DRAFT

ENVIRONMENTAL STATEMENT

Operation Breakthrough

April 9, 1971

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Washington, D. C.

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I. INTRODUCTION:

Any attempt to assess the environmental impact of Operation Breakthrough must take into consideration the experimental nature of the program. As such, the entire program is an effort to develop, demonstrate and offer improved housing systems as alternatives to conventional living arrangements in residential communities.

Breakthrough attempts to demonstrate that many of our environmental problems can be solved or at least improved upon within the context of improved housing systems. Housing system is used in its broadest sense to indicate all of the skills and recources necessary to deliver a quality community environment to the consumer. Heavy emphasis is placed on well-conceived land and urban planning approaches (here-to-fore among the least utilized professional skills in housing) to assure that the advanced housing technology is placed in a setting that enhances family living and avoids monotonous repetition. Total energy systems, pneumatic garbage collection, new, varied building materials and systems-based volume production methods are being combined to assure the proper relationship of the housing to commercial and community facilities, transportation, employment and educational facilities.

Together, the new technology, sound planning for land use and the provision of necessary facilities will, hopefully, demonstrate that an improved living environment is within our immediate capability.

II. THE NATURE OF OPERATION BREAKTHROUGH:

The overall objective of Operation Breakthrough is to "break through" the barriers that now constrain our housing approaches in order to provide for the housing needs of our people as effectively as possible.

Because of concern that the application of advanced technology, modern management advanced design, and modern marketing approaches were not being encouraged in the home building business to the extent that they were with most other consumer products industries, it was determined that the Federal Government should take steps to accelerate the process of improvement that was considered necessary. The significant fact is that as for most advanced technological applications under ordinary circumstances, new housing technology arrives in the United States' market place some years-perhaps as many as ten to fifteen years-after it is conceived.

Operation Breakthrough is significantly reducing this time lag. It has brought together technicians, production facilities, management skills, financial support in a way that has accelerated previous trends in this direction. In this sense, the program has already fulfilled one of its prime goals.

Although advanced technological ideas were available, they had not been applied in volume. Progress has been made in the home building business in the application of advanced approaches, with an increasing interest in having major components and elements built in factories, but progress in this direction has been limited by a wide variety of constraints. These constraints include:local government limitations on the availability of land for moderate lot sizes and housing types that could be within the reach of lower to middle income families; the administration of thousands of local building code variations; specifications written into codes that discourage application of new materials and that do not readily permit acceptance by an inspector of new techniques; labor practices that make the acceptance of factory built components and onsite assembly activities uncertain; and, to a very large extent, a major concern as to the acceptance by the American public of factory production of housing components and full systems.

These various factors, among others, have tended to fragment the market and have led to a fragmented industry. No one segment of this industry has been able to conduct advanced research and development in the housing area of a type and scope that has become general practice in almost all other consumer product areas.

Under these circumstances, the industry did not have the incentive to invest capital in approaches that might not yield the return required to pay off that investment and result in a longer term profit opportunity. Therefore, it was felt that it was appropriate for the Federal Government to step in and encourage the acceleration of the modernization of the entire housing business. The objective is not modernization or advancement or innovation for their own sake, but rather, to improve the process to provide greater assurance of supplementing the output of our present housing construction approaches to the extent needed to meet the housing needs of all of our people in the decades ahead.

A. Objectives

The major objectives of Operation Breakthrough are:

- To develop the means for supplementing our production of housing to assure the supply needed for our total population in the years ahead.

- To modernize zoning regulations so as to develop improved land use arrangements that provide the living space needed for a good living environment.

- To attract into the housing business the architects, the planners, the suppliers, the engineers, the broad range of industrial capacities, financial institutions, management organizations, builders, and developers that have the ability to develop improved housing system approaches.

- To encourage production and operating arrangements with our labor organizations and with the labor force that makes more effective use of our full labor force (all skill levels) to overcome the already existing and worsening shortages of skilled labor.

- To encourage new techniques and materials.

- To encourage the development at our State government level of a concern with and a capability for the development of housing based on the improved approaches that are developed in the program.

- To encourage actions at State and local level that will provide an opportunity for all people to obtain housing where they want it and to live in an environment where a sense of responsibility and satisfaction is encouraged.

- To seek out innovative and expanded financing mechanisms, recognizing that we may need basic reform in monetary institutions and regulatory laws.

B. Reliance on Private Enterprise:

In keeping with the basic approach of relying on the private enterprise system, industry was requested to submit their best ideas for improvement in the entire housing system and also submit their ideas for more advanced and improved components or elements of housing. The commitment was made that HUD would select the most promising of these various ideas, and that HUD would fund the design and development of those concepts and arrange to have them produced and erected in sample residential communities throughout the United States. Those sample communities are referred to as prototype sites aimed at demonstrating improved living patterns. In addition, the commitment was made to provide incentives to local communities, developers, housing authorities to encourage volume orders of the selected systems.

HUD sent Request for Proposals (RFP) to over 5000 organizations. A total of over 600 proposals were received. Of these, 22 full housing systems and 11 proposals for various advanced elements or components of the housing business were selected. HUD also selected 10 prototype sites and one subsite from among 218 sites that were proposed by city Mayors, local officials, or State governors, on which to erect and display this advanced housing. Because of recent budget reductions, HUD has now cancelled two of these prototype sites. In order to promote improved land use and residential community designs, as well as improved building designs, on these sample prototype sites, HUD selected 11 site planners out of 82 that had proposed in response to another Request for Proposals (RFP).

C. System Types and Development Approaches:

Twenty-two housing systems were selected.

Of these existing, but as yet little used technologies selected in Operation Breakthrough, what are the most important characteristics? First, all of the 22 selected systems are true steps in the direction of an industrialized building process. The selection criteria had deliberately left open the opportunity for improved or "rationalized", conventional, in-situ construction techniques, but none of the systems of this nature were ranked high enough to be selected.

Second, for all of the winning systems, the process offered was either an advance over the proposer's previous technology or represented the establishment of new, imaginative approaches.

Third, the selected technologies represent a significant departure from conventional materials. Where upwards of 75 percent of residential building in the United States uses wood as its basic structural material, this proportion is nearly exactly reversed among the 22 selected systems in Operation Breakthrough. Roughly one-fourth of the systems use a wood structure while the remaining three-fourths use concrete, metal or plastic structures. This is especially important as a means of encouraging competition in the market place among the alternative materials.

Fourth, the technology continues to represent an attempt to produce conventional housing forms despite the change in production methods and materials. It is evident that the producer's designers made a strong and largely successful effort to mask the industrial orgin of the product to the ultimate consumer.

Fifth, it is clear from the diversity of selected building system types that no approach is the obvious, finally agreed upon, best choice. The Breakthrough selections are in this sense experimental. Nearly equal encouragement is given to the panel systems and to factory completed three dimensional modules. Even hybrid systems, more than panels alone but less than fully modular elements are encouraged.

Breakthrough is serving as a catalyst, moving the American housing industry towards industrialization faster than would otherwise be the case. It is also providing a basis for evaluating housing systems by determining how those systems satisfy the performance requirements of housing. Efforts are underway to develop performance criteria - structural, mechanical, electrical, physical environmental - for evaluating housing system designs. Under HUD's sponsorship, the National Bureau of Standards and the National Academies of Science and Engineering have developed for Operation Breakthrough. The first comprehensive set of performance criteria for the evaluation of housing concepts while it is an historic first step, it is recognized as a not yet completed project. A performance basis for evaluation is not yet available for all elements of the housing system and, therefore, conventional or accepted practice must still serve as the interim evaluation guide while valid performance data are being assembled. For example, there do not yet exist performance criteria for good land planning or for the appropriate durability of many housing elements. Operation Breakthrough's effort along these lines is aimed at establishing a more rational basis for the administration of building codes than is available in the thousands of different codes used throughout our country.

To assure that the building systems that are used in Operation Breakthrough are safe, sound, durable, and livable, HUD is establishing a rigorous test program similar to that carried out in the development and evaluation of many other consumer products. In this case, the National Bureau of Standards (NBS) is serving as HUD's technical arm in developing, conducting, monitoring, and directing performance tests. The tests will be carried out only in part by the National Bureau of Standards and other government laboratories with a major test effort carried out by private test organizations and the housing producers themselves. Performance criteria and the test results will be evaluated by a Technical Subcommittee that has been set up specifically for the purpose by a joint Advisory Committee of the National Academy of Sciences and the National Academy of Engineering. Establishment of the validity of test data by the National Academies based on review and direction by NBS will provide a basis for certification by the Department of Housing and Urban Development of suitable housing systems.

Operation Breakthrough is providing the stimulus for change in our entire process of housing, even though construction of prototype housing units is not yet underway (2-1-71). The constraints mentioned earlier are indeed beginning to give way. The various levels of government, industry, labor are moving constructively toward improvement of the system of housing. In addition, there seems to be a growing acceptance and recognition of factory produced housing as providing a suitable living environment by our people. HUD fully expects that the demonstrations presented on prototype sites will further that acceptance by all groups. The result will be a significant increase in the United States of housing built in factories with improved design, high quality, good living configuration, and more effectively controlled costs.

D. Improved Living Environment:

HUD does not consider a housing system to be the building alone. Progress in full housing systems requires improvement not only in the building production process itself, but also in the design of the overall residential community. In Operation Breakthrough, teams of architects, planners, landscape architects, and engineers were employed to design the selected prototype sites to display the new production approaches and an improved housing and living environment.

Concern about environmental quality is vital to the success of Operation Breakthrough. At the same time, Operation Breakthrough affords an excellent opportunity to improve the environmental quality aspects of housing as it affects people and communities. Environmental quality is important to the success of Operation Breakthrough because the American public links HUD with low-income housing and associates pre-fabricated and modular housing with poor grade housing. As this tends to be the first association made by the American people with Operation Breakthrough, these negative and erroneous attitudes are being erased in order to improve the public and private acceptance of the goals of Operation Breakthrough. This is particularly vital because Operation Breakthrough is designed to demonstrate that systems-produced modular housing can provide for the needs of all income-ranges, family types, age and ethnic groups. It will also demonstrate that a high quality living environment can be made available in all parts of the country.

Operation Breakthrough, therefore, will contribute toward enhanced environmental quality through improved housing design and improved planning for the housing environment. It is unique in its concerted effort to seek out and understand people and community environmental needs and to design and build accordingly.

The techniques for the provision of a high quality living environment in the prototype phase of Operation Breakthrough, hopefully, will provide examples and guidelines for all subsequent housing programs. Those housing systems which meet the high standards of its proposed certification program, will be subject to continuing review of the quality of their product and its design and land planning excellence. These should serve as on-going models of the best in housing.

Even though Operation Breakthrough will be developing at eight separate sites throughout the nation during its prototype phase, it represents a concerted, unified effort to achieve change. Accordingly, its potential environmental impact must be viewed not from the limited context of an individual site or even the eight individual sites, but rather from the perspective of a total program, using specific environmental planning techniques illustrated at different sites as examples. Later in its development, Operation Breakthrough will review, evaluate, and synthesize the various environmental planning techniques used in the prototype phase and develop more refined guidelines and criteria.

III. ADDITIONAL FACTORS BEARING ON OPERATION BREAKTHROUGH:

A. Housing Systems Producers and Housing System Designs

The 22 Operation Breakthrough housing systems represent an attempt to apply the best modern approaches, latest techniques and materials in housing production in order to supplement existing housing construction methods now used to fulfill our housing needs.

The concepts being used in this project include panel, module, and service core units made of wood, concrete, metal and fibrous glass and plastic products. Concrete, which has been used extensively for years in Europe, has never been utilized as fully for housing in America. Several companies are demonstrating the flexibility of design and construction to which concrete panel systems lend themselves.

Few houses have been built out of metal in the United States, but other companies are demonstrating varied approaches to the metal panel concept. One company is producing metal reinforced modules in a "jack-up" structural frame which show promise for swift construction of high-rise buildings as well.

Space age technology has been adapted to produce fibrous glass and plastic reinforced modular housing systems. Their advanced use of these materials allows them to produce exterior finishes which are virtually timeless - they are not subject to erosion or deterioration, and require low maintenance; in addition, they can be made to look like everything from brick to wood. Other newer materials in panel structures, such as polymer bonding agents and polyurethane foams are being utilized.

Breakthrough is also sponsoring research by housing systems producers on innovative approaches to overall housing design. Some very interesting products have been prepared; among them are service cores which can be installed as complete units. These core units range from kitchen and bathroom units to complete utility areas with plumbing, electrical, heating, air-conditioning, and ventiliation all self-contained. Other innovations include such things as packaged elevator systems, and the idea of producing elevated street, land and garden areas for high rise apartment units.

These new approaches are being tested, evaluated, and demonstrated as examples of the most promising new technology for housing production in the United States.

All selection procedures were done by special interdisciplinary committees and boards from HUD and a number of other Federal agencies. Proposals were placed in rank order, recommended by the Committees and Proposal Evaluation Board and chosen finally by the Source Selection Official. In total, over 100 Federal staff members participated in the selection activities. The critical Proposal Evaluation Board was composed of roughly an equal number of technically oriented and socially oriented specialists. The former included architects, engineers, land-planners, and landscape architects; the latter specialists in consumer needs, public administration, political science, economics and systems analysis.

To provide the housing systems and construction concepts which could supply aggregated markets with quality housing produced in volume, two types of proposals were accepted from private industry - Type A and Type B. Type A provided for the design, testing, evaluation and prototype construction of complete housing systems which can lead to volume production. Type B proposals differed from Type A in that they were either full systems not yet ready for volume production or subsystems or complete systems or portions of housing problems which needed further research. They included such environmental concerns as: improvements for plumbing waste systems, new methods for electric power distribution, and a study of the special housing requirements for Mexican Americans.

The criteria for choosing the Type A system producers were that they be strong in land and site planning as well as building technology, management and finance. The producers of all systems are concerned with such physical site characteristics such as topography, traffic, and integrating utilities with the systems, and should they be certified, will be required to furnish experienced site planning services as a part of their quoted prices.

B. Prototype Site Planning Concepts

Operation Breakthrough sites were selected for prototype development on the basis of their suitability for housing, regional visibility and their variations in their neighborhood settings. The prototype is being designed not just to demonstrate engineering potential - but to show the high quality possible in industrialized housing through good architectural and engineering design.

The sites will also illustrate the potential of flexible zoning and subdivision regulation in allowing for good development, including a variety of housing types - single to multi-family. This housing and site design, should be convincing examples of the environment that is possible in other communities.

Four of the selected sites are in-city, urban renewal sites: The Seattle, Washington (subsite), Jersey City, New Jersey, St. Louis, Missouri, and Memphis, Tennessee, two - Macon, Georgia and Kalamazoo, Michigan - are located in smaller cities: Sacramento and Indianapolis are in built-up areas of larger cities while the King County site is located in the suburbs of Metropolitan area of Seattle, Washington.

In order to provide the best site design on these sites, site planners were selected on a national basis for their ability to provide immaginative, attractive and functional site designs.

The job given to the Breakthrough prototype site planners was to plan for efficient land use and attractive design, utilizing the natural features offerd by each site. Because the prototype will serve as a testing ground for the various housing concepts, the site designs must permit units in sufficient quantity to assure that the land use pattern is fully evaluated and demonstrated. It is the intent of each prototype site whether in-city, peripheral or suburban,to be an example of effective design of a community in which various housing types, including single and multi-family units, and various economic level or price of housing can be appropriately arranged in reasonable proximity to each other-without sacrifice of a good living environment.

The objectives of the site design effort include:

- Planning for good design and layout of land uses programmed for each site.

- Planning for densities that reduce typical per dwelling unit land and site development costs.

- Planning to achieve economies and innovation in layout of roads, utilities and services.

- Planning for a harmonious mix of housing types, family income levels, and life styles.

- Planning for harmonious linking of this site with the surrounding community.

Good and innovative design needs the sound basis of proper analysis of many factors associated with physical aspects of the site, its location, and the requirements of site occupants. Several planning and design ideas have resulted from the design process and are illustrated in the site plans.

Brief descriptions of the eight sites selected follow. The total number of housing units to be constructed on some of the sites is still being negotiated.

Indianapolis, Indiana - The site is on the periphery of the city near the famous Indianapolis Speedway.

This site is 42.9 acres. Approximately 10 acres in addition to this will be devoted to a public park, and is a portion of a 120 farm originally operated by the Indiana Mental Health Department. The site is about a 15 minute drive from the Indianapolis central business district. Since its closing about two years ago, the property has been unused. The site is owned by the county and, except for dormitories and farm related structures located centrally on the tract, the land was used for cultivation of crops. For this reason, the site is presently zoned for agricultural use.

Jersey City, New Jersey - This 6.35 acre inner city site is located at the intersection of Newark Avenue and John F. Kennedy Boulevard, one block from the heart of the downtown area.

The most outstanding characteristic of this site is the view of the panorama of the Manhatten skyline and the New York and Newark harbors. Downtown Manhatten is about 20 minutes away by rapid transit. The site has been vacant for several years having been cleared as a part of St. John's Urban Renewal Project Area. The flat site, lies near the crest of a gently sloping hill, one block from the principal commercial square of Jersey City.

Kalamazoo, Michigan - This is a 33.8 acre suburban site located on a plateau overlooking a lake in Spring Valley Regional Park within the Kalamazoo city limits. It is about two miles northeast of the central business district.

The park that adjoins the site is open in character with well-drained plateau areas, long down-hill slopes, wetland areas with a dense cover of low shrubs, tall grasses, as well as thick tree cover on the slopes adjacent to the lake. The site area is a plateau away from the lake edge and adjacent slopes. Particular care is being taken to protect the slopes and the lake from adverse storm water run-off.

Sacramento, California - This 44 acre site occupies the eastern portion of the 200 acre former California State Fairgrounds. It is located 4 miles southwest from downtown Sacramento and 3 miles from the State Capitol Building.

Two of California's major recreational waterways- the Sacramento and American Rivers are nearby. The dominant positive force near the site is the County Medical School which is linked closely with the University of California at Davis Medical School.

Seattle, Washington (Subsite) - This 1.8 acre site is situated in the Yesler Atlantic Neighborhood Improvement Project in the downtown section of Seattle.

Breakthrough will be the first Federal program to be built in the project area. This site is within an urban renewal area which has been in planning since 1960, and it is also within a model city area. This site is in contrast with the suburban King County site, also in the Seattle area.

King County, Washington - This 35.9 suburban site is located about 40 minutes from downtown Seattle. This site is one of the two sites located in Seattle.

This gently rolling site is located among a heavy second growth of coniferous trees, which are carefully being preserved. Through the center of the site there is a creek and low land which will remain in its natural state. An 80 foot wide water and power easement on the periphery of the site has been made into a potential recreation asset rather than drawback.

Macon, Georgia - Formerly an attractive estate with a six acre lake located four miles from the center city, this 50 acre site is in a rapidly developing area of Macon.

Considered to be the most attractive prototype site, this site is heavily wooded with pine and hard-wood trees in a bowl-like contour with major orientation to a central small lake. The water level of the lake is maintained by springs. Housing units have been set in small clusters around the high perimeter land to avoid soil erosion and to retain as much of the trees and natural setting as poss[illegible]

Memphis, Tennessee - This 15.9 acre site is located in the Court Avenue Urban Renewal area in downtown Memphis midway between the central business district, and the University of Tennessee Medical Center. It is within walking distance of the central business district to the west and adjacent to the medical center.

There are no existing structures or trees on the site and the west end is bounded on 3 sides by major traffic arterials. Because of these arterials, the site presents challanges in noise abatement design concepts as part of the planning process. The site contours will be re-shaped to provide a berm, or created-hill, to serve as a noise shield. From the site are unobstructed views of the Medical Towers and the downtown skyline.

St. Louis, Missouri - The site occupies two neighboring parcels of 7.6 acres and 7.9 acres in the Mill Creak Urban Renewal area in downtown St. Louis.

This is a slum clearance and redevelopment project with all structures in the project area having been demolished and removed from the parcels. The site is located near one of the best rowhouse developments in the country, Le Clede Town, a new, well-planned housing development that has been highly successful in revitalizing this neighborhood near the downtown area. St. Louis University is located on one edge of the site.

The Operation Breakthrough sites, because of the program's emphasis that environmental factors be taken into account in the planning process, will be integrated into the total urban environment of the community, and - taken as a group - should serve as a model for the best in current land planning in varying urban and suburban settings.

D. Market Aggregation

Breakthrough early recognized the major constraints to volume production over broad markets. Diverse building codes, restrictive labor practices, outdated land use, and obsolete zoning patterns - all hindered potential of wide markets. All of this had made investments in plants relatively unattractive to the financial community.

Using a systems approach Breakthrough has tried to deal with all aspects of housing problems at one time. A major effort has been made to end the fragmentation of the market place by "aggregating" or "pooling" the market through assembly of appropriate housing sites - the definition of local housing needs, and the bringing together of viable sponsors.

All 50 State governments (and many local governments) now have assigned personnel responsible for aggregation of Breakthrough markets, and the development of positive state programs for housing. Before Breakthrough only few states and cities had such agencies.

E. Timetable

May 1969	Secretary George Romney announces Operation Breakthrough at a press conference during series of meetings with representatives of the housing industry, labor and State and local governments.
June 24, 1969	Mailing begins of Breakthrough Request for Proposals (RFP) for housing systems and components; requests mailed to more than 5,000 organizations.
July 2, 1969	Briefing in Washington, D. C., for Governors and Mayors and their representatives; preliminary RFP for Prototype Sites was handed out. In August, the RFP, with an attached questionnaire, sent to State and local officials; responses due September 19, 1969.
July 11, 1969	Briefing for prospective proposers held in the Department in Washington, D. C.; more than 625 firms represented.
August 21, 1969	An RFP for Site Planners sent to 350 firms, with responses due by September 26, 1969.
	(From May through September, state meetings on Operation Breakthrough held in Ohio, Michigan, Indiana, Florida, Pennsylvania, Minnesota, California, Delaware, Massachusetts, Texas, North Carolina, Arkansas, Connecticut, and West Virginia.)
September 19, 1969	Proposals for housing systems and concepts and Proposals for prototype sites due at HUD.
September 23, 1969	Responses to the RFP for Prototype Site Planners due.
December 16, 1969	Eight (8) prototype sites announced with two more awaiting final clearances.
December 23, 1969	Thirty-seven (37) proposers announced with one additional reduction to be made. Two Type B proposals announced.
December 1969 - January 1970	Market Aggregation meetings held in each HUD Regional Office with state and metropolitan 701 planning agencies.

February 26, 1970	Twenty-two (22) Breakthrough Housing System Producers announced.
April 18, 1970	Advertised for prospective site developers in the Federal Register.
May 25-26, 1970	Two-day market aggregation meeting in Washington, D. C., for State and metropolitan agencies undertaking Operation Breakthrough activities as part of their planning programs.
May - June, 1970	Contracts signed with all Breakthrough Housing System Producers for Phase I design and development.
July 2, 1970	Nine (9) Type B research proposals announced.
July 20-29, 1970	Contracts signed with site developers.
September - December 1970	Meetings held in eight (8) HUD Regions between Breakthrough producers seeking markets there, the state and metropolitan 701 agencies, local housing and urban renewal agencies, developers and other interested parties.
October 22, 1970	Groundbreaking at Sacramento site.
November-December 1970	Land acquired and ground broken at other prototype sites. Site work commences.
December 1970 - March 1971	Phase II contracts to be executed with Breakthrough producers covering the construction of housing units on the prototype sites.
May-December 1971	Breakthrough units to be produced in the factories and erected on the prototype sites.

IV. ANALYSIS OF ENVIRONMENTAL CONSEQUENCES:

As can be inferred by the scope of Operation Breakthrough's multiple objectives, the approach that is being used is complex, innovative, and undergoing continual modification. Operation Breakthrough is a research as well as a demonstration project. The attention being given to environmental quality in the design of the housing and the housing environment is considerable because of its direct links to the marketability of the houses produced. Community acceptance is needed for Breakthrough to succeed.

The approach to the environmental planning of Operation Breakthrough is interdisciplinary but can not be characterized as completely systematized. This is primarily because a standardized systems approach to environmental planning at the individual site scale does not exist. A special study was carried out to provide a framework for evaluation of the Operation Breakthrough site plans which will allow comparable measurement and evaluation of the physical cost and environmental aspects. This evaluation and continuing study will consider the user's point of view.

This lack of a detailed guide for environmental planning also is being compensated for by careful selection of the housing system producers, site planners, and developers with recognized competency, close coordination with other Federal agencies with supporting capability, and the initiation of supporting research studies.

A. Probable Environmental Impact of Breakthrough

The environmental planning approach being developed by Operation Breakthrough will help relieve the nationally-recognized environmental quality problem of misuse of urban land. This approach views the various environmental concerns involved in the development of housing from a people-community perspective. Accordingly, it focuses upon the complex social and physical interrelationships between people, housing, site, and community. Encompassed in this approach are many of the established principles and techniques of natural resource management as applied to the land, water and air. Operation Breakthrough will also demonstrate advanced housing, total energy, and solid waste disposal systems. An important thrust is the surveying of community issues, concerns and problems in order to help insure that Operation Breakthrough will not only fit harmoniously into the community environment but will also contribute toward the enhancement of that environment.

No one site has the full range of environmental concerns addressed by Breakthrough or can be used to illustrate the full breadth of of environmental planning techniques used and proable environmental impacts. The following discussion will present the environmental planning approach being developed by Operation Breakthrough, illustrating selected examples from various sites and techniques and discuss their probable environmental impacts.

1. Cluster Development

A major concept evident in Operation Breakthrough site design is the housing cluster approach. This approach provides great opportunity and flexibility for environmental management activities. The cluster planning approach tends to separate vehicular and pedestrian circulation, aggregates open space for communal use, provides green ways linking the open spaces and the housing units, concentrates required parking at specific locations in the development, and helps to preserve the ecology and natural features of a site.

The King County site plan in the State of Washington is an illustration of a cluster plan. An advantage of cluster planning is a more economical infrastructure with less land for roads and shorter utility runs needed to service the housing. The plan has one main road and utility line with more units served per foot of road and utility, and there is less road and utility to maintain. This layout is one more easily serviced by public transportation than the standard grid approach. Also, more community open space is available for passive and active recreation as in the Macon site. There is a maximum exposure of units in a cluster plan to open space, privacy on the living side, preservation of amenities (tree, rock outcrops, natural quality of site), and minimum disturbance from grading (less erosion, less road and site preparation). In addition, parking in clusters eliminates the numerous repetitive driveways associated with a typical gridiron development and provides less driving hazard by eliminating automobiles backing out into streets. A mix of housing types is possible in harmonious relationship which can result in various economic levels readily accommodated in close proximity.

2. Community Considerations

The requirement for good and innovative design of Operation Breakthrough sites will result in harmonious linking with the surrounding community environment. This approach necessitated an analysis of many factors associated with the social and physical aspects of the site, its location within the community, and the requirements of site and community residents. Numerous meetings and interviews were held with community groups to determine community issues and needs and detailed socio-physical reports were required of the site planners. These meetings served to let the community know that Breakthrough was concerned about its impact upon the community and the effects of the community upon Breakthrough and that they, in turn, should also share these concerns. Wherever possible, efforts were made to provide for community access to the facilities on the Breakthrough sites. This approach helps to develop a proper liaison and interface with the surrounding community.

The site planners have approached the social and physical problems of their communities in a variety of ways--some have given the community a choice of plans from which to choose, some have interviewed the neighborhood to discover what they want, all have had many community meetings to communicate with the community and learn community concerns. These meetings have taken place not only with the people in the surrounding neighborhood but with school boards, public agencies, public officials, churches, recreation departments and interested group of individuals. Efforts have been taken to fit Breakthrough into the community, and to design Breakthrough sites to help reduce some of the community problems such as lack of open space.

Jersey City and Indianapolis are planning schools either on or adjacent to their sites. In Kalamazoo, the Breakthrough site was chosen and designed to preserve slopes being used by the community for recreational purposes. An ecological study supported avoidance of building on the slopes because of potential soil erosion problems. As an offset to the new housing use of this property, HUD has provided grant assistance for the community to acquire parkland in a part of the city which needs open space, and also to help develop the remainder of Spring Valley park.

On all the Operation Breakthrough sites, planners were required to assess the adequacy of community facilities and services such as transportation, solid and liquid waste disposal, energy, water supply, recreation, and schools. The socio-economic mix of the community was assessed as well as probable directions of social change. Surrounding housing types, values and trends and the pertinent zoning and building codes and laws were reviewed. The types of housing designed for the Breakthrough sites were based upon careful analysis of community housing needs. Surrounding present and planned land uses were noted and a compatible relationship planned for the site and any existing master plans. Attention was given to potential sources of air and water pollution, visual pollution, fire, noise and flooding.

Steps are being taken to help remedy the situation where community facilities and services are inadequate. Particular attention was given to the adequacy of open space and recreation. Community concerns in Indianapolis are the lack of community parks and fear of crowded schools. Open space is not available within a mile and one half radius of the site. To handle this problem the site planners have blended a school with the housing and have given the site 10 acres of community open space. There is no open recreation space within a ten-minute walk of the Jersey City site; adjacent schools are very over crowded. In order to mitigate this, both recreational areas and supplemental school space are being planned on the site for Operation Breakthrough and the community.

It goes almost without saying that the psychological and psychic benefits that occur to individuals from pleasant views are not being overlooked. Views of and from Operation Breakthrough sites are being given particular consideration in the Kalamazoo, Jersey City and Macon sites. At Kalamazoo the planners are concerned with the control of commercial development along a road which would control the major view of the Operation Breakthrough site. The outstanding view of the Manhattan skyline from the Jersey City Operation Breakthrough site has been fully taken advantage of in the housing siting and design, in conspicuous contrast to its conventionally planned neighbors. The planning of the Macon site considered both the views of the lake and the distant countryside.

3. Site Considerations

Site environmental planning considerations have to do with the interrelationships between the Operation Breakthrough housing units, their occupants, and the surrounding physical environment.

Within the guiding principles of best use of land and maintainance of natural features, a variety of land, water and air environmental planning techniques are being used. Also, Operation Breakthrough will demonstrate some of the environmental benefits resulting from the use of advanced systems for site energy production and solid waste disposal.

With a fairly high level of success, all the site planners have designed around the opportunities and constraints of the physical environment and have prepared plans which harmonize with the physical setting. Perhaps the most sophisticated approach to environmental planning was used at the Kalamazoo site. Here the site planners used a computer mapping technique call "SYMAP". This technique rated each portion of the site as to its most desirable and least desirable activity. After this was done, the site was divided into eight distinct regions best suited for certain activities.

Opportunities for multiple use of land were evaluated as is demonstrated by the planning at the King County site for recreation use in an 80 foot wide water, sewer, and power easement. This use will be part of an overall county trail network. Another example of expanding the land resource immediately available to Operation Breakthrough residents, is the system which will be used at the Seattle site which will help create synthetic "land in the sky" by building elevated pedestrian streets and individual earth-filled backyards.

The normal concerns regarding soil stability for foundations and the potential for soil erosion guided the planning at all sites. Concern about the instability of the soils associated with springs at the Macon site led to the use of a thermal mapping study to assist in the identification of the areas unsuitable for housing. Because these areas also contain alluvial soils which are particularly subject to erosion, the Macon site planners have designated them as the site's major open space avoiding a number of potential environmental problems.

Ecological aspects of the Operation Breakthrough sites were also studied and the developments will reflect ecological considerations. A detailed study of the ecology at the Kalamazoo site recommended that annual spraying of the wild cherry trees to prevent tent caterpillars be stopped as inadequate, and the trees ultimately removed. The plan for the King

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County site calls for the preservation of the lush coniferous vegetation and retention of the natural character of the area. Here the most visually appealing land will be preserved. Also, possible funding under HUD's Open Space Program is being explored for acquisition of the wooded areas adjacent to the site. Studies have been designed and proposed by Mercer University to evaluate the ecological effects of the development of the Macon site on undeveloped wooded portions.

The need of residents for outdoor recreation will be better met on the Breakthrough sites. Site planners for the St. Louis site have provided for interior courts as city parkland and playgrounds. These community facilities will be available to neighboring residents. Some sites like Kalamazoo are providing different types of recreation and special areas for the smallest children.

Recreation for older and retired people will be provided in Sacramento. In Seattle, the site planners have suggested the latest in outdoor playgrounds, an Adventure Playground which would be designed to let children manipulate their environment and build their own playthings. Here high density housing will be constructed next to a three block park. The presence of the park near this inner city site determined the number of families to be housed on the Breakthrough site and the number of units to be provided for large families.

Planning for water resource management at all sites addresses the traditional concerns of adequacy of water supply, storm water drainage, waste water disposal, and water pollution. Progressive approaches which will result in minimum environmental degredation are being planned for the Kalamazoo and the Macon sites. At Kalamazoo, the Ecological Study concluded that site drainage should not be allowed to flow into the lake because of the potential for siltation. The management approach suggested is to use the storm drainage as a source of water for the recharge of groundwater supplies. At both the Kalamazoo and Macon sites, where lakes need to be preserved, the design requirements for the storm sewer systems specify filtration of hydrocarbons.

In Indianapolis, the site is designed to detain storm water during peak flow periods. This will help eliminate downstream flooding and result in cost savings through the reduced requirements for large-sized sewers. Site flooding problems at the Indianapolis site are being jointly studied by the site planners and the State Division of Water Resources. The close linkage between the water resource aspects of Operation Breakthrough and the surrounding community is also being given close attention at the King County site. Here, corrective measures will be taken to eliminate off-site drainage problems and water pollution from neighboring septic tanks.

Measures are being taken to control noise at the prototype sites. The potential for noise exposure and the acoustical environment are being evaluated and recommendations made for noise control measures which can be incorporated into the development of the site and into the housing systems. HUD has requested the Federal Aviation Administration (FAA) to provide the Noise Exposure Forecast (NEF) contours from nearby airport operations for all sites.

Two of the sites (Memphis and Jersey City) have high levels of noise from surrounding traffic. Acoustic specialists have recorded the noise levels at parts of the Memphis site and found them to be higher than HUD's interim standards for a site to be acceptable for housing without suitable noise control measures. Therefore the housing systems and the site plan were designed to minimize the impact of environmental noise and produce an acceptable living environment. The probable adverse impact of Operation Breakthrough construction noise on the surrounding community and alternate methods for its minimization are being considered.

4. Housing Considerations

Although Operation Breakthrough's primary objective is to establish mechanisms for volume production of housing, great attention is being given to assure the health, safety, and comfort of the occupants and the public.

Consideration is given to requirements of the families, such as locating those with many small children in the apartments close to the ground so that there is easy access to play areas. Another idea is to include an area for automobile washing and repairing in the basement garage.

Aggregating a part of each house lot into community open space is demonstrated in the Indianapolis plan. A proper amount of private space on each lot is given the homeowner, but use of zero front and/or side yards yields a one to two acre community park space. Creative mass grading is used for environmental interest, gaining privacy by raising the house above the street level, screening parked automobiles from view, and building mid-rise apartments against the slope, so that no elevator is required. Streets are designed for a specific function such as collectors with no house access, and those for house access which have no through traffic. The plan has less street (18-20 percent vs 25-35 percent for conventional plans) and provides the additional economy of clustered parking.

To screen the parked automobile from view, parking areas can be covered with a deck. The deck space can be used for recreation and possible other uses such as a base for community building. From such a raised deck, it is possible to build pedestrian bridges across busy bordering streets. In downtown areas, where an intense use of the available land is desirable, parking can be put in the lower floors of structures. This suggests multiple use of the same area, such as housing and shops over the parking. It vertically separates the pedestrian and the automobile. Where it is too costly to cover the parking, the cars are clustered in modest size parking lots to avoid large undesirable parking fields. Portions of the site remain for people only.

This discussion of auto parking requirements indicates the extent of emphasis and consideration that must be given to family automobiles which have now grown to a total of about 86 million. Although work is in progress on improved mass transit systems, this obvious desire for private transportation does significantly complicate design of residential communities as well as overall urban design.

The National Bureau of Standards is in the process of outlining requirements, criteria, and tests for use in the design and evaluation of the prototype housing. This is particularly vital since the state-of-the-art prior to Breakthrough as to the development of performance requirements and criteria for housing was incomplete. The requirements and criteria being developed will guide the innovative and experimental aspects of the as-built housing systems. Quality assurance programs will be established for each system.

To further support this effort, environmental research outlines are being developed to evaluate the habitability of the housing units. This research would try to develop an understanding of the relationships between the housing environment and social behavior and attitudes as indicators of the physical, mental and social well-being of the residents. Specifically focused upon will be such factors as the relationships of housing density to livability, improvement of security against crime, safety standards for home accidents, assessment of auditory privacy between dwelling units and the effect of environmental noise.

5. Advanced Utility Systems Demonstration

The opportunity of using Operation Breakthrough to demonstrate advanced utility systems has been recognized. HUD has contracted with National Bureau of Standards to study total energy systems and with the Environmental Protection Agency to study the solid waste systems. Individual site planners have developed some of their own innovative ideas.

The use of a Total Energy System, in particular, contributes toward improved air quality for all people by reducing the fuel consumption for a required energy demand. By paying close attention to the solid waste storage and handling problems, in particular the use of advanced pneumatic collection systems, the odor problem normally associated with waste is drastically reduced, and potential increases in bacteriological air contamination due to the presence of solid wastes is reduced.

A total energy system is planned for the Jersey City site. The idea of this system is to locate a generating plant on the site and use a single source of power to provide air conditioning, hot water, and inside heating. This use of a total energy plant compared to individual heating and cooling plants in each housing unit and a separate supply of electricity means less environmental pollution and greater reliability. The noise that might be caused by the generator, cooling tower, and other components is being estimated and steps are being taken to reduce the noise and other potential environmental problems. The energy system will be located in an area where it will have minimal environmental impact upon surrounding residences.

A Pneumatic Solid Waste system is planned for demonstration both at Jersey City and Memphis. This system has not been used in residential applications in this country although the system planned for Jersey City is being used in Swedish residential areas. The system planned for Memphis is an advancement - - single family dwellings are included. With these systems, refuse is gathered through sealed vacuum tubes directly from the disposal chute to a central collecting and compacting point with no handling. This system reduces the refuse volume and overflowing dustbins, smells, dust, noise, and spillage during loading and transport. Expensive access roads for service become unnecessary.

The Urban Institute will analyse and evaluate the innovative utility systems being demonstrated, i.e., solid waste systems and energy systems. National Bureau of Standards, Environmental Protection Administration, and the Urban Institute will coordinate and study the utilities for:

1. efficiency of operation
2. reliability
3. maintenance and repair
4. cost of operation
5. relationship to user needs
6. physical environmental quality

6. General Environmental Consequence

Immediate environmental benefits will result from the environmental considerations that are included in the review of site plans prior to their certification. The environmental consequences of

the prototype phase of Operation Breakthrough, from a national perspective, however, will be quite limited. A beneficial cumulative environmental impact could result if the improved knowledge of the man-housing-site-community environmental interrelationships gained through the program were transformed into environmental planning guidelines, criteria and requirements for following volume - produced housing and housing in general. This would be particularly true if environmental standards were formulated and required as a basis for future HUD certification of housing systems and site planning.

As HUD's perspective upon environmental actions chiefly relates to their ultimate effect upon the physical, mental, social, and economic well being of the individual, the precise effects of the environmental planning techniques being applied in the prototype phase of Operation Breakthrough are difficult if not impossible to quantify. Planned studies of the sociological and psychological response of the occupants of the housing units and the surrounding community to the innovative housing and site design and the advanced utilities systems should provide much of the understanding needed to better evaluate and plan for environmental impacts.

In general, however, it is believed that the environmental planning and management approach being developed in Operation Breakthrough will result in an significantly improved living environment in volume-produced housing systems and consequently will improve the physical, mental, and social well-being of the occupants to a degree not previously attainable.

B. Probable Adverse Environmental Effects

At this stage of Operation Breakthrough, no adverse environmental effects can be foreseen. Careful provisions are being made, however, to monitor and evaluate the social and physical environmental effects of the program upon the occupants of Operation Breakthrough sites and the surrounding community. Remedial actions will be taken if potentially harmful environmental effects are detected.

C. Alternatives to Operation Breakthrough

One alternative is that no action be taken by HUD to stimulate volume production of housing systems. If this alternative were pursued, present and future housing needs would not be met and many promising techniques for volume housing production would be delayed or not used at all.

Full attention could also be given to improving methods for volume production of housing systems while disregarding the needs for improved environmental planning guidelines such as those used in Operation Breakthrough. As industrialized production of housing is already underway, this alternative would result in significantly reducing the environmental amenities associated with this housing. Indeed, much industrialized housing today is of relatively low

quality and embodies virtually no environmental considerations. This is especially true if we include mobile homes in this category. To launch a program to develop and promote industrialized housing without showing real concern for environmental quality would be folly.

Another alternative to increased housing production would be to provide the availability of mortgage funds, or other incentives, sufficient to stimulate the existing, conventional construction industry to higher levels. In our view, this would largely lead to greater competition for scarce labor and materials, thus driving up costs and prices even faster. This, in turn, would diminish effective demand and thus decrease the opportunity to meet pressing housing needs rather than enhance it.

D. Relationship to Maintenance of Long-Run Productivity and Irreversible and Irretrievable Commitment of Resources

From the perspective that each generation is a trustee of the environment for succeeding generations, the environmental planning and management of Operation Breakthrough will have beneficial long-term effects. Operation Breakthrough will expand rather than curtail the range of beneficial uses of the environment. No irretrievable commitment of natural resources is being made as part of Operation Breakthrough.