AN EXPERIMENT IN LOW-COST HOUSING

IN STILLWATER, OKLAHOMA

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

In the Housing and Urban Development Act of 1968, Congress affirmed the national housing goal--"a decent home and a suitable living environment for every American family." The Act further stated that highest priority and emphasis should be given to meeting, with full utilization of private enterprise and individual self-help, the needs of those families for which the national goal has not become a reality (1). In this way, Congress placed a portion of the burden on private enterprise and the resources of the individual consumer who desires a home, rather than placing the full burden for meeting this goal on the federal government. Government resources would be used to encourage private business firms and individual citizens to develop ways to solve the housing problems facing the nation.

By signing the National Housing Act on August 1, 1968, President Lyndon Johnson pledged that this nation would eliminate substandard housing units within the following 10 years. Such a goal requires the construction or rehabilitation of an estimated 26 million housing units by the end of 1978. This figure includes six million units of subsidized housing for those who cannot afford to pay for housing themselves (1).

A recent Ford Foundation study of these goals suggested that this estimate may be too low. The study reassessed the need for low-income housing and recommended raising the subsidized housing goal from 6 million to 13 million units (2).

The housing demand by those who can afford to pay for their own housing is rapidly exceeding the supply also. In the four year period from 1966 through 1969, the production of housing, including apartments and mobile homes, has run an estimated 1.5 million units behind the demand (2). In 1969, the basic demand for nonsubsidized housing was approximately 2.2 million units. This total included 1.3 million units needed to shelter new families; 700,000 units to replace homes destroyed by fire, storms, and bulldozers; and 160,000 new second homes (2). Achievement of the national housing goal set by Congress will be a formidable task for both the federal government and private enterprise. It is a battle which must be waged against time, soaring construction and financing costs, and a myriad of regulatory restraints (3). Nor does there seem to be optimism about achieving the goal of 600,000 units per year of subsidized housing for those unable to pay for their own housing. Such a goal would require billions of dollars of federal aid funds which do not appear to be forthcoming at this time (4).

Neither does the housing industry's past construction performance, now complicated by anti-inflationary restraints, offer any immediate encouragement. The average yearly goal of 2.6 million units is almost double the 1.4 million unit average constructed during the past decade

(5). Equally disturbing is the warning by Secretary George Romney of the U. S. Department of Housing and Urban Development that housing construction is expected to decrease by 50 per cent by the end of 1969. If this expectation is realized, the total units constructed in 1969 would be less than one million units (6). Obviously, it has to be concluded that the United States will soon face its worst housing shortage since the end of World War II (3).

Purpose of the Study

The need for low-cost housing is evident, but little progress or concrete results to alleviate the shortages have been observed. As proclaimed by President Richard Nixon on January 12, 1970, "We are facing a crisis situation in the housing of our people (7)." Also disturbing is the statement by the editors of Fortune magazine, who said, "It is by no means an overstatement to say that the housing situation is the disgrace of American industry (8)." Ironically, this statement was made in 1932! Today, after 38 years, six presidents, 18 sessions of Congress, countless committees and commissions, and an $847.3 billion increase in the Gross National Product, practically nothing has changed (8).

Vast sums have been spent to investigate and define the problems that have caused Secretary Romney to say, "Millions of Americans are cut off from decent housing. Over half of our families cannot afford to live in new housing built at today's prices (8)." Depending upon the

source of information, and perhaps its social and political overtones, the causes for the housing shortage have been attributed to rising interest rates and a tight money market; the inability to realize a breakthrough in mass produced housing, although attempts have been made as early as 1932; soaring material and labor costs, union rules, and trade practice barriers; skyrocketing land prices and unrealistic zoning requirements; restrictive building codes, preventing the use of new construction materials and methods; and government red tape, and delays caused by the same agencies that were formed to assist in alleviating the housing shortage (8).

Much useful information relating to the above problems could be gained from an actual experiment in low-cost housing at the community level. Experimentation could provide the means to identify the local restrictions and other contributing factors that have restrained the construction of low-cost housing. Large sums of money would not be necessary, and private financing would provide a considerable advantage over government-sponsored operations in regard to reducing red tape and allowing more flexibility in the planning, design, and construction of such a project. Local needs would be a prime consideration in the experiment, and local people would be intimately involved in the entire procedure.

This concept of studying the problems connected with low-cost housing on a local basis was used in an experiment in low-cost housing conducted in Stillwater, Oklahoma. The purposes of the study in

conducting the experiment were:

1. To determine the local need for low-cost housing.

2. To determine the economic feasibility of low-cost housing.

3. To identify the local restraints that deter the construction of low-cost housing.

4. To establish recommendations for the removal or modification of the restraints to low-cost housing.

5. To provide an accumulation of data and information that may be applicable to low-cost housing problems of other communities with characteristics similar to those of Stillwater, Oklahoma.

To accomplish these purposes, a comprehensive review and study of recent literature and low-cost housing construction practices was made. The literature was supplemented with meetings, correspondence, and conversations with those individuals, private companies, and governmental agencies intimately concerned with low-cost housing. A low-cost housing unit commensurate with the needs and financial capabilities of a low income family was designed and constructed. This experimental project provided the means to identify major low-cost housing problems at the community level.

Local Housing Situation

Stillwater, Oklahoma, the site of the experiment in low-cost housing, is the county seat of Payne County, Oklahoma, and the home for 15,109 permanent residents and 18,891 Oklahoma State University

students and their dependents (9). The City of Stillwater faces a crisis in housing needs similar to that previously discussed for the nation. The City of Stillwater also faces special problems resulting from the fact that its population is composed of young, highly mobile, and seasonal residents with lower than average mean incomes.

In the fall of 1969, the City Planner for the City of Stillwater predicted that the city would need to build at least 490 housing units each year to meet the needs of its growing population. At that time, only 100 to 200 new housing units were being built in Stillwater each year (10). A recent Community Renewal Program report stated that of the 4,733 structures surveyed in Stillwater as part of the program, there were 328 dilapidated houses which should be eliminated, and 2,955 deteriorating units needing major renovations (11).

The 1968 City of Stillwater Housing Committee Report stated that 410 Stillwater families have annual incomes below $2,000.00, while more than 40 per cent of its population have incomes below $7,000.00 (12). However, during the July 1, 1968-June 30, 1969 fiscal year, the 120 building permits issued by the City of Stillwater for the construction of new residences had an average construction cost of $22,775.00 (13). The construction cost of a residence is the monies required to build the structure itself, and does not include the cost of land, financing, or other indirect charges. Table I indicates the distribution of building permits issued by the City of Stillwater for the 1968-69 fiscal year:

TABLE I

DISTRIBUTION OF BUILDING PERMITS

City of Stillwater, July 1, 1968 - June 30, 1969

Cost of Construction	Number of Building Permits
$ 0 - $ 9,999.00	0
10,000.00 - 14,999.00	8
15,000.00 - 19,999.00	26
20,000.00 - 24,999.00	39
25,000.00 - 29,999.00	35
30,000.00 - 34,999.00	7
35,000.00 - 39,999.00	5
	Total 120

Within the $10,000.00 - $14,999.00 range, one building permit was issued for $10,950.00; one building permit was issued for $11,000.00; and six permits were issued for $13,500.00. Obviously, the housing needs of the lower-income groups are being neglected, since those families cannot afford the homes now being built. In their report, the Stillwater Housing Committee stated that housing should not be labeled low-cost housing unless it is available to families with an annual income that does not exceed $4,000.00 (12). The Stillwater Housing Committee further recognized that there is no substitute for private enterprise, and recommended that this sector of the local economy be used to effectively provide the needed housing. However, their concern was expressed as

to whether the need for low-income housing could be fulfilled by private enterprise, and whether private enterprise could realize sufficient profit to motivate its efforts (12).

Limitations of the Study

To accomplish the objectives of this study effectively, it was necessary to adopt certain limitations which served as guidelines in the performance of the experiment in low-cost housing. These limitations confined the scope of the experiment to a consideration of the following:

1. The magnitude of the experiment was to be commensurate with the time and financial capabilities of this study. That is, it was to be an experiment small in scale, exploratory, and effective as possible in delineating the problems of low-cost housing at the community level.

2. The experiment was to be conducted within the city limits of Stillwater, Oklahoma. This requirement established a specific geographical area with known economic and regulatory characteristics.

3. The construction of the low-cost housing unit was to be performed on a parcel of land that was already improved with sidewalks, paving, and readily accessible utilities. This requirement was necessary to satisfy the time and financial restrictions of the experiment.

4. The low-cost housing unit was to be available for purchase by a low-income family as defined by the Stillwater Housing Committee, i.e., a family with an annual income not exceeding $4,000.00 (12).

The development of a technological breakthrough in construction

materials or in the method of constructing the low-cost housing unit was not within the scope of this experiment. These aspects have been assumed by a joint partnership between private business organizations, who have sufficient funds for adequate research and development, and the federal government under the much publicized "Operation Breakthrough" program. "Operation Breakthrough," lauched in early May, 1969, by the U. S. Department of Housing and Urban Development, is an attempt to reduce housing costs by mass producing and industrializing housing and component parts (14). It is an ambitious plan that will require the construction of 30 to 40 prototype housing units in 10 cities at a cost of $15 million to $20 million (15). Whatever radical technological advances, if any, are achieved, they likely will have little effect on the nation's ability to meet the immediate 10-year housing goal, established by Congressional legislation in 1968 (16). To date, none of the new construction technologies developed in other housing projects sponsored by the U. S. Department of Housing and Urban Development has demonstrably cut direct construction costs below those of conventional methods (17).

CHAPTER II

LAND ACQUISITION

Land is our most precious commodity (18). For centuries, man has recognized that land is a basis for wealth. Theodore Roosevelt once remarked, "Every person who invests in well-selected real estate in a growing section of a prosperous community adopts the surest and safest method of becoming independent, for real estate is the basis of wealth."

Unlike many of the natural resources used to satisfy men's wants, land is fixed in quantity. It cannot be increased by human activity, ingenuity, or production. Man has learned ways of altering land acreage, but not of increasing it. Relatively high prices paid for the use of land have encouraged him to improve his land through irrigation, drainage, land-fill, conservation methods, and other means designed to increase the output on a given amount of land (19).

Anyone who has travelled across the United States knows that the potential land supply in this country appears unlimited. Even near the cities and towns, there is a potential supply of land, but transportation and public facilities must be provided before it can be put to its best usage. The immediate problem in this country is not the supply of land, but soaring land prices (16).

America's population, in the next 30 years, is expected to increase by at least 80 million people. This is equal to adding the present population of England and France to the United States (16). There is little hope, therefore, for a decrease in demand for land, especially in urban areas.

Land prices have been identified as the single most rapidly rising element of home development costs (20). Land cost has increased on the average of 16 per cent per year since 1951, or a total of nearly 300 per cent during this period (21). Land costs now account for one-fifth (21 per cent) of the total cost of a new house, compared to one-tenth (11 per cent) two decades ago (22). The effect of rising land prices on homebuilding is important. Home purchasers normally allocate some slightly variable proportion of their income to housing, and tend to spend less on construction, as the lot price increases (20). Muth (23) has estimated from Federal Housing Administration data that for each dollar's increase in lot cost, approximately 50 cents less is spent on construction of the house by a consumer.

In addition to economic laws of supply and demand, zoning and planning constraints contribute to higher land costs in a particularly controversial fashion. Countless localities use these means to upgrade lot sizes, require costly improvements, such as streets, sidewalks, and curbs, and restrict locations of houses to a particular spot on the lots. Suburbanites generally contend that such requirements help preserve the amenity of their neighborhoods. Critics charge that the restrictions are

concocted to exclude unwanted families and prevent an influx of children from swamping public schools and forcing realty taxes higher. Almost everyone agrees that economic discrimination by zoning is keeping house prices high (26).

Land Survey

The first step toward acquiring land for this experiment was to survey possible land sites in and around Stillwater. An extensive search for land which would be compatible with the planned low-cost housing project was conducted during a period of approximately two and one-half months. During this time, the following activities were carried out in connection with this search:

1. A personal survey by automobile of suitable sites throughout the Stillwater area was made.

2. A diligent review of the local newspaper advertisements, of lots for sale, was made.

3. Personal contacts were made with 32 people who were directly or indirectly involved with the real estate business in Stillwater. These individuals included:

a) real estate brokers

b) real estate salesmen

c) attorneys

d) local government officials

e) faculty and staff members of Oklahoma State University

f) real estate developers and residential builders

g) real estate investors

The results of the search were most disappointing. In general, individuals with land investments in Stillwater were extremely reluctant to sell land for such a project. They were very much aware of the investment security they enjoyed by retaining the property. It was unfortunate for this project that inflation of land prices is greatly fostered by the system of real estate taxation in the United States. Stillwater, not unlike other similar localities, taxes vacant land very lightly and improved land proportionately higher, making it desirable for speculators to hold vacant land off the market in hopes of selling for a greater profit than could be realized immediately. When sold, the profit from the sale of such vacant land usually is taxed at only half the rate of profits from other business sources. A system of taxation such as this inhibits new construction and improvement, encourages blight, decay, and slum formation, and suburban sprawl, or the premature carving up of fringe acreage into subdivisions (3).

Failing to locate a suitable piece of land through the above means, an advertisement was drawn up and inserted in the local daily newspaper, "The Stillwater News-Press." This display advertisement, approximately two inches by two inches, read: LAND--LOTS WANTED: Suitable for Low-Cost Homes; Must Be Close In and Ready To Build; All Zoning Acceptable; Bill Cleverly, 377-2440.

The advertisement was designed to locate already improved lots,

for reasons outlined earlier. All types of zoning were included in the advertisement because a request for rezoning could be made to the City of Stillwater for a permitted usage compatible to the needs of the low-cost housing project. Consequently, all vacant land with any type of zoning was acceptable.

During the period of six publication days that the advertisement appeared (November 20-26, 1969), only six responses were received. Three of these were from residential builders who relayed pessimism about the availability of land for such a project. Another call was from a property owner who offered his home for sale in the belief that his property was large enough to support another residence. The final two responses came from real estate investors who owned large fringe acreages outside the city limits of Stillwater, tracts that would require extensive improvements before they could be subdivided into lots. From the results of this advertisement, it became quite evident that vacant land in Stillwater was in particular demand as an investment holding rather than as an opportunity for development.

Option Agreements

At the request of one of the real estate investors who called in regard to the advertisement, further explanation of the experiment was offered, i.e., the experiment in low-cost housing was to be small in scale, with the primary objective of determining the restraints to and the economic feasibility of low-cost housing in the City of Stillwater.

The investor, recognizing the potential value of such a low-cost housing experiment to the City of Stillwater, offered to sell two developed lots within the city limits which were improved with paving, sidewalks, and readily accessible utilities for the sum of $2,000.00 each. It was interesting to note that although this property was only subdivided into lots in November, 1966, this investor and/or members of his family had had continuous vested rights to this property since January, 1927--again an example of investment holding of vacant land in Stillwater.

The offered property was located in the southeastern portion of Stillwater, and consisted of two lots on the east side of Fern Street between 18th and 19th Avenues. Each lot measured 70 feet wide by 135 feet deep, and contained 9,450 square feet. The legal description of these lots as shown in Figure 1, was as follows: Lots Three (3) and Four (4) of Block One (1), Otey Tract, being a part of the SE/4 of the SE/4 of Section 23, Township 19 North, Range 2 East, of the I.M., Payne County, Oklahoma. These lots were zoned R-1, Single-Family Dwelling District (25).

Pending further development of the proposed low-cost housing project, a 180-day Option Agreement was signed on November 24, 1969, which provided the right to purchase these lots at any time, on or before, May 23, 1970. An Option Agreement is a right to purchase the therein described property at a specified price during a specifically designated period of time and with certain terms of purchase. For this right, a consideration is paid (26). The consideration paid was the nominal sum of $1.00. An Option Agreement, accompanied with a Contract

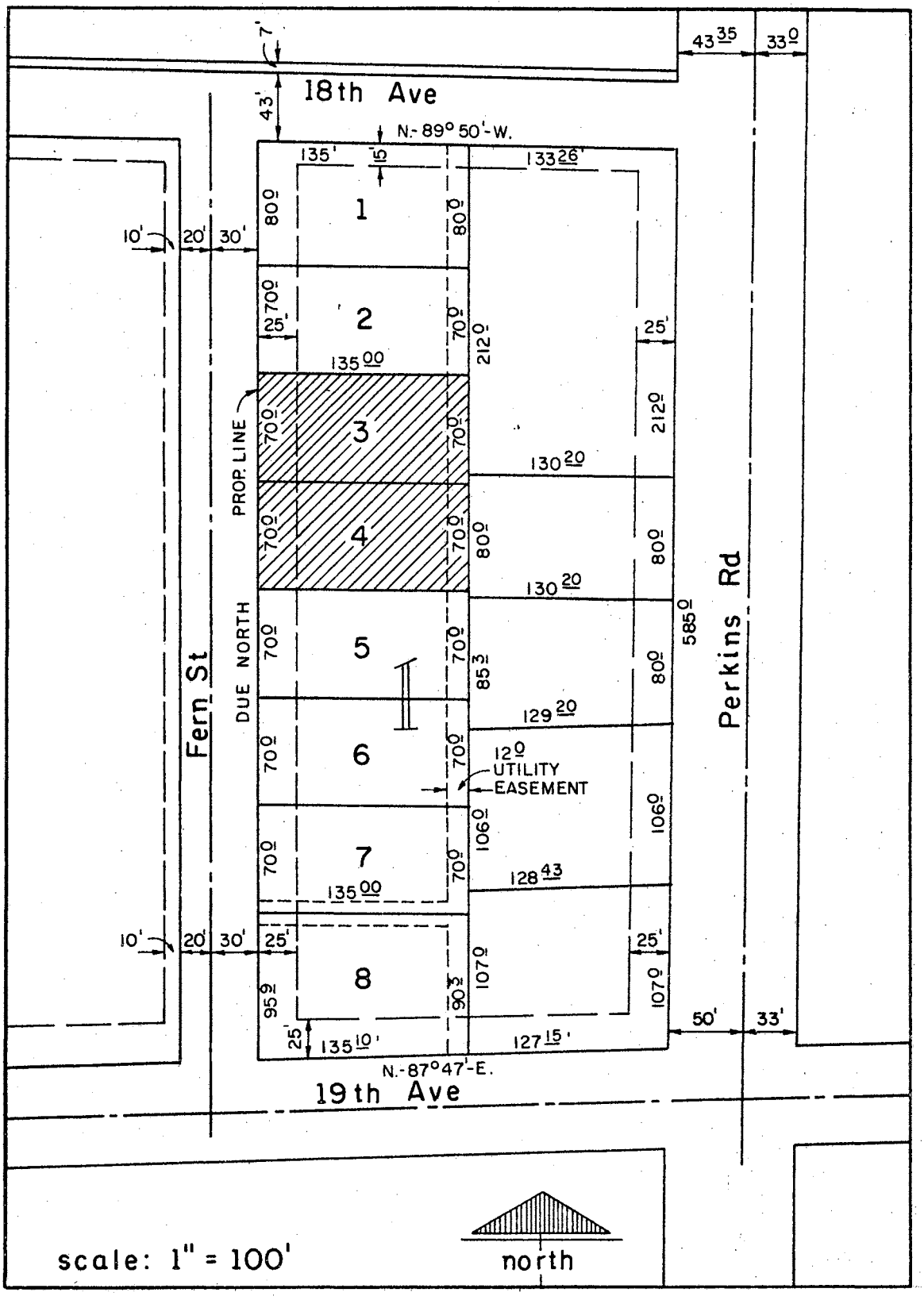

Figure 1. Lots Offered for Sale

for Sale setting forth the terms of purchase, was favored because it reserved any cash outlay and/or interest costs until the land was actually needed for construction of the low-cost housing unit.

Immediately following the execution of the Option Agreement, the City of Stillwater was contacted through the Department of Community Development, City Planning, to discuss the construction of the low-cost housing project. It was suggested to the City that the surface area of 9,450 square feet of each of these lots was excessive for a single housing unit, since the housing unit which was tentatively planned would be slightly over 900 square feet in size. The maximum lot coverage allowed for main and accessory buildings under R-1 zoning was 30 per cent, while one low-cost housing unit would cover only 9.52 per cent of each lot. Furthermore, the land cost of $2,000.00 per lot also appeared excessive in view of the objective of minimizing all costs of a low-cost housing unit. Because of this, a lot split of the two lots into three equal lots, each having a front footage of 46.67 feet was proposed to the City. It was planned to build one housing unit per sub-lot, which would result in a lot coverage of 28.57 per cent and a minimum land cost per housing unit of $666.67. This proposal is illustrated in Figure 2.

At this point, the City Planner advised that Ordinance 1044, Zoning Ordinance, City of Stillwater, required a minimum frontage width of 50 feet per lot under all residential zoning classifications. He proposed that an additional five feet of frontage be purchased from each adjacent property owner on the north and south to complement the 140 feet of

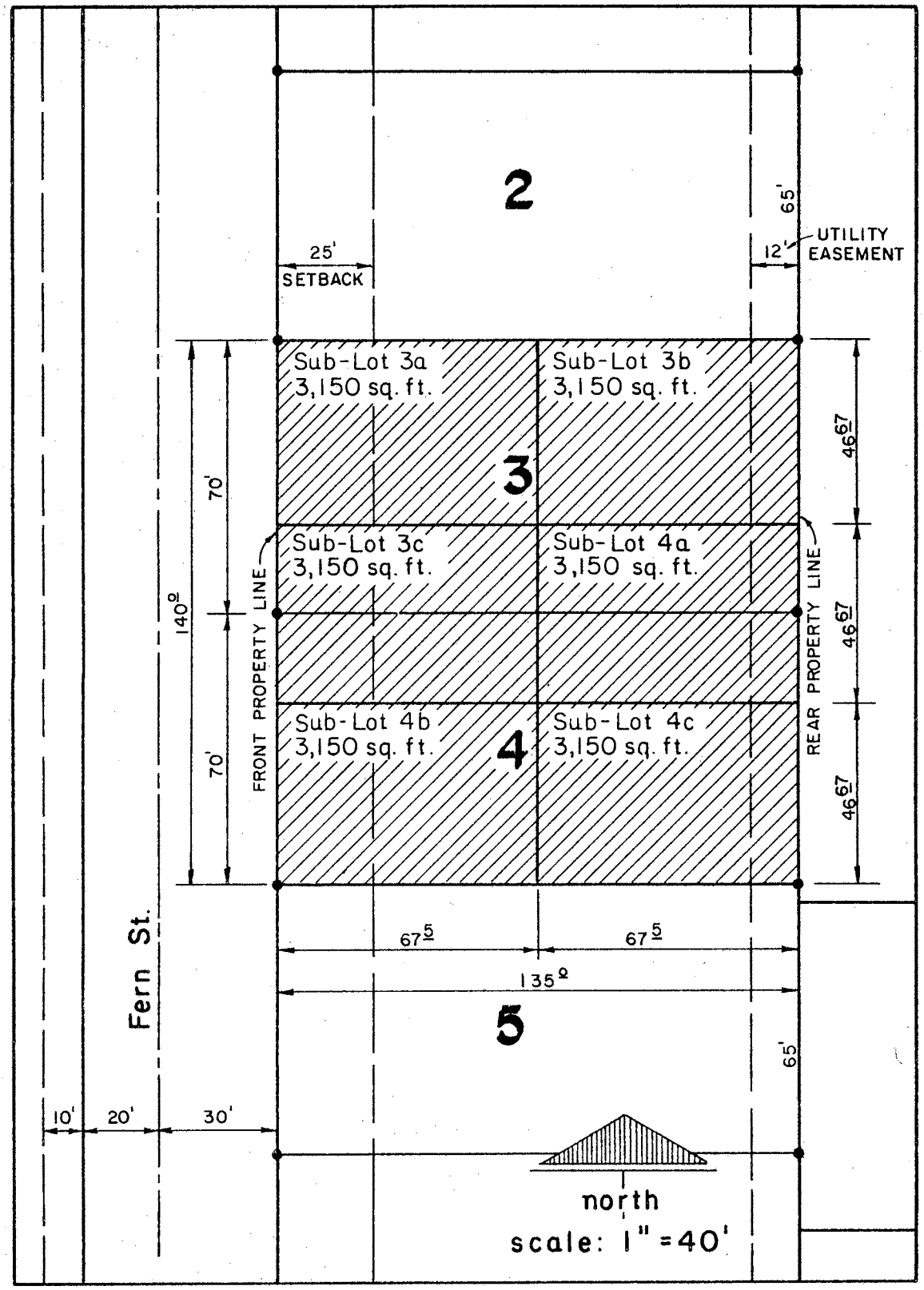

Figure 2. Lot Split Proposed to City for Minimum Unit Land Cost

frontage under option. The total property frontage of 150 feet could then be split into three equal lots of 50 feet each, as indicated in Figure 3. The City Planner suggested further that a zoning classification change to R-2, Two-Family Dwelling District, would allow another lot split in which the 135 feet deep lots could be split in half, resulting in six equal lots. Each lot would then measure 50 feet wide by 67.5 feet deep, with an area of 3,375 square feet. The lot coverage under this plan would be 26.66 per cent.

After receiving this advice from the City Planner, an Option Agreement was signed with the owners of Lot Two (2) on December 3, 1969, to purchase the south five feet of Lot Two (2) for $200.00. A similar Option Agreement was obtained from the owners of Lot Five (5) on the same date to purchase the north five feet of Lot Five (5) for $200.00. In both cases, the option period was for 180 days expiring on June 1, 1970. An application for a Zoning Amendment and Lot Split Request were then submitted to the City by a letter, dated December 10, 1969.

The proposed development of these lots is illustrated in Figure 4. Although not as economically desirable as the first proposal (Figure 2), this arrangement would result in a unit land cost of $733.33. It should be noted that this proposal for 3,375 square feet lots was submitted to and approved by the U. S. Department of Housing and Urban Development and the housing units erected according to this plan would have been eligible for FHA-insured mortgages.

The Stillwater Metropolitan Area Planning Commission, popularly

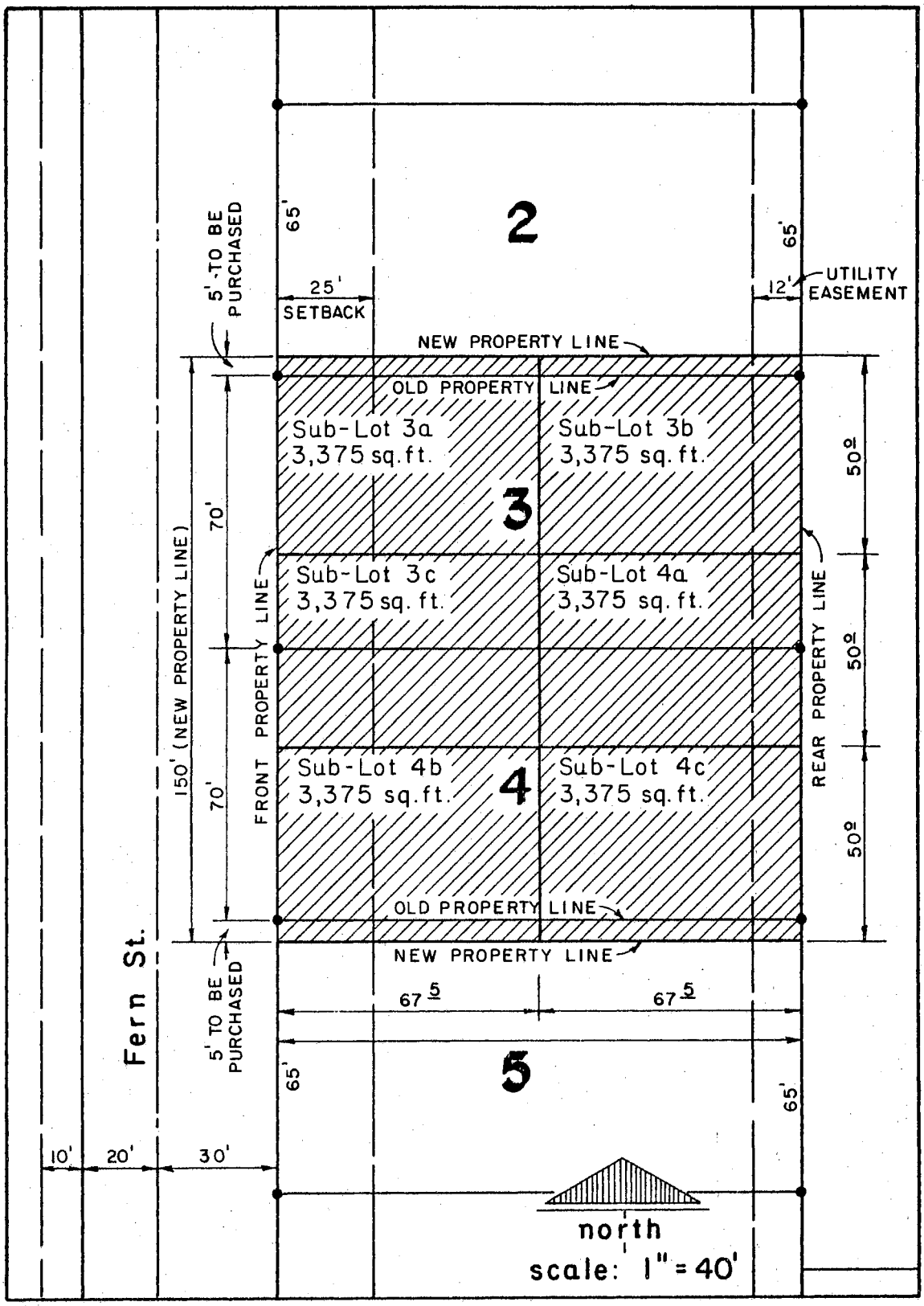

Figure 3. Modified Lot Split Suggested by City Planner

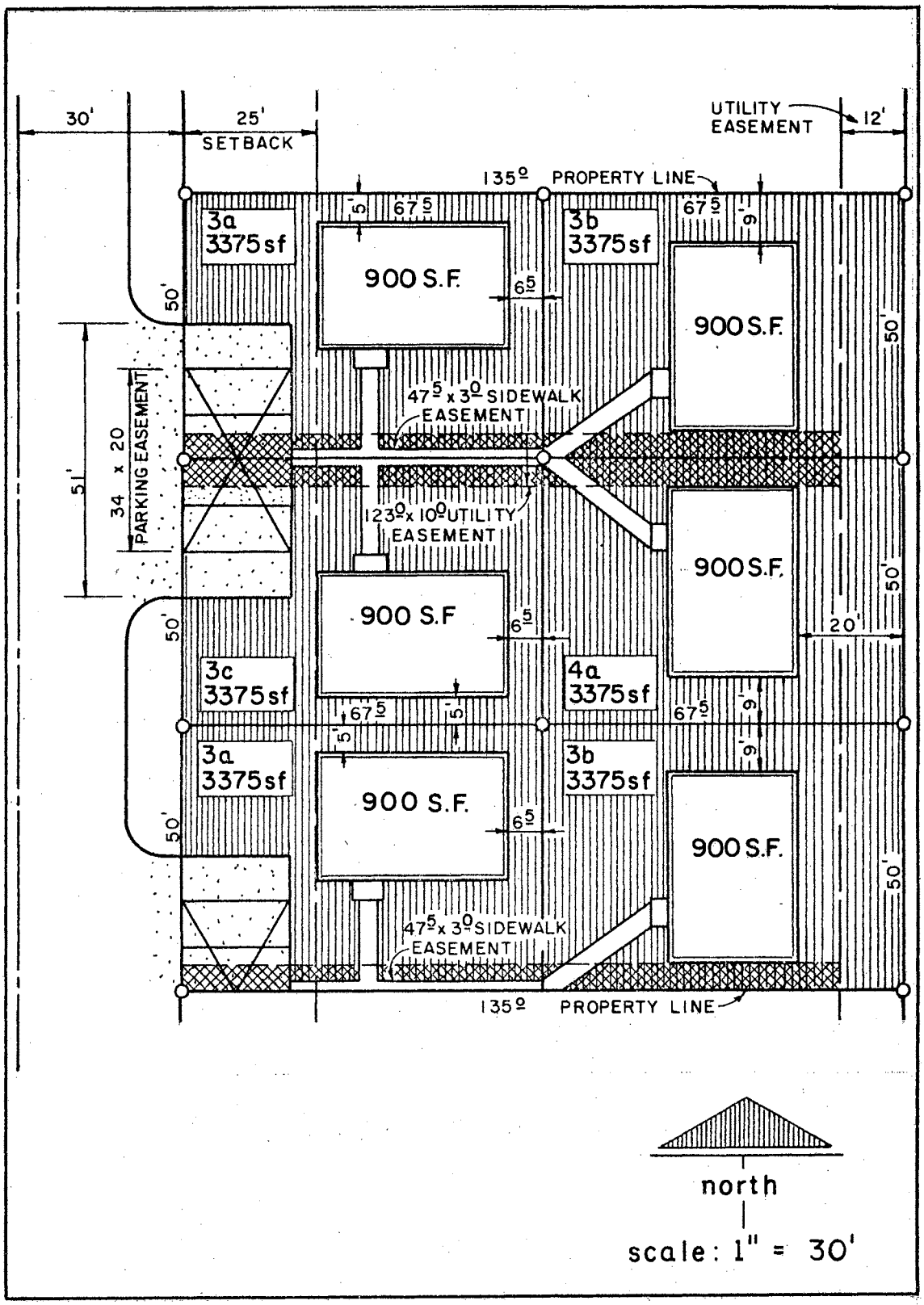

Figure 4. Proposed Development of Sub-Lots

referred to as the MAPC, meets regularly on the third Wednesday of each month to consider and recommend changes to the Zoning Ordinance and to act upon lot split requests. The MAPC is set up under the provisions of House Bill No. 105 of the Twenty-sixth Legislature of the State of Oklahoma, Title 19, of Oklahoma Statutes, 1961. This bill states that such a Commission shall consist of 10 members, with the Mayor and Chairman of the City Commission as ex officio members (17). They must meet at least once each month as a group, and are authorized to carry out a comprehensive plan for the City under the authority of existing statutes and laws, and the county is authorized to establish zoning regulations, building codes, etc., in the area outside the city limits (27).

Although the MAPC was unable to obtain a quorum at its meeting scheduled on December 17, 1969, to act upon the requested Application for Zoning Amendment and Lot Split Request, an informal session did convene. Members of the MAPC stated that the City Attorney had advised them that afternoon that a lot split into lots smaller than 6,000 square feet in area was illegal under all present residential zoning classifications. Therefore, they stated that they intended to deny the Lot Split Request.

By letter dated December 19, 1969, the City Attorney was requested to furnish documented reasons for his advice to the MAPC and to offer suggestions by which land costs for the low-cost housing experiment could be minimized. The reply to this letter on February 11, 1970, failed to offer any constructive advice, but did serve to emphasize that one of the

major obstacles to the low-cost housing experiment was the requirement of the Zoning Ordinance that there be a minimum lot area of 6,000 square feet for a single-family dwelling.

Recognizing that the requested lot split would be illegal and that R-2 zoning would no longer benefit the low-cost housing experiment, a letter dated December 22, 1969, was sent to the MAPC withdrawing the original application for Zoning Amendment and amending the Lot Split Request.

The City advised the owner of Lot Two (2) on December 21, 1969, that his intention to sell the south five feet of his lot would seriously damage the potential usage of his total property, which consisted of Lots One (1) and Two (2). His total frontage from these lots was 150 feet, which could be split into three 50-foot lots. Selling the south five feet decreased his possible ownership to only two lots. Upon this owner's request, therefore, it was agreed not to exercise the rights of the Option Agreement. Instead, the original Option Agreement with the owner of Lot Five (5) was amended to allow the purchase of the north ten (10) feet of Lot Five (5) for $500.00. This action did not impair the potential value of Lot Five (5). The total parcel that was optioned is shown in Figure 5. Accordingly, an additional letter dated January 7, 1970, was sent to the Metropolitan Area Planning Commission amending the Lot Split Request originally made December 20, 1969.

The amended Lot Split Request was approved in a final action by the MAPC at its meeting on January 7, 1970. This resulting split is

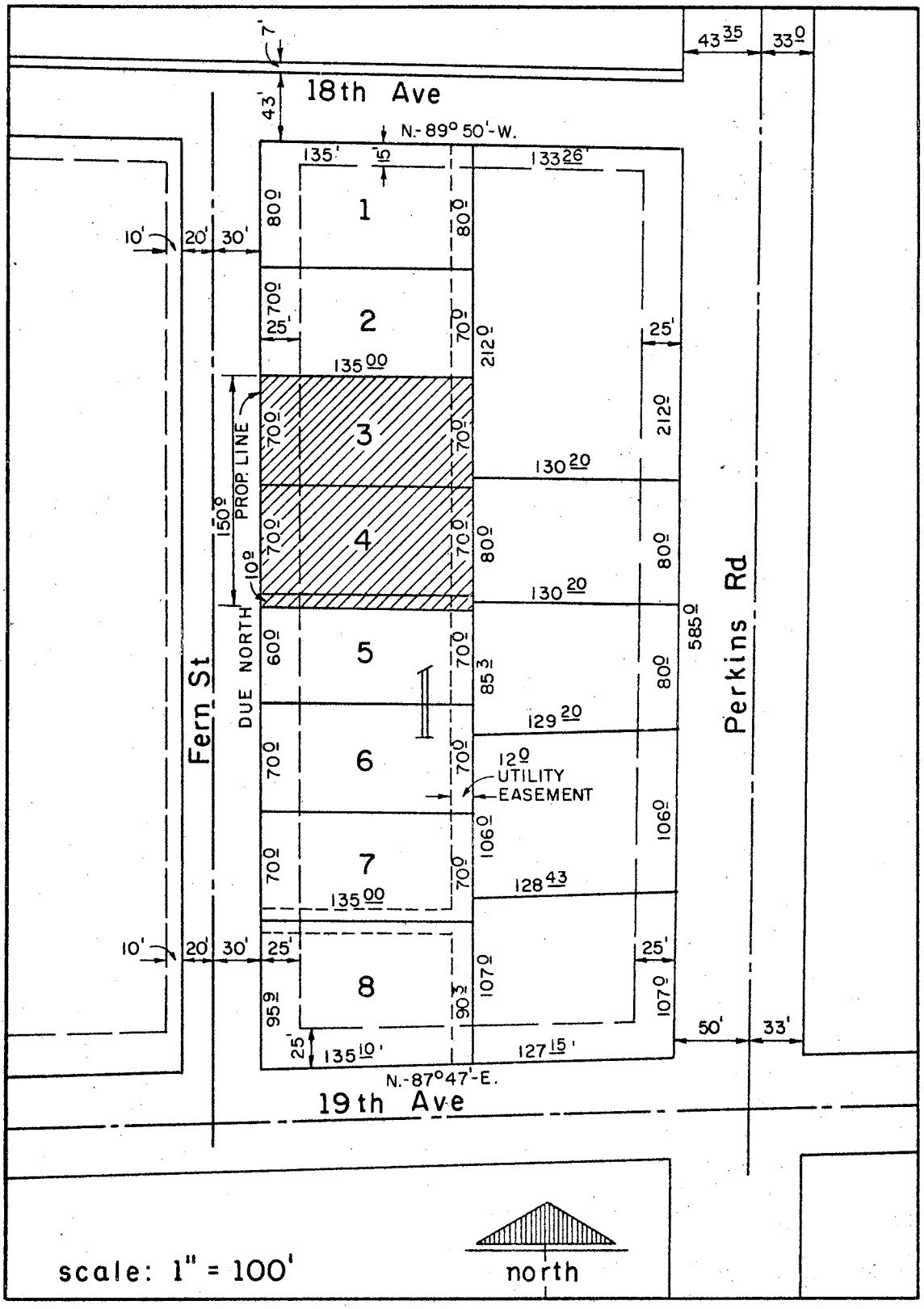

Figure 5. Total Parcel Finally Optioned

shown in Figure 6. This lot split, the only possibility under the existing Zoning Ordinance, provided three lots, each having a frontage of 50 feet and a depth of 135 feet, with a lot area of 6,750 square feet. For the tentatively planned 900 square foot low-cost housing unit, there would be a coverage of 13.33 per cent and a unit land cost of $1,500.00.

Summary

Table II summarizes the sequential steps involved in acquiring the land for this project and illustrates the opportunity to use land acquisition methods to substantially reduce the cost of housing for low-income families.

In this aspect of the experiment, restraints by the City of Stillwater through its Zoning Ordinance prevented the obtaining of the least expensive unit land cost. This zoning ordinance does not encourage the development of low-cost housing in Stillwater. The decision to set a minimum lot width of 50 feet and a minimum area requirement of 6,000 square feet coupled with high land costs could put the chance for home ownership out of reach for low-income families. Obviously, smaller and less expensive lots could lead to less expensive housing, and substantially reduce the consumer's monthly housing expenditure.

Due largely to these zoning restrictions and the high cost of real estate, trailer homes now provide the low-cost housing for those who cannot afford lot costs in Stillwater (28). The number of mobile homes in Stillwater is growing daily, and at practically every meeting of the

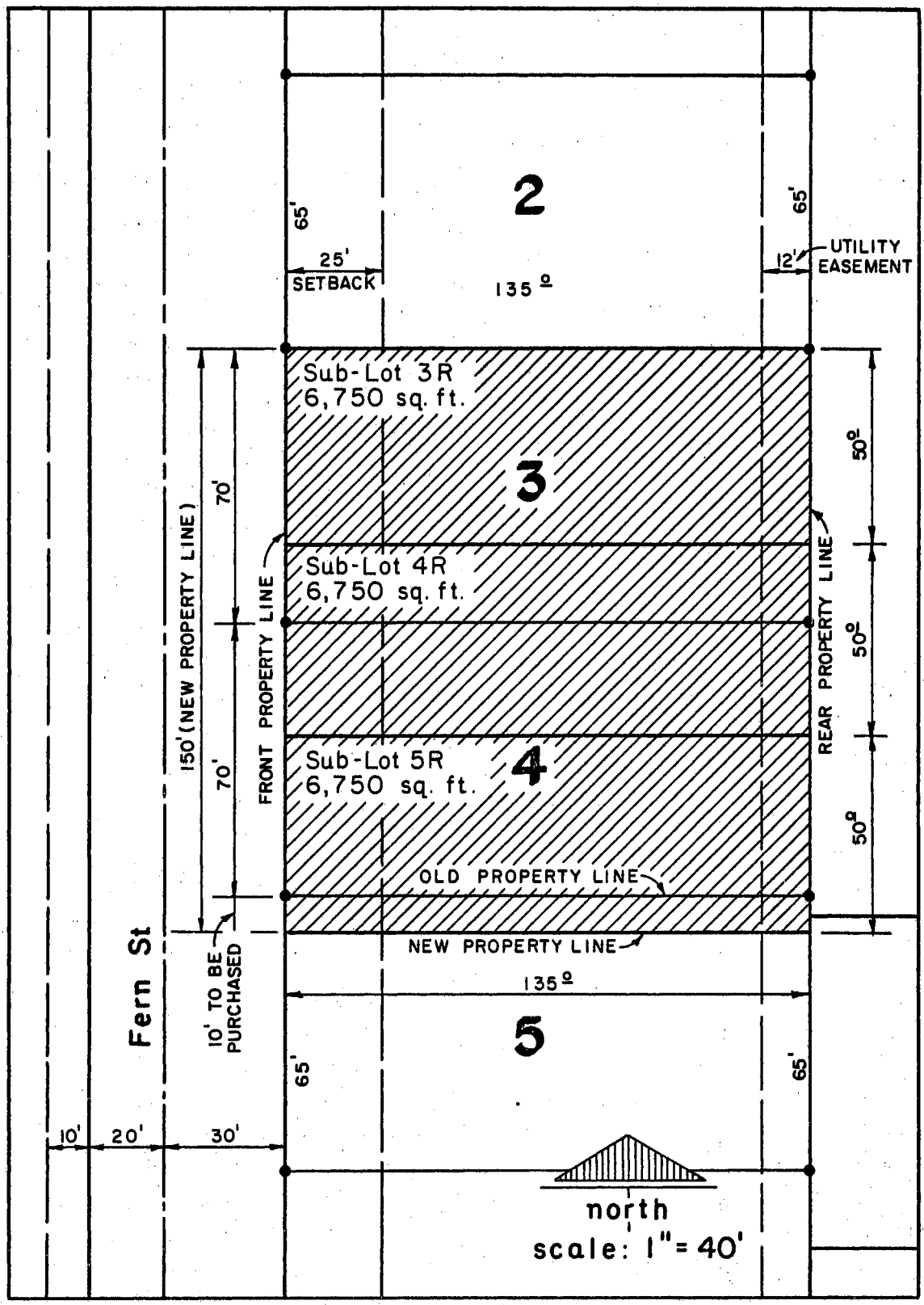

Figure 6. Final Lot Split Required by Zoning Ordinance

TABLE II

SEQUENTIAL STEPS IN LAND ACQUISITION
AND RELATED UNIT LAND COSTS

	I As Per Original Option Agreement	II Lot Split Proposed to City for Minimum Unit Land Cost	III Modified Lot Split Suggested by City Planner	IV Final Lot Split Required by Zoning Ordinance
Total Parcel Size	140'x135'	140'x135'	150'x135'	150'x135'
Parcel Area (Sq.Ft.)	18,900	18,900	20,250	20,250
Total Parcel Cost	$4,000.00	$4,000.00	$4,400.00	$4,500.00
No. of Housing Units	2	6	6	3
Unit Lot Size	70'x135'	46.67'x67.5'	50'x67.5'	50'x135'
Unit Lot Area (Sq.Ft.)	9,450	3,150	3,375	6,750
House Area (Sq.Ft.)	900	900	900	900
Lot Coverage	9.52%	28.57%	26.66%	13.33%
Allowable Lot Coverage	30.00%	30.00%	30.00%	30.00%
Unit Land Cost	$2,000.00	$666.67	$733.33	$1,500.00

Board of City Commissioners, some action is taken regarding mobile homes (29). The members of the MAPC have expressed concern about the number of mobile homes and mobile home courts in Stillwater, and the Stillwater City Planner has also indicated that a lessening of local zoning restraints to encourage private permanent ownership of low-cost housing units is a necessity for a growing community where approximately 20 per cent of all residential units are mobile home units.

Mobile homes are now permitted in a R-3, Multiple-Family Dwelling District, subject to review by the City Planning Commission and the issuance of a use permit (25). The number of mobile homes permitted by the Trailer Court Ordinance is based on the formula that 2,800 square feet of lot area is required for each living unit after provision has been made for ingress and egress to that living unit (30). It is estimated by local mobile home park developers that approximately 15 per cent of the total parcel acreage must be reserved for ingress and egress purposes. On a hypothetical 10-acre parcel of land, the above formula and access provisions will yield approximately 132 mobile home sites. In addition, pavement restrictions are minimal as well as other development costs.

In contrast, developing a 10-acre parcel of land for low-cost housing units, approximately 25 per cent of the total parcel must be dedicated for public rights-of-way. Subdividing the balance into 6,000 square feet lots will yield only 54 housing units. Not only will the raw unit land costs for permanent housing be approximately two and one-half times that for mobile home sites, but the housing units are further

penalized by higher costs for more stringent pavement requirements and other development needs not required by mobile home court regulations.

Obviously, cities like Stillwater, with lower than average mean incomes, must decide whether they are satisfied with present trends toward large numbers of mobile homes and mobile home courts, or whether they prefer to encourage low-cost permanent housing by easing zoning restraints that tend to force land costs upward.

CHAPTER III

SELECTION OF THE LOW-COST HOUSING UNIT

The selection of a low-cost housing unit compatible with the purposes and limitations of the experiment posed certain difficulties which served to emphasize one of the major problems connected with the development of low-cost housing. The selection of a low-cost housing unit was dependent upon a host of interacting considerations. The basic objective of low-cost housing has been to provide adequate and decent housing for low-income families. However, the voluminous amount of reference material pertaining to low-cost housing studies, the many architectural conceptions of low-cost housing units, and the variety of materials and construction methods used to assemble a low-cost housing unit attest to the efforts and difficulties encountered in meeting this objective.

To avoid becoming lost in a maze of unlimited possibilities and subjective opinions, it was necessary that certain guidelines be adopted with regard to the selection or design of the low-cost housing unit. These limitations confined the selection of the low-cost housing unit to the following:

1. The housing unit should be a single-family dwelling unit

suitable for construction or installation on an individually-owned lot.

2. The housing unit should provide an adequate and decent shelter for a low-income family, be structurally sound and durable, and have reasonably low maintenance costs.

3. The cost of the housing unit should be compatible with the limitations of the experiment, i.e., the total cost of the housing unit, including land and financing costs, had to be within the means of a family with an annual income not exceeding $4,000.00.

4. If constructed on-site, the design of the housing unit should be readily adaptable to local building practices and incorporate conventional building materials.

A comprehensive review and study of the literature pertaining to low-cost housing studies and projects was rigorously pursued to select a suitable housing unit within the adopted guidelines of this study. Low-cost housing is a very current topic, and having received the impetus of being designated a national goal, the literature was current and voluminous. This literature survey resulted in the creation of a substantial library of privately collected items of interest pertaining to various aspects of low-cost housing. The major source of reference materials was the federal government.

Government Studies and Projects

Federal Government. The U. S. Department of Housing and Urban Development maintains a library of current reference materials for the purpose

of informing its staff of latest developments in that field (31). As the volume of current literature increased, it was necessary for the library to issue a fully-annotated, bi-monthly issue called "Housing and Planning References" (32) so that its personnel could be more aware of the many additions to the library. This publication is perhaps the most comprehensive guide to housing literature now published. In each bi-monthly issue, some 1,000 recent books, monographs, and articles are listed by subject, geographical location, and author.

It was not within the scope of this experiment to examine critically every low-cost housing unit that has been or is being developed in the United States and elsewhere. It was assumed that any significant development in this area would appear in one of the major housing studies published by the U. S. Department of Housing and Urban Development. Some of these more important housing studies which were examined were as follows:

1. "An Analysis of Twelve Experimental Housing Projects" (17) is a comprehensive report derived from an extensive investigation of six low-cost housing demonstrations, five Federal Housing Administration experimental housing projects, and Habitat '67, an exhibit of new urban housing concepts for EXPO '67, the World's Fair at Montreal, Canada. This report was based on research conducted under contract with the MITRE Corporation, the Office of Urban Technology and Research, and the U. S. Department of Housing and Urban Development.

The report focused on four major areas--mobile homes, precast

concrete modules, post and slab components, and rehabilitation projects. For each of these areas, cost data and other descriptive material were supplied. Although cost data were restricted to only seven of the completed projects as of September, 1968, the results were rather divergent. Ranging from a low of $11.20 per square foot construction cost for a stacked mobile home technology method used at Fredella Village, Vicksburg, Mississippi, to a high of $103.00 per square foot construction cost (or $130,000.00 for a two-bedroom unit) for the precast concrete modules at Habitat '67, the average construction cost was $18.51 per square foot for the six completed projects. This average necessarily excluded the excessive costs of Habitat '67. These six projects included all construction technologies. More importantly, the report stated in its summary that "none of the new construction technologies has demonstrably cut direct construction costs below those of more conventional methods (17)."

2. "Reston Low-Income Housing Demonstration Program Report" (33) is a U. S. Department of Housing and Urban Development report of a low-income housing demonstration project to investigate new ways of reducing housing costs. Funded by federal grants totaling $268,000.00, it is an in-depth study of a completely planned new low-income community in Reston, Virginia. Begun in 1961, a community of 80,000 is being planned by 1971 on a 7,400 acre tract of land. Because of financial difficulties, the project did not meet the U. S. Department of Housing and Urban Development's objective to provide low-cost housing for low-

and middle-income families. Although initial plans called for housing units starting at the $12,000.00 level, housing priced below $22,000.00 is not available in Reston. Three years after the project was begun, the prices ranged from $24,000.00 to $45,000.00, with an average price level of $34,000.00 (34).

3. Perhaps the most comprehensive review of individual low-cost housing units available was the catalog, "Manufactured Housing Technically Suitable for FHA Mortgage Insurance," (35) issued by the U. S. Department of Housing and Urban Development. Through its Federal Housing Administration, the U. S. Department of Housing and Urban Development recognized that manufactured housing systems and components are a significant and essential part of the national housing industry. The Federal Housing Administration evaluated housing systems to determine if they were suitable for mortgage insurance and issued "Structural Engineering Bulletins" on acceptable systems. This information was then disseminated to housing officials, developers, state and local authorities, and other interested parties. Contained in the catalog were architectural plans, a perspective view of the unit, and a brief descriptive summary of each system approved. The catalog also specified the name and location of the manufacturer, what portion of the total unit was available directly from the manufacturer, the nature of the construction work required at the site, including the foundation, utility systems, etc. In total, there were 102 manufactured housing units that were approved as technically suitable for an FHA-insured mortgage during

the period from May 10, 1951, through May 8, 1969. Although the report offered helpful information pertaining to the architectural concepts of low-cost housing units, it did not contain specific cost data for the manufactured units.

4. The publication, "List of Technical Studies and Experimental Housing Projects," (36) is published periodically to advise research organizations, industry, and others of the Federal Housing Administration's needs and interests, to stimulate research and experimentation, and to avoid duplication of research efforts. Under the Technical Studies Program section, contracts are let with other government agencies, educational institutions, and research organizations to study the technical problems that the Federal Housing Administration encounters with construction, design, and materials. These Technical Studies help assure that FHA-insured homes are sound, well-constructed, and economical (36). The Experimental Housing Program section stimulates the use and testing of advanced technology in housing design, materials, and construction. It does so by underwriting mortgages on housing which incorporate these advanced technologies, thus reducing the risk involved in experimentation. The most recent publication, dated September 1, 1967, listed 101 current and completed projects in both sections of the program (36). Although no cost data were given for the 52 experimental housing projects, helpful information was obtained relative to the engineering and architectural aspects of housing units being researched by the federal government.

Operation Breakthrough. A major force behind the drive to develop prototype low-cost housing units was the formation of Operation Breakthrough by the U. S. Department of Housing and Urban Development. Although no specific information regarding the present availability of and cost data for the low-cost housing units in the program was obtained, the literature pertaining to Operation Breakthrough was researched to determine the latest developments in the field of low-cost housing.

Operation Breakthrough proposed to alleviate the national housing problems through a partnership between labor, private enterprise, and government at all levels--local, state, and federal. Plans included developing new techniques of production, marketing, and management (37), and attaining the entrepreneurial efficiencies in business organization, financing, and management that is believed to be made possible by a large scale organization within the building industry (38). The problem has been implemented in three phases: Phase I consisted of the design and planning aspects; Phase II consisted of the prototype construction, and Phase III involved the volume production of the units deemed worthy (39).

Operation Breakthrough was launched publicly in May, 1969. In July, 1969, in response to a public announcement requesting interested bidders to participate in the program, more than 1,500 requests for proposals were mailed to prospective bidders. The bidders included general contractors, homebuilders, aerospace companies, and other companies associated with the building industry. Under Type A bids of the

Operation Breakthrough program, a bidder could submit a plan to develop, test, evaluate, and construct complete housing systems leading to a volume production. Type B bidders were invited to submit a plan to research, develop, and design an innovative concept or idea not ready for prototype construction but which would provide individual elements of a total system (40). Proposals for the sites for the prototype construction were also taken. The deadline for all such proposals was set as September 19, 1969 (41).

From the Department's request for proposals, 550 Type A proposals were received, and 385 Type B proposals. Of these, 22 Type A proposals were selected for prototype construction, and two Type B proposals were chosen for further discussion and negotiations. Also, 10 prototype sites were selected from the 218 submitted proposed sites. More than 2,000 prototype housing units for all income levels will be built (42).

The selections were finalized in February, 1970. Several months are being spent in a site design period as of this writing, with actual construction not scheduled to begin until sometime during the summer of 1970. At the planned rate, some of the units will be completed in 1971, and extensive testing will continue for many months after the units have been completed and occupied. Results of the program will be evaluated by the National Academies of Science and Engineering. Obviously, it will be several years before complete results are available (42).

Spokesmen of the U. S. Department of Housing and Urban Development have tried to emphasize the scope and nature of overall housing

problems rather than the ultimate production line method by which the housing units are expected to be brought into being. However, the appointment of Harold Finger to the position of Assistant Secretary for Research and Technology is indicative of the Department's emphasis on research and technology (38).

Oklahoma State University hosted a Banking-finance Seminar on the campus in Stillwater, Oklahoma, in November of 1969. Focused entirely on Operation Breakthrough, excerpts from the Seminar concurred with earlier evaluations of the program offered by authorities in the housing field. These authorities emphasized that the following problems are inherent to the program.

1. Operation Breakthrough will take two to three years to develop and tentatively evaluate the units produced, and another five to 10 years to reach a final evaluation. By then, the nation's housing problems may be beyond hope (16).

2. Nationally, 31 per cent of the cost of the finished unit is attributed to the cost of land and financing. Little attention is devoted to these critical areas by the Operations Breakthrough program (20).

3. U. S. Department of Housing and Urban Development Secretary Romney stated that it is still to be determined whether even a technological breakthrough can substantially reduce costs and allow mass production methods to be put into action (43).

4. Operation Breakthrough must face all the problems that are being presently encountered by builders. Included among these are

shortages of land, the current squeeze on mortgage funds, restrictive labor practices, Congressional fund-cutting, and lukewarm Administration support for the program in the form of funding (38).

5. Operation Breakthrough is already months behind schedule, and as recently as March, 1970, Secretary Romney stated that almost none of the units selected offered new technological ideas that were particularly exciting. Instead, he concluded, the plans displayed what is possible under existing technology (44).

Former Secretary of the U. S. Department of Health, Education and Welfare John Gardner, summed up the situation by saying, "Operation Breakthrough is a useful part of the whole approach, but so are a lot of things (43)."

Universities. Considerable interest and effort has been given to the need for decent and adequate housing for low-income families by the federal government. In addition to searching governmental sources for a suitable low-cost housing unit, it was necessary to explore the efforts of the academic institutions in this area.

A primary effort was extended to determine what doctoral dissertations had been authored on this subject. For this purpose, the services of DATRIX (Direct Access to Reference Information) were used. It is a research tool offered to students and researchers by University Microfilms, a Xerox company. By using a key word index, DATRIX made a comprehensive computerized search of the University Microfilms

dissertation files, which contain 95 per cent of all doctoral disserations written recently at United States and Canadian universities. Only two unpublished dissertations in the area of low-cost housing were found, neither of which had any direct bearing on the selection of a low-cost housing unit for the study. The two dissertations were "Social Prestige in a Low-Income Housing Community" (45) and "An Outline of the Housing Market, with Special Reference to Low-Income Housing and Urban Renewal" (46).

As a result of the request for a publication entitled "The New Building Block," correspondence was established with its publisher, the Center for Housing and Environmental Studies at Cornell University, Ithaca, New York. This center was originally founded in 1950 as the Housing Research Center, and its name was changed in 1961 to its present title to better reflect the scope of the Center's activities and interests. The Center emphasizes both basic research on man's shelter requirements, and studies of current problems facing individuals, groups, and public authorities in the field. Its general objective is to focus, stimulate, and facilitate research in the broad areas where many of the problems will necessarily cross departmental and college lines. A list of its publications indicated that some 70 research reports, documentary films, and reprints are available (47).

"The New Building Block" (48) essentially reviews current happenings in the field of factory-produced dwelling modules, with a brief commentary on individual efforts and their possible significance for the

future of housing. This comprehensive report resulted from a research project completed by an eight-man staff of the Center for Housing and Environmental Studies. In addition to an in-depth survey of 33 case studies in this report, adequate discussion was given to the other aspects of solutions to the low-cost housing problems besides the technological advances. The availability of comparative specifications and related unit square foot costs for eleven of the 33 completed projects was an important contribution to selecting a low-cost housing unit for the present study.

The University of Texas has carried on experimental housing projects for about 25 years. All ceramic houses, the Air Condition Village, and others were early studies undertaken by the University of Texas. The University, with a $360,000.00 grant from the U. S. Department of Housing and Urban Development, instigated Austin Oaks '68, a crash program to construct 10 low-cost homes in an experimental project begun in September, 1968. The 10 homes were selected individually from a list of 88 homes proposed by various builders. The houses selected ranged in style from a conventional frame construction to precast concrete to concrete block to semi-mobile types to panelized construction. More than 20 faculty members will observe the construction techniques in detail and will record and analyze costs. They will also evaluate all engineering aspects of the project, as well as the architectural, sociological, and psychological aspects. The unique project is expected to involve a two-year period for testing and evaluation (49).

The most important significance of the Austin Oaks '68 project was that aside from minor material innovations, conventional building materials and methods maintained a unit square foot cost range of approximately $7.00 to $10.00. Although information was not given as to the general availability of the units nor their eligibility for FHA-insured mortgages, it may be reasonably assumed that this information will be made available when the findings of the project are published.

Financing Requirements

Following the foregoing preliminary research of the literature, it became apparent that low-cost housing units range widely in cost, architectural concept, construction materials, method of construction, and type of financing available. The previously adopted guidelines regarding cost themselves became a restraining factor by requiring the cost of the housing unit to be within the financial means of a low-income family. In addition, it was necessary to determine the most satisfactory method of financing the housing unit for the low-income family.

A survey of financing sources determined that the most favorable form of mortgage financing to the prospective low-income purchaser of the housing unit constructed on an individually-owned lot, was that financing which would be available from a lender if the repayment of the loan were insured by an agency of the federal government, i.e., an FHA-insured mortgage.

Founded by the National Housing Act of 1934, the Federal Housing

Administration was organized to attract monies into the field of home financing by furnishing an insurance plan under which lenders would be protected from the full loss of their loans--a not too uncommon occurance during the preceding depression years (50). Under the Federal Housing Administration system, a homebuyer makes a small down payment and obtains a mortgage for the balance of the purchase price of the home. The mortgage loan is made by a bank, a building and loan association, a mortgage company, an insurance company, or by other approved Federal Housing Administration lenders, and is insured by the Federal Housing Administration. It is not a government loan, nor does the Federal Housing Administration lend money or build homes. By charging the borrower a mortgage insurance premium of one-half of one per cent a year on the average scheduled mortgage balance outstanding during the year, the Federal Housing Administration will insure the lender against a loss on the mortgage. (This mortgage insurance premium for an FHA-insured mortgage is sometimes referred to as mutual mortgage insurance, or in abbreviated form, MMI.) Consequently, the lender can allow more liberal mortgage terms than the homebuyer might otherwise be able to obtain. Under Section 203(b) of the National Housing Act, the Federal Housing Administration can insure mortgages for 97 per cent of the appraised value for proposed construction and 90 per cent on homes approved for mortgage insurance after construction has begun or before the home is one year old, up to a maximum mortgage amount of $30,000.00 (51). The current maximum term to repay the loan in equal

monthly payments is 30 years at an interest rate of eight and one-half per cent per year (52).

There are numberous other means of financing available to the prospective buyer which are commonly referred to as conventional financing. However, a survey of these financing sources indicated that a greater down payment is required from the purchaser, and the length of time to repay the mortgage is shorter than that available from an FHA-insured mortgage. Although other specialized Federal Housing Administration programs are authorized by the National Housing Act, they do not provide for mortgages on individually-owned parcels of land.

The FHA-insured mortgage provided for in Section 203(b) of the National Housing Act provides the most favorable and versatile form of permanent financing for the prospective low-income buyer. It not only is available to a broader group of applicants, but it permits them to have a home on an individually-owned parcel of land. Another advantage to constructing the low-cost housing unit for eligibility under Section 203(b) was the opportunity for purchasing the housing unit for a family who was qualified for subsidy assistance under Section 235 of the National Housing Act. This program provides assistance to qualified low-income families in the form of supplemental monthly payments by the U. S. Department of Housing and Urban Development direct to the mortgagee so as to reduce the purchaser's total monthly payment for an FHA-insured mortgage (51).

To assure that a proposed housing unit is eligible for an FHA-

insured mortgage under Section 203(b), the Federal Housing Administration has adopted a set of minimum property standards: "Minimum Property Standards for One and Two Living Units" (53). These standards set forth minimum planning and construction requirements for a residential property, including the land and all improvements thereon, which is offered or is proposed to be offered to the Federal Housing Administration as security for an insured mortgage loan. The standards are intended to provide a sound technical basis for FHA-insured mortgages by providing minimum standards which will insure well-planned, safe, and soundly constructed homes.

In addition to the above publication, the Federal Housing Administration has issued a "Minimum Property Standards for Low Cost Housing" (54) specifically to encourage the construction of housing designed to meet the needs of low-income families. Section 203(b) provides for a housing unit constructed under these lesser standards and eligible for an FHA-insured mortgage provided that the amount of the mortgage does not exceed $13,500.00. In the development of the standards for low-cost housing, emphasis was placed upon those characteristics which would assure housing that is structurally sound and durable, has reasonably low future maintenance, and is well-planned for the needs of the expected occupants. The standards as contained in the "Minimum Property Standards for Low Cost Housing" are somewhat below those of the "Minimum Property Standards for One and Two Living Units" in several respects. The principal relaxations involve planning standards

where aspects of shelter predominate over convenience, where a lesser quality of finish for exterior and interior covering materials is permitted; and where certain improvements which require no special knowledge or experience are left to be completed by the purchaser. The standards do not attempt to provide an absolute minimum degree of shelter, structural strength, or durability, but they do establish adequate and decent shelter standards for low-income occupants.

It was thus determined that the low-cost housing unit would have to satisfy the "Minimum Property Standards for Low Cost Housing" if it was to be eligible for an FHA-insured mortgage. Further research and review of the literature was performed to determine the availability of a low-cost housing unit that would be compatible with the limitations of the study prescribing that the housing unit, including land and financing, could be purchased by a family with an annual income not exceeding $4,000.00.

Manufacturers

The literature pertaining to manufacturers who supply total housing units was surveyed to determine the availability, cost, and the method of financing for low-cost housing units. The literature of building material suppliers who were furnishing or planned to furnish component parts for a housing unit was also considered in the search.

Prefabricated Units: The manufacturers supplying total housing units

offered them either as prefabricated units, mobile homes, or as prototypes. The prefabricated housing units produced by some of the larger manufacturing companies varied in the extent to which the unit was ready for occupancy upon delivery. Some manufacturers supplied a prefabricated kit consisting only of the basic building materials needed by the purchaser to erect the outside shell. Others offered a completed housing unit constructed on the purchaser's land. In between these two extremes, the manufacturers offered units differing in either the amount of material needed by the purchaser to complete the construction or in the amount of work performed by the manufacturer in erecting the housing unit for the purchaser. Because of these variances, a random sampling of unit square foot costs indicated inconsistencies in comparing the costs of one housing unit against another. Unit square foot costs ranged from approximately $6.00 per square foot for a prefabricated shell to more than $12.00 per square foot for a completed housing unit. The only consistencies were the requirements that transportation costs be added to the purchase price of all prefabricated units, and that the purchaser was responsible for the installation of the foundation and/or concrete slab, and for providing water, gas, and electrical services for the housing unit. More importantly, none of the prefabricated units that were considered was eligible for an FHA-insured mortgage.

Mobile Homes: Mobile homes rightfully have earned serious consideration as a low-cost housing unit. Being widely advertised and readily

marketed and distributed, they are a complete housing unit that can be easily ordered and installed in a minimal time period.

Although mobile homes are easily and conveniently ordered, they are not necessarily the least expensive housing unit. At the time of this writing, local representatives of mobile home manufacturers quoted unit square foot costs in an approximate range from $10.50 to $12.50 per square foot. Although built-ins and minimal furniture normally were included in the quotation, deleting the furniture would result in a cost saving of approximately only $0.75 to $1.00 per square foot from the original cost. In addition to the basic unit cost, the purchaser is responsible for providing the connections for utility services to the housing unit. The Mobile Homes Manufacturing Association reported in June, 1969, that the average mobile home sold nationally for approximately $8.75 per square foot. They further offered, for comparison purposes, information that the average site-built home costs about $20.00 per square foot (55).

The most curtailing restraint to the use of a mobile home unit for this experiment was the fact that the unit would not qualify for a Section 203(b) maximum term FHA-insured mortgage. Although the Federal Housing Administration recognized the need for mobile home financing, they have also recognized the temporary nature and earlier replacement period for a mobile home, and thus have limited the term of repayment to 12 years instead of the 30-year repayment schedule for a site-built housing unit.

Prototype Units: In the early stages of development, it is difficult for the developer of the prototype to price his unit competitively and recover those sums expended for the development of the unit. Even after receiving the approval of the U. S. Department of Housing and Urban Development for the housing unit, the other problems originating at the community level remain unsolved. One example of the monies and personnel required for development of a prototype housing unit was the recent effort of a team of 12 aerospace engineers. These men combined their average of 20 years experience with aerospace materials to develop a first prototype housing unit at a cost of $150,000.00 (56). Providing 1,190 square feet of living area, the three-bedroom, two-bathroom, and double garage unit was available at their California prototype location at a cost of $10,000.00 (57). The use of this housing unit in Stillwater would have entailed shipping costs plus the costs of having their construction crew come to Stillwater to erect the unit.

Another example of high costs for a prototype unit was one which was approved for an FHA-insured mortgage and manufactured in Oklahoma City, Oklahoma--a distance of approximately 80 miles from Stillwater. The basic components for a 700-square foot housing unit were estimated at approximately $7,000.00. In addition to the shipping costs for the unit, the material and work to be furnished and performed by the purchaser at the erection site included: the foundation and floor slab; erection of wall panels and roof framing; plumbing, heating, and electrical facilities installation; miscellaneous trim and finishing; and utility

connections--all contributing to a total construction cost of approximately $10,500.00, or $15.00 per square foot.

Building Material Suppliers: Material suppliers, having shown considerable interest in the problems of low-cost housing, were also surveyed to determine their knowledge regarding low-cost housing units. Although their literature was interesting, no specific information was obtained applicable to the selection of a suitable housing unit for this study. However, the efforts of the suppliers should be observed for any developments that may be forthcoming from such consortiums as that reported by a major cement association in which 41 concrete firms, operating some 67 plants throughout the country, proposed to commence production of precast building components (58). Representative of other suppliers' interest is that of a leading supplier of rubber products, which advised of their cooperation with approximately 80 manufacturers of module homes in the application of structural adhesive to instant housing units (59).

Cost Considerations

The value of a home that a family may purchase is related to the family's ability to make the required down payment and its ability to make the monthly payments after the home is purchased. The family's ability to afford a home is dependent largely on the total income of the family, the number of members in the family, income deductions, long

and/or short term debts, and credit status as well as the maintenance and utility costs and the monthly payment for the mortgage principal and interest, fire insurance, and taxes. Because of these variables it is not possible to fix a price of a low-cost housing unit with the expectation that it may be purchased by all families earning the same annual income. The Federal Housing Administration also recognizes these differences between families. Each family is individually considered to determine its eligibility to assume a mortgage. Although there is no fixed ruling, a spokesman for the local insuring office of the Federal Housing Administration concurred with the guideline used by permanent leaders. This guide is that the maximum monthly payment for the mortgage principal and interest, fire insurance and taxes, that an average family may safely assume in purchasing a home is limited to a maximum of 25 per cent of their monthly income. This rule is flexible and may be adjusted downward in considering the debt characteristics of the family. If the family is heavily in debt, the decreased amount of monies available to maintain the monthly payments is reflected by decreasing the amount of the mortgage available to the purchaser. For the purpose of this experiment, it was assumed that the average family whose income did not exceed $4,000.00 a year would be approved for a maximum mortgage amount in which total payments could not exceed $1,000.00 a year, or $83.33 per month. From data furnished by the Federal Housing Administration, it was determined that the estimated monthly expenditure for fire insurance and taxes would be $5.00 and $4.50, respectively, leaving a balance of

$73.83 per month for principal, interest, and mortgage insurance premium purposes.

The current interest rate of an FHA-insured mortgage was eight and one-half per cent and the required mortgage insurance premium was one-half per cent per year on the average outstanding balance of the mortgage during the year. Because the Federal Housing Administration reduces the allowable mortgage amount to be insured to the lowest multiple of $50.00, it was determined that a mortgage of $9,100.00 could be assumed by a low-income family. The monthly principal and interest payment to reduce a mortgage of $9,100.00 for a 30-year term of repayment was $69.98. The monthly insurance premium for a mortgage amount of $9,100.00 was $3.78 per month. In addition to these payments, the estimated monthly payment of $5.00 for fire insurance and $4.50 for taxes resulted in a total monthly payment of $83.26.

The amount of a Section 203(b) FHA-insured mortgage is limited to not more than 97 per cent of appraised value, or purchase price, whichever is the lower. Consequently, having previously determined that the maximum allowable mortgage was $9,100.00 to an average family earning $4,000.00 per year, it was determined that the purchase price of the low-cost housing unit could not exceed $9,381.44 if the down payment and total monthly payment was to be kept as low as possible.

Having projected a total cost of approximately $3,300.00 for land, financing, and sales expenses, overhead and profit, a balance of approximately $6,000.00 was budgeted for the construction cost of the

housing unit. Upon advice of the local Federal Housing Administration insuring office in Oklahoma City, Oklahoma, the size of the low-cost housing unit was limited to a minimum of 900 square feet. Accordingly, the cost per square foot could not exceed $6.67.

The maximum construction cost requirement under Section 235 of the National Housing Act is considerably less severe. Section 235 is a program to provide housing for low-income families by the U. S. Department of Housing and Urban Development through payment of a subsidy directly to the approved lender for a mortgage insured under Section 203(b). Maximum mortgage amounts and eligible annual family income limits are established for each locality. In Payne County, Oklahoma, the maximum mortgage amount is $18,000.00 which can be increased to $21,000.00 if a family consists of five or more persons and requires four bedrooms. Family income limits, expressed in terms of adjusted family income limits, are based on 135 per cent of the actual or permissible public housing limits in the locality. Adjusted family income is total income less $300.00 per minor child, 5 per cent of total income to allow for social security withholding and similar deductions, and any unusual or temporary income which will be or has been discontinued. Family assets are also limited to $2,000.00 ($5,000.00 if the buyer is over age 62) plus $500.00 per minor child and an amount equal to the family's annual payment to the lender for the home. Personal property such as cars, appliances, and furniture are not included in determining total assets. In Payne County, Oklahoma, the adjusted family income limits range

from $4,050.00 for a family of one to $7,020.00 for a family of 10 (60).

The purchaser is required to pay 20 per cent of his adjusted monthly income toward the total monthly payment for principal, interest, mortgage insurance premium, insurance, and taxes. The maximum subsidy payment by the U. S. Department of Housing and Urban Development directly to the lender is the lesser of (1) an amount to reduce the payment of principal and interest to the amount that it would be at an interest rate of 1 per cent, or (2) the difference between the total monthly payment and 20 per cent of the purchaser's adjusted monthly income. In addition, the required cash investment to purchase the home is limited to $200.00 plus any additional funds required to reduce the mortgage to the next lowest multiple of $50.00. Closing costs such as the prepaid first year's fire insurance, taxes, and other charges may be included in the purchase price to minimize the purchaser's total cash requirements. The purchaser can contribute the full value of his labor in the construction of the unit toward the required down payment or to reduce the mortgage, or both (61).

In Stillwater, Oklahoma, a family of four whose adjusted family income does not exceed $5,040.00 is eligible for subsidy under Section 235 if all other criteria are satisfied. To illustrate the provisions of Section 235, it was assumed that such a family with an annual income of $4,000.00 might purchase the low-cost housing unit for $9,380.00 with estimated closing costs of $100.00, for a total sales price of $9,480.00. The family's adjusted income was determined to be $3,200.00 a year ($4,000.00 less $300.00 for each child and 5 per cent for social security

and other withholdings) or $266.67 per month. Twenty per cent of $266.67, or $53.33 would be the amount that the family would be required to pay toward the total monthly payment. For the determined total sales price of $9,480.00, a down payment of $230.00 would result in a mortgage of $9,250.00 with a total monthly payment of $84.47 for a Section 203(b) FHA-insured mortgage at 8 1/2 per cent interest for 30 years. The total monthly payment of $84.47 includes the sum of $71.13 for principal and interest, $3.84 for mortgage insurance premium, $5.00 for fire insurance, and $4.50 for taxes. The U. S. Department of Housing and Urban Development would subsidize under Section 235, the lesser of either (1) the amount of $41.34 which is the difference between the present principal and interest payment of $71.13 and $29.79, which it would be at an interest rate of 1 per cent, or (2) the sum of $31.14, calculated as the difference between the total monthly payment of $84.47 and $53.33, which is 20 per cent of the purchaser's adjusted monthly income. It was thus determined that a subsidy payment of $31.14, which was the lesser of the two, would reduce the total monthly payment to $53.33 for a family eligible for subsidy assistance. More importantly, the provisions of Section 235 could permit a monthly payment as low as $43.13 to an eligible purchaser. This amount is the difference between the total monthly payment of $84.47 and the maximum allowable subsistance of $41.34. A typical family of four, whose approximate annual income was $3,350.00 or less, and which was eligible for subsidy assistance, would pay the minimum total monthly

payment of $43.13. [A preliminary ruling by the Internal Revenue Service holds that the buyer will not have to declare the subsidy on his interest rate as income, but can deduct it from his taxes just as though he had paid it himself (62).]

It was apparent that the provisions of subsidy assistance under Section 235 would allow a higher sales price and a correspondingly higher unit square foot construction cost for the housing unit than that previously determined when subsidy assistance was not considered. However, limiting the maximum unit square foot construction cost to $6.67 provided a low-cost housing unit that would be available to an average family whose annual income did not exceed $4,000.00, whether or not they were eligible for subsidy assistance.

Design Criteria

A review of the available manufactured or developed housing units showed that their basic costs were beyond the allowable limit of $6.67 per square foot. Also, the basic cost of the unit had to be increased by the additional expenses of transportation, site preparation, and, depending upon the unit, materials to be furnished and work to be performed on site.

Because a low-cost housing unit that would meet the cost criteria was not available from a manufacturer or supplier, it was necessary to develop a unit specifically for this experiment. According to guidelines for this experiment, it was necessary that the design of the low-cost

housing unit incorporate conventional building materials and methods of construction.

An architect licensed to practice in the State of Oklahoma and a graduate student of the School of Architecture of Oklahoma State University was employed to assist in the design of the unit. Designed in close collaboration with the architectural staff of the local Federal Housing Administration insuring office in Oklahoma City, Oklahoma, the "Mini-Max Home" as shown in Figure 7, was adopted for this experiment in low-cost housing in Stillwater, Oklahoma.

The general specifications of the unit, all complying with the "Minimum Property Standards for Low Cost Housing," were as follows:

Foundation and Slab:	12 in. diameter concrete piers at 8 feet o.c., 6 ft. deep with one #6 dowel for full length extending into beam. 6 in. x 24 in. perimeter concrete beam with #6 reinforcing bar continuous at top and bottom. Monolithic concrete slab 4 in. thick with 6 x 6, 10/10 welded wire fabric reinforcing over 4 mil polyethylene film vapor barrier on top of 4 in. base of crushed rock. All concrete, 5 sack mix with 5% air entraining agent, 3,000 psi in 28 days.

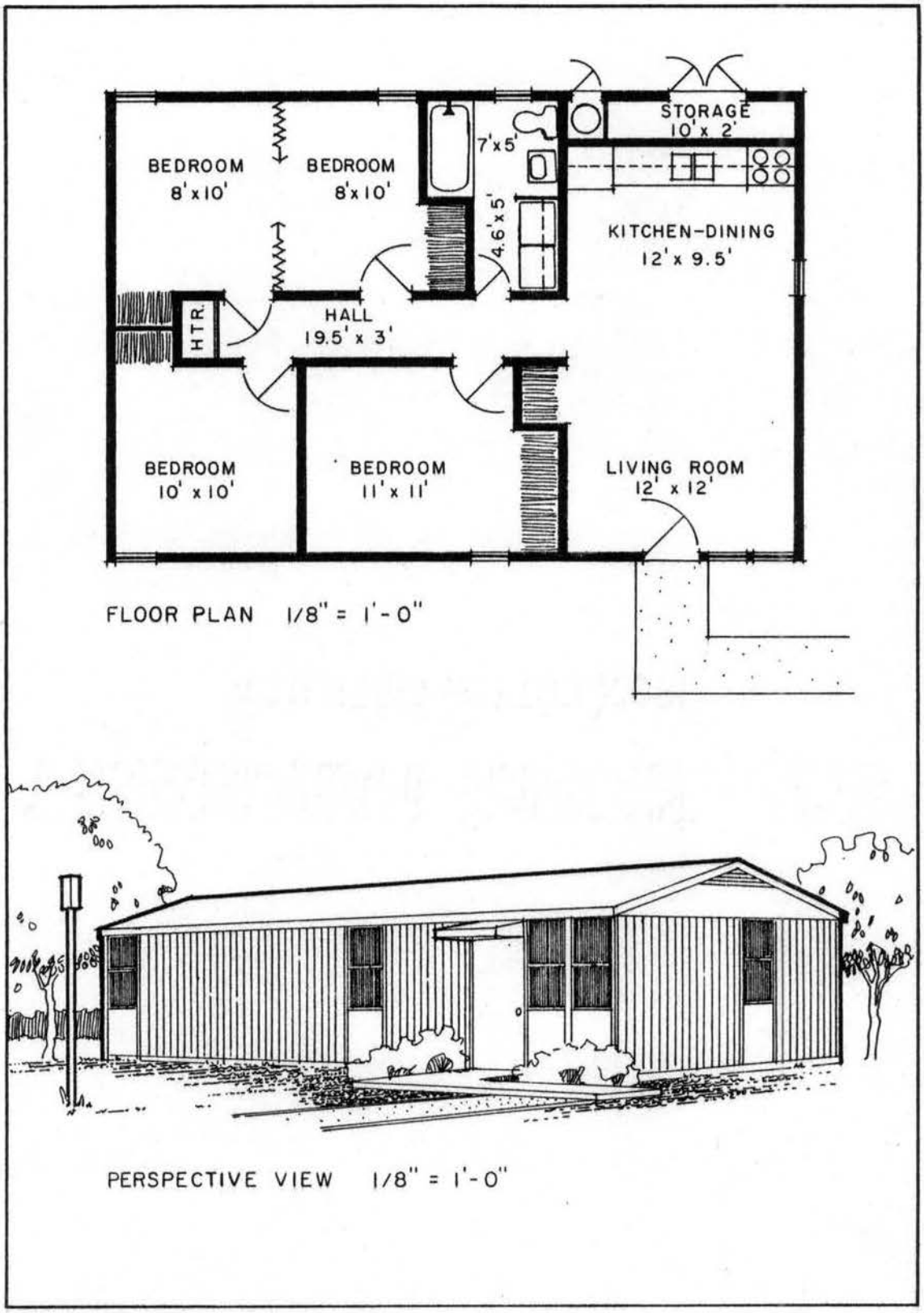

Figure 7. The Mini-Max Home, a Low-Cost Housing Unit

Exterior walls:	2 in. x 4 in. wood members, 24 inches o.c., with 4 ft. x 8 ft. sheets of vertical grove, exterior grade, 3/8 in., exterior cedar siding.
Interior walls:	2 in. x 4 in. wood members at 24 inches o.c.
Roof:	Prefabricated wood trusses, 24 inches o.c., 2 in. x 4 in. members, covered with 3/8 in. exterior plywood sheathing and asphalt shingles.
Interior finishes:	3/16 in. prefinished wood wall paneling. 1/2 in. gypsum board ceilings with sprayed texture finish. Vinyl asbestos floor tiling.
Insulation:	1 in. thick expanded polystyrene insulation board around perimeter of foundation. 3 1/2 in. thick mineral wool batts in exterior walls. 6 in. poured mineral wool in attic.

Doors:	1 3/8 in. thick, 3 ft 0 in. x 6 ft 8 in., hollow core Philippine mahogany.
Windows:	Aluminum single hung with single strength, B-grade glass and aluminum screen.
Furnace:	Central forced air, gas-fired heater with fan and thermostat, 64,000 BTU output.
Hot Water Heater:	30-gallon, gas-fired, insulated, 36,000 BTU heating capacity.
Bath:	Vitrious china lavatory and water closet, porcelain enameled tub with built-in shower, 16 in. x 20 in. metal medicine cabinet with mirror, facilities for washer and dryer.
Kitchen:	Double porcelain finished sink built into cabinet; cabinets of prefinished metal.
Walks and Drive:	4 in. thick concrete, 3 ft wide, and 10 ft x 20 ft crushed rock driveway.

Summary

A four bedroom low-cost housing unit containing in excess of 900 square feet of floor space was designed for this experiment. This housing unit, estimated to cost $6,000.00, or $6.67 per square foot, was projected to be lower in construction cost than any other comparable type unit. The total unit, i.e., housing unit and lot, was estimated to cost $9,380.00 and was eligible for the best available financing as provided by an FHA-insured mortgage. Under provisions of Section 203(b) of the National Housing Act, the total monthly payment for this home was estimated to be $83.26. For a purchaser who was eligible for subsidy assistance under Section 235 of the National Housing Act, the total monthly payment was estimated to be as low as $43.13.

CHAPTER IV

CONSTRUCTION OF THE LOW-COST HOUSING UNIT

Certain preliminary steps and arrangements were necessary prior to construction. These included arranging construction financing for the experiment; purchasing the land in accordance with the Option Agreement; selecting a qualified building contractor or construction personnel; and obtaining all pertinent information concerning building codes and required inspections.

Construction Financing

Construction financing--sometimes referred to as interim or short term financing--requires the obtaining of funds by the builder to pay for his labor, material, and other related costs during the period that the project is under construction. Once the housing unit is completed, the structure can be used by the builder or the new owner to obtain permanent financing. While permanent financing is available for long periods ranging from 15 to 30 years after the construction is completed, construction financing arrangements are made for only the time period required to complete the project and to obtain permanent financing.

The usual prerequisite for obtaining construction financing is to

demonstrate the availability of permanent financing for the completed housing unit. The funds generated from permanent financing are used to retire the short term construction loan. Consequently, the lender who will provide construction financing generally requires proof that the builder or the proposed new owner has arranged for permanent financing to be available when the structure is completed. This proof of permanent financing is called a commitment.

A commitment is a written or oral agreement stating the amount and terms of the permanent financing that is offered to the borrower from a lender on the condition that the structure is satisfactorily completed in accordance with the standards set forth in plans and specifications. Commitments issued to a builder may be either firm or conditional. In a firm commitment, the lender accepts the marketing risk and agrees to provide permanent financing to the builder when the housing unit is completed. Because of the marketing risk, a firm commitment to a builder is usually for a lesser amount than the amount of permanent financing available to a purchaser. Whereas a Section 203(b) FHA-insured mortgage will provide permanent financing for 97 per cent of the appraised value to an approved buyer, a firm commitment to a builder may be for only 85 per cent of the appraised value. The builder is responsible for the monthly payments until such a time as a new owner purchases the housing unit. For a new owner, the mortgage is increased to 97 per cent of the appraised value of the unit. In a conditional commitment, the lender agrees to provide permanent financing only when the unit is completed and the credit

of the new owner meets the lender's approval. Under a conditional commitment, the builder assumes the marketing risk because permanent financing is not available until a qualified buyer purchases the living unit (63). Some of the more popular sources of a commitment for a permanent loan for the builder are commerical banks, insurance companies, savings and loan companies, mortgage companies, savings banks, and trust companies.

As earlier stated in the experiment, the most favorable permanent financing available was an FHA-insured mortgage as provided by Section 203(b) of the National Housing Act. While the Federal Housing Administration does not provide permanent financing, it will insure permanent financing made by an approved lending institution provided that the lending institution adheres to certain procedural requirements. For a low-cost housing unit to be eligible for a Section 203(b) mortgage, it must comply with the Federal Housing Administration's "Minimum Property Standards for Low Cost Housing (54)." Compliance with these standards by the builder assures the lending institution that an FHA-insured mortgage is available, and it can consequently issue a commitment for permanent financing.

The "Minimum Property Standards for Low Cost Housing" are specific and require the submittal of certain exhibits by the lending institution. The exhibits must indicate, both graphically and in written form, all proposed work, including the location and size of the proposed housing unit and the grade and quality of all materials and equipment to be used

in the improvements. Although these submittals to the Federal Housing Administration must be made by the lending institution with its request for an FHA-insured mortgage, the builder is encouraged to use the services of the local insuring office of the Federal Housing Administration directly to assure that the required exhibits are properly prepared for submission. Consequently, personal meetings, correspondence, and telephone conversations were initiated with the local insuring office of the Federal Housing Administration in Oklahoma City, Oklahoma, to obtain approval of the design of the Mini-Max Home and to properly prepare the exhibits required by the lender.

The interest rate for an FHA-insured mortgage is fixed by law and the amount of discount (a discount, sometimes referred to as "points," is the percentage amount that an FHA-insured mortgage is discounted to increase its effective yield to a buyer and thus be competitive with marketable conventional mortgages) is basically uniform among the various lending institutions. Therefore, the selection of an approved lender can be based on convenience. An approved lender in Oklahoma City, Oklahoma, was chosen because of the convenience and prior assistance given to this experiment by their local representative in Stillwater, Oklahoma.

In accordance with the requirements, exhibits were prepared and submitted in duplicate to the approved lender on February 19, 1970. Accompanying the exhibits was the required fee of $45.00. It was requested that the approved lender forward the exhibits to the Federal

Housing Administration, and, upon its approval, issue a commitment for an FHA-insured mortgage.

On March 3, 1970, an FHA standard form, "Statement of Appraised Value for a Mortgage to be Insured under the National Housing Act," as issued by the Federal Housing Administration, was received from the approved lender. It indicated that the Federal Housing Administration had approved the value of the proposed low-cost housing unit at $10,150.00, and that it was eligible for an FHA-insured mortgage for $9,800.00. This statement of appraised value formed the basis of a conditional oral agreement with the lender.

It should be noted that although the Federal Housing Administration appraised the unit at $10,150.00, and would insure a mortgage up to 97 per cent of that amount, the estimated construction cost of the unit, including a land cost of $1,500.00, was only $9,380.00.

After receiving a commitment of permanent financing from the approved lender, sources of construction financing were investigated. Several of the more popular sources of construction financing used by local builders are:

1. Commercial loans--a broad category that includes all sources of business loans from financial institutions or individuals. As funds are advanced to a builder to pay for his construction costs, a commericial loan may require these funds to be secured by a note and supported by a recorded mortgage encumbering the parcel of land upon which the structure is being built.

2. Internal financing or self financing--either from the liquid assets of a business entity, or by providing an equity or joint venture interest in the project to an investor in exchange for his funds.

3. Credit from suppliers--an arrangement with suppliers to defer collection until the housing unit is completed and permanent financing funds are available.

4. Credit from subcontractors--similar to credit from suppliers in that the subcontractors are paid after the housing unit is completed and the funds from permanent financing are made available.

5. Credit from landowners--an Option Agreement or a minimal down payment for the land purchase, with the balance paid from the permanent financing funds.

6. Advance payments from the buyer--assistance in defraying financing costs of construction in the form of a down payment from the prospective buyer before the structure is completed. (The Federal Housing Administration requires the down payment to be deposited by the builder in a trust or escrow account pending the completion and delivery of the housing unit to the buyer.)

A commercial loan from a financial institution was initially considered because it represented the most widely used method in the local area. Construction loans in Stillwater, Oklahoma, were available at interest rates varying from 9 to 10 per cent, with an additional discount of 2 to 3 per cent to yield a higher effective return to the lender. A construction loan usually requires a higher yield to the lender because

of the risk involved in completing the structure. A commercial loan is also not necessarily the most convenient because of the amount of administrative work required by the lender. In addition, there are costs for credit reports, preparation of notes and mortgages, title abstracts, title insurance, lien waivers, and the necessity for a more rigid accounting system.

Because of the limited size of the experiment, it was decided not to use a commercial loan but to use a combination of financing as follows:

1. Credit was obtained from the landowners by the use of Option Agreements. At such time as the title to the land was needed, the Option Agreement was exercised. Only a portion of the purchase price was required, with the balance, interest free, due four months from the date the Option Agreement was executed. Thus a minimum of cash resources was required for land purchase, resulting in a subsequent savings in financing costs.

2. A limited amount of credit was obtained from certain suppliers and subcontractors because of the nature of their invoicing systems. Although most materials were ordered to the job site, and work was done on the low-cost housing unit by subcontractors, payment for these materials and services was not normally due until the monthly billing was received.

3. Any funds required after the above arrangements were planned came from internal or self financing, with the knowledge that these

funds would be repaid from the permanent financing source. Although it may appear that self financing saves financing costs, the builder should include the opportunity cost for using his own funds in the total cost of the completed structure.

Land Purchase

The Option Agreement for Lot Three (3) and Lot Four (4) was signed on November 24, 1969, allowing the option to be exercised on or before 180 days from that date, or May 23, 1970. The Option for the north ten feet of Lot Five (5) was signed December 1, 1969, and could be exercised anytime on or before June 1, 1970. The land chosen to be used for the first low-cost housing unit was the north 50 feet of Lot Three (3). Although only 50 feet would be needed, the terms of the Option Agreement required that Lot Three (3) be purchased in its entirety. Although this purchase included 70 feet of frontage, the unused south 20 feet of Lot Three (3) would be reserved to supplement the north 30 feet of Lot Four (4) (see Figure 6, page 26).

The terms of the Option Agreement required a 25 per cent down payment at the time that the option was exercised, with the balance of 75 per cent due in four months. Although a balance is usually secured by a note to the landowner and evidenced by a recorded mortgage, the landowner in this instance required only a note for the balance. Thus, if it had been planned to use the full value of the land as collateral for a loan, it would not have been necessary to pay off the balance of 75 per

cent to obtain title to the land, clear of any recorded encumbrances.

Such an arrangement is often referred to as a subordination. The landowner agrees to allow a construction loan mortgage to occupy the first lien position against the land, with the landowner's interest occupying a secondary or subordinate position to the first construction loan mortgage. It is a useful device often employed by builders. With only 25 per cent of the value of the land paid for, the opportunity existed to use 100 per cent of the land value as a collateral for a commercial loan.

Although a commercial loan was not used for financing and title to the lot was not needed for security, it was decided to exercise the Option Agreement and to proceed with the purchase of the land before the start of construction. This decision assured that the landowner could deliver a marketable title to the land prior to the construction of the housing unit. Although the Option Agreement required delivery of a Warranty Deed, an explicit guarantee that title is good, there could be conditions or defects in the property title that the owner could not remove, and which could prevent the issuance of a Warranty Deed to the new buyer. Because the funds used to construct the housing unit were to be repaid from a permanent loan mortgage dependent on delivery of a Warranty Deed to the purchaser, a title defect that was not discovered until the housing unit was completed could prevent the eventual sale of the unit and jeopardize the availability of permanent financing.

Consequently, the Option Agreement for Lot Three (3) was exercised

February 24, 1970, by presenting the owner a 25 per cent down payment and executing a promissory note for the balance. It was then found that certain defects in the title did exist. Clearing the title involved a request for spouses of the landowners to join with their husbands in conveying the property and recertifying the original subdivision plot of the Otey Tract which was subdivided November 30, 1966. Although this problem was minimal and easily rectified, it is conceivable that unforseen and more difficult circumstances might have prevented obtaining the needed signatures and the delivery of the Warranty Deed.

In accepting property from a seller, it is usually a requirement that the seller issue to the buyer a certificate of title insurance insuring the buyer for the loss of his property against an existing but unknown claim that might arise against the property after the purchase had been completed. Ordinarily title insurance is issued for the amount of the purchase price of the land only, but in this case, the value of improvements to be constructed on the land, i.e., the housing unit, would exceed the amount of this title insurance. Consequently, it was requested that the title insurance be increased to cover any losses caused by faulty title to the land up to an amount of $10,000.00.

Construction Personnel

The selection of personnel to construct the low-cost housing unit was extremely important to the experiment. It was apparent that the results of this experiment might exert some influence on future efforts

toward providing a decent home and suitable living environment for low-income families in Stillwater, Oklahoma. Because of this, it was desirable that the proposed housing unit be constructed by skilled craftsmen to obtain a dwelling unit that was as attractive and well constructed as possible. It was also desirable that the construction personnel be knowledgeable of the local building practices and customs, as well as building regulations and other local statutory requirements. Initially, an attempt was made to obtain the services of a local qualified residential contractor for the work.

In Oklahoma, the term "qualified contractor" is subjective and without an adequate definition, since the state does not require an individual to show proof of his ability, experience, financial capability, or of his integrity and character prior to offering his services to the public as a residential contractor. Many states, in the interest of the health, safety, and welfare of its people, require the applicant to demonstrate his ability to perform as a contractor before he is licensed by that state to offer his services as a contractor. It is not within the scope of this study to pass judgment on the merits of a contractor's licensing requirement, except to note that if there were a Registrar of Contractors for the State of Oklahoma, the identification of qualified residential contractors in the City of Stillwater would have been greatly facilitated. In the State of Oklahoma, anyone who advertises himself as a residential contractor is accepted as such. The November, 1969, City of Stillwater telephone directory listed 13 building contractors and it was found that

an additional 22 individuals in the Stillwater area provided building contractor services.

Of the major building contractors, seven were invited to construct the low-cost housing unit. The purposes and significance of the experiment with regard to the needs of the community and its low-income citizens were explained. All seven builders refused to participate in the experiment for one or more of the following volunteered reasons:

1. As builders of more expensive homes, an association with a low-cost housing project would be detrimental to their present custom-home building images and possibly to their present pricing structure.

2. They did not believe that there would be sufficient profit motivation in low-cost housing nor would they be able to recover their initial higher construction costs inherent in building a residence with which they lacked familiarity.

3. Present sales of their already constructed residences were unsatisfactory and they did not want to engage in another speculative project.

4. They were not interested in encouraging a competitive challenge to their own building programs.

5. Because the project was of insignificant size, the extra aggravation of working with the Federal Housing Administration, material suppliers, and subcontractors on a limited contract amount was too demanding.

6. Residential development and construction no longer offered

them the same economic possibilities that mobile home park development now offered.

Failing to engage a local builder through personal meetings and telephone conversations, a classified advertisement was placed in the Stillwater News-Press. This advertisement, placed in the "Help Wanted" column for two days, read as follows: "Need a responsible party who is immediately available and equally qualified to be a contractor, superintendent, and carpenter, to assist in construction of low-cost housing units. Ability to conquer costs a must; 377-2440." Of the 13 respondents to the advertisement, seven were contractor-carpenters who, after receiving more information about the experiment, did not feel capable of assuming the responsibility. The remaining six applicants performed construction work for owners on an hourly basis only, i.e., the owners purchased all needed materials, contracted with the subcontractors, and merely paid the carpenter for his labor at an hourly rate. Obviously, these owners were acting as contractors and hiring the carpenters without recognizing the responsibilities and potential liabilities that they were incurring in their assumed role as an employer.

Following the failure to locate a suitable contractor by this advertising method, visits were made to the five local lumber companies in the City of Stillwater to ask their assistance in locating qualified construction personnel. One well-established and knowledgeable company recommended a carpenter whom they often engaged under their company name to perform construction work for their customers. However, in

keeping with local practice, his services, and those of his helper, were available only at an hourly rate, with all other contracting responsibilities, such as materials purchasing and subcontracting, to be performed by the owner.

In summary, the extensive survey of local construction forces indicated an almost complete lack of interest in the low-cost housing experiment on the part of the more well-established and reputable residential contractors. Because of the inability to negotiate the construction of the housing unit at a predetermined cost or fee and the time element involved in the study, it became evident that the author would have to establish himself as a contractor. In order to become established as a contractor, and assume all administrative and accounting responsibilities, a business entity, called Min-Max Homes, was established, and accomplished the following:

1. Obtained an Employer's Identification Number from the Internal Revenue Service and performed the required reporting and disbursement of monies for:

    a) Federal Insurance Contributions Act payments;

    b) Federal Unemployment Tax Act payments;

    c) Federal Withholding Tax payments;

    d) State Withholding Tax payments.

2. Obtained Workmen's Compensation Insurance coverage.

3. Obtained Employer's Insurance to cover the following liabilities:

a) Employer's liability on behalf of his employees, both property damage and bodily injury;

b) Comprehensive general liability to cover all construction operations in addition to the work performed by employees for both property damage and bodily injury.

4. Obtained general fire and liability coverage for the low-cost housing unit.

After these requirements were satisfied, the aforementioned carpenter and his helper were hired to perform the construction of the housing unit. While not the most desirable arrangement, this afforded an opportunity for close supervision of this phase of the experiment and provided additional insight into some of the problems associated with the actual construction of this type of housing.

Building Codes and Inspections

The construction of the low-cost housing unit was subjected to two major sources of controls and restrictions--one statutory, and the other resulting from the Federal Housing Administration requirements.

Statutory: Statutory controls were imposed on the construction of the low-cost housing unit by the 1966 Stillwater City Code (64). The Code is kept current with deletions of expired ordinances and the additions of newly adopted ordinances. Chapter 4 of the Code, Building, Plumbing, and Electrical Installations, is specifically dedicated to the construction requirements of buildings.

To insure compliance with the Stillwater City Code, it was necessary to apply for a building permit prior to beginning construction. A building permit was issued upon the submittal of certain exhibits, including a plot plan, a floor plan, and an elevation. The Code is administered through the Community Development Department of the City with the assistance of a building inspector, electrical inspector, and plumbing inspector.

A plot plan showing the proposed low-cost housing unit was required to determine that the unit was in compliance with the land usage permitted by the Stillwater Zoning Ordinance. Because of the previous lot split approved by the Metropolitan Area Planning Commission, a building permit could not be issued until the total parcel was surveyed, the lots formally split, and the Certificate of Survey and formal lot split approval filed and recorded in the official records of the County Recorder of Payne County, Oklahoma. These documents gave public notice that the lots were officially designated as Lots 3R, 4R, and 5R of Block One, Otey Tract (see Figure 6, page 26).

The floor plan and elevation plan were required by the City of Stillwater to permit the calculation of the cubic content of the proposed structure. The permit fees for new buildings are computed on the basis of a flat base of $4.00, plus $0.40 for each 1,000 cubic feet of content or fraction thereof up to 25,000 cubic feet of content. On February 25, 1970, building permit #1600 was issued for the construction of the low-cost housing unit.

The City of Stillwater has not developed a specific building code of its own, but has adopted the National Building Code of the American Insurance Association to control the construction of all buildings within its jurisdiction. There is no attempt to determine that a proposed housing structure conforms to the National Building Code upon application for the building permit, nor is this done through inspections during the construction of the building. The only purpose for the required inspections during construction and after the unit is completed is to insure that the plumbing and electrical installations are properly performed. Plumbing and electrical installations require an inspection of the "rough-in," i.e., the inspection of the items that will be permanently covered and concealed, as well as an inspection of the completed installation by the City of Stillwater.

While the plumbing and electrical installations required prescribed inspections, these installations are further controlled to a considerable extent by rigid licensing requirements of the subcontractors performing the work. Plumbing installations are governed by the Plumbing Manual of Ordinance No. 785, Plumbing Code, enacted by the City of Stillwater and included in the Stillwater City Code. It requires that the plumber be licensed by the State Department of Oklahoma as a Master Plumber or Master Gas Fitter and that he be further certified to perform in the City of Stillwater as determined by the Examining and Supervising Board of Plumbers of the City of Stillwater. In addition to his certification, he must furnish an annual bond of $5,000.00 to the City of Stillwater and

pay an annual license and registration fee. The registration fee for a plumber is $300.00, and the annual renewal fee is $100.00.

Also restrictive, but not so severe, are requirements for an electrician's license. Prior to engaging in electrical contracting, an applicant must obtain a Master Electrician's license from the City of Stillwater, which requires an examination before a board of examiners. The applicant must furnish the City of Stillwater a $1,000.00 surety bond, and must pay an annual licensing fee of $35.00.

Federal Housing Administration: Construction inspections are made by the Federal Housing Administration to assure that the construction is being performed in accordance with the "Minimum Property Standards for Low Cost Housing." The architectural exhibits that were submitted to and approved by the local insuring office of the Federal Housing Administration had to be available at all times on the job site, and the Federal Housing Administration case number posted at the job site so that it could be read from the street (54).

Requests for compliance inspections are made either by telephone or by submitting FHA Form 2289 to the local insuring office of the Federal Housing Administration in Oklahoma City, Oklahoma. These inspections normally are required at each of three prescribed stages of construction, with the Federal Housing Administration reserving the right to make unscheduled inspections or additional inspections that may be dictated by the special nature of the construction (54).

A first inspection was required after the foundation and slab forms

were prepared and ready for concrete. A second inspection was required after the electrical and plumbing installations were "roughed-in," walls framed, exterior wall siding completed, roof sheathing finished, and the unit ready to be roofed. This inspection preceded the permanent covering of all work thus far performed. The third and final inspection was required when the low-cost housing unit was completed, cleaned, and ready for occupancy. Upon each inspection by the Federal Housing Administration, an approved copy of the Compliance Inspection Report, Form 2051, was issued to indicate that the housing unit was accepted by the Federal Housing Administration.

On-Site Construction

In keeping with the stated purposes of the study, the construction of the housing unit was considered as an excellent opportunity to identify those major problem areas associated with the actual construction of the low-cost dwelling. Consequently, a diary was kept throughout the construction phase to document each stage of work and the related problems encountered.

Table III details the construction phases of the housing unit relative to the passage of calendar days and construction days, with a datum of September 1, 1969, the date that the search for available land began. For the purposes of this table a construction day was defined as a day in which the carpenter and his helper each performed 8 hours of labor.

TABLE III

CONSTRUCTION OF THE LOW-COST HOUSING UNIT

Cal. Days	Constr. Days	Date	Work Performed	Comments
		1969	Preliminary:	
1		9/1	Commenced survey of available land.	
85		11/24	First land parcels, Lots Three (3) and Four (4), Block One (1), Otey Tract, optioned.	
94		12/3	Second land parcels, South five feet of Lot Two (2) and north five feet of Lot Five (5), optioned.	
101		12/10	Formal lot split request to MAPC.	
		1970		
129		1/7	Option on second land parcels modified to include north ten feet of Lot Five (5). South five feet of Lot Two (2) deleted from experiment. Lot split approved by MAPC.	
131		1/9	Architect retained to develop low-cost housing unit.	

TABLE III (Continued)

Cal. Days	Constr. Days	Date	Work Performed	Comments
		1970	Preliminary:	
152		1/30	Final design meeting with FHA.	Tentative approval given to unit.
172		2/19	Exhibits required by FHA delivered to approved lending institution.	For an FHA-insured mortgage, construction cannot begin until FHA has approved exhibits, issued appraised value to lender, and assigned a case number.
176		2/23	Construction personnel hired.	
177		2/24	Option Agreement for Lot Three (3) exercised.	
178		2/25	Building permit #1600 issued by City of Stillwater.	Name of plumber required before permit may be issued.
179		2/26	Temporary power pole installed.	
181		2/28	Temporary power pole re-installed and electrical connections made by City. Batter boards placed in position.	Service to pole required by City to be 10' above the ground.

TABLE III (Continued)

Cal. Days	Constr. Days	Date	Work Performed	Comments
		1970	Preliminary:	
184		3/3	Commitment received for permanent financing. FHA 1st inspection requested by telephone.	FHA Case No. 421:100430 assigned. FHA must inspect site before concrete is placed for foundations and slab; 24-hour notice required. Contractor must estimate date of needed inspection.
			On-Site:	
185	1	3/4	Lines on batter board established. Crushed rock delivered to slab site. Piers drilled and filled with concrete. Stem walls machine-excavated. Reinforcing bars set in piers. Stem formwork started. Grade stakes set for floor slab.	Underestimated quantity of crushed rock. Additional order, dumped off-site, had to be hand shoveled to slab site. Excavation for stem walls of sufficient width for forms to be placed in excavation and supported by opposite earth bank.
186	2	3/5	Crushed rock spread for slab. Stem formwork completed. Plumbing tree installed. Water, gas, and sewer lines placed in crushed rock base. Blocked out for bathtub plumbing. Set finished grade for concrete slab.	Because it was contrary to customary practice, stem formwork was not set into excavation. Plumbing tree assembled at job site. FHA made 1st inspection, accepting all work. City inspected and accepted plumbing installation.

TABLE III (Continued)

Cal. Days	Constr. Days	Date	Work Performed	Comments
		1970	On-Site:	
187		3/6	No work performed.	Rain.
188		3/7	No work performed.	Rain.
190	3	3/9	Vapor barrier placed over crushed rock. Mesh for concrete slab installed. Anchor bolts set. Concrete slab poured and finished. Erected job sign with address and FHA case number. Studs cut to length. Exterior plates cut to length. Exterior walls pre-assembled.	One portion of stem formwork, not anchored sufficiently, floated out of place. FHA requires address and case number posted at job site and able to be read from street.
191	4	3/10	Exterior walls erected. Interior walls erected. Roof trusses arrived from Oklahoma City.	Delay in receiving exterior sheathing from Oklahoma City postponed finishing exterior walls. Exterior walls had to be braced with roof sheathing for erection of trusses. Extra costs for prefabricated roof trusses unjustified.
192		3/11	No work performed.	Windy and cold (30^{o}F).

TABLE III (Continued)

Cal. Days	Constr. Days	Date	Work Performed	Comments
		1970	On-Site:	
193	4 1/2	3/12	Installed windows and 5 roof trusses.	Work began at 1 p.m. Morning too wet and cold for work.
194	5 1/2	3/13	Interior walls completed. Erection of roof trusses completed. Roof sheathing one-third completed. Gable ends fitted with studs. Electrical boxes installed. Relocated closet.	Closet location was scaled from plans, not calculated. Closet had to be relocated.
195	6 1/2	3/14	Roof sheathing completed. Exterior siding one-third completed. Metal sill flashing installed.	Metal sill flashing needed to span from exterior face of studs to and over exterior styrofoam insulation. Removed temporary bracing of exterior walls.
197		3/16	No work performed.	Snow.
198		3/17	No work performed.	Snow.
199		3/18	Plumber installed tub, washer connection, dryer vent, and sink drains.	Snow.

TABLE III (Continued)

Cal. Days	Constr. Days	Date	Work Performed	Comments
		1970	On-Site:	
200	7	3/19	Gable siding completed. Exterior siding completed. Fascia board installed.	Started work at 12 p.m. Morning too wet and cold to work.
201	7 1/2	3/20	Relocated stud wall at bath in preparation for drywall installation. Installed drywall nailers. Installed front door. Roofing one-half completed. Plumber made shower and vent connections. Installed gas piping. Electrical wiring begun.	Carpenter began two-week vacation. Expected return April 6. Helper worked alone today. City inspected and accepted plumbing installations.
202		3/21	Roofing completed.	Electrician did not appear as scheduled.
204		3/23	Electrical wiring one-half completed. Requested 2nd FHA inspection by telephone.	Work began at 12 p.m.
205		3/24	Electrical wiring completed.	City inspected and accepted electrical wiring.
207		3/26		FHA made 2nd inspection, with following corrections and

TABLE III (Continued)

Cal. Days	Constr. Days	Date	Work Performed	Comments
		1970	On-Site:	submittals required: 1. Proof required that 1st inspection was made. 2. Roof truss design data must be submitted to FHA. 3. Doors must be installed on storage room. 4. Change in heating system must be approved by FHA. 5. Exterior walls must be insulated. 6. No water outlet in front of house. 7. "H" clips not used to join edges of wood roof sheathing. 8. 2 in. x 4 in. wood blocking must be installed between trusses at edges of plywood roof sheathing in lieu of "H" clips.
208		3/27	Drywall completed and ceilings sprayed. Attic and walls insulated.	Drywall subcontractor paid at completion of his work.

TABLE III (Continued)

Cal. Days	Constr. Days	Date	Work Performed	Comments
		1970	On-Site:	
217		4/5	Cleaned interior and exterior of house.	Drywall subcontractor did not clean up before leaving job site.
218	8 1/2	4/6	2 in. x 4 in. wood blocking between trusses at edges of plywood roof sheathing one-half completed. Trim for interior windows cut.	Carpenter and helper returned to work after two-week vacation.
219	9 1/2	4/7	2 in. x 4 in. wood blocking between trusses at edges of plywood roof sheathing completed. Eave vents installed. Doors to storage room completed.	
220	10 1/2	4/8	Exterior siding nailed at base. Exterior trim prepared. Front walkway formed for concrete.	Painter did not appear as scheduled.
221	11 1/2	4/9	Trenching machine excavated for gas, water, and sewer lines. Gas, water and sewer lines installed. Back-filled all ditches. Door frames installed. Interior paneling begun. Joints of metal sill flashing caulked.	

TABLE III (Continued)

Cal. Days	Constr. Days	Date	Work Performed	Comments
		1970	On-Site:	
222	12 1/2	4/10	Interior paneling continued. Mortised for door hinges. Front walkway filled with concrete. Exterior prime-coated.	
223	12 3/4	4/11	Interior paneling continued. Exterior painting completed.	Carpenter worked until 11 a.m. Helper did not work.
224		4/12	Cleaned interior and exterior of house.	
225	13 3/4	4/13	Water meter ordered from City of Stillwater. Gas meter ordered from gas company. Window trim installed. Door headers installed. Gas line to meter installed. Interior paneling continued. Formwork for walkway removed.	Supplier for drywall subcontractor notified that subcontractor had not paid bill and they were preparing to file a lien. Heavy weekend rains indicated that metal sill flashing was not water tight.
226	14 3/4	4/14	Interior paneling continued. Sill flashing caulked at joints. Design data for roof trusses mailed to FHA in Oklahoma City.	Drywall subcontractor requested to give a check to be delivered to his supplier.

TABLE III (Continued)

Cal. Days	Constr. Days	Date	Work Performed	Comments
		1970	On-Site:	
227	15 3/4	4/15	Interior paneling continued. Interior door trim installed. Sill flashing caulked lengthwise and fitted with trim.	
228	16 3/4	4/16	Interior paneling continued.	Sill flashing and joints in exterior sheathing proved not to be watertight after hard rain in the afternoon.
229	17 3/4	4/17	Modification of metal sill flashing three-fourths completed. Sand fill delivered to site to fill water and mud holes in working area.	
230		4/18	Meeting with carpenter to schedule firm completion date.	
232	18 3/4	4/20	Modification of metal sill flashing and threshold completed.	
233	19 3/4	4/21	Interior paneling completed. Drywall subcontractor returned for remedial work.	

TABLE III (Continued)

Cal. Days	Constr. Days	Date	Work Performed	Comments
		1970	On-Site:	
			Painter returned to repaint exterior remedial work. Trash hauled off job site. Ceramic tile installed for shower. Furnace delivered to job site. Heat duct work started. Submitted kitchen cabinet specifications to FHA.	
234	20 3/4	4/22	Interior trim one-half completed. Furnace installation one-half completed. Furnace duct work one-half completed. Rough graded lot. Electrical finish work started.	
235	21 3/4	4/23	Interior trim three-fourths completed. Furnace installed. Furnace duct work completed. Shelves and clothespoles installed. Kitchen cabinets one-half completed.	
236	22 3/4	4/24	Bath fixtures, kitchen sink, hot water heater, lamp post installed. Interior trim completed.	Electrician forgot to order light fixtures. Two week delay unless purchased locally.

TABLE III (Continued)

Cal. Days	Constr. Days	Date	Work Performed	Comments
		1970	On-Site:	
			Access hole to attic cut. Kitchen cabinets completed.	Hot water tank installation leaked. Shut off water to house.
237		4/25	Light fixtures purchased locally. Cleaned interior and exterior of house.	Floor tile subcontractor did not appear as scheduled. Earth mover for grading lot did not appear as scheduled.
239		4/27	Interior painting completed. Electrical fixtures and outlets completed. Plumber connected gas to stove, furnace, and hot water heater.	
240		4/28	Floor tile installed. Driveway excavated for gravel.	Painter requested payment in full for work performed yesterday. Difficulty in locating clothespoles and medicine cabinet in Stillwater.
241	23 3/4	4/29	Site raked. Floor trim installed. Vent hood, exhaust fan, clothespoles, LR. folding door, towel rack, and miscellaneous trim installed. Electrician installed furnace thermostat, bath	

TABLE III (Continued)

Cal. Days	Constr. Days	Date	Work Performed	Comments
		1970	On-Site:	
			fixtures, hooked up exhaust fan. Requested FHA, by post card, to make final inspection on Friday, 5/1.	
242	24	4/30	Canopy installed. Storage room insulated.	Folding door for bedroom not available from supplier as scheduled. Heavy rains prevented miscellaneous outside work from being completed.
243		5/1	House cleaned, floors waxed, windows polished, appliances put into working order; house ready for occupancy.	Supplier of folding door indicated an expected three week delay in receiving folding door. Price was estimated as being approximately 3 times more expensive than originally quoted.
246		5/4	Called FHA to learn of their reasons for not having made their final inspection on 5/1. Advised that FHA schedules inspections in Stillwater on Thursdays. Consequently, the request for an inspection which was mailed to FHA on 4/29 was not scheduled by FHA until 5/7.	

TABLE III (Continued)

Cal. Days	Constr. Days	Date	Work Performed	Comments
		1970	On-Site:	
249		5/7	FHA made a final inspection and issued a Compliance Inspection Report certifying that the low-cost housing unit was ready for occupancy and constructed in accordance with "Minimum Property Standards for Low Cost Housing" and the approved architectural submittals.	FHA indicated on the final compliance inspection report that the following items, not required by the "Minimum Property Standards for Low Cost Housing" nor included in the approved architectural exhibits were included as additions: 1. Baked-on painted metal canopy over front entranceway. 2. Folding door for living room coat closet. 3. Colored gas range and oven. 4. Range hood and light. 5. Colored refrigerator, 11.6 cu. ft. 6. Aluminum window and screen in bath in lieu of exhaust fan. 7. 5 ft. ceramic tile wainscot over tub. 8. Prefinished wood kitchen cabinets in lieu of prefinished metal cabinets.

TABLE III (Continued)

Cal. Days	Constr. Days	Date	Work Performed	Comments
			SUMMARY: 249 Calendar Days for Entire Low-Cost Housing Experiment. 64 Calendar Days to Construct Low-Cost Housing Unit. 24 Construction Days to Construct Low-Cost Housing Unit.	

Summary of Construction Problems

The major problem areas which were encountered during the construction of the low-cost housing unit were as follows:

1. Weather:
    a) A total of six working days was lost because of adverse weather.
    b) Following the snows or rains, unfavorable working conditions resulted from the job site being wet and muddy. On one occasion, sand was ordered to the job site and spread in the immediate work area to alleviate the muddy conditions which would have otherwise prevented construction for several days.
2. Federal Housing Administration:
    a) Exhibits prepared by the builder for the lending agency required a considerable amount of detail and time to prepare. A total of 20 calendar days were required to prepare the formal architectural exhibits required by the Federal Housing Administration.
    b) Construction of a residence intended to be financed with an FHA-insured mortgage cannot proceed until the architectural exhibits have been approved and a statement of appraised value issued with an assigned case number. When these have been accomplished, an additional 24-

hour notice is required from the builder for an inspection of the site prior to the placement of permanent construction. Twelve calendar days passed from the date that the final exhibits were submitted to the date that approval was received and another two days were required before the first inspection was made. Thus, beginning of construction was delayed a total of 14 calendar days.

c) Compliance inspections were made to determine whether the construction was acceptable under the provisions of the commitment for mortgage insurance. They are not made to assist a builder in determining what he should do, but rather to determine what he should not have done. To a builder who is not thoroughly familiar with the "Minimum Property Standards for Low Cost Housing," omissive acts can be expected, but most of these omissions could be avoided if the Federal Housing Administration would invite the builder's attention to some of the more common pitfalls. An example was the omission of "H" clips between the unsupported edges of the roof sheathing which was determined during the second compliance inspection. This requirement appeared in a footnote to a table on page 151 in the "Minimum Property Standards for Low-Cost Housing." As a result, extensive remedial work and related cost was unnecessarily incurred.

d) The burden to show compliance with the "Minimum Property Standards for Low-Cost Housing" is placed on the builder. The Federal Housing Administration's copy of the first compliance inspection was temporarily misplaced in their filing system. Consequently, when the second compliance inspection was made, it was necessary to show proof that the first compliance inspection was made or to uncover the work already completed for reinspection. The safekeeping of the builder's copy of the first inspection report assisted in finding the misplaced inspection report in the files of the Federal Housing Administration and averted what otherwise could have been a costly requirement.

e) In addition, the roof trusses used in the housing unit were the same type used extensively in other residences constructed and approved for FHA-insured mortgages in Oklahoma. However, it still was necessary to obtain design data from the manufacturer and forward it to the Federal Housing Administration.

3. Subcontractors:

a) The inability to identify qualified and experienced subcontractors for drywall installation and other work items, and to negotiate competitive pricing was similar to the problem encountered in attempting to locate a contractor.

With the exception of licensed plumbers and electricians, all trades are accomplished by those who purport to have the ability to perform the needed service. Consequently, the selection of the subcontractors became a task controlled by personal and limited knowledge rather than a competitive survey of an established group of licensed personnel or companies.

b) Because of the limited choice locally, several of the subcontractors employed for this experiment were marginal in both their financial strength and their quality of workmanship. This resulted in several of the subcontractors requiring payment for their services at the end of the day in which their work was performed, neglecting to remove their own debris from the job site at the completion of the job, and refusing to return for work needing corrections.

4. Material Suppliers:

a) Material suppliers, unlike subcontracts, were easily identified, but fewer in number. Stillwater, Oklahoma, has five major companies specializing in lumber and building material supplies, with several other lumber and building supply companies serving the Stillwater area from peripheral communities. In assembling an estimate of materials needed and corresponding unit

prices, all the lumber and building supply companies in Stillwater and one company in an adjacent community were contacted. One local lumber company refused to quote material prices with the explanation that any additional construction of residences in Stillwater would detract from the sale of residences that they were building in their own subdivision development.

b) Initially, the most favorable unit material prices were obtained from the lumber and building supply company located in a neighboring community. However, one of the Stillwater lumber and supply companies, wishing to encourage low-cost housing in Stillwater, voluntarily reviewed their unit costs and subsequently submitted the most favorable material unit prices.

5. Scheduling:

a) A delay in receiving the exterior plywood sheathing, which was ordered through local suppliers and should have accompanied the roof trusses from Oklahoma City, caused a costly change in the method of construction. It had been planned to erect and sheath the exterior walls, for diagonal support, and then to erect the roof trusses and install the plywood roof sheathing. This would have provided the most immediate method for protecting the housing unit from adverse weather conditions before any

interior work was begun. Because the sheathing was not expected for several additional days, it was necessary to use the roof sheathing for the exterior diagonal support and to proceed with the erection of the roof trusses and interior walls.

b) A folding door for the bedrooms was ordered from a local supplier in sufficient time to have been received when needed for installation. When the supplier was requested to ship the folding door to the job site, he advised that a two to three week delay was expected and that the price for the door would be approximately three times more than his original quotation. The order was cancelled and placed with a local mail-order firm.

c) There were numerous occasions when miscellaneous hardware and other building supply items, because they were needed immediately, were purchased on the basis of need from the closest supplier, without consideration of the price.

6. Errors and Omissions:

a) Styrofoam insulation around the perimeter of the foundation was required by the design of the unit. Metal sill flashing was used to span from the exterior floor plate out, over, and down the styrofoam for a watertight installation but this was unsatisfactory and water leaked

into the interior through the flashing joints. An attempt to caulk the joints and fit wood trim over the flashing was also unsatisfactory. Finally, this design error was rectified by removing portions of the styrofoam insulation, reshaping the metal sill flashing, caulking the flashing joints and covering it with a 1 in. x 6 in. board running the entire perimeter of the house. The threshold also had to be modified to make it compatible with this substantial change.

b) The exterior plywood sheathing as installed and painted was unsatisfactory as a watertight membrane. This required the caulking of all exterior joints.

c) The painting of the exterior of the house was completed before the water problems were encountered in the metal sill flashing and vertical joints of the exterior sheathing. The foregoing correction of these items required the exterior surfaces to be repainted.

d) Omission of the required metal "H" clips between the edges of the 3/8 in. plywood roof sheathing on roof truss spacings of 24 in. resulted in considerable additional material and labor costs. The use of one "H" clip for each unsupported edge of roof sheathing at the time of installation would have averted the need to cut 2 in. x 4 in. wood blockings and fasten them between the

trusses in the tight confining attic space.

e) Errors in layout created the need to relocate one already constructed closet and the recessed wall for the bathtub.

Completed Housing Unit

After completing the construction of the low-cost housing unit and evaluating all the problems encountered, it was apparent that additional savings in construction costs could have been achieved. Avoidance or elimination of these problems in future construction of low-cost housing units could add many dollars of value in architectural improvements without increasing the basic cost of these units. The increased efficiency from larger projects, i.e., where a number of such units are built at the same time, would yield greater profits to the builder--again, without increasing the basic cost.

However, despite the problems and difficulties of this small project, a truly low-cost housing unit was achieved. This unit is soundly constructed, is attractive and liveable, and is available to low-income families for less or only slightly more than what they are now paying in rent for sub-standard living accomodations.

The completed low-cost housing unit is illustrated in Figure 8, which shows the front elevation and an interior view of the kitchen area of the unit.

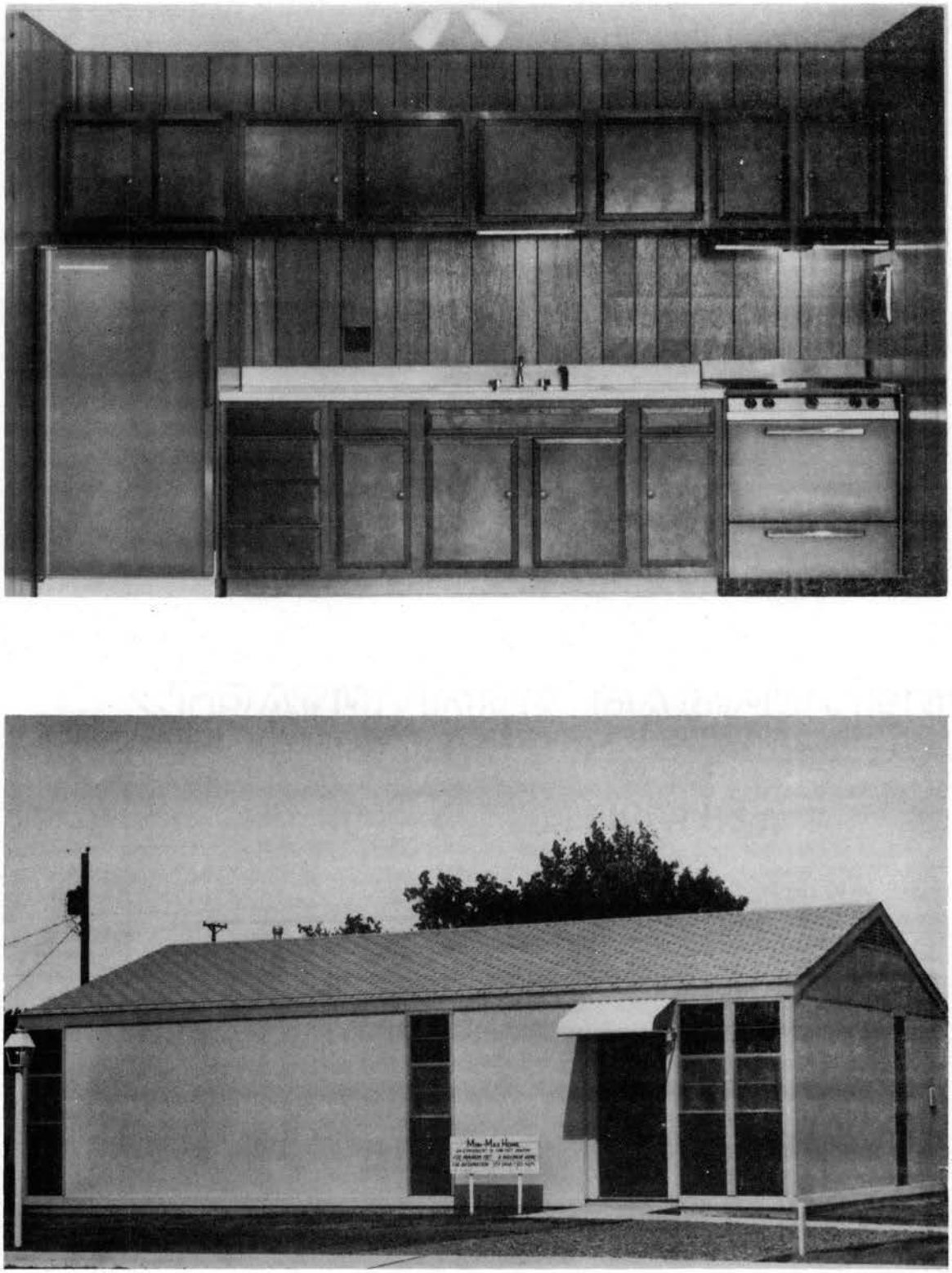

Figure 8. The Constructed Mini-Max Home

CHAPTER V

COSTS FOR THE HOUSING UNIT

The costs for the low-cost housing unit were determined from an accrual accounting of all expenses incurred in the construction of the housing unit. The accrual basis of accounting was employed to enable the total costs for the housing unit to include all actual cash expenditures plus all expenses that were incurred but not yet paid, such as the Federal Insurance Contribution Act payments.

Table IV is an itemized presentation of costs for the low-cost housing unit. To provide a meaningful interpretation of the experiment, deductions were made from the incurred costs to arrive at a net cost. These adjustments were justified and entered in Table IV if they were either of a non-recurring nature or an addition to the basic housing unit.

Deducted Costs

Costs of a non-recurring nature were largely attributable to those errors and omissions caused by a lack of experience in constructing the housing unit. These errors, explained in the preceding chapter, were justifiably considered as experimentation costs and were not related to the cost of the completed housing unit. Corresponding to the bracketed

TABLE IV

ITEMIZED COSTS FOR THE LOW-COST HOUSING UNIT

Item	Cost	Deductions	Net Cost
STRUCTURE			
Preparation:			
Building Permit	$ 7.50		$ 7.50
Temporary Power	13.12		13.12
Utility Connections	35.00		35.00
Subtotal	$ 55.62		$ 55.62
Labor:			
Carpenter; 220 Hrs. @ $4.00	$ 880.00	$196.00 (1)	$ 684.00
Helper; 188 Hrs. @ $2.00	376.00	80.00 (1)	296.00
Labor Burden:			
F.I.C.A. 4.800%			
F.U.T.A. 3.100%			
Work. Comp. 5.080%			
Prop. Dam. Insur. .321%			
Pub. Liab. Insur. .246%			
13.547%	170.15	37.39 (1)	132.76
Subtotal	$ 1,426.15	$313.39	$ 1,112.76
Material:			
Aggregate	$ 90.40	$	$ 90.40
Canopy, entranceway	13.99	13.99 (7)	
Cabinets, kitchen & counter	286.63		286.63
Concrete	317.00		317.00
Door, folding; BR.	95.00		95.00
Door, folding; LR.	17.88	17.88 (8)	
Doors, Wood	41.09		41.09
Exhaust fan, kitchen	13.42		13.42
Fixtures, electrical	85.99		85.99
Hardware, finish	90.76		90.76
Hardware, rough	135.52		135.52
Lumber	513.42	74.06 (2)	439.36
Paneling	178.56		178.56
Range and oven	93.13	93.13 (9)	
Range hood and light	12.20	12.20(10)	
Refrigerator	130.00	130.00(11)	
Roofing, material	81.65		81.65
Sheathing, exterior	200.94		200.94

TABLE IV (Continued)

Item	Cost	Deductions	Net Cost
Sheathing, roof	$ 78.00	$	$ 78.00
Tools, misc.	8.53		8.53
Trusses	231.20		231.20
Windows	108.83	9.83(12)	99.00
Subtotal	$ 2,824.14	$351.09	$ 2,473.05
Subcontractors:			
Cleanup, exterior	$ 42.50	$	$ 42.50
Cleanup, interior	27.50		27.50
Concrete Finisher	50.00		50.00
Drywall	165.00		165.00
Electrical	252.84		252.84
Excavation & Grading	27.72		27.72
Heating	238.85		238.85
Insulation	129.19		129.19
Painting	248.45	96.53 (3)	151.92
Plumbing	940.00		940.00
Roofing, labor	29.25		29.25
Tile, ceramic	60.00	30.00(13)	30.00
Tile, floor	265.59		265.59
Subtotal	$ 2,476.89	$126.53	$ 2,350.36
SUBTOTAL STRUCTURE	$ 6,782.80	$791.01	$ 5,991.79
LAND			
Basic Cost	$ 1,500.00	$	$ 1,500.00
Lot Split Costs:			
Fee	9.00		9.00
List of Property Owners	44.78	44.78 (4)	
Certificate of Survey	35.00	23.33 (5)	11.67
Recording Fee	2.50	1.67 (6)	.83
Transfer Costs:			
Attorney's Fee	25.00		25.00
Title Abstract	16.50		16.50
Title Policy	55.00		55.00
Warranty Deed	2.00		2.00
SUBTOTAL LAND	$ 1,689.78	$ 69.78	$ 1,620.00
OVERHEAD			
Advertising	$ 25.70		$ 25.70

TABLE IV (Continued)

Item	Cost	Deductions	Net Cost
Blueprints	$ 13.82		$ 13.82
Insurance	10.50		10.50
Interim Financing (estimated)	91.00		91.00
Misc. (estimated)	100.00		100.00
Sign	21.65		21.65
Telephone	2.60		2.60
Travel	15.00		15.00
SUBTOTAL OVERHEAD	$ 280.27		$ 280.27
SALES (estimated)			
Attorney's Fees			$ 25.00
Escrow Fee			7.50
Revenue Stamps			10.55
Selling Fee (negotiated)			150.00
Title Abstracts			15.00
Warranty Deed			2.50
SUBTOTAL SALES			$ 210.55
FINANCING (estimated)			
Appraisal Fee			$ 45.00
Mortgage Discount			364.00
SUBTOTAL FINANCING			$ 409.00
PROFIT			
Profit (estimated)			$ 868.39
TOTAL COST			$ 9,380.00

Note: Bracketed numbers in the Deductions column refer to the order of listing of the respective explanation of each deducted item in the narrative.

numbers appearing in Table IV, these deducted costs were:

(1) The total labor time of the carpenter was reduced by a total of 49 hours, and the labor time of the carpenter's helper was reduced by a total of 40 hours. Nine hours of the carpenter's time was expended for off-site meetings and conferences during the planning stages of the experiment. The balance of 40 hours each for the carpenter and his helper were deducted for:

(a) Extensive work required for correction of the sill flashing;

(b) Waterproofing the exterior sheathing;

(c) Cutting and fitting wood blocking under edges of plywood roof sheathing;

(d) Relocating clothes closet and bath wall;

(e) Installing additions, such as the entranceway canopy, a folding door in the living room coat closet, and the window in the bathroom.

Because of these reductions in total labor costs, a proportionate part of the labor burden costs also had to be deducted:

(2) A total material cost of $74.06 was deducted as an adjustment to compensate for the materials used for the following:

(a) Correction of sill flashing;

(b) Wood blocking used under edges of plywood roof sheathing.

(3) A total painting cost of $96.53 was deducted as an adjustment

for costs incurred to repaint the exterior of the housing unit after the corrective work on the sill flashing and waterproofing of the exterior siding was completed.

(4) The cost of $44.78 for preparing a list of property owners for the rezoning application to the Metropolitan Area Planning Commission was deducted. As discussed in Chapter II, the rezoning application for the originally proposed lot split required a list of property owners within 200 feet of the proposed parcel to be rezoned. Because the lot split was not permitted under the Zoning Ordinance, the application was withdrawn.

(5) The cost of $35.00 to obtain a Certificate of Survey was prorated among the three lots of the final lot split. This adjustment resulted in a deduction of $23.33 for the lot upon which the low-cost housing unit was constructed.

(6) The cost of recording the Certificate of Survey for the three lots split was $2.50. A proration of this cost permitted a deduction of $1.67.

Costs expended for additions to the basic low-cost housing unit were also deducted as adjustments. Although not required by the "Minimum Property Standards for Low Cost Housing," nor included in the architectural exhibits submitted to the Federal Housing Administration, these additions were added during the construction to improve the appearance and utility of the finished unit. Amounting to a total cost of only $307.03, these additions surpass the stipulated requirements for an adequate and decent housing unit, and it is believed that they could be

added to future housing units at no penalty to total cost:

(7) Baked-on painted metal canopy over entranceway; $13.99.

(8) Folding door for living room coat closet; $17.88.

(9) Colored gas range and oven; $93.13.

(10) Range hood and light; $12.20.

(11) 11.6 cubic foot colored refrigerator; $130.00.

(12) Aluminum window and screen in bathroom; $9.83.

(13) 5-foot ceramic tile wainscot installed over the bathtub in lieu of a sheet vinyl wainscot; $30.00.

These additions were recognized by the Federal Housing Administration during their final compliance inspection of the low-cost housing unit and entered on the copy of the final compliance inspection given to this study. Because the value of these additions was added to the housing unit after the architectural submittals were approved by the Federal Housing Administration, a Request for Acceptance of Change in Approved Drawings and Specifications form was prepared and sent to the approved lender for forwarding to the Federal Housing Administration. This action resulted in the Statement of Appraised Value for a Mortgage to be Insured under the National Housing Act to be increased in value from the previous appraised value of $10,150.00 to $11,000.00, with an FHA-insured mortgage amount of $10,650.00

Summary of Costs for the Low-Cost Housing Unit

Table V is a tabular summary of costs for the low-cost housing

TABLE V

SUMMARY OF COSTS FOR THE LOW-COST HOUSING UNIT

Item	Net Cost		Percent	
Structure:				
Preparation	$ 55.62		.6	
Labor	1,112.76		11.9	
Material	2,473.05		26.4	
Subcontractors	2,350.36		25.1	
Subtotal		$ 5,991.79		64.0
Other:				
Land	$ 1,620.00		17.1	
Overhead	280.27		3.0	
Sales Expenses	210.55		2.2	
Financing Expenses	409.00		4.4	
Profit	868.39		9.3	
Subtotal		$ 3,388.21		36.0
TOTAL COST		$ 9,380.00		100.0

unit and indicates the percentage that each major item contributed to the total cost. The structure for the low-cost, four-bedroom housing unit, was built for a cost of $5,991.79, or $6.66 per square foot. The projected sales price of $9,380.00 for the unit indicated that it was economically feasible for a low-income family to purchase the unit at a total monthly payment of $83.26. This includes $69.98 for principal and interest, $3.78 for mortgage insurance premium, $5.00 for fire insurance, and $4.50 for taxes. A purchaser who was eligible for government subsidy assistance under Section 235 of the National Housing Act could pay a total monthly payment as low as $43.13, i.e., a typical family of four whose approximate annual income was $3,350.00 or less, could pay a minimum total monthly payment of $43.13.

Financing Costs

This low-cost housing unit could be purchased utilizing a mortgage amount of $9,100.00, with an interest rate of eight and one-half per cent for 30 years and a mortgage insurance premium of 0.5 per cent on the average scheduled mortgage balance outstanding during the year. As of July 1, 1969, lenders are required under regulations issued by the Board of Governors of the Federal Reserve Board to disclose to borrowers the annual percentage rate charge on a mortgage loan to finance the purchase of residential real estate. In order to compute the annual percentage rate, the lender must add to the mortgage interest rate the premium paid for insuring the mortgage and for discount points. To determine the

approximate annual percentage rate, the mortgage interest rate of eight and one-half per cent is increased by 0.5 per cent for the mortgage insurance premium plus an additional 1/10 of one per cent for each point of mortgage discount. With an assumption that the discount points to be paid for a FHA-insured mortgage totaled 4.0 per cent, the effective annual percentage rate was approximately 9.4 per cent. Table VI more clearly illustrates the effect of a 9.4 effective annual percentage rate as a total cost of financing and the percentage of the monthly housing expenditure incurred by the low-income family for this cost of financing as related to other cost items. To retire a principal debt of $9,100.00 in 360 equal monthly payments, it was determined that the total of all mortgage payments amounted to $26,556.60. The total cost of financing the housing unit by a low-income purchaser was determined to be $17,862.60, or 67.2 per cent of each dollar expended by the consumer for his housing.

Effects of Land Cost and Interest Rate

A method of lot splitting, permissible under the present Zoning Ordinance, was used to reduce the basic land cost for the housing unit from $2,000.00 to $1,500.00. If the originally proposed lot split (see Figure 2, page 18) and cluster development plan had been used, the basic land cost per housing unit could have been reduced to $666.67. Although this proposal was not permitted by the present Zoning Ordinance, the resulting lot areas in the cluster development would have been in excess

TABLE VI

CONSUMER HOUSING EXPENDITURE

Projected Sales Price		$ 9,380.00
FHA-Insured Mortgage		9,100.00
Interest Rate		8.5%
Term of Repayment, months		360
Monthly Principal & Interest Payment	$ 69.98	
Monthly Mortgage Insurance Premium	3.78	
Total Monthly Mortgage Payment		$ 73.76
Total Mortgage Payments	$26,553.60	
Principal Debt	9,100.00	
Net Cost of Financing		$17,453.60
Mortgage Discount & Fee		409.00
Total Cost of Financing		$17,862.60

Percentage of Consumer Housing Expenditure Attributed to:

Structure;		
Preparation	.2%	
Labor	4.1%	
Materials	9.0%	
Subcontractors	8.6%	
Subtotal		21.9%
Other;		
Land	5.9%	
Overhead	1.0%	
Sales	.8%	
Financing	67.2%	
Profit	3.2%	
Subtotal		78.1%
TOTAL		100.0%

of those now allowed in mobile home parks. This development scheme could have reduced the projected purchase price per unit from $9,380.00 to $8,512.67. (This includes $34.00 saved by a corresponding reduction in the estimated mortgage discount.) Because an FHA-insured mortgage is decreased to the next lower multiple of $50.00, the effect of this saving to a purchaser would be a reduction in the required down payment from $280.00 to $262.67, and a mortgage of $8,250.00 instead of $9,100.00. The new mortgage would require a monthly payment for principle, interest, and mortgage insurance premium of $66.87 instead of the $73.76 required by the higher mortgage. The cumulative effect of a $6.89 reduction in the monthly payment would have been a saving of $2,480.40 in the housing expenditure by a low-income family over a 30-year mortgage repayment period.

Using a fixed monthly expenditure of $73.76 (monthly payment for principle, interest, and mortgage insurance premium on a $9,100.00 mortgage at 8 1/2 per cent interest for 30 years) as a base amount, the effects of an interest rate were determined. Prior to January 5, 1970, when the interest rate was 7 1/2 per cent, $73.76 would have purchased a residence costing approximately $10,300.00 with a mortgage of $10,000.00. Had the application for an FHA-insured mortgage been submitted before January 5, 1970, instead of on February 19, 1970, (45 calendar days) a low-cost housing unit costing approximately $10,300.00 could have been provided for the same monthly payment. The increase of one per cent in the interest rate on January 5, 1970, resulted in

$920.00, or 8.9 per cent, less house for the same monthly payment.

In early 1966, when the interest rate was 5 1/4 per cent for loans insured by the Federal Housing Administration, a $73.76 monthly payment would have purchased a house costing approximately $13,050.00 with a mortgage of $12,650.00. Since this early period in 1966, interest rates have been spiraling with the effect that a purchaser today buys approximately $3,670.00, or 28.1 per cent, less house than he could have purchased had the interest rate remained at 5 1/4 per cent.

CHAPTER VI

RESULTS AND RECOMMENDATIONS

The national housing goal of "a decent home and a suitable living environment for every American family" appears unattainable, particularly by the low-income segment of the population, until the battle against rising construction and financing costs and regulatory restraints has been won. Numerous studies have been and are being made of the many problems that beset low-cost housing. In particular, much emphasis has been placed on physical aspects of the housing unit, i.e., the design, constituent materials, and methods of construction. However, these aspects may only be incidental to the real deterrents of low-cost housing. It also appears that the housing needs of low-income families can best be satisfied by removing the restraints and attacking these problems at the local rather than the national level.

Through an actual experiment in the development and construction of a low-cost housing unit in Stillwater, Oklahoma, this study undertook to determine the need and economic feasibility of low-cost housing, and to identify those restraints that have deterred the construction of low-cost housing in the local community.

Results

The results of this study were as follows:

1. There is a definite need for low-cost housing in Stillwater, Oklahoma. A disparity was shown to exist between the economic profile of the community and the value of the building permits issued for new residential construction during the fiscal 1968-69 year. Also, the number of building permits issued for new residences during the past few years is considered insufficient in number to provide for the normal growth of the city. A large number of the existing houses in the city are inadequate for housing. Many have been evaluated to be in need of major renovations and many of the more dilapidated structures should be demolished. The need for new and less expensive housing has given impetus to an upsurge of mobile home parks with mobile homes now providing approximately 20 per cent of the residential units in Stillwater, Oklahoma. Civic leaders and other responsible citizens of the community have been unanimous in expressing the opinion that there is an immediate and pressing need for low-cost housing.

2. Low-cost housing is economically feasible from the standpoint of profit to the builder as well as from the standpoint of purchase by low-income families, irrespective of their eligibility for mortgage payment subsidies from the federal government. The expected profit is low, but the very nature of this type of housing precludes excessive profit. Removing or modifying those restraints which affected this experiment

would lower the cost of the housing units and increase the profit motivation for private enterprise to undertake projects of this nature.

3. The major restraints to low-cost housing encountered during this study were:

a) Limited availability of suitable land, i.e., improved building sites with sidewalks, paving, and accessible utilities for low-cost housing projects.

b) High cost of such land.

c) Local statutory requirements for lot splitting and government regulations relative to FHA-insured mortgages. (Fulfilling the imposed requirements consumed a disproportionate share of time and effort and in many cases these requirements delayed completion of construction.)

d) Restrictive requirements of the local zoning ordinance.

e) High cost of permanent financing for the housing unit.

f) Lack of a readily available low-cost housing unit that could be easily constructed or erected in Stillwater, Oklahoma.

g) Lack of interest on the part of qualified and established builders to participate in projects of this nature.

h) Indifference of civic leaders and other responsible citizens to the fact that low-cost housing is needed in the community and that their action is necessary to make such housing a reality.

i) Difficulty in obtaining competitive material and subcontract prices, in scheduling of materials, and in obtaining a satisfactory level of efficiency of construction; all of which contributed to a higher than necessary construction cost for the initial low-cost housing unit.

Recommendations

The major deterrents to low-cost housing are interrelated and dependent upon each other in some hierarchy of order. The removal of a restraint at one level will alleviate or remove one or more corresponding restraints at other dependent levels. Recognizing that adequate housing for low-income citizens is primarily a community responsibility, the following recommendations are made:

1. It is recommended that the City of Stillwater encourage low-cost housing by easing the present restrictive zoning density requirements to permit cluster developments of single-family low-cost housing units. Land densities commensurate with the purposes of low-cost housing will provide suitable land at lower unit cost than that now available. In addition, it will economically encourage the development of vacant but already improved lots which are abundant throughout the community.

2. It is also recommended that the City, possibly through the MAPC, plan the location of such low-cost housing developments so as to blend those families into the various partially developed areas of the

community and prevent the furtherance of ghetto conditions which now exist. Consideration as to convenience to shopping areas and other community facilities should also be considered.

3. The cost of financing is the result of a severely restrictive national monetary policy that has curtailed the supply of money and created higher interest rates. This is a national problem and cannot be solved at the community level. However, local savings and loan institutions could help or devise a method to alleviate problems connected with permanent financing of low-cost housing such as absorbing the closing costs and mortgage discount points on such loans. Since a relatively low number of low-cost housing units would be needed in a given community, the local savings and loan institutions could also provide lower than normal interest rates for permanent loans on such housing if the investors in these institutions were earnestly concerned with alleviating the housing problems of the low-income families. It is recommended that these suggestions be thoroughly investigated and if possible implemented to provide a readily available and low-cost source of permanent financing.

4. It is recommended that a non-profit corporation or similar type organization be established in the community to guide low-income families in the procedural requirements and construction operations of building their own low-cost housing. The provisions of Section 235 of the National Housing Act allow the low-income family purchasing a home with an FHA-insured mortgage to contribute the full value of their labor

in the construction of the unit toward the required down payment or to reduce the mortgage, or both. Such an organization staffed with knowledgeable personnel could assist and guide a low-income family through every phase of constructing a low-cost housing unit, i.e., location of a suitable building site, application for financing, selection of house plans, ordering materials, and construction of the unit with their own labor utilized as extensively as possible under the supervision of skilled tradesmen.

This organization might also engage in the following:

a) Design of low-cost housing units, i.e., development of a series of house plans having similar characteristics but different architectural features.

b) Set up prefabricating plants to build sections of these houses, i.e., walls, roof trusses, etc., at a central location which could employ low-income or jobless personnel as "on-the-job trainees."

c) Establish a cooperative facility to purchase construction materials in large quantities with correspondingly lower unit costs, and to store these materials until needed.

Stillwater, Oklahoma, has the material, financial, and human resources to provide their much needed low-cost housing. Community action to remove the existing major restraints and unharness these resources is necessary if private enterprise is to be motivated to engage in low-cost housing developments. However, the failure of the

community to take these necessary steps can be overcome by those who are in the greatest need of housing. Given the proper guidance and assistance, and motivated by their need, self-helping lower-income families can provide their own low-cost housing.

Recommendations for Future Research

The experiment in low-cost housing was intended to be exploratory and broad in its examination of low-cost housing problems at the community level. It was thus able to study certain specific areas of interest as well as to reveal related areas for more detailed investigation.

Further studies and experimentation into the development and construction of other low-cost housing units that could be adaptable to Stillwater, Oklahoma, and other similar communities, could prove to be of much value.

Studies similar to this experiment could be conducted in other communities to verify the similarity and/or differences in the restraining factors to low-cost housing that were revealed by this experiment.

In-depth studies of those particular problems encountered during this study could be rewarded by a more effective removal or modification of these restraints.

Although the topic of low-cost housing has become more timely as a result of recent news presentations, the need has always been present. Until every American family is living in a decent home with a suitable living environment, the challenges for research in this area are unlimited.

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