feedback

OPERATION
BREAKTHROUGH

U.S. Department of
Housing and Urban
Development

PHASE II

SITE PLANNING
AND DESIGN

VOLUME
7

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Preface

The Department of Housing and Urban Development initiated Operation BREAKTHROUGH in May 1969 in order to demonstrate volume housing production techniques. An integral part of the program was the design of each demonstration site by multidisciplinary site planning teams. The primary function of these teams was to provide the design and planning expertise needed to coordinate the demonstration of the prototype housing systems on the prototype demonstration sites.

The Department established a broad range of site planning objectives for the multidisciplinary teams, which included providing a systematic approach to the design of each site; planning for functional and innovative design in land use and housing types programmed for each site; planning to achieve economics in layout of site infrastructure; planning for harmonious mix of housing types, income levels and life styles; planning for harmonious linkage of site to surrounding communities; and, making maximum use of the existing natural features. In many cases, the physical condition of each site and its surrounding environment required the site planning teams to establish additional site specific planning objectives and goals for these urban and suburban sites.

The purpose of this document is to provide a compendium of the site planning efforts of those teams, by describing their planning processes, their objectives and goals, their plans, and the ultimate environment that was created. Much of the material in this compendium has been taken directly from the reports of the planning teams themselves. Photographic documentation of the prototype sites, keyed to the design objective and resulting user reactions is also presented.

It is hoped that this compendium will prove useful to designers, developers, lenders, administrators and all persons concerned with improving the quality of the residential environment.

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Assistant Secretary for Policy
Development and Research

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Introduction

This document is a compendium of the planning and design of the demonstration sites for Operation BREAKTHROUGH, a research and technology program sponsored by the U.S. Department of Housing and Urban Development. This compendium is one of a series of Feedback volumes intended to be general reports suitable for use by the general public as well as professionals in the housing field.

HUD's Operation BREAKTHROUGH marks one of the few times in the history of the United States that the federal government has engaged directly in the design and construction of local housing in various locations across the country. The most notable predecessors to BREAKTHROUGH are the WPA and Greenbelt efforts of the 1930's and 1940's. Several current state level agencies are engaged directly in similar efforts, such as New York's Urban Development Corporation and the Massachusetts Housing Finance Corporation.

It has been a primary goal of Operation BREAKTHROUGH to act as a catalyst in shifting the focus of the national housing industry. The most visible part of the program has been the housing systems selected for development through a national competition in the summer of 1969. In early 1970, twenty-two initial producers were chosen from a field of 236 entries.

The housing systems selected for Operation BREAKTHROUGH varied widely in the degree to which they had been developed or utilized. Some systems were modifications of housing products currently in use, and others were just off the drawing board but showed great promise in design or materials. None of the systems, however, was ready for immediate production under the BREAKTHROUGH program; all required a period of additional design, development, testing and evaluation, and qualification against the comprehensive performance criteria established for the program.

It was recognized at an early stage that no adequate performance-oriented standards existed by which new ideas could be fairly evaluated. HUD, therefore, commissioned the National Bureau of Standards, under the review of the National Academies of Science and Engineering, to develop the standards now known as the "Guide Criteria for the Evaluation of Operation BREAKTHROUGH Housing Systems." These Criteria were published in four volumes geared to the four primary types of housing — multi-family high-rise, multi-family low-rise, single-family attached, and single-family detached. For the first time performance requirements, criteria, and tests were defined for all elements of all types of residential buildings.

Prototype Site Locations

Eleven sites were initially chosen as prototypes. Nine of them were developed..

In order to be sure that the Guide Criteria reflected the highest consensus of professional opinions, HUD had obtained the services of the National Academy of Sciences and the National Academy of Engineering to oversee this effort. A joint "Advisory Committee to the Department of Housing and Urban Development" was established to review and comment on the Criteria and to participate in the review and final acceptance of the housing units designed and produced in accordance with these Criteria, including validation of testing program results.

During the Phase I activities, each of the selected Housing System Producers received direct HUD contracts to complete their system development and design, testing and evaluation within the parameters established by the Guide Criteria. Since the program objectives are oriented to quality, production, management, and marketing, as well as to technology, each producer was required to develop plans demonstrating his knowledge of and commitment to each of these areas. Products of Phase I included specific designs and production plans for the Phase II prototype demonstration program. Finally, each producer was required to develop and implement programs providing for equal opportunity in employment.

In order to demonstrate these systems, prototypical sites were selected in another concurrent competition. Communities were asked to propose specific parcels of land accompanied by assurances of local cooperation in the demonstration of innovations in housing and planning. Eleven sites were selected from over 200 entries. Two of these were later dropped because of budgeting considerations.

As the sites and systems were being selected, HUD chose professional teams of architects, landscape architects, site planners, and engineers to develop and execute the desired innovative land use designs. Eleven Prototype Site Planners were chosen through a third competition from 82 proposals received by the Department.

Functions of the Prototype Site Planners included collection and analysis of site data important for design study, preparation of a conceptual design for HUD review and approval, design coordination of the

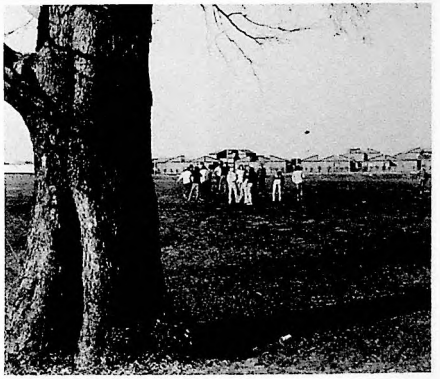
housing systems assigned to the site, and the development of specific design and construction documents for site development work.

Each prototype site community had previously agreed to waive any constraints in its building and zoning codes to permit the erection of innovative systems in the most modern and desirable land use patterns. With this design freedom the planners have created a model — taking all nine sites together — of the latest and best land usage in a variety of urban and suburban settings of differing terrain and climate.

Site developers were required to have the capacity for managing the site construction program, administering construction contracts with the various producers operating and maintaining the site during the demonstration and marketing period, and marketing the completed housing at the end of the prototype program. Eight such site developers were selected from 68 firms proposing to undertake this effort. The two sites in the Seattle area became the responsibility of one Prototype Site Developer.

Ground-breaking ceremonies were conducted on all prototype sites prior to the end of 1970, and site development and construction activities proceeded from that time at speeds that have been somewhat dependent upon the varying readiness of each system to commence prototype construction.

BREAKTHROUGH financing has also been innovative among federal programs. For the prototype sites it comes from two sources — the commercial mortgage money market and federally appropriated research funds. Mortgage financing was undertaken under several HUD housing programs, both subsidized and nonsubsidized, rental and ownership. Two sites, Kalamazoo and Jersey City, were financed through state housing finance agencies. Other sites are using one or more local savings and loan institutions or other real estate financial sources. To accomplish this mix of federal and mortgage financing, it was necessary to create contractual and financing instruments responsive to both the requirements of real estate law and the Federal Procurement Regulations. Thus, private funds are providing for the normal or market value of the prototype units, and federal



The BREAKTHROUGH sites varied from the urban northeast, the wooded south, and the plains of the midwest.

Residents' children were of prime importance to BREAKTHROUGH planning objectives.

research funds are devoted to any excess costs involved in producing innovative prototypes. The first BREAKTHROUGH prototype housing was occupied according to plans in the Spring of 1972 and the final units in the Spring of 1973.

Phase III for Operation BREAKTHROUGH called for encouragement of marketing programs by BREAKTHROUGH producers. This encouragement came through priority processing of program applications and special allocations of HUD housing program funds to BREAKTHROUGH housing. This activity began in fiscal year 1971 with approximately 3,600 units of specially processed housing assistance funds being committed to specific projects using BREAKTHROUGH systems, together with about 1,400 other units under the regular programs of the Department. By mid-1972, approximately 25,000 housing units had been produced under HUD programs. It is expected that these housing systems will become a growing part of the industry without any further assistance from Operation BREAKTHROUGH.

THE OFFICE OF OPERATION BREAKTHROUGH

The Office of Operation BREAKTHROUGH is one of six divisions of the research and technology division of the Department of Housing and Urban Development (HUD). Under the general direction of the Assistant Secretary for Research and Technology, BREAKTHROUGH has operated in several areas: technical operations, including housing systems and site operations; site and land planning; site relations and negotiations; and market aggregation. The activities of each division, and their products, are discussed in this and the companion volumes in the Feedback series.

The Division of Site and Land Planning was established in June 1969. Under its general goal of improving the quality of the built environment, the Division has engaged in several activities:

- Direction and monitoring of BREAKTHROUGH contracts with Prototype Site Planning teams for the planning and design of the prototype sites.

- Provision of technical assistance and coordination with the other Divisions on matters of implementation of site design and development.

- Provision of technical and architectural design assistance in the evaluation and review of system designs for all Phase III volume production units, consisting of approximately 125 projects and 25,000 housing units.

- Development of criteria for the objective evaluation of the quality of site planning and environmental impact of regular HUD program housing and community development.

- Provision of training and guidance for implementation by HUD field personnel.

- Review of research proposals.

- Provision of planning, site and architectural design assistance for other Research and Technology research and demonstration programs as well as other HUD operating programs.

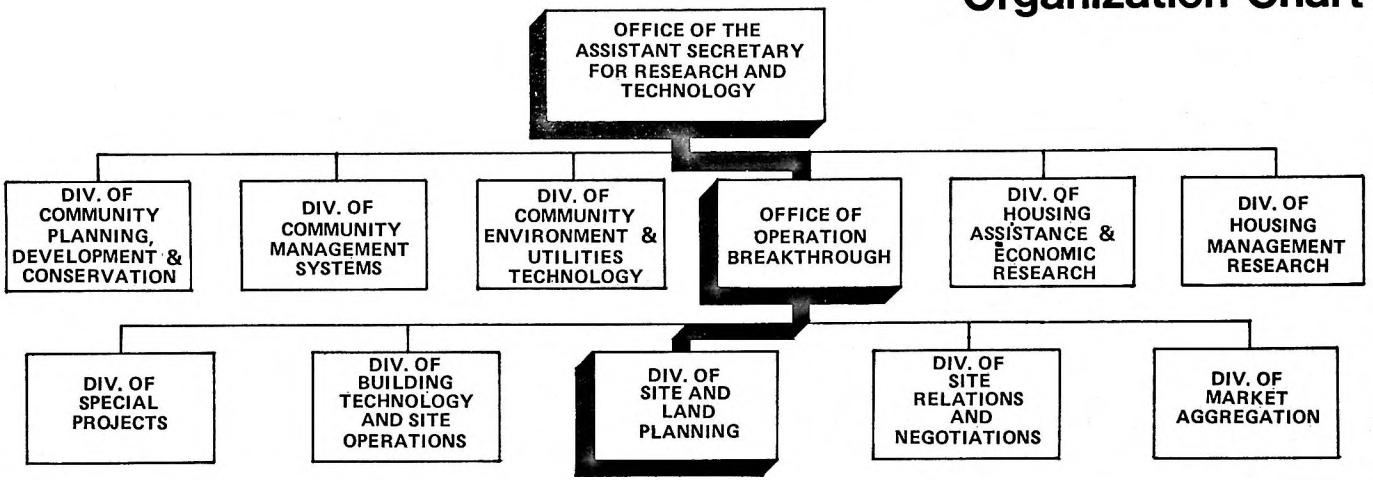
- Coordination with HUD field offices and others on the application of Minimum Property Standards and Operation BREAKTHROUGH Design Guide Criteria to Phase III housing developments.

Through fiscal year 1973 and 1974, the Site and Land Planning Division has continued to provide input into planning, design and construction details of the prototype and volume production sites.

This volume of the Feedback series was specifically concerned with the work of the prototype site planners during Phase II of the BREAKTHROUGH effort. As noted, the planners were responsible for innovation in site and land planning and the accompanying responsibilities for development and documentation of their designs. In most cases the supervision of construction was also involved.

The bulk source of material for this compendium is from the reports of the planners. Much of the material in the Site Summaries chapter is a transferral of their original texts, edited only for the sake of continuity. This was done in the opinion that the original texts best relate the priorities of the individual planning teams.

Operation BREAKTHROUGH Organization Chart



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Objectives

The simplest statement that has been made of Operation BREAKTHROUGH's goal is "to improve the process of providing housing." Rather than just build more houses, BREAKTHROUGH seeks better ways to build houses. Supplementing other programs, it adds the new dimension of industrialized housing, testing fresh ideas in materials, labor, standards, financing, and marketing.

The BREAKTHROUGH Program was conceived by HUD Secretary George Romney and his staff in 1969 to attack, on a broad front, the national housing crisis. What were the dimensions of that crisis? A good illustration is that investment in housing declined between 1950 and 1960 by 52% as a share of the Gross National Product. Because of the large population growth during that interval, a cumulative housing shortage estimated at several million units developed.

A ten-year goal of 26 million new or rehabilitated dwelling units was set by the Congress in the 1968 Housing Act. This represented a proposed yearly average of 2.6 million units, compared with the achieved yearly average in the period 1959–1968 of under 1.5 million. The largest previous production year ever, 1950, saw 1.97 million housing starts.

Clearly, there was a gap between production and need. Given the existing capabilities of the housing industry, this deficit seemed certain to grow in the next decade.

Many of the limitations on the conventional housing industry are beyond the industry's control. Among them is a whole series of economic constraints. There are outmoded laws too, and there are shortages of materials, labor, and money.

Perhaps the most important constraint is the fragmentation of the market. Houses are ordered singly or in small numbers. The result of fragmented orders is a fragmented industry. Even the largest builder does not produce more than a small fraction of the total supply. HUD Assistant Secretary for Research and Technology, Harold Finger, has said, "You don't get economies of scale. A builder never produces enough houses to be able to cut his costs, to permit effective procurement of materials or scheduling of labor forces. He can't supply a large market because of the various codes and restrictions that exist throughout the country."

To find a solution to this part of the housing problem, BREAKTHROUGH had two tasks to accomplish: first, to give a significant impetus to modernizing the housing industry so that production capacity would be greatly enlarged; second, with this

major commitment as a lever, to reduce the outside barriers to market aggregation. These tasks, although interdependent, could be conducted separately and concurrently.

The key to updating the housing business is industrialization: the use of advanced technology to increase production. It involves a high degree of prefabrication and factory building of major components. While progress is being made in the conventional housing industry, it is slowed by the many outside constraints, by consumer attitude, and by the influence of tradition.

Before BREAKTHROUGH, industrialized housing amounted to perhaps 5% of the total units built. However, this figure does not account for mobile homes, a form of industrialized building that holds great portent. The growth of mobile homes sales has been rapid, approaching by 1969 one-third of the total housing units built per year. This tends to prove that assembly-line building works and that the public will buy factory-built dwelling units.

The mobile home is an adequate shelter, with few technological novelties. But the BREAKTHROUGH units were to be a whole new look at human habitation, utilizing any practical innovation known, and pointing the way to those economies of scale possible only through volume production.

HUD defined its BREAKTHROUGH objectives as follows:

This program has as its primary objective the establishment of self-sustaining mechanisms for rapid, volume production of marketable housing at progressively lower costs for people of all income levels, with particular emphasis on those groups and individuals who have had difficulty in obtaining satisfactory housing in the past.

To assist in reaching the primary objective, the program addresses the following secondary objectives:

- Stimulate the modernization and broadening of the housing industry through increased emphasis on better design and greater utilization of improved techniques within the current housing industry and through increased participation by other organizations that possess the necessary talents, interests, and capability for such a commitment.

- Increase participation and leadership by state and local governments to provide on-going planning and marketing and site aggregation for housing, its environment, and the community.

- Waive or remove constraints to the introduction and use of tested and proved innovations in design, construction, land acquisition and use, financing, labor utilization, materials, components and systems, sponsorship, consumer participation, management, and maintenance.

- Introduce new organizational concepts and management techniques for market and site aggregation and for design, production, and marketing of living units.

- Coordinate the application of all available government resources appropriate to a given site or sites for housing, environment, community services, and facilities.

- Encourage identification and development of performance standards for evaluation of innovations, working with authorities in this area.

- Develop an on-going testing and evaluation mechanism and technique for judging the effectiveness of innovations.

- Develop techniques for increased effective participation by consumers and community groups in planning and developing the total housing environments.

The Operation BREAKTHROUGH housing systems were intended to modernize the American housing business by breaking through the established constraints. This modernization could be done by research and development, a systematic R&D program of the type employed successfully in electronics and aerospace but notably lacking in the housing sector.

Marketing plans were oriented to families and individuals of all races and incomes.

3

Planning

As a means for satisfying the stated goals of Operation BREAKTHROUGH, HUD established a broad range of objectives for each prototype site planner (PSP). At the outset, HUD advised the planners to:

- Provide living densities which will reduce per unit land and site development costs.
- Provide for methods of service and site facility design, construction and operation that can reduce site development and operating costs and improve the living environment.
- Create a physical and social pattern that will be harmonious with the surrounding community.
- Make maximum use of the existing natural features.
- Plan for housing with varied family sizes, income levels, and sponsoring methods to assure a socio-economic tenant mix.
- Provide visitor control and visitor facilities adaptable for community usage after prototype review and evaluation.
- Assure that proper consideration is granted to the wishes of surrounding community and prospective occupants of the site.

The Department established a contractual organization with all PSPs in order to coordinate and direct the general planning processes. By dividing the process into tasks and subtasks, HUD was able to monitor the planning progress of each site.

All of the BREAKTHROUGH planning and site design fell under the formal process listed in the accompanying box. In many cases, however, certain aspects required greater effort than others. Consequently, some planners required time or procedural overlaps, elimination of some tasks, or greater emphasis on selected subtasks. A general example is provided by the subtask calling for neighborhood participation. Virtually all of the sites were subject to varying degrees of interest from the community. Some planners found themselves almost constantly occupied with community relations, with little emphasis placed on concurrent subtasks. Several site planners required greater emphasis on ecological concerns because of both the particular site and the planner's personal orientations. Innovative design tools, such as computerized graphics and symbolic planning graphics, were utilized by some planners. In several instances, the planning teams developed master plans for areas larger than the BREAKTHROUGH site. In other cases, certain tasks or subtasks, such as Task IV (construction supervision), were performed by others.

The various locational differences among the BREAKTHROUGH sites required comparably varying approaches to site design. In general they may be distinguished as either suburban or inner city. In the five suburban sites, great emphasis was placed on cluster planning, separation of people and automobile, centralized open spaces, and transitions from adjacent neighborhoods. In the four inner city urban sites, the multi-use of vertical space seemed paramount, along with provisions for community facilities and for the physical integration of BREAKTHROUGH with its neighborhood.

In many cases, the needs of the site and/or its neighborhood caused the BREAKTHROUGH demonstration to incorporate new objectives. Several had to make considerable improvements to sewage services; many felt compelled to provide community-wide service and recreation facilities, particularly in suburban areas where such facilities are traditionally low.

The combination of the locational context and the needs of the particular site resulted in the development of district plans particularly responsive is localized criteria. The Macon and King County sites, suburban locations in heavily wooded areas, placed heavy emphasis on ecological preservation, resulting in clustered plans that separate vehicles from pedestrians and create enclaves of natural growth to which most development has been oriented. The Kalamazoo site was planned similarly.

The Sacramento and Indianapolis sites were planned in highly organized clusters that created open space elements. The urban sites (Jersey City, St. Louis, Memphis, and Seattle), in a similar sense, defined their open spaces by the placement of buildings in an organized pattern. Distinguishable from the ecological suburban sites at Macon, King County, and Kalamazoo, the other sites created environments whose ingredients (topography, vegetation, open space) did not exist prior to the developments. The challenge to the planners, although characteristically different from site to site, was considerable nonetheless for all of the nine BREAKTHROUGH sites.

The individual planners were responsible for the composition of their planning teams. The result was a wide variation in the size and scope of the teams. Two planners chose to perform their tasks without consultants, whereas others subcontracted to various specialty firms. All organizations involved in this respect, as listed in the planners' brochures, can be found preceding each site summary.

Task I: Site Investigation and Conceptual Planning

- Subtask: Analysis of Physical Characteristics
- Subtask: Topographic and Area Survey
- Subtask: Area Planning
- Subtask: Preliminary Subsurface Investigation
- Subtask: Neighborhood Characteristics and Social Participation
- Subtask: Land Use Program
- Subtask: Conceptual Site Plans
- Subtask: Preliminary Design Objectives
- Subtask: Matching Systems to Site

Task II: Preliminary Design

- Subtask: Analysis of Systems' Architectural Characteristics
- Subtask: Analysis of Systems' Construction Methods
- Subtask: Analysis of Systems' Testing Requirements
- Subtask: Analysis of Subsurface Conditions
- Subtask: Site Design
- Subtask: Coordination with Housing Systems Producers
- Subtask: Coordination with Prototype Site Developers
- Subtask: Preliminary Site Plan
- Subtask: Specifications Outline
- Subtask: Preliminary Cost Estimate

Task III: Working Drawing Development

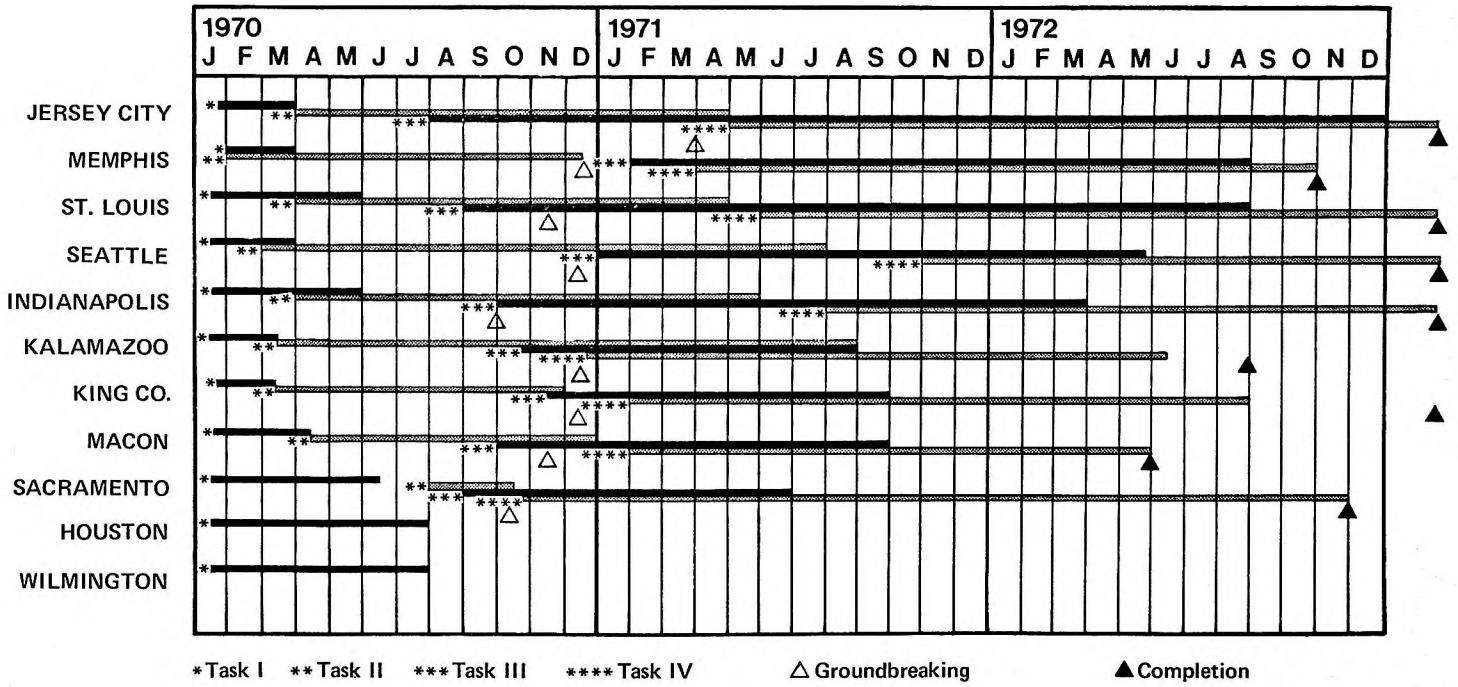
- Subtask: Coordination of HSPs' Working Drawings
- Subtask: Refinement of Preliminary Plans
- Subtask: Preparation of Construction Documents

Task IV: Inspection of Site Construction

- Subtask: Management and Control of Construction
- Subtask: Coordination of Construction
- Subtask: Continuous Inspection of Construction

Most of the Phase II activities were completed in 1973, over two years from the initiation of the program.

Site Development and Time



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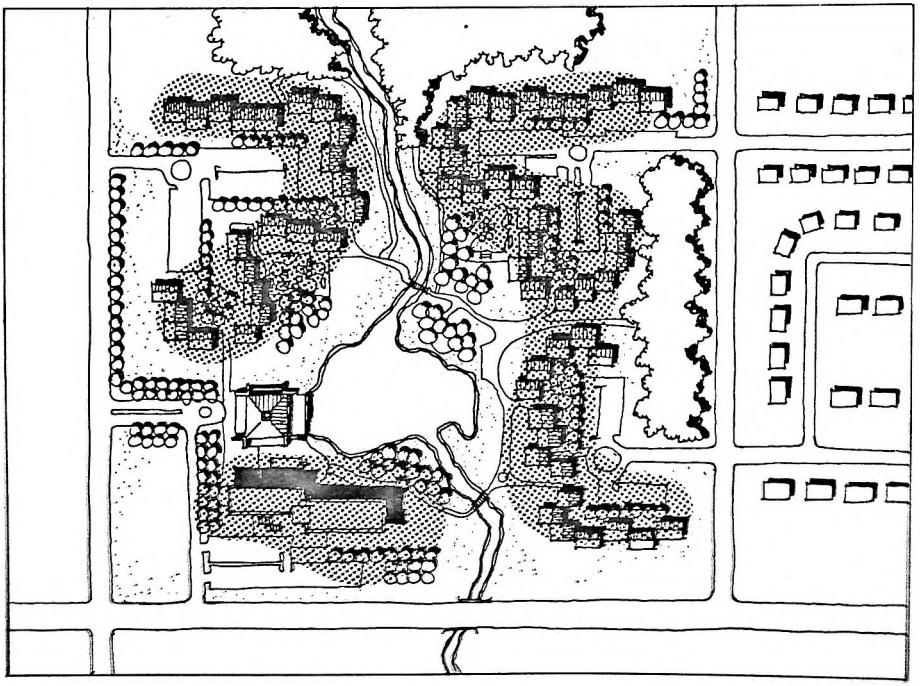
Comparisons

Each of the planners in the BREAKTHROUGH program produced reports of their planning efforts. The following sections contain summaries of their reports, edited for the sake of condensation and continuity alone. With the exception of this chapter's charts and certain other graphics, and all of the photography, the graphics presented herein are those of the individual planners.

In this chapter, a series of comparison charts enumerate the various characteristics of the BREAKTHROUGH sites and housing producers. A questionnaire distributed to the planners contributed much of the information contained in the charts.

Site planning for residential environments involves more than the simple placement of roads and buildings. These charts demonstrate the considerations the planners made not only for the amounts and kinds of housing units, but the amounts of parking needed, other land users and types, considerations for various amenities, and the demands placed on the development by the environment. Additionally, all but one of the sites involved more than one housing producer, which led to the planners' responsibility for coordination of many different interested parties, for integration of divergent architectural types and styles, and for the optimal display of all housing systems of the sites.



The chart opposite demonstrates the wide range of land use elements in the BREAKTHROUGH program. About 2,900 housing units have been produced in Phase II of the program, in gross development densities ranging from 5 units per acre at King County, Washington to 76 units per acre at the Jersey City site. The Memphis site contained the largest number of dwelling units (518), including about 140 that were constructed with conventional methodology.

Reflecting the general need for more cars on suburban sites, the parking ratios vary from less than one car per residence at Jersey City to two cars per unit at Indianapolis. The parking amounts were generally decided in response to the market demands of each of the locations, as well as from the restrictions of site size, provisions of alternative means of transportation, and the characteristics of project residents. Three of the urban sites provided parking below grade in weather protected structures.

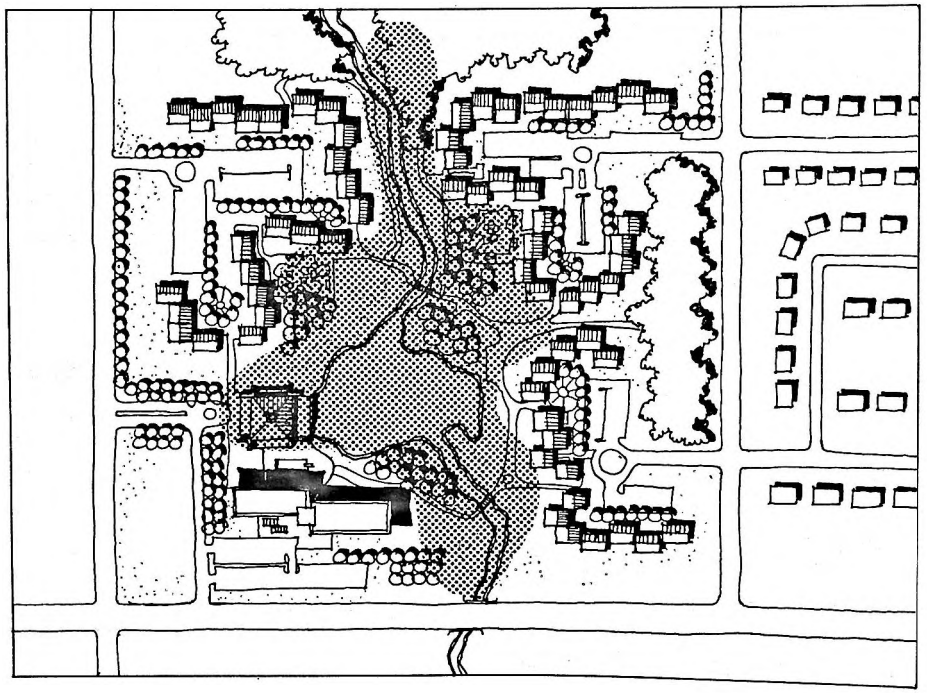
This chart also indicates the additional land uses included on the various demonstration sites, ranging from commercial retail uses to community rooms. When indicated as being "Off Site," these uses are directly adjacent to the BREAKTHROUGH properties and were integrally considered in the planning of the sites. Not all of the nonresidential uses were constructed through BREAKTHROUGH financing programs.

Comparative Site Data / Land Use Facts

Jersey City	Memphis	St. Louis	Seattle	Indianapolis	Kalamazoo	King Co.	Macon	Sacramento	
INNER CITY SITES				SUBURBAN SITES					
6.4	16	15.5	1.8	43	34	36	50	33	Acres
488	518	464	58	295	245	178	287	407	Total Units
				103	14	66	16	20	SFD
	69	75	38	140	127	88	149	179	SFA
12	99	164	14	16	52	24	42	96	MFLR
58		51	6	36	52		24		MFMR
418	350	174					56	112	MFHR
3	4	4	1	8	7	4	6	6	Number
76	33	30	32	7	7	5	5.7	13	Units/Acre
.69	1.25	1.15	1.21	2.00	1.7	1.69	1.5	1.61	Per Unit
338	650	533	70	590	417	300	430	654	Site Total
●	●	●		●	●	●	●	●	On Grade
●	●		●						Below Grade
	●	○		●	●	●	●	●	Community Bldg.
●			●						Community Room(s)
		●			●		●		Maintenance Bldg.
●	○	●							Commercial
●	○	○	○	○	○	○	○	○	School
		●	●		●			●	Day Care Center
●									Central Utility Bldg.
●	●		●						Pedestrian Deck(s)

Acres	SIZE
Total Units	HOUSING
SFD	
SFA	
MFLR	
MFMR	
MFHR	
Number	PRODUCERS
Units/Acre	DENSITY
Per Unit	PARKING
Site Total	
On Grade	
Below Grade	
Community Bldg.	OTHER USES
Community Room(s)	
Maintenance Bldg.	
Commercial	
School	
Day Care Center	
Central Utility Bldg.	
Pedestrian Deck(s)	

Source: Planners' Reports and Questionnaire Response ● On Site ○ Off Site



An unusually high level of amenities have been provided on the prototype sites, as demonstrated by this chart. Open space and structured and unstructured recreation areas ranked high in the priorities of the Department and of the individual site planners. As exemplified by the Indianapolis, Kalamazoo and Sacramento sites, the suburban locations accepted the mandate to provide a high level of amenities with the expressed intention of serving neighboring communities as well as the BREAKTHROUGH site.

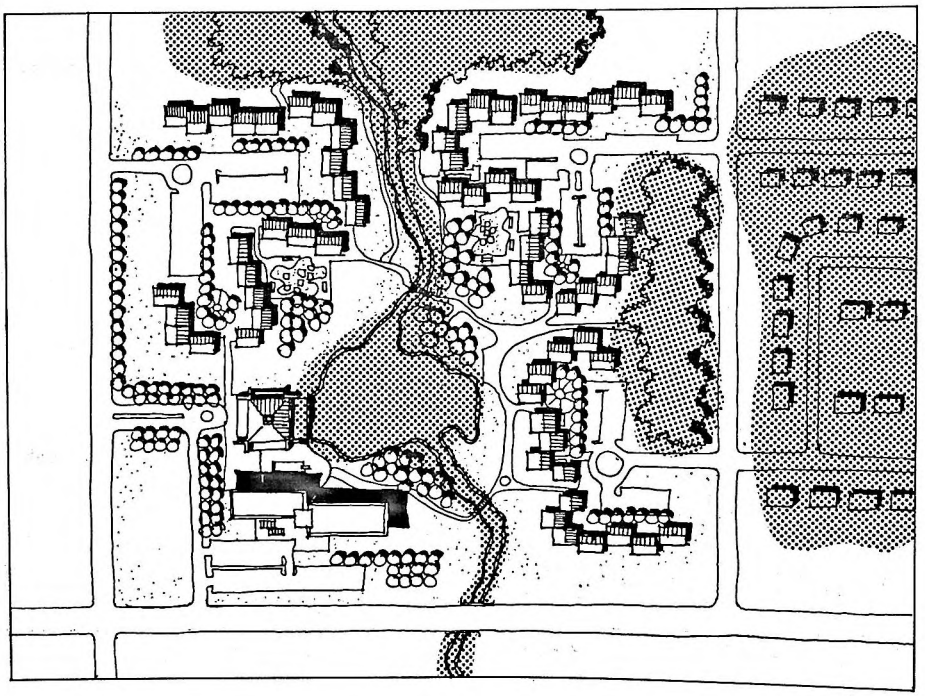
For the most part, utilities and operational services on the demonstration sites are conventional systems. However, a few of the exceptions are worth noting; such as a pneumatic trash collection system and a total energy system at Jersey City, and the in-cluster trash compactors at Kalamazoo.

Comparative Site Data / Amenity Provisions

	Jersey City	Memphis	St. Louis	Seattle	Indianapolis	Kalamazoo	King Co.	Macon	Sacramento
	INNER CITY SITES				SUBURBAN SITES				
Private	●	●	●	●	●	●		●	●
Semi-Private		●		●		●			
In-Cluster			●		●	●			●
Central/Common	●	●		●	●	●	●	●	●
Non-Resident					●	○			
Indoor			●	●	●	●	●		●
Tot lots	●	●	●	●	●	●	●	●	●
Playgrounds	●	●		○	●		○		●
Playfields			○	○	○	●	○		
Hard Courts	●	○	○	○	●	●			
Sitting	●	●	●	●	●	●	●	●	●
Elderly									●
Pool	●	○	●	○	●	●	●	●	●
Outdoor Event			●		●				●
Picnic	●				●				
Bicycle Paths		●			●	●			
Convent'l Sewer	●	●	●	●	●	●	●	●	●
Unconvent'l Sewer									
Convent'l Energy		●	●		●	●	●	●	●
Unconvent'l Energy	●			●					
Convent'l Trash			●	●	●	●	●	●	●
Unconvent'l Trash	●	●				●			

Private	OPEN SPACE
Semi-Private	
In-Cluster	
Central/Common	
Non-Resident	
Indoor	RECREATION
Tot lots	
Playgrounds	
Playfields	
Hard Courts	
Sitting	
Elderly	
Pool	
Outdoor Event	
Picnic	
Bicycle Paths	
Convent'l Sewer	UTILITIES and SERVICES
Unconvent'l Sewer	
Convent'l Energy	
Unconvent'l Energy	
Convent'l Trash	
Unconvent'l Trash	

Source: Planners' Reports and Questionnaire Response ● On Site ○ Off Site



Each of the BREAKTHROUGH sites presented the planners with different environmental characteristics that often dictated the design of the sites themselves. This chart summarizes these qualities and the basic design concepts utilized by the planners.

Because of the benefits accrued to residents in the form of contiguous open spaces and well defined use areas, most of the site plans followed the concept of clustering uses together. These design concepts in combination with the environmental character of the sites themselves were used as primary criteria for the physical design of the demonstration sites. Topography affects the way in which buildings could be placed on the sites, as did the amount of existing vegetation. The level of existing vegetation also indicated the amount of new vegetation that would be required, such as at all sites but Macon and King County where the existing vegetation was heavy.

Recognizing various forms of potential pollution at six of the sites, the planners consciously made preventive efforts to the execution of the plans. Although most of the incidents of pollution were from off-site sources (such as the freeway traffic bounding the Memphis site), the impacts occurred on-site, thus creating potential adverse environmental conditions.

Comparative Site Data & Environmental Character

	Jersey City	Memphis	St. Louis	Seattle	Indianapolis	Kalamazoo	King Co.	Macon	Sacramento
	INNER CITY SITES				SUBURBAN SITES				
Urban Superblock	●								
Urban Linear		●							
Urban Clusters			●	●					
Suburban Clusters					●	●	●	●	●
Inner City	●	●	●	●					
Suburban Developed						●		●	●
Suburban Developing					●		●		
Flat	●		●						
Flat/Contoured					●				●
Sloped		●		●		●	●	●	
Valley							●	●	
None Existing	●	●							
Light Existing			●	●	●	●			●
Heavy Existing							●	●	
Light New	●	●	●	●	●	●			●
Heavy New									
Stream							●		
Lake						○		●	
Air Pollution	●		●	●					
Noise Pollution	●	●							
Water Pollution							●	●	

Source: Planners' Reports and Questionnaire Response

● On Site ○ Off Site

The chart on the opposite page enumerates the producers' extent of participation on the nine BREAKTHROUGH sites. Some participated on only one site, with as few as four units. Others placed units on several sites, led by Material Systems with six demonstrations. The Seattle site exhibited only one system on its small land area, while Indianapolis, the second largest site, demonstrated eight housing systems.

Dwelling Units/ Site/Producers

INNER CITY SITES				SUBURBAN SITES					
JC	MEM	ST. L.	SEA	IND	K'ZOO	KING	MAC	SAC	
						86	52	52	Alcoa
	120						49	75	Boise Cascade
							80		BSI
153									CAMCI
						54	26	73	Christiana Western
141		128							Descon/Concordia
	206			36	52			112	FCE-Dillon
	48			56					General Electric
					51		50		Hercoform
		75		45					Home Building Corp.
					83	28			Levitt
		20		50	10	10	30	30	Material Systems
				14	15				National Homes
				40				45	Pantek
				20					Pemtom
					4				Republic Steel
		241							Rouse-Wates
				34	30				Scholz
194									Shelley
			58						Townland
								20	TRW
488	374	464	58	295	242	178	287	407	Total Systems Units
	144								Non-System Units
488	**518**	**464**	**58**	**295**	**242**	**178**	**287**	**407**	Total Dwelling Units by Site

Source: Planners' Reports and Questionnaire Response

Many of the producers developed housing systems adaptable to more than one of the basic housing types (multifamily high rise, multifamily midrise, multifamily low rise, single family attached, and single family detached). This chart reflects the national trends toward vertically and horizontally attached housing. Of the 3,040 dwelling units in the Program, over 90% were multifamily or single family attached units.

Also evident from this table are the various levels of adaptability between unit types. Seven of the systems (Alcoa, Christiana Western, Descon/Concordia, Material Systems, Pantek, Rouse-Wates, and Townland) were applied to three housing types. None, however was applicable to all five types represented in the BREAKTHROUGH program.

Dwelling Unit Types/ Producers

mfhr	mfmr	mflr	sfa	sfd	
One Box for Each Site Application					
		12 24	24 40 24	62 4	Alcoa
		18 51 28	31 69 47		Boise Cascade
56	24				BSI
153					CAMCI
		16 28	34 26 45	4	Christiana Western
111 90	18 24	12 14			Descon/Concordia
206 112	36 52				FCE-Dillon
		8 48	48		General Electric
		12 12	39 38		Hercoform
			75	45	Home Building Corp.
		32 8	51 20		Levitt
		20	32 10 14 20	18 10 16 10	Material Systems
			14 15		National Homes
		16	29	40	Pantek
			20		Pemtom
				4	Republic Steel
84	27	130			Rouse-Wates
		8 8	26 22		Scholz
154	40				Shelley
	6	14	38		Townland
			14	6	TRW
966	237	519	885	259	Total Systems Units
144					Non-System Units
1110	237	519	885	259	Total Dwelling Units by Type

Source: Planners' Reports and Questionnaire Response

A total of 21 producers, out of 601 original proposals, placed housing units on the nine BREAKTHROUGH sites. Several participated on only one site, with as few as four units and as many as 241. One producer placed dwelling units on six sites (Material Systems); the largest production was 406 units (by FCE – Dillon).

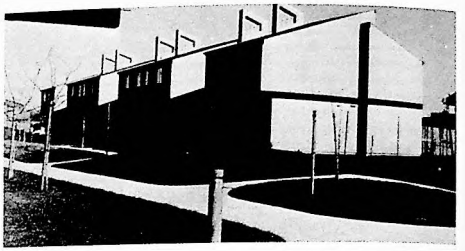
As stated previously, the housing systems selected for Operation BREAKTHROUGH varied widely in the degree to which they had been developed or utilized. The following summary briefly describes each system and presents a typical photograph of them. Most of the producers demonstrated numerous dwelling unit types. A far more detailed and technically oriented discussion can be found in the Feedback volume companion to this, entitled "Design and Development of Housing Systems."

ALCOA (Alcoa Construction Systems, Inc., Pittsburgh, Pennsylvania)
A combination kitchen and bath module is the basic element of Alcoa's system. The modules are transported to the building site where they are joined manually with panels defining the living room and bedrooms. Either aluminum or wood-framed walls are used. Alcoa produced 190 dwelling units for three sites.

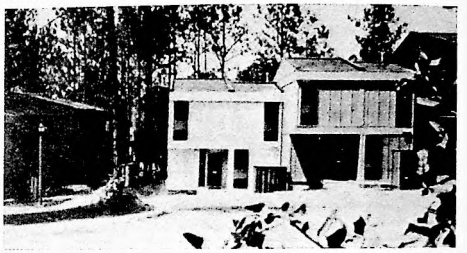
BOISE CASCADE (Boise Cascade Housing Development, Atlanta, Georgia)
The Boise Cascade modular housing system utilizes both wood and light gauge steel modules. The factory-produced units incorporate all interior spaces, with exterior balconies and treatments added on the site. Electrical harnesses and prefabricated plumbing are integral parts. BCHD placed 244 units on three sites.

BSI (Building Systems International, Inc., Atlanta, Georgia)
This system demonstrated adaptation of the European Balency precasting method on one site (80 dwelling units). Concrete load bearing panels are precast in the factory and transported to the building site. The use of these load bearing interior and exterior walls and floor slabs adds to design flexibility.

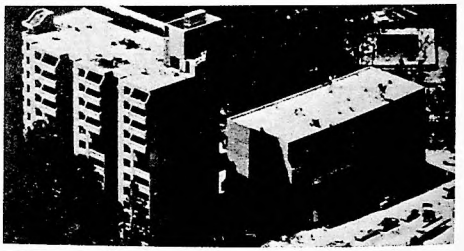
CAMCI (CAMCI, INC., Yonkers, New York)
Another adapted European system, Tracoba, is used by CAMCI. It is also a system of precast concrete load-bearing cross-walls, floor panels, and facade panels. Joints between walls and slabs are cast in place, insuring a rigid, sturdy structure and continuity between elements. One hundred fifty-three units were produced for one site.



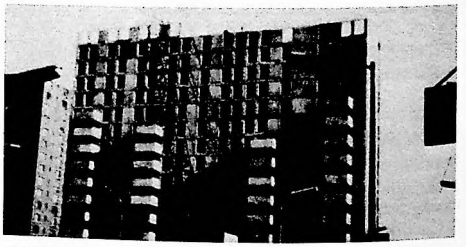
Alcoa



Boise Cascade



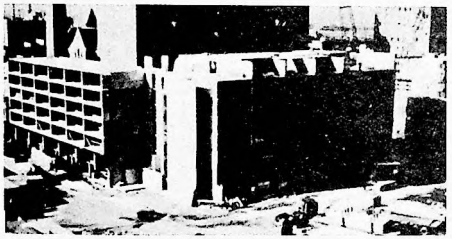
BSI



CAMCI

CHRISTIANA WESTERN (Christiana Western Structures, Inc., Los Angeles, California)
An open wood panel system is used by this producer. Shop-fabricated wood frame panels are used for on-site assemblage of all walls, partitions, and roofs. Insulation, electrical wiring and plumbing are installed on the site. One hundred fifty-three dwelling units by Christiana were placed on three sites.

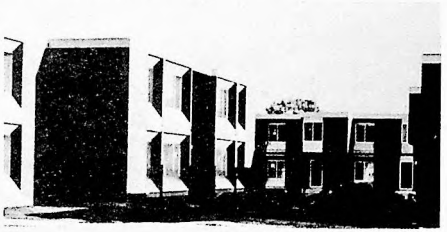
Christiana Western



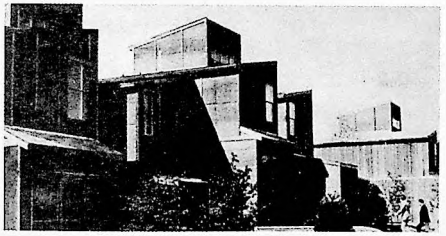
Descon/Concordia

FCE-Dillon

DESCON/CONCORDIA (Descon/Concordia Systems, Ltd., Montreal, Quebec)
The structural components utilized by Descon/Concordia are precast concrete floors, walls, and beams produced in existing facilities. All weather assembly is accomplished by using dry mechanical joints. Utilities are placed in prefabricated mechanical packages. The only non-U.S. producer placed 269 units on two sites.



General Electric



Hercoform

FCE-DILLON (FCE-Dillon, Inc., Akron, Ohio)
The FCE-Dillon system conbines precast and site cast concrete elements consisting of a heart module and pre-cast wall and floor panels supplemented by cast-in-place supports. Interior partitions and non-load-bearing facade panels are of prefabricated wood frame construction. Four sites shared a total of 406 units.

GENERAL ELECTRIC (The General Electric Co., Philadelphia, Pennsylvania)
The G.E. system utilizes a combined wood-steel modular design. The floor, ceiling, and roof assemblies are of wood, and all wall framing is of structural steel studs. Cast-plaster wall finishes and a factory-installed central utility chase are included. G.E. placed 104 units on two sites.

HERCOFORM (Hercules, Inc., Wilmington, Delaware)
The Hercoform system uses wood-framed modules bolted together to form the basic structure. The modules are trucked to the site, arriving completely finished and equipped with all appliances and utility systems. They are then erected by crane on conventional foundations. Hercoform units are demonstrated on two sites with a total of 101 units.

HOME BUILDING (Home Building Corporation, Sedalia, Missouri)
The Home Building Corporation's wood-framed modular units are fabricated at the factory and transported to the building site where they are placed on foundations by crane. An extra-modular hall is sometimes installed on site to join two modules, adding extra width to the house. One hundred twenty HBC units are demonstrated on two sites.

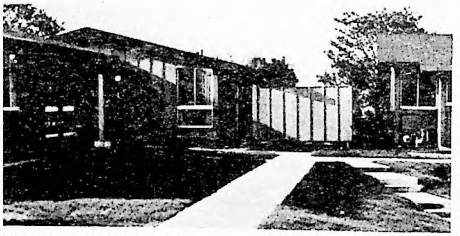
LEVITT (Levitt Building Systems, Inc., Battle Creek, Michigan)
Levitt uses factory-constructed modules with conventional wood framing and finishes transported to the building site by truck or rail. To meet rail clearance requirements, a "Straddle Buggy" is used to position the module exactly on the rail car's center line. One hundred eleven dwelling units have been produced for two sites.

MSC (Material Systems Corporation, Escindito, California)
Both the wall and roof components of the MSC system are manufactured from composite materials consisting of inorganic reinforcing fibers integrated with a polymer matrix. The fibrous glass reinforced resin is molded into panels, assembled into modules and shipped to the building site. Floor panels are conventionally framed. MSC produced 150 units for six sites.

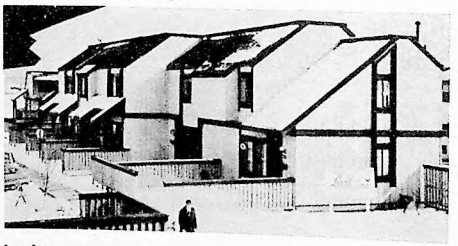
NATIONAL HOMES (National Homes Corporation, Lafayette, Indiana)
The National Homes system produces three dimensional modules of both wood and steel, arriving at the building site in an almost totally finished state. The only site work required is the joining of the units, foundations and utility hook-ups. Twenty-nine units are demonstrated on two sites.

PANTEK (Pantek Corporation, Boulder, Colorado)
The Pantek system utilizes a unique foamed-plastic core panel. The wall panels are composed of aluminum frames, stress skins, and formed-plastic cores. Conventional steel framing is used for the floors and ceilings. The panels are factory produced, and assembled at the site. Pantek produced 85 units for two sites.

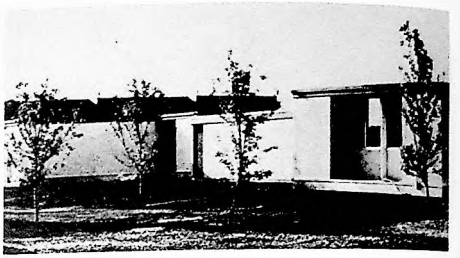
PEMTON (Pemtom Inc., Minneapolis, Minnesota)
The Pemtom system employs stress-skin plywood modules. Panels, comprised of plywood interior and exterior facings separated by a foam core, are joined together by a polymer bond to form modular units. The complete modules are erected on the building site, with considerable flexibility in their arrangement. Twenty units are on one site.



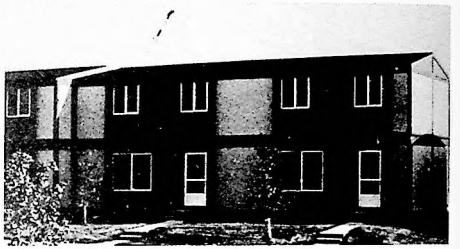
Home Building Corp.



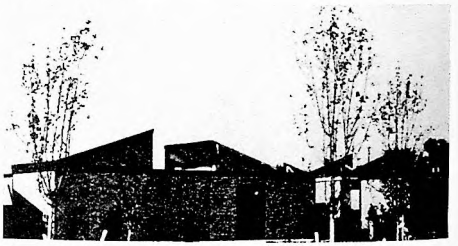
Levitt



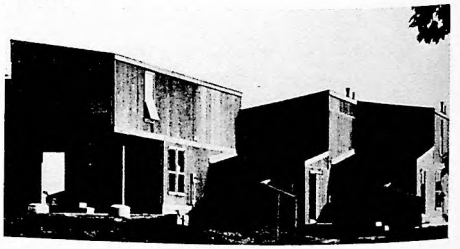
MSC



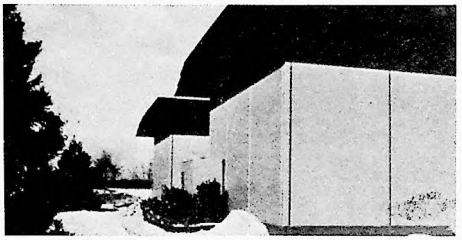
National Homes



Pantek



Pemtom



Republic Steel

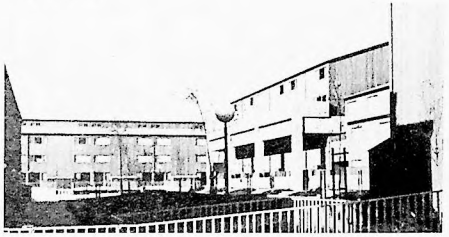
Rouse-Wates

Scholz

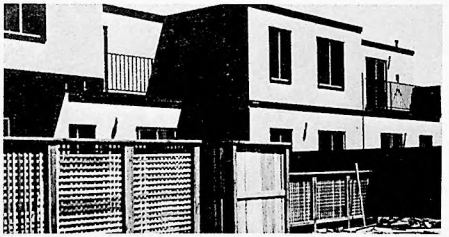
Shelley

REPUBLIC (Republic Steel Corporation, Washington, D.C.)
The wall, floor and roof panels of the Republic system are made up of a foam and insulated paper honeycomb core with steel facing on both sides. Steel rectangular box beams are attached to concrete piers to form foundations. Bathrooms and kitchens are pre-assembled modular components. One site has four Republic units.

ROUSE-WATES (Rouse-Wates, Inc., Columbia, Maryland)
The Wates Building System of England uses precast reinforced concrete panels for the basic structure, produced at or near the building site in mobile plants rather than in fixed locations. Because of their mobility, there is no limit to the possible market area. Rouse-Wates demonstrated 241 units on one site.



Townland



TRW

SCHOLTZ (Inland-Scholz, Inc., Columbus, Ohio)
This system produced both single-family attached and multi-family low-rise units on two sites. The wood-framed modules are completely wired, plumbed and finished at the factory. The modules are transported to the building site and erected on previously prepared foundations. Sixty-four dwelling units were produced.

SHELLEY (Shelley Systems, Inc., New York, New York)
Shelley's structural system employs factory-cast and finished reinforced lightweight concrete modular units. Load-bearing columns are an integral part of the modules so that when stacked, the columns match vertically to carry all gravity loads. The modules are stacked in an alternating, checkerboard fashion, and the resulting open spaces are then enclosed. One hundred ninty-four 194 units are on one site.

TOWNLAND (Townland Marketing and Development Corporation, New York, New York)
The structural make-up of the Townland system uses pre-cast, prestressed concrete columns, spandrel beams and deck slabs to create a frame with the deck slabs running across and between the beams at varied intervals. Multi-story housing units are constructed utilizing light-gauge, steel-framed panels and modules. Fifty-eight units are on one site.

TRW (Community Technology Corporation, Redondo Beach, California)
The load-bearing walls, ceilings and floors of the TRW units are made with a sandwich structure consisting of fiberglass reinforced polyester resin on both sides of a paper honeycomb core. The sidewall, roof and ceiling are all manufactured as panels, assembled at the factory or on site. Modules may be arranged in a variety of two-story architectural configurations. Twenty units are on one site.

5

Prototype Sites

The Department of Housing and Urban Development selected nine locations, out of 200 requests, for the demonstration of Operation BREAKTHROUGH. Two additional sites were discontinued after Task I planning. The demonstration sites range in size from 1.8 acres to 50 acres. Four are located in inner city areas and five in city fringe or suburban areas. The two discontinued sites were also in suburban areas.

Inner City: Jersey City, New Jersey

Utilizing joint and multiple use of land, the Jersey City site was designed to relieve a lack of parks, overcrowded schools and overloaded recreation areas in the city. In addition to housing, as an integral part of the site were built a primary school, an enclosed pool, a community room, a half acre park and a commercial building. The linear design links housing, open spaces, parking and public facilities through a multi-leveled pedestrian system. The systems buildings range from three to eighteen floors, with non-residential uses and larger bedroom units on the ground and lower levels. Structured parking throughout provides recreation decks and conceals vehicles from the site. There are 468 dwelling units on 6.35 acres, yielding a density of 80 units per acre.

Inner City: Memphis, Tennessee

Also using a multi-use of land approach, the Memphis site provides a mixture of building types and uses. Residential facilities ranging from garden to high-rise apartments house residents who are elderly, students, and moderate income families. All structures are oriented toward an internal open space. A parking deck provides a cohesive design element and space for tot-lots, fountains, pedestrian routes and a community building. The deck connects all building areas and effectively recaptures urban land used for parking. Bridge connections with the deck span the adjacent highways, linking with proposed commercial and recreation areas. The Memphis site is also a prototypical demonstration of HUD's efforts to reduce inner city noise pollution. The developed site has 518 housing units on 16 acres, a density of 33 units per acre.

Inner City: St. Louis, Missouri

Located in an urban renewal area a mile from the CBD, the St. Louis demonstration is on two sites separated by Laclede Town, a townhouse development. The variety of housing types, from townhouses to high-rise apartments, are clustered around urban pedestrian spaces to create internal com-

munity space. Parking is located on the periphery of the sites. Because of its proximity to larger park spaces, the west site has the larger family units. Each site has swimming facilities, with the community center on the east site. All vehicular circulation is separated from pedestrian movement. Both sites have a range of recreation facilities, from play lots to quiet sitting areas. Totaling 15.5 acres, the St. Louis BREAKTHROUGH site has 464 housing units for an average density of 30 units per acre.

Inner City: Seattle, Washington

A low-rise urban housing cluster, the Seattle demonstration site occupies one quadrant of a four-block square. The remainder is to be developed as an urban community park. The site is 1.5 miles from the Seattle CBD. Its planning was closely coordinated with that of the general neighborhood, which is undergoing numerous improvement efforts. All resident parking is below the building and recreation deck. With the tallest building being four floors, all large bedroom units have direct access to grade level. An open space hierarchy includes private, semi-private and public spaces. The smallest site in BREAKTHROUGH, Seattle has 58 units on 1.8 acres and a density of 32 units per acre.

Suburban: Indianapolis, Indiana

As do all the suburban locations, the Indianapolis BREAKTHROUGH site uses the cluster approach to residential planning. The plan responds to a lack of community parks and to overcrowded schools in the area by incorporating a new ten-acre park and middle school. Housing is of medium and low density, with single-family detached, townhouses, and apartments provided. The flat site has been relieved by extensive and creative mass grading. A system of contoured storm basins receives rain runoff. Pedestrian and vehicular circulation is horizontally separated. The transition from neighboring developments through the BREAKTHROUGH site is made by progressively increasing densities. Zero lot lines in single-family areas help to aggregate open space. At a density of seven units per acre, the site provides 295 new dwelling units on 42.9 acres of land.

Suburban: Kalamazoo, Michigan

In a clustered configuration, the Kalamazoo BREAKTHROUGH site introduces a broad mixture of housing types to the suburban area, a mixture that includes single-family detached units and a mid-rise multi-family building. The single-family units are locationally related to adjacent developments. The housing clusters are related to an adjacent park and lake, and direct parental supervision is made possible by the placement of tot-lots within each cluster. Open space is arranged in hierarchial order from private patio to central, community space. An ecological concern over storm runoff into parks and the lake led to the provision of leaching catch basins in the storm sewer system. The site measures 33.8 acres and, with 245 dwelling units, is developed at a density of seven units per acre.

Suburban: King County, Washington

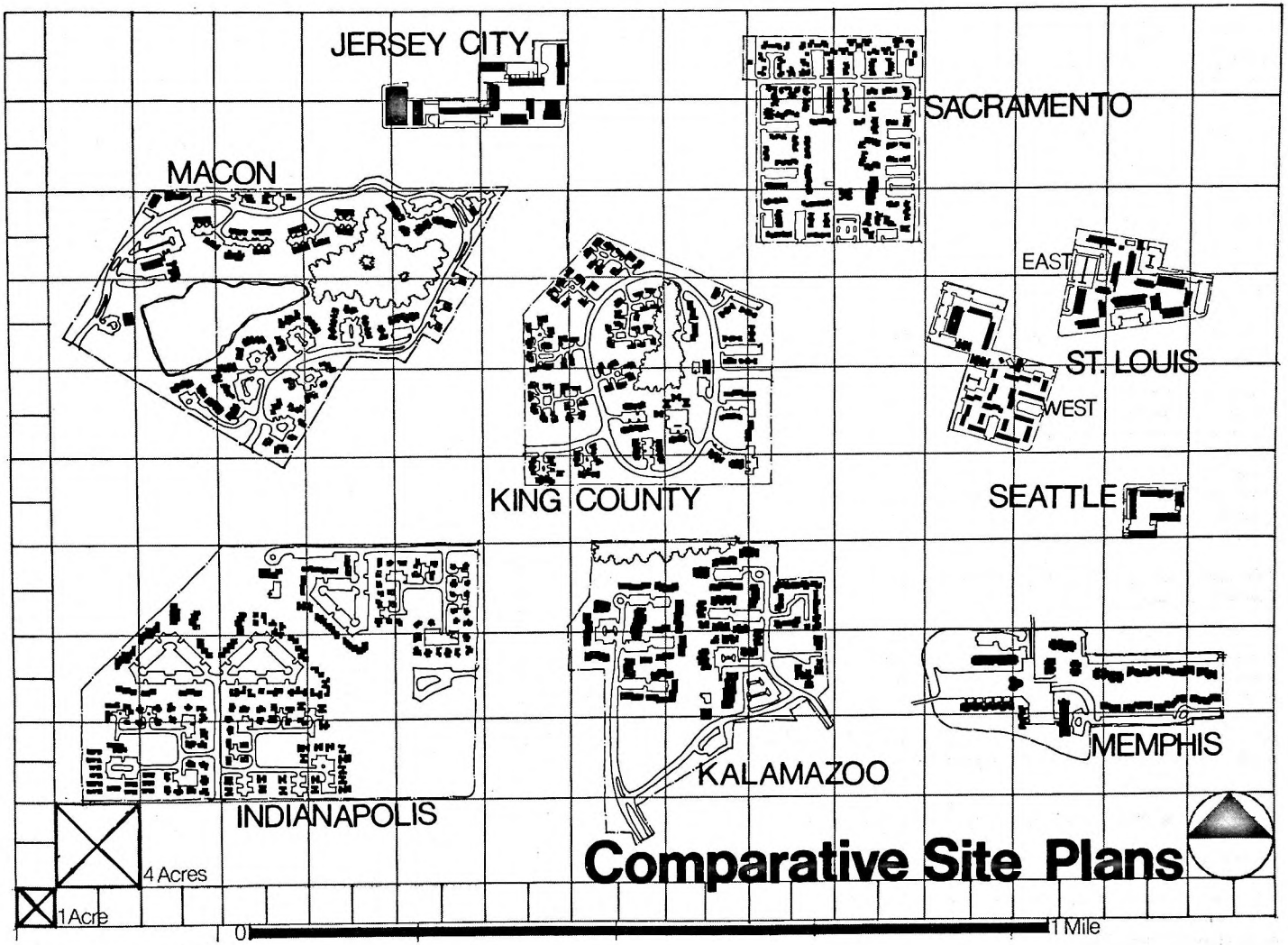
The suburban site, near Seattle, places intimate clusters of housing around and inside a continuous loop road. Decentralized parking areas are placed directly adjacent to most units. A continuous pedestrian system leads from all units to active play areas and then to a central open space. Dwelling units range from single-family detached to garden apartments. A natural buffer around the site has been retained to provide a transitional zone between the site and its neighbors. A swimming pool and community building highlight the public facilities. The site needed major sewer improvements. The 178 dwellings on the 36-acre tract resulted in a density of five units per acre, the lowest of the BREAKTHROUGH demonstrations.

Suburban: Macon, Georgia

Macon, the largest developed BREAKTHROUGH site, introduces a planned community of various dwelling types (high-rise to single-family detached). Clustered units and clustered parking areas are served by separate pedestrian and vehicular circulation patterns. The sensitive ecology of the site led to great concern for the environmental impact of construction. Design thus incorporated natural terrain and slopes, natural ground cover and trees, preservation of a six-acre alluvial area, and runoff and erosion safeguards. The open space hierarchy includes private dwelling space and the central lake open space. Two hundred eighty-seven units are on the 50-acre site, resulting in a density of 5.7 units per acre.

Suburban: Sacramento, California

Located on former fairgrounds land, the California BREAKTHROUGH effort also has a complete range



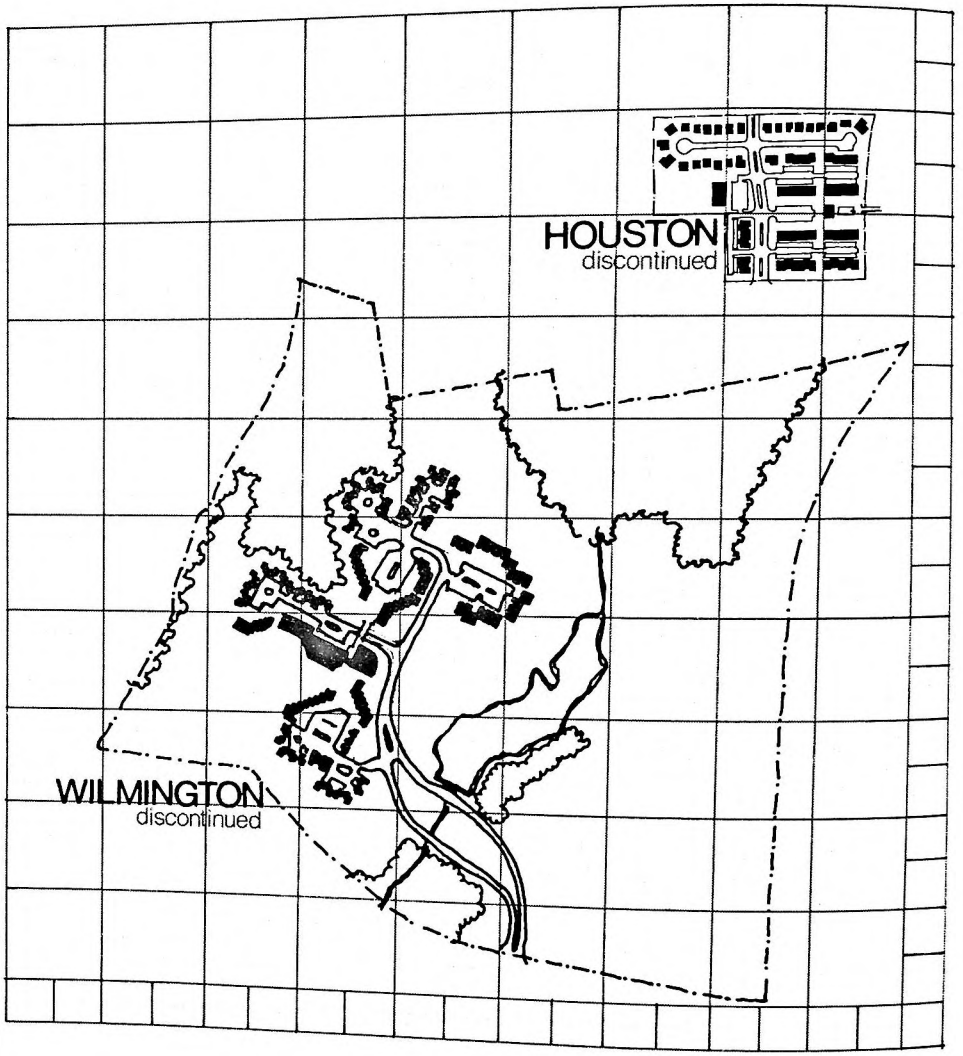
Comparative Site Plans

of housing types in clusters. Vehicular traffic does not penetrate the bulk of the site, thus enabling distinct and safe pedestrian circulation. Each housing cluster relates to either a tot-lot or a sitting area and is served externally by small parking areas. The open space hierarchy culminates in the central space and community center. The flat site is relieved by creative mounding, landscaping and earth berming. There are 407 dwelling units provided on the 33-acre site, resulting in the relatively high suburban density of 13 units per acre.

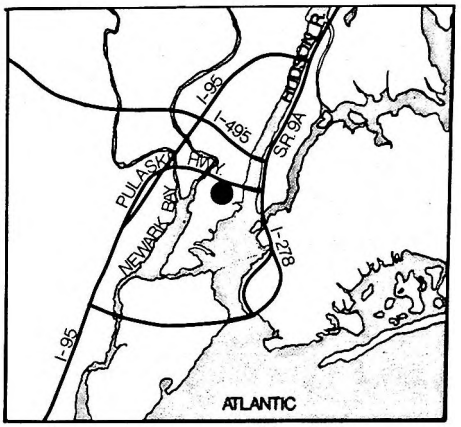
Suburban: Houston, Texas; and New Castle County, Delaware (Discontinued)

The plans for the discontinued BREAKTHROUGH sites utilized differing concepts. The Houston plan proposed housing modules incorporating several clusters and a recreational greenway, with a central car storage area. The design was intended to apply to both BREAKTHROUGH and conventional development on the tract. About 140 units were to be developed.

The New Castle County (Wilmington) site proposed development of 35 of the available 97 acres, with the remaining portion to be assigned for the use of the general public. A dual hierarchy of both building types and open space was proposed to focus on community and educational facilities. A maximum of 200 dwelling units had been planned.



Jersey City



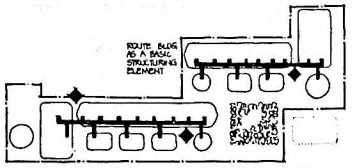
Prototype Site Planner:
David A. Crane and Partners
Philadelphia, Pennsylvania
Consultants:
David Volkert and Associates, engineers
Gamze-Korobkin-Caloger, energy
Envirogenics Inc, pneumatic trash
Robert Gladstone Associates, economic
Cambridge Seven Associates,
public environment
Cope, Linder, Walmsley, landscape
Ray Grenald Associates, lighting

SITE DESCRIPTION

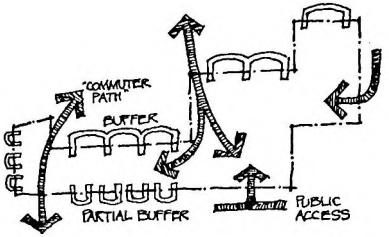
The Jersey City site is located near the crest of a gently sloping hill rising northward from Journal Square, the principal retail center of the city. The site is 1100' long and varies in width from 150' to 450' and is nearly flat. As a part of St. John's Urban Renewal Project Area, it had been vacant for several years prior to start of construction.

The general area is characterized by mixed land uses forming a transition from Journal Square to the south and the primarily residential area north of the Pulaski Skyway. Interestingly, the scale of buildings conforms to this same transition from small scale, two and three-story mixed commercial residential buildings to the south and the large scale 16-story apartment buildings to the north. There are approximately 850 units of upper middle income housing in St. John's Apartments and an additional 275 elderly apartments in Grand View Apartments immediately north of the site.

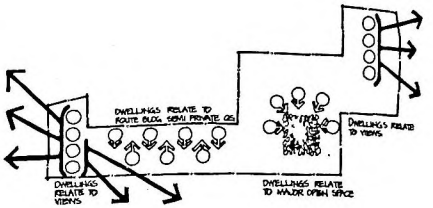
The most unique aspect of the site is its location. There is direct access to Kennedy Boulevard and Newark Avenue which form the major north-south and east-west surface roads in Hudson County. The Pulaski Skyway, while nearly 40 years old, nevertheless provides limited access road connections to



1 route structuring



2 edges



3 dwelling orientation

The Jersey City planners identified a set of six major design principles as guides during their design process.

Manhattan via the Holland Tunnel and to the New Jersey Turnpike. In addition, the Journal Square PATH subway station is within a five minute walk of the site. Journal Square is a major interchange between subways connecting Jersey City to Newark, Hoboken and Manhattan, and the Hudson County surface bus systems. When reconstruction of Journal Square Station is completed, it will become a regional interchange point of major importance.

This unique location is reinforced by the views of and from the site. The Empire State Building and World Trade Center are visible from ground level. At a height of 40' an unbroken panorama ranges from mid-town and lower Manhattan to Verazanno Narrows, to Newark and Hackensack Meadows. These views form one of the most significant amenities of the site.

DESIGN AND PLANNING OBJECTIVES

The planners of the Jersey City site chose to establish a set of design principles, rather than specific objectives, as a guide for design. Taken as a whole, they define an attitude towards the design of a framework within which each housing system could be built, maintaining a high degree of flexibility without allowing too much diversity. This attitude extended to the review and control of buildings designed by other architects on the site as well as to the work executed directly by the site planner. These site design principles are:

- Structuring the Route
- Defining the Edges
- Establishing the Orientation of the Dwelling Units
- Organizing the Open Spaces
- Locating the Non-Residential Uses
- Mixing Together All Socio-Economic Unit Types.

Structuring the Route

The pedestrian path is structured through the use of buildings or surfaces requiring pedestrian connections. Route buildings form links between the three high rise buildings, and contain parking and pedestrian walkways in addition to serving as the base for housing. This pedestrian walkway connects to all non-residential facilities and housing on the site, and by its consistency and character, forms a unifying physical element throughout the site.

Defining the Edge

The edges of the site are designed to allow for controlled access to and from the site and surrounding areas, and buffers the housing from the adverse effects of auto traffic. Buildings with a single orientation to the south form a consistent boundary with the existing St. John's apartments to the north, broken only by walkways at each end and the middle. Housing is set back from Newark Avenue and Kennedy Boulevard and buffered by non-residential uses. Primary auto access to the site is from Newark and Summit Avenues.

Orientation

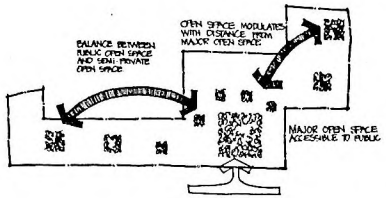
High-rise housing is oriented to take advantage of the views at each end of the site. Low-rise housing in the center of the site is oriented either to the south or to the major open space, to take advantage of unique amenities on site.

Open Space

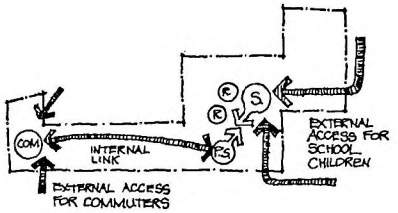
Open space provides a transition from private yards for the exclusive use of ground floor or "route level" tenants, to a major multi-use park open to the public. Smaller open spaces are more intensively developed the further removed they are from the major park. They provide a child-oriented set of play facilities grouped according to a range of ages and activities.

Use Location

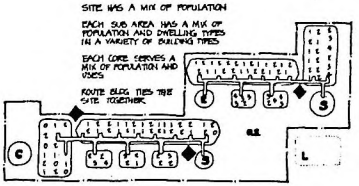
Non-residential uses are located at edges of the site to allow a transition from the public sidewalk to on-site community use areas. This location facilitates a meeting ground for on and off site users without encouraging indiscriminate public access to the residential areas. Commercial uses relate to Kennedy Boulevard to act as an extension of Journal Square retail activity and to reinforce primary commuter walking paths. School uses are located to the east along Newark Avenue in response to the primary direction of approach by off-site children using the school facilities.



4 open space



5 non-residential



6 mix objectives

Social Mix

As a general planning principle, there should be no identification of cost of units by building type or location. Yet the construction economics of different building types should not be violated by accommodating a wide range of housing units in any one building. To achieve this, a sharing of common entry courtyards for both high and low buildings has been used as a conscious point of contact and identification as well as the principle physical access to common site facilities encouraging public interaction between people with all income, racial and ethnic characteristics.

DESIGN AND PLANNING DEVELOPMENT

The design development of the Jersey City site can be broken down into several general categories:

Pre-Design Activities
- Site Program
- Design Responsibilities

Design Activities
- Preliminary Site Design
- Non-Residential Building Design and Systems Integration
- Site Redesign

Pre-Design Activity: Site Program

The programming and design team produced a recommended program based on a variety of indications of the need and market for housing as well as supporting services. Because of the unique location of the site, a very broad range of housing needs could be met. These needs ranged from an initial target of 20% low income units (rent supplement), to 20% moderate income units (Section 236), to 60% middle and upper income units, financed under New Jersey State Housing Finance Agency Programs.

The total number of units was originally fixed at 500 as the maximum number desirable to meet site development objectives. This, in addition to the existing 1100 families already living in the area, generated a need for 50,000 square feet of convenience commercial space, which was further reinforced by strong patterns of commuter walking paths crossing the site.

The existing schools serving the site were both overcrowded and poorly located for lower grade children. It was agreed with the Jersey City Board of Education to build, on a lease-back basis, a K-3 school to accommodate the same number of students as the total number of on-site elementary school aged children. The excess capacity would be filled with children from the surrounding neighborhood. Several classrooms in the neighboring School PS-7 would be used to accommodate children from on-site in grades 4-6. The result was that both school facilities contain on and off-site children.

A day care center was initially programmed as both a service to working mothers and as an adjunct to the on-site school programs. The cost of a separate structure, and the lack of a sponsor, resulted in an expanded multi-purpose room serving both the school and the community.

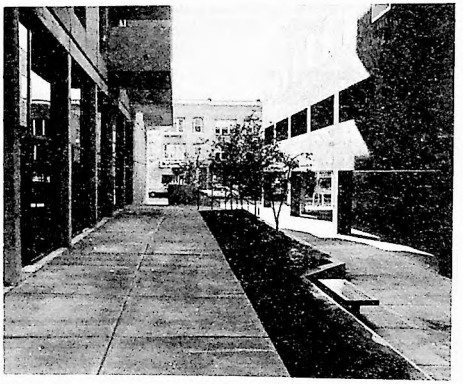
A pool/recreation facility was planned as a tenant amenity. Ab open space program of three tot lots, walkways and sitting area, spray fountain and major park, coupled with the pool and several general purpose meeting rooms, constituted a broad range of community facilities.

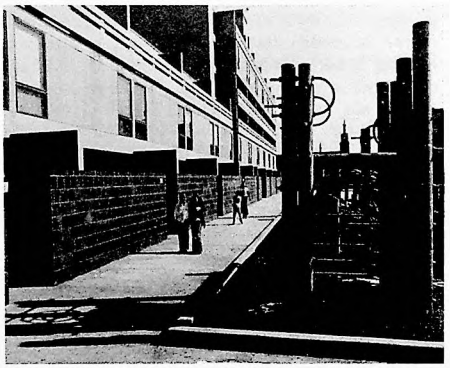
In order to insure maximum quality in the built environment, while at the same time allowing a high degree of design flexibility for each independent housing system producer to demonstrate his own objectives, a careful definition of design responsibilities was made. Initial data on each system was derived from an analysis of HSPs' submissions to HUD. At the same time a set of program objectives, performance specifications, and critical dimensions were defined for each building on the site. These building packages were then matched with initial systems data, and a tentative assignment of HSP's to building envelope was made.

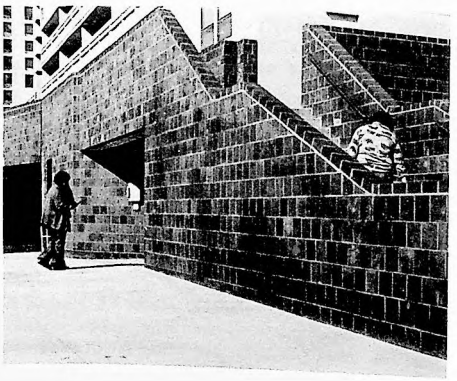
The resulting definition of design responsibility on the entire site was reviewed with the three HSPs initially assigned to the site. A period of discussion

and negotiation with each HSP resulted in adjustments to both the initial assignment of building envelopes, and to the definition of performance specifications as well. These adjustments were incorporated in a revised set of HSP guidelines which became the basic document for coordinating design on the site.

The principal method for ensuring a cohesive, overall site design was through the design of the non-residential buildings and landscaping throughout the entire site. An attempt has been made to overcome potential visual clashes between different systems without creating excessive uniformity. The consistent use of similar materials and forms, located primarily at ground level, and organized under the direct control of the prototype site planner was chosen as the means for visually tying the site together.







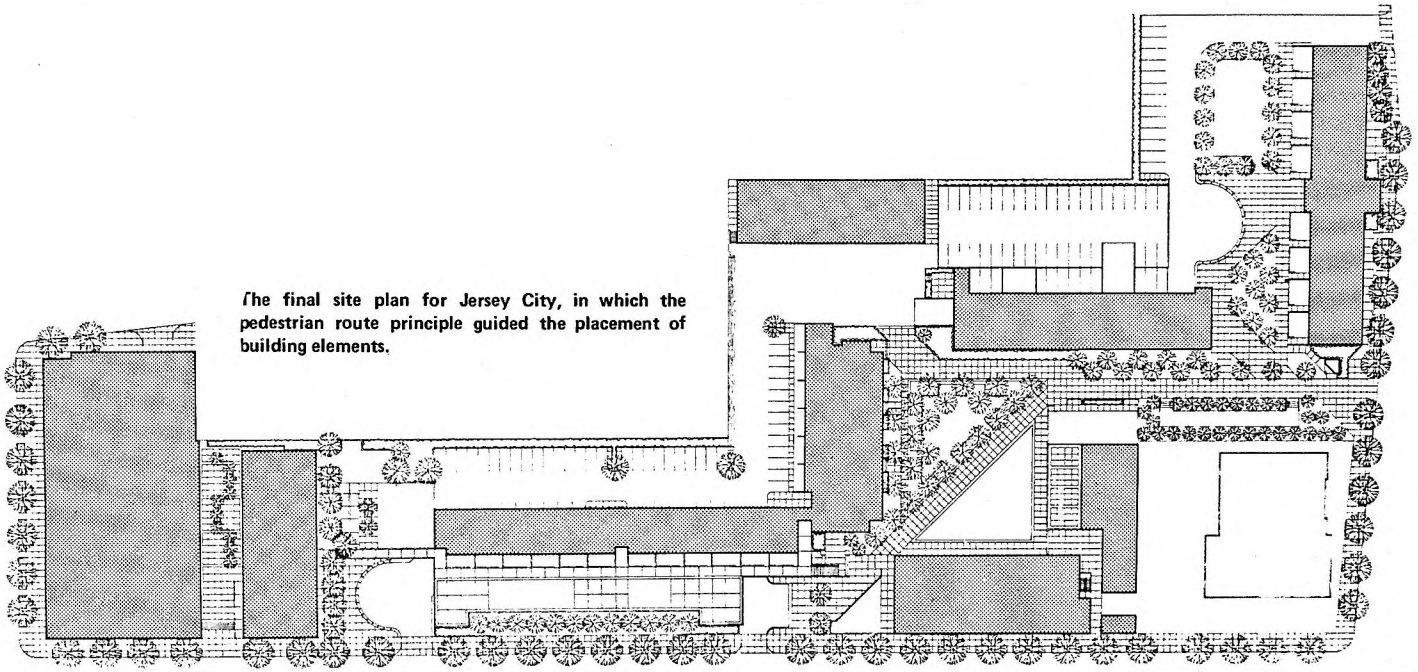
Structured and well defined pedestrian routes characterize the Jersey City site.

Design Activity: Preliminary Site Design

The site design encompassed a broad range of objectives held by a variety of interested participants in the development of the prototype site in Jersey City. In general, taller residential buildings were located at the east and west ends of the site to take advantage of the views to the east and west. A slightly lower building was located on the middle portion of the site. These three buildings contained the main entrances to the site and served as both a visual focus and a center for residential activities.

Connecting these three taller buildings were two lower residential buildings with units which face only south. Both of these buildings were built over parking and were adjacent to the bulk of developed open space on site. The major on-site walkway ran the length of each of these two buildings which made them both visual and functional connections between the higher buildings. These two lower buildings formed the "route" identified previously as the main physical structuring element of the site design.

The commercial building was located at the extreme west end of the site along Kennedy Boulevard. A small shopping court or mall was formed between it and the western high-rise building, channeling pedestrians from the north. A connection between this



The final site plan for Jersey City, in which the pedestrian route principle guided the placement of building elements.

shopping mall and the main on-site pedestrian walkway was made through the base of the western high-rise building. The high densities and the variety of uses accommodated on the site resulted in a multi-layered site design. Residential units were placed over the school and multi-purpose uses near the center of the site.

The preschool was located near the edge of the site and partially under the higher residential building at the center of the site. In these locations, off-site school children could reach both the school and preschool without entering more private residential areas. They could also have direct access to the major open space of the site.

Residential buildings were buffered from surrounding streets by one of several means. The buildings were scaled to form a transition from low buildings on the south to high buildings on the north. They were so located views from both existing and new buildings. Northern exposures have been eliminated on site, while at the same time maximizing views of Manhattan to the east and Newark airport to the south and west.

Design Activity: Non-Residential Building Design and System Integration

The major function of Task II was the coordination of all design efforts focused on the site. Each of the three HSPs originally assigned to the site had their own architects and engineers. In addition, there were consulting firms responsible for the design of an on-site total energy system, of a site-wide pneumatic trash collecting system, and of the conventional site utilities.

Very early in the design coordination process, it became apparent that the goals and objectives of those who controlled the use of each system were as important as the physical limitations of each system. Certain design objectives were not of interest to the manufacturers wishing to demonstrate their product on the Jersey City site. Some mutually shared design objectives proved to be beyond the technical or economical development of a system.

Therefore, a dialogue was carried on with each independent group of architects and engineers in order to determine not only what was feasible, but what was desirable. As a result of this dialogue, the initial guidelines and site plan were changed. The

eastern portion of the site was replanned to accommodate several buildings grouped around a court. The two route buildings were rotated so that apartments were oriented to the east. The general location of non-residential uses remained the same, although their relationship with surrounding development changed to some degree.

The emphasis on an open site without fences and walls was maintained. Yet there was a clear difference between at-grade public walkways, and the private, residential access raised a level above grade. The only entry to primary residential areas was past a doorman located at any of the three principal entrances. Maximum visibility of outdoor areas reserved for residents' use encouraged surveillance of clearly identified private areas. The defense of one's own "turf" was emphasized rather than keeping people out of the site altogether.

Design Activity: Site Redesign

In order to maintain initial construction targets, work on contract documents for non-residential buildings was begun as soon as major design issues were resolved. At the same time an estimation of costs for all construction on the site was made. Upon review by HUD, it was determined that the total cost of the Jersey City Prototype Site was outside program guidelines for Operation BREAKTHROUGH, and a major site redesign was undertaken in March, 1971.

Numerous alternatives varied both the number of systems demonstrated and the number of units built on the site. Non-residential uses were taken out of systems building envelopes wherever possible, and the overall site design simplified. Both the original development program and design objectives were relaxed in an effort to determine their impact on shared costs.

This resulted in a firmly established budget, timetable, new development program, and revised site design. The total number of units was reduced from 532 to 487 and the number of three and four-bedroom units was reduced. The commercial program was increased while the school program and number of parking spaces were reduced. The assignment of building envelopes to each system was modified and a fourth HSP was added to the site.

The planners experienced numerous changes during the process that had significant impact on the design. The substitution of housing systems in particular caused modifications with significant impact on the site planning process.

FINAL SITE PLAN

Aside from the systems designs, the final site plan incorporated some non-system design elements. The principle impact of non-system facilities was on the scale and character of the major park. The preschool program was included in the multi-purpose room and combined in one building envelope with the school. This building was located along the Newark Avenue frontage, formerly given to the public edge of the park. The principal access from Newark Avenue to the new, internal park was the access court at the southwest corner. Access to the school and multi-purpose rooms were at the mid-point of the building, creating a second access point to the park through the school building.

The character of the park changed from a relatively large open space with active areas around its edges, to a series of activity areas surrounded by buildings. A large group of trees provided a passion sitting and game area over nearly half the area. The rest of the park was devoted to play areas to serve the school, preschool, pool and residents' active recreation needs. The location of the pool along the west edge of the park concentrated active recreation facilities in this portion of the site.

The commercial building was changed from a three to a two-story building. A raised walkway along the Kennedy Boulevard face of the building enabled second frontage for shops. The major on-site walkway was continued through the commercial building to tie the raised shopping walk to the shopping mall on the east. Thus, the path channeling commuters past the shops was preserved east of the building, as well as making the new shop frontages along Kennedy Boulevard accessible to site residents.

Because of previous experience with conventional design, bidding and construction experiences on site, and because of a weak overall climate for bidding construction in general on the site, the site developer and site planner concurred in a recommendation to seek combined design-construct bids on non-systems building. This effort was an attempt to meet overall site construction budgets and limit construction cost overruns.

Several potential design-construct firms were interviewed and three were invited to submit bids. Each bid was based on schematic plans, outline specifications, and a statement of general design objectives for each building prepared by the site planner. A firm was selected to prepare contract documents subject to design review by the site planner, and cost verification by the site developer. After a period of negotiation and design modification, however, the bid was rejected because of excessive costs.

Landscape Design

One of the early objectives for development of the site was the creation of a high-quality public environment. Landscape design on the site reinforced the original idea of a route or main walkway. As design changes were made, the idea of a route building was replaced by that of a pedestrian circulation path or walkway.

This walkway was set apart from adjacent paved areas by the consistent use of a unique material and pattern along its entire length. This walkway provided access to all residential and non–residential buildings on the site. Activity points along the route were formed by concentrated tree plantings together with special play equipment. Further from this central park, the points of activity were more intensively developed and more heavily planted. The route terminated with a recreation area on the east and with a public pedestrian plaza on the west end.

Recreation Areas

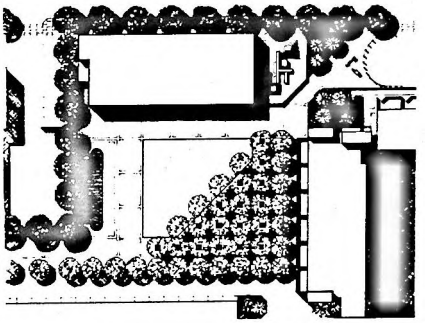
Two recreation areas, a tot lot and play area located were located at or near the ends of the route at the east or west ends of the site. Each recreation area contained a hard surface area equipped for such games as basketball and volleyball, and a sitting area, usually shaded by trees for easy supervision of younger children playing. In addition, each recreation area was equipped with swings, and climbing and sliding apparatus made of heavy wooden timbers.

Fiberglass and wooden benches were designed to relate to the concrete walkways and buildings as well as the heavy timber play equipment. These benches were used in the shopping mall area as a part of a formally landscaped court. They have also been used in conjunction with game tables under the trees of the major park as well as scattered along the walkway at strategic points.

Lighting

In an effort to achieve maximum lighting effect at minimum cost, principal site lighting has been mounted on high buildings at the roof levels. This provides for even distribution of light from relatively few fixtures without creating glare in apartment windows. Areas of greatest intensity occurred at the three main apartment entrances, with open spaces and parking areas receiving relatively lower levels of light. The route walkway has been lighted with small, evenly spaced lights mounted on walls or posts. These created small pools of light at regular intervals along the walkway which increase the importance of activity along the route at night.

The design of site lighting attempted to create a feeling of safety through easy observation of activity from many points on the site. A balance between public and private areas was designed to distinguish site-related activity from general public access, the latter of which must enter the site past points of easy and constant surveillance both day and night. In this way, actual fences, gates and other physical barriers have been kept at a minimum.



The spaces defined by buildings required constant screening of the planners.

Graphics Design

Graphics on the site were designed to aid in the orientation of visitors to the site and to identify functional areas of importance. Information kiosks containing a site directory map and legend, public telephone, police and fire call boxes and trash receptacle were designed and located at each of the three main site entrances. These elements were grouped with a bench and covered by a partial roof.

Each major building containing non—residential uses was identified by a simple metal sign. Apartment buildings were identified by street addresses and related to the overall project name, which was proposed to be Summit Square. The commercial building was identified as Summit Mall.

Directional signs were simple, human scaled, and fastened to walls or low fences. They were kept to a minimum identifying only such places as the management offices, school and pool. Traffic signs were larger but equally simple and unlighted, except for their general placement in areas well lighted at night. The only lighted signs were the apartment addresses.

The concept of a separation between public and private areas of the site was reinforced by the system of site signs. In general signs only occur along public walkways and were used to identify public buildings. A person unfamiliar with the site was not guided by signs once leaving public areas and entering the more private route walkway.

Total Energy

All energy is generated on site and distributed from a central equipment building located near the middle of the site along the northern edge. Waste heat from the generation of electricity is recovered and used to meet the energy demands of the development, providing heat in the winter, potable hot water all year, and air conditioning by powering absorption chillers. When sufficient waste heat is not available to meet the thermal demands of the development, additional thermal energy is provided by supplemental boilers. There is on—site storage for 75,000 gallons of fuel oil. Thermal energy is distributed by means of an underground four—pipe system allowing simultaneous heating and cooling. An interconnect with the Public Service power grid would, in an

Site Summary Chart - Jersey City

Source: Planners' Reports and Questionnaire Response

Comparative Site Data/ Land Use Facts

SIZE	
Acres	6.4
HOUSING	
Total Units	488
SFD	
SFA	
MFLR	12
MFMR	58
MFHR	418
PRODUCERS	
Number	3
DENSITY	
Units/Acre	76

PARKING	
Per Unit	.69
Site Total	338
On Grade	●
Below Grade	●
OTHER USES	
Community Bldg.	
Community Room(s)	●
Maintenance Bldg.	
Commercial	●
School	●
Day Care Center	
Central Utility Bldg.	●
Pedestrian Deck(s)	●

Comparative Site Data/ Amenity Provisions

OPEN SPACE	
Private	●
Semi-Private	
In-Cluster	
Central/Common	●
Non-Resident	
RECREATION	
Indoor	
Tot Lots	●
Playgrounds	●
Playfields	
Hard Courts	●
Sitting	●
Elderly	

Pool	●
Outdoor Event	
Picnic	●
Bicycle Paths	
UTILITIES AND SERVICES	
Convent'l Sewer	●
Unconvent'l Sewer	
Convent'l Energy	
Unconvent'l Energy	●
Convent'l Trash	
Unconvent'l Trash	●

emergency situation, supply electrical energy to the essential load feeder.

Pneumatic Trash

The central equipment building also houses the equipment which operates the pneumatic trash collecting system. A series of welded steel pipes connects the nine trash chutes on site with the central equipment. Trash deposited in any chute is pneumatically transported through the underground conduit system to the Central Equipment Building where it is compacted into 30–yard containers. Given the complex nature of underground pipes and ducts associated with these two major systems, no attempt was made to innovate in the design of conventional site utilities. Telephone and television lines were run in the same banks of ducts with electric power lines.

Construction Development

As originally conceived the site planner was to provide a full range of construction inspection services including supervision of bidding, checking of shop drawings, periodic visits to the site during construction preparation of "as built" drawings, and continued coordination of HSP design efforts. However, this original scope of work was substantially reduced by the elimination of further design responsibility for non–systems buildings other than the central equipment building. This reduction in scope was partially offset by the increased effort at design coordination among all site participants.

Considerable effort was spent in coordinating connections of the various utility systems with building systems. Issues which were normally construction management responsibilities required advice from the site planner until relatively final stages of construction were reached. Major on–site design work was necessary long after major construction had begun.

Consequently, construction inspection was not performed in a conventional manner. Lines of authority and communication tended to be less formal than normal, because of the independent nature of each general contractor on the site and the dual role of site developer and HUD as prime clients. The result was a greater than usual demand for changes during construction under a more than usually complex procedure for approving changes.

● On Site ○ Off Site

Comparative Site Data/ Environmental Character

DESIGN CONCEPT	
Urban Linear	●
Urban Clusters	
Suburban Clusters	
SITE CONTEXT	
Inner City	●
Suburban Developed	
Suburban Developing	
TOPOGRAPHY	
Flat	●
Flat/Contoured	
Sloped	
Valley	

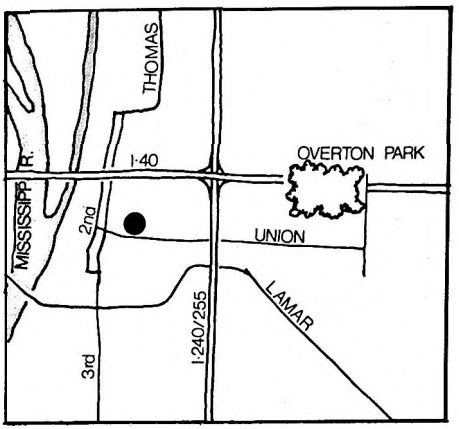
VEGETATION	
None Existing	●
Light Existing	
Heavy Existing	
Light New	●
Heavy New	
WATER	
Stream	
Lake	
ADVERSE CONDITIONS	
Air Pollution	●
Noise Pollution	●
Water Pollution	

Dwelling Units/ Site/Producers

Alcoa	
Boise Cascade	
BSI	
CAMCI	153
Christiana Western	
Descon/Concordia	141
FCE-Dillon	
General Electric	
Hercoform	
Home Building Corp.	
Levitt	
Material Systems	
National Homes	

Pantek	
Pemtom	
Republic Steel	
Rouse-Wates	
Scholz	
Shelley	194
Townland	
TRW	
Total Systems Units	488
Non-System Units	
Total Dwelling Units by Site	488

Memphis



Prototype Site Planner:
Miller, Wihry and Lee, Inc.
Consultants:
Louis and Henry, Architects, architecture
E. R. Ronald and Associates, engineering

SITE DESCRIPTION

The 16-acre Memphis site is located approximately midway between the Central Business District and the Mid South Medical Center, within easy walking distance of both. Nearly all the community facilities available to the area are less than a mile away, but convenient shopping and service facilities were not adequate within the immediate vicinity.

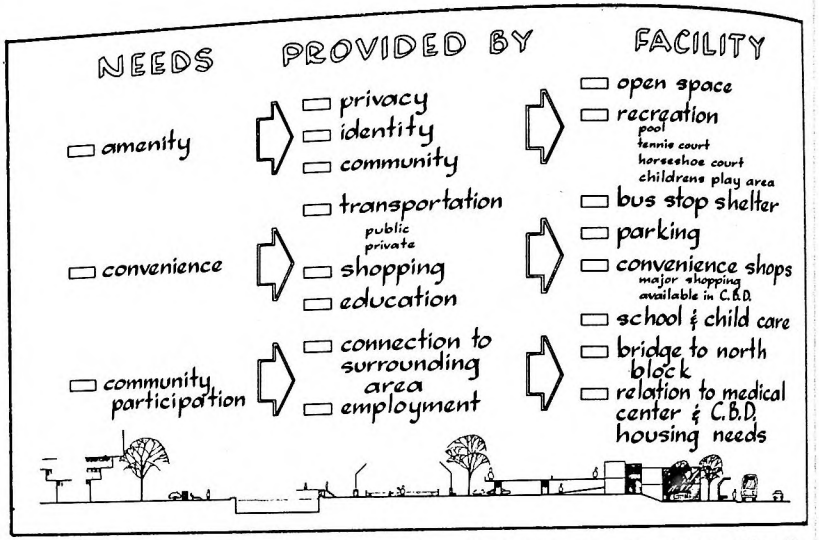
Though relatively small, the site gave rise to a number of problems. It was essentially an island within heavy traffic flow. Some of the surrounding streets and roads are elevated, moreover, and the resulting noise is concentrated and intensified. Land values are disproportionately high at this site because of its urban location, and its development involves the accommodation of suitably high population density (without which the economic feasibility of the development would be jeopardized).

It lies within the boundary of an existing urban renewal project and in an area of general urban redevelopment where two other renewal projects have been undertaken. The site was subject to the characteristics of unrehabilitated urban neighborhoods: unattractive surroundings, excessive noise, and conflicting land uses.

DESIGN AND PLANNING OBJECTIVES

The Memphis Prototype Site Planner identified two development objectives after determining a list of inherent factors defining major problems to be overcome:

Objective: To provide a new housing community in a declining, transitional urban neighborhood.



By identifying the principle needs of the project aside from housing, the planners at Memphis were able to identify the facilities to serve those needs.

Achieved: Five hundred eighteen new housing units were added to the market.

Objective: To assure the creation of an aesthetically exciting, physically functional link between the Memphis Central Business District and the Mid South Medical Center.

Essentially Achieved: The development provides an attractive physical link between the two areas.

DESIGN AND PLANNING DEVELOPMENT

The design development of the Memphis site can be broken down into several activities:

Pre-Design Activities

- Reconnaissance
- Investigations
- Determination of Community and Visitor Needs

Design Activities

- Conceptual Plans
- Preliminary Site Plan
- Housing Systems Producers

Pre-Design Activity: Reconnaissance

The initial planning for development of the Memphis prototype site included investigations of the physical, economic, social and governmental aspects of the site, and led to the following conclusions:

- Physical characteristics of the site presented no insurmountable problems toward meeting the objectives of Operation BREAKTHROUGH. Even though the site is located in a fairly undesirable, noisy environment, it appeared possible to create a quite acceptable living environment by carefully planning the site, choosing housing systems that can meet sound insulation requirements and by exercising control over internal and external noises.
- The surrounding street network and utility system were adequate to serve the site.
- Local codes and regulations presented no serious problems.
- The subsurface conditions were adequate to accommodate the proposed land use, but additional subsurface explorations were required.
- The market analysis indicated a ready market for the mix of housing types and range of units proposed under the development concept. Community attitudes appeared favorable toward the program and public participation programs provided a vehicle for assuring continued cooperation.
- A major portion of the north block was recommended to be added to the site so that a total

community, including varied housing types, community facilities, commercial services, visitor facilties, and park area could be provided.

- A spine concept was recommended for implementation because it provided: (a) separation of pedestrian and vehicular movements; (b) recovery of open usable space above grade; (c) visitor separation during construction; (d) separation and grouping of individual HSPs; and (e) a striking focal point for views from the Central Business District, the Medical Center and adjoining major streets.

- The housing systems under consideration for this site could be accommodated in the recommended design and would meet the program objectives.

- The Memphis Prototype Site was seen as an excellent opportunity to demonstrate the adaptability of housing systems in an urban situation.

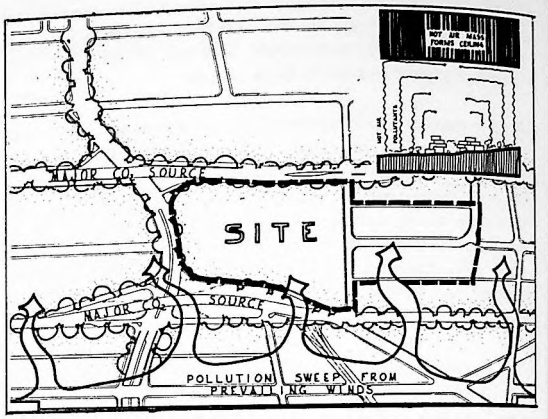
Pre-Design Activity: Investigations

A number of investigative analyses of the Memphis site were conducted. These included topography and vegetation; climate; soils and subsurface conditions; ecology; surrounding land use; population traffic; air, noise and visual pollution; and housing demand and supply.

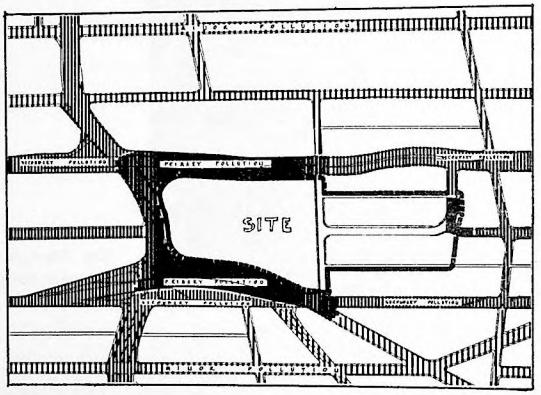
Pre-Design Activity: Determination of Community and Visitor Needs

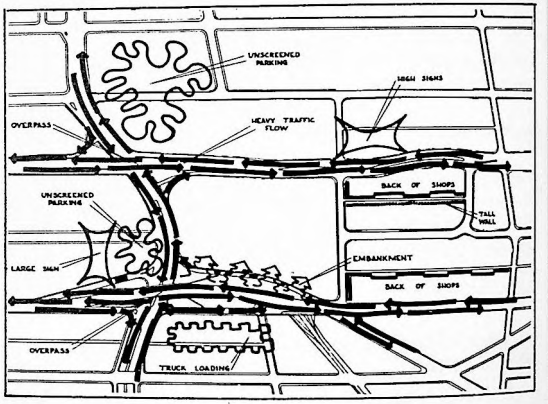
It was determined that the Memphis development would attract two kinds of visitors: individuals and groups interested primarily in the site's design and construction, and those calling upon the area's residents. A visitor seeking information about the development would require special facilities for viewing the overall site and individual structures, program interpretation, and explanatory literature. The safety of such persons must be assured; hence, there would be a need for unobtrusive but effective visitor control. The conventional visitor, on the other hand, would be concerned with a particular resident, and thus has need for parking space and accurate orientation and directional information.

The Memphis pedestrian deck (left) reused land allocated for parking; berms defined most of the site's edges (below).



The Memphis planners analyzed various adverse aspects of their site: high noise levels (below); air pollution sources (right); and other impacts on the site (below right).





The need to promote community identity must be considered simultaneously. This was met by providing a central facility for formal meetings, cultural activites and spontaneous gatherings of the residents.

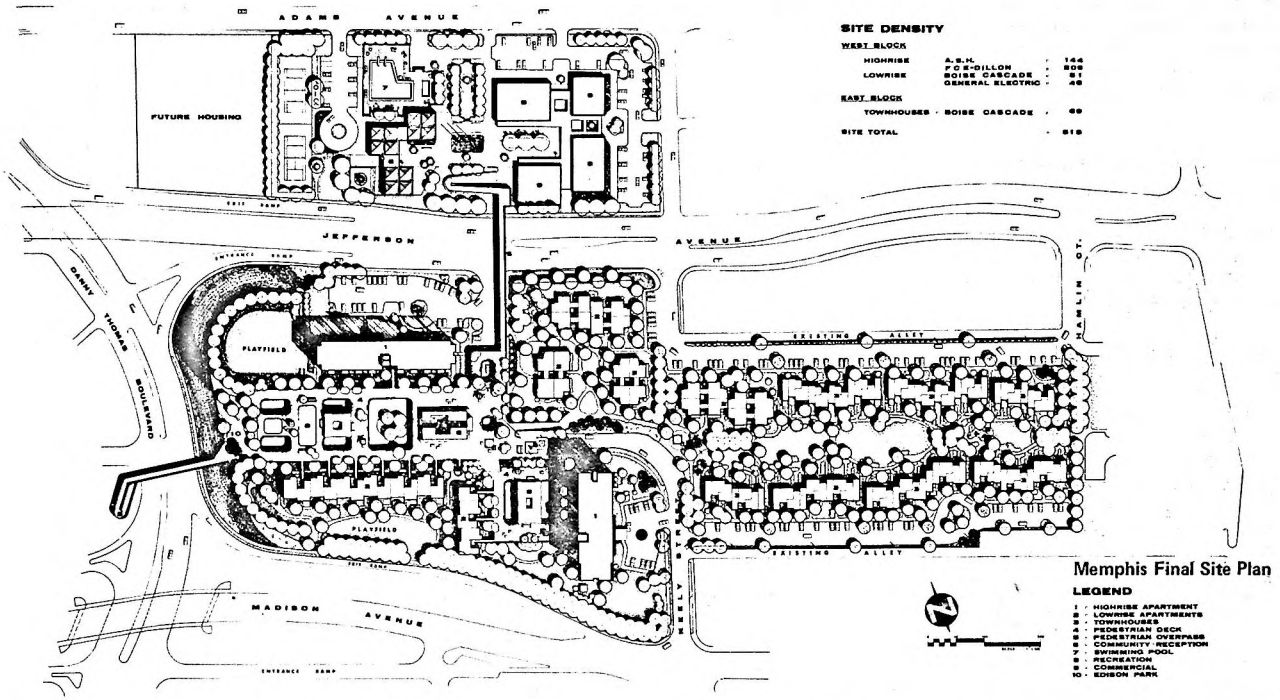
Design Activity: Conceptual Plans

Four concepts or building schemes were developed as possible solutions to the design problems presented here. These alternatives were: The Grade Level Concept, The Enclave Concept, The Mall Concept and The Spine Concept. The Spine Concept satisfied the stated design objectives in a clear and simple form, and its adoption was recommended.

Design Activity: Preliminary Site Plan

The preliminary plan differed somewhat from the original scheme which suggested land uses in general terms. The scheme was refined and modified to reflect the technical requirements of certain structures and the determination of more precise architectural design and dimensions. Among the plan's amenities were:

- A pedestrian bridge over Danny Thomas Boulevard, establishing pedestrian linkage with the Central Business District and providing safe crossing of this major arterial facility.
- Commercial facilities of convenience type linked to the site by a pedestrian bridge over Jefferson Avenue.
- Recreation facilities such as swimming, tennis and other play activities available at the site. The recreation complex also is served by the Jefferson Avenue pedestrian bridge.



Memphis Final Site Plan

– Promenade deck, creating a satisfactory and productive environment to encourage interaction within the BREAKTHROUGH community and to develop a focus for the rest of the city.

Design Activity: Housing System Producers

Concurrent with the development of the preliminary site plan came the selection of Housing System Producers for the Memphis site. Because of the experimental nature of the BREAKTHROUGH projects, the assignment of Systems Producers was an unusually complex task. For a variety of reasons, chiefly difficulty with delivery from plants distant from Memphis, two producers withdrew as designated HSPs and were replaced by another, although several plan changes were made to accommodate their specific requirements, these firms did no final construction. Similarly, a proposed systems project proved unfeasible and was assigned to a conventional builder. At an even later date, another replacement had to be named to the Memphis site to construct the BREAKTHROUGH high-rise building.

Recommended unit allocation for the various types to be supplied by Housing Systems Producers were determined by a market analysis, as well as the basic objectives of Operation BREAKTHROUGH and the proposed conceptual plan. The proposed unit allocation was amended in late phases of the development program. Only three HSPs participated in the final construction providing 374 housing units. A high-rise building containing 144 apartments using conventional techniques was also built. The total of 518 units remained close to that originally proposed in the market analysis.

FINAL SITE PLAN

The Final Site Plan accommodates the goals and objectives of HUD, the PSP and the PSD as refined and modified through detailed site analysis, market studies and the establishment of the needs of the HSPs. Specific highlights of this plan include:

- Acceptance of existing urban-life patterns by accentuating such positive features of the site as its location midway between the CBD and the Medical Center while eliminating or minimizing the adverse effects of the automobile and similar hostile influences.

- A system of noise barriers and sound-absorbing walls, and the orientation of living units so that quiet areas would be away from the streets, and less critical noise spaces would be oriented toward the streets. This plan incorporated other measures for exercising control over noise that originates on the site as well as from the outside.

- An elevated platform or spine that: (1) serves as a unifying element and ties separate areas together visually and physically; (2) increases usable space and permits an increase in site density to a level which allows the creation of a viable community; (3) separates the pedestrian from the vehicle and provides internal traffic control, avoiding outside movement that penetrates and goes through the site; (4) sets the stage for community functions as well as providing a place for leisure and relaxation for the individual; and (5) affords a means for sheltering or concealing what could be an unsightly swath of asphalt through the middle of the site.

- A variety of housing types and densities that takes into account varying family sizes, incomes and lifestyles.

- Clustering of buildings with units staggered relative to each other and non-parallel with the units located on the opposite side of the cluster.

- A central, two-lane road that provides convenient access to housing units but minimizes possible conflicts between pedestrians and vehicles.

- Central open spaces offering convenient recreational opportunities to all residents.

- A system of pedestrian walkways providing safe and attractive routes that encourage pedestrian movement within the site and adjacent areas.

- A conveniently located visitor orientation–community recreation center.

- Adequate, nearby but integral recreational and commercial facilities.

- Parking collected in small, off-street clusters, thereby avoiding the adverse visual and environmental effects associated with large, isolated parking areas.

Streets and Parking

Two principal objectives were achieved by the site street design. Conflicts between pedestrian and vehicular traffic were eliminated wherever possible, and on-site traffic was minimized and outside movement discouraged. Special design care was taken to ensure the adequacy of the street dimensions and strength for delivery and erection of living-unit components and modules. Parking on the site has been clustered in off-street islands conveniently adjacent to the housing units. No parking is permitted on the central street.

Sewerage, Drainage and Utilities

No unusual problems were presented in the engineering and design of sewerage, drainage and utilities for this development site. Because of the depressed formation of the site, provision for positive drainage of the area was important. Construction and installation of these systems were carefully coordinated with the PSD contractors and public utility companies to assure minimum disruption of the site. The master utility plan included a system of parallel ditching and overlapping easements, permitting the installation of several utility services in space normally accommodating only one.

Recreation and Walkway System

A variety of recreation opportunities is conveniently available to all residents of this site. Tot-lots are provided in each housing cluster with specially designed play equipment promoting the development of skills and coordination. Two larger playgrounds are provided to afford opportunities to pre-teen and teen-age children. Facilities programmed for the designated recreation area across Jefferson Avenue included a swimming pool and tennis court.

A Reception-Community Center Building on the promenade deck includes facilities for more formal types of recreation and cultural events, as well as visitor orientation. The deck itself offers numerous opportunities for spontaneous active and passive recreation. The initially provided community facilities can be expanded or modified as indicated by later demand.

The recreation facilities are connected by a walkway system which provides each resident with paved access from his dwelling to any other dwelling or facility on the site.

Landscaping

Three distinct requirements or conditions were encountered in the landscape design of the site. First was the need to minimize and control noise pollution by the functional use of living materials. Secondly, it was recognized that Man has a deep-seated need for growing plants and trees; failure to satisfy this psychological need is a principal cause of the dissatisfaction of urban living. Thirdly, there was no significant existing vegetation on the site.

The siting and placement of landscape materials permitted the emphasizing of noise-absorbing effectiveness, as well as an evaluation of such characteristics as beauty and maintenance needs. Landscape contractors were required to demonstrate pertinent experience on similar projects.

Solid Waste Collection

Solid waste collection and trash disposal will be handled by a private contracting firm. The waste collection program calls for the use of dumpster-type containers centrally located within the dwelling unit clusters.

The collection stations are adjacent to paved areas and provide access by the collection vehicles. Containers situated in parking islands are to be set in screened enclosures; those placed under the deck are

not surrounded by planted areas but are unobtrusive and carefully screened. Site trash will be collected and processed in one of the high-rise buildings.

Lighting

Achieving two important objectives influenced the design of lighting facilities at this site: providing adequate light for safe night-time activity and preventing spillage of light in areas where it was unwanted and undesirable. For this reason, the final lighting incorporated several of the various schemes discussed below.

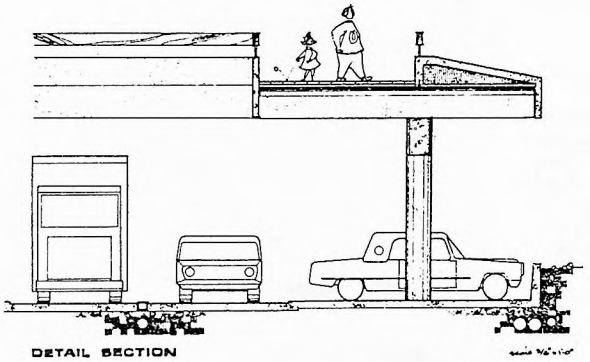
Atop the deck there is a combination of medium high area lights of relatively high intensity which illuminate recreation areas. These are complemented by low, directional bollards which are placed in all walls and stairwells. Street lights are used to prevent dimly-lighted areas between the brighter illuminated islands. Lighting of varying intensity is provided underneath the deck. High intensity lighting is needed at entrances and exits, for example, to minimize the contrast between the bright sunlight outside and the darkness of the covered area. The covered vehicular roads also require bright illumination. Similar heavy activity is not expected in the underdeck parking areas, and these do not need concentration of light fixtures. Underdeck lighting is ceiling mounted.

Spine

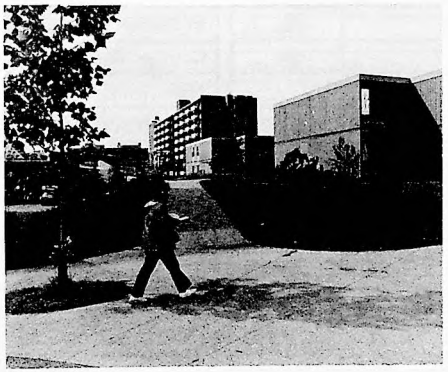
The distinguishing feature of the Memphis site is the spine which incorporates the movement of people and the location of services and activities in a support facility. The planners of the site note several specific advantages resulting from the spine:

– Higher Density: The superimposing of a pedestrian platform over a two-lane road with off-street parking resulted in the recapturing of land area for walks, recreating, and community open spaces. This increased usable space, permitted a comparable increase of site density to a level allowing the creation of a viable community.

  The spine's multi–level function of separating the pedestrian from the vehicle and its central location



The spine concept enabled the Memphis planners to orient the housing directly to a pedestrian zone exclusive entirely of automobiles in an urban location.



through the middle of the site also produces an infrastructure which permits a high density appropriate to this urban setting and potential market.

- Unifying Element: Simplicity of function and design of the spine makes it a unifying element that visually and physically ties separate areas together. The spine imposes a sense of order upon the entire site within which the inherent variety of prototype systems and building types can occur.

- Privacy: The spine clearly defines public, semi-public, and private space. By confining public movement to the spine, the areas immediately around the dwellings are afforded the privacy they deserve. Changes in level, entry drop-off points, and entry courts further insulate the dweller from noise and movement. Non-residents, as well as the people who live in the project, can move comfortably through the site without disturbing the privacy of others.

The promenade (topside) of the elevated spine sets a stage for community and group activities, as well as a place of leisure and relaxation for the individual. Pedestrian movement on the promenade is vital, as it will be the sole means of conveying people over the heavily traveled Danny Thomas Boulevard and Jefferson Avenue. By bridging the people into and out of the site and conveying them directly within the site, the platform provides an efficient pedestrian link and pulls together different functions by making them easily accessible to each other and to the adjacent community.

Site Summary Chart - Memphis

Source: Planners' Reports and Questionnaire Response

Comparative Site Data/ Land Use Facts

SIZE	
Acres	16
HOUSING	
Total Units	518
SFD	
SFA	69
MFLR	99
MFMR	
MFHR	350
PRODUCERS	
Number	4
DENSITY	
Units/Acre	33

PARKING	
Per Unit	1.25
Site Total	650
On Grade	●
Below Grade	●
OTHER USES	
Community Bldg.	●
Community Room(s)	
Maintenance Bldg.	
Commercial	○
School	○
Day Care Center	
Central Utility Bldg.	
Pedestrian Deck(s)	

Comparative Site Data/ Amenity Provisions

OPEN SPACE	
Private	●
Semi-Private	●
In-Cluster	
Central/Common	●
Non-Resident	
RECREATION	
Indoor	
Tot Lots	●
Playgrounds	●
Playfields	
Hard Courts	○
Sitting	●
Elderly	

Pool	○
Outdoor Event	
Picnic	
Bicycle Paths	●
UTILITIES AND SERVICES	
Convent'l Sewer	●
Unconvent'l Sewer	
Convent'l Energy	●
Unconvent'l Energy	
Convent'l Trash	
Unconvent'l Trash	●

– Beneath Deck: By depressing the road and parking three to four feet into the ground and covering it, what could be a very unsightly swath of asphalt through the middle of the site is concealed and sheltered.

Many of the necessary support facilities such as utilities, storage areas for maintenance and occupants, and service areas for cars and waste can be shielded, yet easily accessible since they are located adjacent to the road.

Contract Documents

In the final task, some drawings were assigned a high priority and completed early to minimize delay in the development of the site and its related structures. Included in this high priority category were the grading plan, road network, and phased construction drawings for utility, landscaping and similar work needed for the completion of housing construction at the earliest date. Care was exercised in the coordination of grading, utility interfaces and all engineering aspects to assure proper matches and connections between the HSP parcels and surrounding areas.

Necessary changes and refinements in these documents and drawings were made in response to the research findings of the housing producers who conducted continuing investigations concerning the design factors and construction and management methods affecting their individual assignments.

● On Site ○ Off Site

Comparative Site Data/ Environmental Character

DESIGN CONCEPT	
Urban Linear	●
Urban Clusters	
Suburban Clusters	
SITE CONTEXT	
Inner City	●
Suburban Developed	
Suburban Developing	
TOPOGRAPHY	
Flat	
Flat/Contoured	
Sloped	●
Valley	

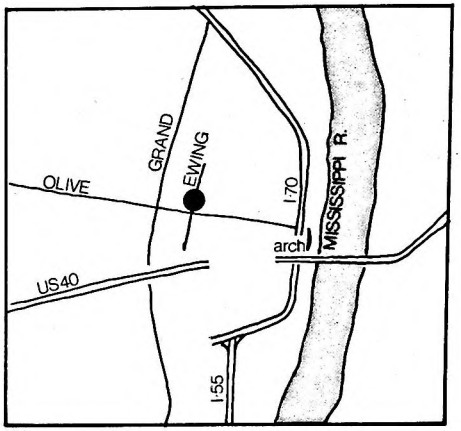
VEGETATION	
None Existing	●
Light Existing	
Heavy Existing	
Light New	●
Heavy New	
WATER	
Stream	
Lake	
ADVERSE CONDITIONS	
Air Pollution	
Noise Pollution	●
Water Pollution	

Dwelling Units/ Site/Producers

Alcoa	
Boise Cascade	120
BSI	
CAMCI	
Christiana Western	
Descon/Concordia	
FCE-Dillon	206
General Electric	48
Hercoform	
Home Building Corp.	
Levitt	
Material Systems	
National Homes	

Pantek	
Pemtom	
Republic Steel	
Rouse-Wates	
Scholz	
Shelley	
Townland	
TRW	
Total Systems Units	374
Non-System Units	144
Total Dwelling Units by Site	518

St. Louis



Prototype Site Planner:
Hellmuth, Obata and Kassabaum, Inc.
St. Louis, Missouri

SITE DESCRIPTION

The St. Louis Operation BREAKTHROUGH site consists of two separated parcels located in the Central West section of the city. Between the two parcels is Laclede Town, a highly successful townhouse development of 625 units. The site is convenient to the Central Business District and several educational institutions and is served by arterial streets on the north and south and an east/west expressway. The west site is 7.9 acres and the east site contains 7.6 acres.

East of the BREAKTHROUGH site is a recently developed business district which contains a variety of low-rise office buildings. Beyond this district lies the St. Louis Gateway Mall, a major open space leading to downtown St. Louis that terminates at the Gateway Arch at the Riverfront. Immediately south of the site are two well maintained townhouse developments, a teacher's college, an elementary school, and an area which will be developed as a community shopping center. Further south is a new, large, light-industrial office park. On the west the site is bounded by a recently constructed portion of the St. Louis University campus. A large area remains as open space for University athletic events. North of the site lies a large, mixed-use area with many vacated buildings in a state of disrepair.

The Laclede Town community has provided a strong anchor for residential development and the BREAKTHROUGH developments at each end have utilized the last two remaining residential parcels to finalize the redevelopment of this area.

DESIGN AND PLANNING OBJECTIVES

After synthesis of HUD Program objectives, citizen input, and site and community factors, a set of preliminary design objectives was established. As the design and planning proceeded, they were further refined and restated. Following are the objectives and the extent of their realization:

Objective: Provide a variety of housing types and densities.

Achieved: The variety includes garden apartments, townhouses, low-rise and elevator apartments accommodating families of varying size and income.

Objective: Develop an optimum living environment with maximum social, economic and aesthetic opportunities.

Achieved: Clusters of housing integrated within a variety of courtyards and open space and carefully allocated according to guidelines from numerous sources foster the desired environment.

Objective: Separate automobile traffic from interior pedestrian movements.

Achieved: Vehicular traffic and parking are limited to the periphery of each site to completely separate automobile traffic from interior pedestrian movements.

Objective: Minimize site maintenance costs.

Achieved: By the use of large, hardy trees and groundcovers and dense vegetation around parking areas, maintenance costs have been minimized as much as possible.

Objective: Optimize the opportunities for a comprehensive pedestrian walkway system.

Achieved: Intensive pedestrian space, serving as the major organizational element, provides easy access to all on-site facilities as well as most adjacent off-site ones.

Objective: Provide identifiable outdoor space for all age groups.

Achieved: A series of connected courtyards provide pedestrian spaces of varying sizes, shapes and activities for all age groups.

Objective: Provide retail services and conveniences within the high rise structures.

Achieved: Neighborhood shops and services, management offices, and a community activity room are provided.

DESIGN AND PLANNING DEVELOPMENT

The design development of the St. Louis sites can be broken down into several activities:

Pre-Design Activities
- Community Participation Program
- Examination of Enabling Legislation
- Development of a Program
- Analysis of Housing Systems
- Preliminary Coordination
- Market Analysis

Design Activity
- Preliminary Site Design

Pre-Design Activity: Community Participation

From the very beginning of the planning process, citizen participation was an important and crucial ingredient. During the conceptual and preliminary planning period, numerous discussion meetings were held with citizen groups, neighborhood businessmen and institutions. A Council of Councils was formed to coordinate and plan citizen meetings. The Council

was very effective in soliciting ideas and site planning concepts from residents, as well as mobilizing the much needed citizen support for the project. The Planner benefited from several design critiques and brainstorming sessions with the citizen groups. All citizens from the metropolitan area were invited, through the media, to participate; most participants, however, came from the immediate neighborhood.

Pre-Design Activity: Examination of Enabling Legislation

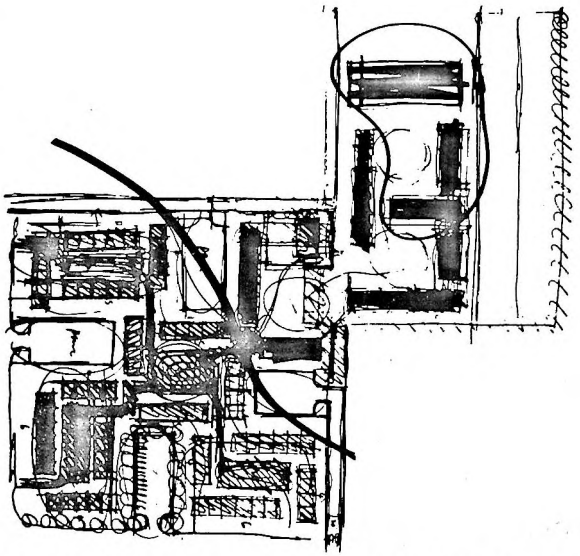
The St. Louis "Breakthrough Bill" was passed on June 19, 1970, and signed on July 6, 1970. This successful passage was preceded by considerable debate and controversy within the Board of Aldermen, several public hearings, and an unsuccessful attempt to pass the bill in March 1970.

The planner observed that early and continued citizen participation resulted in having a group of well informed citizens who actively supported the project. They were effective spokesmen for the community and their efforts undoubtedly had a profound effect on final vote on the "Breakthrough Bill."

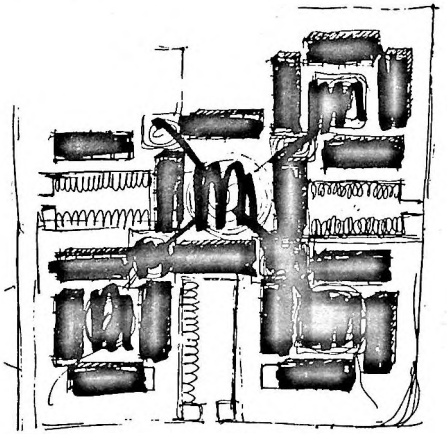
Pre-Design Activity: Development of a Program

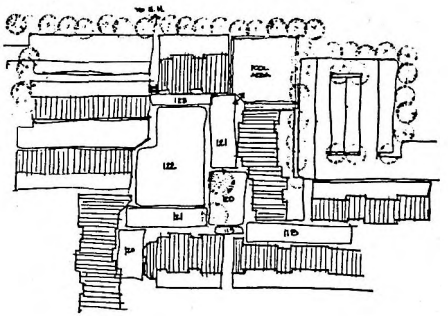
The program for the number, sizes and distribution of housing units on the two St. Louis parcels was developed through close consultation among the planner, site developer, housing system producers and HUD. The program was influenced by several major factors:

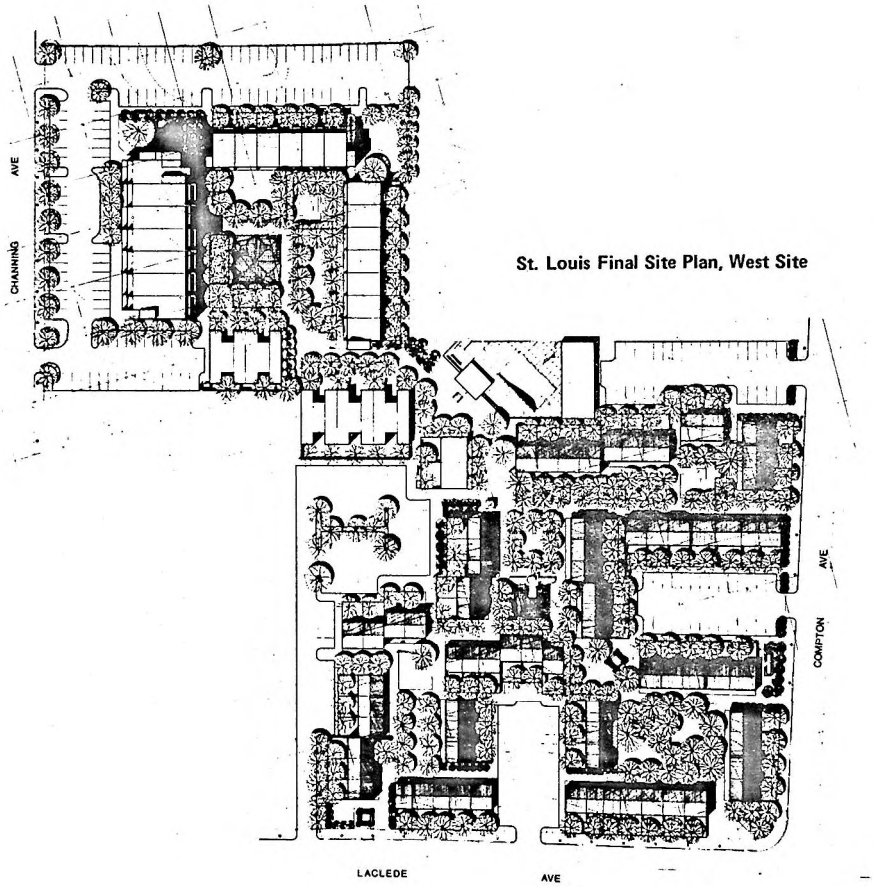
- Ultimate population which could be assimilated within the site and community.
- Initial and ultimate child population and the effect on available schools and areas for recreation.
- Market demands as experienced within the Laclede Town development.
- Analysis of family types needing and desiring urban housing.
- Overall economic feasibility.
- Ability of selected housing system producers to provide most suitable units for the St. Louis market.



Several of the preliminary planning and design sketches studied by the St. Louis planners.







St. Louis Final Site Plan, West Site

A preliminary housing distribution was formulated for the two sites. The west site is very near to an existing elementary school and has five acres of adjoining city-owned land which will be developed for recreation. Therefore, the larger, family type units have been placed on this site.

The east site is adjacent to a high-rise apartment for retired persons; it is bordered by a busy arterial street and an office building and has no nearby access to recreational land. Therefore, this site was programmed for families having fewer children.

Pre-Design Activity: Analysis of Housing Systems

The planner reviewed the housing systems designated for the St. Louis site, together with their requirements, including architectural characteristics, construction method and sequence of erection, and testing requirements. After determining the portion of the site to be occupied by prototype housing, the planner made a general review and investigation of sub-surface conditions to obtain the information necessary to properly design foundations for building systems and other site facilities. This data was made available to the housing system producers.

Specifically the planner examined:

- Architectural Characteristics: consisting of an analysis of scale, color, texture, facade, treatment, materials, and forms of each building system to be used on the site, and recommendations for variations when appropriate.

- Construction Methods: consisting of an analysis of requirements for site storage of components, shipping access, equipment screening, site fabrication areas, and erection sequence.

- Testing Requirements: as established by HUD.

Pre-Design Activity: Preliminary Coordination

After analyzing the architectural, construction and testing requirements for each housing system, the planner developed a site design to maximize the

functional aspects of these three elements while creating a unified site and environmental design.

This task involved close coordination with HSPs and their site planners, the PSD and the testing consultant. This coordination was important to insure that proper consideration be given to adequate site access for the housing system components adequate perimeters for construction and erection equipment, component storage, and any required fabrication on site. The final site design accommodated the sequencing of the various housing systems erection which extended over a period of several months.

Pre-Design Activity: Market Analysis

The marketing procedures have been set forth in the "Management Manual for St. Louis Operation BREAKTHROUGH Prototype Site," prepared by the Laclede Town Company. This manual was originally produced in May 1971, and approved by the Department of Housing and Urban Development, August 12, 1971. Slight modifications were later made at HUD's request. Initially, Operation BREAKTHROUGH marketing had as its goal the careful integration of BREAKTHROUGH homes into the total Mill Creek Valley Community, a community already known for its social and economic diversity.

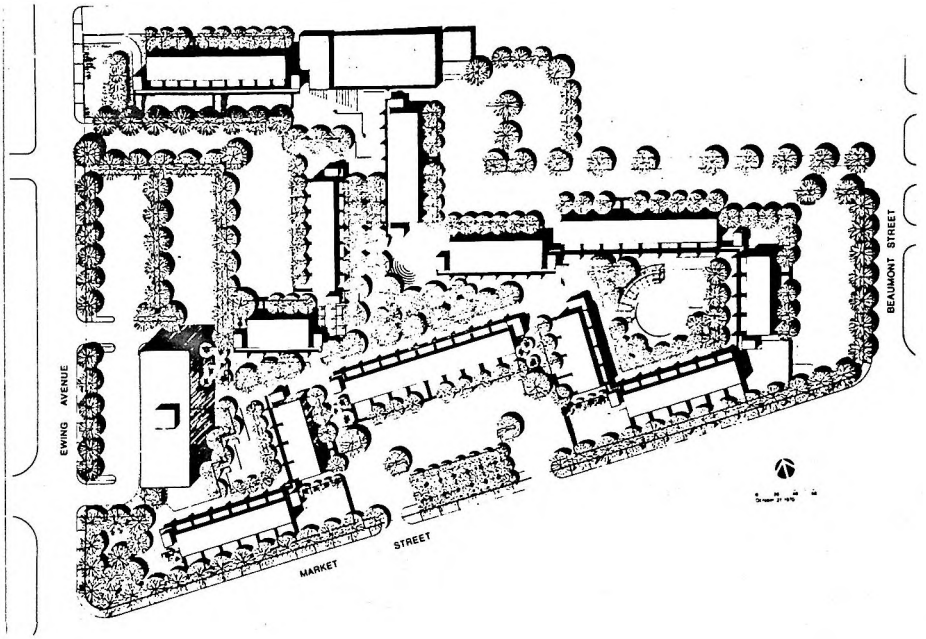
The market analysis includes the following breakdown for four rental categories:

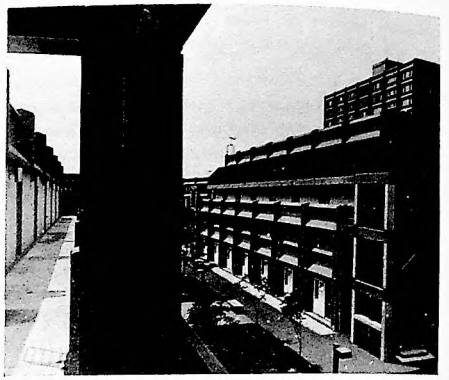
- Low Rent Units (Rent Supplement Program) — 10% of Units.
- Moderate Rent Units (Section 236 Regular Program) — 30% of Units.
- Middle Rent Units (Section 236 Exception Program) — 50% of Units.
- Upper Rent Units (Market Rate) — 10% of Units.

Design Activity: Preliminary Site Design

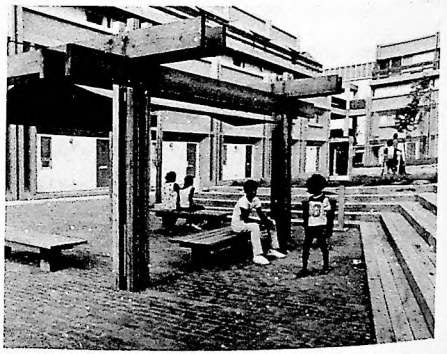
The planner prepared preliminary site plans indicating types of structures and their placement, circulation for pedestrians and autos, all utility lines, and proposed landscaping. The planner determined site engineering requirements and developed drawings and

St. Louis Final Site Plan, East Side





The site plan of the St. Louis location, with its distinctive architecture, included such uses as retail shops, in-cluster recreation areas, and totlots.



specifications for drainage and run-off, storm and sanitary sewers, fire and domestic water service supply, electrical services, gas supply lines, grading and fill requirements, retaining walls, roadways, walks, street furniture, lighting, play areas, and landscape planting.

The PSP was asked to recommend specific zoning changes as needed, and specific provisions of local codes, regulations and ordinances that should be waived, changed or amended in accordance with the commitment of the City of St. Louis in the "Instrument of Cooperation." However, no changes were required since the site plan and design were done in accordance with provisions in local codes, regulations and ordinances.

The basic design concept was to use the buildings to provide a series of connected courtyards with the result being a series of pedestrian spaces of varying sizes and shapes which in total became a pedestrian street. By being inwardly oriented, this accomplished a real and psychological sense of security for residents. At the same time, these spaces became the neighborhood spaces: each being uniquely different from the other as determined by its configuration, the design of the space itself, the types of housing units on the edge, and the way in which it is used by its residents.

All vehicles are on the street side and are housed in lots along the patio (private) side of the units. The fenced patios allow for private entry from the street and parking lot. Visitors must enter through the "community" or "neighborhood" side. Community facilities are strategically placed along pedestrian walkways; play areas for children of all ages, sitting areas, cycling area, wisteria-covered arbors and masses of deciduous trees which provide a canopy effect and park-like setting.

FINAL SITE PLAN

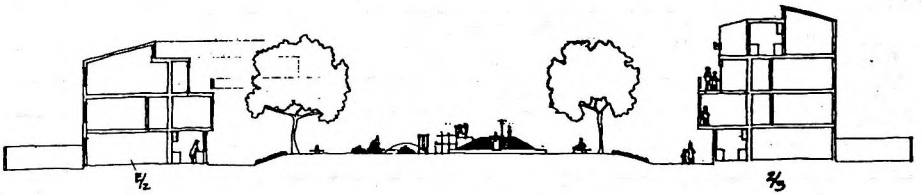
The final plan for BREAKTHROUGH St. Louis varied only in minor ways from the preliminary studies and plans. The plan effectively reflects the basic design concept by utilizing the buildings themselves as major definers of open space. The series of pedestrian spaces created by the connecting courtyards of the buildings provided inwardly oriented spaces of varying sizes and shapes.

Parking on both the east and west sites is provided along the street side peripheries. No new roads are introduced at the urban sites and there is no vehicular penetration through the open space. The strict design relationship of street to parking to building to open space is maintained.

The sites, as noted, are separated by the Laclede Townhouse development. The initial concept of design integration with the neighborhood is achieved by carefully programming sequential continuity between the three areas.

The emerging product of the BREAKTHROUGH program in St. Louis is an urban residential environment that is superior to other areas within the same marketing categories. Acceptance by residents has been very favorable and in general the site is being used as intended. Children are using the facilities and areas designed for them. The fenced patio gardens are being used for planting and are serving the many functions of a private outdoor space. The interconnected pedestrian courtyards provide space for many community activities and serve effectively in establishing a neighborhood scale as well as a sense of security.

The transformation from site plan sections (below) to the actual site retained the design concern for open spaces.



CONSTRUCTION DEVELOPMENT

The planner prepared plans demonstrating aesthetic coordination of the housing systems. The plans also demonstrated construction coordination, showed access and delivery routes for each housing system, indicated areas for storage and protection and coordinated use of such equipment, site fabrication areas and schedules for component delivery and erection.

Early completion of certain drawings was required in order to obtain bids and cost estimates for site work and erection. These drawings included the grading plan, road network, and phased construction drawings for utilities, landscaping, and other work needed for the earliest housing systems. Grading dimensions, utility interfaces and all engineering aspects were coordinated to assure proper matches and connections between housing system parcels and surrounding areas.

Groundbreaking ceremonies took place on November 12, 1970. Rough grading work started on November 16, 1970. The entire St. Louis area was subject to a construction strike in 1972, and the BREAK THROUGH project was picketed for most of the strike which prevented progress of any type.

The sewer work and heavy water main work were all completed early in the project on the East Site. The water distribution work commenced November 29, 1971. The underground electric, telephone and site

Site Summary Chart - St. Louis

Source: Planners' Reports and Questionnaire Response

Comparative Site Data/ Land Use Facts

SIZE	
Acres	15.5
HOUSING	
Total Units	464
SFD	
SFA	75
MFLR	164
MFMR	51
MFHR	174
PRODUCERS	
Number	4
DENSITY	
Units/Acre	30

PARKING	
Per Unit	1.15
Site Total	533
On Grade	●
Below Grade	
OTHER USES	
Community Bldg.	
Community Room(s)	
Maintenance Bldg.	
Commercial	●
School	
Day Care Center	●
Central Utility Bldg.	
Pedestrian Deck(s)	

Comparative Site Data/ Amenity Provisions

OPEN SPACE	
Private	●
Semi-Private	
In-Cluster	
Central/Common	●
Non-Resident	
RECREATION	
Indoor	●
Tot Lots	●
Playgrounds	
Playfields	
Hard Courts	
Sitting	●
Elderly	

Pool	●
Outdoor Event	●
Picnic	
Bicycle Paths	
UTILITIES AND SERVICES	
Convent'l Sewer	●
Unconvent'l Sewer	
Convent'l Energy	●
Unconvent'l Energy	
Convent'l Trash	●
Unconvent'l Trash	

lighting work commenced on September 20, 1971. The Western Union conduits, Union Electric tunnel and the new Western Union cable were completed in August, 1971. Construction of the pool, bathhouse and maintenance building commenced on January 18, 1972.

The sewer work and heavy water main work were all completed early in the project on the West Site. The underground electric, telephone and site lighting work commenced on August 11, 1971. Gas distribution work commenced on October 11, 1971, and water distribution work commenced November 4, 1971.

Fence work commenced at Home Building area on January 26, 1972. Construction of the pool, bathhouse and maintenance building commenced on November 18, 1971, and the swimming pool was placed in operation the weekend of July 4, 1972.

Weekly construction inspections were carried out with representatives of the Prototype Site Developer, HUD, the Planner and on-site inspectors. Monthly written reports on construction progress and quality of construction were prepared by the Planner for distribution to all participants.

The St. Louis project, after delays in obtaining Housing System Producer contracts and 100% drawings, together with the construction strike, delayed not only the HSPs work but also delayed the site development work. These delays caused a major part of the site development work to fall in the winter season. The winter weather caused additional delays in the completion of the total project.

● On Site ○ Off Site

Comparative Site Data/ Environmental Character

DESIGN CONCEPT	
Urban Linear	
Urban Clusters	●
Suburban Clusters	
SITE CONTEXT	
Inner City	●
Suburban Developed	
Suburban Developing	
TOPOGRAPHY	
Flat	●
Flat/Contoured	
Sloped	
Valley	

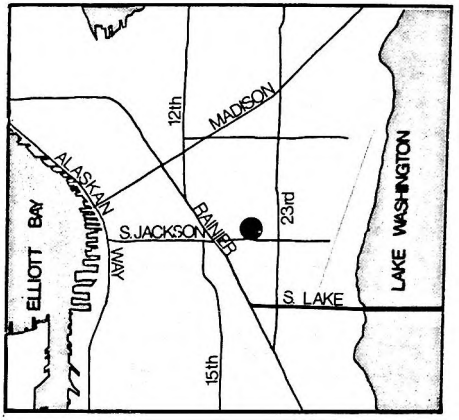
VEGETATION	
None Existing	
Light Existing	●
Heavy Existing	
Light New	●
Heavy New	
WATER	
Stream	
Lake	
ADVERSE CONDITIONS	
Air Pollution	●
Noise Pollution	
Water Pollution	

Dwelling Units/ Site/Producers

Alcoa	
Boise Cascade	
BSI	
CAMCI	
Christiana Western	
Descon/Concordia	128
FCE-Dillon	
General Electric	
Hercoform	
Home Building Corp.	75
Levitt	
Material Systems	20
National Homes	

Pantek	
Pemtom	
Republic Steel	
Rouse-Wates	241
Scholz	
Shelley	
Townland	
TRW	
Total Systems Units	464
Non-System Units	
Total Dwelling Units by Site	464

Seattle



Prototype Site Planner:
Building Systems Development, Inc.
San Francisco, California
Consultants:
Sasaki Walker Associates, Inc.
Murray-McCormick Environmental Group

SITE DESCRIPTION

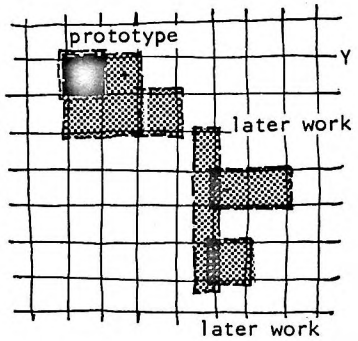
Seattle's BREAKTHROUGH is a 1.8-acre site within a superblock comprised of four former city blocks. Its location in the northwest quarter was fixed jointly by HUD and the City of Seattle before site planning began. The site is located in a lower to moderate income area (50% of the families have annual incomes of less than $4,800), within an urban renewal area which has been in planning since 1960. In 1971 the area was designated as a Model Cities area. To the citizens, who had not yet seen physical results from these federally-supported programs, BREAKTHROUGH was to be the first major kick-off of construction within the renewal project area.

DESIGN AND PLANNING OBJECTIVES

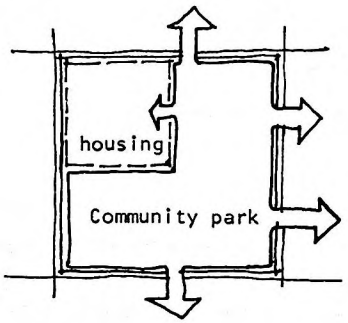
The site planner actively pursued the achievement of a broad, comprehensive list of design objectives. The Seattle objectives have been categorized by the planner in eight groups:

- City Context
- Neighborhood Context
- Housing Site/Park
- Circulation
- Unit Grouping
- Dwelling Units/Parking
- Ancillary Units
- Dwelling Units

Over forty objectives were listed and subsequently discussed in the final report. The unusual detail reflected in the range of objectives is indicative of the broad based, yet specific, hopes placed on the Seattle BREAKTHROUGH site. All of them, therefore, follow with a statement of their extent of realization.



Development coordination needs beyond the Seattle site were identified by the planners (above); a community park comprised the bulk of the site's "super block" (below).



City Context

Objective: Encourage the development of E. Yesler Way from 14th to 23rd Avenues for new housing, convenience shopping and pedestrian activities.

Not Achieved: Extensive rehabilitation, new housing (other than BREAKTHROUGH), and new convenience shopping has not yet been promoted to the extent encouraged by this objective.

Objective: Design should emphasize existing grade changes, E. Yesler Way as an important city arterial, and points of arrival at the BREAKTHROUGH project area.

Achieved: The grade change at 17th Avenue is somewhat marked by the new Neighborhood Center. At 20th and Yesler, a "point of arrival" is emphasized by an entry to the park. The major pedestrian entry and a second entry to BREAKTHROUGH from Yesler emphasize the importance of the right-of-way.

Objective: Improve the quality of the environment on E. Yesler Way by establishing landscaping and a "promenade" sidewalk the length of Yesler Way.

Partially Achieved: A "promenade" has not yet evolved along Yesler. New sidewalks and trees along Yesler (by the City), along with BREAKTHROUGH and the Neighborhood Center, have initiated elements of a promenade.

Objective: Coordinate design with a proposed minor pedestrian walkway connecting the BREAKTHROUGH site to a major walkway.

Essentially Achieved: The Washington Street pedestrian walkway assures continuity through the park.

Neighborhood Context

Objective: Design BREAKTHROUGH site in coordination with proposed nearby developments.

Partially Achieved: BREAKTHROUGH, the Yesler-Atlantic Neighborhood Center and the new Kowabe Memorial House (high-rise for the elderly) now establishes a solid nucleus for major neighborhood activity and for future new development. Active design coordination was not achieved among these projects, however.

Objective: Scale and massing of BREAKTHROUGH development should be compatible with present and proposed development in the neighborhood.

Achieved: Compatibility has been achieved. In keeping with the neighborhood scale, no building exceeds four stories.

Objective: Develop BREAKTHROUGH in the knowledge that principles employed in the design may become the basis of later development work in the neighborhood.

Partially Achieved: BREAKTHROUGH is a model for a new type of housing, namely single-family attached housing in a modified, medium-rise configuration. However, it will not be a specific model for the initially considered megastructure building complex including residential, residential-ancillary (tot-lots, etc.) and possibly non-residential uses.

Housing Site/Park

Objective: Functions for the exclusive use of residents of the housing site should be within the housing site.

Achieved: There is a clear use separation between the public neighborhood park and the private activity facilities and zones of BREAKTHROUGH.

Objective: Provide a sense of transition between the three-block park and the housing site.

Achieved: The patio fences provide a moderately "hard" transition; the solid wood fences are low, permitting views from the houses and patios to the park. Walks interrelating BREAKTHROUGH with the park provide a "softer" transition. The proposed park design fully accommodates the desired transition with a combination of grading, landscaping and walks.

Objective: Maintain access to dwellings from the park relatively private, but without making access excessively circuitous.

Achieved: Direct access to BREAKTHROUGH housing is available only from within the housing site. Two entrances to the park provide good direct access between the housing site and the park. The private domain of BREAKTHROUGH is maintained by low fences and gates.

Circulation

Objective: Separate pedestrian and vehicular circulation throughout BREAKTHROUGH and the park.

Achieved: The ground level of the four-block superblock is for pedestrians only. Parking for BREAKTHROUGH is below grade.

Objective: Provide vehicular access to BREAKTHROUGH only from 18th Avenue, a minor arterial.

Achieved.

Objective: Discourage public pedestrian circulation to the park through the housing site.

Achieved: The park will be very open, inviting entrance from several points. Through access in BREAKTHROUGH is possible, but not convenient due to indirect routes and gates.

Objective: Permit no vehicular access between the park and housing.

Achieved.

Objective: Locate pedestrian routes and entry points to the park so that park functions are not disrupted by cross-circulation or short-cutting.

Achieved: (By the park's designers.)

Objective: Take advantage of existing grades to achieve pedestrian and vehicular access at different levels and to minimize elevator requirements.

Achieved: Grade changes are accommodated by stairs and by a continuous ramp system. The main plaza grade averages eight feet higher than the southern plaza area. Pedestrian and vehicular access from all sides of the site is at-grade with the adjacent area.

Unit Grouping

Objective: Sites bordering the park on all sides should have maximum exposure to the open space.

Achieved: Neither BREAKTHROUGH nor projected park facilities will impede exposure to the park from adjacent sites. The relatively low building profile eased potential problems.

Objective: Locate medium-rise development toward the north or west boundaries of the site to avoid overshadowing of the project and obstructing views of the park and southern vistas. Medium-rise shall not exceed eight to nine stories above the parking levels.

Achieved: The tallest building is only four stories.

Objective: Locate larger units in the upper levels of the medium-rise development only if the objectives underlying the specific requirements for the larger units can be fully satisfied in a non-walkup situation.

Achieved: All three and four-bedroom dwellings have direct at-grade access.

Dwelling Units/Parking

Objective: Incorporate parking into or under buildings.

Achieved: All parking is underneath buildings and plazas.

Objective: Use the natural grades on the site to permit close access of parking to units.

Essentially Achieved: Parking is only reasonably close to dwellings and is totally unobtrusive. Only pedestrian and vehicular access points are visible.

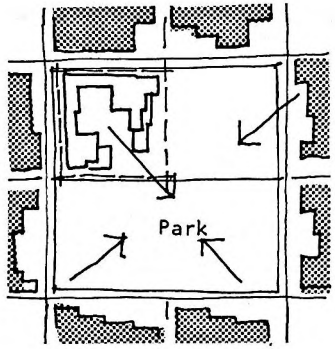
Parking at Seattle was distinctly separated from the housing and open space levels.

Objective: Car parking in or under structures shall be naturally lighted and ventilated and shall be accessible only to the residents.

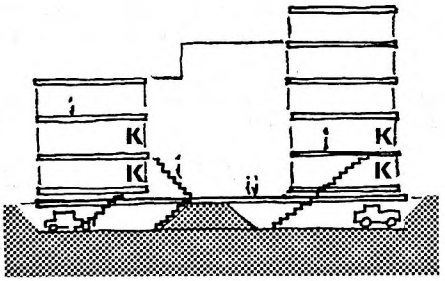
Essentially Achieved: Garage doors are all open mesh metal grillwork which permits natural ventilation and some natural light. Garage security is assured by key-controlled automatic doors. All doors to the garage from plaza-level stairways may be locked for security.

Objective: Provide residents with reasonably direct access from parking to units.

Achieved: Residents use either an elevator or one of four stairways which provides direct access to northern and southern plaza levels. A reasonably short walk through the plaza is required.



Concern for the park was reflected in several of the planning objectives (above); another objection concerned the residents' access to parking (below).



Objective: Kitchens of all larger dwelling units should be a maximum of two levels above parking.

Achieved.

Ancillary Uses

Objective: Where appropriate, design for the multiple use of ancillary facilities.

Achieved: Multiple use will be made of the community rooms, such as for meetings, parties and possible day-care for children.

Objective: Promote the opportunity for social interaction by putting one use next to another.

Achieved: Such opportunity occurs in play areas and sitting areas.

Dwelling Units

Objective: Each dwelling unit should be oriented so that it receives direct sunlight for an extended period of the day.

Achieved: All dwelling unit living rooms and patios have either an easterly, southerly or westerly exposure.

Objective: Individual dwelling units should be planned with maximum visual privacy and sound insulation from other dwelling units.

Essentially Achieved: Visual privacy is reasonably good. No unit directly faces another at a short distance.

Objective: Some redesign or alteration by the occupants should be possible within the unit.

Not Achieved: All walls are fixed.

Objective: Dwelling unit design and configuration should permit some flexibility of unit size to accommodate changing occupancy patterns over the life of the building.

Not Achieved: Units are all fixed as either two, three or four-bedroom dwellings.

Objective: Each large unit shall have a secure, yet private, entry access directly from ground or main pedestrian levels.

Achieved: As an example, at the planner's suggestion, open risers were used in the stairs in hallway entries of multi-family buildings so that there would be an open sight line from the main entry doorway to the door of the dwelling unit at the rear of the entry area.

Objective: Entrances to individual units should be discreetly separated or screened from adjacent units.

Achieved: All units have either a private front door or share a common entry of four units.

Objective: Each unit should have a place resembling the traditional stoop or veranda. This space will be different from the private outdoor space required for each unit.

Essentially Achieved: Although such spaces are small.

Objective: All larger units shall have direct access to grade or a main pedestrian level.

Achieved: For all three and four-bedroom units.

Objective: All units should share similar proximity to parking.

Partially Achieved: Walking distances vary from each unit to a garage stairway and then to an assigned parking stall. The longest distances are from units at the northeast section of the site.

Objective: Fairly direct access should be provided from all larger units to the park and to minor open spaces on the site.

Achieved.

Objective: Every unit should have a range of views.

Partially Achieved: Views from lower floors of units generally are local, i.e., of the immediate open space plazas, city park or streetscape. Neighborhood views are seen from the upper floors; distant views occur from some units.

DESIGN AND PLANNING DEVELOPMENT

The design development of the Seattle site can be broken down into several activities:

Pre-Design Activities

- Process
- Land Use Program

Design Activities

- Superblock Conceptual Plans
- Preliminary Site Plans
- Implications of Systems

Pre-Design Activity: Process

The Prototype Site Planner established a recommended program and the design objectives before either housing system producers or a site developer were selected for the site by HUD. The program and objectives set the framework for BREAKTHROUGH's design and relationship to the surrounding neighborhood. And, importantly, they also set the context for HUD's considerations and selection of a housing system, or systems, appropriate to relatively high density development for low-rise and medium-rise buildings.

The planner deliberately established a building configuration theme of low and medium-rise housing, together with design objectives, as the conceptual plan for BREAKTHROUGH. Selected at the end of Task I, the concept was preferred to other possible schemes for the 80 units of housing. It was felt that an approach using ,flexible themes and objectives would permit maximum opportunity on the tight urban site for housing producers to demonstrate the unique characteristics of their building systems.

HUD chose only one Housing System Producer for the site. The producer's Supported Land System (SLS) was ideally suited to the original program and design objectives in that only very minor modifications has to be made before preliminary design could begin.

Pre-Design Activity: Land Use Program

The planner recommended a BREAKTHROUGH program for 80 housing units, with several residential and ancillary facilities and 100 on-site parking spaces. The program was repeatedly modified throughout design development to assure project feasibility under HUD's budget for the producer and the site as a whole. The most basic adjustments were to vary and finally sharply decrease the number of single-family attached dwelling units that would be located in one of the structures.

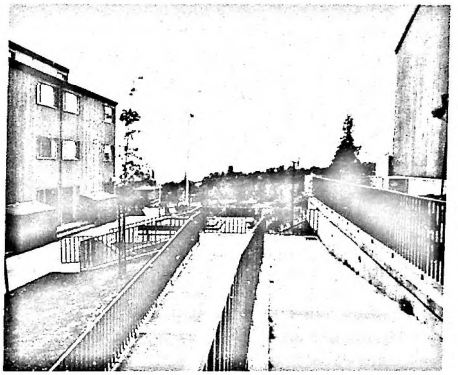
Design Activity: Superblock Conceptual Plans

Realizing the need to plan and design all elements of the superblock in complementary relationship to each other, HUD agreed that planning for BREAKTHROUGH should include conceptual planning for the whole superblock, a quarter of which included the prototype site.

Planning activity of the superblock terminated in April 1971 after preparation of a preliminary program, design objectives and a preliminary "design suggestion" concept for the park and its relationship to BREAKTHROUGH. All these elements were conceptual only because the City had not confirmed a program for either the open spaces or buildings within the park. The materials were fully discussed and submitted to the City in August 1971 for its use in final programming and design of the park.

The design suggestion for the superblock conformed to the Urban Renewal Plan for the Yesler-Atlantic Neighborhood Improvement Project, as amended. It reflected major design elements of the YANIP Plan, including the pedestrian way along South Washington Street which will connect with the park, and other

The facilitation of pedestrian movement over grade changes was eased by Seattle's ramps.



more recent proposals for the adjacent neighborhood. The latter proposals include two facilities which were completed during 1972.

Design Activity: Preliminary Site Plans

The first HUD-accepted preliminary site plan for BREAKTHROUGH featured a plaza which was harder textured, more multi-leveled and more urban in concept than that for the final site plan. A key feature of the concept was the complementary relationship between the hard-surface levels in BREAKTHROUGH and the suggested soft-surface earth mounding in the City park. The plan included two levels of parking and 72 dwelling units.

In February, modification to one level of parking was studied and accepted. Then, because feasibility of the entire project was in question, the number of dwelling units was decreased from 72 to 58, and the interior court of the site plan was somewhat simpli-

fied. A new preliminary site plan was approved by HUD in April 1971. It remained the BREAKTHROUGH site plan until November, when redesign was required again for the final plan.

Design Activity: Implications of System

The Townland Supported Land System enabled a unique living environment to be considered during the process of design development. Site planning was potentially offered more opportunities than limitations by the SLS system.

Opportunities and Advantages:

- Many advantages of single-family living, including: single-family attached design; an open walkway leading to the home; a private 'yard' (with a two to three-story separation for the 'yard' above); two to three floors of living space within the dwelling; and a private entryway and front door.

- Efficient use of the site through higher densities than normally possible for single-family attached units. (As stated by the Townland Marketing and Development Corporation, the SLS system can be constructed to fifteen stories. Therefore, compared to similar at-grade townhouse development, two-story townhouses within the SLS could be up to seven times the density, and three-story townhouses could be up to five times the density.)

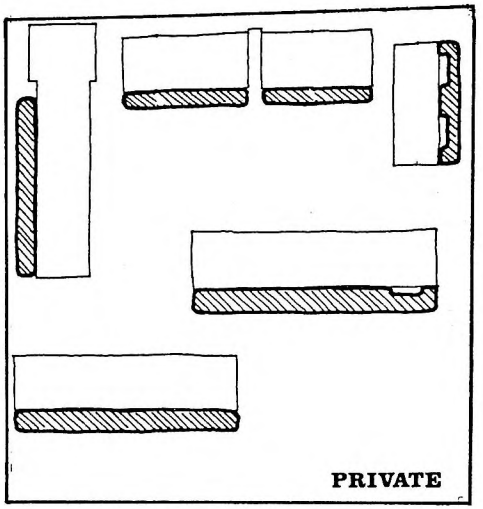
- Potential mixing of residential, commercial and institutional uses.

- Potential flexibility and mixing of infill structures and open spaces (tot-lots, etc.) where infill structures are 'omitted' within one or more SLS bays.

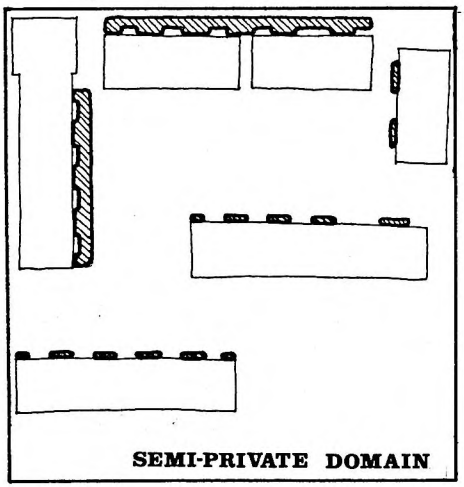
- Opportunity on the same site for units with grade and above-grade entries.

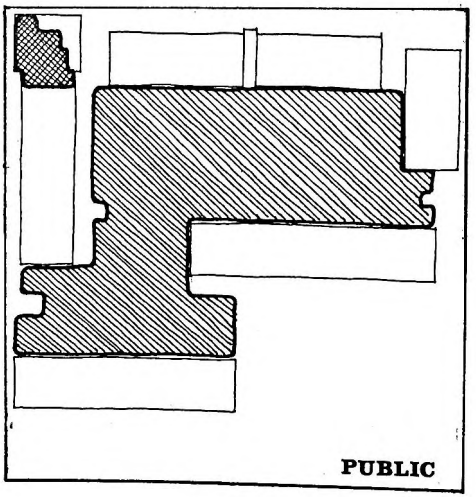
- Convenient access relationship between dwelling and parking space.

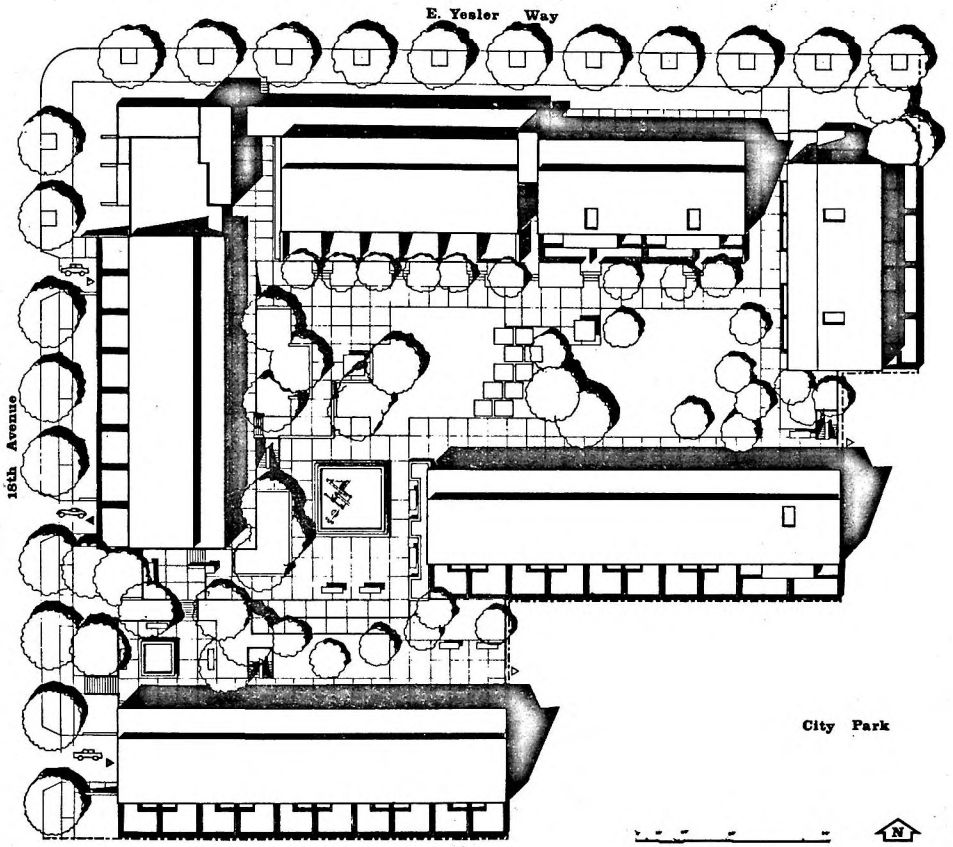
- Flexibility in security from completely "open" to completely "controlled" access to elevators, exterior stairways, lobbies and garages.



Open space types were programmed for distinctly private, semi-private and public usage.







Seattle Final Site Plan

– Potential architectural variety for infill structures within the megastructure.

Limitations:

– Building length fixed as a multiple of the width of the SLS bay (thirty feet wide).

– Straight-line footprint of buildings.

– Dwelling unit widths on a five-foot module (fifteen and twenty feet wide).

– Cost, which prohibited testing the advantages of mixing land use types and infill/open space uses.

FINAL SITE PLAN

Redesign of the Preliminary Site Plan, prompted by the need for cost reduction, was begun in November 1971 and completed a month later. HUD approved the Final Site Plan in January 1972. Changes were made in the central plaza area. A "softer-textured" concept replaced the previous design which included more extensive use of concrete for definition of areas, stepped changes in levels, play forms, and seating edges bordering planting areas. The large arbor covering a sitting area was eliminated. And throughout the site, planting types were modified and the

size of trees was reduced.

Good livability characteristics remain in the final plan, however. These include:

- A range of public, semi-private and private open spaces.
- Play areas and equipment, including mounded grass areas.
- Sitting areas.
- Good access to the adjacent city park.
- Indoor community multi-purpose rooms.
- Continuous ramp system connecting all parts of the site.
- Underground parking with access control from site and buildings to the parking garages.
- Access separation between site and off-site areas to keep small children within the site.

Planning objectives concentrated on providing the best possible living environment and amenities for the 58 lower-income families who would live on the site. There was limited opportunity on the small 1.8-acre site to apply new, innovative site planning concepts. Existing utilities were immediately available on all sides of the site, and the small number of dwelling units precluded site systems, such as the total energy facility demonstrated on the Jersey City BREAK-THROUGH site. Utility innovations were provided within the buildings, however. Door-to-door mail delivery in medium-rise structures, an innovation appropriate to the Townland living concept, was thoroughly discussed with mail officials. But pursuit

Site Summary Chart - Seattle

Source: Planners' Reports and Questionnaire Response

Comparative Site Data/ Land Use Facts

SIZE	
Acres	1.8
HOUSING	
Total Units	58
SFD	
SFA	38
MFLR	14
MFMR	6
MFHR	
PRODUCERS	
Number	1
DENSITY	
Units/Acre	32

PARKING	
Per Unit	1.21
Site Total	70
On Grade	
Below Grade	●
OTHER USES	
Community Bldg.	
Community Room(s)	●
Maintenance Bldg.	
Commercial	
School	
Day Care Center	●
Central Utility Bldg.	
Pedestrian Deck(s)	●

Comparative Site Data/ Amenity Provisions

OPEN SPACE	
Private	●
Semi-Private	●
In-Cluster	
Central/Common	●
Non-Resident	
RECREATION	
Indoor	●
Tot Lots	●
Playgrounds	○
Playfields	○
Hard Courts	○
Sitting	●
Elderly	

Pool	○
Outdoor Event	
Picnic	
Bicycle Paths	
UTILITIES AND SERVICES	
Convent'l Sewer	●
Unconvent'l Sewer	
Convent'l Energy	
Unconvent'l Energy	●
Convent'l Trash	●
Unconvent'l Trash	

of the concept was abandoned when the number of dwelling units was reduced.

CONSTRUCTION DEVELOPMENT

Tasks 1, 2 and 3 were completed in entirety by the planner and his subcontractors. The site planner's role in Task 4 was severely curtailed by HUD and the site developer due to budget limitations. Active inspection and related Task 4 activities were not performed by the planner.

The original schedule for Seattle BREAKTHROUGH was very tight. Task 1 required only the six-week period allotted to it. But complexities then set into the BREAKTHROUGH process. For Seattle, these included (among others): the time required for HUD to assign specific housing system, and for the PSD to make required modifications in its system; budget limitations; unanticipated system costs; and feasibility for using the selected system in the context of HUD's Section 236 low and moderate-income housing program.

Consequently, final site working drawings could not be completed until twenty-three months after the start of planning, instead of five; and site and housing construction were finished approximately one year later. The housing was formally dedicated as "Bryant Manor" in December 1972, with units fully occupied by February 1973.

● On Site ○ Off Site

Comparative Site Data/ Environmental Character

DESIGN CONCEPT	
Urban Linear	
Urban Clusters	●
Suburban Clusters	
SITE CONTEXT	
Inner City	●
Suburban Developed	
Suburban Developing	
TOPOGRAPHY	
Flat	
Flat/Contoured	
Sloped	●
Valley	

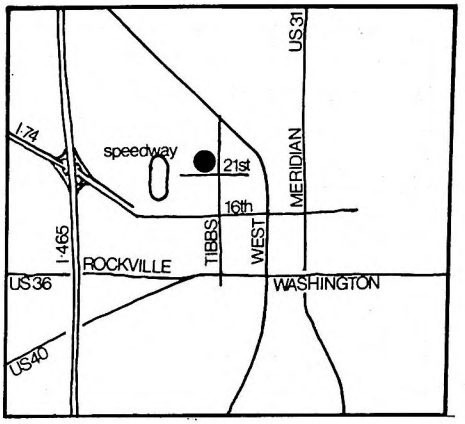
VEGETATION	
None Existing	
Light Existing	●
Heavy Existing	
Light New	●
Heavy New	
WATER	
Stream	
Lake	
ADVERSE CONDITIONS	
Air Pollution	●
Noise Pollution	
Water Pollution	

Dwelling Units/ Site/Producers

Alcoa	
Boise Cascade	
BSI	
CAMCI	
Christiana Western	
Descon/Concordia	
FCE-Dillon	
General Electric	
Hercoform	
Home Building Corp.	
Levitt	
Material Systems	
National Homes	

Pantek	
Pemtom	
Republic Steel	
Rouse-Wates	
Scholz	
Shelley	
Townland	58
TRW	
Total Systems Units	58
Non-System Units	
Total Dwelling Units by Site	58

Indianapolis



Prototype Site Planner:
Skidmore, Owings and Merrill
Chicago, Illinois
Consultants:
Marcou, O'Leary and Associates, marketing
Snyder, Blackburn Associates, architecture

SITE DESCRIPTIONS

The Indianapolis site, a publicly owned, 120-acre undeveloped area, is typical of the urbanized fringe of most all major midwestern cities. These areas are generally characterized by a monotonous sprawl of low density, single-family homes with inefficient land use, excessive circulation area and little if any open space. As a prototype site, a major site planning objective was to set new and more efficient patterns of land use, density distribution, circulation and open space to create a greater variety of physical, social and economic amenities.

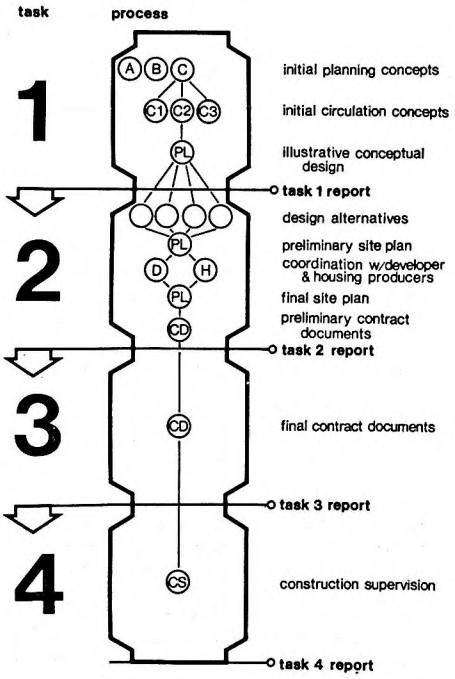
DESIGN AND PLANNING CRITERIA

The planners of the Indianapolis site chose a set of concepts and criteria as guides. These criteria and program elements were based on the overall objectives of BREAKTHROUGH as well as the team's preliminary analyses of the Indianapolis region, the community surrounding the site, and the site itself.

- The site plan must have a strong, clear, perceptible design concept to organize the diverse physical forms of the housing systems.

- The concept of total community design, placing the BREAKTHROUGH development within the context of the overall community, was a prime prerequisite. It was clear that there were two basic community concerns to be dealt with on the Indianapolis site. The first was the need for organized recreation space. Second was a strong desire to see the new project as one in which a home ownership program would be used.

- The total 120-acre site must be planned for continuity in the development staging. The initial development must be clearly a part of the total



Indianapolis planners divided the planning process into four tasks, comparable to HUD's process guidelines.

master plan, but yet be complete in itself at any point in time. A visitor center must provide for viewing during the entire development process.

DESIGN AND PLANNING DEVELOPMENT

The design development of the Indianapolis site can be broken down into several activities.

- Initial Conceptual Planning
- Conceptual Circulation Planning
- Illustrative Conceptual Designs
- Preliminary Site Plan
- Coordination with Housing Systems Producers
- Micro-Site Plans
- Coordination with the Site Developer
- Community Liaison
- Market Analysis

Activity: Initial Conceptual Planning

In the absence of the geometry of the specific housing systems assigned to the site and in order to focus only on the major elements of land planning, the planners developed a graphic vocabulary to illustrate the major elements. These graphics were used to design alternative conceptual site plans by arranging the various housing types within an open space network. This process allowed the testing of conceptual alternatives yet maintained flexibility for later detailed planning and design. When tested against the initial planning criteria, the recommended conceptual site plan emerged.

The initial plan went through further modification and more detailed studies. However, the basic criteria and the organizing design elements remained intact, including the location and density arrangement of the housing within open space network and the location of various site facilities. Open space became the major design tool for structuring the site plan.

Housing density was programmed to be lowest at the periphery of the site, increasing to low-rise, multi-family units surrounding the central open space. Overall site density was set at eight units per acre. Community and institutional facilities were located in relationship to the major open spaces and to a special school for the mentally retarded on the northeast quarter of the site. The integration of this sizeable facility into the overall master plan was a prime planning concern.

Activity: Conceptual Circulation Planning

Alternatives were studied for various patterns of circulation applicable to the basic conceptual design. The selected conceptual circulation plan provided discontinuous access roads from the periphery of the site ending in a variety of parking courts serving the housing clusters. The differing requirements for access and parking are handled efficiently within the hierarchy established by the "tree" structure of this circulation.

Continuity of open space was clearly established with no conflict of pedestrian and vehicular circulation. Noise, pollution and concern for safety were held to a minimum by eliminating through vehicular traffic.

Activity: Illustrative Conceptual Designs

The conceptual plan was converted to an illustrative scheme in order to study in more detail the inputs of the design. General architectural geometry was applied to replace the density symbols and the circulation plan served to further test the initial planning and circulation concepts.

Activity: Preliminary Site Plan

A preliminary site plan established a definitive design prior to the assignment of specific building systems to the site. The entire infrastructure of the site was established at a preliminary design level creating a unifying framework for the housing systems. Based on previous density distribution studies three-dimensional building envelopes and design limits were established for future micro-site planning of the various housing systems.

The design limits became an effective and efficient technique for maintaining control of the overall continuity of the site design as the various HSPs were assigned and started work. The master plan and

design controls provided a framework for the choice of housing systems appropriate to the site and its requirements.

Activity: Coordination with Housing Systems Producers

With the assignment of nine housing systems to the site, a period of intensive technical and marketing analysis was made to determine the performance capabilities of each system. These performance capabilities were matched against site planning and programming requirements and locations for each system were assigned. Based on a review of the design requirements for each portion of the site and a technical assessment of each housing system, design limits were established for horizontal and vertical design control. A preliminary unit type mix and bedroom mix were assigned to each producer to guide his initial detailed designs.

Activity: Micro-Site Plans

Intensive discussions and design reviews were held with each Housing System Producer to finalize the micro-site plans. Site development construction drawings could then proceed in parallel with detailed design development of individual systems.

Activity: Coordination with the Site Developer

In the absence of the assignment of a Site Developer by HUD until the mid-point of Task II, the site planning team initiated many of the marketing, financing and legal/administrative activities normally those of the developer. Upon assignment, all areas of project feasibility were intensively coordinated with the Site Developer.

Activity: Community Liaison

Throughout the planning process in Tasks I and II, a community liaison program was conducted in close coordination with Indianapolis UNIGOV and HUD officials, the Site Developer, leaders in the broader community and neighbors around the BREAKTHROUGH site.

Since the success or failure of the effort ultimately depended upon the response of the public, community liaison was viewed with primary importance. The overriding philosophy of the Indianapolis community liaison program was to widely circulate accurate information in a timely fashion when there was certainty about the content of the information, and when there was a specific objective to be gained. Key features of the liaison plan included:

- Allowing UNIGOV to control the flow of information in Indianapolis in a manner that kept the overall community and BREAKTHROUGH neighborhood informed with minimum potential for misunderstanding.

- Conducting interviews with community and neighborhood leaders to discover concerns and potential issues regarding BREAKTHROUGH.

- Conducting briefings and discussions with neighborhood groups when policy directions and operating procedures have been sufficiently defined and agreed upon.

- Assisting the media in reporting factual material on BREAKTHROUGH through preparation of press released and other supporting material.

- Maintaining continuous contact with key officials and community leaders through UNIGOV.

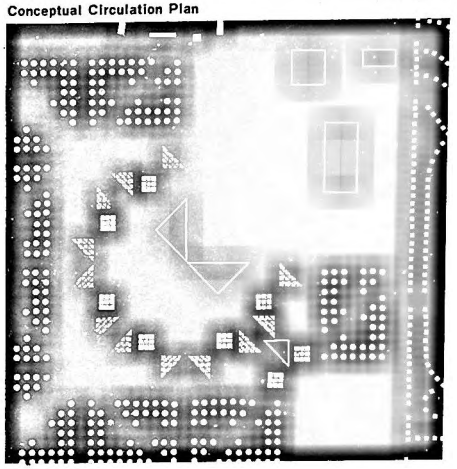
To assist in public presentations and accurate information distribution, a slide presentation was prepared illustrating steps taken during the planning process, the development plan, and detailed explanation of specific innovative developments. The site planning team also prepared an information kit for use by UNIGOV officials in distributing information to the media, and was designed to be easily updated as the project progresses.

Activity: Market Analysis

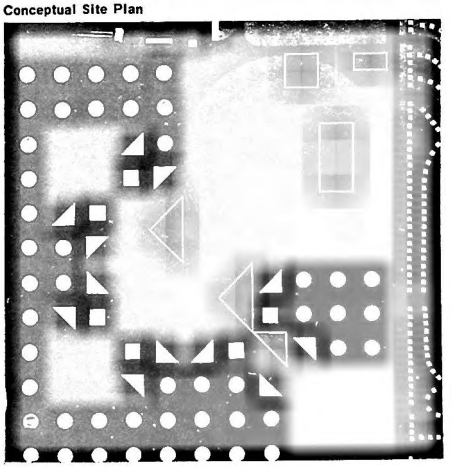
The site planning team undertook an analysis of the Indianapolis housing market to determine the range of prices and sizes of dwelling units on which the

Activities during initial planning included the graphic conceptualization of the principles.

Conceptual Circulation Plan



Conceptual Site Plan



BREAKTHROUGH program should focus. These preliminary findings were subsequently confirmed by the marketing and management arm of the PSD.

Given the general marketing parameters, it became necessary to specify the manner in which the developed site ultimately would be disposed to residents. The recommendation which was made in this regard was oriented to assure, to as great a degree as possible, conformity of tenure with the physical design of the site, community planning objectives and needs, and the requirements of the mortgage insurance programs of the Federal Housing Administration. It was concluded that a common form of ownership on the site was highly desirable from the standpoint of both marketability and management. In the light of the potential administrative problems associated with a condominium approach to ownership of all 295 dwelling units, the most feasible approach to marketability was a conveyance of fee ownership in lots and buildings for all detached and attached single-family homes and the use of the condominium form of ownership in the multi-storied buildings only.

FINAL SITE PLAN

Through careful coordination and testing of all elements of the preliminary site plan with the various HSPs, the PSD, Indianapolis officials and the local community, the plan was refined and became the core of a total development package.

An extensively landscaped and contoured open space system is a unifying framework for all the elements of the plan. In addition, it links the site to the surrounding community, providing a public community park as well as a series of semi-private spaces exclusive to the new community.

All of the various design elements of the plan are arranged in a hierarchial order, providing a continuity of design while developing distinct public, semi-private and private areas. Grading and landscaping are used to reinforce patterns of movement and give further definition to these areas.

To avoid increasing the burden on the community's already over-taxed schools and recreational space, the

Bermed landscaping at the Indianapolis site provided topographical variety on flat land; recreation for all ages, particularly a large student population, was also provided.

site has been designed to include major educational and recreational facilities for the entire community. A middle school, located in the center of the site, is proposed by the School Board. Presently under construction on the northeast quadrant of the site is a special school for mentally retarded children. The educational approach of the school is to operate as an integrated part of the community in order to create as near normal as possible patterns of living for the children. To achieve this end, and to make maximum use of open space and facilitate a joint usage program for the school's recreational programs, the schools are sited on either side of a large open area.

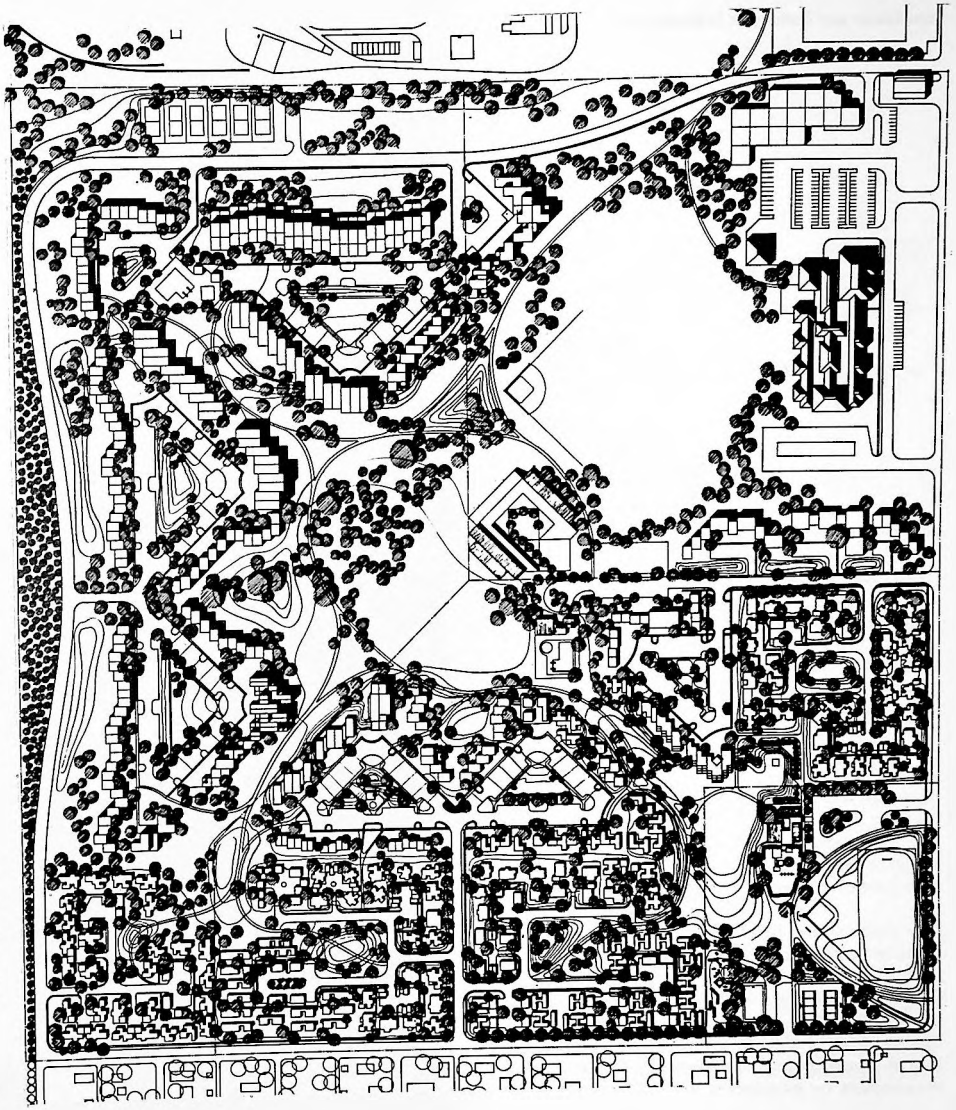
A key link with the surrounding community is the Community Center and Park located in the southeast quadrant of the site, central to the surrounding community and easily accessible to site residents. This park and community building offer major recreational facilities and are strategically located to be a focus for the total community.

Development

Stage 1 of the development is the Operation BREAKTHROUGH portion of the total master plan. Consisting of approximately 42 acres, it is located in the southeast quadrant of the site. This location affords continuity with the surrounding community and allows easy visitor access for observation of the BREAKTHROUGH demonstration. Housing on the site totals 295 DU's and include approximately 35% single-family detached, 25% single-family attached and 40% multi-family low-rise units.

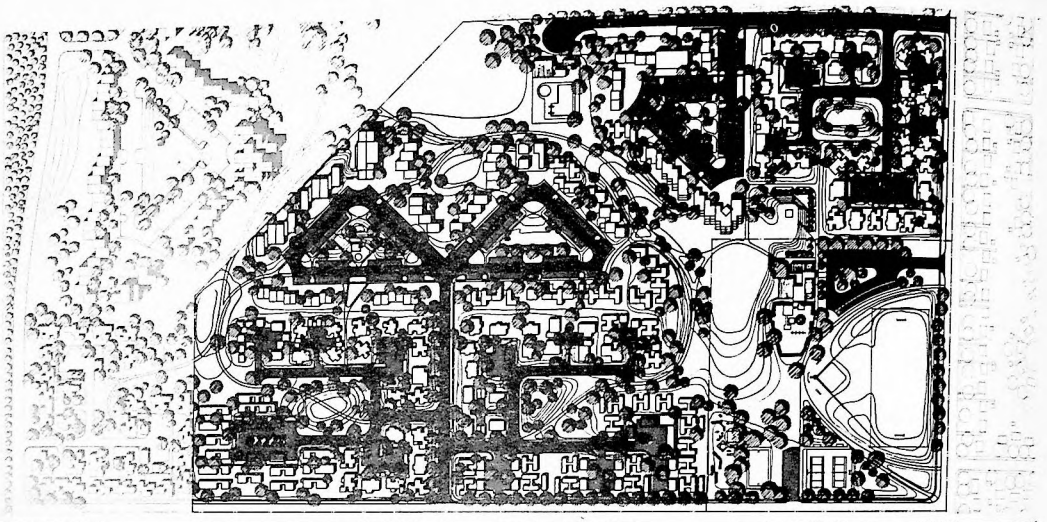
Housing

The basic goal in the design of housing on the site is to create small, distinctive neighborhoods within the total community. These neighborhoods, averaging 50 units per cluster, are oriented along the open space network. Single-family detached clusters are located on the periphery of the site, reflecting the scale and density of the surrounding community. Multi-family



Indianapolis Final Site Plan

Circulation and Parking at Indianapolis.



and townhouse units are combined in clusters toward the interior of the site where they are adjacent to the major open spaces. Units in both types of clusters encircle semi-private parks which provide individual identity and focus for each small neighborhood.

In the single family clusters, houses are placed on minimum and are so arranged that individual private yards are defined by the blank walls of the adjacent houses. Townhouses and apartment units are used on the site to define and channel movement between the major open spaces. Low-rise, multi-family units are placed on the edges of the open space and serve as pointers of reference throughout the site. Four to five-story walk-up units utilize a grade change and eliminate the need for elevators. Single family units are placed on plateaus within the cluster arrangement.

This elevates them two to four feet above the cluster drives to maintain privacy from other activities.

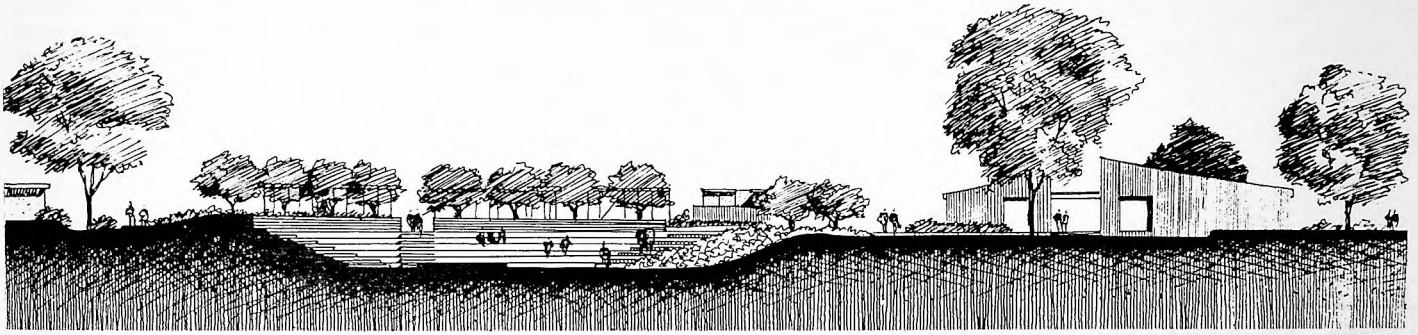
Community and Site Facilities

The community and site facilities play an important role in the successful development of a total living environment by establishing identity ties within the site for the residents and providing an important activity link with the surrounding community. Public community facilities are open to both site residents and the surrounding area. Homeowners facilities are located at key points around the site to provide areas of activity and formal and informal meeting places for the residents. The community park, which is located in the southeast quadrant of the site, is easily accessible for both site and community residents. The park consists of 10 acres and will be owned and maintained by the Indianapolis Department of Parks and Recreation. This includes playing fields set into a bowl-shaped area, a picnic area, a playground for children from six to twelve years old, tennis courts and a multi-purpose hard surfaced court.

In the center of the park is a Community Center and play area for toddlers. This playground is sufficiently removed from main activity areas to allow for safety and easy parental supervison. The Community Center will provide space for such community activities as classes, meetings and social events. During the publicity and display period of Operation BREAKTHROUGH, this facility will serve as a Visitor Center. Immediately northwest of the Community Park is an open meadow connecting the park to the site's central open area. In this area an amphitheater is formed by earthwork and railroad ties for seating.

Landscaping

Grading and landscaping is used to reinforce the open areas and play a major role in the total site design. The continuous flowing contours create a sense of unity from any point on the site and help tie together the diverse of many building systems. The degree of contouring varies in relation to the type of building forms and intensity of development and is, therefore, integral to the design. Subtle contouring in the low density areas of the site increase proportionately with the increase in density and complexity of building form in the higher density multi-family areas. Park and path areas are graded lower than housing and roads to define usage and maintain privacy. Trees and shrubs follow the edges of the open space, providing further definition and punctuating points of entry. The use of more mature plant material than is usually contemplated for conventional developments is dictated by the somewhat unusual nature and forms of the housing units, their "industrialized" stigma and the practical need for a visual completeness in the initial viewing stages of the development.



Amphitheater **stage platform** **community/visitor center**

Open Space Hierarchy

The size and distribution of green areas is ordered according to a hierarchy of usage. These areas range in scale from private yards to semi-private cluster parks and public open spaces. Individual housing units are provided with small private yards and courtyards. The private spaces of the individual houses surround a semi-private cluster park. Intended for use by the families within each cluster, they provide space for activities which require more room than a private yard.

The larger open areas offer major recreational, educational, and community facilities to all area residents. These spaces will be owned and maintained by the Indianapolis Parks Department. The meadow in the center of the site is the converging point of the open space system. The large trees around the old State Farm buildings in this area will be carefully preserved. This area will offer a shady canopy for picnic areas on the fringes of the meadow.

Utilities

Layouts for the necessary utility systems were prepared by the proprietary companies for water, gas, telephone and electric distribution, and by the project team for storm and sanitary sewers. Sewers are located in proposed public rights-of-way with the intent of their reverting to Indianapolis UNIGOV ownership upon completion. Ownership of all other systems will remain with the respective private utilities. Of these, water is generally located within the right-of-way, but the power, telephone and gas companies find it more efficient to distribute adjacent to the right-of-way. Easements will be provided to these firms as well as to UNIGOV for facilities on private property.

The extensive grading and contouring of the site allows a significant cost saving in the storm sewer system The system is designed to take advantage of the low green open space areas on the site. During periods of intense rainfall, low areas will provide temporary ponding capacity for that runoff in excess of storm sewer capacity, resulting in smaller sewers without endangering private property.

Vehicular Circulation

Vehicular circulation is provided by a discontinuous internal road system. This space is independent of the given open spaces thereby affording continuous pedestrian circulation. Existing roads are used to form an exterior loop road which offers entry points to specific destinations on the site. At 18% of total land area, the circulation space required is less than half of that of a conventional sub-division of comparable density.

All roads on the site have been carefully designed with the proper turning radii for service and emergency vehicles. The system of pedestrian paths has been designed to accommodate vehicles in an emergency situation.

Street Furniture and Fixtures

The design and placement of street furniture and hardware has been closely coordinated to produce an uncluttered, well-organized system reinforcing the concepts of the site plan. The complementary mate-

rials and designs used throughout promote visual unity and identity while requiring little maintenance to retain their attractive appearance.

The lighting plan developed for the site maintains the residential scale of the community. It is primarily a destination system with low-keyed definition of information sources, key decision points for motorists and pedestrians. Entrances, intersections and parking areas are clearly illuminated for the motorist, as are specific destinations and information sources. Between these points, car headlights are depended upon to provide ample street lighting. Pedestrian illumination is provided along pathways in the common open areas, at points of activity such as major groupings of street furniture and play areas.

The regulatory and informational system of signing is closely coordinated with the lighting arrangement. Common standards are used throughout to reduce unnecessary clutter. The system is designed to accommodate the many temporary signs necessary for BREAKTHROUGH purposes, marketing and visitor control, while offering a finished and consistent appearance at any point in the development. The format for all permanent signs is a variation of the rectangle. The signs are clear and immediately legible without detracting from the landscape. All temporary signs use a circle format and will be easily recognized by site visitors. A system of separate color coding

Site Summary Chart - Indianapolis

Source: Planners' Reports and Questionnaire Response

Comparative Site Data/ Land Use Facts

SIZE	
Acres	43
HOUSING	
Total Units	295
SFD	103
SFA	140
MFLR	16
MFMR	36
MFHR	
PRODUCERS	
Number	8
DENSITY	
Units/Acre	7

PARKING	
Per Unit	2.00
Site Total	590
On Grade	●
Below Grade	
OTHER USES	
Community Bldg.	●
Community Room(s)	
Maintenance Bldg.	
Commercial	
School	○
Day Care Center	
Central Utility Bldg.	
Pedestrian Deck(s)	

Comparative Site Data/ Amenity Provisions

OPEN SPACE	
Private	●
Semi-Private	
In-Cluster	●
Central/Common	●
Non-Resident	●
RECREATION	
Indoor	●
Tot Lots	●
Playgrounds	●
Playfields	●
Hard Courts	●
Sitting	●
Elderly	

Pool	●
Outdoor Event	●
Picnic	●
Bicycle Paths	●
UTILITIES AND SERVICES	
Convent'l Sewer	●
Unconvent'l Sewer	
Convent'l Energy	●
Unconvent'l Energy	
Convent'l Trash	●
Unconvent'l Trash	

clearly distinguishes each of the six housing clusters or courts. Each court is thus given a strong visual identity and uniqueness.

CONSTRUCTION DEVELOPMENT

The HUD Prototype Site Developer was responsible for the management control, inspection and coordination of all construction for the site development. The prototype site planner reviewed shop drawings and conducted observation of the construction work at various points in time. As a product of this observation, the planner recommended to HUD that various corrections and additions be made to bring construction to the level indicated by the plans and specifications.

● On Site ○ Off Site

Comparative Site Data/ Environmental Character

DESIGN CONCEPT	
Urban Linear	
Urban Clusters	
Suburban Clusters	●
SITE CONTEXT	
Inner City	
Suburban Developed	
Suburban Developing	●
TOPOGRAPHY	
Flat	
Flat/Contoured	●
Sloped	
Valley	

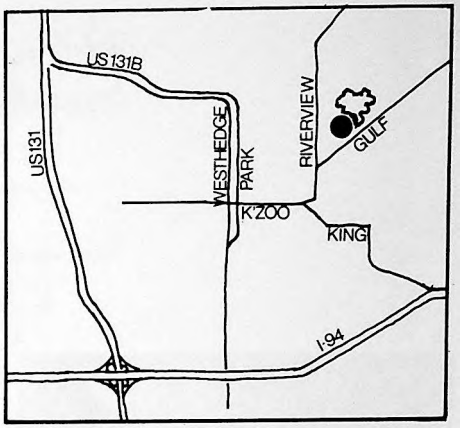
VEGETATION	
None Existing	
Light Existing	●
Heavy Existing	
Light New	●
Heavy New	
WATER	
Stream	
Lake	
ADVERSE CONDITIONS	
Air Pollution	
Noise Pollution	
Water Pollution	

Dwelling Units/ Site/Producers

Alcoa	
Boise Cascade	
BSI	
CAMCI	
Christiana Western	
Descon/Concordia	
FCE-Dillon	36
General Electric	56
Hercoform	
Home Building Corp.	45
Levitt	
Material Systems	50
National Homes	14

Pantek	40
Pemtom	20
Republic Steel	
Rouse-Wates	
Scholz	34
Shelley	
Townland	
TRW	
Total Systems Units	295
Non-System Units	
Total Dwelling Units by Site	295

Kalamazoo



Prototype Site Planner:
The Perkins and Will Partnership of Michigan
Chicago, Illinois
Consultants:
ISD Inc.
Social Planning Associates, Inc.
Jeffrey Gilbert
P & W Engineers, Inc.
Wilkins and Wheaton
Halpert, Neyer and Associates

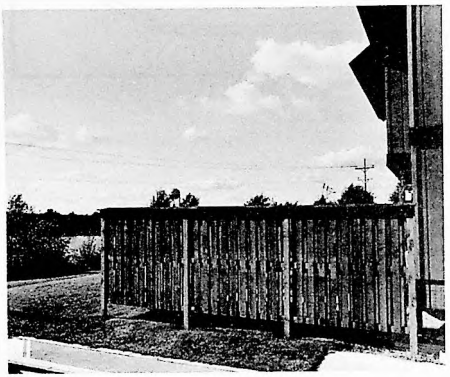
SITE DESCRIPTION

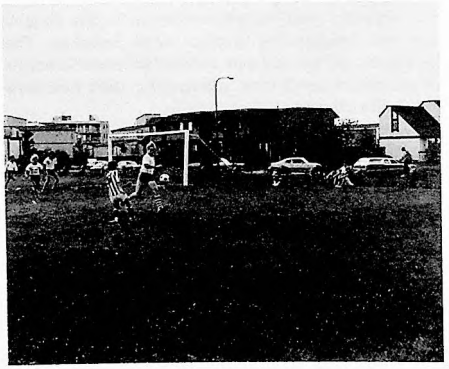
The Kalamazoo BREAKTHROUGH site is located in a portion of Spring Valley Park in northeast Kalamazoo and is well served by state highways, with a new circumferential highway providing a link to the Interstate System. Existing schools, neighborhood shopping, hospitals, police and fire protection and public transportation serve the site. An analysis of city and regional plans was made to assure compatibility of the development program.

The complete original Operation BREAKTHROUGH site covered an area of approximately 43 acres, ultimately reduced to 33.8 acres. A plateau and adjacent slopes comprised the site which overlooked Spring Valley Lake and the Park. An ecological study of the site identified the plateau and slope, and strongly recommended restricting construction to the plateau area and emphasizing ground water recharge. The boundaries of the site were defined by considerations for ecological conditions, topography, park functions and public utilities.

PLANNING AND DESIGN OBJECTIVES

A set of design objectives was established by the planner early in the process. These objectives, in conjunction with considerations for circulation, development use, and utilities distribution, provided the basis for subsequent land use alternatives. Some





of the objectives, and the extent of achievement, were:

Objective: Develop a pedestrian/vehicular system that minimizes friction and maximizes access.

Achieved: Through site access is possible only on the non-residential road, thereby discouraging non-resident traffic and providing a relatively friction-free pedestrian environment.

Objective: Develop a rational and comprehensible circulation and land use system.

Achieved: A strong, direct relationship between compatible land use in conjunction with minimized incompatibility results in a logical, easily readable plan.

Objective: Make optimum use of existing land, present topography, and visual amenities.

Essentially Achieved: By limiting development to the plateau area of the site, the existing topography is maintained and visual orientation toward the Park is achieved.

Objective: Provide equitable parceling for HSPs while allowing necessary flexibility.

Essentially Achieved: Within the constraints of compromise, a close working relationship with the HSPs throughout the planning achieved this goal.

Objective: Develop an optimum living environment.

Essentially Achieved: By emphasizing and incorporating social, economic and aesthetic opportunities in the BREAKTHROUGH context, such an environment is envisaged.

Objective: Minimize ecological disruption on site and the immediate environment.

Essentially Achieved: To the greatest extent reasonably possible, water runoff has been controlled and existing vegetation replaced when disturbed.

DESIGN AND PLANNING DEVELOPMENT

The design development of the Kalamazoo site can be broken down into several general categories:

Pre-Design Activities

- Market Analysis and Community Participation
- Land Use Program
- Housing System Distribution

Design Activities

- Design Development
- Conceptual Plans
- Preliminary Plans
- Micro-Site Design

Pre-Design Activity: Market Analysis and Community Participation

A comprehensive survey and analysis was conducted of the social and market environment of the Kalamazoo site, guided by the principal objectives of Operation BREAKTHROUGH. As a result of this analysis, a preliminary distribution of housing units by type, price and tenure mix was established as a guide for conceptual design. In addition, certain planning recommendations were made in response to market preferences.

Concurrent with market survey and analysis activities, a program for community participation in the planning process was undertaken. A neighborhood citizens advisory committee was formed, representing a broad spectrum of interests from the immediate area, including private citizens and institutional representatives. Cooperative work with this group in the planning process was most instrumental in allaying fears about the development and allowing the program to be carried out smoothly.

Pre-Design Activity: Land Use Program

An evaluation of the characteristics of the site and the forces upon on it was performed to establish guiding patterns. One of the several basic design inputs was a computer mapping technique (SYMAP)

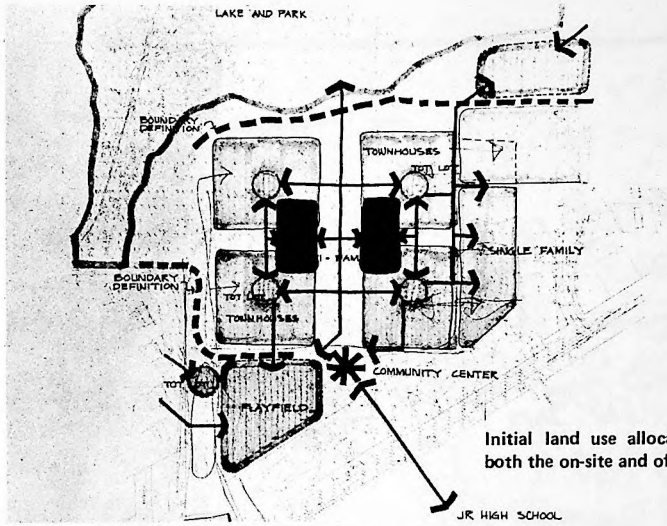
employed to evaluate 21 characteristics of the site, ranging from soil fertility to community receptivity. A composition of these gave a pattern determining more and less desirable areas for development. Judgment and evaluation of these alternatives led to the development of the optimal (at this stage) land use diagram which contained consideration of unit type, price and renter/owner mix as well as circulation, utilities description and land characteristics.

Inasmuch as no housing systems had yet been designated for the BREAKTHROUGH sites, an assumption had to be made for the basic housing planning module. It was felt that improvements could be made in the relationship of the dwelling occupant to his outdoor environment. In particular, the role of the vehicle in site/dwelling relationship planning was felt to be overly dominant in much conventional design. Consequently, the planning module stressed a more active relationship of the dwelling to an internal pedestrian street while at the same time allowing convenient access to personal and service vehicles. The planning module was used as the basic element in the further design stages.

As a result of the initial market analysis, a preliminary unit distribution was established that included single-family homes, townhouses and apartments. Early statements from HUD indicated the desirability of this range and included some high-rise units in the apartment group. As analysis of community sentiment continued, it became apparent that high-rise apartments would be a decided detriment to the development since they connoted poor quality "public housing." The unit mix was adjusted and the high-rise units reduced to three stories in height. This distribution served as the basis for the land use program utilized in conceptual design.

Pre-Design Activity: Housing System Distribution

The next step in unit distribution was the introduction of the housing systems producers. Unit distribution was modified to reflect their desire to demonstrate a variety of housing types, sizes and styles, while retaining the essential composition necessary for successful marketing. This unit distribution was refined continuously through preliminary design and design development. Later, at the introduction of the PSD, unit distribution was again modified on the basis of a new market analysis reflecting a considerable change of program approach. This represented an emphasis on pragmatic marketing objectives and a moderating of some of the social goals.



Initial land use allocations at Kalamazoo reflected both the on-site and off-site considerations.

Design Activity: Design Development

As the PSD and HSPs came to agreement on their preliminary micro-site plans, the planner proceeded into the design development phase. At this point, two HSPs were dropped from the site, the void being filled by three others. The substitution generally caused only minor revisions. The development of the other four micro-sites proceeded smoothly with essential agreement reached during the preliminary design stages. In addition to preparing finite designs for the micro-sites, the PSP was also preparing final design solutions for the non-system plan elements. The planner was also responsible for continuing design review through design development, particularly in the areas of color and materials.

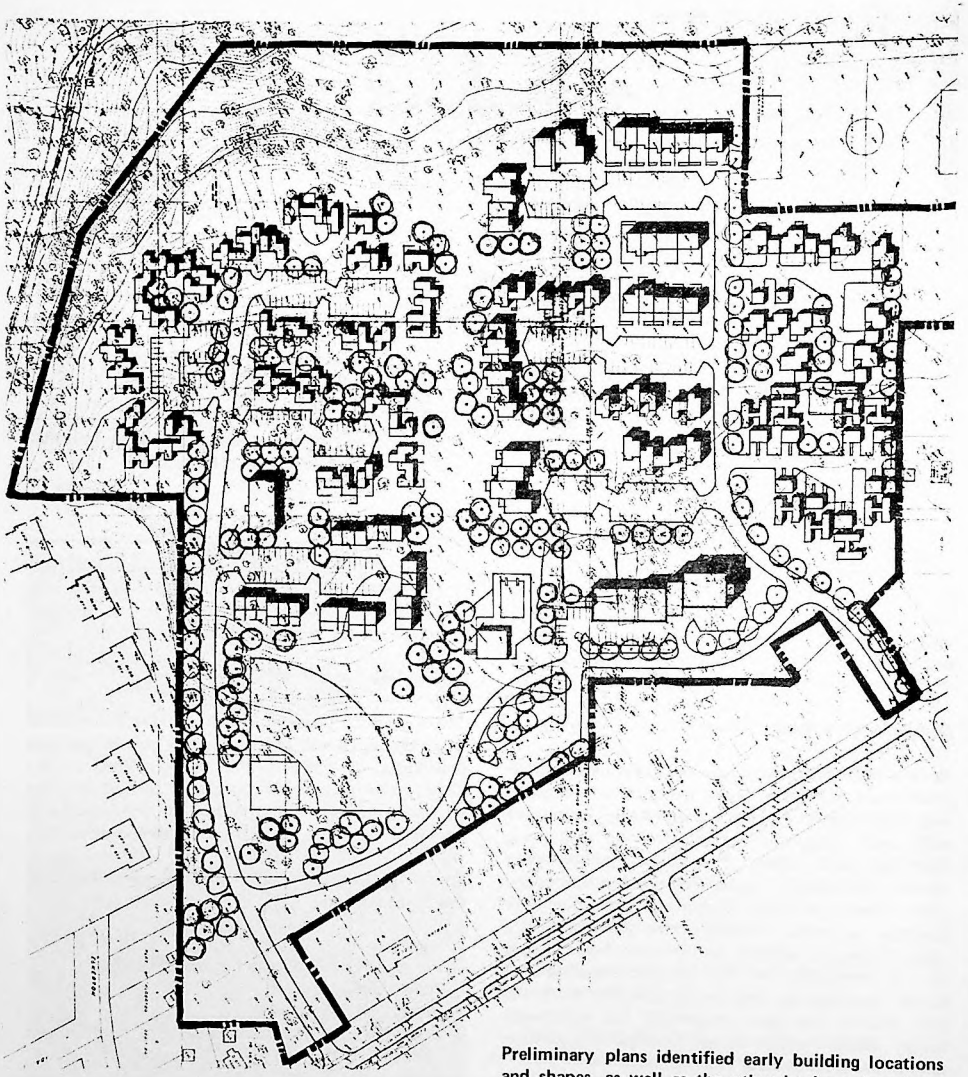
At this point, the entire plan was reviewed with the PSD and HUD, utilizing their extensive marketing and construction capabilities. A number of budget revisions were resolved.

Design Activity: Conceptual Plans

The conceptual phase illustrated in three dimensional terms the social and urban design principles outlined previously. In addition, this phase refined certain design principles to be followed throughout the subsequent phases. The intent of the conceptual site plan was merely to illustrate these design principles.

Specifically, the Urban Design Criteria established at this point included:

- Land Use
- Vehicular Circulation and Storage System
- Pedestrian Circulation
- Recreational Plan
- Quality, Scale and Disbursement of Public Open Space
- Storm Water Run-off System



Preliminary plans identified early building locations and shapes, as well as the other land use locations.

- Scale, Quality and Location of Architectural Elements
- Scale and Quality of Private Open Space
- Quantity and Distribution of Plant Material

Design Activity: Preliminary Plans

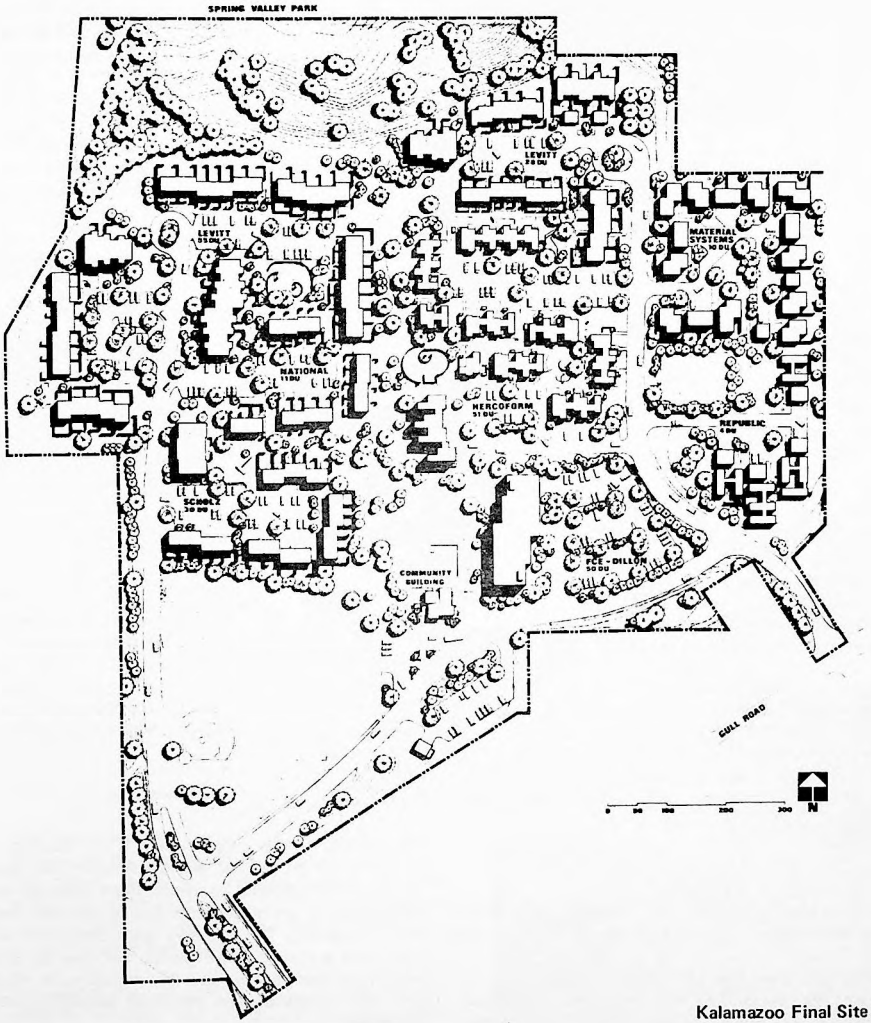
The next phase was largely devoted to applying the conceptual design principles to actual conditions made available by bringing the HSPs and PSD into the design team. The initial task was concurrence with the PSD with the number of units, unit mix, and conceptual design. Although there was essential agreement with the design principles, the PSD chose to pursue a more conservative marketing approach. The PSP and PSD met with the individual HSPs to negotiate exact numbers and unit mix. Design review matters were also discussed. Although it was felt the HSPs should be given maximum design freedom, their units should not detract from the whole. Substantial care in massing and detailing was vigorously pursued to overcome the image of publicly sponsored housing.

Design Activity: Micro-Site Design

To insure a unified planning concept, it was agreed the PSP should exercise strong control in the development of the micro-site design. It was also felt individual HSPs should be given an opportunity to demonstrate their site planning capabilities within the total urban design framework. Logistically, this was accomplished by sending each HSP a preliminary micro-site plan and allowing them to either critique it or to develop an alternate plan. Five of the seven HSPs approved the preliminary micro-site plan with only minor revisions. The discrepancies between the preliminary micro-site plans and their alternates were resolved by consensus between the HSPs, the PSP, and PSD and HUD. Each HSP was kept informed of adjacent micro-site designs and was given an opportunity to comment on their development. The developer participated extensively in the entire process.

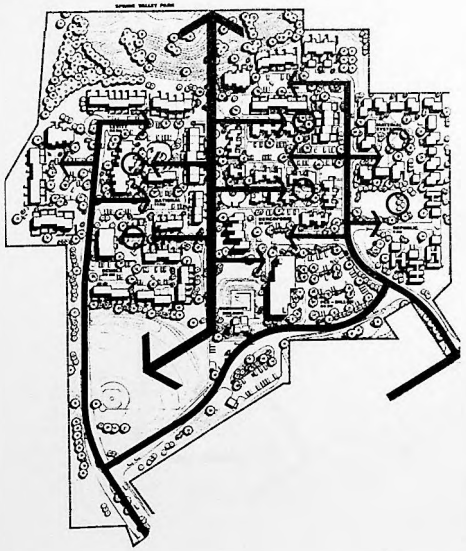
FINAL SITE PLAN

After engaging in conceptual and preliminary design and planning, a final site plan was established. The



Kalamazoo Final Site Plan

Pedestrian and vehicular circulation were clearly separated in the Kalamazoo plan.



plan incorporated the systems designs of each HSP as well as many non-system elements.

Circulation System

There are two distinct circulation systems, one for pedestrians and one for automobiles. The vehicular system consists of an east and west feeder road and a southern connector road. The two feeder roads are connected by an emergency vehicle lane of stabilized soil and marked for easy visibility. Two access roads off the east feeder road serve the single-family area and are designed to discourage unnecessary traffic. All parking areas are designed to visually minimize the amount of paved area. Longer parking lots are divided at the mid-points and offset to slow traffic and provide points for safe pedestrian crossing.

The genesis of the pedestrian circulation system is the central green way spine and its connection with Spring Valley Park on the north to the community center and recreation area to the south. From this green space, two paths were extended to the west and two to the east, terminating at neighborhood tot lots.

Land Use

The land use distribution developed for the preliminary Site Plan consists of five elements:

- The major green space bisecting the community
- The large recreational field at the west entry road
- The townhouse communities on either side of the green space
- The single-family housing along the eastern boundary
- The mid-rise apartments community center complex at the junction of the green space and the recreation area

The mid-rise apartments, useful as a marketing tool, are placed adjacent to the community center. The recreation field is placed along the western boundary, providing a buffer against a neighboring apartment complex and giving a feeling of spaciousness upon entering the site. The single-family system housing is placed along the eastern boundary to serve as a transitional element between the existing single-family homes and the BREAKTHROUGH housing. At the same time, the single-family housing was separated from the townhouses as a discernible element in their own right. It was determined that one system should occupy the northeastern ridge line since it could adapt to that line with the greatest degree of sensitivity, and another system located to best aid the HSPs' marketing program.

Community Center

The community center is located at the south end of the central green space between the two entry roads. It serves as a destination of the open space system and at the same time as a visitor and marketing center. This location was also selected because of its proximity to the mid-rise apartment. Although a one-story solution for the center was initially pursued, a two-story scheme was finally chosen in order to separate the swimming activities from the social and marketing areas.

Open Space

The pedestrian circulation system is the catalyst of the entire design concept and the specific placement of all of the planning elements. Plant material was determined by the quality and scale of the space they would generate. The planners were concerned not only with the spaces themselves, but also in their relation to one another and the sequences in which they are perceived. The perceived sequential categories are:

Entry: A short space open at both ends with two sides formed by walls in which height is roughly equal to the width of space.

Enclosure: A sense of an outdoor "room" sim ulated by fencing, plant material or similar screening.

Alley: An extension of backyards with a similar scale of an entry, envisioned as a recreational amenity in the form of paved surfaces.

Linear Park: A connecting recreational element between the community center and the meadow.

Meadow: An open space providing the development with a sense of spaciousness complementing the urban quality of nearby spaces, as well as space for team sports.

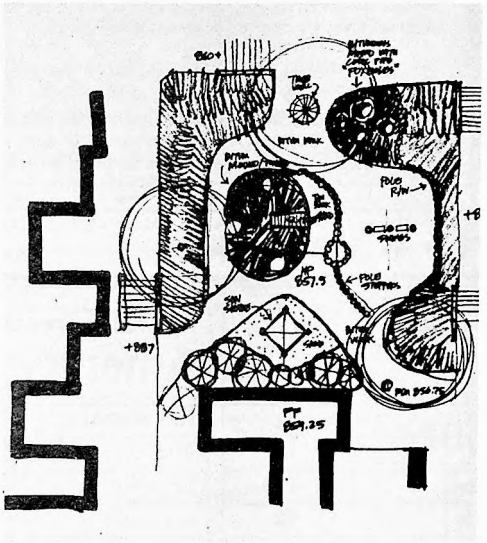
Recreation

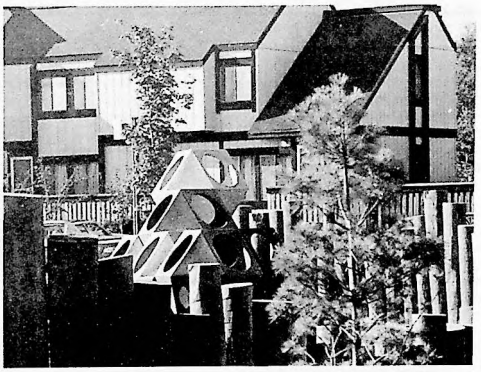
The recreational requirements of the BREAKTHROUGH residents and the location neighborhood were carefully considered. The existing playfields on the site have been preserved for recreational use by BREAKTHROUGH inhabitants and the larger neighborhood. A community center and a swimming pool are the recreational amenities of the site and provide a focus for social activities. The adjacent Spring Valley Park and Lake provide an unlimited regional recreational potential. The Park's assets of view, open space, recreation and territorial definition became some of the principal design determinants.

Special Design Features

The underground storm sewer system at the Kalamazoo site is designed to recharge the surrounding subsoil, with the resultant subsurface water eventually returned to Spring Valley Lake adjacent to the site. This site is also designed to carry off extreme rainfall through a piped system.

The unique play equipment of the tot lots has been carefully selected. The playgrounds are designed to capture the imagination of youngsters with items





Preliminary sketches and as-built recreation facilities on the Kalamazoo site.

such as tire swings, vertical wood pole stepping walls, mock fishing pier, and an adventure playground surrounded by a wood picket fence. A wooden animal sculpture was created for the smaller children.

The Greenway Spine Walk creates a pleasant visual space between units for the residents. This walk traverses the length of the developed area and connects to the various units for access. Benches are provided at several points along the walk as well as at the terminus created for a gathering or conversation area.

A unique system of signage has been developed locating the three major roads as named streets, the parking entries as hundred series numbers for address location and the inner spaces between HSP units as named places. This has been done to give a sense of neighborhood location to residents within the development.

A sculpture by a local artist was commissioned to be placed on the site near the entry to the community building. The sculpture piece is designed to indicate a brotherhood theme and is constructed of various size metal plates welded together to depict three people of different races with their arms locked together standing in a semi-circle.

CONSTRUCTION DEVELOPMENT

HUD and the PSP requested a "Fast Track" approach to the production of contract documents and to produce some items out of phase. Since all HSPs had

Site Summary Chart - Kalamazoo

Source: Planners' Reports and Questionnaire Response

Comparative Site Data/ Land Use Facts

SIZE	
Acres	34
HOUSING	
Total Units	245
SFD	14
SFA	127
MFLR	52
MFMR	52
MFHR	
PRODUCERS	
Number	7
DENSITY	
Units/Acre	7

PARKING	
Per Unit	1.7
Site Total	417
On Grade	●
Below Grade	
OTHER USES	
Community Bldg.	●
Community Room(s)	
Maintenance Bldg.	●
Commercial	
School	○
Day Care Center	●
Central Utility Bldg.	
Pedestrian Deck(s)	

Comparative Site Data/ Amenity Provisions

OPEN SPACE	
Private	●
Semi-Private	●
In-Cluster	●
Central/Common	●
Non-Resident	○
RECREATION	
Indoor	●
Tot Lots	●
Playgrounds	
Playfields	●
Hard Courts	●
Sitting	●
Elderly	

Pool	●
Outdoor Event	
Picnic	
Bicycle Paths	●
UTILITIES AND SERVICES	
Convent'l Sewer	●
Unconvent'l Sewer	
Convent'l Energy	●
Unconvent'l Energy	
Convent'l Trash	●
Unconvent'l Trash	

previously signed off at the design development level on their respective micro-sites, their input into working drawing coordination was minimal. Primary coordination of working drawings was with the PSD, although HUD input was often essential to resolve disputes or give direction. The budget was adjusted often in light of current expenditures. This became an opportunity to request variations.

Numerous meetings and coordination reviews were necessary. Communication lines were kept open with the PSP in order to expedite production. The unusual procedure of installing utilities prior to normal rough grading resulted in a lower priority assigned to grading. Pad elevations in some micro-sites had to be adjusted after the round grading drawing was issued due to overlap with design development in those micro-sites. However, the overall package worked out without any major conflicts.

Specifications were prepared to fit each bid package. The planner prepared technical specifications and the PSD then added front-end material, bidding forms, etc. Specifications were written in normal fashion, often with several alternatives. Unit prices were requested in both tot lot and planting packages, allowing some adjustment in final construction cost. The full set of compiled specifications was published after completion of most site work.

Budget considerations necessitated a revision of the working and contract documents for the Community Building. The final contract documents had minimal detail and the contractor was to be allowed considerable initiative in establishing construction methods and details. Construction management by the PSD was to fill in where drawings and specifications did not cover a situation.

Site Construction Supervision

All site inspections were carried out with representatives of the PSD, PSP, HUD and on-site inspectors. This coordinated effort resulted in close cooperation and minimal misunderstanding. After each inspection, a report was prepared by the PSP in detail, and distributed to all participants. The first inspection began in January of 1971 for the underground storm sewers contract. The last inspection, made in July of 1972, included tot lots, play areas, lawns and planting.

● On Site ○ Off Site

Comparative Site Data/ Environmental Character

DESIGN CONCEPT	
Urban Linear	
Urban Clusters	
Suburban Clusters	●
SITE CONTEXT	
Inner City	
Suburban Developed	●
Suburban Developing	
TOPOGRAPHY	
Flat	
Flat/Contoured	
Sloped	●
Valley	

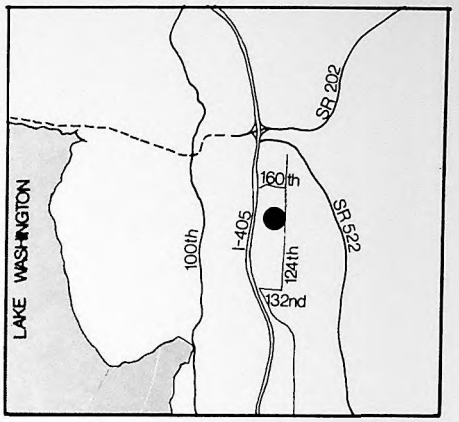
VEGETATION	
None Existing	
Light Existing	●
Heavy Existing	
Light New	●
Heavy New	
WATER	
Stream	
Lake	○
ADVERSE CONDITIONS	
Air Pollution	
Noise Pollution	
Water Pollution	

Dwelling Units/ Site/Producers

Alcoa	
Boise Cascade	
BSI	
CAMCI	
Christiana Western	
Descon/Concordia	
FCE-Dillon	52
General Electric	
Hercoform	51
Home Building Corp.	
Levitt	83
Material Systems	10
National Homes	15

Pantek	
Pemtom	
Republic Steel	4
Rouse-Wates	
Scholz	30
Shelley	
Townland	
TRW	
Total Systems Units	242
Non-System Units	
Total Dwelling Units by Site	242

King County



Prototype Site Planners:
Eckbo, Dean, Austing & Williams, Inc. and
George S. Nolte & Associates
San Francisco, California

SITE DESCRIPTION

The King County site is located in an unincorporated area near the incorporated cities of Bothell and Kirkland and the unincorporated community of Woodinville. Approximately one mile from the Juanita-Woodinville interchange of Interstate 405, the site fronts a county primary arterial avenue. Interstate 405 is a north-south freeway in the Seattle metropolitan area providing prime service to the Bellevue corridor east of Lake Washington.

The BREAKTHROUGH site environs is an advance area of suburban development experiencing steady, staged growth of almost exclusively single-family detached dwellings. Shops, parks, schools and library facilities are anticipated within a convenient walk or drive from the site. It is gently rolling, wooded, and attractive to residential development.

The property has a topographic variation of approximately 40 to 50 feet from the lowest to highest points, although a slope analysis determined few limitations to site development. An evaluation of soils and drainage indicated that any of the areas typed as "well drained" would be suitable for development. Most of the site was thus categorized. However, an area indicated as "swampy and ponded" was considered best suited as a park or green belt, minimizing engineering efforts and providing a feature of natural relief to overall site development.

The site lies in a region of evergreen forest, much of which has been logged over, resulting in second growth tree cover becoming a mixture of coniferous and deciduous trees. The quality and variety of natural vegetation represented a prime attribute to be emphasized in site design and protected during development.

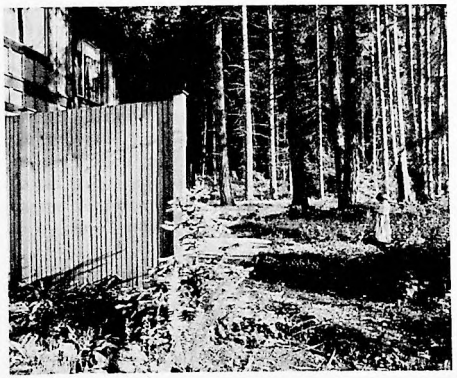
Views are restricted to those internal to the site, controlling the visual impact of the BREAKTHROUGH site on adjoining properties and allowing the development to be relatively unobtrusive in its natural setting. Within the site there are a variety of

viewpoints into and through tree clusters and toward the internal open spaces.

The relatively rural environs of the BREAKTHROUGH site feature clean air and water and an absence of noise. The planners recognized that continuing suburbanization would cause some degrading of this present quality but that it would be insignificant to the general profile of the area as a healthy and comfortable place to live. The major feature expected to impact the site appeared to be the planned upgrading of the adjacent county arterial. The planners hoped to minimize this impact with the use of berms, placement of housing, and the natural buffer of existing trees.

The community facilities and transportation network to serve this region are in various stages of planning and development by the responsible agencies. A subdivision developing in the vicinity of the site has single-family housing at an average price of $28,000. In the vicinity of the site are a number of community facilities being planned and developed, including a proposed 25-acre community park. Present schools are several miles away, although closer facilities are in the planning stage. A church has been built west of the site, and a library has broken ground to the south. Major utilities are located adjacent to or within short distance of the property.

Using the natural buffer of trees, the King County site retains much of its rural character.



DESIGN AND PLANNING OBJECTIVES

The selection of a general land use configuration set the stage for conceptual site planning. Based on the site analysis and the standards of progressive site planning, the PSP developed a set of preliminary design objectives by which conceptual site plans were evaluated. A subsequent analysis of the final plans revealed the level of achievement as noted in the following list:

Objective: Conform to and enhance existing natural features.

Essentially Achieved: The design of the street system and location of housing clusters responds to features of slope, drainage, tree cover and native vegetation.

Objective: Conserve trees and other natural features as integral amenities of the site.

Essentially Achieved: The natural vegetation was integrated as much as possible; much was conserved at some considerable inconvenience to site construction.

Objective: Conserve interior site views.

Achieved: Internal site views and outlooks are provided by the siting of housing clusters and the central location of the community center.

Objective: Provide open space buffers between the site and the surrounding community.

Achieved: Such buffers and transition areas are provided by retention of trees and location of single-family detached homes along the western boundary; higher density apartment and townhouse clusters are oriented to the eastern prime access point and the community center.

Objective: Minimize development costs while providing a substantial open space.

Achieved: A loop road system and clustered housing areas minimized such costs while providing a substantial open space system.

Objective: Minimize through site vehicular circulation.

Essentially Achieved: A loop road provides access points between arterials to the west. At the same time, the circuitous nature of the loop road should discourage through-site traffic.

Objective: Provide a convenient pedestrian circulation network.

Achieved: The continuous pedestrian network provides walking access throughout the site, leads to active recreation areas, and emphasizes the large central open space.

Objective: Eliminate large, open parking lots.

Achieved: Parking is decentralized within housing clusters.

Objective: Fit development to the Northwest idiom and the existing developed area.

Essentially Achieved: High proportion of single-family units, attention to siting of higher density units, and the control of system architecture and exterior finish assure basic compatibility with the existing development.

Objective: Accommodate social mix in housing siting.

Essentially Achieved: Social mix and community identity are fostered by the range of housing types and costs, the integrated pedestrian network and recreation system, and the community center.

Objective: Provide a high level of community facilities and services.

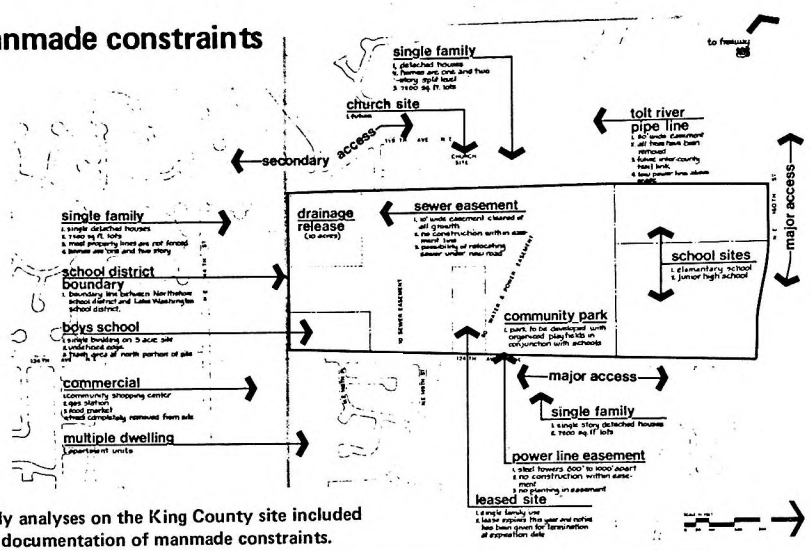
Essentially Achieved: A comparatively high level of facilities and services is provided, such as underground utilities, pedestrian network, recreation and open space systems, clubhouse and pool, and vehicle storage areas.

DESIGN AND PLANNING DEVELOPMENT

The planners of the King County BREAKTHROUGH project arrived at a final design through a series of stages spanning both Task I and Task II. In general, those steps were as follows:

Pre-Design Activities

Outdoor recreation included a community center (top left), use of cul-de-sacs (bottom left), and totlots (bottom).



Early analyses on the King County site included the documentation of manmade constraints.

- Community Participation Considerations
- Development of Land Use Program
- Analysis of Planning and Land Use Controls
- Development of Conceptual Site Plans
- Analysis of Markets and of Systems Producers

Design Activities

- Modifications to Preliminary Site Plan
- Coordination of Participants
- Local Governmental Inputs

Pre-Design Activity: Community Participation Considerations

Careful attention was given to the resident community in order to achieve the BREAKTHROUGH objectives of achieving social and economic integration, designing a living area in harmony with the larger community, and gaining both initial and continuing acceptance of the project. The resident population around the site forms a new suburban community of predominantly middle income white families in the family-forming age group. There is no low income housing in the area and the planners encountered organized resistance to such projects.

The PSP recognized the need for a concentrated program of community relations and involvement that would reach the opposition activists, special interests, county officials, and the community at large, while at the same time moving ahead with site planning. The PSD became deeply involved in the community relations program. A plan for project information and community participation was established, interested individuals, groups and officials identified and contacted, and a series of discussion meetings held. The results of 70 formal briefings in six months contributed much to the success of the BREAKTHROUGH projects in King County.

Pre-Design Activity: Development of a Land Use Program

This activity involved selecting the exact BREAKTHROUGH property and assigning major land uses and housing types. The PSP prepared a series of schematic land use plans alternating various properties with related land uses. The schematic plans were analyzed in terms of (1) relationship of site to natural features, (2) site access and relationships with community facilities, utilities, and easements, and (3) considerations of site planning, preparation, and development costs. Plan D of four alternative land use schemes was selected as most consistent with project objectives.

A preliminary housing market analysis and recommended housing unit composition were prepared following discussions with private and public officials and experts. Age groupings, family sizes, income levels, and lifestyles of the potential market were used in the analysis. The bedroom mix was based strongly on HUD-FHA's experience with regional market trends. The market demand figures were then tempered by the need for the demonstration program to provide a test for a mix of housing types and slightly modified to meet both the BREAKTHROUGH objectives and the requirements of the HSPs.

The program was then allocated according to the initial objective of clustering units around a central open space and providing a broad range of housing opportunities. A range of net densities of six to twenty units per acre resulted, depending on housing type. The open space system, buffers and community center contributed to a moderate overall density of under five units per acre, typical of surrounding development. The gross development density was well within that allowed by local regulations.

Pre-Design Activity: Analysis of Planning and Land Use Controls

A series of meetings were held with planners from local governments in order to inform local officials of intentions and to become acquainted with applicable local plans and land use control ordinances. Because the site is within planning and control authority of King County, close and frequent coordination was accomplished with County officials and staff. No conflicts were presented by County regulations nor with any development goals or policies of the nearby cities of Bothell, Redmond, Kirkland, and Bellevue.

Pre-Design Activity: Development of Conceptual Site Plans

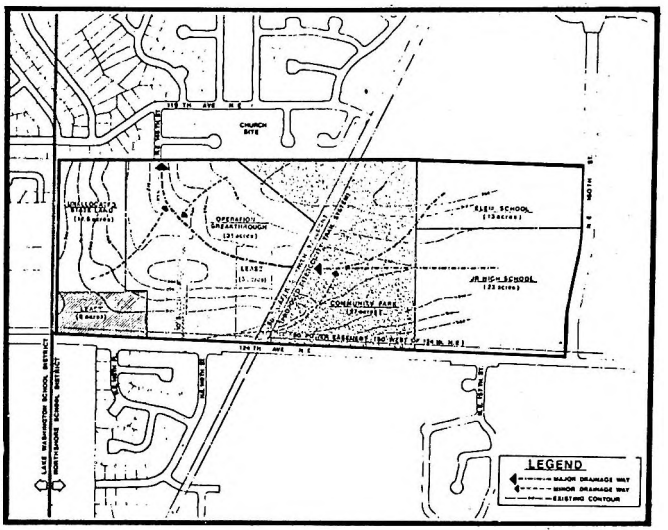
Based on the selected land use program and housing distribution, a series of alternative site plans was prepared by the PSP. These conceptual plans were judged on the basis of the expressed design objectives and objectives of Operation BREAKTHROUGH. The selected plan uses cluster development, with various housing areas circumscribing the site in a pattern identified with the major loop street. The layout provides ample opportunities for phasing the locations of various housing types. The loop road features convenient multiple access vehicular circulation continuous with the community street system while controlling the automobile traffic impact moderately well. A continuous pedestrian network, with limited road crossing points, integrates into this scheme. The use of the central open space, incorporating the drainageway, is a compatible relationship between desired open space and natural site features.

Single-family units are located along the west boundary with higher densities allocated to the east and near the community center. Maximum pedestrian accessibility would be through the central open space and to the park. Each cluster tends to respect one particular kind of unit such as single family, or apartments and townhouses.

Access is provided by a variety of means throughout the site. Parking is on an individual unit basis in some cases, with clusters for apartment and townhouses; pull-outs for passing and guest parking are provided.

Pre-Design Activity: Analysis of Market and Systems Producers

The process of housing systems analysis ran concurrently with the final market analysis in order to determine desired housing unit mix for the site. The requirements for marketability placed another constraint on final selection of HSPs and their product allocation to the site. During the analysis phase, one producer opted not to participate at this site, resulting in some readjustment in the assignments of the other four assigned housing systems. The interrelationship of housing system production, project marketing, and site requirements resulted in the final site specific housing unit allocation. Due to program changes in these interrelationships, the specific allocation experienced a series of adjustments extending beyond the housing system analysis and preliminary site planning phase.



SELECTED SCHEME

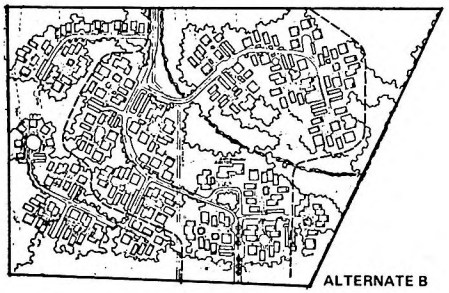
At the same time the HSPs were reviewing the conceptual site plan, the PSP was responsible for a thorough analysis of the housing systems designated for the King County Site. This analysis involved establishing the special requirements of individual housing systems and their accommodation within site planning objectives. The following were considered: architectural characteristics (scale, color, texture, facade treatment, materials and form of each housing system); construction method (site storage of components, shipping access, screening of heavy construction equipment, site fabrication area, and erection sequence); and the testing requirements of individual systems.

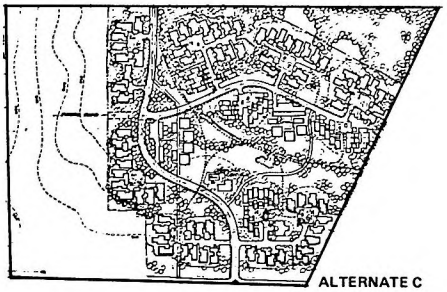
Design Activity: Modifications to Preliminary Site Plan

As a result of the application of housing unit allocation, individual housing systems requirements, and detailed site surface and subsurface conditions, the preliminary site plan experienced a number of modifications. The resulting Site Plan nevertheless retained the principal features of the conceptual plan. The plan fit well within its local community while at the same time providing a desired variety of housing and site layout not found in the surrounding suburban residential development.

Design Activity: Coordination of Participants

Throughout the planning process there was the need for the PSP to coordinate with the key participants involved in developing the King County BREAKTHROUGH project. During the preparation of the preliminary site plan, the coordination process became crucial. The PSP had to coordinate site planning with the requirements of the HUD BREAKTHROUGH program and the particular requirements of the selected housing systems.





The King County planners arrayed several plan choices prior to the selection of the final plan.

The Prototype Site Developer was selected during preliminary planning. The PSD's responsibility for integrating site planning and the housing systems into a program for timely and optimum site development required its deep involvement during final site planning. The PSP's commitment to preparing a site plan sensitive to natural site features, the adjacent community, and high standards of design, was subject to review within the HSPs' interests in demonstrating and marketing their housing systems and the PSD's responsibility for seeing the project developed on time, within cost, and with minimum negative impact on the neighboring community.

The coordination between these various interests served as a synthesizing process of design in which a large number of changes were made to a series of proposed site plans. The PSP judged the requested changes and prepared plan revision based on their adherence to overall site design objectives. It was the role of the PSP, assisted by the PSD, to insure the integrity of overall site plan in this process of compromise and revision. Finally, HUD reviewed the steps in the planning process in terms of national BREAKTHROUGH goals and, in turn, also required a number of revisions. There was also a considerable requirement for coordination with local government and the neighboring community.

Design Activity: Local Government Inputs

In the reviews with King County agencies responsible for land use and building control, there were several areas in which desired design features had to be negotiated to the code and ordinance standards of land use and public works controls. In some cases, government concessions to desired design were made in the context of the planned unit design process. In other cases, the conventional public works requirements held, and site design compromises were necessary.

The site planning negotiations took place through the normal process of local PUD and platting review and coordination. A number of other important meetings were held with local government to establish location, planning, and design and development factors. The process was lengthened by the local opposition to the BREAKTHROUGH project. In order to allay fears and to inform the public, detailed presentations were made to the County governing body. Questions regarding the site location, design, impact, type and cost of housing, and general philosophy of the program were answered in careful detail. This extensive process of public information, coordination and review went well beyond that typically exercised in land subdivision and development.

Significant to the housing systems analysis was product acceptance within local building codes and ordinances. The systems varied considerably in this regard. Only one system did not require any waivers to local codes; the other systems had varying numbers of waiver requests. Because the waivers were supported by national uniform codes or performance testing by the National Bureau of Standards, they were generally accommodated within the spirit of agreement between BREAKTHROUGH and state and local government. However, several housing product changes were necessitated by local requirements. These production changes were relatively minor, costing more in time than in money.

FINAL SITE PLAN

The final site plan at King County reflected closely the conceptual and preliminary plans previously discussed. Following is an overview of its non-system features:

Recreation and Open Space

The pedestrian circulation system is the connecting network among and between housing clusters and open space. This trail system provides intrasite access independent of the automobile. The trail network focuses on the internal open space system while leading to active recreational facilities such as the pool and tot-lots.

A swimming pool is located adjacent to the community center with a separate splash pool for small children. The central open space features the creek draining the site, providing the opportunity for solitude from the living areas and active recreation facilities. The tot-lots were designed as creative play

areas for children and with structural forms that enhance the site.

Roads and Parking

A circular loop road provides convenient access to housing clusters while deemphasizing the internal road system. It fits the natural features of the site and causes minimum conflict with the pedestrian network. Traffic is brought from the main loop into small parking lots in individual housing clusters. Additional parking space for oversize and recreation vehicles is enclosed in a hard-surfaced fenced lot in the southeast corner of the site.

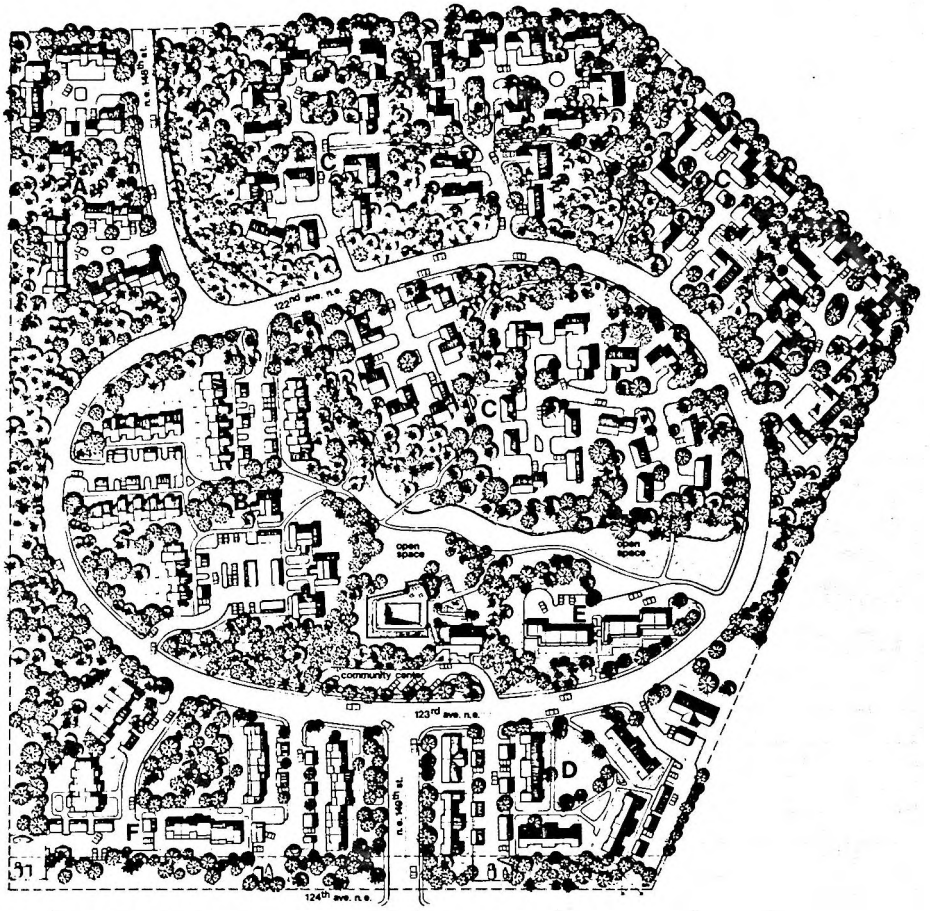
The road layout provides multiple site access and a continuation of the local street system, as well as convenient access to residents, service and emergency vehicles. The circuitous nature of the loop street should retard large amounts of through traffic. Sidewalks were minimized because of the extensive pedestrian trail system.

Community Building

The community building is the focal point of the entrance to the site and is intended as a gathering place for the social, cultural, and recreational exchange of site residents. Designed within strict cost constraints, this facility houses a wide range of activities in a relatively small utilitarian space well within the means of the community organization to maintain. Designed by a local architect, the conventional wood frame building sensitively fits the Northwest idiom. The building has 2800 square feet on two levels with the upper level and outside decks opening to the loop road and the lower level opening to the pool area, parking, and pedestrian pathway. There are two major multi-purpose rooms, one on each level. Downstairs is the community club administration office, restrooms and showers. The upper level contains a small kitchen, fireplace in the multi-purpose room, and barbeque area on the outer deck.

Landscaping

Site landscaping features a combination of native trees, plants and ground cover, and materials intro-



King County Final Site Plan

duced to the site. The objectives are to maintain and enhance the relatively lush northwest landscape, soften man-made intrusions upon the natural site, separate and define high density activity centers, screen obtrusive structures, and provide texture and color to the development. The preservation of stands of trees and the creation of berms serve to control the impact between the BREAKTHROUGH site and adjoining development. The large stands of evergreens serving as buffers on the western boundary are deep forest-like attractions with thick native ground cover.

CONSTRUCTION DEVELOPMENT

By contract revision, the PSD assumed the major responsibility for Task IV inspections with the PSP in an on-call consulting position. Construction inspection took place almost daily, made possible by the PSD's presence on site. Formal inspection surveys with the HUD Site Technical Representative, the PSP, Housing System Producer (HSP) representatives, and others took place periodically at construction completion points. Weekly inspection reports were filed. There was extensive coordination between the PSD and individual HSPs regarding clear responsibility for construction and installation of improvements on site. As might be expected, this complex coordinating

Site Summary Chart - King County

Source: Planners' Reports and Questionnaire Response

Comparative Site Data/ Land Use Facts

SIZE	
Acres	36
HOUSING	
Total Units	178
SFD	66
SFA	88
MFLR	24
MFMR	
MFHR	
PRODUCERS	
Number	4
DENSITY	
Units/Acre	5

PARKING	
Per Unit	1.69
Site Total	300
On Grade	●
Below Grade	
OTHER USES	
Community Bldg.	●
Community Room(s)	
Maintenance Bldg.	
Commercial	
School	○
Day Care Center	
Central Utility Bldg.	
Pedestrian Deck(s)	

Comparative Site Data/ Amenity Provisions

OPEN SPACE	
Private	
Semi-Private	
In-Cluster	
Central/Common	●
Non-Resident	
RECREATION	
Indoor	●
Tot Lots	●
Playgrounds	○
Playfields	○
Hard Courts	
Sitting	
Elderly	

Pool	●
Outdoor Event	
Picnic	
Bicycle Paths	
UTILITIES AND SERVICES	
Convent'l Sewer	●
Unconvent'l Sewer	
Convent'l Energy	●
Unconvent'l Energy	
Convent'l Trash	●
Unconvent'l Trash	

process of site development was further complicated by the demonstration nature of the housing systems.

A fast track schedule was not realized on the King County Site. The many program delays prevented optimum construction sequencing and quick completion. The PSD employed several fast track management techniques, such as a construction event CPM and "action item" activity assignment seats. However, these techniques contributed mainly to detailed progress reporting.

Always a critical concern in construction scheduling, interface control proved a good deal more demanding in King County BREAKTHROUGH. In addition to usual interface points, there were many and varied interface concerns with the HSPs. As a result of much coordination, the PSD established agreements regarding "Construction Interface Responsibilities" with the HSPs. These agreements covered a range of points of interface, including storm drains, sanitary sewers, water, gas, power, telephone, television cable, boundary surveying, grading, sidewalks, porches, patios, garages and carports, fences, driveways and landscaping.

● On Site ○ Off Site

Comparative Site Data/ Environmental Character

DESIGN CONCEPT	
Urban Linear	
Urban Clusters	
Suburban Clusters	●
SITE CONTEXT	
Inner City	
Suburban Developed	
Suburban Developing	●
TOPOGRAPHY	
Flat	
Flat/Contoured	
Sloped	●
Valley	●

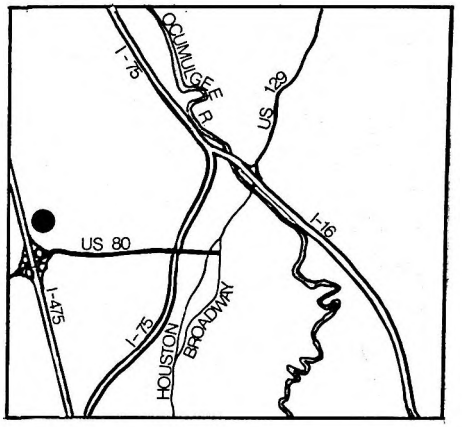
VEGETATION	
None Existing	
Light Existing	
Heavy Existing	●
Light New	
Heavy New	
WATER	
Stream	●
Lake	
ADVERSE CONDITIONS	
Air Pollution	
Noise Pollution	
Water Pollution	●

Dwelling Units/ Site/Producers

Alcoa	86
Boise Cascade	
BSI	
CAMCI	
Christiana Western	54
Descon/Concordia	
FCE-Dillon	
General Electric	
Hercoform	
Home Building Corp.	
Levitt	28
Material Systems	10
National Homes	

Pantek	
Pemtom	
Republic Steel	
Rouse-Wates	
Scholz	
Shelley	
Townland	
TRW	
Total Systems Units	178
Non-System Units	
Total Dwelling Units by Site	178

Macon



Prototype Site Planner:
Reynolds, Smith and Hills
Jacksonville, Florida

SITE DESCRIPTION

A densely wooded, 50-acre site was chosen for the Operation BREAKTHROUGH prototype development in Macon, Georgia. Located on Chambers Road in southwest Macon, the site enjoys a strategic location convenient to downtown, regional shopping centers and Interstate 75. Neighborhood shopping and school facilities are within easy walking distance. At the time of purchase, the site was a private estate and game preserve. A rustic cabin and dock were located adjacent to Crystal Lake, a spring-fed, six-acre lake which serves as the major focal point of the project. The site's essential character is defined in simplest terms as a tree covered sloping "horseshoe" with major orientation to the lake. Alluvial areas above and below the lake blend with an abundance of lush vegetation which covers the majority of the site. The delicate balance of the site's characteristics of vegetation, rolling terrain, and natural springs and streams have the effect of encouraging sensitive design and hold the promise of a pleasant lifestyle for middle Georgia residents.

DESIGN AND PLANNING OBJECTIVES

A synthesis of all site factors with HUD program objectives established the following general requirements to achieve maximum functional, aesthetic and conceptual relationships. A subsequent analysis of the final site plan reveals the extent of realization of the design objectives:

Objective: Accommodate families of varying size and income.

> **Essentially Achieved:** A variety of housing types and densities, including single-family detached and attached, multi-family low-rise, mid-rise and high-rise, accommodate families of varying size and income.

Objective: Design should respond to the character of vegetation and topography.

Essentially Achieved: A cluster approach to development responds to the particular topographic and vegetative characteristics of the site.

Objective: Achieve convenient pedestrian access while minimizing pedestrian-auto conflicts.

Essentially Achieved: A periphery loop road provides convenient access to housing clusters while maintaining minimum conflict between pedestrian and vehicle.

Objective: Avoid large parking areas.

Achieved: Parking is collected in small clusters to minimize the adverse effects of large parking areas.

Objective: Organize housing to reinforce the open space system and the visual amenities of the site.

Achieved: Clusters of housing groups integrate with a unifying open space system and take advantage of the outstanding views to the lake and distant countryside.

Objective: Establish a consistent interior-exterior relationship.

Essentially Achieved: In most instances, a hierarchy of living spaces is maintained under a sequential relationship of private indoor space to private outdoor space to public outdoor space.

Objective: Encourage social and recreational activities within the site.

Achieved: A central open space system offers easily accessible recreational opportunities to all residents, and a conveniently located Community Center serves as a nucleus of social activity for the residents.

Objective: Respect and maintain the ecological character of the site both during and after construction.

Achieved: A passive nature area is preserved in the alluvial area to maintain ecological balance; the existing site drainage is integrated into the open space system, while the discharge of surface run-off is controlled to minimize its erosive and pollutive factors. Clearing, grading and grubbing prior to and during construction were carefully monitored to minimize ecological damage.

DESIGN AND PLANNING PROCESS

Following the general BREAKTHOUGH procedural guidelines and contractural obligations, the Macon site planners engaged in a series of pre-design phase activities and design phase activities:

Pre-Design Activities

- Development of a Site Program
- Selection of HSPs

Design Activities

- Parcel Design
- Road Design
- Clearing and Grubbing Policies

Pre-Design Activity: Development of a Site Program

One of the key events prior to the development of the Preliminary Site Plan was the naming of the Prototype Site Developer. The PSD was required to establish unit types, bedroom mix and amenities which would be required of the HSPs in response to local marketing considerations. This event took place late in the program. The PSP had developed a conceptual site plan at this point which identified the location of housing units on the site. A tentative

selection of HSPs had also been made at this time, as well as an analysis determining basic compatibility between the selected housing systems and the site.

After reviewing the conceptual planning efforts of the PSP and the results of the analysis of the HSPs, the PSD approved the conceptual plan and prepared the Site Development Program. This program recommended that the site be financed and developed as a 236 cooperative. In conjunction with this recommendation, the PSD established criteria for the design of the units to be supplied by the HSPs.

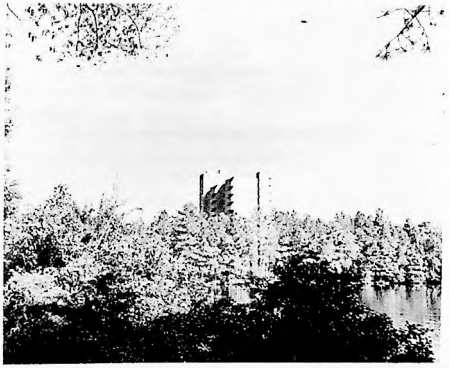
Pre-Design Activity: Selection of HSPs

At the time the Conceptual Site Plan was developed, the HSPs were not under contract to HUD for the development of their proposed systems. Although the proposals for all potential systems were available, a final selection of the units to be used had not been made. Therefore, all site planning during that period was necessarily done with floor areas and unit configurations which were not systems-specific, but typical for the housing types being proposed. When the final selection had been made, the PSP made an analysis of the basic requirements of the various HSPs and a recommendation as to which systems displayed the best potential for compatibility with the Macon site. Because of the limited number of units each system would be developing and the desirability of displaying each of the systems in several different locations, several trial mixes of systems were required before a tentative selection was established.

As preliminary plans were developed for both the units and the site, further adjustments were made in the list of HSPs to be included, as well as in the number and type of units which they would display.

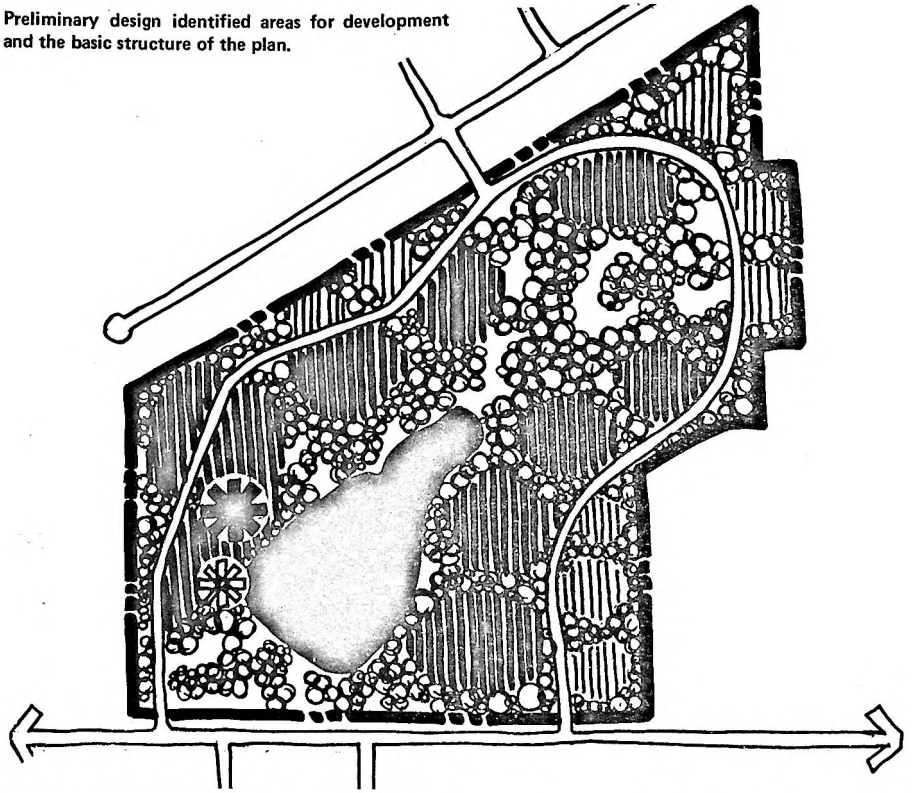
Design Activity: Parcel Design

The PSP's responsibility for parcel site design under Task II was originally limited to the coordination of the producers' designs. Because of the heavy workload being experienced by the HSPs in the development of the final site plan, the required continuity of design was not being realized, and the original assignment of planning responsibility was altered. A



The Macon site planners took great care to preserve the Georgia landscape and an existing on-site lake.

Preliminary design identified areas for development and the basic structure of the plan.



reduction in interface problems involved in utility development and landscaping themes was also desired. It was therefore decided that the PSP should take on the detailed site planning of the individual parcels.

Numerous changes were required as the parcel site design evolved. In many cases, final contract documents for the units had not been completed or accepted by HUD prior to the initial site design. Changes were thus required in the site design as refinements were made in the units in order to make them more responsive to the design criteria developed by the National Bureau of Standards. In one case the unit redesign was total. Final contract documents had been completed when an entire redesign effort was required to reduce cost and to develop a more typical unit. The envisioned structured parking associated with the high-rise was deleted, resulting not only in a change in site design but also in a change in total unit count. In other cases, the design changes were less dramatic. One producer, for example, increased the width of his units, causing not only a rework of the contract documents but also a reduction in unit count.

Design Activity: Road Design

One of the major design elements which would serve to tie the site together and provide continuity from parcel to parcel was the loop road. This road was intended to be as responsive to the site as possible, producing a minimum of impact to the existing vegetation and terrain. In order to accomplish this goal, the road's preliminary location was established using the preliminary plan and sectional profiles. The preliminary center line was then staked in the field and actual profile and side elevations were taken. Significant trees and other pertinent factors were also considered in the final alignment of the road. Adjustments and refinements were then made in the road's location and cross-sections, islands were created, and shifts in alignment were made to preserve the maximum amount of existing plant material possible. At the same time, elevation changes were made which reduced the amount of grading required.

Design Activity: Clearing and Grubbing Policies

The Macon site's most outstanding feature is its quantity and quality of vegetation. The planner's goal from the very inception of site design was to preserve as much of this material as possible. All planning and design were evaluated by this criterion.

Due to the large amount of material to be considered in clearing and grubbing, special provisions were made to insure that this process was as responsive to the intent of the site design as possible. Areas to be cleared were located in plan and identified in the field by staking known reference points. The planners then tagged existing trees and other material, thereby delineating the limits of the clearing operation. These limits and the intent of the markings were then outlined and discussed with the PSD's site inspector to insure that the operation and the contractor's work would proceed smoothly. This approach has worked very successfully and has reduced both construction impact to the site and amount of new landscaping required.

FINAL SITE PLAN

The Final Site Plan combines the goals and objectives set for the site in HUD's Program Objectives, the Planners Design Objectives, and the PSD's Development Program with the requirements established through site analysis, market study, and the needs of the Housing Systems Producers. Aside from the housing systems, the plan embodies many non-system elements.

Roads and Parking

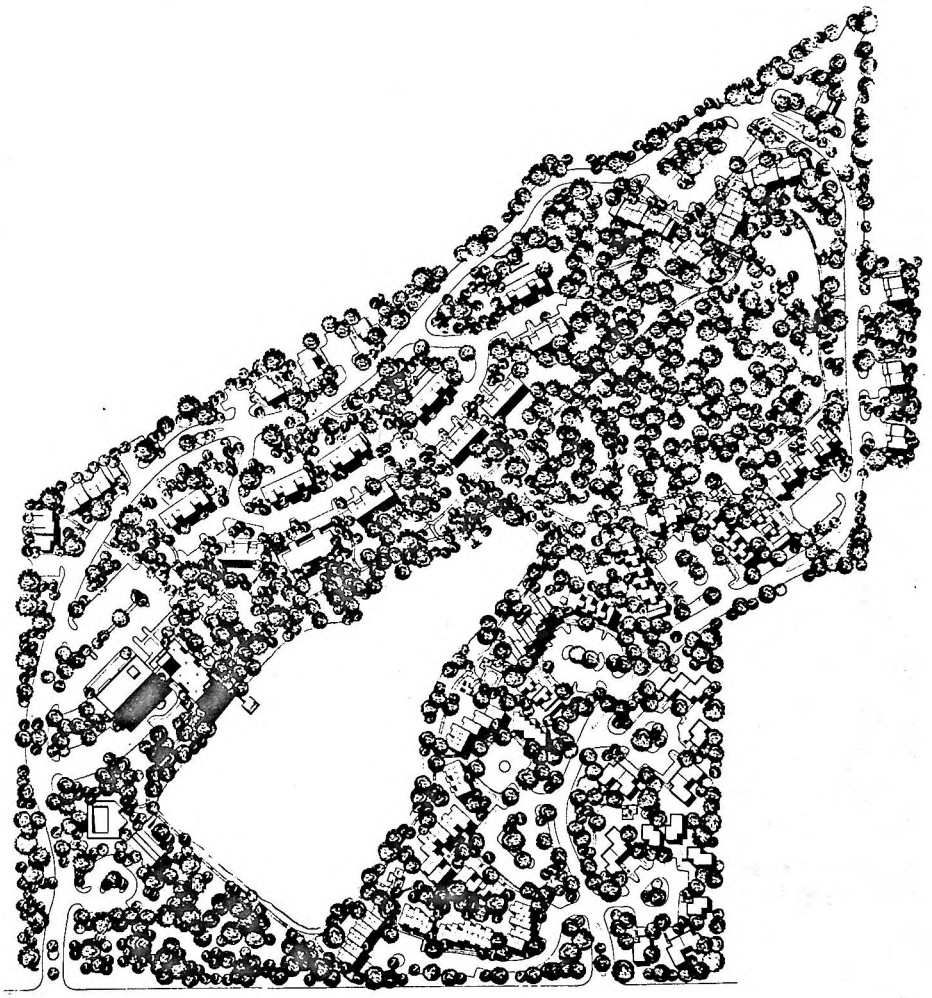
A peripheral loop road provides convenient access to the housing clusters while maintaining a minimum of conflict between the pedestrian and vehicular traffic. Its design incorporates eleven islands enhancing the road's residential character. Particular care was taken in the design of the road to insure that adequate provision was made to allow the passage of the transporters which would be delivering the unit components and modules during the HSPs erection process. The load-carrying capacity of the road was also increased to allow the passage of this heavy equipment.

Parking on the site is collected in small clusters in order to minimize the adverse effects of large parking areas. All parking on the site is in these parking clusters, and parking ratio of at least 1.5 cars per living unit is maintained. This ratio was enhanced by the creation of additional parking, intended for long-term and oversized vehicles, located within a fenced compound at the maintenance building.

Conservation and Lake Areas

One of the most salient natural features of the Macon site is the lake and its adjacent alluvial areas. The interrelationship of these areas and the lake was recognized for its delicate nature; special provisions were made to insure that these features would not be unduly disrupted or destroyed by the development of the site. The safeguards used in their protection included the prohibition of all but very minor construction in the alluvial areas, and the strict control of all construction involved with the lake's shoreline.

Macon Final Site Plan



Pedestrian circulation (above) and vehicular circulation form concentric loops on the Macon site.

A study of the existing environmental conditions and any changes in the ecological sub-systems of the alluvial areas and the lake due to construction has been performed. One of the recommendations of the lake study was to improve the quality of water in the lower strata of the lake by installing a siphon to remove some of the stagnated water in the lake's bottom, thus allowing marine life to occur at lower levels in the lake. To allow for potential run-off due to the paved areas on the site, a new overflow structure was installed in the existing dam. Existing streams on the site have been left undisturbed and in some areas reinforced by water collected in the underdrain systems installed in some of the parcels.

Recreation Areas and Walkway Systems

The clustered housing groups of the Macon site have been integrated into a unifying open space system which offers convenient recreational opportunities to all of the site's residents. A system of recreational areas contained in this open space is located to serve the various clusters and is scaled to allow a variety of activities to take place at each location. Informal active and passive recreational activities are for the residents on site; formal recreation and organized sports take place at a nearby school and other recreational areas around the site. A broad scope of recreational activities is provided.

A walkway system provides each resident with paved access from his dwelling to any other dwelling or facility on site. It was created with only a minimum of disruption to the site by taking advantage of areas which were cleared for utilities. The walkway system is a soil cement base with a light asphaltic topping; steps are created by using railroad ties anchored with steel pins. In order for the system to be as responsive to the site as possible, the plans indicated tentative alignment and grading, reserving final location for in-field establishment.

Community Center

The Community-Visitor's Center facility on the Macon site is a unique expression of architectural response to site conditions. Built below the existing dam in an area characterized by a high water table and heavy vegetation, the center is built on piles above the ground plain. This approach allows the reestablishment of the ferns and natural ground cover under the building. The stream flowing from the dam's overflow structure remains undisturbed.

The center functions jointly as a social center for the site's residents and a management center for a co-op. A variety of spaces for various meetings and activities are provided. The fully fenced pool area and the second floor of the center were built at the same elevation as the top of the dam, thus providing an outstanding view and relationship with the lake and the remainder of the site.

Maintenance Building

The maintenance building, boat and camper storage area is a direct outgrowth of the financial orientation of the site. Use of the co-op approach to project management required that all exterior maintenance be performed by the co-op. The maintenance building is equipped with an area for light auto repair and maintenance by the residents, screened from view from the road and residential areas.

Graphics

Design objectives incorporated in the graphics system include the desire to use only an absolute minimum of signs with each sign relaying a distinct and high order message, and a combination of materials and low profile producing unobtrusive, but highly readable signs.

The system of site graphics and addressing used on the Macon site is a direct reflection of the cluster approach to site design. Each cluster of units is represented by only one connecting drive to Crystal Lake Circle and is identified by a consistent numbering system. The scale, location and design of each sign is directly related to the movement mode to which they are addressed. All signs which are to be read from the automobile are scaled to be read from 150 feet for the cluster identification number and direction arrow, while the unit numbers contained in each cluster are scaled to be read from 30 feet and at a slower speed. The signs used to warn pedestrians at

road crossings are smaller in size to relate to the pace of the pedestrian.

Landscaping

The challenge to landscape design on the Macon site is characterized by two distinct conditions: the site's existing lush and mature vegetation, and the expectation of almost total disruption of this condition during construction. The presence of these conditions was a major factor in the decision to use the cluster approach in site design.

Great care was used in the design process to insure that the areas which would be subject to disruption were held to a minimum. Stringent controls were used in the clearing and grubbing of the site. A list of plant materials to be used in the landscape design was developed by observing and using only those materials which were existing on the site or native to the area. This approach produces, at maturity, a harmony of material with little distinction between new and existing vegetation.

Solid Waste Collection

Solid waste collection on the Macon site is handled by a private contracting firm using dumpster type containers centrally located within the clusters. These locations are adjacent to paved areas to provide access by the collection vehicle, but in all cases the containers are set in screened and landscaped enclosures. A compactor unit is featured within the high-rise structure allowing a twice-weekly collection schedule to be maintained.

Street and Area Lighting

The lighting concept used on the site is scaled to provide safe night-time activity while avoiding the overuse of light. The street lights are mounted on 30' wood standards located at the intersections of the cluster drives and the main road. Area lighting is obtained by the use of the same lighting fixture with a lower wattage bulb mounted on a 12' wood standard. The area lighting units are located within the clusters and the open space systems along the walkways and at the recreation areas. All fixtures will be operated by photocells.

The above areas were reserved as natural conservation zones in the site, upon which no development could occur.

Utilities

The utility systems installed on the Macon site were closely coordinated with the PSD's contractor and the public utility companies to insure a minimum of disruption to the site. A master utility plan was developed using a system of parallel ditching and overlapping easements. This approach allowed several utilities to be located in the space which would normally have been cleared for just one. These cleared areas were then used to form the major links in the walkway systems.

CONSTRUCTION DEVELOPMENT

Because of the research and development nature of Operation BREAKTHROUGH, the final designs from the HSPs were expected to be delayed beyond the point at which it would be advisable to delay site improvements until unit design was complete. The decision to proceed with site improvements was also a result of the very nature of industrialized housing. Units would be delivered with a rather high degree of finish, requiring very little field work to bring them to completion. In order to eliminate delay between completion of unit construction and site improvements, the following sequence of contract document release was used:

Site Summary Chart - Macon

Source: Planners' Reports and Questionnaire Response

Comparative Site Data/ Land Use Facts

SIZE	
Acres	50
HOUSING	
Total Units	287
SFD	16
SFA	149
MFLR	42
MFMR	24
MFHR	56
PRODUCERS	
Number	6
DENSITY	
Units/Acre	5.7

PARKING	
Per Unit	1.5
Site Total	430
On Grade	●
Below Grade	
OTHER USES	
Community Bldg.	●
Community Room(s)	
Maintenance Bldg.	●
Commercial	
School	○
Day Care Center	
Central Utility Bldg.	
Pedestrian Deck(s)	

Comparative Site Data/ Amenity Provisions

OPEN SPACE	
Private	●
Semi-Private	
In-Cluster	
Central/Common	●
Non-Resident	
RECREATION	
Indoor	
Tot Lots	●
Playgrounds	
Playfields	
Hard Courts	
Sitting	
Elderly	

Pool	●
Outdoor Event	
Picnic	
Bicycle Paths	
UTILITIES AND SERVICES	
Convent'l Sewer	●
Unconvent'l Sewer	
Convent'l Energy	●
Unconvent'l Energy	
Convent'l Trash	●
Unconvent'l Trash	

- Clearing and Grubbing of the Loop Road
- The Loop Road and Major Utility Trunk Lines
- The Maintenance Building
- The Grading, Parking Lots and Minor Utilities for the Parcels
- The Community Center
- The Walkway System, Recreation Areas, Landscaping and Site Graphics

The work embodied in these various packages was further phased to coordinate site improvement work with the erection phasing of the HSPs. By phasing site improvement work on individual parcels in the order of the HSPs arrival and completion sequence, confusion and delay in the various work areas were reduced.

The sequence was followed with only one exception. In early 1971, when revisions were made in the Davis-Bacon Act, the main road and major utility package had been bid and was ready for contract signing. Due to the change in the Act, this package had to be rebid. At that point, the package for the work in the parcels was almost ready for bidding; and it was decided that due to the similarity of the work involved, the two packages should be combined and released for bid as one complete package.

● On Site ○ Off Site

Comparative Site Data/ Environmental Character

DESIGN CONCEPT	
Urban Linear	
Urban Clusters	
Suburban Clusters	●
SITE CONTEXT	
Inner City	
Suburban Developed	●
Suburban Developing	
TOPOGRAPHY	
Flat	
Flat/Contoured	
Sloped	●
Valley	●

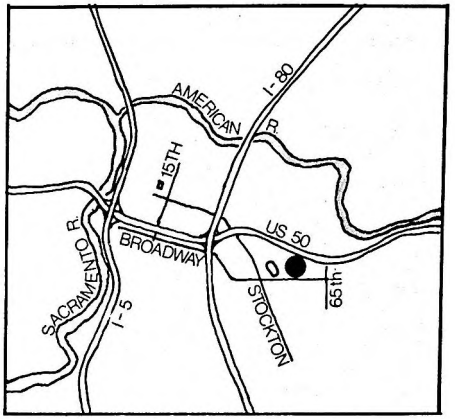
VEGETATION	
None Existing	
Light Existing	
Heavy Existing	●
Light New	
Heavy New	
WATER	
Stream	
Lake	●
ADVERSE CONDITIONS	
Air Pollution	
Noise Pollution	
Water Pollution	●

Dwelling Units/ Site/Producers

Alcoa	52
Boise Cascade	49
BSI	80
CAMCI	
Christiana Western	26
Descon/Concordia	
FCE-Dillon	
General Electric	
Hercoform	50
Home Building Corp.	
Levitt	
Material Systems	30
National Homes	

Pantek	
Pemtom	
Republic Steel	
Rouse-Wates	
Scholz	
Shelley	
Townland	
TRW	
Total Systems Units	287
Non-System Units	
Total Dwelling Units by Site	287

Sacramento



Prototype Site Planners:
Wurster, Bernardi and Emmons, Inc. and
Lawrence Halprin and Associates
San Francisco, California

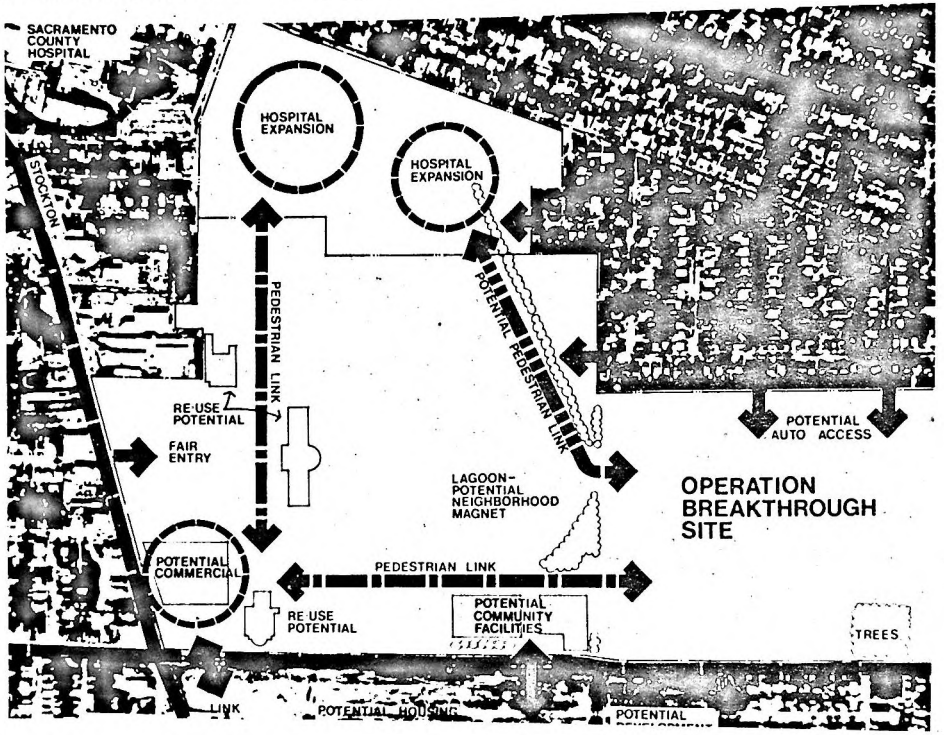
Consultants:
Wilbur Smith and Associates, traffic
G.F.D.S. Enginers, structural and site engineering
Dames and Moore, soils
Larry Smith and Co., Inc., economic
Spink Corporation, civil engineering
Cyril Roseman Associates, sociology
G. M. Simonson and T. R. Simonson, consulting engineering
John S. Baldwin, community
Marshall Roath, graphics

SITE DESCRIPTION

The Sacramento BREAKTHROUGH site is a level, 31-acre parcel carved out of the old California State Fairgrounds. It is readily accessible to major employment, retail and educational centers strategically located around the project area. Very close to the north-south and east-west freeways bisecting Sacramento, the site is 2.5 miles from the downtown State Capitol and business district.

There are schools and small neighborhood shops within walking distance, and a municipal bus system directly serves the site. The immediate surrounding neighborhood consists almost entirely of small single-family homes, modest in scale, built in the 1930's and 1940's. The homes are nearly all well maintained. One of the prime concerns of the planners was to create a physical and social pattern in the Operation BREAKTHROUGH project that would be harmonious with the surrounding community.

Sacramento planners considered the site's relationship with its neighborhood, principally the potentials for further development of the fairgrounds.



DESIGN AND PLANNING CONCEPTS

The Sacramento planners framed their work around a series of design concepts. With the program objectives in mind and based on the investigation data, concepts were established from which the future plan evolved:

Objective: Plan living units organized into clusters as a means of opening up more usable common space and reducing site utility costs.

Achieved: Clusters are kept small to reinforce a strong sense of identification for residents, while also limiting the number of families to a level where social interaction becomes more meaningful.

Objective: Promote a conviction that more variety is needed in our residential areas to combat the trend toward deadly monotony.

Achieved: Building types range from single-family detached units to a multi-family, high-rise structure providing a broad resident mix.

Objective: Provide a traffic circulation system which minimizes any undesirable impact on the surrounding community.

Achieved: The neighborhood to the north of the site is presently stable but vulnerable to disruption by additional vehicular traffic. All traffic is planned to approach the site from the south.

Objective: Locate parking lots to keep the center of the site free from the intrusion of automobiles.

Achieved: All parking is served from the loop road surrounding the site. No thru traffic in the parking areas is permitted.

Objective: Provide a pedestrian system separated from vehicles.

Achieved: A major pedestrianway in the interior of the site encourages maximum separation of pedestrian and vehicular traffic. The pedestrianway connects the housing clusters and their central courts and provides access to a central open space.

Objective: Provide a wide variety of open spaces within the site.

Achieved: Each unit has private outdoor space related to a larger common court for the clusters. The large open park area at the heart of the project provides a major recreation area for the development. Other open spaces are created along the pedestrian path system.

Objective: Use similar elements to give continuity to the total site development.

Achieved: Free parking compounds around the site are treated uniformly to establish continuity around the perimeter of the site. Common fencing, lighting, as well as landscaping, help establish continuity throughout the site.

DESIGN AND PLANNING DEVELOPMENT

The design development of the Sacramento site can be broken down into several activities:

Pre-Design Activities

- Land Use Recommendations
- Market Research
- Housing Systems Analysis

Design Activities

- Producer Assignments
- Preliminary Site Plan

Pre-Design Activity: Land Use Recommendations

The following were viewed as the primary influences affecting the development of the Sacramento Operation BREAKTHROUGH site:

Neighborhood Character – The surrounding area consists of modest, well-kept, single-family residences. Most homes exhibit a simplicity and scale not often found in new neighborhoods. Landscaping is extensive.

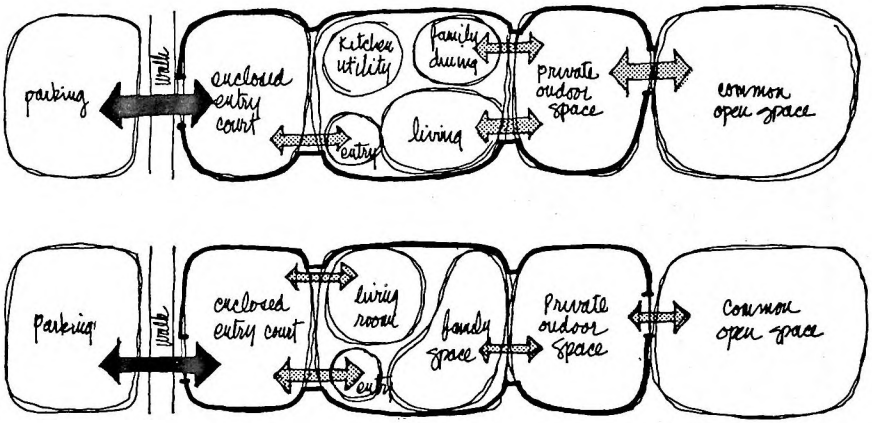
Future Fairground Uses – Great emphasis was given to the entire Old State Fairgrounds in the early studies of the Sacramento site. The future potential of this presently vacant land was too important not to be considered.

Sacramento County Hospital – The neighboring hospital, with its proposed expansion to include medical school facilities, is seen as a potential source of tenants for the units on the BREAKTHROUGH site. The usual economic and racial mix of hospital employees would be a positive factor in encouraging such a mix within the development.

Retail Facilities – The lack of sufficient retail facilities in the area is important and suggests some on-site convenience shops to serve the tenants. The potential for major shopping facilities exists on the entire strip along Broadway from Stockton Boulevard to the Operation BREAKTHROUGH site. Some fine existing fairgrounds buildings could be converted into commercial or recreational use.

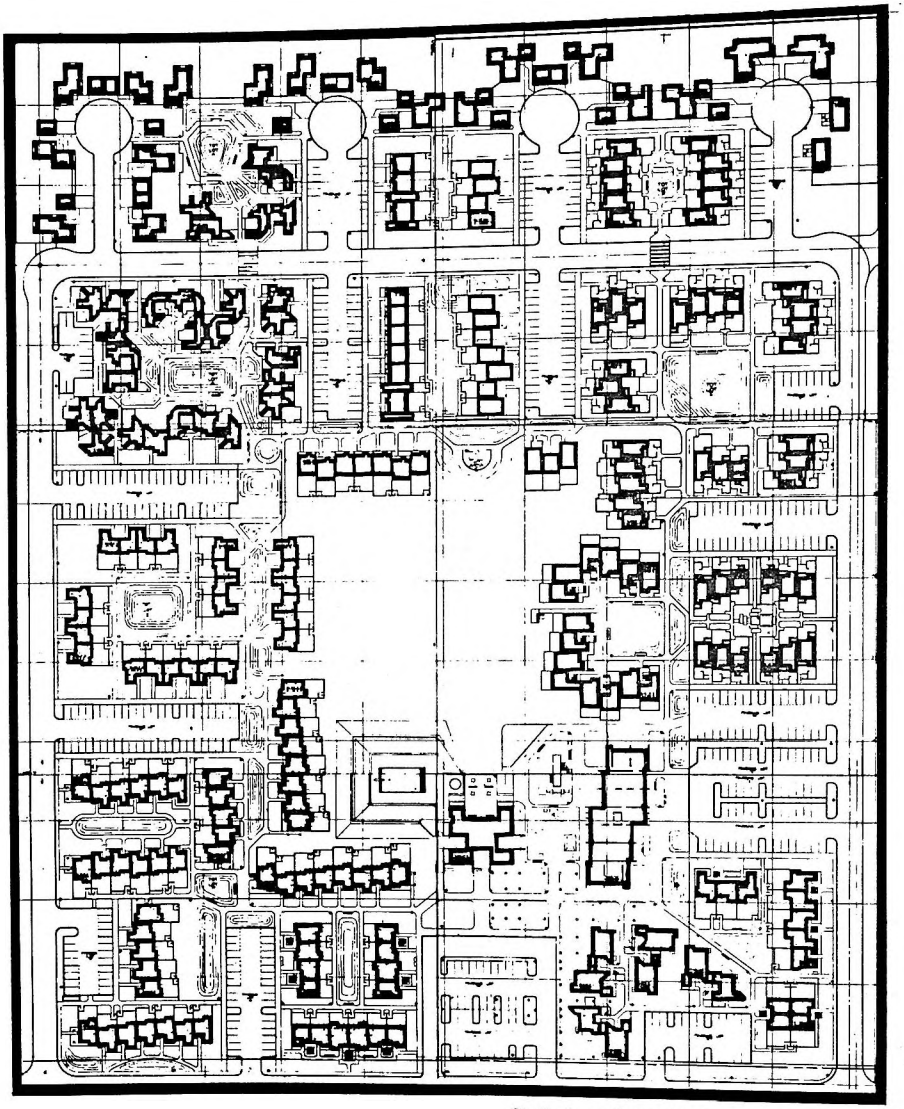
Lagoon – The central core of the Old Fairgrounds, including its lagoon, has been recommended as part

Section



Plan

The relationships of various hierarchial open spaces, above, enabled the Sacramento planners to apply consistent principles throughout the site.



Preliminary Parcellization Plan, Sacramento

of an experimental recreation area. Should funds for this large park not become available, the remainder of the site, except for a smaller central park, should be devoted to housing.

Access to Transportation — Broadway, on the southern edge of the site, is a well-traveled street leading to easy access to the Freeways and to the entire Sacramento area, as well as to the mountains and to San Francisco.

Sacramento State College — A little over a mile to the south, the Sacramento State College was considered to be another major influence factor on the site, with cultural, educational and employment opportunities accessible to the future resudents.

Climatic Factors — The intense heat of summers in the Sacramento area is a very important influence factor. Winter rain storms are also a factor, but do not create discomfort conditions comparable to the summer heat.

Pre-Design Activity: Market Research

An economic study was undertaken as part of Task I to determine the types of occupancy and income ranges to be incluced in the project. Analysis of this report and its recommendations, together with later advice from the Prototype Site Developer, established the balance between rental and ownership homes.

An all rental program would involve the least market risk. However, realizing that HUD wanted to demonstrate the marketability of units as sale housing, the economic report recommended a major sales program of 80% sale units, 20% rental units. Further study and analysis adjusted this relationship to the present 50% — 50% ratio.

Pre-Design Activity: Housing Systems Analysis

Housing units in the site plan were initially assumed projections of the housing systems designated for the site. Communication and coordination were major tasks: seven HSPs, each with its own "micro-site" architect, together with HUD, the Prototype Site Developer and the Prototype Site Planners, all made for a formidable design team.

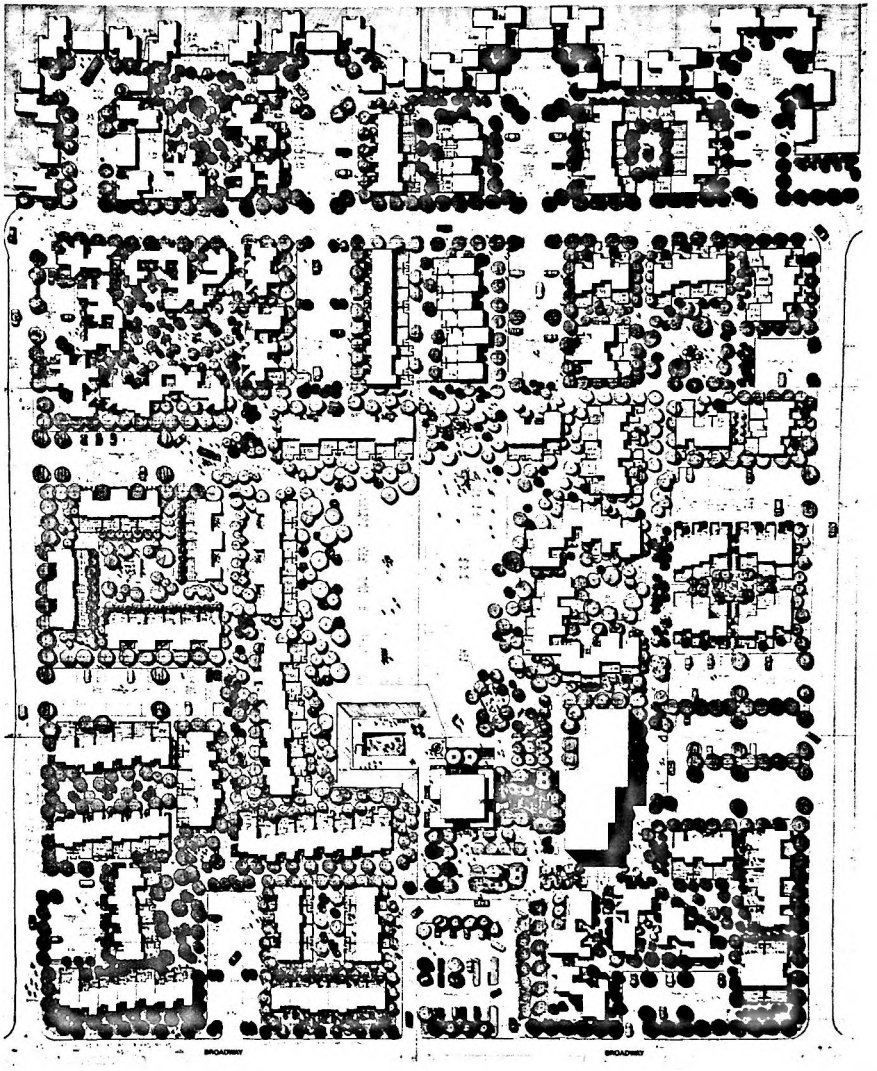
The planners analyzed the housing systems and their site requirements, fitted them into the conceptual site plan, and furnished each HSP with a plan locating each parcel in the overall scheme. The HSP reviewed this "micro-site", ensured that it met certain requirements, and proceeded with preliminary plans. A Site Criteria Program established the concepts for the site plan as well as the criteria and the limits of responsibility to guide the HSPs.

Design Activity: Producer Assignments

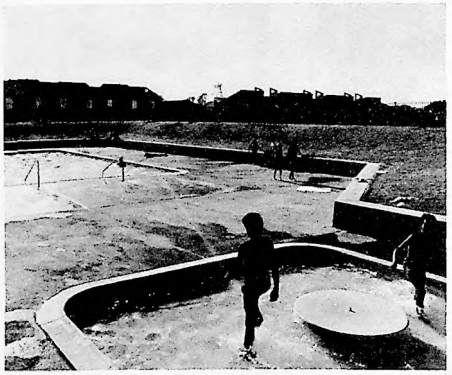
Housing Systems Producers were assigned to the Sacramento site based on parameters established by HUD. The Planners reviewed these assignments as to their suitability. The systems, the number of units and their location on the site were evaluated. Some degree of flexibility existed, particularly with regard to the numbers of units assigned to multi-family low-rise and single-family attached on the same site. The number of units at the Sacramento site grew from 300 to 388 to a final 407 units. The Planners, applying the design concepts of the clusters and rental/owner relationships, prepared a Parcel Plan which established the HSP micro-sites.

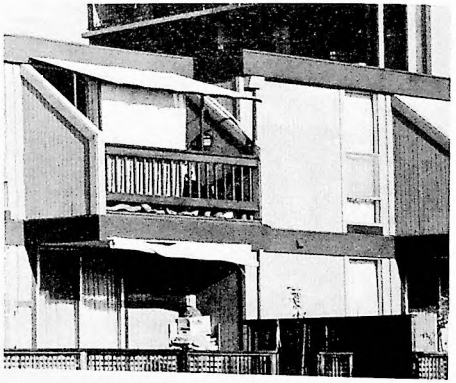
The preliminary site plan followed the design concepts established under Task 1. It incorporated the aims of the Operation BREAKTHROUGH program and the specific requirements of the Prototype Site Developer and of each of the Housing Systems Producers. Two basic relationships between living units and their exterior were established in the plan:

- Some prototype units assigned to the Sacramento site had plans which place a living room on the entry side of the unit with a family room on the rear side. Following the basic site design concept, these units were placed with entries oriented to the parking areas and family living space oriented to the common green area. An entry court screened the front, facing the living room, providing privacy for the residents.



Sacramento Final Site Plan





Recreation at Sacramento included public areas, such as totlots and swimming pools, as well as private yards and balconies.

— Other prototype units assigned to the Sacramento site had plans in which living room/family room were placed on the side opposite the entry. Such units were oriented with the entry to parking, with living space and private outdoor space oriented to the common green area.

The preliminary plan established pedestrian circulation and site amenities as the primary structuring elements for the site. The major pedestrianway was looped through the interior of the site, nearly completely separated from vehicular traffic. As a connection between the housing clusters and their central courts, it was designed to have fingers penetrating the central open space.

Among the many amenities on the site, the plan located a central Community Center with multi-purpose potential. An enclosed area containing swimming and wading pools was placed adjacent to the Community Center. A three-acre park of open lawn for unstructured recreation was located in the center of the project and an outdoor recreational area for the elderly near the high-rise building. Tot-lots and quiet courtyards were located throughout the site.

FINAL SITE PLAN

The final site plan evolved directly from the preliminary plan. Final commitments were made in the types and numbers of units to be used. Some unit sizes and shapes changed over time, necessitating building adjustments within the framework of the plan. Enrichment of the living environment was made by developing the pedestrianways and open spaces to the maximum extent permitted within the budget.

The final plan illustrates the design concepts envisioned early in the program:

— Housing clusters to permit groupings for better sense of identification as well as to open up the site.

— Variety of housing units and green spaces.

– Vehicular circulation and parking kept away from the center of the site.

– Major pedestrianway threading the site with minimum contact with vehicular traffic.

– Large central green space for openness and recreation.

– The small community building, together with the high-rise tower, to form the project's entrance plaza.

– Treatment of parking compounds, fencing and lighting to unify the site.
– Multi-family low-rise rental units cluster around and near the high-rise home for the elderly; single family attached units are sited beyond, while single-family detached houses are located on the northern boundary as a transition to the existing neighborhood.

Graphics

The Graphic Program was divided into two sections: 1) signs needed during construction for contractor information/direction and public information; and, 2) permanent signs for resident, postal and visitor direction after project completion. A bold approach was used on the first phase of signing. A system of signs to direct deliveries to contractor storage yards was developed. The contractors' corporate symbols were incorporated in the design of these signs for easy driver identification. Project identification and on-site promotion, in the form of a construction fence, visitor directional signs, and supergraphics on the administration building, were bold in color and design to stimulate public interest. For the permanent signs a less bold, more human scale was used.

Utilities

Site drainage and utility design presented some challenging problems to the planners, their engineers and the participating utility companies at the Sacramento site. Total energy systems, central plant concept and multiple central plants were all investigated. In view of the economical sources of power readily available to the site, it was decided to utilize

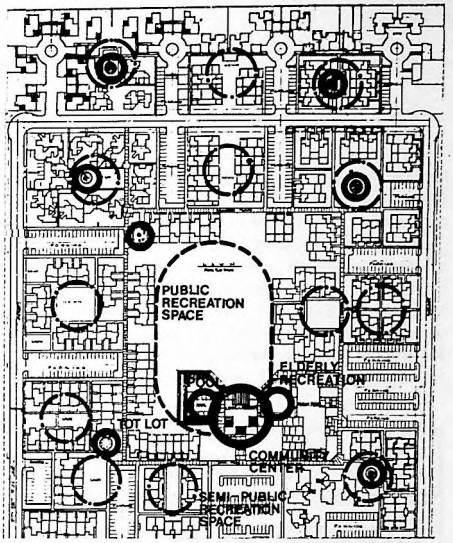
Pedestrianways on the site have little or no contact with vehicles.

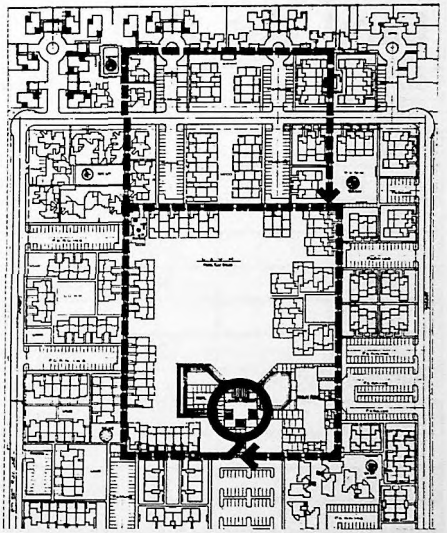
conventional service and metering. While sanitary sewerage was taken south to Broadway, storm sewerage was taken to the north-west corner of the site, necessitating careful coordination. An off-site trunk-line storm sewer, one and one-half miles long, had to be extended towards the American River. This became a critical element in terms of added cost and construction timing.

Joint trenches were designed for the wholly underground systems with the utility companies fully cooperating in their design and construction. The location of the utility lines and their service and splice points required a major coordinating effort for all parties involved. The total site area not within individual lot lines was declared a general utility easement area.

Landscaping

Landscaping at Sacramento BREAKTHROUGH plays a major part in unifying the site. Outside of a small grove of existing trees, the flat site required all new





landscaping. Street trees have been planted to continue the tree-lined character of the surrounding community. The common courtyards of the housing clusters utilize mostly grass and trees with a minimum of paving. Tot-lots were placed in some of these courts. The play areas are integral parts of the landscaping. Extensive use of earth berming gives variety to the flat site and buffers certain noises. The fencing around the entire project was treated uniformly to give some cohesiveness to the varied systems designs. Lighting was developed as a family of fixtures using similar standards. Planting was extensive. In addition to shade trees along the streets, parking lots and walks, clumps and groves of trees were placed throughout for shade, texture, color and enrichment of the matrix in which the housing clusters are set.

The Community Center

A vital element of the project is the Community Center. The Planners chose to include such a facility to serve the residents as a focus for their community activities which could also include participation from the adjacent neighborhoods. It was also designed to serve as a visitor center during the construction and display period of Operation BREAKTHROUGH.

Primary emphasis was given to its community function as a gathering place for social, cultural and recreational exchange. To be managed by the Home Owner's Association, it was designed for all age groups. The Planners wanted the building to respond to Operation BREAKTHROUGH's concepts through the use of factory-built components combined with conventional construction as necessary. The central multi-purpose hall, spanned by a space frame, is flanked by modular "pods" of uniform width, but of varying length. The flexibility of the design makes it admirably suited to its varied functions.

Site Summary Chart - Sacramento

Source: Planners' Reports and Questionnaire Response

Comparative Site Data/ Land Use Facts

SIZE	
Acres	33
HOUSING	
Total Units	407
SFD	20
SFA	179
MFLR	96
MFMR	
MFHR	112
PRODUCERS	
Number	6
DENSITY	
Units/Acre	13

PARKING	
Per Unit	1.61
Site Total	654
On Grade	●
Below Grade	
OTHER USES	
Community Bldg.	●
Community Room(s)	
Maintenance Bldg.	
Commercial	
School	○
Day Care Center	●
Central Utility Bldg.	
Pedestrian Deck(s)	

Comparative Site Data/ Amenity Provisions

OPEN SPACE	
Private	●
Semi-Private	
In-Cluster	●
Central/Common	●
Non-Resident	
RECREATION	
Indoor	●
Tot Lots	●
Playgrounds	●
Playfields	
Hard Courts	
Sitting	●
Elderly	●

Pool	●
Outdoor Event	
Picnic	
Bicycle Paths	
UTILITIES AND SERVICES	
Convent'l Sewer	●
Unconvent'l Sewer	
Convent'l Energy	●
Unconvent'l Energy	
Convent'l Trash	●
Unconvent'l Trash	

CONSTRUCTION DEVELOPMENT

The preparation of contract documents is a familiar process in the construction industry. Two aspects, coordination and phasing, were of more than usual significance in this Operation BREAKTHROUGH project. There was considerably more than the traditional coordination and interchange between Owner, Planner, Consultants and Community Officials.

Coordination with all parties for the sixteen "micro-sites" was a formidable task. Great care had to be exercised in coordination of grading, dimensioning, utility interfaces and all engineering aspects to assure proper matches between housing systems parcels the surrounding areas.

Since certain housing systems would be constructed earlier than others, the aspect of phasing greatly affected the production of the bidding documents. In order to enable as many of the smaller contractors to participate as possible, the various elements of the site improvements were subdivided.

● On Site ○ Off Site

Comparative Site Data/ Environmental Character

DESIGN CONCEPT	
Urban Linear	
Urban Clusters	
Suburban Clusters	●
SITE CONTEXT	
Inner City	
Suburban Developed	●
Suburban Developing	
TOPOGRAPHY	
Flat	
Flat/Contoured	●
Sloped	
Valley	

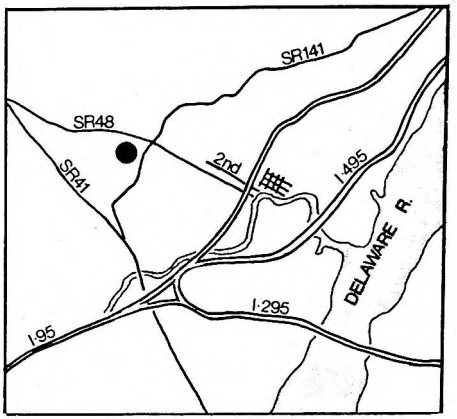
VEGETATION	
None Existing	
Light Existing	●
Heavy Existing	
Light New	●
Heavy New	
WATER	
Stream	
Lake	
ADVERSE CONDITIONS	
Air Pollution	
Noise Pollution	
Water Pollution	

Dwelling Units/ Site/Producers

Alcoa	52
Boise Cascade	75
BSI	
CAMCI	
Christiana Western	73
Descon/Concordia	
FCE-Dillon	112
General Electric	
Hercoform	
Home Building Corp.	
Levitt	
Material Systems	30
National Homes	

Pantek	45
Pemtom	
Republic Steel	
Rouse-Wates	
Scholz	
Shelley	
Townland	
TRW	20
Total Systems Units	407
Non-System Units	
Total Dwelling Units by Site	407

Wilmington



Prototype Site Planner:
RTKL Associates, Inc.
Baltimore, Maryland
Consultants
M. Paul Friedberg and Associates, landscape architecture
Dewberry, Nealon and Davis, engineering
Rivkin/Carson Inc., economic

One of the two discontinued BREAKTHROUGH sites was located in New Castle County, Delaware, near the city of Wilmington. Reasons for its discontinuation are presented and discussed at the end of this section. The planners were able to complete the initial phases of planning (HUD's Task I), the results of which are summarized below. In this phase, the planners performed five general planning tasks:

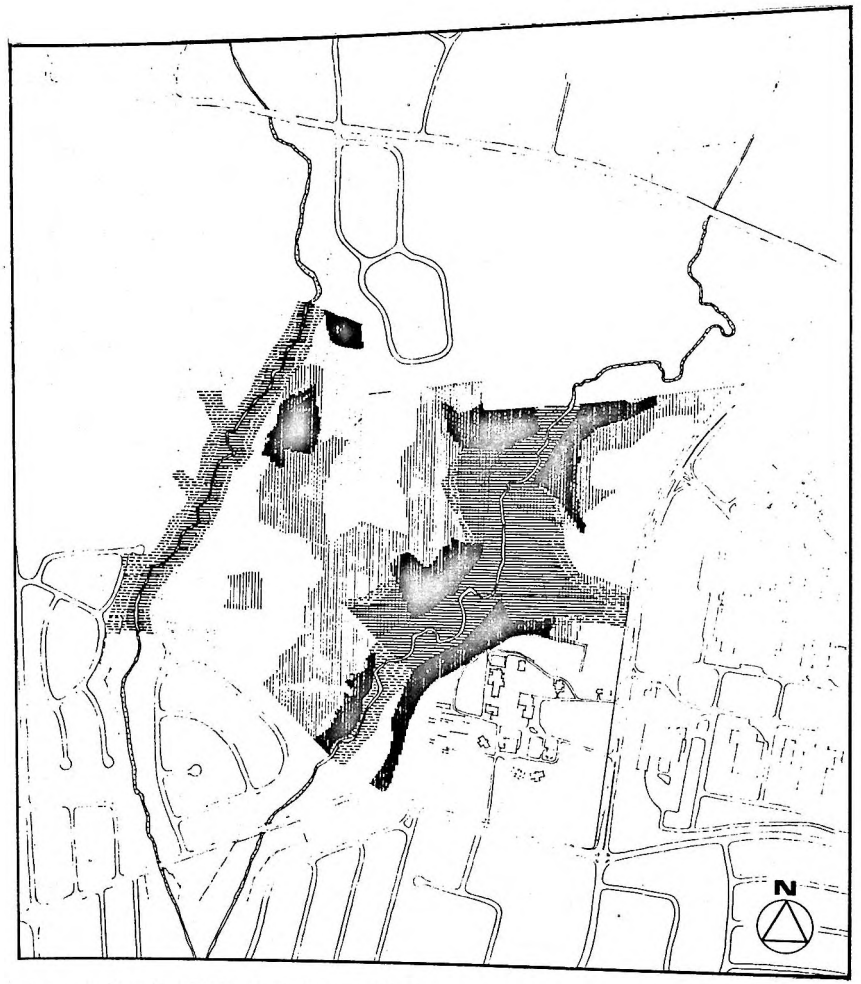
- An analysis of the community setting.
- A site analysis.
- Involvement of the community.
- Development of a land use program.
- Development of a conceptual site plan.

COMMUNITY SETTING

In the analysis of the community around the proposed BREAKTHROUGH site, the PSP reviewed (1) community profile, (2) community facilities, and (3) local planning proposals.

The site offered by the State of Delaware was to be a 97-acre portion for the State's Ferris Vocational School for Boys, a tract that totaled 187 acres. It was, and remains, undeveloped open and forested land separating variously developed lands to the north and south.

The site is served by four major roadways forming a land module within which the site is located. Air and rail terminals are both located within five miles of the site.



A composite of multiple natural features identified the ecologically sensitive areas of the Wilmington site.

A survey of existing and proposed community facilities in the area was undertaken. This survey enabled the planning team to determine the impact of BREAKTHROUGH as well as the facilities needed on the site. Included in this survey were schools, libraries, civic facilities, state and federal facilities, shopping, and health facilities.

Among the local planning proposals, the most pertinent was the proposal by the Army Corps of Engineers to handle the flood problem of the Little Mill Creek which runs through the site. Discussions between the Corps and the planners were held in the hope that the Corps' plans would best suit recreational opportunities.

SITE ANALYSIS

The Wilmington planners' analysis of the site included examination of (1) natural features, (2) utilities, (3) access, (4) pollution factors, and (5) local restrictions and regulations.

The planners felt that the physical characteristics of the site, through its beauty and its varying conditions, offered great opportunity to display BREAKTHROUGH in the most attractive manner. Generally the only limitations were due to some areas of prohibitive topography and a flood plain created by the flood control project.

Among the natural features analyzed were topography, drainage, soils, climate, and vegetation. Suitable building areas were delimited by steep topographies, poor drainage and flood conditions, and the existing borders of the forest mass. Compatibility with such non-building conditions as roads, active recreation areas and passive recreation areas was also analyzed.

Conclusions referring to the provision of utilities were made in which water supply, natural gas, and electricity services were seen as being adequate. A further study of sanitary sewer problems during rainfall was recommended.

Vehicular access to the site, as well as the projected

impact of BREAKTHROUGH traffic on existing streets, was judged acceptable. After studying various levels of pollution, existing and potential, it was concluded that further study of water pollution factors was warranted since the site is bounded by creeks on the east and the west.

In order to accommodate the desired BREAKTHROUGH densities, it was necessary to request rezoning of the site. In the absence of state-enabling legislation as an instrument of cooperation with BREAKTHROUGH, the normal rezoning procedures were undertaken. Eventually a Planned Unit Development classification was recommended but not enacted.

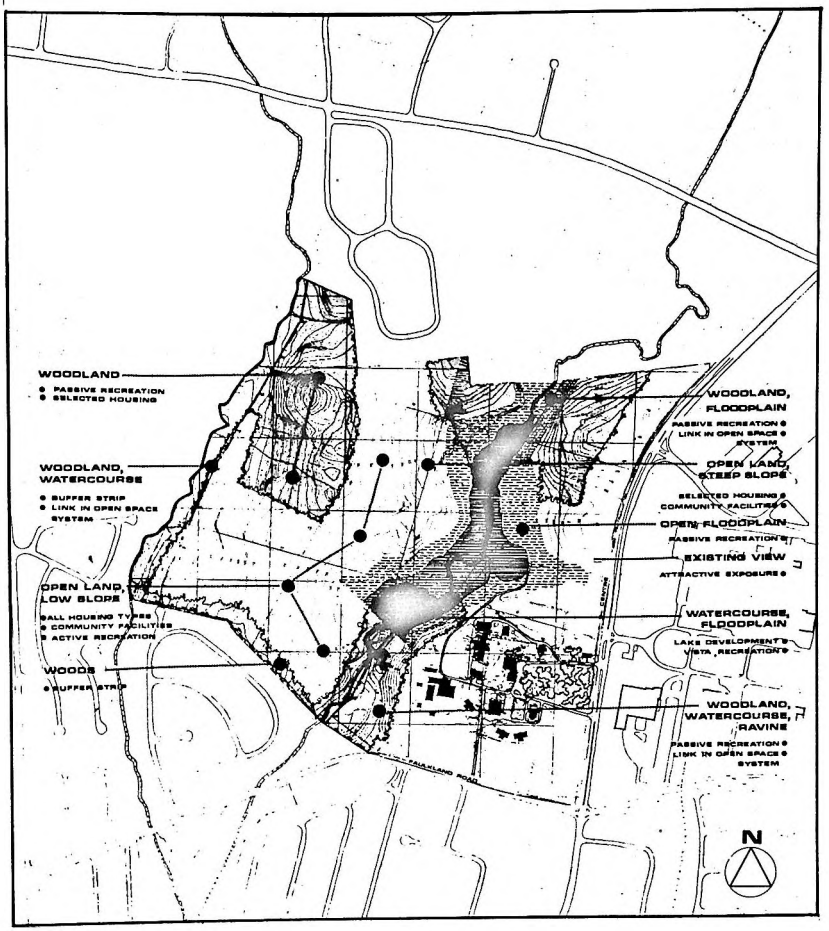
COMMUNITY INVOLVEMENT

The unique nature of community context at Wilmington required intense and multi-faceted activity concerning community relations and involvement. This activity included working relationships with appropriate agencies at all levels and a major communications effort with site neighbors, county and regional organization, and the public at large.

The most intense and vocal concern occurred in the communications with the adjoining neighborhoods. The planner's objectives were to provide easy access to facts about the program, to elicit ideas on neighborhood needs, and to counter the program's opposition. Many meetings with various factions and groups were held.

DEVELOPMENT OF A LAND USE PROGRAM

Concurrently with the community discussions, the development of a program for land use was proceeding. By carefully studying several considerations, the planners were able to produce a summary development program. Among the studied considerations were the county's housing market, the status of open space, recreational and educational facili-



The site analysis for Wilmington documented the lands features with respect to their ability to be developed.

ties, the population and school enrollments, and anticipated visitor needs.

The housing market study revealed that the entire 200 units pegged for the site could have been easily marketed as single-family homes, as garden apartments, or some combination thereof. Because of the experimental nature of the BREAKTHROUGH program, considerations other than market constraints were necessary. A mix of housing types evolved, including single-family detached, single-family attached (townhouses), and garden apartments. Both sale and rental units were programmed.

Viewing the BREAKTHROUGH site as an integral part of the existing community and as a key precedent to future urban expansion, the planners engaged in a study examining potential future open-space community and county-wide relationships with the site. This study included not only a quantified documentation of open spaces, but also a detailed listing of activities available in them. The study revealed that regional and district park facilities and access were more than adequate, but that neighborhood parks fell far short of the desirable attributes. The planners developed a systematic process in which the unmet open space needs were matched to land requirements and subsequently to the capacity of the BREAKTHROUGH site in order to reach the optimum open space provisions by the site. It was concluded that the site's open space should be a well-integrated, functioning system incorporating a neighborhood park and facilities for special recreational and educational programs, including possibly an elementary school.

After population and school capacity analyses, the planners proposed to the local school board that a 21-acre school—park site be developed adjoining the site. The board was considering the proposal at the time of discontinuation.

CONCEPTUAL SITE PLAN

The conceptual site planning process entailed the development of alternative site development concepts, an extensive review and evaluation of these concepts and subsequently the selection and refinement of one of these concepts as the recommended conceptual site plan. General planning objectives included:

- To create a residential living environment in accordance with the cost saving and innovative objective of Operation BREAKTHROUGH and the highest possible standards of site planning, design and architecture.

- To develop the site in a manner which is compatible with, and an integral part of, the larger community recognizing:
  - the physical development and growth trends of the area,
  - available and proposed community facilities and services and their capabilities,
  - area—wide planning proposals, and
  - community attitudes and values.

- To develop the site in a manner which sensitively recognizes the unique natural environmental qualities of the site and minimizes the disturbances to the natural ecology.

- To provide a compatible mixture of housing types which:
  - responds to the relative housing needs of the community,
  - provides for a degree of socio—economic mix among residents, and
  - effectively demonstrates the assigned building systems capabilities.

- To provide a physical environment conducive to promoting a sense of community through voluntary associations rather than any prescribed notion of social conduct or group behavior.

In developing alternative site plans for the BREAKTHROUGH Site, consideration had been given to a number of planning criteria as well as objectives. Three alternative development concepts were generated by the design team. Because similar criteria were not necessarily mutually exclusive, a great deal of trading off of elements between concepts was possible. In addition, criteria were presented without making an attempt to judge their relative values. The evaluation process among professionals and the local community which took place afterwards enabled the design team to rank the objectives and criteria.

The planners established the following criteria under which an evaluation of alternative concepts could be made:

- Location of the developed area within the 100-acre parcel.
- Relationship to natural features.
- Relationship to surrounding communities.
- Location of display/community buildings.
- Inclusion of school and other community facilities.
- Circulation.
- Density.
- Open space.
- Utilities.
- Physical form and building system.

Derived from the selected alternative development concept, the recommended conceptual site plan utilized 35 acres of the 97-acre site specifically to accommodate the Operation BREAKTHROUGH development, while the remaining portions of the site were designated for other public uses integrally related to the Operation BREAKTHROUGH development.

The Operation BREAKTHROUGH development was to be located on the central area of the site along the prominent ridge and above the flood plain to the east of the development. The development area was strategically located on that portion of the site which could be developed without destruction of existing tree cover. The plan itself demonstrated an approach to cluster development which could be staged easily and effectively.

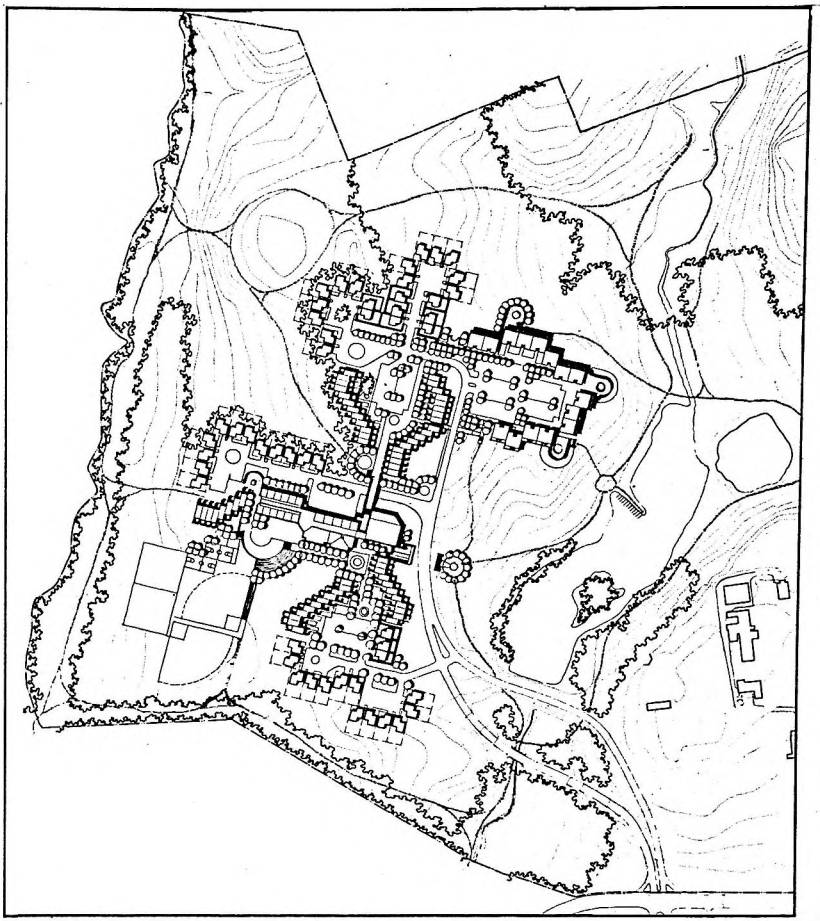
Housing was to be organized in four major clusters, maximizing the number of dwelling units with direct access to open space. A gross density of 5.7 units per acre was achieved. Three of the housing clusters contained single-family detached, semi-attached and townhouse units. The fourth cluster contained garden apartments located on a promontory overlooking Mill Creek Valley and a proposed water feature. Housing clusters having direct interface with adjacent neighborhoods were compatible in type and density with neighboring units and separated by an open space buffer.

Within the three mixed housing clusters, single-family detached houses were arranged in small, intimate clusters around motor courts. These single-family detached groups spatially flowed into larger, more public spaces formed by townhouse clusters which, in turn, funneled pedestrian movement toward centrally located community facilities, thus establishing a desirable heirarchy of open space.

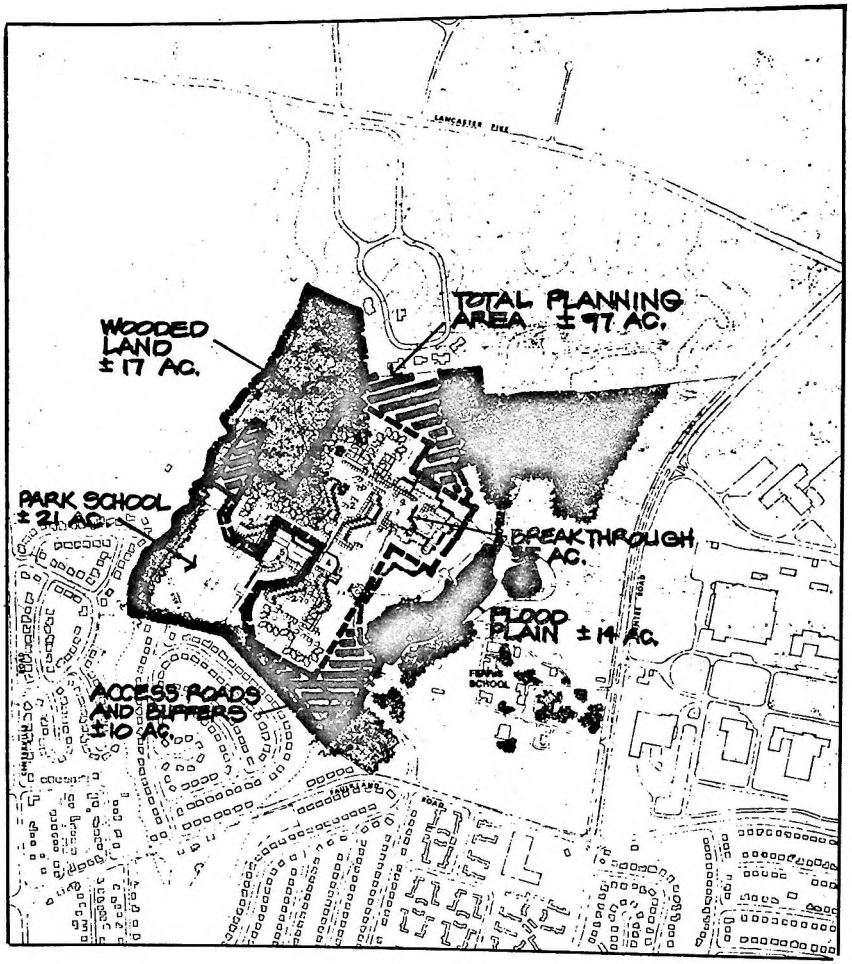
Community facilities were designed to serve not only the residents of the Operation BREAKTHROUGH development but also residents of adjoining neighborhoods. These facilities included a visitor's center to display models and information during the two-year demonstration period, thereafter being converted to a community recreation-meeting building. Immediately adjacent to the center was the site of a proposed K-4 school-park. The school-park was located on the most level portion available on the site. Directly adjoining the school building was an active playground area which would be developed on the 21-acre school site.

These central community facilities were interconnected to the Operation BREAKTHROUGH housing clusters and adjacent neighborhoods by a pedestrian circulation system separated from the automobile traffic. A pedestrian overpass connected these facilities with housing clusters to the north while a pedestrian underpass connected these facilities with overflow school parking, open space and possible water recreation to the east.

The automobile circulation system was designed to minimize through traffic within individual housing clusters by employing cul-de-sac roads into individ-



Wilmington Proposed Site Plan



Distribution of land area, Wilmington Site

ual clusters from the primary roadway. Auto access from Faulkland Road to the Operation BREAKTHROUGH development was to be accomplished via a divided roadway with the ingress roadway running over a proposed earth dam developed in cooperation with the Army Corps of Engineers flood control project.

Located along the pedestrian circulation system were mini—recreation nodes designed to serve their respective housing clusters. These nodes incorporated adult sitting areas and childrens' play areas. The mini—parks and the playground facilities to be developed in conjunction with the future school provided for the major active outdoor recreation needs of residents of the development and adjoining neighborhoods. In addition, provisions were made to accommodate a possible future district park facility to be developed by the County Parks Department on the forested open space and lake areas of the site and adjacent stream valleys. A continuous open space system was created which would surround the Operation BREAKTHROUGH development and connect to adjoining areas.

DESIGN OBJECTIVES

The following design objectives were employed in the development of the recommended conceptual site plan:

- To directly relate dwelling units to open space (maximize the number of units with immediate access and views to open space).
- To develop in a compatible manner (scale, character and unit type) those residential sites which interface with existing neighborhoods.
- To closely relate different housing unit types and densities.
- To locate apartment parking areas with immediate access to the roadway.
- To locate single-family detached units on their

individual parcels in a manner which consolidates private yard space.

- To integrate a K-4 neighborhood school and related recreation facilities into the development and link these facilities to those adjacent neighborhoods.

- To integrate a display building into the development which is directly accessible from the primary roadway and directly related to the school when the structure is eventually converted into a community center.

- To provide a variety of active and passive recreation facilities and open space.

- To preserve the natural tree cover and vegetation as much as possible.

- To provide a well ordered internal auto circulation system which recognizes the amount of traffic generated at various points within the development and minimizes the amount of through traffic within the various residential clusters.

- To provide a continuous internal pedestrian circulation network which links the various residential clusters with community facilities, recreation and open space, and adjacent neighborhoods.

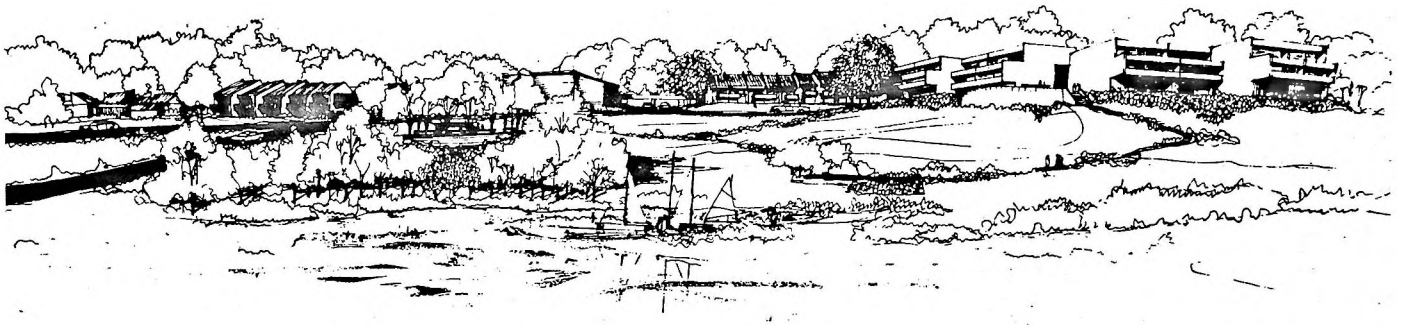
- To minimize pedestrian–vehicular conflicts.

- To provide adequate parking within close proximity to dwelling units.

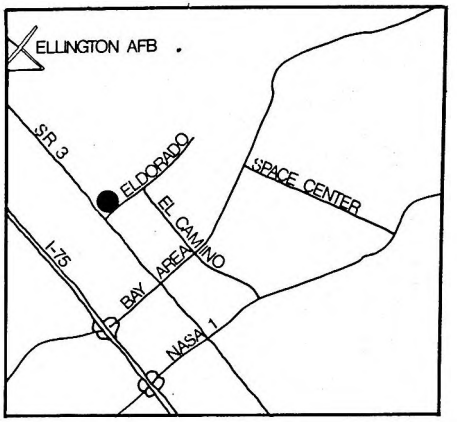
CANCELLATION OF THE PROJECT

At the completion of Task I numerous factors had been identified which were key to the implementation of the project. Each of these factors were in various stages of resolution. First, required legislative approval for the sale of state lands appeared probable. Second, legal challenges to the use of housing on the property had favorably passed lower courts and were before the State Supreme Court. Third, rezoning requests had passed the planning commission and were before the City Council. The proponents of the project were optimistic that each issue would be successfully resolved, but predicted that the project would be slowed by several months.

HUD, in view of prospective delays caused by the above issues and because of disproportionately high projected site preparation and development costs (due to low gross density, a lengthy entrance road, and considerable sewage improvements), was forced to eliminate the site from the program.



Houston



Prototype Site Planner:
Caudill Rowlett Scott
Houston, Texas
Consultants:
Lifson, Wilson, Ferguson & Winick, Inc., market
McClellan Engineers, Inc., soils

The second site to be discontinued by HUD after Task I was located in the Clear Lake City area near Houston, Texas. The planners of the BREAKTHROUGH housing effort conducted initial analysis of two separate sites, one succeeding the other for reasons discussed below. For the initial site, numerous planning subtasks were completed, ranging from an analysis of physical characteristics to conceptual studies. For the second site, programming and conceptual designs were performed.

THE ORIGINAL SITE

Physical Characteristics

A 15-acre site was offered by the owners of Clear Lake City to BREAKTHROUGH. Clear Lake City is a 3,500-acre planned community in an unincorporated area south of Houston and adjacent to the NASA Manned Spacecraft Center. A number of similar developments are in the area; all are characterized in a similar manner: open, low density subdivisions with garden apartments, townhouses and, single-family detached dwellings. Commercial and light industrial development have been confined to areas adjacent to major arteries.

Clear Lake City has been planned as a series of residential neighborhood cores, each of which contains an elementary school, outdoor recreation and convenience shopping. A Town Center is planned to incorporate major shopping facilities. At the time of planning for BREAKTHROUGH, about 2,000 dwellings had been sold in Clear Lake City, some as low as $16,000, but most in a range from $23,000 to $35,000.

There were no trees in the natural landscape sur-

rounding the original BREAKTHROUGH site. Low budget landscaping installations had been made in the developing areas, but without continuity or aesthetic unity in the plant materials and their use. Most of the planting exaggerated the extreme horizontality of the region.

The planner's site analysis included a documentation of nearby community facilities, including shopping centers, schools, employment centers, churches, parks, swimming pools and sports areas. Their analysis of topography and drainage revealed not only the obvious flat terrain, but potential drainage-related problems pertinent to the site. For example, an open ditch bounding the eastern property line was viewed as a potential source of mosquito breeding and for consideration as a potential health and environmental hazard to the development.

The planner also observed that the Coastal Prairie soils had poor internal drainage characteristics contributed by numerous factors difficult to alter: low content of organic matter, poor internal drainage, working of the land when wet, grazing under wet conditions, submergence of extended periods, and a high content of silt and clay. The use of commercial fertilizers was seen as necessary.

Area Planning

The Houston region had no current regional plans at the time of BREAKTHROUGH planning. The developments within the region, such as Clear Lake City, had individual plans, often officially approved by the City of Houston Planning Commission. Annexation of the Clear Lake City area was being undertaken by the city of Houston, but not without problems created by the independent Clear Lake Water Authority and its current bonded indebtedness. The residents of Clear Lake had long expressed a desire to incorporate their community separately and distinctly from Houston and nearby Pasadena.

The BREAKTHROUGH site, therefore, was under the general jurisdiction of multiple planning agencies. Included were the Houston City Planning Commission, with subdivision control; Harris County, with control over construction standards; the

Houston-Galveston Area Council, a voluntary association of municipal and county governments; the Clear Lake Water Authority, with taxation powers; the Clear Creek Independent School District; and the Clear Lake Community Association, a private, non-profit service association. The existance of many, often overlapping, agencies such as these complicated the planning process.

Neighborhood Characteristics

The residents of the area surrounding the first BREAKTHROUGH site were young families, upwardly mobile and socio-economically middle class. Their concerns for property value and socio-economic status were revealed in their general resistance to the HUD BREAKTHROUGH program.

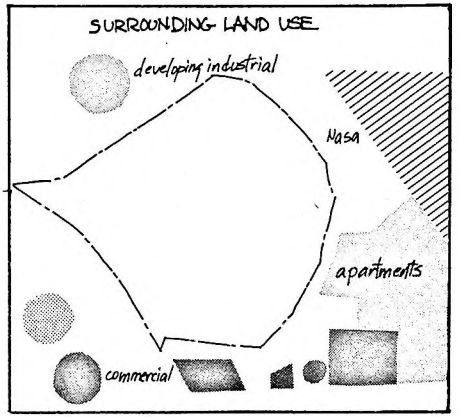
Three community organizations were pinpointed for involvement in the planning of the site. The PSP proposed a series of meetings with them in order to exchange ideas and concerns and to provide a liaison with their respective organizations and constituencies. The planner also recommended a substantial public information and public relations program in conjunction with the planning of the site.

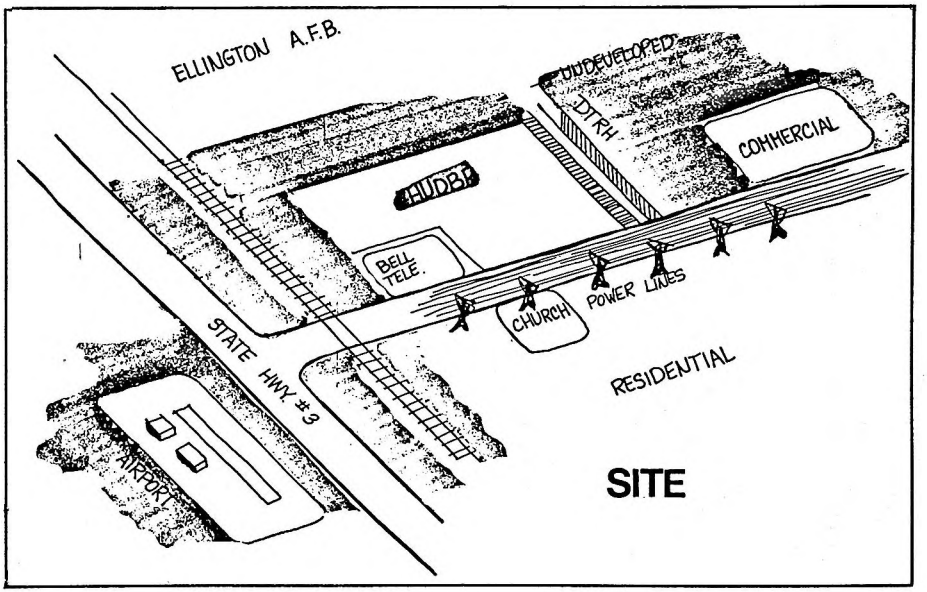
The concerns and resistance shown early in the planning of the site by the area residents contributed in part to HUD's eventual discontinuation of the Houston site.

Preliminary Design Objectives

As in all of the BREAKTHROUGH sites, the planner of the Houston site established a set of planning objectives early in the first Task. The planning and design objectives were:

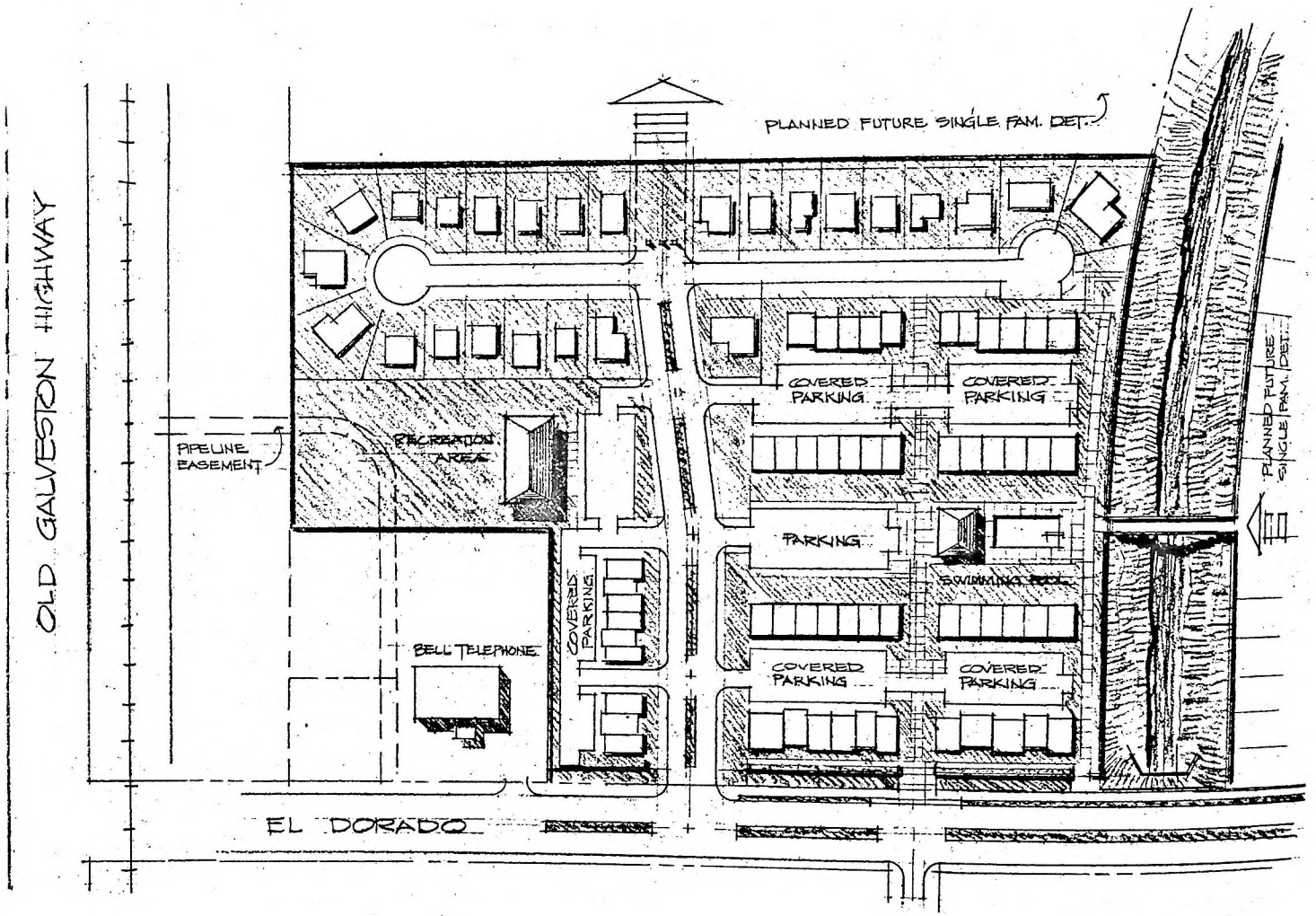
- Plan for a development that is socially and physically compatible with the adjoining neighborhoods.
- Develop optimum physical and social settings.
- Establish a distinctive character and identity for the development while relating it harmoniously to adjoining sections of the community.





Area descriptions for the first Houston site (below) and the second (left).

Houston Proposed Site Plan, First Site



– Make provisions for functional connections and social and/or recreational interaction with adjoining areas.

– Organize density, landscaping, and dwelling unit orientation to minimize noise, light, and traffic hazards.

– Minimize on-site traffic flow and minimize localized areas.

– Provide neighborhood recreation center as a focal point of the development.

– Develop a sense of harmony and relatedness between different dwelling unit types.

A subsequent redefinition of design objectives for the Houston site was made by the planner. Several of the above objectives were retained, but as a reflection of the market and the residents' concerns, several were added:

– Use the site to successfully demonstrate housing systems.

– Provide dwelling unit sizes and values comparable to or better than the existing market provisions.

– Minimize site and development costs per dwelling unit.

– Reduce project maintenance costs.

Development Program

Within the constraints provided by the above objectives and the market analyses, a development program was produced. Prior to the design of conceptual alternatives for the site, an analysis of the area was completed based upon a program for 140 units, two more studies for lesser amounts (75 and 130 units respectively) and a fourth for 108 units. The analyses included program, market considerations, site coverage, provisions of open space and recreation, parking and circulation, easements and setbacks, and a community park.

Concept Plan

The planner developed a concept of sectored dwelling unit groupings for the Clear Lake City site. The sector theory grouped units by their system and through an internal organization that located housing types most directly interrelated with each other. The optimum affinities between types were single-family detached with single-family attached and single-family attached with apartments, with single-family detached having a negative affinity with apartments.

With this as the ordering element, a concept plan was developed. The plan had the following characteristics:

– Circulation was simple and legible, adhering to a clear functional hierarchy.

– The major automobile entrance was gracious and distinctive.

– The major pedestrian walkway related to an adjacent street and to the adjoining neighborhood, with a pedestrian connection to the park from the adjoining neighborhood provided by a bridge over the drainage canal.

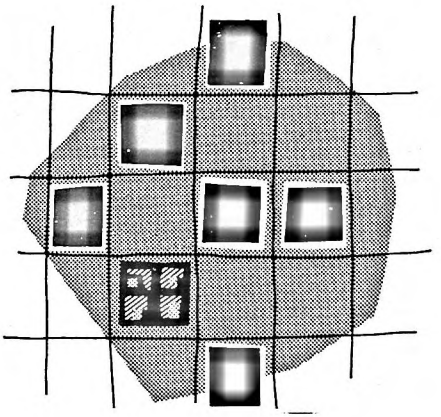
– Apartments were strongly related to the park and swimming pool.

– Single-family dwellings abutted the only property line shared with adjoining developments.

– Dwellings were kept away from a pipeline easement.

– Five development parcels were provided with a flexible mixing of dwelling types for both system and dwelling type changes.

Modular planning system for Houston second site.



THE SECOND SITE

The low level of existing amenities and the presence of undesirable/natural elements, in combination with neighbor resistance, led to an offer by Clear Lake City of another site within the new town for the BREAKTHROUGH demonstration. The second site was much larger than the first, 65 acres on virtually flat land with a mature grove of trees located on the eastern third of the site. The amenity level was seen as being much more desirable than that of the first site.

Like the first site, the second site had low density neighbors, developing industrial and commercial strips, and drainage easements abutting the site and a pipeline through it. Much of the analysis conducted for the first site could be applied to the second.

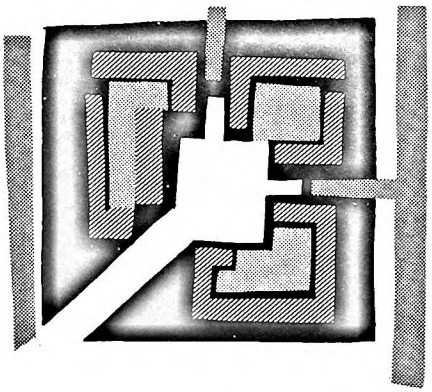
The planner retained the design objectives for the new site and added four basic precepts as criteria for achieving a creative solution to the physical design of the new site:

- Develop the site as a unified neighborhood in which the BREAKTHROUGH prototype would be the first stage.
- Pedestrian circulation dominating the neighborhood with the automobile used for movement to and from the neighborhood.
- Create a planning system that will allow the grouping of individual building systems, establish order for service and utilities, and promote social identity among neighbors.
- Establish a sequence of pedestrian spaces as the focus of the neighborhood life.

A new development program was proposed for the second site, in which a combination of single-family detached units, townhouses, and multi-family units totaled between 180 and 195 units. Also programmed were the site improvements, recreation facilities and parking requirements.

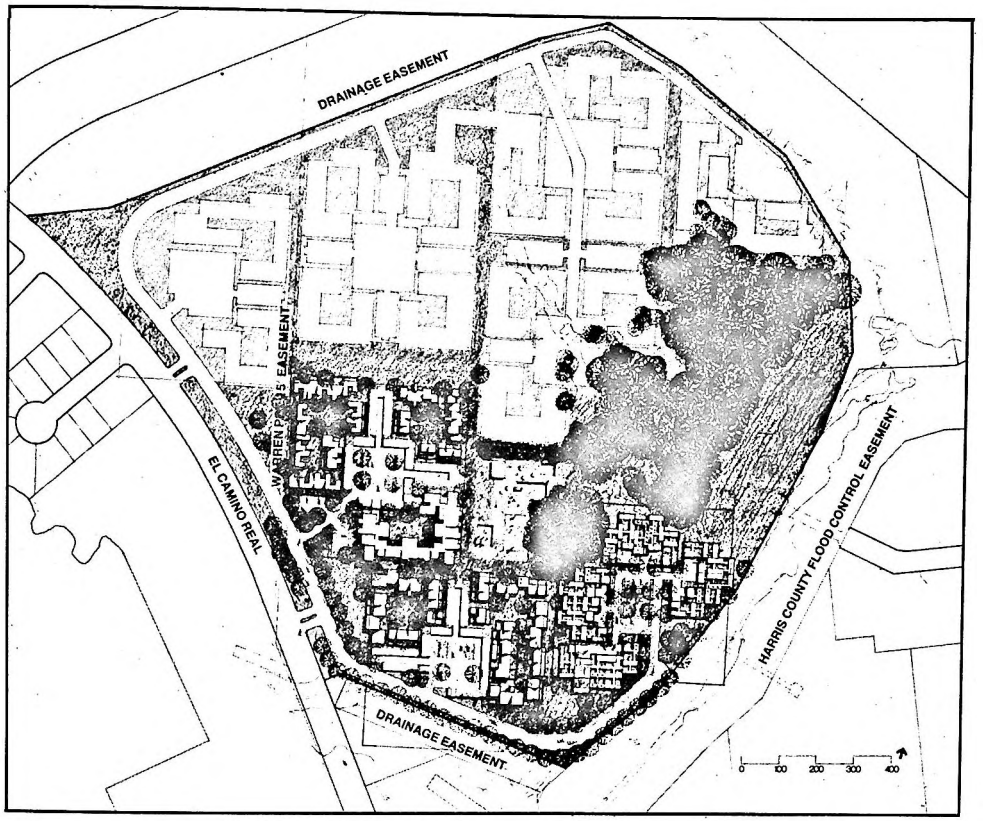
The second site study resulted in a second concept for design that reflected the BREAKTHROUGH site's contextural relationship with the entire neighborhood and the site's role as a module within new development on the 65-acre tract. The planner developed a planning system in which the BREAKTHROUGH site was a module of the neighborhood and consisted of clusters designed by the same housing system producer. The planning modules were composed of dwelling clusters arranged around central guest parking and private tenant parking areas. The smaller clusters consisted of mixed groups of same-system dwellings within a space envelope that focused on a semi-private courtyard. Three of the larger modules comprised the BREAKTHROUGH prototype and were to be connected by a system of pedestrian greenways and adjoined by a recreation area.

Development module for second site.



CANCELLATION OF THE PROJECT

At the completion of Task One, and after review by the Department of Housing and Urban Development, the Houston site, along with the New Castle County Site, was canceled. Primarily a budgetary move in both cases, HUD also took into consideration other factors. At the Houston site both community pressure and low labor costs for traditional housing construction which affected the feasibility of manufactured housing contributed to the decision.



Houston Proposed Site Plan, Second Site

6

Photoreview

As the preceding summaries demonstrate, and developed a number of methods to achieve them. On a site by site basis, the major considerations incorporated by the planners are displayed in the following pages.

The Planners of the **Jersey City** site viewed the main objective as the maintenance of a high degree of flexibility with a minimum amount of diversity. In order to define a framework within which each housing system could be built, they established a set of six guiding principles for the site design, encompassing considerations for orientation, open space, pedestrians, nonresidential uses, and socioeconomic mixes.

The **Memphis** site planners identified two principle objectives as their guidelines. They wished to provide a new housing community in a declining, transitional neighborhood, and they wanted to assure the creation of a link between the central business district and a major medical center. Their planning context was made unusual by a high volume of automobile traffic, creating problems of safety, air pollution, and noise abatement for the site.

In **St Louis**, the planners were principally concerned with a creation of a residential environment superior to comparable areas of the city. Accordingly, they identified separation of automobiles and pedestrians, comprehensive pedestrian environments, retail services and conveniences, and identifiable outdoor spaces among their objectives. Their planning task included physical integration with an existing development that bisected the site.

The broadest and most comprehensive list of objectives were identified by the planners of the **Seattle** site. The list included not only concerns for the site's context within the city, but also the functional relationships between the various elements within the site. Through this detailed, goal-oriented analysis, the Seattle planners were able to systematically monitor the relationships between their planning product and their planning principles.

The **Indianapolis** planners were at the outset guided by concepts rather than goals. They felt that a strong, clear, and perceptible concept could serve as the organizer of the diverse forms found in the housing systems themselves. They developed graphic schemes for circulation, density patterns, open spaces, facilities, and infrastructure systems prior to transferring the conceptualizations to the site. Another major planning activity by the Indianapolis planners was a program of community liaison with neighbors, civic leaders, and government officials.

The development of various land use alternatives for the **Kalamazoo** site was based on design objectives that included pedestrian and vehicular considerations, optimization of residential environment potential, ecological concerns, equity in parceling for producers, and maximum use of the land topography, and the development of a community participation process occurred early in the planning of the site.

In suburban **King County,** Washington, the planners used their design objectives as the basis for evaluating conceptual site plans. Their objectives emphasized the natural state of the site and the neighborhood by stressing conservation of natural features, buffers and open spaces, and architecture in the idiom of the Northwest. The planners also included the minimization of development costs as a goal of the design.

Similarly, the **Macon** planners established ecological and recreational concerns as primary objectives. The designers cited the character of vegetation and topography, the maintenance of the site ecology, and the encouragement of social and recreational activities, along with economic mix, private versus public space, and an open space system to reinforce other elements of the plan.

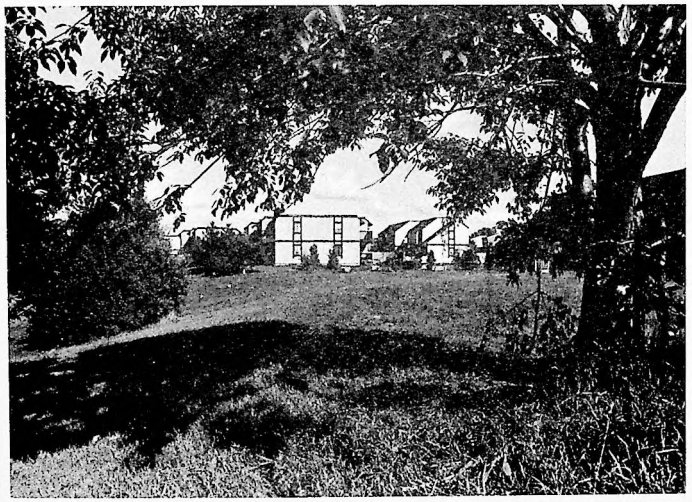
Finally, the **Sacramento** site planners keyed their objectives to variety, to be expressed by a broad range of building types, clustered developments and a range of open space sizes. To provide continuity, the planners made an objective of using similar graphic elements (signs, fencing, lighting). Their vehicular goals included concern for the surrounding community and the peripheral siting of clustered parking lots.

The following pages review in photographs the BREAKTHROUGH programs and the manners in which the planners met certain objectives. While the objectives varied from site to site, there were general considerations common to all of the sites.

Objective: To create physical and social patterns harmonious with the surrounding community.

Much of the success or failure of any new development relates to the degree to which it is compatible with its neighbors. In the nine Operation BREAKTHROUGH sites a wide variety of settings gave each set of planners a broad array of considerations about the physical and social needs emanating from beyond the boundaries of the sites.

Kalamazoo



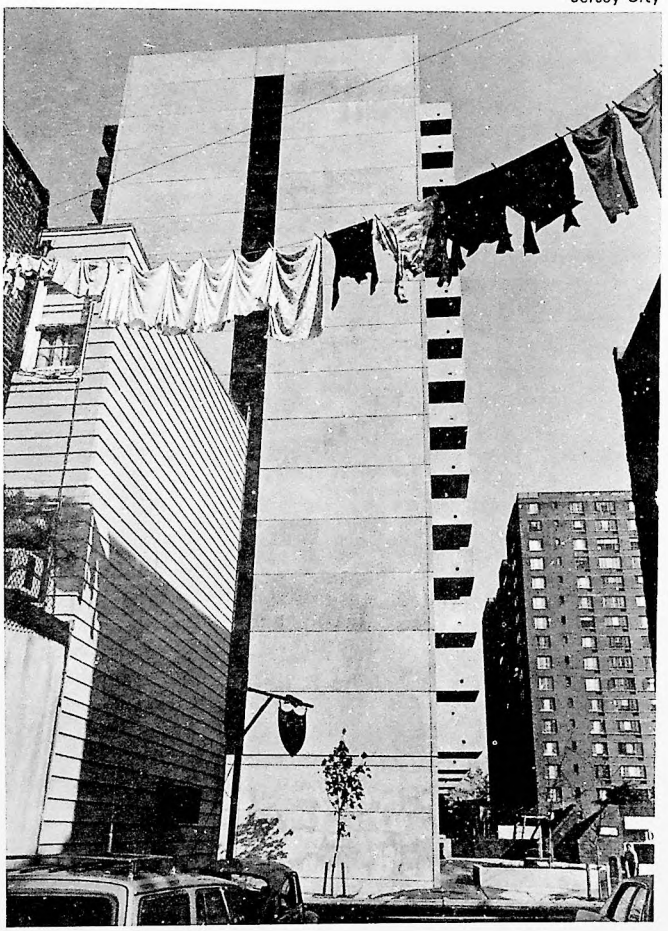
The urban sites, in general, had to deal with different varieties of external concerns than did the suburban sites, such as those arising from essentially manmade urban environments versus natural suburban environ-

St. Louis

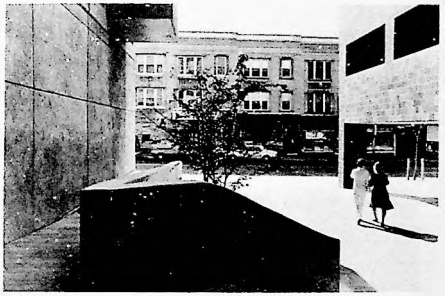
Memphis

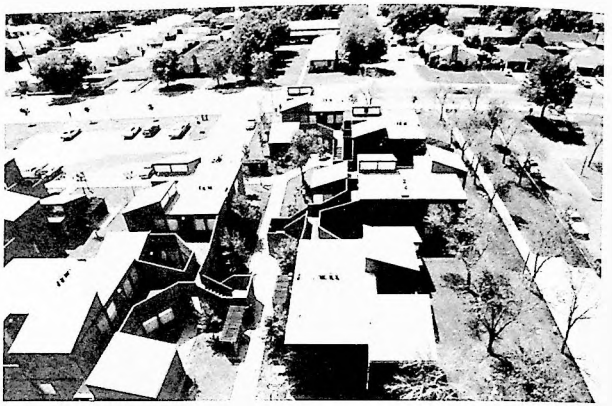
The urban locations needed to accentuate the positive manmade elements of their settings while minimizing the negative forces.

Jersey City



The pedestrian was of particular concern. In one urban site, for example, provisions for pedestrian penetrations into the site became the structuring basis for the site planning.

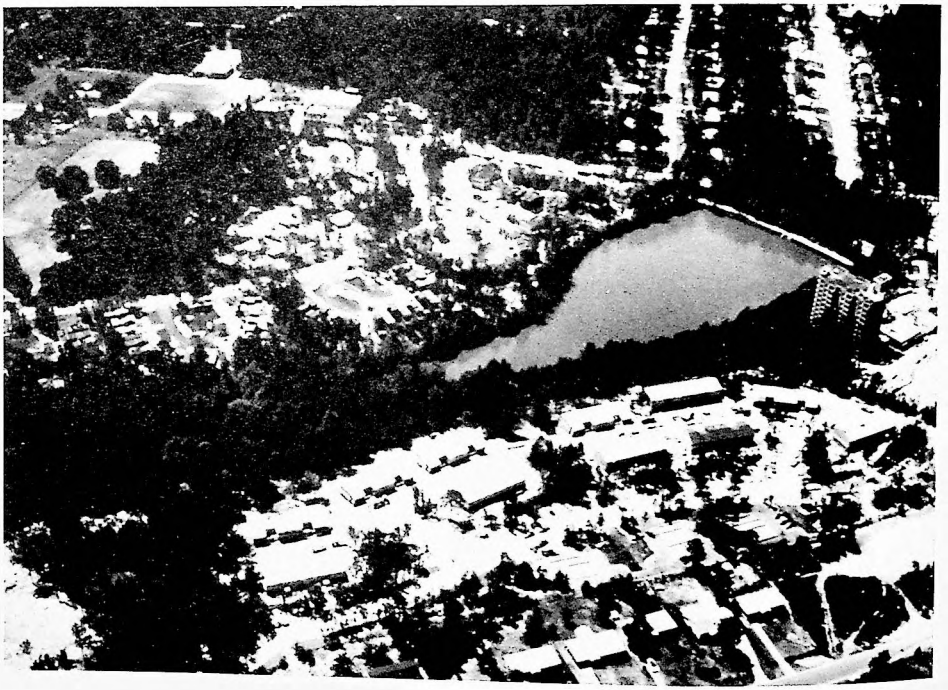




Sacramento

Macon

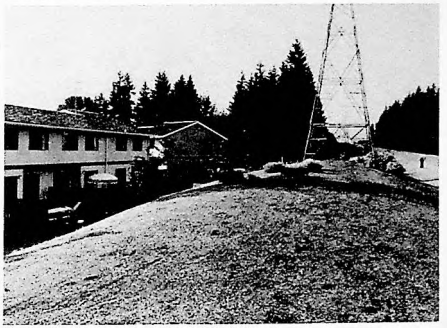
The surrounding development patterns of the suburban locations were continued on some of the sites or altered in others; these decisions depended on the environmental constraints of the sites themselves.



Existing public infrastructures, such as street and utility systems, provided additional elements defining the way in which planners could deal with the relationship of site to environs.

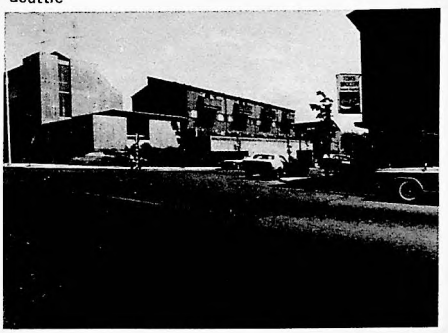
Sacramento

King County

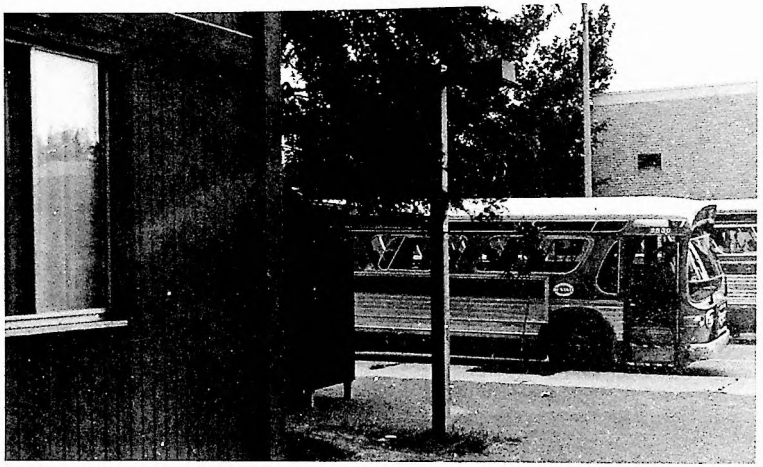


Seattle

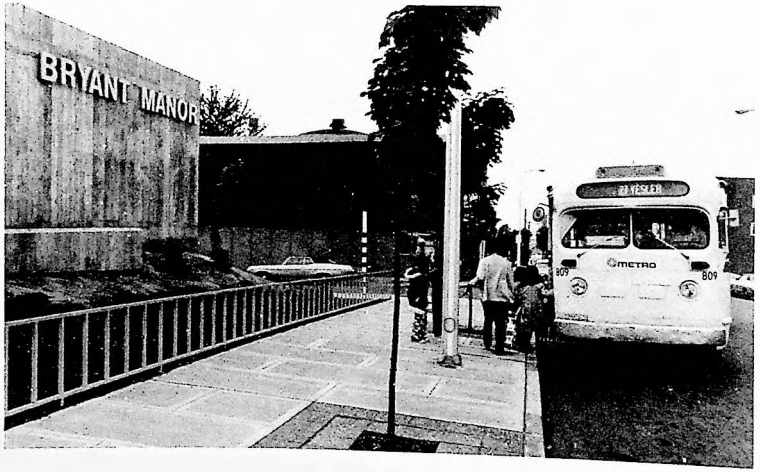
Seattle



Design and planning criteria for the site, such as these bus stops, contributed to the pattern of relationship between the site and neighboring communities.



St. Louis



Seattle

The variety of land and vegetation forms included water and dense trees, flat open land, and northwest forests. The site plans preserved the indigenous qualities of these areas.

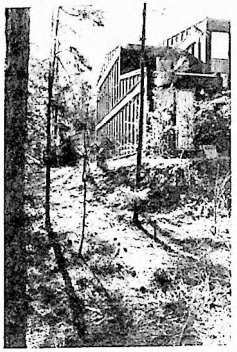
Indianapolis

King County

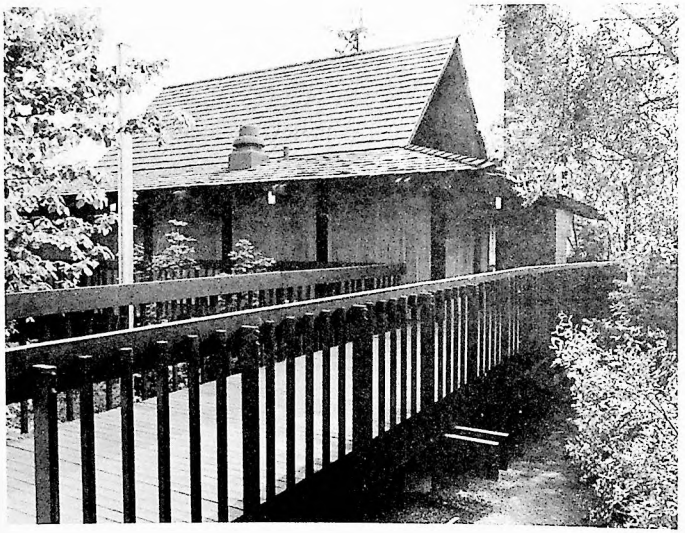
Objective: To make maximum use of existing natural features while minimizing ecological disruptions.

The suburban BREAKTHROUGH sites provided particularly challenging natural environments for the planners. Concern was expressed not only for preservation of the environment after completion of construction, but also for protection during construction.

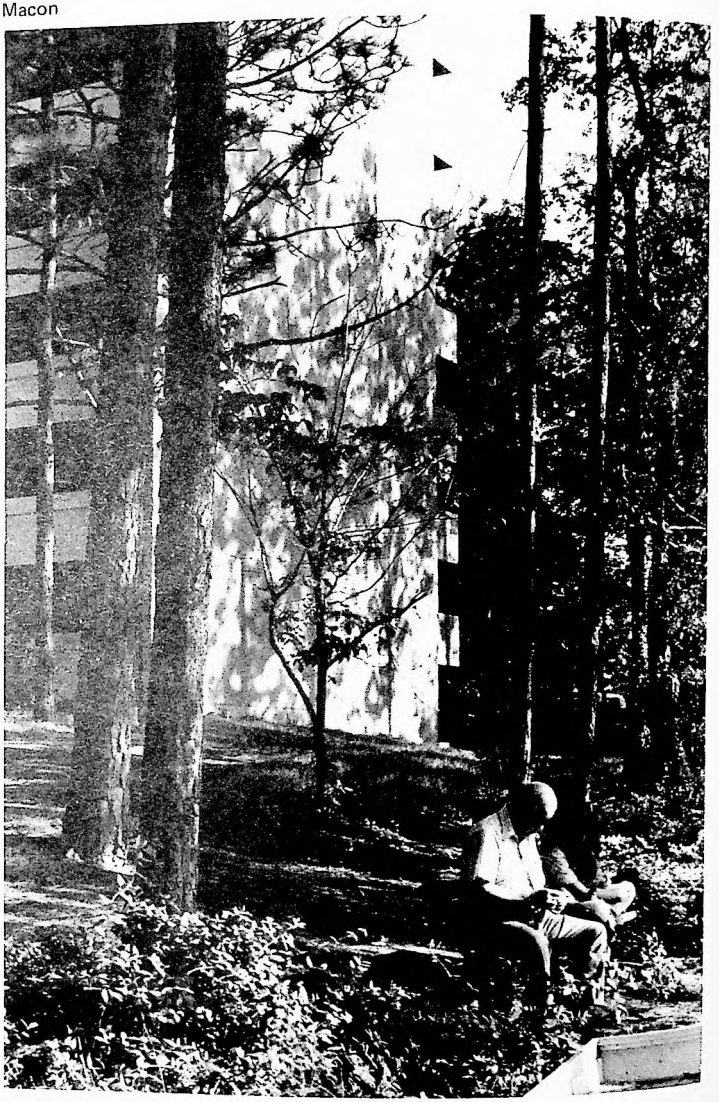
Macon



King County

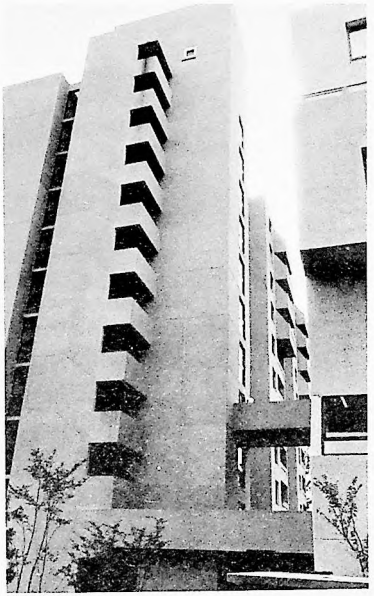


Macon

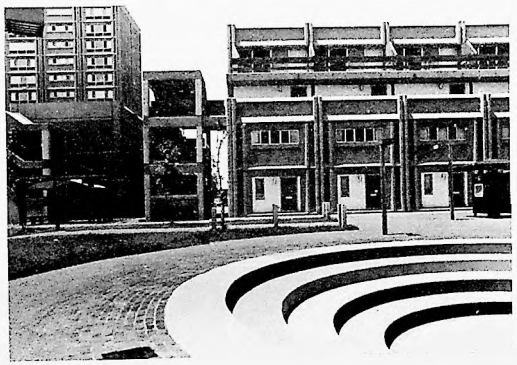


The compatibility of architecture and its environment was considered essential, at some sites particularly. Concern for such compatibility encompasses both conventionally built and industrialized structures.

Macon



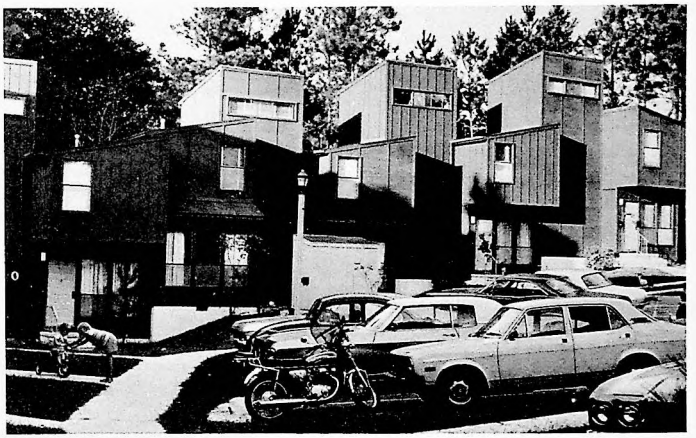
St. Louis



Objective: To plan housing for families of varied sizes and income levels.

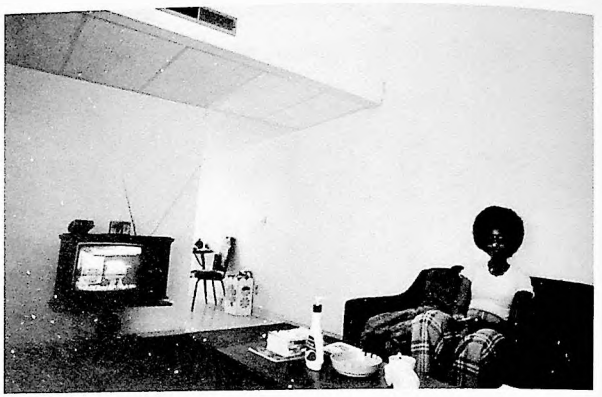
All of the BREAKTHROUGH sites were marketed to attract a broad cross section of families in terms of size and economic status. Some also encouraged the residency of students, young adults, and the elderly.

Macon



In an effort to avoid association with public housing, housing units were designed and sited without regard to the economic character of their future residents.

Sacramento

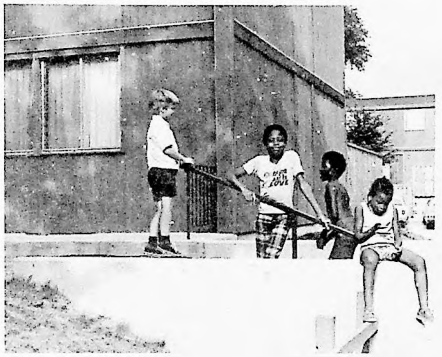


Sacramento

As these interiors suggest, the income combinations at the BREAKTHROUGH prototype sites included middle as well as lower income groups.

Families with children were actively sought as residents, particularly on the suburban sites. Over one-third of the total number of dwelling units were either single family attached or detached units; almost two-thirds of the suburban units were single family.

St. Louis



Memphis

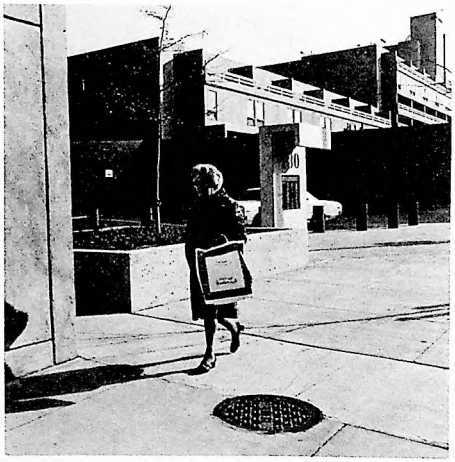
Jersey City

Kalamazoo

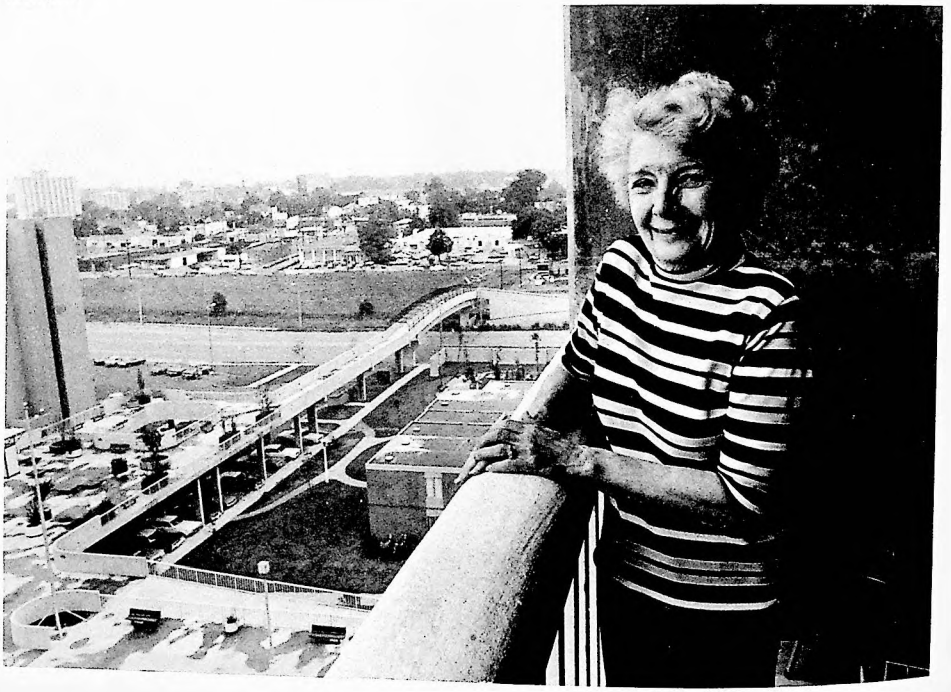
Kalamazoo

The provision of housing for the elderly was another concern of the planners, especially at urban sites where the elderly population tends to be higher.

Jersey City



Memphis



Shops and Outdoor Eating Facilities
St. Louis

Objective: To plan for nonresidential uses, including communitywide facilities, based on the needs of the residents.

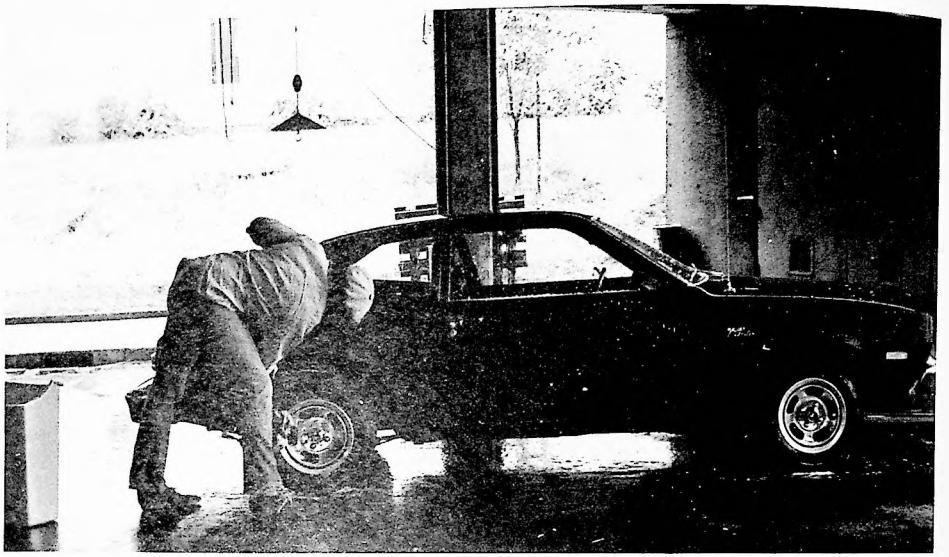
The provision of nonresidential uses varied greatly from site to site. In several cases the need for such uses was perceived by the planners but subsequently eliminated for budgetary or other reasons. These photographs suggest the many ways in which the resident needs for nonresidential amenities were satisfied on the BREAKTHROUGH sites.

Bicycle Riding
Memphis

Retail Shops
Jersey City

Community Recreation Center
King County

Trash Receptacle
Seattle



Carwashing under the Deck
Memphis

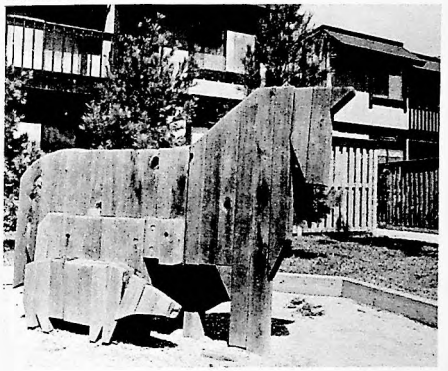
Passive Seating Area
Sacramento

Totlot
King County

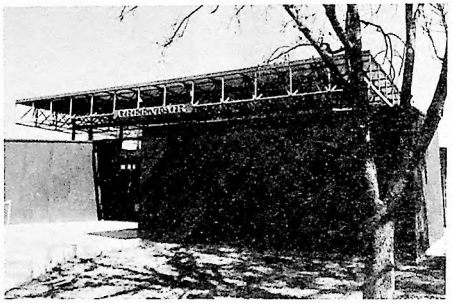
Graphics
Indianapolis

Setting for Solitude
Macon

Unqiue Sculpture
Kalamazoo



Community Visitor's Center
Sacramento

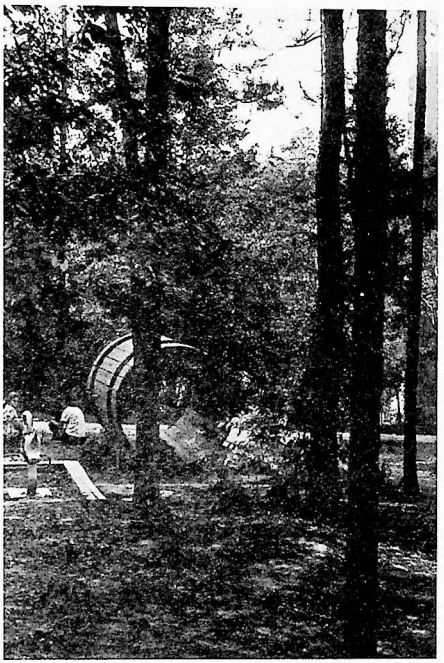


Public Laundry Facilities
St. Louis

Community Reception
Sacramento

Elderly Recreation
Memphis

Macon



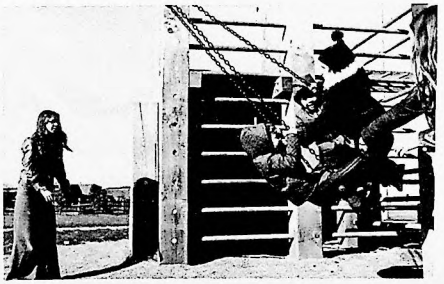
Objective: To provide space for community social and recreational objectives, both formal and informal.

Recreational facilities in the BREAKTHROUGH sites included such major facilities as swimming pools, as well as minor amenities such as totlots and community rooms. They included spaces for large group activities, for supervised recreation of youth, and for individual entertainment. It was considered important that private spaces receive as much consideration as public areas.

St. Louis

Macon

Indianapolis

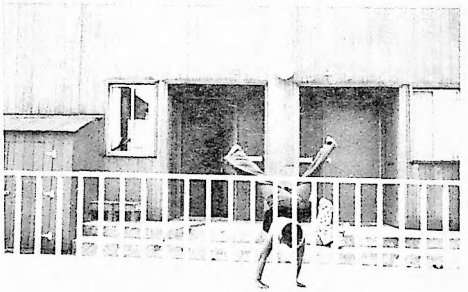


Totlots and play areas for young children abound on the BREAKTHROUGH sites. Most were designed with contemporary geometric play forms and are generally located in proximity to family housing units.

Opportunities for individualized recreation occur in both formal and informal places. The photographs at left are play areas, the ones at right are not, yet each appears effective in satisfying the desire to play.

Memphis

Seattle



Seattle

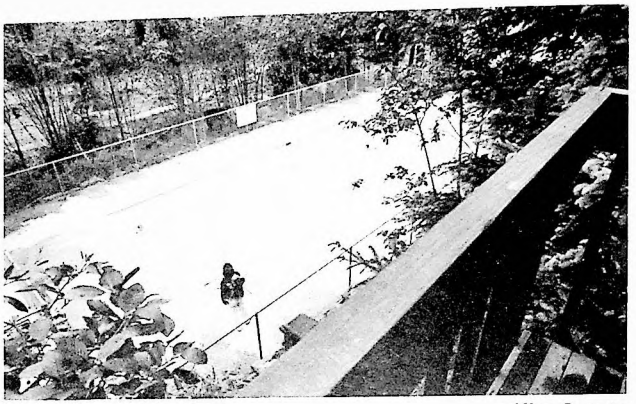
Jersey City

Hard court and field recreation were provided when land areas allowed; at one site the project management sponsored a team in an organized youth athletic program.

Indianapolis

Macon

St. Louis



King County

Seven of the sites have swimming pools within their boundaries. One site permits the storage of boats and recreation vehicles as well.

Macon

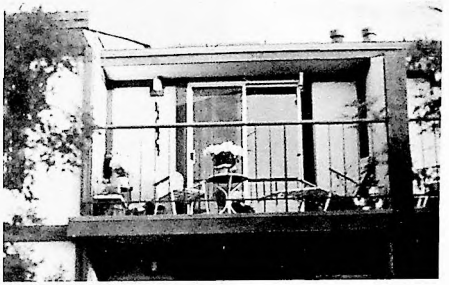
St. Louis

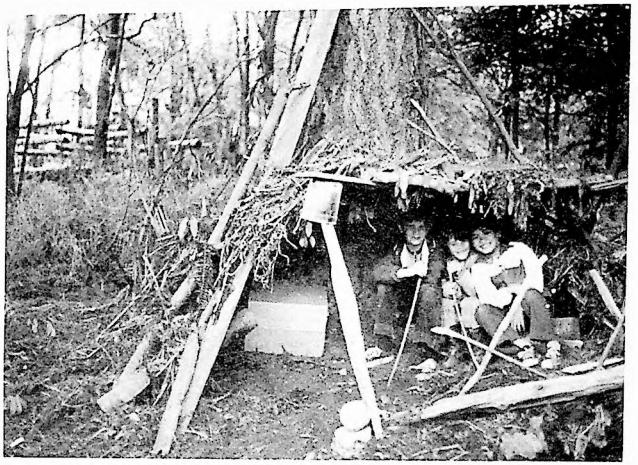
The need for private outdoor space was recognized on all of the sites, varying from balconies on high rise structures to yards in the single family areas.

King County

Sacramento

Sacramento

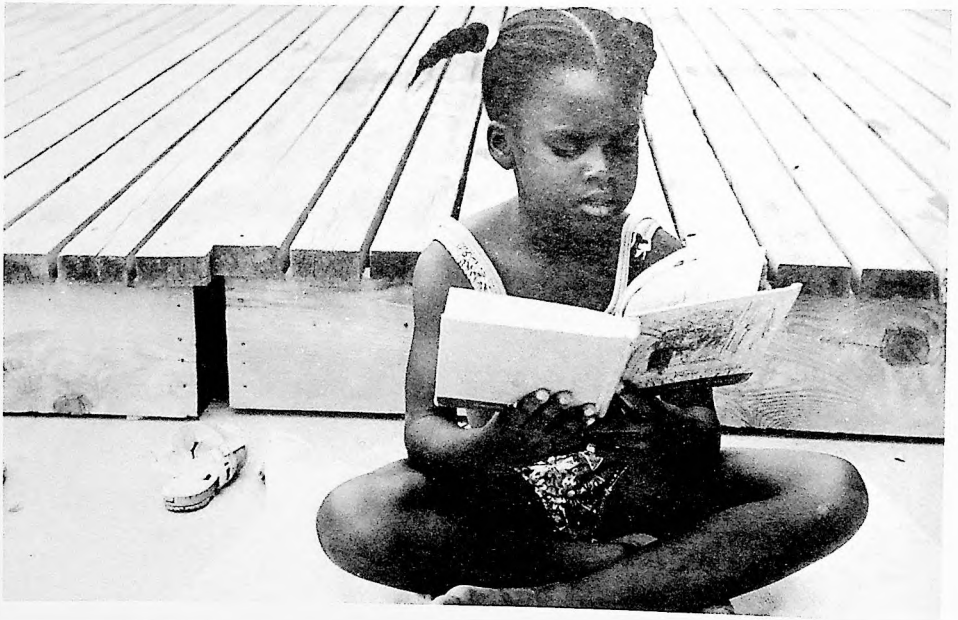




King County

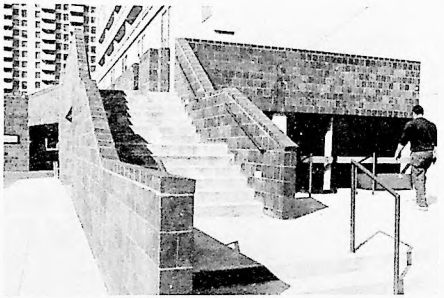
These photographs indicate that the desire to create one's own space is not inhibited by the physical planning efforts of the designers.

St. Louis



Memphis

Jersey City

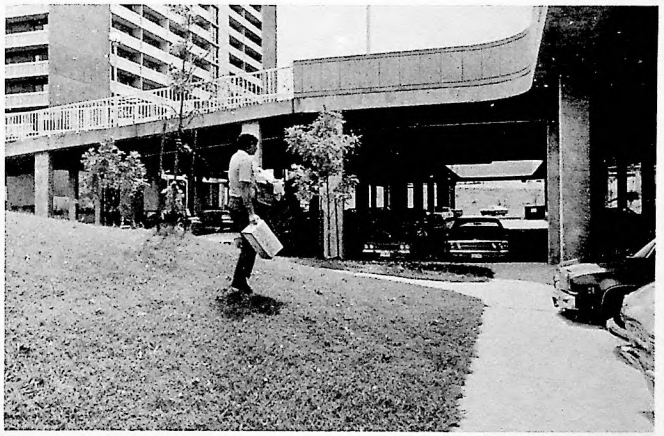


The planners of one site not only designed pedestrian bridges connecting separated parcels, but also created a large recreation deck above open air parking. Another site had most of its automobiles placed under high rise structures.

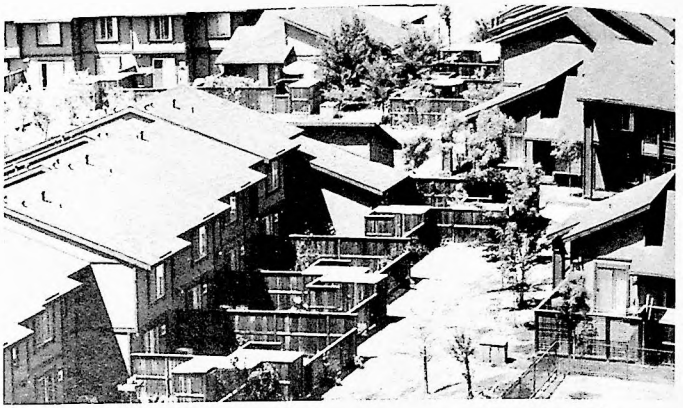
Objective: To separate automobile traffic from interior pedestrian movement.

Without exception, the BREAKTHROUGH site planners placed the separation of pedestrians and vehicles high on their lists of priorities. The general solutions were to cluster parking at the suburban locations, and to cover parking at the urban sites.

Memphis

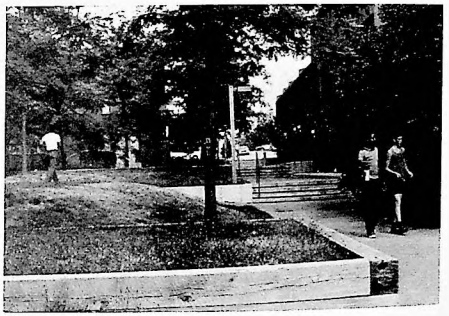


The grouping of automobiles in lots enabled most of the planners to create spaces within the housing areas for exclusive pedestrian zones. The next three pages show the results of this planning principle and some of the ways in which these spaces have been used.

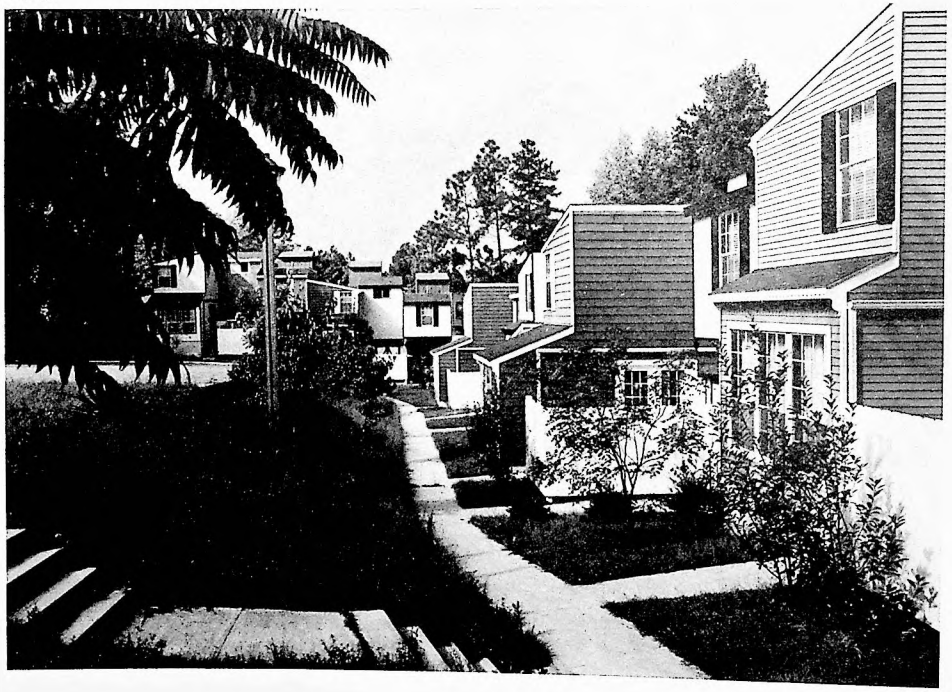


Sacramento

St. Louis

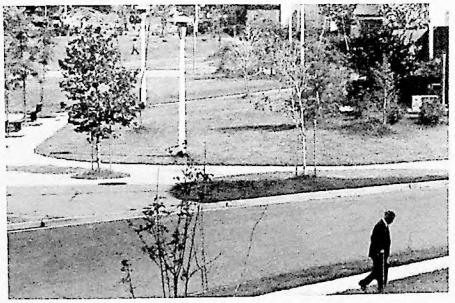


Macon

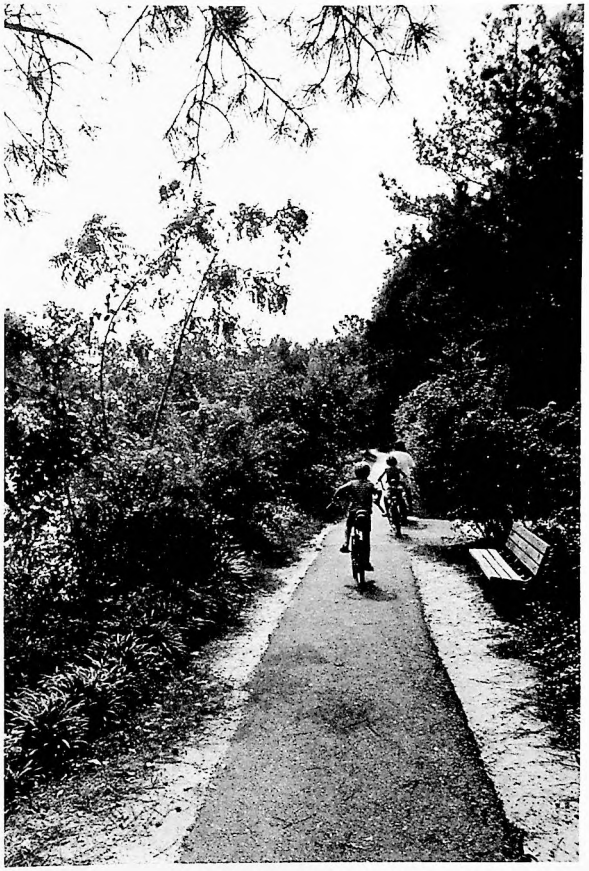


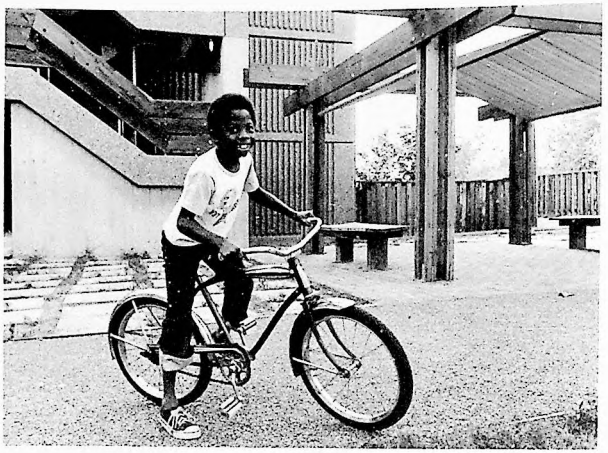
Sacramento

Memphis



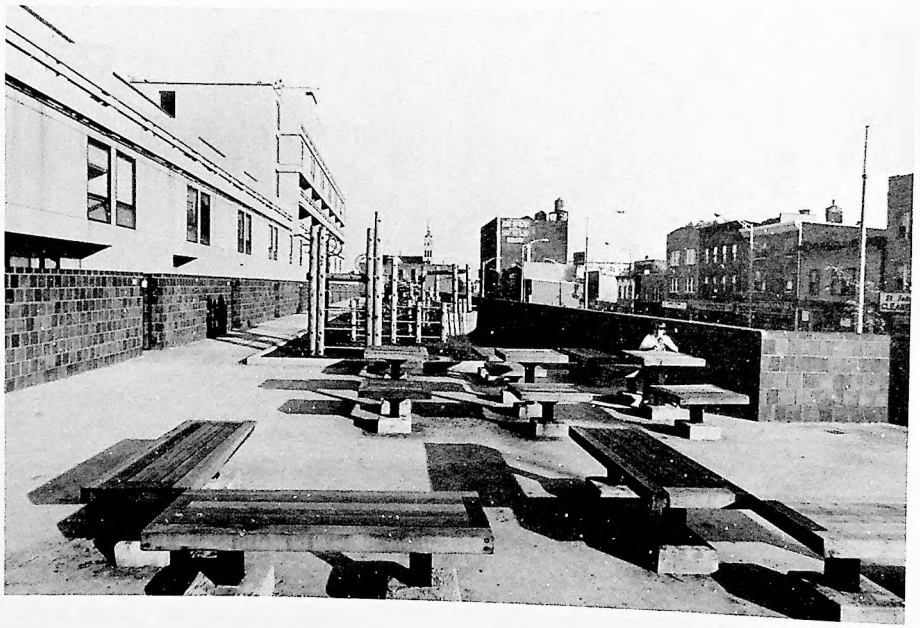
Macon



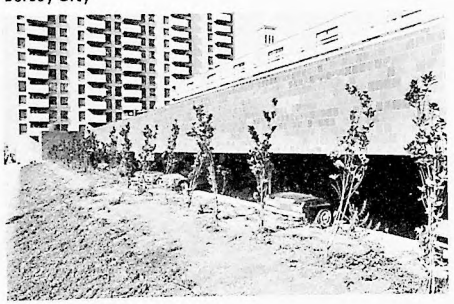


St. Louis

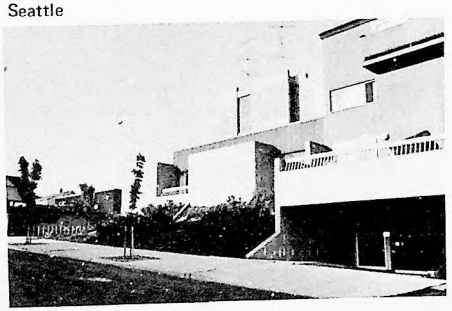
Jersey City



Jersey City



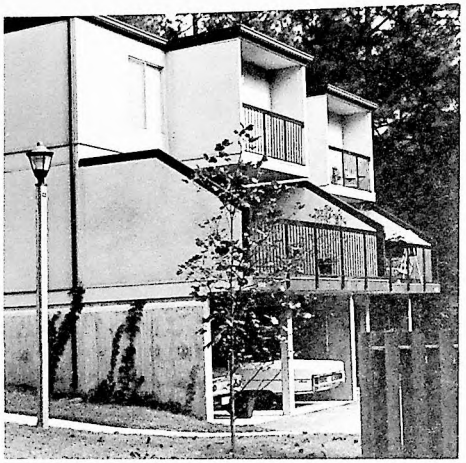
Seattle



Objective: To provide adequate by obtrusive parking facilities.

As a user of large amounts of land, the automobile presented the planners with the problem of providing the needed amount of space in an aesthetically attractive manner. The following photographs indicate some of the responses to this problem.

Memphis

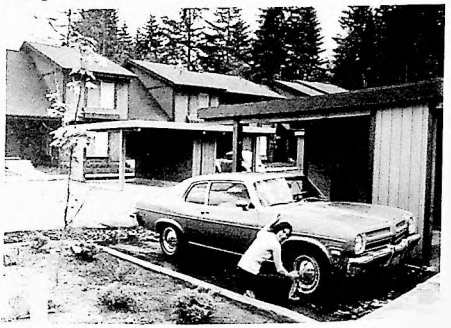


Macon

St. Louis

Sacramento

King County



Sacramento

Objective: To maximize comfort in, satisfaction with, and enjoyment of the environment for the residents.

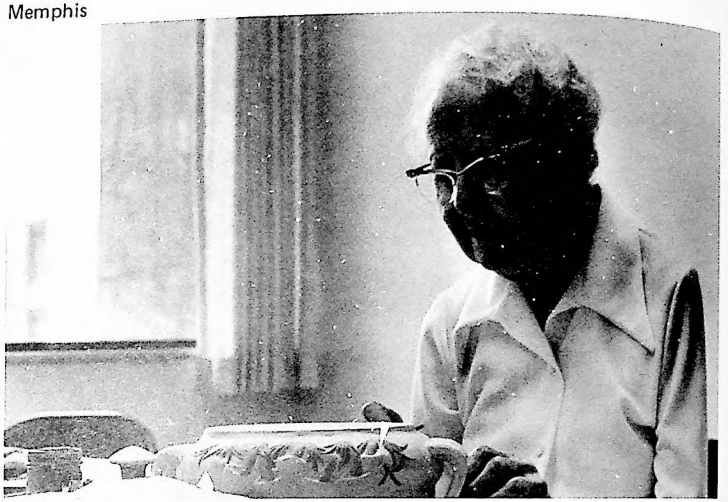
Postoccupancy studies have indicated that most of the BREAKTHROUGH residents are contented with their surroundings. These photographs reveal some of this fit between resident and planned environment.

St. Louis

Kalamazoo

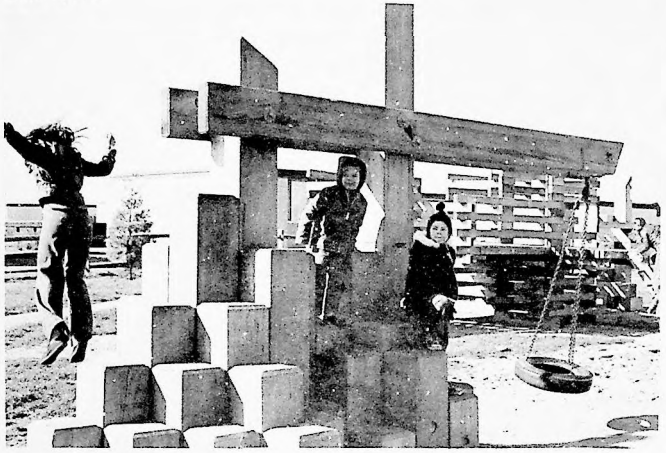
Macon

Memphis

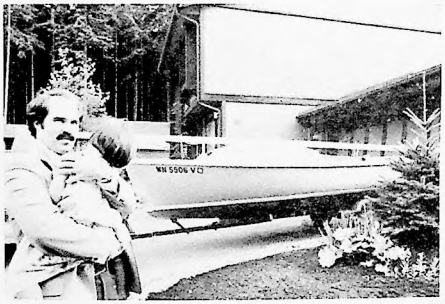


Jersey City

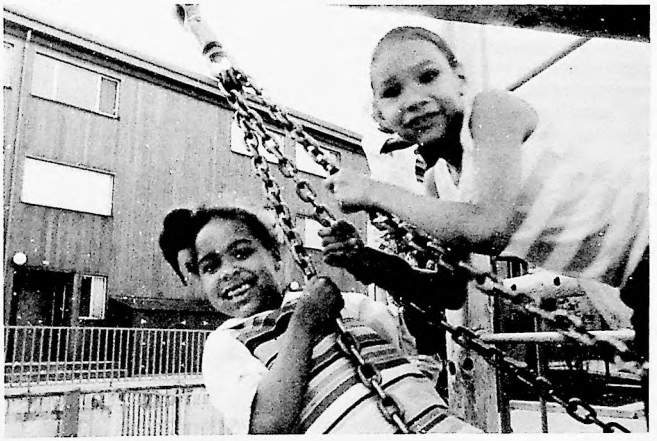
Indianapolis



King County



Seattle



7

Conclusion

The second phase of Operation BREAKTHROUGH, in which prototype housing units were designed and demonstrated on nine selected sites, succeeded in achieving many of the program goals established in 1969. Phase III continued this achievement by producing in volume, and for many more locations, many of the prototypes previously tested. In this concluding chapter, a summary of the program, with objective commentary, is presented.

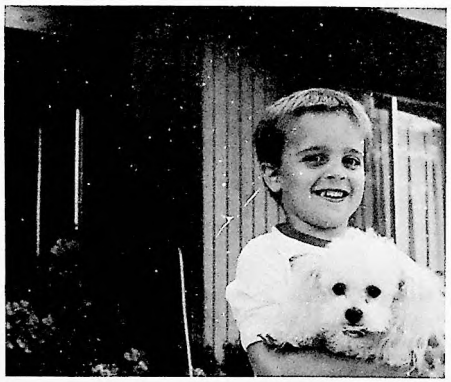
PLANNING OF THE SITES

The use of a structured, sequential planning process for multiple sites in BREAKTHROUGH provided a significant departure from planning processes in general. Given eleven different planning teams in eleven different locations, each with a myriad of inputs unique to themselves, the application of a uniform process for all to follow was remarkably successful.

By imposing this uniform process, HUD was able to monitor the progress of each planning team in a uniform manner. The Department was also able to break down the process into tasks heavily oriented toward analysis and synthesis, thus adopting officially the generally accepted planning principle of complete and comprehensive investigations before the actions of design and construction. The uniform process was not able to channel each planning effort into parallel and similar time frames, however. Such an achievement would have been highly unlikely in view of widely varying local characteristics, conditions and problems. The fact that some teams needed more time for certain tasks than did other teams enabled the Department to reevaluate the process while it was still being applied, thus allowing refinements earlier in time than would have normally been possible.

The use of multi-disciplinary planning teams in BREAKTHROUGH insured the broadest and most knowledgeable approach to each of the sites. The teams were often large, consisting of the planners, consultants, developers, and producers, as well as local officials, HUD officials and local citizen's groups. Often the planners discovered that the mere logistics of coordinating the efforts of the teams required major blocks of time. Some sites had as many as 15 principal participants in addition to consultants, local officials, and citizen's groups. In their final report, the planners of the Seattle site wrote:

Breakthrough was complex, involving a totally atypical team approach for planning, development and decision-making, and a range of objectives which simultaneously sought housing and planning innova-



tions, quality, cost savings, speed, participation of minority groups in training and construction, and extensive local participation of citizens and organizations ...

Other planners found themselves in situations in which most of their time was spent meeting with groups to allay fears based on concerns that were socially much broader than the intended scope of the Program itself. The planners became in a very real sense arbiters between seemingly opposing forces. Thus, in some cases, the process of planning BREAKTHROUGH sites involved more time as "diplomats" than as "designers".

ACHIEVEMENT OF PLANNING GOALS

Most of the planning teams established planning and design goals at the outset of the planning process. Virtually all of the local goals were achieved, as is evidenced by the preceding texts on each of the sites.

These goals, however, were very much oriented toward the achievable and thus relied heavily on the experiences of the planning teams as well as the adoption of successful, progressive planning principles. For example, all of the sites achieved the separation to varying degrees of the automobile and the pedestrian; all of the sites provided significant amounts of commonly held open space and recreation areas; all of the sites treated sensitively their relationships with neighboring developments; all of the sites carefully and successfully handled the interface between system and nonsystem elements. Phase II of BREAKTHROUGH demonstrated that commonly accepted progressive planning principles are not compromised by industrialized housing. In a few instances, the local planning teams attempted to introduce significant departures from usual local practice. Inasmuch as the eleven original sites were located in communities with varying familiarity with progressive planning, some plans seemed more innovative than others. In those instances when planning proposals represented significant departures from the known, success was mixed. For example:

- Two sites, Jersey City and Seattle, attempted vertical integration of land uses; one was moderately successful.
- One site, New Castle County, planned to concentrate development intensity on a relatively small portion of its large site; it was discontinued.
- Two suburban sites, Indianapolis and Sacramento, relied heavily on the use of landscape design to create unique outdoor environments; one was successful, the other moderately so.
- Two sites, Macon and King County, concentrated efforts on protection and conservation of existing lush environments; both were successful.
- Three sites, Memphis, Jersey City and Seattle, were designed to locate housing and/or recreation uses above parking areas; two did so successfully.

Virtually all of the BREAKTHROUGH planning teams were presented with sites having varying degrees of undesirable qualities. Some sites were in poorly drained areas, others had inadequate access.

One site had unusually high noise and air pollution problems; another was highly sensitive to water pollution. Many were located in communities with low levels of public facilities; others often were in neighborhoods with poor quality housing, urban renewal designations, or other marketing liabilities. Problems such as these were carefully approached and overcome by the planning teams, often to the extent of turning these liabilities into assets.

The various planning teams faced the additional challenge posed by the housing systems themselves: innovation in the planning process. Technical innovations in the prototypical housing systems were inherently necessary; as a result, parallel need for site planning innovations was considered desirable.

Many appeared:

- Use of the computer in planning (Jersey City and Kalamazoo sites);
- On-site, in-process planning (Macon);
- Use of graphics as instrumental planning tools (Indianapolis);
- Use of generalized building envelopes in preliminary planning, as opposed to specific building shapes (many sites);
- Sensitive ecology preservations and considerations, particularly during erection stages (Macon and King County);
- Sensitive consideration of noise and air pollution (Memphis);
- Extensive use of earth berming and landscaping on flat sites (Indianapolis and Sacramento);
- Self-contained energy and trash systems (Jersey City);
- Scheduling of utilities construction to follow erection processes (Jersey City);

- Use of interior-exterior spatial relationships and private, semiprivate and public space hierarchies (many sites).

Much emphasis was consciously placed on the harmonious mixture of social, racial, economic, and age groups. Several sites were planned to accommodate a wide range of occupants, resulting in wide ranges of lifestyles. In many localities, such planning considerations were in themselves innovative.

In another Feedback volume* an extensive survey of the opinions of BREAKTHROUGH residents was conducted, providing significant and valuable insight for future planning efforts as well as an evaluation tool for Phase II of the Program. The survey verified the achievement of many of the original BREAKTHROUGH objectives. For example:

- The relative cost of the housing was cited as the principal reason for moving to the sites.
- Most respondents believed their residential environments would be the same if not better in five years.
- Most occupants planned long-term tenure.
- Favorable evaluation was given to the dwelling units themselves.
- Favorable evaluation was given to the features of the sites.
- Occupants were aware of both the industrialized nature of their housing and their federal sponsorship.
- Economic, social, and community factors were highly rated on the sites.
- Over 90% of the residents indicated overall satisfaction with both the dwellings and the sites.

Comparatively few of the 1,481 BREAKTHROUGH occupants interviewed expressed dissatisfaction with their residential environments. Most prominent of the dislikes was a perceived need for improvement in site management and a concern about other residents, a concern that exists on any site.

The survey report extensively disaggregated responses expressing likes and dislikes about the sites, the dwelling units, and with plans to move. It is significant to note that site design features generated relatively few high frequency responses; that is, of those input variables that received over 70% frequency, few were related to overall sites, site design features, and other planning related factors. One could perhaps conclude that the occupants were either ambivalent toward their site as a whole, or perhaps that overall site design is difficult to perceive. (It is possible that the questions were not structured to elicit such responses.) The survey results indicated the greatest positive and negative responses occurred in relation to personal spaces and to ongoing management. Out of thirty-three input variables that received over 70% "very well satisfied" responses, only one site, as a whole, was included and only four site related factors were mentioned. Similarly, only one site was among 20 variables over 70% associated with "no plans to move." Of those persons responding with "plans to move" from the site, three of the sixteen high frequency responses were related to the sites themselves (significantly, two were sites with high transient student populations).

In a 1975 study to determine the impact of Opera-

*Margulis, Stephen T., et al. "Feedback from Breakthrough: Opinions of Phase II Operation Breakthrough Housing Occupants About Their Residential Environments". Architectural Research Section, National Bureau of Standards, December 1974.

tion BREAKTHROUGH on the nation's housing industry*, certain conclusions were made that give additional feedback concerning the planning impacts:

- Requests for special zoning produced changes in zoning procedures in some communities;
- Zoning regulations in some communities were revised to allow for the development of Planned Unit Developments as a result of prototype site designs;
- One BREAKTHROUGH community adopted a landscape design service as a result of prototype site design strategies;
- Some local government officials noted that economic integration was "surprisingly successful" at their prototype sites;
- Consumers were attracted by aspects of the landscaping, the location, and the recreational facilities of the sites;
- The issue of look-alike housing did not surface, whereas the residents were generally pleased with the aesthetics and workability of their dwellings.

It is apparent, therefore, that the impact of comprehensive planning and design considerations in BREAKTHROUGH extended beyond the satisfaction of the needs of residents and users to communities as a whole. When these achievements are combined with the broader achievements of the entire program, BREAKTHROUGH successfully demonstrated the technical and financial feasibility of industrialized housing. The particular lesson from the planning and design aspects has been the need for emphasis on these nontechnical aspects of the industry as being crucial to the successful entry of industrialized housing into the housing supply.

*Real Estate Research Corporation, with Building Technology, Inc. and Arthur D. Little, Inc., preliminary draft, executive summary dated November 7, 1975.

Publications

Other Feedback Reports

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- Feedback, Volume 4: Phase II Prototype Construction and Demonstration, Washington, D.C., U. S. Government Printing Office, 1975.
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- Feedback, Volume 6: A Compendium of Performance Testing Programs, Washington, D.C., U. S. Government Printing Office, 1976.

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Indianapolis, Indiana: Skidmore, Owings and Merrill, November 1972.

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Other Documents

Margulis, Stephen T., et al, "Feedback from Breakthrough:
Opinions of Phase II Operation Breakthrough Housing Occupants about their Residential Environments." Architectural Research Section, National Bureau of Standards, December 1974.

Real Estate Research Corporation,
with Building Technology, Inc. and Arthur D. Little, Inc., "Report on Impact of Operation Breakthrough on the Housing Industry", preliminary draft of executive summary, November 1975.

Credits

Charles A. Gueli, Director of Community Design Research, and Samuel J. Hodges III, as the Government Technical Representative, supervised the preparation of this Feedback report for the Office of Policy Development and Research, U. S. Department of Housing and Urban Development.

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