmental practices, more sensitive agency bureaucracies, and more effective citizen roles. It is possible that the NEPA process could eventually provide the basis—not for conflict in the courtroom or at agency hearings—but for negotiation in good faith between interested parties over points of dispute as revealed by the environmental assessment. The labor-management experience under the National Labor Relations Board provides useful conflict-resolution experience which should be reviewed for possible application in the NEPA context.

³³4 ERC 1593 (1972).

³⁴*Supra*, note 32.

³⁵Circular 645, *A Procedure for Evaluating Environmental Impacts*, U.S. Geological Survey (1971).

Implications for Project Management

NEPA has established a new context for project management and new procedures for decision-making. It has legitimized the provision of new information to the public, citizen review of management processes and feedback of critical responses to decision-makers, the use of interdisciplinary and unquantifiable inputs, and coherent review of primary and secondary project impacts before project realization. Suddenly, the social context for project management contains new laws and regulatory programs, criteria, actors, objectives and review processes.

How to manage projects in this increasingly complex and dynamic context, so that projects will be implemented in a cost-effective manner which coincides with concepts of responsibility to the human and natural environments? The fundamental task is to develop a coherent framework for project management which integrates project information and objectives with substantive sectors of concern, the relevant legal and regulatory authorities, and the dynamics of citizen feedback.

Developing a Coherent Framework For Project Management

Projects are implemented by activities in the several sequential stages of conception, planning, siting, design, construction, and operation of the completed facility. Each stage requires different levels and types

of resources or *inputs*, for example: manpower, funds, time, facilities and equipment, materials and natural resources such as land, fill, etc. The facility that emerges from the construction stage—and indeed the construction process itself—brings about social and environmental effects or *outputs* which can be designated direct and indirect, primary and secondary, beneficial and detrimental, measurable and unmeasurable. Whether one uses a nuclear power plant, airport, or housing as project examples, several basic classes of effects or outputs from both construction process and final facility are apparent. These include effects on:

Ecology—sedimentation, erosion, landscape change, wildlife habitat change, groundwater and runoff changes, etc.

Economy—Private: property values, taxes, insurance rates, jobs, etc.

Local and Regional Community: jobs, development and commerce, services and tax base, etc.

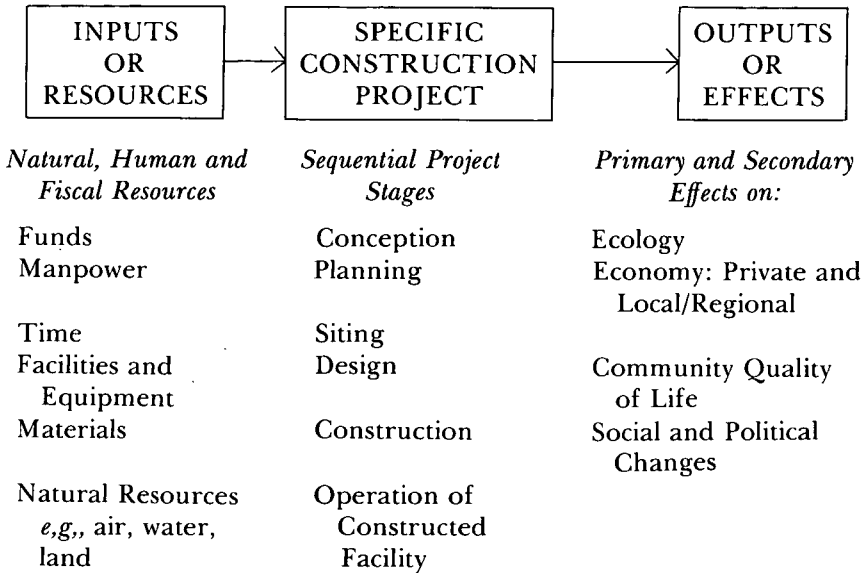
Community Quality of Life—aesthetics, congestion and traffic, population migration, open-space and recreation, noise and odors, etc.

Social and Political Factors—new residents and life styles; new economic and social opportunities; changing socio-political characteristics; changes in municipal systems for education, water supply, energy, solid waste disposal; etc.

Now that we have briefly discussed inputs and outputs to the construction project management process, we can begin to develop a simple flow chart: (Figure 1).

The implementation of each project depends on numerous decision-makers in both public and

FIGURE 1



private sectors, and at varying jurisdictional levels—local, state, regional and federal. These decision-makers function as controls on any project essentially in two ways, as depicted in Figure 2:

by controlling inputs of resources: e.g., public agencies and private sector sources of manpower and funds for planning, design, and construction; zoning and other land use or natural resource authorities; federal and state legislatures whose enactments may be essential to the availability of other project resources; project management itself; and

by controlling the effects or outputs: e.g., the courts by means of preliminary or permanent injunctions or awards of compensatory damages; federal agen-

cies such as the DOT, EPA and their state counterparts who engage in standard-setting, regulation and enforcement; project management, insurers, and building and health authorities, who may bring about project redesign to abate or ameliorate specific effects.

To further develop this “model,” some of the major influences on construction project management must be determined. These influences (depicted in Figure 3) generally include:

- (a) Land and other resource availability information;
- (b) Project technical and economic feasibility information;
- (c) Actual and potential effects information; and

FIGURE 2

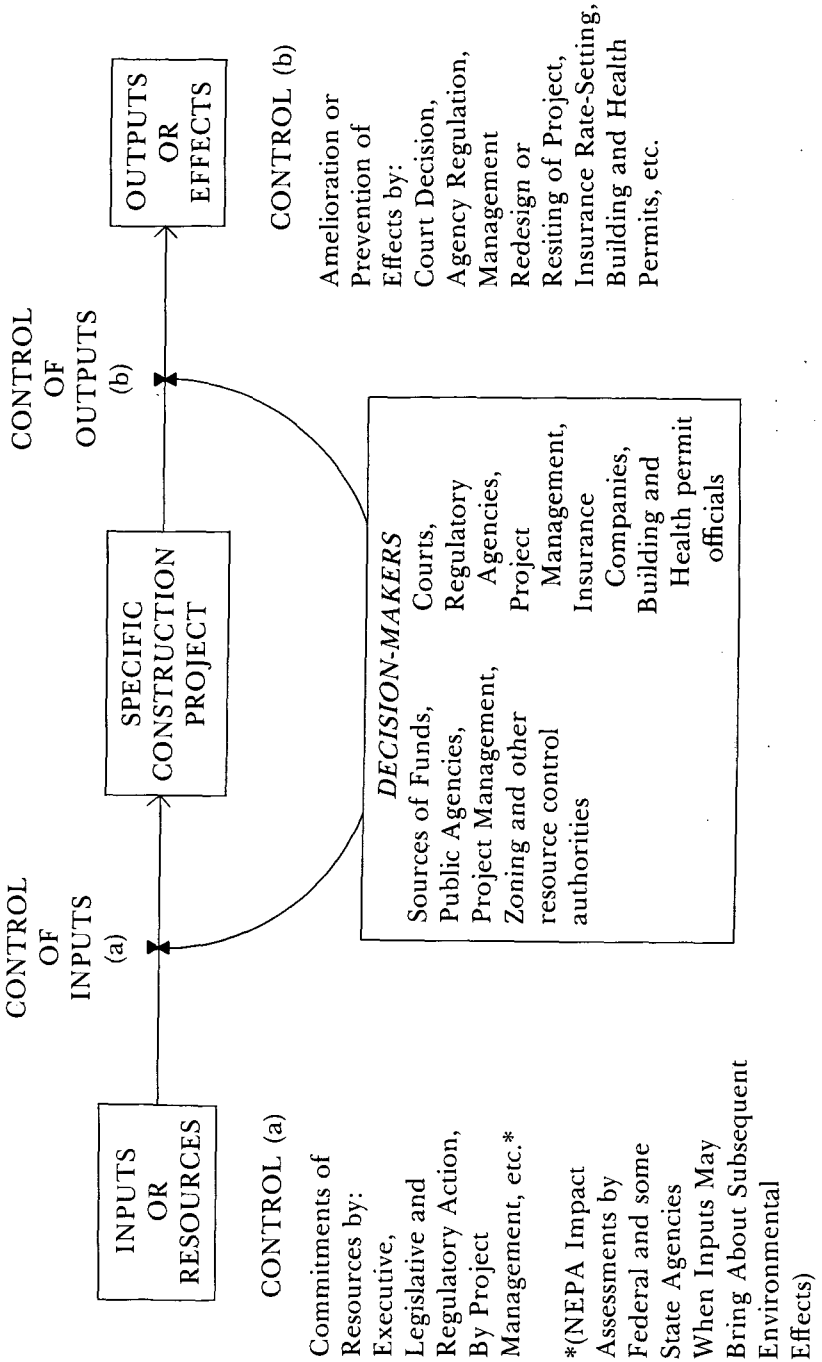
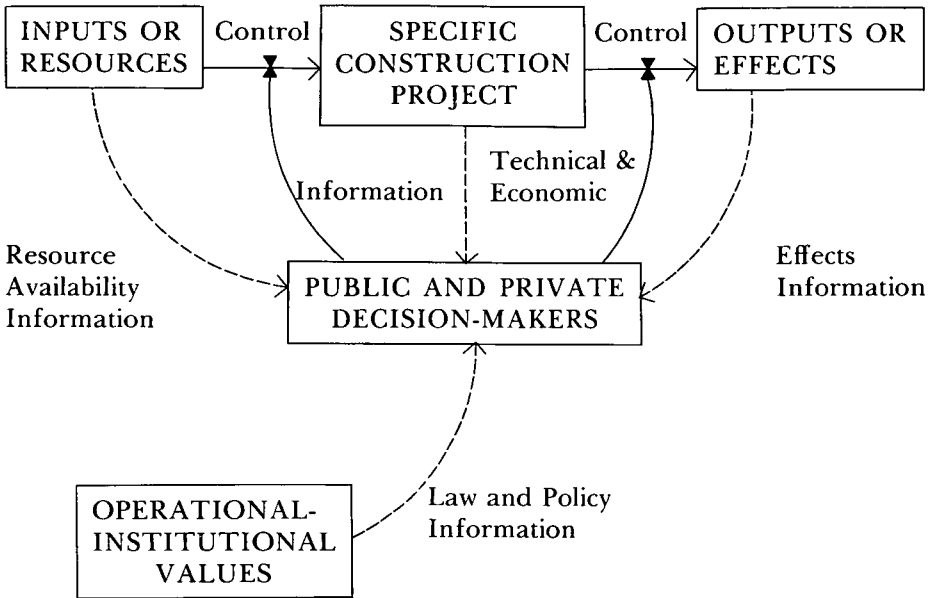


FIGURE 3

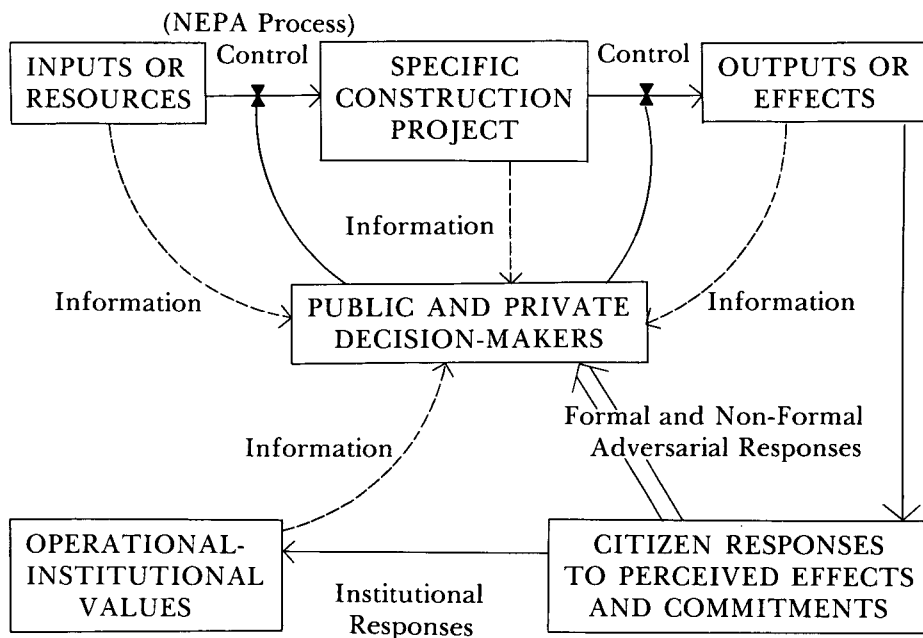


(d) Information from what can for convenience be called “operational-institutional values;” comprised of the common law, legislation, economic and social policy, developer and management policies and other “given” values which have been recognized and accepted by project management as of the time any specific decision is made regarding further project development. This includes diverse and sometimes conflicting laws and policies—*e.g.*, the National Environmental Policy Act (to foster the conservation and rational use of resources) and

HUD Housing Programs (to foster subsidized and dispersed housing).

Now to complete this general “model,” the social dynamics brought about by a construction project must be considered further; specifically the responses of individual citizens and organized interest groups to perceived resource commitments and project effects. (Figure 4) These responses can be manifested through *institutional procedures* for changing the laws and policies (operational-institutional values) such as the community master plan, which influence decision-makers—a lengthy process requiring extensive aggregation of voters

FIGURE 4



and generally undertaken in order to influence future projects, not the particular project which provoked the response.

Alternatively, responses can be manifested through *formal, adversarial procedures* to challenge decision-making—e.g., injured citizens can go to court or appeal zoning decisions to appeals boards, disturbed environmentalists can intervene in agency proceedings or seek judicial review of agency decision. Finally, a variety of *non-formal adversarial procedures* can be employed to feed back responses to decision-makers, such as demonstrations, raucous town meetings, or quasipolitical campaigns. The en-

vironmental protection movement serves as a vivid example of these new pressures on decision-makers—new only in their intensity.

Although the sector of society which responds adversely to perceived detrimental effects or resource misuse of a specific project does not normally constitute a democratic majority in its early stages, the issues raised by such adverse responses deserve serious consideration, and the procedures for eliciting such responses are being strengthened by the courts and legislatures. First, the responses represent new perceptions—new “pieces of the truth” which were either unknown to, or ignored or

lightly considered by decision-makers earlier. Second, they represent market and political influence which can be magnified by use of the media. Third, they may be initially ignored, but will continue to reappear in various forms and may later bring about project delays, which are more costly after construction has been undertaken as utilities and the Atomic Energy Commission, for example, are now finding out as they attempt to further the nuclear power program. Plant construction and operation are running more than two years behind schedule, with greatly increased costs due to extensive litigation and hearings, because of earlier failure to consider the concerns of citizens over thermal and radioactive waste disposal, reactor safety and related ecological and health issues. Fourth, such responses are based on real concerns, will often find larger public support and eventually could result in stringent legislation or judicial decisions which decision-makers would have to learn to live with. Fifth, and finally, citizens reflecting a diversity of interests are the most effective mode of promoting the accountability of decision-makers to the full social context in which they operate.

Certainly, construction management decision-making in both

public and private institutions is becoming more complicated and less efficient in the short-term sense; but long-term efficiencies in terms of larger social interests such as resource utilization can be expected. In more pragmatic economic and political terms, it has become increasingly apparent that it is in the long-term self-interest of program officials and their project personnel to be open and responsive to the interests of these minority sectors of the public.

In the public sector, opposition to projects and failing credibility of programs has prompted several federal agencies to enhance citizen participation in program planning and design, beyond the environmental impact statement requirements of the National Environment Policy Act. For example, the Department of Transportation has incorporated into its Policies and Procedures, new modes of citizen participation in the highway realization process,³⁶ based to a considerable extent on its sponsored research into "community values in highway location and design."³⁷ The Corps of Engineers has also recently initiated on a regional scale, its "Fishbowl Planning" concept which attempts to bring citizens into the early planning stages of Corps projects.³⁸ These represent early attempts to provide new information

³⁶Policy and Procedure Memorandum 90-4, U.S. Department of Transportation (1972).

³⁷Manheim, *et al.*, *The Impacts of Highways Upon Community Values*, M.I.T. URBAN SYSTEMS LABORATORY REPORT 69-1 (1969).

³⁸Sargent, *Fishbowl Planning Immerses Pacific Northwest Citizens in Corps Projects*, CIVIL ENGINEERING, at 54, Sept. (1972).

to citizens so that citizen response can be *responsible* and *constructive*. Additionally, by providing access to project management in the earlier, more flexible stages of planning and design, such initiatives enable citizens to have *meaningful access* to management decision-processes.

These developments can be discussed in relationship to the model as follows: on the model, the arrow from citizens to decision-makers today usually represents—not a flow of information as from other sectors—but adversarial processes in courts and agency proceedings. For management to “learn” from an endless series of adversarial processes is a slow, costly, and painful task of benefit only to the legal profession. The task facing our public and private sector project managers is to *transform this relationship from an adversarial one to one of joint decision-making and negotiation of differences in good faith among all interested parties: in short, to establish an ongoing dialogue and joint effort at*

planning, designing, siting, and constructing necessary facilities.

This effort will require new management procedures, such as those now being introduced by DOT and the Corps of Engineers, the development of more sophisticated assessment techniques, the practice of management articulation of objectives, an opening up of project or program planning and design stages, and ultimately structural and substantive changes in our political system.

“Who speaks for the public?” will become a central issue—one which the federal agencies and the courts are now grappling with in the NEPA context.³⁹ Perhaps technology itself may here provide some assistance. “Citizen feedback” technology now exists, has been used experimentally and has demonstrated a remarkable dual potential for both informing citizens and for eliciting opinions and information useful for decision-making.⁴⁰ The enhanced “process” orientation that

³⁹See *Sierra Club v. Morton*, 3 ERC 2039 (1972), wherein the U.S. Supreme Court provided the latest answer to when “. . . a party has a sufficient stake in an otherwise justiciable controversy to obtain judicial resolution of that controversy . . .” The Court noted that injury other than economic harm is sufficient to bring a person within the zone of standing; that merely because an injury is widely shared by the public does not preclude an individual from asserting it as a basis for personal standing; that injury sufficient for standing can include aesthetic, conservational and recreational, as well as economic and health injury. But the Court noted that “. . . broadening the categories of injury that may be alleged in support of standing is a different matter from abandoning the requirement that the party seeking review must have himself suffered the injury . . .” and that “. . . a party seeking review must allege facts showing that he is himself adversely affected . . .” in order to prevent litigation by those “who seek to do no more than vindicate their value preferences through the judicial process.”

⁴⁰See Sheridan, *Technology for Group Dialogue and Social Choice*, M.I.T. Report to NSF on Grant FT-16, CITIZEN FEEDBACK AND OPINION FORMULATION, 1971; and Ducsik, Lemmelshtrich, Goldsmith and Jochem, *Class Exercise Simulating Community Participation in Decision-Making on Large Projects: Radiation Case Study*, 4 May 1972, unpublished, available from author.

could result from management use of the recommended "model," improved information flow, and new citizen-feedback techniques, would ensure continuing recognition in decision-making of the pervasive social impacts of construction projects.

The "model" or framework for project management does not provide any answers, but can be used for several purposes: to open up a fuller perception of planning, design, and decision-making respon-

sibilities for specific projects; to depict the interrelationship of resources, effects, actors, institutions and citizens; to develop management and project alternatives; and to assess and grapple with the dynamics of the impacts of specific projects before construction and conflict. The framework can be used by all the actors, irrespective of their interests, for establishing rational analysis and constructive or cooperative discourse.