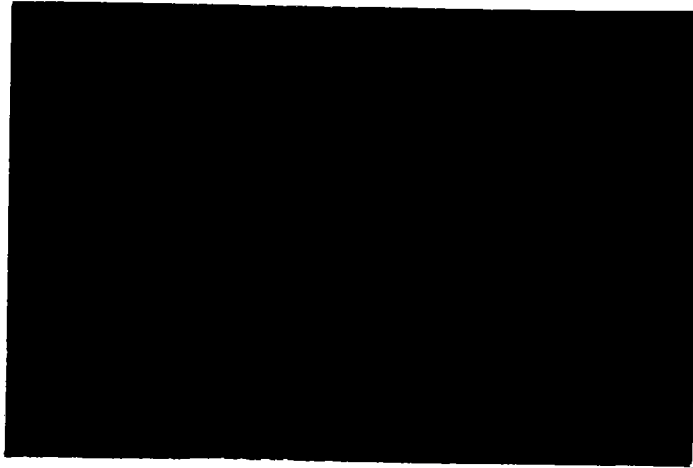


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HOUSING ASSISTANCE SUPPLY EXPERIMENT

A WORKING NOTE



This Note was prepared for the DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, under Contract No. H-1789. It is intended to facilitate communication of preliminary research results. Views or conclusions expressed herein may be tentative and do not represent the official opinion of the sponsoring agency.

Rand
SANTA MONICA, CA. 90406



WN-8645-HUD

SELECTING THE BASELINE SAMPLE OF
RESIDENTIAL PROPERTIES: SITE I

Eugene C. Poggio

March 1977

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PREFACE

This report was prepared for the Office of Policy Development and Research, U.S. Department of Housing and Urban Development. It documents the procedures followed in selecting the baseline sample of residential properties in Site I of the Housing Assistance Supply Experiment, and describes the resulting sample of 5,039 properties, stratified as to location, tenure, number of housing units, and rent or market value.

The events reported here occurred between January 1973, when planning for sample selection began, and October 1973, when field materials relating to the sampled properties were delivered to Rand's survey subcontractor. Baseline surveys of the owners and occupants of these properties began immediately thereafter. Properties for which complete survey records were compiled were subsequently eligible for inclusion in a permanent panel, to be resurveyed annually for the duration of the experiment.

The survey sample for the Supply Experiment was designed by Timothy M. Corcoran, Eugene C. Poggio, and Tiina Repnau.* Responsibility for sample selection rested with Poggio, the author of this note. Formal documentation of the procedures was delayed for a variety of reasons, but the information reported here was available to those charged with selecting the permanent panel and to those who weighted and analyzed the data collected in the baseline surveys.

The information needed for sample selection was assembled with the help of officials of Brown County and its political subdivisions. The field staff of Mathematica, Inc., the survey subcontractor, conducted

* See their *Sample Design for the Housing Assistance Supply Experiment*, The Rand Corporation, WN-8029-HUD, November 1972. Subsequent decisions as to the number of sample strata and the total sample size are reflected in Corcoran's *Survey Sample Design for Site I*, The Rand Corporation, WN-8640-HUD, March 1974; the current status of sample design is summarized in Ira S. Lowry, *Monitoring the Experiment: An Update of Sec. IV of the General Design Report*, The Rand Corporation, WN-9051-HUD, April 1975.

the property record search and the screening survey; Dennis Brachfeld, Walter Corson, and David Crest were key persons in that work.

At Rand, Misako Fujisaki, Sharon Anderson, and Edward Woo worked under extreme schedular pressure to process the sample-selection data. Tiina Repnau and Timothy Corcoran made population estimates and offered useful suggestions for documentation. Ira S. Lowry reviewed both the procedures and their results. Linda Ellsworth, Jan Evan, Mike Griego, Vicenta Jacobs, Geraldine Jaimovich, Sandy Mast, Ruth Moore, Charlotte Sato, and Ethel Sniderman typed drafts for this note. Helen Turin edited the typescript and supervised production of final copy.

This report was prepared pursuant to HUD Contract H-1789, Mod. 23, and fulfills the requirements for Task 2.3.1 of that contract.

SUMMARY

This note describes the selection of a sample of properties and housing units in Brown County, Wisconsin, Site I of the Housing Assistance Supply Experiment. Beginning in October 1973, this sample was scheduled for baseline surveys designed to gather information about the properties and their owners and the housing units and their occupants immediately before an experimental housing allowance program for low-income families began there. Subsequently, a permanent panel of properties and housing units was chosen from among those with adequate baseline records; each member of the panel will be resurveyed annually for the duration of the experiment, probably five years. These surveys will provide most of the data needed to analyze the effects of the experimental housing allowance program on the local housing market.

SAMPLE DESIGN

The baseline sample, the precursor of a longitudinal panel of properties and housing units, consists of a stratified sample of properties and a stratified cluster sample of housing units. Regular residential properties are stratified by neighborhood density (urban and rural), housing tenure (ownership and rental), housing cost (rent or value), and size. For the terminal panel consisting of properties for which complete five year survey records are obtained, the design calls for a total of 1162 properties.

SAMPLE SELECTION STRATEGY

A four-phase procedure was used to select the baseline sample. Each phase entailed collecting information on properties, stratifying the properties based on that information, and selecting a sample of these properties. In each phase, information was collected only on the properties sampled in the previous phase. The number of properties on which information was collected consequently decreased with each successive phase of the procedure. The phases were designed so that the less expensive information and information closely related to

differential sampling rates was collected in the earlier phases, when samples were largest.

SAMPLE SIZE REQUIREMENTS

Sample sizes for each phase of sample selection were calculated backward from the terminal panel targets. Allowing for nonresponse of landlords, tenants, and homeowners in the postenrollment surveys, we estimated the baseline panel would have to contain about 2600 properties to reach the terminal panel targets totalling almost 1200 properties. By taking into account such factors as survey nonresponse, the greater aggregation of strata in earlier phases, expected misclassifications of properties, and the possibility of nonparticipation of some jurisdictions in the allowance program, we estimated that more than 15,500 properties would have to be selected in Phase I, more than 7000 in Phase II, and more than 5200 in Phase III to obtain the 2600 complete baseline records required for the baseline panel.

PHASE I

In the first step of Phase I, an Addressograph file of parcels in the Brown County Tax Listing Service Office provided the sampling frame, consisting of all 61,791 properties in Site I. This source also indicated where the properties were located, enabling them to be classified as either urban or rural. The city directory (in the urban area) and local officials (in the rural area) were the principal sources used to identify 7778 rental properties in the county. On the basis of this information, each property was assigned to one of four strata: urban rental, rural rental, urban nonrental, or rural nonrental. From this property record search stratification, a property record search sample of 15,535 properties was selected.

PHASE II

In Phase II, information on number of housing units, assessed value, and land use was collected from assessor's records on each of the properties sampled in Phase I. This information was used to sub-stratify urban rental properties by number of housing units, nonrental

properties in both the urban and rural areas into ownership and non-residential, and ownership properties into value quartiles. Properties identified as rooming houses, mobile home properties, or seasonal properties were assigned to separate strata. From this stratification the screening survey sample of 6019 properties was selected. A cluster sample of 9790 housing units was also selected, consisting of all units on properties with no more than eight units and a sample of eight on larger properties.

A validation check against census data indicated that our sample selection procedure had failed to identify about 600 urban and 600 rural rental properties (mostly single-family). We used special procedures to search for these, but found only 211 urban and 179 rural rental properties to add to the screening survey sample.

PHASE III

In the third phase, fieldworkers attempted to interview the occupants of the 10,753 housing units selected in the screening survey sample. The survey instrument, which gathered information on tenure and number of housing units and captured the first information on rent, was completed on 80 percent of the units. The information was used to restratify properties into post-screening strata, similar to the screening strata, in which urban rental properties were stratified by number of housing units, ownership properties were stratified by value quartile, and rooming houses, mobile home properties, and seasonal properties were assigned to separate strata. Because this restratification resulted in different selection probabilities among properties within each post-screening stratum, the sample was corrected to reduce these differences. The rental properties were then substratified by gross rent tercile. Following this last stratification, the baseline survey sample of 5039 properties and 7987 housing units was selected.

More than 3000 rental properties were in the baseline sample, about 2600 urban properties with about 5500 sample housing units and about 500 rural with about 300 sample units. The urban rental sample contained about 1200 single-family properties, 2200 two to four unit properties, and 250 five or more unit properties. Almost 1300 ownership

properties were included in the sample, about 1000 in the urban area and more than 300 in the rural area. The remainder of the residential sample consisted of rooming houses, mobile home properties, and seasonal properties. The nonresidential sample, selected entirely from the urban area, is composed of 200 unimproved properties and 176 properties with nonresidential improvements that are potentially convertible to residential use.

PHASE IV

In the fourth and final phase of the procedure (not documented in this note), the baseline survey instruments were administered to owners and occupants of each property and housing unit in the baseline survey sample. Though the surveys primarily serve other functions, they enabled us to verify property information used for sample selection. Where that information was found to be in error, the property was re-stratified. Finally, the baseline panel was selected.

REVIEW

After selecting the baseline sample, we reviewed the selection procedure to identify problems bearing on statistical inference from data collected in the surveys.

The principal problem stemmed from our inability to identify all rental properties. We used special procedures to identify about 400 such properties and combined a sample of these with the random sample. The added properties constitute a nonrandom component of the baseline sample.

Another problem was the restratification of properties as more or better information was obtained in successive phases of sample selection. Though the sampling history of each property is clear, estimation of corresponding populations is greatly complicated because properties within strata have unequal selection probabilities.

In the final section of the report, we suggest procedures for dealing with both of these problems in the analytical work to come.

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I. INTRODUCTION

This note describes the selection of a sample of properties and housing units in Brown County, Wisconsin, Site I of the Housing Assistance Supply Experiment. Beginning in October 1973, this sample was scheduled for baseline surveys designed to gather information about the properties and their owners, and the housing units and their occupants immediately before an experimental housing allowance program for low-income families began there. Subsequently, a permanent panel of properties and housing units was chosen from among those with adequate baseline records; each member of the panel will be resurveyed annually for the duration of the experiment, probably five years. These surveys will provide most of the data needed to analyze the effects of the experimental housing allowance program on the local housing market, and our ability to generalize from those data depends critically on the care with which the survey sample was selected.*

Brown County was designated as Site I of the Supply Experiment in December 1972. Planning for sample selection began in January 1973, with a site visit to gather information about the availability, organization and content of property data sources.** The selection activities described in this note began shortly thereafter and continued through December 1973, when the final installment of the baseline sample list of 5039 properties and 7987 housing units was compiled. Baseline fieldwork, conducted by HASE's survey subcontractor, began in October 1973 and continued through June 1974.

* For an overview of the experiment and a description of the survey agenda and its purposes, see Ira S. Lowry (ed.), *General Design Report: First Draft*, The Rand Corporation, WN-8198-HUD, Secs. II and IV. Revised versions of Secs. I through IV have been published as working notes (WN-9098-HUD, WN-9070-HUD, and WN-9051-HUD) and should be consulted in preference to the earlier versions of these same sections in WN-8198-HUD.

** See Eugene C. Poggio, *Sample Selection Procedures for Site I*, The Rand Corporation, WN-8201-HUD, March 1973.

FIELD SURVEYS

A major component of the monitoring plan for the Housing Assistance Supply Experiment is the annual cycle of field surveys of residential and nonresidential properties.* Baseline surveys are taken just before the beginning of the allowance program; postenrollment resurveys are made at one year intervals for the duration of the experiment.

The specific survey instruments administered to a given property depend upon its characteristics. On residential rental properties, a survey of landlords instrument is administered to the owner, survey of tenants and homeowners instruments are administered to the tenants, and a survey of residential buildings instrument is administered on the building. On residential ownership properties, a tenants and homeowners instrument is administered to the resident-owner and the residential building instrument is administered on the building.**

SAMPLE DESIGN

The field surveys will enable us to estimate the effects of the allowance program on the housing market and its various participants. The survey sample had to be designed to assure that estimates made for various sectors of the housing market are sufficiently precise.***

* After the completion of the baseline surveys in Site I, a decision was made in the interest of cost reduction to eliminate postenrollment surveys of seasonal and nonresidential properties.

** The survey of mobile home residents instruments is substituted if the tenant or resident owner lives in a mobile home or the survey of lodgers instrument if the tenant resides in a rooming house. Additionally, in the baseline surveys in Site I, the survey of owner of seasonal property instrument was administered to owners of properties with seasonal residential use, the survey of nonresidential properties instrument to owners of properties with commercial use, and the survey of unimproved properties instrument to owners of properties without improvements. Seasonal and nonresidential properties will not be resurveyed.

*** For the most extensive discussion of the logic of the sample design, see Timothy M. Corcoran, Eugene C. Poggio, and Tiina Repnau, *Sample Design for the Housing Assistance Supply Experiment*, The Rand Corporation, WN-8029-HUD, November 1972. Subsequent general decisions on stratification and sample sizes are reflected in Timothy M. Corcoran, *Survey Sample Design for Site I*, The Rand Corporation, WN-8640-HUD, March 1974; and in an exchange of correspondence between Rand and HUD in June 1974.

The sample designed for Site I is first of all a longitudinal panel: Sample elements successfully surveyed in the baseline survey will be resurveyed annually for the duration of the monitoring period. The design calls for samples of two elements: tax parcels (or properties) and housing units. The tax parcel is the smallest unit of real estate whose location and ownership is separately recorded in public records. The design specifies a stratified sample of properties and a stratified cluster sample of housing units in which properties serve as the cluster.

The design called for a stratified sample of properties that would capture effects of the housing allowance program on various market sectors and would enhance generalization of the experimental results to other housing markets. Residential properties were stratified by neighborhood density (urban and rural area), housing tenure (ownership and rental), housing cost (rent or value), and size (number of housing units on rental property). The design allocated the total sample on the basis of relative reliability targets for stratum-specific estimates of the price elasticity of the supply of housing services. The specifications of the targets were based on a plan in which sectors of the housing market likely to be most strongly affected by the allowance program and sectors somewhat unimportant locally but important elsewhere were assigned targets of higher reliability. Finally, the design specified a total sample size goal of 1162 properties for the terminal panel, which will consist of properties for which complete five year survey records are obtained.

The terminal panel design is shown in Table 1.* It has 19 residential and five nonresidential strata.

The first 16 strata are composed of residential properties stratified by neighborhood density and housing tenure. The urban rental properties are substratified by both size and gross rent tercile, the rural rental properties stratified only by gross rent. The ownership properties are all stratified by value. Three strata are used in the

* This table shows the sample of properties only. The sample of housing units consists simply of all housing units on each selected property up to a maximum of eight.

Table 1
TERMINAL PANEL

Baseline Panel Stratum Number	Stratum Description	Number of Properties
	<i>Urban Rental Properties by Gross Rent Tercile</i>	
	First tercile, by size:	
1	Single-family	91
2	2-4 units	114
3	5+ units	35 ^a
	Second tercile, by size:	
4	Single-family	112
5	2-4 units	145
6	5+ units	27 ^a
	Third tercile, by size:	
7	Single-family	35
8	2-4 units	46
9	5+ units	29 ^a
	<i>Rural Rental Properties by Gross Rent Tercile</i>	
10	First and second terciles	60
11	Third tercile	24
	<i>Urban Ownership Properties by Value Quartile</i>	
12	First quartile	78
13	Second quartile	98
14	Third and fourth quartiles	34
	<i>Rural Ownership Properties by Value Quartile</i>	
15	First and second quartiles	49
16	Third and fourth quartiles	24
	<i>Other Residential Properties</i>	
17	Rooming houses	11 ^b
18	Mobile home properties	18 ^b
19	Seasonal properties	44
	<i>Nonresidential Properties</i>	
20	Urban, unimproved	44
21	Urban, improved, convertible	44
22	Urban, improved nonconvertible	0
23	Urban, institutional and subsidized	0
24	Rural	0
	TOTAL RESIDENTIAL	1,074
	TOTAL NONRESIDENTIAL	88
	GRAND TOTAL	1,162

SOURCE: Timothy M. Corcoran, *Survey Sample Design for Site I*, The Rand Corporation, WN-8640-HUD, March 1974, p. 77.

^aThis is constrained by the number of properties estimated with 1970 U.S. Census data to be in this stratum.

^bThis is constrained by the number of properties in this stratum identified with the sample selection procedure.

urban area; only two in the rural. Additional strata are used for rooming houses, mobile home properties, and seasonal properties.

The five strata for nonresidential properties are stratified by density. The urban properties are further stratified according to whether the property had no improvements, had improvements potentially convertible to residential use within five years, had improvements not potentially convertible, or was institutional or subsidized housing.*

The terminal panel includes 1162 properties, 634 urban and 84 rural rental. Of the urban properties, 238 are single-family, 305 have two to four units, and 91 have five or more units. The panel also includes 210 urban and 73 rural ownership properties. The three strata for special types of residential use include 73 properties, and the urban nonresidential strata for properties with no improvements or with improvements potentially convertible to residential use have 88 properties.

SAMPLE SELECTION STRATEGY

It is one matter to decide on the number of properties in each stratum in the terminal panel and quite another to determine a method to obtain them. The former is the concern of sample design; the latter is the concern of sample selection.

The strategy adopted for sample selection was the use of a four-phase selection procedure. Each phase entailed collecting information on properties, stratifying these properties based on that information, and selecting a sample of these properties. In each phase information was collected only on the properties sampled in the previous phase. The number of properties on which information was collected consequently decreased with each successive phase of the procedure. The phases were designed so that the less expensive information and information more closely related to differential sampling rates was collected in the earlier phases, ensuring that the procedure was efficient.

* While not actually nonresidential, institutional and subsidized housing is, for these purposes, categorized with nonresidential because it is not available on the open market.

OVERVIEW OF PROCEDURE

Phase I began with a listing of the sampling frame, which consisted of all 61,791 properties in Site I. Information was collected from official sources and from the city directory on neighborhood density and housing tenure for each of these properties, and each was stratified on the basis of this information. As shown on the left of Fig. 1, the sampling frame was partitioned into four strata: urban rental, rural rental, urban nonrental, and rural nonrental. From this *property record search stratification*, the *property record search sample* of 15,535 properties was selected.

In Phase II, information on number of housing units, value, and land use was collected from assessors' records on each of the sampled properties. As indicated in Fig. 1, this information was used to sub-stratify urban rental properties by number of units. The nonrental properties in both the urban and rural areas were stratified into ownership and nonresidential; the urban ownership properties were substratified according to whether the value fell in the first, second, or third or fourth quartile; the rural, according to whether the value fell in the first or second, or third or fourth quartile. Properties identified as rooming houses, mobile home properties, or seasonal properties were assigned to separate strata. The result was the *screening survey stratification* from which the *screening survey sample* of 6019 properties and 9790 housing units was selected.

In Phase III, a screening survey instrument was administered on all housing units selected in the screening survey sample. This survey captured rent information by which urban and rural rental properties were stratified, as indicated in Fig. 1. Urban properties, previously stratified by number of units, were substratified. Rural properties, not having been stratified by number of units, were stratified according to whether the rent level fell in the first or second, or third tercile. Nonresidential properties* were stratified as unimproved,

* For the method and sources of information by which the nonresidential properties are stratified, see Timothy M. Corcoran, *Sampling Nonresidential Properties: Site I*, The Rand Corporation, WN-8623-HUD, March 1974.

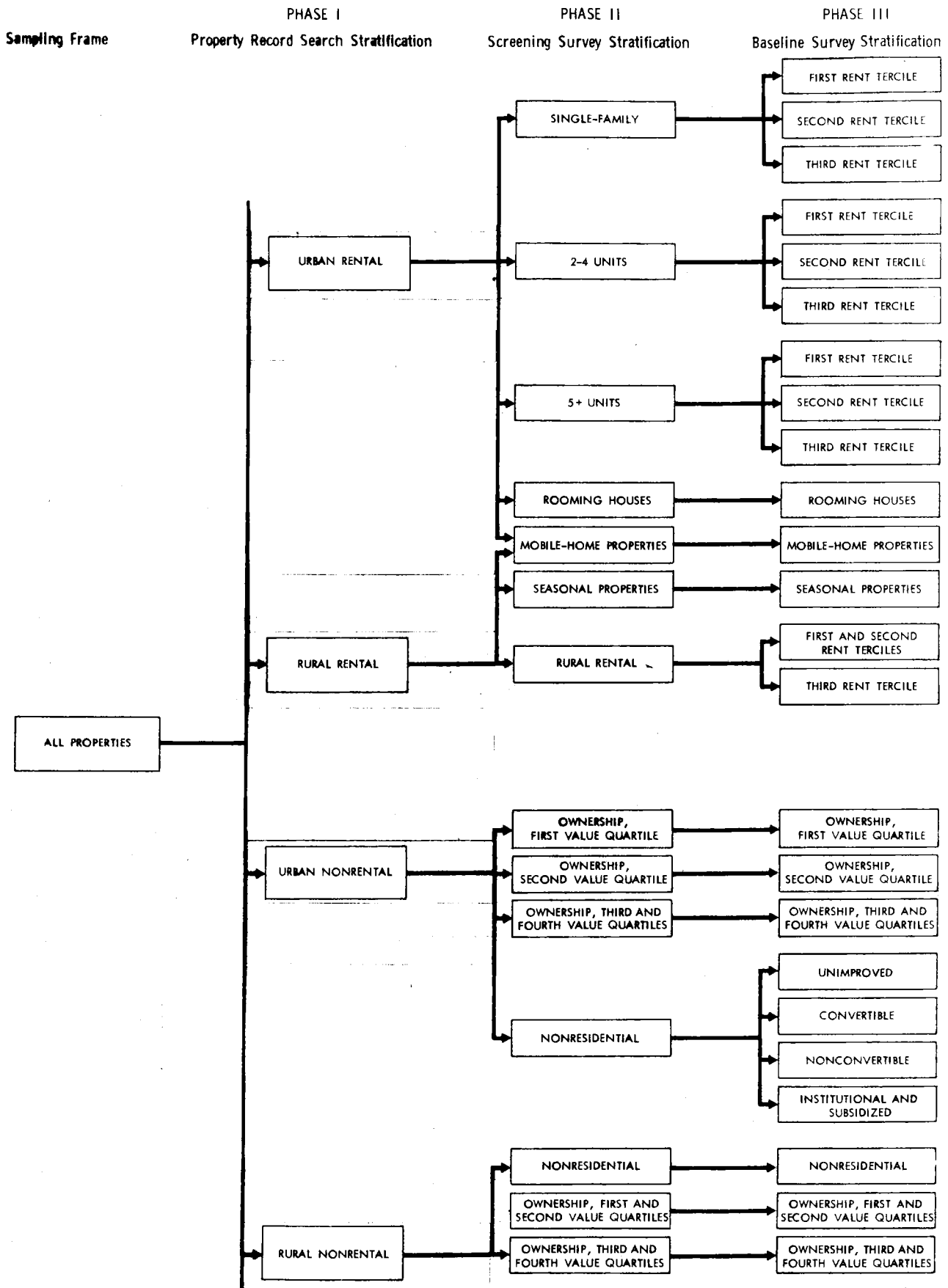


Fig. 1 - Overview of stratification

convertible within five years, not convertible within five years, or institutional and subsidized housing. The screening survey additionally captured information allowing a verification of the tenure and size of properties. Whenever a discrepancy was found in the earlier information, the property was restratified. The result was the *baseline survey stratification* from which the *baseline survey sample* of 5039 properties and 7987 housing units was selected.

In the fourth and final phase of the procedure (not documented in this note), the extensive baseline survey instruments were administered on each property and housing unit in the baseline survey sample. Although they primarily serve other functions, the baseline surveys verify previously obtained information. Where previous information was found to be in error, the property was restratified. The resultant *baseline panel stratification* is the final stratification of the sample selection procedure. Its strata are identical to the baseline survey stratification, and are consequently not shown in Fig. 1. From this stratification, the *baseline panel* was selected.

Each of the properties in this panel will be administered the post-enrollment resurveys in each of the five subsequent years. The properties having complete survey records at the end of this period constitute the *terminal panel*. The number of properties selected in the final phase had to be sufficiently large that terminal panel targets can be met.

SAMPLE SIZE REQUIREMENTS

The number of properties chosen in each phase of the sample selection procedure had to be sufficiently large, allowing for such factors as survey nonresponse, that the target sizes for the subsequent phase could be met. The sample size requirements are summarized in Table 2.

All figures in the table are referenced to baseline panel strata as shown on the left.* The population size estimates for these strata are given in column (1).**

* The strata have been taken out of numerical order for purposes of display.

** The estimates are actually for baseline survey strata, but estimates for baseline panel strata will likely differ only slightly.

Table 2

SAMPLE SIZE REQUIREMENTS AT EACH PHASE OF THE SAMPLE SELECTION PROCEDURE

Baseline Panel Stratum Number	Stratum Description	Number of Properties					
		Estimated Total Population ^a (1)	Property Record Search Sample (2)	Screening Survey Sample (3)	Baseline Survey Sample (4)	Baseline Panel (5)	Terminal Panel (6)
	<i>Urban Rental Properties by Size</i>						
	Single Family, by Gross Rent Tercile						
1	First tercile	388	}	2,592 ^b	626	268	91
4	Second tercile	670			768	329	112
7	Third tercile	781			241	103	35
	2-4 Units, by Gross Rent Tercile						
2	First tercile	1,376	}	1,625	363	207	114
5	Second tercile	1,309			463	264	145
8	Third tercile	1,292			147	84	46
	5+ Units, by Gross Rent Tercile		6,342 ^c				
3	First tercile	58	}	192 ^b	74 ^b	52 ^b	35 ^b
6	Second tercile	133			57 ^b	40 ^b	27 ^b
9	Third tercile	79			61 ^b	43 ^b	29 ^b
	<i>Other Residential Properties</i>						
17	Rooming houses	37	}	66 ^d	33 ^d	17 ^d	11 ^d
18	Mobile home properties	127		19 ^e	50 ^e	32 ^e	18 ^e
19	Seasonal properties	721		0 ^f	250 ^g	100 ^g	44 ^g
	<i>Rural Rental Properties by Gross Rent Tercile</i>		1,436 ^h				
10	First and second tercile	558	}	985 ^b	343	158	60
11	Third tercile	90			142	63	24
	<i>Urban Ownership Properties by Value Quartile</i>						
12	First quartile	5,523	}	438	354	177	78
13	Second quartile	6,905		552	446	223	98
14	Third and fourth quartiles	13,151		191	154	77	34
	<i>Nonresidential Properties</i>		3,841				
20	Urban, unimproved	8,047	}	0	200 ⁱ	100 ⁱ	44 ⁱ
21	Urban, improved, convertible	1,759			200 ⁱ	100 ⁱ	44 ⁱ
22	Urban, improved, nonconvertible	1,839			0	0	0
23	Urban, institutional and subsidized	330	}	0	0	0	0
24	Rural	10,656			0	0	0
	<i>Rural Ownership Properties by Value Quartile</i>		3,916				
15	First and second quartiles	3,190	}	275	222	111	49
16	Third and fourth quartiles	2,758		136	110	55	24
	TOTAL RESIDENTIAL	39,146	11,979 ⁱ	7,071	4,854	2,403	1,074
	TOTAL NONRESIDENTIAL	22,631	3,556 ⁱ	0	400	200	88
	GRAND TOTAL	61,777	15,535	7,071	5,254	2,603	1,162

SOURCE: Computed from terminal panel requirements given in Timothy M. Corcoran, *Survey Sample Design for Site I, The Rand Corporation, WN-8640-HUD, March 1974, p. 77.*

NOTES TO TABLE 2

NOTE: This table gives estimated sample sizes required for each phase of sample selection to meet the requirements of subsequent phases, allowing for such factors as survey nonresponse.

^aThis column indicates population size estimates for baseline survey strata, based on sample selection procedure data. Estimates for baseline panel strata are unlikely to differ substantially.

^bThis figure is constrained by the number of properties estimated with 1970 U.S. census data to be in this stratum.

^cThis figure is constrained by the number of properties in this stratum identified with the sample selection procedure. It includes those rooming houses, mobile home properties, and seasonal properties that were identified in the urban area.

^dThis figure is constrained by the number of properties in this stratum identified with the sample selection procedure.

^eThis figure is constrained by the number of properties in this stratum identified with the sample selection procedure. A substantial number of additional mobile home properties were identified during the screening survey.

^fThough seasonal and nonresidential properties were not included in the screening survey sample, baseline survey samples of these properties were selected, using separate procedures.

^gAfter completion of the baseline surveys, a decision was made to eliminate the postenrollment surveys of seasonal and nonresidential properties. The figures given here for the baseline and terminal panel are the targets that had been set before that decision.

^hThis figure is constrained by the number of properties in this stratum identified with the sample selection procedure. It includes those rooming houses, mobile home properties, and seasonal properties that were identified in the rural area.

ⁱThe split between residential and nonresidential in the property record search sample is not inherent in the stratification. It is estimated here based on information collected in the property record search.

The table is most easily explained from right to left. In Col. (6) are the sample design figures as given in Table 1 for the terminal panel, each property of which is to have a complete five year record of field surveys. The other figures in the table are derived from these.

Column (5) gives estimates of the sample size required for the baseline panel so that the design targets for the terminal panel may be met. These figures allow for expected nonresponse of some landlords, tenants, and homeowners during the postenrollment surveys.*

The estimated number of properties that need to be selected in the baseline survey sample to meet the targets for the baseline panel are shown in Col. (4). These take into account the expected nonresponse of landlords, tenants, and homeowners in the baseline surveys.

Column (3) gives the estimated sample size for the screening survey sample required to achieve the baseline survey sample targets, allowing for several factors, including nonresponse of tenants in the screening survey and misclassification of properties. It was expected that some ownership properties were misclassified as single-family rental, and most such properties would not be eligible for the baseline sample. A final factor taken into account was the greater aggregation of screening strata compared with baseline survey strata. The screening stratification had, for example, only one stratum for all single-family urban rental properties, whereas the baseline stratification had separate strata for each rent tercile. The sampling rate for the single screening stratum had to be set high enough that the requirements of the most heavily sampled disaggregated baseline stratum could be met.

The sample sizes for the property record search sample, as required to meet screening survey sample targets, are given in Col. (2). One factor that had to be taken into account was the possibility that several jurisdictions would not participate in the allowance program and that properties in such jurisdictions would not be included in our

* See Timothy M. Corcoran, *The Effects on Nonresponse on Record Completion in a Panel of Residential Properties*, The Rand Corporation, WN-8174-HUD, April 1973.

survey samples. A second important factor is that the property record search strata are more aggregated than the screening strata. We therefore had to sample each aggregated property record search stratum at a rate sufficiently high to meet the target for the most heavily sampled disaggregated screening stratum. Other factors used in determining the property record search sample sizes allowed for inability to complete the property record search on some properties and for misclassification of properties. The final factor taken into account was sampling variability. A 10 percent sample of urban nonrental properties, for example, may well not include 10 percent of the urban ownership properties in the first value quartile. A slight increase in sampling rates for the property record search sample virtually assured that the required number of properties would be obtained in each of the screening strata.

COVERAGE

This document describes the sample selection procedure through the selection of the baseline sample at the end of Phase III. Phase IV will be described in a subsequent document. Despite the decision to eliminate postenrollment surveys of seasonal and nonresidential properties and the detailed documentation on the selection of nonresidential properties,^{*} I have included enough documentation on the selection of the samples of seasonal and nonresidential properties to present a comprehensive view of the entire sample selection procedure through the baseline sample.

^{*} See Corcoran, *Sampling Nonresidential Properties: Site I*.

II. PHASE I: PROPERTY RECORD SEARCH SAMPLE SELECTION

As in all phases of the sample selection procedure, in this phase we collected information, stratified properties based on the information, and selected a sample based on the stratification. This first phase also lists the sampling frame. Information on neighborhood density and housing tenure was collected. It was advantageous to collect information on density in this first phase because it was inexpensive, and on tenure because it was most highly related to differential sampling rates among strata. Rental properties were all sampled at high rates, nonrental properties at low rates.* Properties in the sampling frame were stratified and a sample selected for property record abstraction in the next phase of the procedure.

The first step was to list the sampling frame: the set of tax parcels in Brown County, Wisconsin. A by-product of this listing procedure was a determination of the value of neighborhood density for each property. The next step collected information on housing tenure. A city directory and local officials were used to identify all residential rental** properties in the county. The third step used the information on density and tenure to stratify each property in the sampling frame. Then the property record search sample was selected. In the final step of this phase, a few properties identified as rental after completion of the record step were listed for property record abstraction along with those in the property record search sample.

STEP 1: SAMPLING FRAME

In any sampling procedure the sampling frame should consist of the set of sample units in the population of interest. Our frame, listed

* It is for this reason that rooming houses and mobile home properties, which were also sampled at high rates, are included with the rental properties.

** The term "rental" will frequently be used to denote "residential rental."

in the first step, consists of the set of all legally defined tax parcels in Brown County, Wisconsin in March 1973.* It was necessary to define the frame at a specific point in time, because parcels occasionally split or merge; we chose the time at which the frame was listed. These parcels constitute the entire land area of the county.** Each parcel is represented in the frame by a parcel number.

Listings by Political Subdivision

The Brown County Tax Listing Service Office maintains an Addressograph file of the parcels in each political subdivision in the county. There is one Addressograph plate for each parcel that indicates the parcel number, the name of the owner, and the legal description.***

The office produced listing of the plates within each political subdivision, and the office's records were used to update the parcel numbers in these lists to be current as of March 1973.

Political Subdivision Coding

Though parcel numbers are unique *within* a political subdivision, there is much duplication of numbers *across* political subdivisions. To be able to combine the lists of parcel numbers for the various jurisdictions without creating confusion, we prefixed each parcel number by a code indicating the subdivision.**** The lists were then combined into a single list of all tax parcel numbers.

Determination of Density

A fringe benefit of the political subdivision coding is a determination of the value of the neighborhood density variable for almost

* One minor exception is discussed on p. 15.

** There are a few exceptions including federal property, state property, and Indian reservations.

*** For the city of Green Bay, the plates also include the address of the property.

**** See Appendix A for a list of these codes.

all of the properties in the sampling frame. This determination serves no function in the listing of the sampling frame; it is, however, essential to the stratification performed in Step 3 of this phase. It is discussed here because the determination was made as a by-product of the listing procedure.

We defined density based upon the Census definition of the urbanized area: Properties within this area were considered to be urban, those outside were considered rural. Density was determined, with one exception, simply by political subdivision. In Ashwaubenon, split by the Census's urban boundary, a parcel-by-parcel determination of density was made, and an additional component to the political subdivision code indicating this determination was incorporated into each parcel number. The density of any property was then immediately determinable from its parcel number.

Parcel Groups

Finally, a minor set of changes was incorporated in the combined list of parcel numbers, changes necessitated by groups of two or more legally defined parcels that we chose to treat as a single parcel for one of two reasons:

1. The several parcels are spanned by a single improvement, the corresponding property records being grouped by the local assessor with the assessed value of improvements either assigned to a single parcel or divided equally among the parcels.
2. The several parcels are the site of a mobile home park.

In cases of the first type, there are inherent difficulties in handling a single improvement spanning several parcels. In cases of the second type, it would have been difficult to determine which mobile homes were on which parcels. There are eight such parcel groups. Each is represented in the sampling frame by a primary parcel number, which is simply the parcel number of one of its constituent parcels. The parcel numbers corresponding to the other members of the group were not included in the frame.

Resulting Frame

The resulting sample frame consisted of a total of 61,791 sample units, each of which will be referred to as a property. Table 3 shows the locations of these properties by political subdivision. Seventy percent are in the urban area; 30 percent are in the rural area. Almost half of the properties are located within the city of Green Bay.

STEP 2: RENTAL PROPERTIES

The identification of all residential rental properties^{*} in the county was the objective of the second step of the sample selection procedure. On the basis of this identification, the stratification variable *tenure* was defined. Wherever possible, formal sources were used to make the identification. A city directory was the primary source for the urban area. In the rural area, local officials were asked to attempt the identification.

City Directory

The "Street and Avenue Guide" of *Wright's 1972 Green Bay City Directory* was the principal source of information used in identifying rental properties in the urban area. Each entry in the Guide consists of a street address, the name of the occupants, the telephone number, and, if appropriate, a homeowner symbol. The entries are ordered by address. The homeowner symbol is placed next to each entry for which the publishers "received information during the canvass that the house is owned by some member of the family."^{**}

^{*}A property was considered to be rental whenever at least one housing unit on the property was not owner-occupied. Residential hotels, institutional housing, and subsidized housing were, for our purposes, not considered to be rental property. For purposes of Phase I, rooming houses, mobile home properties, and seasonal properties were considered to be rental.

^{**}*Wright's Green Bay City Directory*, "Street and Avenue Guide," Wright Directory Co., St. Paul, Minnesota, 1972, p. 1. Regarding the indication of homeownership, the *Directory* states, "as the publisher cannot and does not guarantee the correctness of the information furnished, nor the complete absence of mistakes, no responsibility for errors can be or is assumed." We used the *Directory* in spite

Table 3

PROPERTIES IN THE SAMPLING FRAME BY POLITICAL
SUBDIVISION: BROWN COUNTY, WISCONSIN, 1973

Political Subdivision	Type of Political Subdivision	Number of Properties
Urban Area		43,801
Green Bay	City	29,025
De Pere	City	4,286
Allouez	Town	4,553
Ashwaubenon (urban portion)	Town	3,277
Howard	Village	2,660
Rural Area		17,990
Ashwaubenon (rural portion)	Town	428
Bellevue	Town	856
De Pere	Town	759
Eaton	Town	642
Glenmore	Town	699
Green Bay	Town	980
Hobart	Town	1,600
Holland	Town	853
Humbolt	Town	696
Lawrence	Town	789
Morrison	Town	918
New Denmark	Town	958
Pittsfield	Town	1,025
Rockland	Town	572
Scott	Town	1,581
Suamico	Town	1,795
Wrightstown	Town	1,048
Denmark	Village	595
Pulaski	Village	738
Wrightstown	Village	458
Total		61,791

SOURCE: Tabulation by HASE staff of tax parcel records for March 1973, obtained from the Brown County Tax Listing Service Office.

NOTE: Generally, a property was taken to be a parcel of land, improved or unimproved, as listed by the Brown County Tax Listing Service Office. In a few instances, however, adjacent parcels under common ownership were grouped for HASE purposes to form a single property.

Each address for which at least one person is shown without a home-owner symbol was listed as a rental address.* Some entries in the Guide were shown as "vacant," "under construction," or "no return," the last simply indicating no response to the publisher's canvass. Each such entry was listed in an effort to include *all* rental residential addresses. Addresses for which a purely commercial, manufacturing, or institutional land use was indicated were omitted. This step identified approximately 8000 rental residential addresses in the urban area.

Rooming House List

Because rooming houses, like rental properties, are sampled at a high rate, it was advantageous to classify them with rental properties in this phase of the sample selection procedure. Few, if any, rooming houses were thought to exist outside of Green Bay. A list obtained from the Green Bay Assessor's Office identified rooming houses within the city, and we added these properties to the list of urban rental properties.**

Correspondent Parcel Numbers

The approximately 8000 urban addresses now had to be related to the parcel numbers listed in the sampling frame. Different sources were used for each jurisdiction to obtain the parcel number corresponding to each address.

In Green Bay, six plat books from the Assessor's Office mapped the parcels within the city and indicated both the street address and the parcel number.

In De Pere, a file of owners maintained by the Assessor indicated for each property both the address and the parcel number. Each card

of this disclaimer inasmuch as it was the only available formal source that would identify single-family rental properties as well as multiple-unit properties.

* The few mobile home properties identified in the *Directory* were indicated as such for use in Phase II.

** These properties were identified as rooming houses for Phase II.

had to be checked to determine whether the indicated address had been listed as rental.*

In Allouez the Assessor's street address file indicated, for each address, the corresponding parcel number.**

In Ashwaubenon, approximately 75 percent of the addresses were transformed to parcel numbers in a two-step procedure. The Ashwaubenon Assessor's plat book and certified survey maps, both of which indicated parcel number, were used to determine the approximate block and lot number corresponding to each address. The Assessor then used this information to locate the corresponding property record indicating both the address and the parcel number. The remaining 25 percent were determined by use of the Ashwaubenon Fox River Heights Sanitary District plat books, which contain the parcel number and in which the street addresses have been hand-recorded.***

No formal records for the village of Howard contained both the address and parcel number of each property; the parcel numbers corresponding to each rental address were obtained for us by a former village clerk. She determined the owner's name corresponding to each rental address by use of a file, maintained by the local assessor, listing the property owners in the village by street address. The owners' names for addresses not listed in this file were determined by use of a similar file maintained by the Water Department. She then found the approximate location for the property in the Assessment Roll, searched that location for the owner's name, and recorded the parcel number corresponding to that name as the number corresponding to the original street address. A verification was made with the owner's name of a neighboring improved property presumed to be owner-occupied, by using the *City Directory* or telephone book to check that the address was close to that of the original property.

* The De Pere Assessor aided in this determination.

** Here the aid of the Town Clerk was enlisted to resolve problems.

*** This latter procedure would have been used for all of the Ashwaubenon rental addresses had the existence of the Sanitary District's plat book been known at the outset.

Some addresses were found to have multiple corresponding parcel numbers; others had parcel numbers duplicating those of other addresses. In all cases, each parcel number corresponding to each address was recorded. All duplicate parcel numbers were then eliminated. The set of parcel numbers so obtained was considered to be a list of urban rental properties.

Rural Officials

In the rural area, no formal source could be found that would provide either the addresses or the parcel numbers of rental properties. Consequently, in each political subdivision in the rural area, local officials were asked to list the parcel numbers of rental properties located within their jurisdiction. In Green Bay, Scott, and Suamico, there were many small lakefront properties, most of which were believed to be seasonal, but about which little was known individually. All of these seasonal properties were conservatively included in the rental listings.

About 1400 rural properties were listed as rental, three-quarters of them seasonal.

Additional Sources for Multiple-Unit Properties

Two secondary sources augmented the identification of rental properties having more than a single unit. The county land use maps maintained by the County Planning Office indicated, within categories, the number of units on a property. They were used to verify that all properties with three or more units were included in the rental list. Properties found not to have been included were added. This procedure was not used for duplexes because of the large number of such properties, the difficulty in determining the parcel number of properties shown on the map, and the results of a test showing that few additional duplexes would be identified.

Building permits were searched in the hope of identifying newly constructed rental properties not captured by other sources. Because tenure is not specifically indicated on permits, a rental identification could be made only by inference for properties with multiple

units. All such properties not previously included were added to the rental list.

Rental Properties Identified

Table 4 summarizes the result of this step of the procedure. It gives the number of properties identified as rental in each political subdivision, a total of 7,778 properties. Of these, 6,342 properties were in the urban area, more than 80 percent in the city of Green Bay, and 1,436 properties in the rural area. Most of these can be seen to be located in the three towns in which seasonal properties were listed.

STEP 3: PROPERTY RECORD STRATIFICATION

The information on two stratification variables collected in the last step is now used to stratify all of the properties in the sampling frame. This is the property record search stratification and forms the basis upon which the property record search sample was selected in the next step.

Definition of Stratification Variables

The property record search stratification was based on density and tenure. *Density* was defined based upon the Census definition of the urbanized area. Properties within this area were defined to be urban; those outside were taken to be rural. In the sampling frame, each parcel number has a code indicating the political subdivision in which the property is located. Each subdivision, save one, lies entirely either in the urban or rural area. Ashwaubenon, the exception, is split by the Census definition. There, density was determined parcel by parcel and an additional component added to the code. Density is assigned as urban or rural to each property according to its parcel number. *Tenure* is defined based upon the results of Step 2. Each property identified as rental in this step is assigned a rental tenure. All other properties are assigned a tenure of nonrental. Table 5 summarizes the definitions of these variables.

Table 4

RENTAL PROPERTIES IN THE SAMPLING FRAME BY POLITICAL
SUBDIVISION: BROWN COUNTY, WISCONSIN, 1973

Political Subdivision	Type of Political Subdivision	Number of Properties
Urban Area		6,342
Green Bay	City	5,076
De Pere	City	504
Allouez	Town	304
Ashwaubenon	Town	275
(urban portion)		
Howard	Village	183
Rural Area		1,436
Ashwaubenon	Town	8
(rural portion)		
Bellevue	Town	29
De Pere	Town	3
Eaton	Town	20
Glenmore	Town	15
Green Bay	Town	342
Hobart	Town	0
Holland	Town	9
Humbolt	Town	32
Lawrence	Town	19
Morrison	Town	15
New Denmark	Town	2
Pittsfield	Town	32
Rockland	Town	7
Scott	Town	500
Suamico	Town	257
Wrightstown	Town	27
Denmark	Village	39
Pulaski	Village	53
Wrightstown	Village	27
Total		7,778

PRINCIPAL SOURCES: Street and Avenue Guide of *Wright's Green Bay City Directory*, Wright Directory Company, St. Paul, Minnesota, 1972, in urban area; local officials in rural area.

NOTE: As listed here, a rental property is a property with at least one housing unit identified as rental. Properties that were listed in the 1972 *Wright's Green Bay City Directory* as "vacant," "under construction," and "no return," and lakefront properties that were thought to be seasonal were all conservatively included. As expected, many of these properties were later found not to be rental.

Table 5

DEFINITION OF PROPERTY RECORD SEARCH
STRATIFICATION VARIABLES

Variable		Values		
Symbol	Name	Symbol	Name	Source
D	Density	u	Urban	Phase I, Step 1
		r	Rural	
T_1^a	Tenure 1	r	Rental	Phase I, Step 2
		n	Nonrental	

^aThe subscript distinguishes this tenure variable from those defined in subsequent phases.

Definition of Stratification

The properties were stratified as indicated in Table 6. Properties with urban density and rental tenure were assigned a property record search stratum number 1. Those with rental tenure but with rural density were assigned to stratum 10. Among the nonrental properties, those in the urban area were assigned to stratum 12, those in the rural to stratum 15.

Table 6

DEFINITION OF PROPERTY RECORD SEARCH STRATIFICATION

Property Record Search Stratum Number	Description	Logical Definition
1	Urban, rental	$D = u, T_1 = r$
10	Rural, rental	$D = r, T_1 = r$
12	Urban, nonrental	$D = u, T_1 = n$
15	Rural, nonrental	$D = r, T_1 = n$

Stratification Assignments

The result of the stratification is shown in the third column of Table 7. About 6,300 urban and 1,400 rural rental properties, identified in Step 2, are assigned to the two rental strata. The remaining 37,000 urban and 17,000 rural properties are assigned to the two non-rental strata. The last two columns of the table are discussed below.

Table 7

PROPERTY RECORD SEARCH STRATIFICATION AND SAMPLE SELECTION

Property Record Search Stratum Number	Description	Population (properties)	Sampling Rate	Sample (properties)
1	Urban, rental	6,342	1.000	6,342
10	Rural, rental	1,436	1.000	1,436
12	Urban, nonrental	37,459	.103	3,841
15	Rural, nonrental	16,554	.237	3,916
	TOTAL	61,791	-	15,535

SOURCE: Tabulation by HASE staff of records of the Sample Selection Procedure Master File for Site I.

STEP 4: PROPERTY RECORD SEARCH SAMPLE

From the stratified population, the property record search sample, for which assessors' records are abstracted in Phase II, is selected. As discussed in the Introduction, the size of the sample selected is based on the target sample size for the screening survey, taking into account several such factors as nonparticipation in the allowance program by some jurisdictions and the aggregation of the property record search stratification. The size of the sample selected is the same as that shown in Table 2, col. (2).

The result of the sample selection is shown in the last column of Table 7. All rental properties in both the urban and rural areas were selected for property record abstraction. Among the nonrental properties, random samples of about 10 percent of the urban properties and 24 percent of the rural properties were selected. In total, 15,535 properties were selected in the property record search sample.

STEP 5: CONDITIONAL PROPERTY RECORD SEARCH SAMPLE

A few properties were identified as rental by various means after the completion of Step 2. Since all rental properties in the property record search sample were to be sampled, these properties, referred to as the *conditional property record search sample*,* were listed for record abstraction along with those discussed above. All but one was in the urban area. Eight were mobile home properties identified by a check on the licensing of such properties in the urban area.**

* Properties were included conditionally on being identified as rental.

** Each of the eight mobile home properties was identified as such, for Phase II.

III. PHASE II: SCREENING SURVEY SAMPLE SELECTION

The first phase of the sampling procedure used information collected on two stratification variables to select a sample of properties for which assessors' records were searched in this phase. Assessors' records provided information on number of housing units, value, and land use that was used to substratify properties. From the properties so stratified, a subsample was selected on which screening survey instruments were administered in the next phase.

In the first step of Phase II, property records were abstracted for all of the properties sampled in Phase I. This information, along with information collected previously, was then used to stratify the sampled properties. Urban rental properties were stratified according to number of housing units; nonrental properties were stratified as ownership and nonresidential, the ownership being substratified according to value. This stratification formed the basis for selecting a subsample of properties for the screening survey in the third step. Because a check with Census-based estimates revealed that many single-family rental properties had not been identified, special procedures were instituted in the final step to try to locate these properties. Properties identified as rental by this means were also administered the screening survey instrument.

STEP 1: PROPERTY RECORD SEARCH

One source used to obtain information on each of the properties selected in the last two steps of Phase I was the property record cards maintained by the county's 24 district assessors. The other source was the assessment rolls held by the County Assessor. These sources provided the values for several of the stratification variables, as well as information required for field operations. Table 8 lists the items abstracted from these sources.

Address of property and name of owner were obtained primarily for field operations. A sample property was identified in the sampling frame by its parcel number; but a property must have an address, or

Table 8
PROPERTY RECORD SEARCH ITEMS

Designator	Item	Codes	Code Names
AD	Address of property ^a	character string ^b	--
O	Name of owner	character string	--
U ₁	Number of housing units 1	numeric	--
MH	Mobile home property indicator	1 0	Mobile home property Not mobile home property
V _L	Assessed value of land	numeric e	-- Exempt
V _I	Assessed value of improvements	numeric e	-- Exempt
A	Acreage	numeric	--
FR	Frontage ^c	numeric	--
DP	Depth ^c	numeric	--
P	Parcel type	r c m a w f s cr mr ar wr fr sr	Residential Commercial Manufacturing Agriculture Wasteland Forest Swampland Commercial-Residential Manufacturing-Residential Agriculture-Residential Wasteland-Residential Forest-Residential Swampland-Residential
LD	Land use description ^d	character string	--

SOURCE: Property Record Search Form.

^a Address of property was collected in this step only for nonrental properties. For rental properties, the address had already been collected in Phase I, Step 2.

^b The term *character string* is used to denote a sequence of alphabetic and numeric characters.

^c Frontage and depth were obtained only when acreage was unavailable.

^d Land use description was collected only for urban properties.

set of addresses, to be located on site. Name of owner was used for rental properties to identify the person to whom the baseline landlord survey should be administered.* It was also used to verify the tenure of single-family urban rental properties.

The remaining items were used for stratification. The first of these is number of housing units. It was obtained from the property record cards and indicates the total number of housing units on the property, regardless of the number of buildings in which they might be located. The second item, also from the cards, indicates a mobile home property.

The assessed value of the property was recorded separately for the land and the improvements in the next two items obtained from the assessment rolls.** An "e" is used in both cases to indicate exemption from assessment. Acreage, frontage, and depth were used to adjust the assessed value of the land on some large parcels.

Parcel type is a variation on the parcel classification scheme used by the assessors, which categorized all properties as residential, commercial, manufacturing, agricultural, wasteland, forest, or swamp-land. Our classification scheme partitioned the last six categories according to the presence or absence of residential units. Properties with residential units were assigned a parcel type indicating both the assessors' classification and residential use; properties without residential units were assigned the assessors' designation. Among the properties that the assessors class as agricultural, those with residential units were classified agricultural-residential and those without simply agricultural. The large apartments considered commercial in the assessors' classification were classified as residential. The assessment rolls were used to determine the assessors' classification. The last item, land use description, was used in selecting the nonresidential properties for the baseline survey sample. In particular, it was used

* The response to Question 23 in the screening survey instrument was also used.

** On properties under construction, building permit data were used to estimate the assessed value of the improvements.

in determining the convertibility of improved nonresidential properties to residential use. It was collected only for properties in the urban area, since only urban properties were to be included in the nonresidential sample.

STEP 2: SCREENING SURVEY STRATIFICATION

Step 1 collected information for each of the properties in the property record search sample. Step 2 used that information to perform the *screening survey stratification*, which formed the basis for selection of the screening survey sample. Just as in Phase I, a set of variables on the properties was defined and then the stratification scheme was based upon these variables.*

Definitions of Stratification Variables

Table 9 defines the six variables on which the stratification is based. Each variable is defined on each property in the property record search sample.**

Density is defined to be identical to the property record search stratification variable of the same name, as listed in Table 5. Tenure 2 is an update to tenure 1, shown in the same table. Properties found in the property record search to have more than one housing unit, for example, were assigned a tenure of rental. Designating rooming houses, mobile home properties, and seasonal properties, *special land use type* is defined based on identifications of these types of properties made primarily in Phase I.

Number of housing units 1 was defined to be identical to the property record search item of the same name. Land use was defined to be residential if there was at least one housing unit and no commercial

* As will be discussed on p. 35, the stratification of the additional properties is not done on the basis of these variables.

** There are two exceptions: the additional properties, which are assigned to separate strata, and the properties that could not be assigned to any screening strata because of missing or incorrect information. See p. 35 for a discussion of the former and Appendix B for a discussion of the latter.

Table 9

DEFINITIONS OF SCREENING STRATIFICATION VARIABLES

Variable		Values			
Symbol	Name	Symbol	Name	Computational Form	Logical Condition
D	Density	u	Urban	--	(a)
		r	Rural	--	
T ₂	Tenure 2	r	Rental	--	(b)
		n	Nonrental	--	
ST	Special land use type	r	Rooming house	--	(c)
		m	Mobile home property	--	
		s	Seasonal property	--	
		n	No special land use	--	
U ₁	Number of housing units 1	numeric	-- --	--	(d)
L	Land use	r	Residential	--	(U ₁ ≠ 0) and (P=r, ar, wr, fr, or sr) ^e
		m	Mixed residential-nonresidential	--	
		n	Nonresidential	--	
V	Equalized assessed value	numeric	--	$f_j \left(\frac{V_L}{2A} + V_I \right)^f$	(P=ar, wr, fr, or sr), (A>.5), (V _L ≠ e), and (V _I ≠ e)
		e	Exempt	--	(V _L =e) or (V _I =e)
		numeric	--	$f_j (V_L + V_I)$	Otherwise

^aDensity was defined to be identical to the property record search stratification variable. The values assigned to it are those made in Table 5 for the later variable.

^bTenure 2 is a modification of the property record search stratification variable tenure 1. It was assigned as rental to all properties in the conditional property record search sample and for all properties for which the property record search item Number of housing units 1 was greater than one. It also incorporated other modifications to tenure 1 based on updates to the information on which tenure 1 was defined.

^cRooming house was assigned to properties identified as such in Phase I (see p. 18). Mobile home property was assigned to properties identified as such in Phase I in the City Directory (see footnote, p. 16), with the licensing check (see footnote p. 28), or in Phase II by the property record search (see p. 29). Seasonal property was assigned based on the seasonal sample selection procedure. (Most of those assigned this value were identified in Phase I.)

^dNumber of housing units 1 is identical to the property record search item of the same name.

^eP denotes the property record search item parcel type.

^f f_j is the equalization factor given in Table 10 for the political subdivision (the jth) in which the property is located. V_L and V_I denote the property record search items assessed value of land and assessed value of improvements, as described in Table 8. A denotes acreage, shown in the same table. Whenever acreage was not collected in the search, it was calculated from frontage (FR) and depth (DP) as $A = (FR \times DP) \div (43,560)$.

or manufacturing enterprise on the property. Agricultural property on which a residence is located was considered to be residential. A property was regarded as having a mixed residential-nonresidential land use if there were at least one housing unit *and* a commercial or manufacturing enterprise. A property was considered nonresidential if there were no housing units on the property; such properties may be improved or unimproved.

Equalized assessed value was defined as the sum of the assessed value of land and assessed value of improvement with two adjustments. For certain residential properties with extensive acreage, we included only the value of the land immediately associated with the improvements. For residential properties classed as agricultural, wasteland, forest, or swampland larger than one-half acre, we assigned the value of an average half-acre of land. The second adjustment was made to compensate for variations across political subdivisions in the county. A set of equalization factors, one for each subdivision, was used to make the adjustment. The factor for each subdivision was calculated as the ratio of the aggregate recommended full value to the aggregate assessment of all Class A residential properties located in that subdivision, as given in the *1972 Statistical Report of Property Values, Brown County, Wisconsin*, Bureau of Property Taxation, Wisconsin Department of Revenue. The factors are shown in Table 10. We used them not simply for Class A residential properties but for all properties. They were multiplied by the sum of the assessed value of land (in some cases adjusted) and the assessed value of improvements.

Definition of Stratification

The screening stratification is defined in Table 11 as a function of these screening stratification variables.*

The urban rental properties were assigned to screening stratum 1, 2, or 3 according to whether the number of units equaled one, two to four, or at least five. All rural rental properties were assigned to stratum 10.

*The stratification of the additional properties is not included here, but is discussed separately on p. 35.

Table 10

EQUALIZATION FACTORS FOR COMPUTATION
OF EQUALIZED ASSESSED VALUE

Political Subdivision ^a	Type of Political Subdivision	Equalization Factor ^b
Urban Area		
Green Bay	City	1.3232
De Pere	City	1.1086
Allouez	Town	1.1963
Ashwaubenon	Town	2.6928
(urban portion)		
Howard	Village	1.2101
Rural Area		
Ashwaubenon	Town	2.6928
(rural portion)		
Bellevue	Town	1.2756
De Pere	Town	2.5619
Eaton	Town	1.4471
Glenmore	Town	4.4707
Green Bay	Town	1.2155
Hobart	Town	2.0970
Holland	Town	3.0762
Humbolt	Town	2.7217
Lawrence	Town	1.0950
Morrison	Town	1.7643
New Denmark	Town	0.5784
Pittsfield	Town	3.5878
Rockland	Town	1.1523
Scott	Town	1.8582
Suamico	Town	1.9270
Wrightstown	Town	1.2081
Denmark	Village	4.6241
Pulaski	Village	1.2659
Wrightstown	Village	1.5561

SOURCE: 1972 Statistical Report of
Property Values, Brown County, Wisconsin,
Bureau of Property Taxation, Wisconsin, De-
partment of Revenue, p. 28.

^aPolitical subdivisions coincide with
assessment districts in Brown County.

^bThe equalization factor is defined, for
each political subdivision (assessment dis-
trict), to be the ratio of the aggregate rec-
ommended full value to the aggregate assess-
ment of all Class A residential properties in
that subdivision as given in the 1972 Statis-
tical Report of Property Values, Brown County
Wisconsin.

Table 11
DEFINITION OF SCREENING STRATIFICATION

Screening Stratum Number	Description	Logical Definition
1	Urban, rental, single-family	$L \neq n$, $ST = n$, $D = u$, $T_2 = r$, and $U_1 = 1$
2	Urban, rental, 2-4 units	$L \neq n$, $ST = n$, $D = u$, $T_2 = r$, and $2 \leq U_1 \leq 4$
3	Urban, rental, 5+ units	$L \neq n$, $ST = n$, $D = u$, $T_2 = r$, and $5 \leq U_1$
10	Rural, rental	$L \neq n$, $ST = n$, $D = r$, $T_2 = r$
12	Urban, ownership, first value quartile	$L = r$, $ST = n$, $D = u$, $T_2 = n$, and $0 \leq V \leq 13090$
13	Urban, ownership, second value quartile	$L = r$, $ST = n$, $D = u$, $T_2 = n$, and $13090 \leq V < 17864$
14	Urban, ownership, third and fourth value quartiles	$L = r$, $ST = n$, $D = u$, $T_2 = n$, and $17864 \leq V$
15	Rural, ownership, first and second value quartiles	$L = r$, $ST = n$, $D = r$, $T_2 = n$, and $0 \leq V < 17864$
16	Rural, ownership, third and fourth value quartiles	$L = r$, $ST = n$, $D = r$, $T_2 = n$, and $17864 \leq V$
17	Rooming houses	$L \neq r$ and $ST = r$
18	Mobile home properties	$L \neq n$ and $ST = m$
19	Seasonal properties	$L \neq n$ and $ST = s$
20	Mixed residential-nonresidential, urban ownership	$L = m$, $ST = n$, $D = u$, and $T_2 = n$
21	Mixed residential-nonresidential, rural ownership	$L = m$, $ST = n$, $D = r$, and $T_2 = n$
23	Urban, additional	(a)
24	Rural, additional, residential	(a)
26	Urban, nonresidential	$L = n$ and $D = u$
27	Rural, nonresidential	$L = n$ and $D = r$
28	Rural, additional, non-residential	(a)

^aSee p. 35 for a description of the stratification of the *additional* properties.

The ownership property assignments were based upon equalized assessed value and, in particular, upon the quartile into which this value fell. The quartiles were estimated with the data collected in the property record search to be as follows:*

first quartile: \$0 to \$13,090
second quartile: \$13,090 to \$17,864
third quartile: \$17,864 to \$23,280
fourth quartile: \$23,280 and over

The urban ownership properties were placed in stratum 12, 13, or 14 according to whether the equalized assessed value fell in the first, second, or third or fourth quartile. The assignment of rural properties was to stratum 15 or 16 depending on whether the value fell below or above the median value of \$17,864.

Special land use properties were assigned to stratum 17, 18, or 19 depending on use.

Ownership properties with mixed residential-nonresidential land use were divided between strata 20 and 21 according to rural or urban density. The stratification of these properties by value was postponed until the value of the *residential* portion could be determined by screening survey data. Since value plays no part in the screening stratification of properties with rental tenure, rental properties with mixed use were not included in stratum 20 or 21, but simply assigned along with purely residential rental properties to stratum 1, 2, 3, or 10. Urban properties for which the land use was indicated to be nonresidential were assigned to stratum 26, rural properties to stratum 27.

* The quartiles were estimated based upon those properties with abstracted records in the property record search sample for which $(T_2 = n)$, $(U_1 \geq 1)$ and $(P = r \text{ or } ar)$ and for which neither the assessed value of land nor the assessed value of improvements was exempt or estimated with building permit data.

Definition of Stratification for Additional Properties

Slightly less than 1000 properties assigned to rental property record search strata 1 and 10 were found to be nonrental during or after the property record search. Because the search was not completed on all these properties, they were assigned to one of three strata created specifically for these *additional* properties.

About half of the properties are urban. Most were determined to be nonrental by means of an address check on single-family properties. The property record search yielded the address of the property and the name of the owner. By comparing the address with the address of the owner from the phone book, we determined whether the owner resided on the property. Other urban properties were determined to be nonrental by a variety of sources. All additional urban properties were considered residential and were assigned to stratum 23.

Half of the additional properties were rural. Almost all were listed in Phase I as seasonal and included in the rental list. In checking the assessed value in Phase II, we found that almost 500 of these were without improvements. These nonresidential properties were assigned to stratum 28. By various means, a few other properties in the rural area were also determined to be nonrental. These were, however, still considered to be residential and were assigned to stratum 24.

Stratification Assignments

Table 12 displays the outcome of the stratification. A total of 15,546 properties were stratified. More than 11,000 were residential properties containing almost 20,000 housing units. More than 6,000 properties were rental and contained almost 14,000 housing units. Less than 400 of these properties are rural. About 4,000 properties were stratified as ownership, 65 percent of which were urban.

STEP 3: SCREENING SURVEY SAMPLE

The screening stratification of properties in the last step was the basis from which we selected the *screening survey sample*. Unlike the property record search sample, which is a sample only of properties,

Table 12

SCREENING SURVEY STRATIFICATION AND SAMPLE SELECTION

Screening Stratum Number	Description	Estimated Total Population		Screening Stratum Assignments		Effective Property Sampling Rate	Screening Survey Sample	
		Properties	Housing Units	Properties	Housing Units		Properties	Housing Units ^d
	<i>Single Properties by Density and Size</i>							
1	Urban, single-family	2,018	2,018	2,012	2,012	.997	2,012	2,012
2	Urban, 2-4 units	3,886	8,741	3,572	8,035	.418	1,624	3,664
3	Urban, 5+ units	264	3,615	249	3,410	.943	249	1,797
10	Rural	450	646	376	540	.836	376	540
	<i>Ownership Properties by Density and Value Quartile</i>							
12	Urban, first quartile	5,488	5,488	562	562	.080	438	438
13	Urban, second quartile	6,943	6,943	711	711	.080	552	552
14	Urban, third and fourth quartiles	13,125	13,125	1,344	1,344	.015	191	191
15	Rural, first and second quartiles	3,336	3,336	787	787	.082	275	275
16	Rural, third and fourth quartiles	2,738	2,738	646	646	.050	136	136
	<i>Other Residential Properties</i>							
17	Rooming houses	66	66 ⁱ	66	66 ⁱ	1.000	66	66 ⁱ
18	Mobile home properties	39	759	19	737	.487	19	90
19	Seasonal properties	644	644	612	612	.000	0	0
	<i>Mixed Residential-Nonresidential Ownership Properties by Density</i>							
20	Urban	137	137	14	14	.088	12	12
21	Rural	187	187	44	44	.091	17	17
	<i>Additional Residential Properties</i>							
23	Urban	497	(c)	496	(c)	.101	50	(c)
24	Rural	23	(c)	23	(c)	.087	2	(c)
	<i>Nonresidential Properties</i>							
26	Urban	11,368	0	1,163	0	.000	0	0
27	Rural	10,123	0	2,393	0	.000	0	0
28	Additional rural	457	0	457	0	.000	0	0
	TOTAL RESIDENTIAL	39,841	48,443 ^d	11,533	19,520 ^d	--	6,019	9,790 ^d
	TOTAL NONRESIDENTIAL	21,948	0	4,013	0	--	0	0
	GRAND TOTAL	61,789	48,443 ^d	15,546	19,520 ^d	--	6,019	9,790 ^d

SOURCE: Tabulation of records of the Sample Selection Procedure Master File for Site I and estimation by HASE staff.

^a This is the number of sampled housing units, as distinguished from the number of housing units on sampled properties. The sampled housing units include at most eight units from any single property.

^b Though rooming houses may have multiple housing units, each is treated here as having only one unit, inasmuch as only a single screening survey instrument was administered to each.

^c The number of units was unknown for the additional residential properties at this point in the sample selection procedure.

^d This figure includes only one unit for each rooming house and no units for additional residential properties.

the screening sample consists of samples of both properties and housing units, the sampled housing units being located on the sampled properties. In Phase III, the sampled housing units were administered the screening survey instrument to obtain information concerning the sampled properties on which they are located. The information was used in that phase to further stratify these properties.

Sampling Method

The properties were selected as a stratified random sample, a simple random sample being selected from the properties assigned to each screening stratum.* The selection of these properties constitutes the first of two stages in the selection of the sample housing units as a stratified cluster sample.

In any cluster sampling procedure, the first stage draws a sample of clusters and the second selects a sample of elements from within each sampled cluster. In this case, properties were treated as clusters of housing units. The first stage drew a sample of properties and the second stage selected a sample of the housing units located on each of these properties.

The selection of housing units within each sampled property was accomplished by simple random sampling. All housing units were sampled on properties with no more than eight units, and from a field list of the housing units on each of the properties with more than eight units we selected a simple random sample of eight units.

Sample Sizes

We determined the number of properties to be sampled in each stratum by comparing the estimated numbers required to meet target sample sizes for the baseline survey samples and the number of properties actually assigned to screening survey strata. As discussed in the Introduction, the former allow for nonresponse of tenants in the screening

* Because the screening stratification is not a perfect substratification of the property record search stratification, the sample obtained was an imperfect stratified random sample.

survey, misclassification of properties, and the greater aggregation of screening strata than baseline strata. They are shown in Table 2 under "Screening Survey Sample." The numbers of properties assigned to screening strata are shown in Table 12 under "Screening Stratum Assignments." The number of properties selected was basically the minimum of the two. The principal exception was for the stratum of urban rental properties with five or more units in which more properties were identified with the selection procedure than had been estimated to exist with 1970 Census data. The figure in Table 2 was constrained by this estimate. Consequently, all of the identified properties were sampled.

Sample Selection

The results of the sample selection are shown in Table 12. The *effective sampling rate* was defined as the ratio of the number of properties sampled to the number of properties estimated for the population.

A total of 6,019 properties and 9,790 housing units were selected. More than 8,000 of the housing units are on about 4,300 rental properties. In the urban area, all single-family rental properties were selected. About half of the properties with two to four units, and all of the units on these properties, were sampled. All properties with at least five units were sampled, with no more than eight units sampled on any. We sampled all rural rental properties and all units on these properties were selected.

Among ownership properties, we selected about 1,200 urban and 400 rural properties and a corresponding number of housing units.

All properties classed as rooming houses were chosen for the screening survey sample; each was treated as a single housing unit, though presumably some contain numerous units.* All properties occupied by mobile homes, and all housing units on these properties up to a maximum of eight were sampled. No properties classed as seasonal were

* For rooming houses, a single screening survey instrument was administered to someone responsible for the property.

selected for the screening sample. We chose 29 ownership properties with mixed residential-nonresidential use.

Among the additional residential properties, 50 were selected in the urban area and two in the rural.* Being unsure as to the number of units on these properties, we took the screening survey instrument into the field and administered it to all housing units, up to a maximum of eight, on each property.

No nonresidential properties were selected in the screening survey sample.

STEP 4: CONDITIONAL SCREENING SURVEY SAMPLE

After completing the screening stratification in Step 2, we performed a validation check of the sample selection procedure. The numbers of properties assigned to the rental and ownership strata were compared with corresponding population estimates based on 1970 Census data.**

For urban multiple-unit rental strata and for ownership strata, the procedure appeared to have worked well. However, in the urban single-family rental stratum, 2012 properties were located with the procedure whereas estimates for 1970 with Census data indicated 2592; and the procedure found only 376 rural single-family rental properties, whereas the Census estimate for 1970 was 985. In short, we apparently failed to identify on the order of 600, mostly single-family, rental properties in each area.

We thus instituted special procedures in both areas in an attempt to locate as many of the unidentified rental properties as possible. The properties thus obtained and the housing units*** on these properties were designated the conditional screening survey sample.****

* The property record search was completed on all sampled additional properties and the information was used in the post-screening stratification.

** See Appendix C for the complete comparison.

*** Up to a maximum of eight.

**** The property record search was completed on all properties in the conditional screening survey sample, the information obtained to be used in the post-screening stratification.

Urban Area Procedure

A comparison by political subdivision of properties identified with the sample selection procedure and Census estimates showed that the problem in the urban area was confined almost entirely to the city of Green Bay and the village of Howard: We apparently had failed to identify some 500 out of about 2,000 rental properties in the former and another 50 out of about 130 in the latter.

Because one of the data elements required was not available for Howard, the procedure below was applied only to the city of Green Bay.

The 29,000 parcel records for Green Bay in the Addressograph listing from the County Tax Listing Service Office used in Phase I, Step 1 was winnowed in a series of steps until we obtained a list of previously unidentified rental properties.* The first step eliminated all properties currently identified as rental; all properties with screening stratification numbers equal to 1, 2, or 3 were dropped regardless of whether they had been selected for screening. Next, all properties selected in the screening survey sample were excluded. Any of these properties that were rental would be identified as such by means of the screening survey instrument.

In the third step, the County Tax Listing Service Office List and the "Street and Avenue Guide" of the City Directory were used to eliminate residential ownership and commercial properties. The County Office list indicates for each parcel in Green Bay the parcel number, the owner, the address of the parcel, and the legal description. The "Street and Avenue Guide" gives, for each listed address, the name of the occupants, the phone number, and, if appropriate, an indication of homeownership.** Addresses were used to link the two sources. The name of the owner as given in the County Office list was compared with the name of the occupants as given in the Guide. A match presumably indicates a homeowner. Matching records were deleted. Properties for

* Although the procedure was intended primarily to identify single-family properties, some properties with multiple units were also identified.

** This is the homeownership symbol used to determine tenure in Phase I, Step 2.

which no address was given on the County Office list, and consequently for which no name comparison could be made, were retained, even though most were thought to be unimproved. In this manner, the list of "potential" rentals was winnowed to about 5,200 properties, about half of which were without an address.

The assessment rolls were then used to further cull the list. Properties with zero-valued improvements and properties indicated as having a commercial land use were all deleted. More than 60 percent of the properties were eliminated in this manner; only about 1,900 properties remained.

The final step of the procedure was a field tenure determination. We attempted to administer question 14 of the screening survey instrument to the occupants of housing units on the 1,900 properties. Sometimes no units were found, the property having only commercial improvements or no improvements whatsoever. All such properties were deleted. When a single unit was found, the occupants were asked if their unit was (1) owned or being bought by someone who lived in the household, (2) rented from someone who was not in the household, or (3) occupied rent free. Properties for which the first response was received were deleted as ownership; those for which the second or third response was received were retained as rental. If the occupants refused to respond, the property was deleted. Properties with a single vacant unit were also deleted, unless a specific indication was obtained that the unit was rental. Whenever multiple units were found on a property the property was retained as rental.

The 211 properties that were retained and the housing units^{*} on them constitute the urban conditional screening survey sample. Unfortunately, only 89 of these were single-family rentals; 111 had two to four units, and 10 had five or more units. The sample also included one rooming house.

^{*} Up to a maximum of eight.

Rural Area Procedure

The method used to try to locate the unidentified rental properties in the rural area was a refinement of the original procedure used to identify these properties. The primary source of information, the local assessors and clerks, was the same in both instances.

This procedure began with a list of the almost 18,000 rural parcels. The first step deleted properties selected in the screening survey sample.* Again, any of these properties that were rental would be identified as such with the screening survey instrument. A check of the assessment rolls was made in the second step. Properties found to have no improvements were deleted. Each of the remaining properties was discussed with an official from the jurisdiction in which the property is located. Those determined not to be rental were deleted.

The final step of this procedure was also a field tenure determination. In the rural areas, the field tenure determination was a verification of rental tenure. The rules used in the urban area governing the deletion of properties on the basis of field determinations were reapplied in the rural procedure.

The properties remaining after these steps and the housing units on these properties** constituted the rural conditional screening survey sample, containing 179 properties, 21 of which were mobile home properties.

* In the rural area, there was no need for a separate step deleting rental properties because all rental properties were included in the screening survey sample.

** Up to eight units.

IV. PHASE III: BASELINE SURVEY SAMPLE SELECTION

The third phase of the sample selection procedure repeated the pattern of the earlier phases: collect information, stratify properties, and select a sample. A screening survey instrument was administered to each of the housing units selected in the last phase. It gathered update information on tenure and number of housing units, and captured the first information on rent. Rent was advantageously obtained in this late phase because of the expense involved in collecting it. Properties on which these housing units were located were again stratified, and subsamples of properties and housing units to be administered the baseline survey instruments were selected.

The screening survey was fielded in the first step of this phase. On each housing unit selected in the screening survey sample and the conditional screening survey sample, the survey instrument collected both update and new information. The former was used in the second step to perform a restratification called the post-screening stratification. Revised data on tenure and number of units were used to reassign properties to strata similar to the screening strata. Because this restratification resulted in differences in selection probabilities among properties within the new strata, a sample correction was performed to reduce these differences. The new information was used in the baseline survey stratification of the fourth step to substratify properties on the basis of mean gross rent. In the final step, the baseline survey sample was selected.

STEP 1: SCREENING SURVEY

The screening survey collected data for several purposes: (1) to establish standards for the Housing Allowance Program, (2) to estimate the number of households eligible for assistance, (3) to facilitate administration of the baseline survey, and (4) to select the baseline survey sample. Insofar as it served this last purpose, the screening survey was a step of the sample selection process.

The screening survey updated previously obtained information on housing tenure and size on the basis of which significant numbers of

properties were restratified. It also obtained the first information on rent, which provided the basis for substratifying all rental properties.

Administration of Instruments

The survey sample for the screening survey consisted of the set of housing units selected in Phase II in both the screening survey sample and the conditional screening survey sample.* A screening survey instrument was administered to the household residing in each of these units, whenever possible. If a unit was found to be unoccupied, a vacancy report form was completed instead. If the occupants of a unit refused to respond, a refusal form was completed. A retired form was completed on all other units for which a screening survey instrument was not completed. Table 13 summarizes the record completions for housing units in the screening survey. The screening survey instrument was completed on 80 percent of the units.

Retired Forms

A detailing of those housing units with retired forms** is shown in Table 14. There were three general categories of housing units: (1) those eligible for the residential baseline survey sample, (2) those eligible for the nonresidential baseline survey sample, and (3) those ineligible for either. The first included "housing units" on which we were unable to complete a screening survey instrument but believed we could complete a baseline tenant/homeowner instrument.*** The second consisted of "housing units" on properties that were found to be

* Additional housing units were occasionally found on a property in the screening survey. When the total number of units on the property was no more than eight, all of these units were included in the sample. When the total exceeded eight, a sample of eight units was selected for inclusion.

** Some of these were found not to be housing units at all. For convenience, we nevertheless continue to refer to these elements as "housing units."

*** In addition, that category included housing units on properties determined to be seasonal, which are eligible for the seasonal baseline sample.

Table 13

HOUSING UNIT RECORD COMPLETIONS IN THE
SCREENING SURVEY BY TYPE OF RECORD

Type of Record	Housing Unit Records	
	Number	Percent
Screening survey instruments	8,578	79.7
Vacancy report forms	452	4.2
Refusal forms	573	5.3
Retired forms	1,150	10.7
Total	10,753	100.0

SOURCE: Tabulation by HASE staff of records of the Screening Survey for Site I.

NOTE: The figures shown include completions obtained on housing units in the screening survey sample and the conditional screening survey sample and on sampled additional housing units.

nonresidential, either improved or unimproved.* The third category was composed of "housing units" that were not then residential units and housing units that could not be located.

Almost 75 percent of the 1150 retired units were eligible for the residential baseline sample. Of these, 80 percent were retired because no contact had been made after four attempts. An additional 8 percent were retired because the units were still under construction. Only 9 percent of the retired units were retired as eligible for the nonresidential baseline survey sample, including 15 units of institutional housing and nine units of subsidized housing. The two most frequent retirement codes in this category are nonresidential land use and demolished, each about 37 percent. Of all retired units 17 percent were ineligible for either the residential or nonresidential baseline samples;

* Additionally, that category included institutional and subsidized housing, which we chose not to include in the residential baseline survey sample.

Table 14

HOUSING UNITS RETIRED IN SCREENING SURVEY BY RETIREMENT CODE

Retirement Code	Reason for Retirement	Number of Housing Units ^a
Housing units eligible for residential baseline survey sample		852
100	Resolvable administrative problem	9
101	Under construction	65
102	Resolvable address error	19
103	Vacation	2
104	Respondent claims previously interviewed	20
105	Lost screening survey instrument label	1
106	Insufficient time	3
107	No contact after four attempts	681
108	Seasonal property	7
109	Incorrect unit decrease ^b	1
110	Error discovered too late to interview	18
111	Rooming house, no responsible person available	5
112	Vacant, vacancy report omitted	1
113	Hostility	6
114	Illness or senility	12
115	Language barrier	2
Housing units eligible for nonresidential baseline survey sample ^c		105
200	Institutional housing	15
201	Subsidized housing	9
202	Nonresidential land use	39
203	Condemned	1
204	Government-owned	1
205	Mobile home moved	1
206	Demolished	39
Housing units ineligible for baseline survey sample ^d		193
305	Unresolvable address error	25
306	Unit decrease ^b	156
310	Unit nonresidential ^e	11
311	Unit demolished ^f	1
Total		1150

SOURCE: Tabulations by HASE staff of records of the screening survey for Site 1.

^aFor convenience, the term *housing units* refers to all screening survey sample elements, even though some elements were found not to be housing units.

^bA *unit decrease* occurred when the number of units on a sample property was found with the screening survey to be lower than the number obtained with the on-site data collection. In almost all such instances, the screening survey figure was deemed correct and the nonexistent housing units were retired with Code 306. In the single instance in which the discrepancy was resolved in favor of the on-site data collection figure, the unit involved was retired as an *incorrect unit decrease* with Code 109 and became eligible for selection in the baseline sample.

^cThe term *nonresidential* includes institutional and subsidized housing, which, though they are residential, were not eligible for the baseline sample.

^dCodes 300 to 304 and 307 to 309 are now obsolete.

^eA unit was retired if the housing unit was nonresidential but there were other residential units on the property.

^fA housing unit was retired if the unit had been demolished but other residential units remained on the property.

25 units were unresolvable address errors, and the remaining 168 were non-existent residential units.

Data Collected

Two types of information were collected in the screening survey for the baseline survey sample: (1) data to verify and update information obtained previously from other sources and (2) data unobtainable except with a field survey. The first type was used in Step 2 for the post-screening stratification; the second was used in Step 4 for the baseline survey stratification.* The specific items in the screening survey used to define the variables for the post-screening stratification and baseline survey stratification are shown in Tables 15 and 16. T 15 16

Like the screening survey stratification variables, both the post-screening and baseline survey stratification variables are defined on properties, not housing units. The definitions of these variables were made according to the record completions obtained for the housing units on the property and were based entirely on screening survey instruments, so long as at least one instrument was completed on the property. The definitions were based upon vacancy report forms, if at least one such form, but no screening survey instruments, were completed. For properties on which neither screening instruments nor vacancy report forms were completed, the definitions are based on previous information, and in some cases, on retired forms. The items in Tables 15 and 16 used to define the post-screening and baseline survey stratification variables are listed according to these three categories of record completions.

The class of respondents to each item is indicated in both tables. Table 15 shows the variable derived from the screening survey item, along with the corresponding variable name. These are omitted in Table 16 since all items are used to define mean gross rent.

* A minor exception is question 75 of the screening survey instrument, which is of the second type but was used in the post-screening stratification.

Table 15

SCREENING SURVEY ITEMS USED TO DEFINE POST-SCREENING STRATIFICATION VARIABLES

Item Designator	Item	Class of Respondents	Variables	Variable Names
Items for Properties with Completed Screening Survey Instruments				
L15 ^a	NUMBER OF HOUSING UNITS ON PROPERTY:-----	All housing units	U ₂	Number of Housing Units 2
Q1 ^b	Is this your usual year-round residence? YES.....1 NO.....2	All households	SP	Seasonal Property Indicator
Q2	How many months out of the year do you usually live in this (house/apartment/mobile home)? NUMBER OF MONTHS: _____	Households for which unit is not usual year-round residence	SP	Seasonal Property Indicator
Q3	CIRCLE ONE: UNIT IS MOBILE HOME OR TRAILER..... 1 OTHER..... 2	All households	MH	Mobile Home Property Indicator
Q5	Is this (house/apartment) government subsidized housing? YES.....1 NO.....2	Households not in mobile homes	SH	Subsidized Housing Indicator
Q6	Is the land your mobile home is on: owned or being bought by someone who lives in the household..... 1 rented from someone who is not in this household, or 2 occupied rent free?..... 3	Households in mobile homes	T ₃	Tenure 3
Q14	Is your (house/apartment)? owned or being bought by someone who lives in this household 1 rented from someone who is not in this household 2 occupied rent free 3 A ROOMING HOUSE 4 HOUSEHOLD MEMBER ASSUMES OWNERSHIP; TITLE HELD BY PERSON(S) OUTSIDE OF HOUSEHOLD OR IN PROBATE..... 6	Households not in	T ₃	Tenure 3
			RH	Rooming House Indicator
Q75	WHAT PORTION OF THE SPACE IN THIS BUILDING IS FOR RESIDENTIAL USE? UP TO 1/4 1 1/4 TO 1/2 2 1/2 TO 3/4 3 3/4 OR MORE 4	Households on	V _R	Residential Equalized Assessed Value
Items for Properties with Completed Vacancy Report Forms but Without Completed Screening Survey Instruments				
L15	NUMBER OF HOUSING UNITS ON PROPERTY:-----	All housing units	U ₂	Number of Housing Units 2
QV3 ^c	CHECK ONE OF THE FOLLOWING ON THE BASIS OF INFORMATION YOU GATHERED NOT AVAILABLE FOR SALE OR RENT..... 1 AVAILABLE FOR RENT ONLY 2 AVAILABLE FOR SALE ONLY 3 AVAILABLE FOR SALE OR RENT 4 RENTED, AWAITING OCCUPANCY 5 SOLD, AWAITING OCCUPANCY 6 UNKNOWN 7	Unoccupied housing units	T ₃	Tenure 3
Items for Properties with Neither Completed Screening Instruments nor Completed Vacancy Report Forms				
L15	NUMBER OF HOUSING UNITS ON PROPERTY:-----	All housing units	U ₂	Number of Housing Units 2
RC	RETIRED CODE. ^d (A retired code of 108 indicates "seasonal property"; a retired code of 111 indicates "rooming house, no responsible person available"; retired codes in the range 200 to 299 indicate "nonresidential property.")	All housing units retired from the screening survey	SP	Seasonal Property Indicator
			RH	Rooming House Indicator
			NP	Nonresidential Property Indicator

SOURCE: Screening survey instrument, vacancy report form, and retired form.

^aL_j denotes the jth position of the Screening survey label.

^bQ_j denotes the jth question of the Screening survey instrument.

^cQV_j denotes the jth question of the vacancy report form.

^d.....

Table 16

SCREENING SURVEY ITEMS USED TO DEFINE MEAN GROSS RENT

Item Designator	Item	Class of Respondents
Items for Properties with Completed Screening Survey Instruments ²		
Q4 ^b	How many housing units are there in this building? DON'T KNOW.....999	Households not in mobile homes
Q14	Is your (house/apartment): owned or being bought by someone who lives in this household..... 1 rented from someone who is not in this household..... 2 occupied rent free..... 3 A ROOMING HOUSE..... 4 HOUSEHOLD MEMBER ASSUMES OWNERSHIP; TITLE HELD BY PERSON(S) OUTSIDE OF HOUSEHOLD	Households not in mobile homes
Q15	Is rent for this (house/apartment/mobile home itself) paid by the week, month, year, or what? WEEK..... 1 EVERY TWO WEEKS..... 2 TWICE A MONTH..... 3 MONTH..... 4 YEAR..... 5 OTHER..... 8 SPECIFY: _____	Households paying rent for home
Q16	How much is the rent per (PERIOD FROM Q15)? Please tell me the <u>total amount</u> paid the landlord for this (house/apartment/mobile home itself, not including the space), including anything the landlord charges for furnishings and kitchen appliances. \$ _____	Households paying rent for home
Q18	Is this the full rent that would usually be charged by the landlord for this (house/apartment/mobile home) or does your household get a rent reduction? FULL RENT..... 1 RENT REDUCTION..... 2	Households paying rent for home
Q19A Q19B Q19C	What is the <u>full rent</u> the landlord would usually charge on this (house/apartment/mobile home)? (IF DON'T KNOW, PROBE:) What would you estimate the monthly rent for this (house/apartment/mobile home) would be?) How often would that be paid? ACTUAL \$--- OR ESTIMATE \$--- PER: WEEK..... 1 EVERY TWO WEEKS..... 2 TWICE A MONTH..... 3 MONTH..... 4 YEAR..... 5 OTHER..... 8 SPECIFY: _____	Households with rent reduction for home or occupying home rent free
Q20	Is this (house/apartment/mobile home) (rented/ provided) as a furnished (house/apartment/mobile home), <u>not</u> counting a stove or a refrigerator? IF ONLY A STOVE AND/OR REFRIGERATOR ARE FURNISHED, CODE "NO." YES..... 1 NO..... 2	Households paying rent for home or occupying home rent free

Footnotes at end of table.

Table 16--continued

Item Designator	Item	Class of Respondents
	(In addition to the amount you pay for rent) do you pay extra for:	Households paying rent for home or occupying rent free
	YES NO	
Q21A2	Electricity..... 1 2	
Q21B2	Water..... 1 2	
Q21C2	Gas..... 1 2	
Q21D2	Oil..... 1 2	
Q21E2	Kerosene..... 1 2	
Q21F2	Coal..... 1 2	
Q21G2	Other..... 1 2	
Q43	How many of the rooms have at least one window that can be opened or skylight that can be opened? NUMBER: - -	All households
Q7	Is rent on this mobile home space paid by the week, month, year, or what? WEEK..... 1 EVERY TWO WEEKS..... 2 TWICE A MONTH..... 3 MONTH..... 4 YEAR..... 5 OTHER..... 8 SPECIFY: _____	Households in mobile homes paying rent for land
Q8	How much is the rent per (PERIOD FROM Q.7)? Please tell me only the amount paid the owner for the mobile home space. Do not include any rent paid for the mobile home itself. (IF RESPONDENT RENTS BOTH MOBILE HOME AND SPACE FROM SAME LANDLORD FOR ONE SUM, PROBE: How much of that rent is for the space itself?) \$---	Households in mobile homes paying rent for land
Q10	Is this the full rent that would usually be charged by the owner for this mobile home space or does your household get a rent reduction or discount? FULL RENT..... 1 RENT REDUCTION..... 2	Households in mobile homes paying rent for land
Q11A	What is the full rent the owner would usually charge for this space? (If don't know, probe: What would you estimate the total monthly rent for this space would be?) How often would that be paid? ACTUAL \$---	Households in mobile homes with rent reduction on land or occupying land rent free
Q11B	OR ESTIMATE \$---	
Q11C	PER: WEEK..... 1 EVERY TWO WEEKS..... 2 TWICE A MONTH..... 3 MONTH..... 4 YEAR..... 5 OTHER..... 8 SPECIFY: _____	

Footnotes at end of table.

Table 16--continued

Item Designator	Item	Class of Respondents
Items for Properties with Completed Vacancy Report Forms but Without Completed Screening Survey Instruments ^c		
QV5 ^d	Is rent for that (house/apartment/mobile home space) paid by the week, month, year or what? WEEK.....1 EVERY TWO WEEKS.....2 TWICE A MONTH.....3 MONTH.....4 YEAR.....5 OTHER.....8 SPECIFY: _____ DON'T KNOW.....9	Unoccupied housing units
QV6	How much is the rent per (PERIOD FROM Q5)? (What is the <u>total amount</u> paid the landlord for this (house/apartment/mobile home space), including anything the landlord charges for furnishings and kitchen appliances.) \$--- DON'T KNOW..... 999	Unoccupied housing units
QV7	Does the rent of (AMOUNT IN Q6) include utilities? YES.....1 NO.....2 DON'T KNOW.....9	Unoccupied housing units
Items for Properties with Neither Completed Screening Survey Instruments nor Completed Vacancy Report Forms		
	None	

SOURCE: Screening survey instrument and vacancy report forms.

^aFor the purpose of calculating the *baseline* survey stratification variables, a complete Screening Instrument is considered to be an Instrument for which $R_G \neq b$, where R_G is defined in Tables 25 and 26.

^b Q_j denotes the j th question of the screening survey instrument.

^cFor the purpose of calculating the *baseline* survey stratification variables, a completed vacancy report form is considered to be a form for which $R_G \neq b$, where R_G is as defined in Table 27.

^d QV_j denotes the j th question of the vacancy report form.

Items For Post-Screening Stratification Variables

In Table 15, there are eight items used to define the post-screening stratification variables for properties with completed screening survey instruments. The most important are Q14 and Q6, which were used to verify the tenure of each property. As will be seen in Step 3, a substantial number of properties were updated on the basis of these items. Item L15, number of housing units, is used to update the number of housing units as obtained in the property record search. For properties with both residential and commercial use, item Q75 obtained the proportion of space for residential use, which was used subsequently to define a *residential* equalized assessed value. Other items were used to verify and update earlier information indicating subsidized housing, rooming houses, mobile home properties, and seasonal properties.

For properties with vacancy report forms, but no screening survey instruments, there are only two items used in defining the post-screening stratification variables. The first updates the number of housing units on the property; the second, the tenure of the property.

For properties with neither screening survey instruments nor vacancy report forms completed, there are only two items. One is L15, which again updates the number of housing units on the property. The other is the retired code; it indicates seasonal properties, rooming houses, and nonresidential properties.

Items For Baseline Survey Stratification Variables

The screening survey items listed in Table 16 were all used in defining the baseline survey stratification variable mean gross rent for a property. It was computed as an average of the gross rent of the housing units on the property.

For non-mobile home units with completed screening survey instruments, gross rent was defined as a function of the payments per month, the contract rent, and utility adjustment. The definition of gross rent for mobile-home units was similar except that the computations for the mobile home itself and for the land on which it is situated were made separately. Items Q14, Q15, Q18, and Q19C were used to define the payments per month and items Q14, Q16, Q18, and Q19B were used

to define the contract rent for non-mobile home units. On mobile home units, the same items were employed with Q12 used in lieu of Q14 for the home itself. Items Q6, Q7, Q10, and Q11C and items Q6, Q8, Q10, Q11A, and Q11B were used to define the payments per month and the contract rent for the land on which mobile home units are situated. Items Q4, Q21A2 through Q21G2, and Q43 were used in defining the utility adjustment for all units.

For properties with vacancy report forms but without screening survey instruments, gross rent is defined as a function of three items. Q_V5 is used to define the payments per month, Q_V6 the contract rent, and Q_V7 the utility adjustment.

For properties with neither screening survey instruments nor vacancy report forms, there are no items that can be used to define the gross rent of any housing unit.

STEP 2: POST-SCREENING STRATIFICATION

The data collected in the last step to verify and update earlier information were used in this step to perform a restratification, which we termed the post-screening stratification of properties in the screening survey sample and the conditional screening survey sample.

This stratification was defined by a set of nine variables, each being defined on the properties in these samples.* The definitions, made according to the record completions obtained on the properties in the screening survey, were based upon completed screening survey instruments whenever possible. When no instruments were completed, the definitions were instead based upon any completed vacancy report forms. When neither screening survey instruments nor vacancy report forms were completed, the definitions were based on previous information and, in some cases, on the retired form. The definitions for these three classes of record completions are given in Tables 17, 18, and 19. The screening survey items used in these definitions are those listed in the corresponding sections of Table 15.

*There are, however, 41 properties in the screening survey sample on which these variables are not defined and which, consequently, are not assigned to post-screening strata. See Appendix D for a discussion of these properties.

Definitions of Stratification Variables for Properties with Screening Survey Instruments

Table 17 defines the variables for properties with completed screening survey instruments. Density is taken here to be identical to the property record search stratification variable of the same name. Number of housing units 2 was taken to be the number of housing units as indicated on the screening survey label.

The rooming house indicator designated a rooming house whenever Q14 in the screening survey instrument so specified. The mobile home property indicator designated a mobile home property whenever at least three-quarters of the units with completed screening instruments on the property were indicated by Q3 as being mobile homes. The seasonal property indicator designated a seasonal property whenever, for all units with completed screening survey instruments, Q1 and Q2 indicated that the household lived in the unit less than half of the year. The special land use indicator designated special land use if the property was a rooming house, a mobile home property, or a seasonal property.

Tenure 3 updated the previous information on the property's tenure and was used directly in defining the stratification. It was defined to be ownership if, for each unit on the property, Q14 indicated that a household member owned, was buying, or assumed ownership. Whenever at least one unit was rented or occupied rent free, the property was considered rental. For all properties with a special land use, however, the tenure was considered to be undefined.

Residential equalized assessed value provided a measure of the value of the residential portion of ownership properties in order to stratify them. For ownership properties with mixed residential-non-residential use, its definition incorporated the portion of the space in buildings devoted to residential use as obtained with Q75.* For such properties, it was defined to equal 12.5 percent of equalized assessed value if the portion devoted to residential use was between zero and one-quarter, 37.5 percent if the portion was between one-quarter

*Whereas Q75 was administered on all properties with mixed use, it was used here only on those that were ownership.

Table 17

DEFINITIONS OF POST-SCREENING STRATIFICATION VARIABLES FOR
PROPERTIES WITH SCREENING SURVEY INSTRUMENTS

Variable		Values			
Symbol	Name	Symbol	Name	Computational Form	Logical Condition
D	Density	u r	Urban Rural	-- --	(a)
U ₂	Number of Housings Units 2	numeric	--	L15 ^b	--
RH	Rooming House Indicator	1	Rooming House	--	Q14 = 4 for one unit on property with screening instrument ^c
		0	Not Rooming House		Otherwise
MH	Mobile Home Property Indicator	1	Mobile Home Property	--	Q3 = 1 for at least 75 percent of units on property with screening instruments
		0	Not Mobile Home Property	--	Otherwise
SP	Seasonal Property Indicator	1	Seasonal Property	--	(Q1=2) and (0<Q2<6) for all units on prop- erty with screening instruments
		0	Not Seasonal Property	--	Otherwise
SI	Special Land Use Indicator	1	Special Land Use	--	RH + MH + SP > 0
		0	No Special Land Use	--	RH + MH + SP = 0
T ₃	Tenure 3	0	Ownership	--	(SI = 0) and, for each unit on property, [(Q14 = 1 or 6) or (Q6 = 1)]
		u	Undefined	--	SI = 1
		r	Rental	--	Otherwise
V _R	Residential Equalized Assessed Value	numeric	--	[.250(Q75)-.125]V ^d	(Q75 = 1,2,3 or 4) and (T ₂ = 0) ^e
		numeric	--	V	(Q75 ≠ 1,2,3 or 4) and (T ₂ = 0)
		blank ^f	Undefined	--	Otherwise
NP	Nonresidential Property Indicator	1	Nonresidential Property	--	Q5 = 1 for all units on property with screening instruments
		0	Residential Property	--	Otherwise

^aDensity as defined here is identical to both the property record search and screening stratification variables of the same name. The values assigned to it are those made in Table 5 for the property record search variable.

^bL15 is identical among sampled housing units on a single property. Hence in computing U₂ for a property, the value of L15 for any of its sampled units could be used.

^cThere is only one screening instrument on any property for which Q14 = 4 for one unit with a screening instrument.

^dV denotes an updated version of Equalized Assessed Value as defined in Table 9.

^eQ75 is identical among housing units for which T₃ = 0. Hence, in computing V_R for a property, the value of Q75 for any of its housing units may be used.

^fblank indicates a blank.

and one-half, 62.5 percent if it was between one-half and three-quarters, and 87.5 percent if it was between three-quarters and one. For ownership properties without mixed use, it was defined to be the same as equalized assessed value. For non-ownership properties, it was undefined.

The nonresidential property indicator simply flags a property as nonresidential if, for each unit on the property with a completed screening survey instrument, Q5 indicates government subsidized housing.*

Definitions of Stratification Variables for Properties with Vacancy Report Forms

Table 18 gives the definitions for the post-screening stratification variables for properties with vacancy report forms, but without screening survey instruments. The definitions for density and number of housing units 2 are identical to those made in Table 17.

The next three variables indicated the special types of land use whenever the screening survey stratum number did. We relied entirely on the previous information inasmuch as the vacancy report form provided no indication of these special uses. The special land use indicator was, as before, defined to specify special land use whenever the property is either a rooming house, a mobile home property, or a seasonal property. Tenure 3 defined an updated tenure as a function of tenure 2 (the screening survey stratification tenure variable), Q_v3 (the question on tenure in the vacancy report form), and the special land use indicator. For properties without special land use, tenure 3 was defined to be ownership if there was only one unit on the property *and* either (1) Q_v3 indicated not available for sale or rent, available for sale only, sold awaiting occupancy, or (2) Q_v3 indicated available for sale or rent and tenure 2 indicated nonrental. For all other properties without special land use, tenure 3 was defined to be rental. It was considered undefined for properties with special land use.

The vacancy report form provided no information on the mix of residential and nonresidential use, so the residential equalized assessed

* Again we chose to categorize subsidized housing with nonresidential properties inasmuch as such housing was not eligible for the residential baseline sample.

Table 18

DEFINITIONS OF POST-SCREENING STRATIFICATION VARIABLES FOR PROPERTIES WITH VACANCY REPORT FORMS BUT WITHOUT SCREENING SURVEY INSTRUMENTS

Variable		Values			
Symbol	Name	Symbol	Name	Computational Form	Logical Condition
D	Density	u r	Urban Rural	-- --	(a)
U ₂	Number of Housing Units 2	numeric	--	L15 ^b	
RH	Rooming House Indicator	1 0	Rooming House Not Rooming House	-- --	SS = 17 ^c SS ≠ 17
MH	Mobile Home Property Indicator	1 0	Mobile Home Property Not Mobile Home Property	-- --	SS = 18 SS ≠ 18
SP	Seasonal Property Indicator	1 0	Seasonal Property Not Seasonal Property	-- --	SS = 19 SS ≠ 19
SI	Special Land Use Indicator	1 0	Special Land Use Not Special Land Use	-- --	RH + MH + SP > 0 RH + MH + SP = 0
T ₃	Tenure 3	o u r	Ownership Undefined Rental	-- -- --	[SI = 0], [U ₂ = 1], and [(Q _V 3 = 1, 3, or 6) or Q _V 3 = 4 and T ₂ = n] ^d SI = 1 Otherwise
V _R	Residential Equalized Assessed Value	numeric numeric f ^e	-- -- Undefined	$\frac{V^e}{2}$ V --	(T ₂ = o) and (SS = 20 or 21) (T ₂ = o) and (SS ≠ 20 or 21) T ₂ ≠ o
NP	Nonresidential Property Indicator	1 0	Nonresidential Property Residential Property	-- --	None All

^aDensity as defined here is identical to both the property record search and screening stratification variables of the same name. The values assigned to it are those made in Table 5 for the property record search variable.

^bL15 is identical among sampled housing units on a single property. A consistency check was made and differing values were reconciled and corrected. Hence, in computing U₂ for a property, the value of L15 for any of its sampled units could be used.

^cSS denotes the screening stratum number as defined in Table 11.

^dT₂ denotes Tenure 2 as defined in Table 9.

^eV denotes an updated version of Equalized Assessed Value as defined in Table 9.

^ff indicates a blank.

value variable was defined here simply as one-half of equalized assessed value for all ownership properties indicated as mixed by a screening survey stratum number of 20 or 21, and as equal to equalized assessed value for all other ownership properties. For nonownership properties, it was undefined.

Since all properties with completed vacancy report forms but without completed screening survey instruments should be residential,* the nonresidential property indicator was defined to indicate residential for all such properties.

Definitions of Stratification Variables for Properties with Neither Screening Survey Instruments nor Vacancy Report Forms

The definitions of the post-screening stratification variables for properties on which neither screening instruments nor vacancy report forms were completed are made in Table 19.

Density and tenure are defined as in Tables 17 and 18.

The definitions of the variables designating special land uses are similar to those in the previous table. A property is designated as a rooming house if either a screening survey stratum number of 17 or a retired code of 111 indicates it to be so. A mobile home property is indicated if the screening survey stratum number is 18. With either a screening survey stratum number of 19 or a retired code of 108 for each unit on the property, a property is indicated as seasonal. As above, a property is designated as having special land use if it is indicated as being a rooming house, a mobile home property, or a seasonal property.

Tenure 3 was defined primarily as a function of tenure 2. Properties without special land use were designated as ownership whenever tenure 2 indicated nonrental, and rental whenever it indicated rental.

The residential equalized assessed value assigned one-half of the equalized assessed value to those ownership properties for which the screening survey stratum number indicated a mixed use.

As discussed in the last step, some properties thought to be residential and selected for the screening survey sample were found to be

* Some such properties could be subsidized housing, in which case we would have classified them with nonresidential. With no indication of subsidy, however, we presumed the properties to be unsubsidized.

Table 19

DEFINITIONS OF POST-SCREENING STRATIFICATION VARIABLES
FOR PROPERTIES WITH NEITHER SCREENING SURVEY
INSTRUMENTS NOR VACANCY REPORT FORMS

Variable		Values			
Symbol	Name	Symbol	Name	Computational Form	Logical Condition
D	Density	u r	Urban Rural	-- --	(a)
U ₂	Number of Housing Units 2	numeric	--	L15 ^b	--
RH	Rooming House Indicator	1	Rooming House	--	(SS = 17) ^c or (RC = 111 for one unit on property) ^d Otherwise
		0	Not Rooming House	--	
MH	Mobile Home Property Indicator	1	Mobile Home Property	--	SS = 18 Otherwise
		0	Not Mobile Home Property	--	
SP	Seasonal Property Indicator	1	Seasonal Property	--	(SS = 19) or (RC = 108 for each unit on property) Otherwise
		0	Not Seasonal Property	--	
SI	Special Land Use Indicator	1	Special Land Use	--	RH + MH + SP > 0 RH + MH + SP = 0
		0	No Special Land Use	--	
T ₃	Tenure 3	o	Ownership	--	(SI = 0) and (T ₂ = n) ^e SI = 1 (SI = 0) and (T ₁ = r)
		u	Undefined	--	
		r	Rental	--	
V _R	Residential Equalized Assessed Value	numeric	--	$\frac{V^f}{2}$	(T ₂ = o) and (SS = 20 or 21) (T ₂ = o) and (SS ≠ 20 or 21) T ₂ ≠ o
		numeric	--	V	
		g ^g	Undefined	---	
NP	Nonresidential Property Indicator	1	Nonresidential Property	--	200 ≤ RC ≤ 299 for all units on property Otherwise
		0	Residential Property	--	

^a Density as defined here is identical to both the property record search and screening stratification variables of the same name. The values assigned to it are those made in Table 5 for the property record search variable.

^b L15 is identical among sampled housing units on a property. Hence, in computing U₂ for a property, the value of L15 for any of its sample units may be used.

^c SS denotes the screening survey stratum number as defined in Table 11.

^d There is at most one unit on a property for which RC = 111.

^e T₂ denotes Tenure 2 as defined in Table 9.

^f V denotes an updated version of Equalized Assessed Value as defined in Table 9.

^g g indicates a blank.

nonresidential. All sampled housing units listed for these properties were retired with a 200 series retired code, and the nonresidential property indicator defined to indicate nonresidential for all properties on which these units were located.

Definition of Stratification

Nine post-screening stratification variables have been defined on all of the properties included in the screening and conditional screening survey samples, since each such property has a set of record completions corresponding to one of the last three tables. As shown in Table 20, these variables were used directly to define the post-screening stratification of all of these properties.

The post-screening stratification is similar to the screening survey stratification. As for the latter, rental properties were stratified by density, and urban rental properties substratified by number of units. Ownership properties were stratified by density and residential equalized assessed value per unit.* Properties on which special land use was indicated were again assigned to special strata, seasonal property and properties with nonresidential land use were stratified by density.

The post-screening strata differ from screening strata in that five strata distinguished in the latter were consolidated in the former. Screening survey strata 20 and 21 for urban and rural mixed residential-nonresidential ownership properties were differentiated from other ownership properties in the screening stratification to postpone their stratification by value until information on the mix of residential-nonresidential use could be obtained. Collected with the screening survey, this information was incorporated into the post-screening measure of value by the definition of residential equalized assessed value. These properties were assigned to strata 12 through 16, along with all other ownership properties, as a function of density and residential equalized assessed value per unit.

* Value per unit rather than simply value is used so that in those few instances in which a property with more than a single unit is defined to be ownership the property is stratified by the average value per unit rather than the total value of all units.

Table 20

DEFINITION OF POST-SCREENING STRATIFICATION

Post-Screening Stratum Number	Description	Logical Definition
1	Urban, rental, single-family	$NP=0, SI=0, D=u, T_2=r, \text{ and } U_2=1$
2	Urban, rental, 2-4 units	$NP=0, SI=0, D=u, T_2=r, \text{ and } 2 \leq U_2 \leq 4$
3	Urban, rental, 5+ units	$NP=0, SI=0, D=u, T_2=r, \text{ and } 5 \leq U_2$
10	Rural, rental	$NP=0, SI=0, D=r, \text{ and } T_2=r$
12	Urban, ownership, first value quartile	$NP=0, SI=0, D=u, T_2=o, \text{ and } 0 \leq V_R/U_2 < 13090$
13	Urban, ownership, second value quartile	$NP=0, SI=0, D=u, T_2=o \text{ and } 13090 \leq V_R/U_2 < 17864$
14	Urban, ownership, third and fourth value quartiles	$NP=0, SI=0, D=u, T_2=o \text{ and } 17864 \leq V_R/U_2$
15	Rural, ownership, first and second value quartiles	$NP=0, SI=0, D=r, T_2=o, \text{ and } 0 \leq V_R/U_2 \leq 17864$
16	Rural, ownership, third and fourth value quartiles	$NP=0, SI=0, D=r, T_2=o, \text{ and } 17864 \leq V_R/U_2$
17	Rooming houses	$NP=0, RH=1, \text{ and } MH \neq 1$
18	Mobile home properties	$NP=0 \text{ and } MH=1$
19	Seasonal properties	$NP=0, SP=1, RH \neq 1, \text{ and } MH \neq 1$
26	Urban, nonresidential	$NP=1 \text{ and } D=u$
27	Rural, nonresidential	$NP=1 \text{ and } D=r$

The other strata differentiated in the screening survey stratification and consolidated in the post-screening stratification are screening strata 23, 24, and 28, the three additional properties strata. Some of the property record information necessary to assign them to other strata had not been collected at the time of the screening survey stratification. The information was subsequently obtained, and the post-screening stratification assigned them according to the same rules as all other properties.

Stratification Assignments

The results of the stratification are shown in Table 21. A total of 8,136 properties were assigned to post-screening strata. Of these, 3,512 properties were assigned to the three urban rental strata and 473 to the single rural stratum. 1,702 properties were assigned to the urban ownership strata and 474 to the rural.

STEP 3: SAMPLE CORRECTION

The restratification of properties in the post-screening stratification caused differences in selection probabilities among properties within each post-screening stratum. The objective of this step was to reduce these differences.* We had two reasons for doing so.

First, it was desirable that our sample of properties** approximate a stratified random sample so that we could apply results derived in the statistical literature for such samples to our sample. It is characteristic of a stratified random sample that, within each stratum, each combination (of the appropriate size) of elements is equally likely to be selected. A consequence is that all elements within a stratum have an equal probability of selection. Though we could not correct our sample to make each combination equally likely or to make the selection probabilities equal, we could do much to lessen the differences among

* Another discrepancy results from the restratification by the screening survey stratification of the property record search stratification. The sampling of the additional properties in the screening survey sample partially corrected this discrepancy.

** We here consider only the sample of properties.

Table 21

POST-SCREENING STRATIFICATION

Post-Screening Stratum Number	Description	Estimated Total Population (properties)	Post-Screening Stratum Assignments
	<i>Rental Properties by Density and Size</i>		
1	Urban, single-family	1,840	1,482
2	Urban, 2-4 units	3,977	1,779
3	Urban, 5+ units	270	251
10	Rural	649	473
	<i>Ownership Properties by Density and Value Quartile</i>		
12	Urban, first quartile	5,523	629
13	Urban, second quartile	6,906	668
14	Urban, third and fourth quartiles	13,151	405
15	Rural, first and second quartiles	3,190	315
16	Rural, third and fourth quartiles	2,758	159
	<i>Other Residential Properties</i>		
17	Rooming houses	37	33
18	Mobile home properties	127	50
19	Seasonal properties	721	562
	<i>Nonresidential Properties</i>		
26	Urban	11,976	1,270
27	Rural	10,656	60
	TOTAL RESIDENTIAL	39,149	6,806
	TOTAL NONRESIDENTIAL	22,632	1,330
	GRAND TOTAL	61,781	8,136

SOURCE: Tabulation by HASE staff of records of the Sample Selection Procedure Master File for Site I.

NOTE: The table includes figures for seasonal and nonresidential properties at corresponding points in the sample selection procedures for these properties.

the selection probabilities. We think that for many purposes the sample correction reduced the differences sufficiently to enable us to treat the sample as a stratified random sample and to make estimates based upon this assumption.*

The reduction in differences among selection probabilities within the post-screening strata also allowed us to better allocate our resources. Without the correction, properties within a stratum with higher selection probabilities would be more highly represented in our sample than was intended in the sample design. An example is properties misclassified in the screening survey stratification because of a recent change in tenure from rental to ownership. Without the sample correction, such properties would often be sampled at more than ten times the rate of other ownership properties.

Restratification

The differences among selection probabilities result from the restratification by the post-screening stratification of the screening survey stratification. Table 22 displays this restratification. The screening strata are indicated by the rows; the post-screening strata by the columns. (The strata descriptions are given in Tables 11 and 20. It may be helpful to note that the descriptions for strata 1 through 19, 26, and 27 are identical in the screening survey and post-screening strata.)

Of the 2012 properties in screening stratum 1 (urban, rental, single-family), only 1313 were assigned to the corresponding post-screening stratum. Of the remaining properties, 111 were assigned to post-screening stratum 2 (urban, rental, two to four units); 501 were assigned to the urban ownership strata 12, 13, and 14; 10 were assigned to the special land use strata 17, 18, and 19; 65 were assigned to the urban nonresidential stratum 26; and 12 were not assigned at all.

The frequency of reclassification among properties assigned to screening strata 1 through 16 is found to be highest in strata 1 and

* We now recommend the use of an estimation procedure, described on pp. 89-91, not requiring this assumption.

Table 22

DISTRIBUTION OF SCREENING SURVEY SAMPLE PROPERTIES BEFORE
SAMPLE CORRECTION BY SCREENING AND POST-SCREENING STRATA

Screening Stratum Number	Post-Screening Stratum Number															Total
	1	2	3	10	12	13	14	15	16	17	18	19	26	27	NA ^a	
1	1,313	111	--	--	194	125	182	--	--	1	1	8	65	--	12	2,012
2	39	1,516	11	--	15	9	14	--	--	3	--	2	14	--	1	1,624
3	2	12	229	--	1	--	--	--	--	2	1	--	2	--	--	249
10	--	--	--	292	--	--	--	56	20	--	4	1	--	3	--	376
12	16	3	--	--	404	--	--	--	--	--	--	2	6	--	7	438
13	1	3	--	--	1	525	--	--	--	--	--	--	17	--	5	552
14	2	1	--	--	--	--	184	--	--	--	--	1	3	--	--	191
15	--	--	--	18	--	--	--	250	--	--	5	1	--	1	--	275
16	--	--	--	2	--	--	--	--	132	--	1	1	--	--	--	136
17	15	16	1	--	3	2	--	--	--	26	--	1	1	--	1	66
18	--	--	--	--	--	--	--	1	--	--	16	--	--	2	--	19
19	--	--	--	--	--	--	--	--	--	--	--	545	--	54	6	605
20	1	--	--	--	3	2	3	--	--	--	--	--	3	--	--	12
21	--	--	--	2	--	--	--	7	7	--	1	--	--	--	--	17
23	4	6	--	--	8	5	22	--	--	--	--	--	5	--	--	50
24	--	--	--	1	--	--	--	1	--	--	--	--	--	--	--	2
26	--	--	--	--	--	--	--	--	--	--	--	--	1,154	--	9	1,163
27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
28 ^b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
C ^b	89	111	10	158	--	--	--	--	--	1	21	--	--	--	--	390
Total	1,482	1,779	251	473	629	668	405	315	159	33	50	562	1,270	60	41	8,177

SOURCE: Tabulation by HASE of records of the Sample Selection Procedure Master File for Site I.

NOTE: Besides properties in the screening survey sample, this table also includes preliminary samples of seasonal and nonresidential properties for which sample corrections were also necessary.

^aNA indicates properties in the screening survey sample not assigned to post-screening strata, as listed in Appendix D.

^bC indicates properties identified in the conditional screening survey sample.

10, largely because of errors in tenure determination for single-family properties--in particular, from having erroneously classified such properties as rental. Stratum 1 consists exclusively of properties thought to have been single-family; stratum 10 consists primarily of such properties. Erroneously classifying a rental property as ownership occurs much less frequently.

Sample Correction Rule

The need for the sample correction arises because properties in each of the post-screening strata have differing probabilities of selection according to which screening survey strata they were assigned.* Among the 629 properties assigned to post-screening stratum 12, for example, the 194 from screening survey stratum 1 have probabilities of selection close to 1.00, whereas the 404 from screening stratum 12 have probabilities of selection equal to about .08.

To reduce these discrepancies, a correction was made according to the following *sample correction rule*:

Sample properties assigned to screening stratum I and post-screening stratum J at a rate equal to

$$\text{minimum} \left[\left(\frac{\text{sampling rate for screening stratum J}}{\text{sampling rate for screening stratum I}} \right), 1.000 \right].^{**}$$

Note that in the expression the ratio is of two screening survey stratum rates, though the determination of I and J is on the basis of both screening survey and post-screening strata. The sampling rates used in the correction were the approximate rates given in Table 23. Precise rates were not used since none were available at the time of the sample

* Because of the additional source of discrepancy discussed in the footnote on p. 62, the selection probabilities also differ as a function of the property record search strata to which they were assigned.

** All sample corrections for properties assigned to post-screening strata 19 and 26 were accomplished using somewhat different procedures. For a description of the procedure, see Corcoran, *Sampling Nonresidential Properties: Site I*.

Table 23

SCREENING SURVEY SAMPLING RATES
FOR SAMPLE CORRECTION

Screening Stratum Number	Sampling Rate	Screening Stratum Number	Sampling Rate
1	1.000	18	1.000
2	.455	19	(a)
3	1.000	20	.088
10	1.000	21	.091
12	.080	23	.103
13	.080	24	.237
14	.015	26	(b)
15	.083	27	.000
16	.050	28	.000
17	1.000	C	1.000

NOTE: The rates shown in this table are those actually used in the sample correction. They are preliminary estimates of the effective sampling rates and differ somewhat from the final estimates shown in Table 12.

^aNo rate is given for seasonal properties because the correction used a somewhat different procedure.

^bNo rate is given for urban nonresidential properties because the correction used a slightly different procedure. See Timothy M. Corcoran, *Sampling Nonresidential Properties: Site I*, The Rand Corporation, WN-8623-HUD, March 1974.

correction. The results from the correction made with these preliminary rates is judged to be negligibly different from those that would have been obtained with precise rates.

Application of the Sample Correction Rule

The results of applying the sample correction rule are shown in Table 24. Again the screening strata are indicated by rows and the post-screening strata by columns. Within each cell, the figure to the right of the slash indicates the number of properties before the sample correction. It is the same as the figure given in Table 22. The figure to the left of the slash indicates the number of properties remaining after the sample correction.

In the first cell are the 1313 properties assigned to screening stratum 1 and post-screening stratum 1. Both I and J as specified in the correction rule are equal to 1. To calculate the rule's sampling rate, only the sampling rate for screening stratum 1 was needed from Table 23. It was indicated as 1.000. The rule specified that these properties should be sampled at a rate equal to

$$\text{minimum} \left[\left(\frac{1.000}{1.000} \right), 1.000 \right] = 1.000 .$$

Therefore, all 1313 of these properties were retained.

Consider next the 39 properties assigned to post-screening stratum 1, but to screening stratum 2. Here I = 2 and J = 1. Table 23 gives the screening rate for stratum 2 as .455 and the screening rate for 1 as 1.000. The rule then specified that we draw a sample from these 39 properties at a rate equal to

$$\begin{aligned} & \text{minimum} \left[\left(\frac{1.000}{.455} \right), 1.000 \right] \\ &= \text{minimum} \left[2.198, 1.000 \right] \\ &= 1.000. \end{aligned}$$

Again all of the properties were sampled.

In fact, all of the 1482 properties assigned to post-screening stratum 1 were retained in the sampling correction, because the

Table 24

DISTRIBUTION OF SCREENING SURVEY SAMPLE PROPERTIES AFTER AND BEFORE
SAMPLE CORRECTION BY SCREENING AND POST-SCREENING STRATA

Screening Stratum Number	Post-Screening Stratum Number															Total
	1	2	3	10	12	13	14	15	16	17	18	19 ^a	26 ^b	27	NA ^c	
1	1313/1313	51/111	--	--	16/194	10/125	3/182	--	--	1/1	1/1	3/8	7/65	--	0/12	1405/2012
2	39/39	1516/1516	11/11	--	3/15	2/9	0/14	--	--	3/3	--	2/2	3/14	--	0/1	1579/1624
3	2/2	5/12	229/229	--	0/1	--	--	--	--	2/2	1/1	--	0/2	--	--	239/249
10	--	--	--	292/292	--	--	--	5/56	1/20	--	4/4	0/1	--	0/3	--	302/376
12	16/16	3/3	--	--	404/404	--	--	--	--	--	--	2/2	6/6	--	0/7	431/438
13	1/1	3/3	--	--	1/1	525/525	--	--	--	--	--	--	17/17	--	0/5	547/552
14	2/2	1/1	--	--	--	--	184/184	--	--	--	--	--	1/1	3/3	--	191/191
15	--	--	--	18/18	--	--	--	250/250	--	--	5/5	1/1	--	0/1	--	274/275
16	--	--	--	2/2	--	--	--	--	132/132	--	1/1	1/1	--	--	--	136/136
17	15/15	7/16	1/1	--	0/3	0/2	--	--	--	26/26	--	0/1	0/1	--	0/1	49/66
18	--	--	--	--	--	--	--	0/1	--	--	16/16	--	--	0/2	--	16/19
19	--	--	--	--	--	--	--	--	--	--	--	240/545	--	0/54	0/6	240/605
20	1/1	--	--	--	3/3	2/2	1/3	--	--	--	--	--	3/3	--	--	10/12
21	--	--	--	2/2	--	--	--	6/7	4/7	--	1/1	--	--	--	--	13/17
23	4/4	2/6 ^d	--	--	6/8	4/5	3/22	--	--	--	--	--	5/5	--	--	24/50
24	--	--	--	1/1	--	--	--	0/1	--	--	--	--	--	--	--	1/2
26	--	--	--	--	--	--	--	--	--	--	--	--	1154/1154	--	0/9	1154/1163
27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0/0
28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0/0
C ^e	89/89	52/111	10/10	158/158	--	--	--	--	--	1/1	21/21	--	--	--	--	331/390
Total	1482/1482	1640/1779	251/251	473/473	433/629	543/668	191/405	261/315	137/159	33/33	50/50	250/562	1198/1270	0/60	0/41	6942/8177

SOURCE: Tabulations by HASE staff of records of the Sample Selection Procedure Master File for Site I.

NOTE: Besides properties in the screening survey sample, this table also includes preliminary samples of seasonal and nonresidential properties for which sample corrections were also necessary.

^a The sample correction procedure for properties assigned to post-screening stratum 19 differs from the regular procedure by (1) taking into account variation in selection probabilities within each post-screening stratum and (2) selecting the baseline sample of such properties in conjunction with the correction procedure.

^b The sample correction procedure for properties assigned to post-screening stratum 26 differs slightly from the regular procedure. For a description of this sample correction, see Timothy M. Corcoran, *Sampling Nonresidential Properties: Site I*, The Rand Corporation, WN-8623-HUD, March 1974.

^c NA indicates properties in the screening survey sample not assigned to post-screening strata, as listed in Appendix D.

^d All six of these properties should have been retained.

^e C indicates properties identified in the conditional screening survey sample.

sampling rate of one for screening stratum 1 is of necessity greater than or equal to the rates for all of the other screening strata. Thus, in the expression for the sampling rate of the correction, the numerator of the ratio is always greater than the denominator, the ratio always no less than one, and the minimum of the ratio and one also no less than one.

The screening sampling rates for strata 3, 10, 17, and 18 also equal one. Consequently, the sample correction rule also retains the properties assigned to the corresponding post-screening strata.

In other post-screening strata, however, not all properties are retained. For the 111 properties assigned a post-screening stratum of 2 but a screening stratum of 1, the rule has us draw a sample at a rate equal to

$$\text{minimum} \left[\left(\frac{.455}{1.000} \right), 1 \right] = .455 .$$

Thus, 51 (.455 x 111) properties were selected. Among properties assigned to post-screening stratum 2, slightly less than half were retained from screening strata sampled at a rate of 1.000, and all of those from other screening strata.

The largest effect of the sample correction was on properties re-stratified from rental screening survey strata to ownership post-screening strata. Most such properties were deleted. Among the 194 properties assigned to screening stratum 1 and then to post-screening 12, for example, only 16 were retained. In the urban area, almost 500 properties switching from single-family rental to ownership were deleted in the correction. Another 70 properties switching from rental to ownership were deleted in the rural area.

STEP 4: BASELINE SURVEY STRATIFICATION

Rent information captured in the screening survey formed the basis of the baseline survey stratification, which was actually a substratification of the post-screening stratification for rental properties and

urban nonresidential properties.* The substratification of the rental properties was based upon estimated mean gross rent, estimated from the gross rent of housing units on the properties with completed screening survey instruments.

Gross Rent

The definition of a housing unit's gross rent is presented in Tables 25 to 27. Table 25 defines gross rent for nonmobile home housing units, rented or occupied rent free, with completed screening instruments; Table 26 defines it for mobile home units with completed screening instruments for which both the mobile home and the land are rented or occupied rent free. For housing units with completed vacancy report forms, the definition is given in Table 27. Table 28 defines a utility adjustment used in the gross rent definitions.

In Table 25, the variable payments per month (P) was used to convert contract rent with arbitrary payment periods to monthly equivalents. For housing units with rent paid weekly, for example, payments per month will equal 52/12. The three sets of conditions with each of the values correspond to the cases of housing units at full rent, with rent reduction, and occupied rent free. In the last two cases, payments per month were based on the payment period for the full rent that the landlord would usually charge. Contract rent (R_C) was then defined to be the actual rent paid in the case of housing units at full rent and the actual or estimated full rent that would usually be paid in the case of housing units at reduced rent or occupied rent free. Finally, gross rent (R_G) was defined as $(P)(R_C) + U$ where U is the utility adjustment, defined in Table 28, to convert monthly contract rent to monthly gross rent. In case either P or R_C was undefined, because of missing or non-standard values, R_G was also taken to be undefined.

The definition of gross rent for mobile home units in Table 26 is entirely analogous, except that the rent for the land and that for the mobile home itself were handled separately. Thus, two payments per

* For a description of the means by which the nonresidential properties were substratified, see Timothy M. Corcoran, *Sampling Nonresidential Properties*, The Rand Corporation, WN-8623-HUD, March 1974.

Table 25

DEFINITION OF GROSS RENT FOR NONMOBILE HOME HOUSING UNITS WITH COMPLETED SCREENING
INSTRUMENTS RENTED OR OCCUPIED RENT FREE
[(Q14=2 or 3) and (Q5=2)]

Variable		Values			
Symbol	Name	Symbol	Name	Computational Form	Logical Condition
P	Payments per Month	$\frac{52}{12}$	--	--	(Q14=2, Q18=1, and Q15=1), (Q14=2, Q18=2, and Q19C=1), or (Q14=3 and Q19C=1)
		$\frac{26}{12}$	--	--	(Q14=2, Q18=1, and Q15=2), (Q14=2, Q18=2, and Q19C=2), or (Q14=3 and Q19C=2)
		2	--	--	(Q14=2, Q18=1, and Q15=3), (Q14=2, Q18=2, and Q19C=3), or (Q14=3 and Q19C=3)
		1	--	--	(Q14=2, Q18=1, and Q15=4), (Q14=2, Q18=2, and Q19C=4), or (Q14=3 and Q19C=4)
		$\frac{1}{12}$	--	--	(Q14=2, Q18=1, and Q15=5), (Q14=2, Q18=2, and Q19C=5), or (Q14=3 and Q19C=5)
		$\emptyset^a$	Undefined	--	Otherwise
R_C	Contract Rent	numeric	--	Q16	(Q14=2, Q18=1, and Q16 $\wedge$ n)
		numeric	--	Q19A	(Q14=2, Q18=2, and Q19A $\wedge$ n) or (Q14=3 and Q19A $\wedge$ n) ^b
		numeric	--	Q19B	(Q14=2, Q18=2, Q19A $\wedge$ n, and Q19B $\wedge$ n) or (Q14=3, Q19A $\wedge$ n, and Q19B $\wedge$ n) ^c
		$\emptyset$	Undefined	--	Otherwise
R_G	Gross Rent	numeric	--	$(P)(R_C)+U^d$	$(P \neq \emptyset)$ and $(R_C \neq \emptyset)$
		$\emptyset$	Undefined	--	$(P=\emptyset)$ or $(R_C=\emptyset)$

^a" $\emptyset$ " indicates a blank.

^b" $\wedge$ n" indicates "is numeric."

^c" $\wedge$ n" indicates "is not numeric."

^d_U is the utility adjustment as defined in Table 28.

Table 26

DEFINITION OF GROSS RENT FOR MOBILE HOME UNITS WITH COMPLETED SCREENING INSTRUMENTS
FOR WHICH BOTH HOME AND LAND ARE RENTED OR OCCUPIED RENT FREE
[(Q6=2 or 3) and (Q12=2 or 3)]

Variable		Values			
Symbol	Name	Symbol	Name	Computational Form	Logical Condition
p ^L	Payments per month for land	$\frac{52}{12}$	--	--	(Q6=2, Q10=1, and Q7=1) or (Q6=2, Q10=2, and Q11C=1) or (Q6=3 and Q11C=1)
		$\frac{26}{12}$	--	--	(Q6=2, Q10=1, and Q7=2) or (Q6=2, Q10=2, and Q11C=2) or (Q6=3 and Q11C=2)
		2	--	--	(Q6=2, Q10=1, and Q7=3), (Q6=2, Q10=2, and Q11C=3), or (Q6=3 and Q11C=3)
		1	--	--	(Q6=2, Q10=1, and Q7=4), (Q6=2, Q10=2, and Q11C=4), or (Q6=3 and Q11C=4)
		$\frac{1}{12}$	--	--	(Q6=2, Q10=1, and Q7=5), (Q6=2, Q10=2, and Q11C=5), or (Q6=3 and Q11C=5)
		␣ ^a	Undefined	--	Otherwise
R _C ^L	Contract rent for land	numeric	--	Q8	(Q6=2, Q10=1, and Q8 [⋀] n)
		numeric	--	Q11A	(Q6=2, Q10=2, and Q11A [⋀] n) or (Q6=3 and Q11A [⋀] n) ^b
		numeric	--	Q11B	(Q6=2, Q10=2, Q11A [⋀] n, Q11B [⋀] n) or (Q6=3, Q11A [⋀] n, and Q11B [⋀] n) ^c
		␣	Undefined	--	Otherwise
p ^H	Payments per month for mobile home	$\frac{52}{12}$	--	--	(Q12=2, Q18=1, and Q15=1), (Q12=2, Q18=2, and Q19C=1), or (Q12=3 and Q19C=1)
		$\frac{26}{12}$	--	--	(Q12=2, Q18=1, and Q15=2), (Q12=2, Q18=2, and Q19C=2), or (Q12=3 and Q19C=2)
		2	--	--	(Q12=2, Q18=1, and Q15=3), (Q12=2, Q18=2, and Q19C=3), or (Q12=3 and Q19C=3)
		1	--	--	(Q12=2, Q18=1, and Q15=4), (Q12=2, Q18=2, and Q19C=4), or (Q12=3 and Q19C=4)
		$\frac{1}{12}$	--	--	(Q12=2, Q18=1, and Q15=5), (Q12=2, Q18=2, and Q19C=5), or (Q12=3 and Q19C=5)
		␣	Undefined	--	Otherwise
R _C ^H	Contract rent for mobile home	numeric	--	Q16	(Q12=2, Q18=1, and Q16 [⋀] n)
		numeric	--	Q19A	(Q12=2, Q18=2, and Q19A [⋀] n) or (Q12=3 and Q19A [⋀] n) ^b
		numeric	--	Q19B	(Q12=2, Q18=2, Q19A [⋀] n, and Q19B [⋀] n) or (Q12=3, Q19A [⋀] n, and Q19B [⋀] n) ^c
		␣	Undefined	--	Otherwise
R _G	Gross rent	numeric	--	(p ^L)(R _C ^L)+(p ^H)(R _C ^H)+U ^d	(p ^L ≠␣), (R _C ^L ≠␣), (p ^H ≠␣), and (R _C ^H ≠␣)
		␣	Undefined	--	(p ^L =␣), (R _C ^L =␣), (p ^H =␣), or (R _C ^H =␣)

^a"␣" indicates a blank.

^b"[⋀]n" indicates "is numeric."

^c"[⋀]n" indicates "is not numeric."

^dU is the utility adjustment as defined in Table 28.

Table 27

DEFINITION OF GROSS RENT FOR HOUSING UNITS WITH
COMPLETED VACANCY REPORT FORMS

Variable		Values			
Symbol	Name	Symbol	Name	Computational Form	Logical Condition
P	Payments per month	$\frac{52}{12}$	--	--	QV5=1
		$\frac{26}{12}$	--	--	QV5=2
		2	--	--	QV5=3
		1	--	--	QV5=4
		$\frac{1}{12}$	--	--	QV5=5
		$\emptyset^a$	Undefined	--	Otherwise
R_C	Contract rent	numeric	--	QV6	$(QV6 \sim n)^b$ and $(QV6 \neq 999)$
		$\emptyset$	Undefined	--	Otherwise
R_G	Gross rent	numeric	--	$(P)(R_C)+U$	$(P \neq \emptyset)$ and $(R_C \neq \emptyset)$
		$\emptyset$	Undefined		Otherwise

$a, \emptyset$ indicates a blank.

$b, \sim n$ indicates "is numeric."

month (P^L and P^H , for the land and home) and two contract rents (R_C^L and R_C^H) were defined. Gross rent was then defined as $P^L R_C^L + P^H R_C^H + U$, where U is again the utility adjustment.

In Table 27, gross rent is defined for housing units on which we completed a vacancy report form rather than a screening instrument. The definition is again analogous to that in Table 25, except that no account can be taken of reduced or free rent. Hence, the payments per month (P) were defined simply as a function of the payment period, and the contract rent (R_C) was taken directly as the rent paid. Gross rent is then defined as $(P)(R_C) + U$.

Table 28 defines the utility adjustment used in each of the computations of gross rent discussed above.* In the upper portion of the table, the adjustment is defined for housing units with completed screening survey instruments to be the sum of four components: electricity, water, cooking gas, and heating gas. The component for electricity is, for example, defined to be 5 plus \$.90 times the number of rooms with openable windows or skylights, when the tenant pays for electricity (in addition to the amount paid for rent), and zero when he does not. In the lower portion of the table, the utility adjustment for vacant units is defined to be zero when the contract rent is said to include utilities, and \$23.42 when it is not.

Definitions of Stratification Variables

Having defined gross rent for housing units, we are now in a position to define the baseline survey stratification variables defined on properties. Only two variables are required for residential properties: the post-screening stratum number, given in Table 20, and mean gross rent. These are shown in Table 29. Mean gross rent is computed as the average gross rent across all housing units on a property on which screening instruments were completed; or, if there were no such units, the average gross rent across all units on a property on which vacancy report forms were completed and for which gross rent was defined.

*The analysis underlying this utility adjustment is given in David M. deFerranti et al., *Screening Survey Audit Report for Site I*, The Rand Corporation, WN-8684-HUD, November 1974, Appendix C. The specific adjustment used here differs slightly.

Table 28

DEFINITION OF UTILITY ADJUSTMENT

Variable		Values		
Symbol	Name	Symbol	Computational Form	Logical Condition
Definition for Housing Units with Completed Screening Instrument				
E	Electricity	numeric	5.00+.90(Q43)	Q21A2 = 1
		numeric	0	Otherwise
W	Water	numeric	.90	Q21B2 = 1
		numeric	0	Otherwise
G _C	Cooking gas	numeric	2.75+.50(Q43)	Q21C2 = 1
		numeric	0	Otherwise
G _H	Heating gas	numeric	6.70+2.10(Q43)	[Q21C2 = 1, Q2101 = 2, Q21E1 = 2, Q21F1 = 2, and Q21G1 = 2) or (Q2102 = 1, Q21E2 = 1, Q21F2 = 1, or Q21G2 = 1)] and [Q4<5]
		numeric	0	Otherwise
U	Utility adjustment	numeric	$E+W+G_C+G_H$	
Definition for Housing Units with Completed Vacancy Report Forms				
U	Utility adjustment	0.00	--	Q _V 7 = 1
		23.42	--	Otherwise

Table 29

DEFINITION OF BASELINE SURVEY STRATIFICATION VARIABLES

Variable		Values				
Symbol	Name	Symbol	Name	Computational Form	Logical Condition	Sources
PSS	Post-screening stratum number	(a)	(a)	--	--	Table 20
$\bar{R}_G$	Mean gross rent	numeric	--	$\frac{1}{N} \sum_S R_G^b$	$R_G \neq \emptyset$ for at least one unit on property ^c	--
		$\emptyset$	Undefined	--	Otherwise	

^aSee Table 20. The values are the stratum numbers given in the first column; the value names are the descriptions given in the second column.

^b R_G is gross rent as defined in Tables 25, 26, and 27. The summation extends over the set S, where S is the set of all housing units with completed screening survey instruments for which $R_G \neq \emptyset$; or, if no such units exist, the set of all housing units with completed vacancy report forms for which $R_G \neq \emptyset$. N is the number of housing units in the set S.

^c R_G is considered to be equal to " $\emptyset$ " (undefined) for all housing units with neither completed screening instrument nor completed vacancy report form.

Table 30

DEFINITION OF BASELINE SURVEY STRATIFICATION

Baseline Survey Stratum Number	Stratum Description	Logical Definition
1	Urban, rental, first rent tercile, single-family	PSS=1 and $0 < \bar{R}_G < 118$
2	Urban, rental, first rent tercile, 2-4 units	PSS=2 and $0 < \bar{R}_G < 118$
3	Urban, rental, first rent tercile, 5+ units	PSS=3 and $0 < \bar{R}_G < 118$
4	Urban, rental, second rent tercile, single-family	PSS=1 and $118 < \bar{R}_G < 154$
5	Urban, rental, second rent tercile, 2-4 units	PSS=2 and $118 < \bar{R}_G < 154$
6	Urban, rental, second rent tercile, 5+ units	PSS=3 and $118 < \bar{R}_G < 154$
7	Urban, rental, third rent tercile, single-family	PSS=1 and $154 < \bar{R}_G$
8	Urban, rental, third rent tercile, 2-4 units	PSS=2 and $154 < \bar{R}_G$
9	Urban, rental, third rent tercile, 5+ units	PSS=3 and $154 < \bar{R}_G$
U1	Urban, rental, unknown rent tercile, single-family	PSS=1 and $\bar{R}_G = \emptyset$
U2	Urban, rental, unknown rent tercile, 2-4 units	PSS=2 and $\bar{R}_G = \emptyset$
U3	Urban, rental, unknown rent tercile, 5+ units	PSS=3 and $\bar{R}_G = \emptyset$
10	Rural, rental, first and second rent terciles	PSS=10 and $0 < \bar{R}_G < 154$
11	Rural, rental, third rent tercile	PSS=10 and $154 < \bar{R}_G$
U10	Rural, rental, unknown rent tercile	PSS=10 and $\bar{R}_G = \emptyset$
12	Urban, ownership, first value quartile	PSS=12
13	Urban, ownership, second value quartile	PSS=13
14	Urban, ownership, third and fourth value quartile	PSS=14
15	Rural, ownership, first and second value quartile	PSS=15
16	Rural, ownership, third and fourth value quartile	PSS=16
17	Rooming houses	PSS=17
18	Mobile home properties	PSS=18
19	Seasonal properties	PSS=19
20	Urban, nonresidential, unimproved	(a)
21	Urban, nonresidential, improved, convertible	(a)
22	Urban, nonresidential, improved, nonconvertible	(a)
23	Urban, nonresidential, institutional and subsidized	(a)
24	Rural, nonresidential	PSS=27

^a See Corcoran, *Sampling Nonresidential Properties: Site I*, for the procedures by which the urban nonresidential properties were stratified.

Definition of Stratification

As seen in Table 30, the baseline survey stratification is simply a substratification of the post-screening stratification. Rental properties were substratified based upon the tercile into which the value of mean gross rent fell. The mean gross rent terciles were estimated with screening survey data to be as follows:*

first tercile: \$0 to \$118

second tercile: \$118 to \$154

third tercile: \$154 and over.

The three urban post-screening strata of rental properties were substratified into 12 baseline survey strata according to whether mean gross rent fell in the first, second, or third tercile, or was undefined. The single rural post-screening stratum was substratified into three baseline survey strata according to whether the mean gross rent was in the first or second tercile, in the third tercile, or undefined.

The table also indicates the substratification of the urban non-residential properties into four strata: unimproved properties, properties potentially convertible to residential use within five years, properties not potentially convertible, and properties with institutional or subsidized housing.

Stratification Assignments

The outcome of the stratification is shown in Table 31. Each of the 6,942 properties retained in the sample correction was assigned to a baseline survey stratum. Of these, about 3,800 are rental properties and 1,600 are ownership. Of the 1,482 properties retained in post-screening stratum 1 in the sample correction, 241 are now assigned to baseline survey stratum 1, 416 to stratum 4, 485 to stratum 7, and 340 to stratum U1.

*The terciles were estimated based upon those properties assigned to post-screening stratum 1, 2, 3, or 10 and retained in the sample correction for which mean gross rent, as defined in Table 25, is computable on the basis of at least one completed screening survey instrument.

Table 31

BASELINE SURVEY STRATIFICATION AND SAMPLE SELECTION

Baseline Survey Stratum Number	Description	Estimated Total Population		Baseline Stratum Assignments		Property Sampling Rate	Baseline Survey Sample	
		Properties	Housing Units	Properties	Housing Units		Properties	Housing Units ^a
	<i>Urban Rental Properties by Gross Rent Tercile</i>							
	First tercile, by size:							
1	Single-family	299	299	241	241	.806	241	241
2	2-4 units	1,217	2,987	502	1,232	.298	363	875
3	5+ units	55	441	51	409	.927	51	316
	Second tercile, by size:							
4	Single-family	516	516	416	416	.806	416	416
5	2-4 units	1,157	2,663	477	1,098	.354	410	937
6	5+ units	127	1,408	118	1,308	.929	118	865
	Third tercile, by size:							
7	Single-family	602	602	485	485	.400	241	241
8	2-4 units	1,142	2,425	471	1,000	.129	147	305
9	5+ units	76	1,445	71	1,350	.934	71	545
	Unknown tercile, by size							
U1	Single-family	422	422	340	340	.806	340	340
U2	2-4 units	461	956	190	394	.351	162	336
U3	5+ units	12	228	11	209	.917	11	81
	<i>Rural Rental Properties by Gross Rent Tercile</i>							
10	First and second terciles	395	649	288	473	.729	288	473
11	Third tercile	64	116	47	85	.734	47	85
U10	Unknown tercile	189	293	138	214	.730	138	210
	<i>Urban Ownership Properties by Value Quartile</i>							
12	First quartile	5,523	5,549	433	435	.064	354	356
13	Second quartile	6,905	6,905	543	543	.065	446	446
14	Third and fourth quartiles	13,151	13,220	191	192	.012	154	155
	<i>Rural Ownership Properties by Value Quartile</i>							
15	First and second quartiles	3,190	3,190	261	261	.070	222	222
16	Third and fourth quartiles	2,758	2,758	137	137	.040	110	110
	<i>Other Residential Properties</i>							
17	Rooming houses	37	37 ^b	33	33 ^b	.892	33	33 ^b
18	Mobile home properties	127	971	50	882	.394	50	147
19	Seasonal properties	721	727	250	252	.347	250	252
	<i>Nonresidential Properties</i>							
20	Urban, unimproved	8,047	0	805	0	.025	200	0
21	Urban, improved, convertible	1,759	0	176	0	.100	176	0
22	Urban, improved, nonconvertible	1,839	0	184	0	.000	0	0
23	Urban, institutional and subsidized	330	0	33	0	.000	0	0
24	Rural	10,656	0	0	0	.000	0	0
	TOTAL RESIDENTIAL	39,146	48,807	5,744	13,244 ^c	--	4,663	7,987 ^c
	TOTAL NONRESIDENTIAL	22,631	0	1,198	0	--	376	0
	GRAND TOTAL	61,777	48,807	6,942	13,244 ^c	--	5,039	7,987 ^c

SOURCE: Tabulations of records of the Sample Selection Procedure Master File for Site I and estimation by HASE staff.

^aThis is the number of sampled housing units, as distinguished from the number of housing units on sampled properties. The sampled housing units include at most eight units from any single property.

^bFollowing the pre-screening convention, only a single unit is recorded for each rooming house, since the number of living units (in which, up to the usual maximum of eight, the lodger survey instrument is administered) is unknown at this point in the sample selection procedure.

^cThis figure included only a single unit for each rooming house.

STEP 5: BASELINE SURVEY SAMPLE

The first three phases of the sample selection procedure culminate, in this final step, with the selection of the baseline survey sample. The extensive baseline survey instruments were administered on each of the properties and housing units in this sample.

Sampling Method

Like the screening survey sample, the baseline survey sample was of both properties and housing units. Again, properties were selected as a stratified random sample, and housing units were selected as a stratified cluster sample, the selection of properties serving as the first stage in the cluster sampling of housing units. The selection of units for the sampled properties was done by simply reselecting those chosen in the screening survey sample. On properties with no more than eight units, all units were selected; a sample of eight was selected on larger properties.

Sample Sizes

Estimated requirements to meet baseline panel targets were compared with the numbers actually assigned to the baseline survey strata to determine the number of properties selected in each stratum. These requirements take into account the expected nonresponse rates of landlords, tenants, and homeowners to the baseline surveys and were shown in Table 2 under "Baseline Survey Sample." The numbers of properties assigned to the baseline survey strata are given in Table 31 under "Stratified Population."

For nonrental strata, the number of properties selected was simply the lesser of the two. The determination of the number selected for rental strata was more complicated because of properties with unknown rent.

Many properties from the unknown-rent strata were included, first, because the numbers of properties assigned to the known-rent strata frequently fell short of the estimated requirements. By sampling from the unknown-rent strata, additional properties could be obtained. Second, there may be a systematic difference between properties for

which rent was and was not obtained. By sampling from the unknown-rent strata, the extent of any such bias could be assessed and taken into account.

All urban single-family properties, urban properties with five or more units, and rural properties in the unknown-rent strata were sampled because, in each case, the numbers of properties assigned to at least one of the corresponding known-rent strata fell short of the requirements. The number of properties sampled in the known-rent strata for these properties was the lesser of the number of properties assigned and the required number. The exception is the two known-rent strata for properties with five or more units in which the estimated requirement was constrained by a census-based estimate and the number of properties assigned exceeded that estimate. In those two strata, all assigned properties were selected.

For urban properties with two to four units, numbers of properties adequate to meet estimated requirements were assigned to each stratum. For these, the sampling rate for the unknown-rent stratum and the most heavily sampled known-rent stratum were set at a level so that the expected number of properties from these strata with rent falling in the second tercile equaled the estimated requirement given in Table 2. For the other two strata, the standard minimum rule was applied.

Sample Selection

The result of the baseline survey sample selection is shown in Table 31 under "Sample." The property sampling rate was computed as the ratio of the number of sampled properties to the estimated number of properties in the population.

A total of 5,039 properties and 7,987 housing units were selected. 4,663 were residential properties; the remaining 376 properties were nonresidential.

There were more than 3,000 rental properties in the sample, about 2,600 urban properties with about 5,500 sample housing units and about 500 rural units about 800 sample units. The urban rental sample contained about 1,200 single-family properties, 1,100 two to four unit properties, and 250 five or more unit properties. Almost 1,300

ownership properties were included in the sample, about 1,000 in the urban area and more than 300 in the rural area. The remainder of the residential sample consisted of rooming houses, mobile home properties, and seasonal properties.

The nonresidential sample, selected entirely from the urban area, is composed of 200 unimproved properties and 176 properties with non-residential improvements that are potentially convertible to residential use.

V. REVIEW OF SAMPLE SELECTION

Having selected the baseline sample, we now review the selection procedure to identify the problems, primarily to understand what implications those problems and our solutions to them have for estimation with the baseline sample and its derivatives, including the baseline and terminal panels. Additionally, the advisability of using a cluster sample procedure with properties as the first stage sample unit as a means of sampling housing units or households is discussed to aid anyone faced with sampling either of these.

PHASE I

The sampling frame that we constructed from the County Tax Listing Service Office Addressograph file appears to be accurate. The 7,778 parcel numbers listed (without reference to the frame) as rental in Step 2 matched the parcel numbers in the frame in all but six cases. Thus, we estimate that errors of omission in the frame occur with a frequency of about 1/10 of 1 percent. Similarly, the sample of 7,757 nonrentals can be used to estimate an upper bound on errors of inclusion. Some property information was obtained on all but six of these, indicating that the remainder were all legitimate parcel numbers. Since the six on which no information was obtained may also be legitimate, we estimate that errors of inclusion probably occur with a frequency no greater than 1/10 of 1 percent.

In the first phase, information on two variables was collected and used for stratification. The determination of density is thought to be exceptionally reliable since it could be assigned as a function of political subdivision in all but one case.

The determination of tenure is known to have been inaccurate, the principal difficulty being the identification of single-family rental properties. This difficulty presented by far the greatest problem in selecting the baseline sample, forcing us to use the extraordinary procedures of the selection of the nonrandom (conditional) samples and of restratification. Though the total number of rental properties

identified in Step 2 corresponded closely with estimates based on 1970 census data, as we were to learn in the next two phases, many properties had been erroneously identified as rental and an approximately equal number had not been identified. Most of the erroneous identifications no doubt resulted from our conservative procedures: We had "identified" as rental rural seasonal properties and properties corresponding to City Directory listings of "vacant," "under construction," and "no return."* The errors of omission were more frequent in the rural area, undoubtedly because of reliance on local officials, in lieu of formal sources, to identify rental properties. There were a considerable number of errors in the urban area too, however, presumably because of errors in the City Directory's indication of homeownership.

In the final step of this phase and in a departure from random sampling procedures, we added to the stratified property record search sample what we termed the conditional property record search sample, consisting of 26 properties identified as rental after Step 2. Had we been successful in identifying all but a negligible number of rental properties (as we had hoped), we could have considered this augmented property record search sample to be a stratified random sample and used the standard estimation procedures for such samples. The original rental sample plus the 26 conditional properties would have constituted 100 percent simple random samples from the two rental strata, and the original nonrental samples would have constituted simple random samples from the slightly reduced nonrental strata. Since we were unsuccessful in identifying all rental properties, however, we cannot treat this as a stratified random sample. We must use special estimation procedures to handle this conditional sample and check, to the extent possible, that no bias is introduced into the estimates by the non-random selection, particularly from the mobile home properties, which constitute almost one-third of this sample. Suggestions for procedures to handle this conditional sample, as well as the conditional sample of the next phase, are given on p. 92.

* Presumably many of these were determined to be nonrental in the address check discussed on pp. 16-17.

PHASE II

Information was collected from the assessor's records on assessed value, number of housing units, and land use and was used for stratification in this phase. The assessed value information is probably accurate, as it was obtained from the assessment rolls. Thus, errors should be limited to those we committed in obtaining the information (such as copying errors).

Because of inaccuracies in the number of housing units as obtained from the assessor's records, some properties had to be restratified in Phase III. The problem was confined almost entirely to properties in the urban rental strata. Of the 2,012 properties assigned to the screening stratum for urban single-family rental properties, 111 were found to have two to four units; and of the 1,624 sampled properties assigned to the screening stratum for urban two-to-four unit properties, 39 were found to have only a single unit and 11 to have five or more units. Of the 249 properties assigned to the urban rental strata for properties with five or more units, 14 were found to have fewer units. Only a very few properties assigned to urban ownership strata were found to have more than one unit and, consequently, restratified into multiple-unit rental strata.

The land use information obtained in Phase II was primarily used to stratify properties into residential or nonresidential use. Some errors occurred in both directions. Out of more than 6,000 residential properties in the screening sample, 176 properties were found to be nonresidential. These present no problem for us, as we will no longer be surveying nonresidential properties. However, in making estimates for residential properties, we will have to take special account of the 12 residential properties found during the nonresidential sample selection procedure and the 33 residential properties found in the nonresidential baseline sample.* This is discussed on p. 93.

Though not represented explicitly as in Phase III, Phase II also involved a restratification. The defining characteristic of a

* These properties were found to be residential during the baseline surveys of nonresidential properties.

restratification is that properties assigned to a new stratum come from more than one old stratum, resulting in different selection probabilities. In a *substratification*, all properties come from a single old stratum and consequently have identical selection probabilities. The screening survey stratification combines a *restratification* and a *substratification* of the property record search stratification.

The *restratification* in Phase II was made by means of the stratification variable tenure 2, which was a modification of the variable tenure 1 defined in the previous phase.* By creating the strata for *additional* properties, defined as those properties for which tenure 1 indicated rental but tenure 2 indicated nonrental, the *restratification* of these properties was postponed until Phase III. The properties for which tenure 1 indicated nonrental and tenure 2 indicated rental, however, were *restratified* in Phase II, and special procedures need to be used to handle this *restratification*, as well as the *restratification* in the next phase. This is discussed on p. 90.

Because a validation check with Census data revealed that we had failed to identify about 600 rental properties, mostly single-family, in each of the urban and rural areas, in the final step of this phase, we instituted radical procedures to identify these properties so that they might be added to the screening survey sample in what we termed the conditional screening survey sample. We needed most of these unidentified properties to meet baseline and terminal panel targets. We reasoned, as we had with the smaller conditional property record search sample, that though the procedure departed from standard sampling methods, if in fact we were able to identify all but a negligible number of the unidentified rental properties, our sample would still be equivalent to a (multiphase) stratified random sample** and the standard estimation procedures for such samples could be applied. Unfortunately, the procedure fell far short of its goal. Only 89 single-family rental

* Both tenure 1 and tenure 2 were defined to be rental for rooming houses, mobile homes, and seasonal properties. Updated information on these special types of land use are reflected in the tenure 2 variable.

** Aside from the *restratification* for which special procedures would, in any case, have to be used.

properties (besides 111 two to four unit properties and 10 five or more unit properties) were identified in the urban area, and only 179 rental properties in the rural area.

The failure of the procedure poses some problems: (1) the sample sizes in several strata are insufficient to meet baseline targets, (2) the screening survey sample augmented with the conditional sample cannot be treated as a (multi-phase) stratified random sample, and (3) biased estimates may result from the nonrandom selection procedures for the conditional sample.

Because of the failure to identify all single-family rental properties, we currently expect to fall short of the sample design targets for the terminal panel in the two urban, single-family, lower rent strata and the rural high rent stratum. Whether this will occur will depend, of course, on the various factors affecting a property's continued inclusion in the panel. The only factors over which we have any control are survey response rates, and, consequently, our only course of action is to make special efforts to achieve higher than the originally planned response rates in these strata.

That we cannot reasonably consider the augmented screening survey sample as a stratified random sample implies that we also cannot treat its derivatives, including the baseline sample and the baseline and terminal panels, as stratified random samples. To make estimates based on the augmented sample, we must also make some assumptions concerning the conditional sample and develop and apply special estimation procedures. We must be careful that a significant bias is not introduced by the nonrandom procedure by which the conditional sample was selected. Fortunately, the small number of properties in the conditional sample, compared with the number in the corresponding strata of the stratified sample, and the high overall sampling rates in the rental strata both lessen the effect of any bias in the conditional sample on an estimate based on both sets of properties.

We currently know of two specific sources of nonrandomness in the *urban* conditional sample. First, it contains only properties from the city of Green Bay, since the procedure was applied only in that city. All of the unidentified rental properties in the remainder of the urban

area had no chance of selection. Second, the urban sample excludes properties recently converted from ownership to rental tenure. Properties becoming rental after the information from the City Directory was collected were not identified. There may be other sources of bias in the urban and rural samples.

On p. 92, we suggest a procedure for handling the conditional sample in making estimates and recommend a check to minimize the introduction of a significant bias.

PHASE III

The final phase of selecting the baseline sample collected information to verify and update the old stratification variables and to calculate a new stratification variable, mean gross rent. All of the information collected in this phase was apparently quite accurate as attested to by the baseline survey data subsequently obtained.

The aspects of this phase of principal concern are the restratification and sample correction, necessitated by the misclassifications in earlier phases of substantial numbers of properties.* Most were due to erroneous tenure determination. The sample correction was performed to mitigate the problem resulting from the restratification. Nevertheless, this restratification, as well as that in Phase II, requires that special procedures be developed and used for estimation with our samples. This is discussed below.

IMPLICATIONS FOR ESTIMATION

In reviewing the sample selection procedure, we found that the restratification of properties in Phases I and II, the conditional samples selected in Phases I and II, and the residential properties discovered in the nonresidential strata each pose problems for estimation. We now offer suggestions for procedures to handle these. Additionally, we briefly discuss the splitting and merging of parcels, which, though

* Actually, it is not the misclassifications themselves that necessitated the restratifications, but rather our desire to substratify. It is awkward to substratify by mean gross rent a stratum containing ownership, as well as rental, properties.

they presented no problems in the selection process, do require special methods in the estimation procedure.

Restratification

As has been discussed, Phase II and to a lesser extent Phase I involved restratifications of properties that resulted in different selection probabilities within the new strata. It is consequently inappropriate to make population estimates assuming the new stratification to be equivalent to a stratified random sample.

We think that the best procedure^{*} is to base our estimation on what we shall term the *super-stratification*, composed of the classifications of properties at each phase of the sample selection procedure.^{**} Those properties belonging to property record search stratum 1, screening survey stratum 12, post-screening stratum 12, and baseline survey stratum 12, for example, would constitute a single stratum in the super-stratification. Since within each of these super-strata, all combinations (of the appropriate size) of properties were equally likely to have been selected,^{***} we can consider the sample is to be a multi-phase stratified random sample from this super-stratification. We can consequently use the standard estimation procedures for such samples to make population estimates for parameters of interest and to estimate their precision.

The estimates of population sizes for the super-strata would be made by using the property record search sample to estimate the number of properties in the population falling into the two-way stratification by property record search stratum and screening survey stratum. The screening survey sample, considered as a sample from this two-way stratification by taking into account the property record search stratum

^{*} We here consider estimation excluding properties in the conditional samples, the handling of which is discussed on p. 92.

^{**} The definition of the super-stratification described here should be extended to include the baseline panel stratification and the described method used to make estimates based on the baseline panel and its derivatives.

^{***} We assume the attrition due to survey nonresponse and other sources to be completely random.

to which each sampled property had been assigned, would then be used to estimate the number of properties in the population falling into the three-way stratification by property record search stratum, screening survey stratum, and post-screening stratum. Finally, by considering the properties retained in the sample correction as a sample from this three-way stratification, we can estimate the number of properties in the population in each of the super-strata.*

The problem with this method is that some super-strata have very small (but nonzero) population sizes for which the sample size will be zero and for which we consequently cannot obtain sample-based estimates for parameters of interest. There will undoubtedly be more such strata because of the attrition of properties during the course of the experiment. To handle this problem, the best solution is probably to choose a stratum with positive sample size likely to have similar distributions and to use the estimates for the chosen stratum as the estimates for the stratum without sampled elements. Presumably the chosen stratum would have the same baseline survey stratum number. It is probably reasonable, for example, to assume properties in property record search stratum 1, screening survey stratum 2, and post-screening and baseline survey strata 14 to have distributions similar to properties in property record search stratum 12, screening stratum 14, and post-screening and baseline survey strata 14. Though there are no means by which to check such assumptions with the sample, we can test our ability to make such assumptions accurately by trying to predict which of the strata with positive sample sizes should be similar and checking these predictions with the data collected. The exceptionally small population sizes of the super-strata in which we have no sampled elements will make overall population estimates made as outlined above insensitive to our estimates for these strata.**

*The population size estimates for strata as given in this document are based on a different, and slightly less preferable, procedure. They should be reestimated by summing the population size estimates for the corresponding super-strata.

**There is a similar problem with strata for which we have only one sampled element, as generally at least two elements are required in each stratum in order to estimate the precision of our estimates. We

Conditional Samples

In both Phase I and Phase II of the procedure, nonrandom conditional samples of rental properties were added to the randomly selected sample. Because we failed to identify all rental properties, the conditional samples cannot be combined with the random sample and the whole treated as a random sample.

The best method for handling the conditional samples is probably first to ignore them and use only the random samples to estimate the super-strata population sizes. Then a determination should be made of the super-strata to which the conditional properties would most appropriately belong. This determination should be checked to minimize the chance of introducing a significant bias, by comparing the distributions of a number of variables for conditional properties with the distributions for the randomly sampled properties in the super-stratum to which those conditional properties are thought to belong. If these appear to be substantially the same, then with some justification, conditional properties could be assumed to have the same distributions for all variables as the properties in the corresponding super-strata and the randomly selected properties and the conditional properties could be treated together as simple random samples from these super-strata. The entire sample could then be assumed to be a stratified random sample from the super-stratification, and our estimation procedure based upon this assumption, with the population size estimates for the super-stratification being based upon only the randomly sampled properties. If substantial differences are found in some cases, it may be possible to determine the source of those differences and make special provisions to handle them. **

suggest that the single sampled elements be used to estimate the parameter of interest for such strata (assuming the parameter is one such as a mean or proportion that can be estimated with only a single element) and that the estimation of the variances of these estimates be based upon the variances of the underlying variable as estimated from strata chosen to be most similar to the strata with single-sample elements.

** Additionally, if sample sizes in rental strata are ever reduced for any reason we recommend that the properties in the conditional samples be eliminated both because they are intrinsically less valuable to us and because they complicate the estimation procedure.

Residentials in the Nonresidential Sample

The 12 residential properties identified in the nonresidential sample selection procedure and the 33 residential properties in the base-line sample of nonresidential properties and the unsampled residential properties that they represent must be taken into account. Available information on the stratification variables for the sampled properties should be used to determine the residential strata (in the appropriate phase) to which each property might belong. Based on this determination, the sampled properties *and* the represented properties should be allocated among the strata in proportion to the estimated strata population sizes and the estimated population sizes should be correspondingly increased. These properties should be assumed, for lack of better information, to have distributions identical to the other properties in the strata to which they are allocated. The samples from the strata can then be considered as samples from the augmented strata and used to represent the residential properties from the nonresidential strata, as well as the residential properties originally assigned to residential strata.

Parcel Changes

While changes in the boundaries of parcels did not present problems for us in the sample selection procedure, such changes cannot be ignored throughout the course of the experiment. Our sampling frame consists of the list of properties in Brown County in March 1973. All subsequent changes to (at least) sampled properties must be referenced to that list, and estimation procedures need to be developed to handle the changes. Parcel splits, for example, might best be handled by considering properties in the frame as clusters of the properties into which they are divided. In any case, it is advisable at an early date to develop procedures to handle the changes so that whatever information needs to be collected to support the procedure will be available when the time comes to make estimates. It is possible, for example, that we will want to know not only the changes in our sample but also in the population as a whole.

PROPERTY-CLUSTER METHOD

To the best of our knowledge, our sample of housing units is the first sample of either housing units or households ever drawn using a two-stage sample in which the sample unit of the first stage was a property. We would consequently like to offer our comments on the use of such a procedure to others faced with sampling either housing units or households.

One of the principal benefits of this method^{*} is that in most jurisdictions an exceptionally accurate sampling frame can be easily and inexpensively obtained. In Brown County, the frame was produced mechanically by an Addressograph machine. (In our other site, it was obtained simply by copying a computer tape listing of the properties in that jurisdiction.) Almost all of the field listing required with most alternative procedures, along with the inherent problems and expense of such listings, can be avoided.

Because the property clusters are small (that is, they contain a small number of housing units), the property cluster sample can be expected, for a fixed sample size of housing units, to yield more precise estimates than samples based on larger clusters. This same smallness will result, however, in higher field costs, because the total travel time between sample elements is greater.

Our only major difficulty in using the property-cluster method came in the determination of tenure. Even in retrospect, we are at a loss to say what we could have done differently to have avoided this problem, short of contacting all households in the site. Others using the property cluster method might have similar difficulties with tenure or any other stratification variables by means of which they wished to oversample certain types of properties, if adequate information sources are not available. Consequently, if the numbers of properties of types to be oversampled is still small in relation to the total population

^{*} Because we are here concerned only with samples of housing units and households, we ignore the even greater benefits, for our purposes, derived from the inherent link with this method between the property and housing unit samples.

size of these types, it is probably preferable to use large clusters of housing units such as block groups. All of the units within the cluster can then be listed and a screening survey administered to the units to obtain values of the stratification variables, and, on the basis of this information, a final survey sample selected.

On the other hand, if the numbers of properties desired of at least one type represent a large portion of the total population of such properties (we, for example, needed 100 percent in some rental strata), there is no advantage to the larger clusters, and the property-cluster still provides an excellent method. For those who do not need to oversample certain types of properties, the entire difficulty with stratification variables is avoided and the property-cluster method can possibly be used to advantage.

Appendix A
POLITICAL SUBDIVISION CODES

The table in this appendix lists the political subdivision codes assigned in Phase I, Step 1.

Table A.1
POLITICAL SUBDIVISION CODES

Political Subdivision	Type of Political Subdivision	Code
Urban Area		
Green Bay	City	1
De Pere	City	2
Allouez	Town	3
Ashwaubenon	Town	4U
(urban portion)		
Howard	Village	22
Rural Area		
Ashwaubenon	Town	4R
(rural portion)		
Bellevue	Town	5
De Pere	Town	6
Eaton	Town	7
Glenmore	Town	8
Greenbay	Town	9
Hobart	Town	10
Holland	Town	11
Humbolt	Town	12
Lawrence	Town	13
Morrison	Town	14
New Denmark	Town	15
Pittsfield	Town	16
Rockland	Town	17
Scott	Town	18
Suamico	Town	19
Wrightstown	Town	20
Denmark	Village	21
Pulaski	Village	23
Wrightstown	Village	24

Appendix B

PROPERTIES IN THE PROPERTY RECORD SEARCH SAMPLE
NOT ASSIGNED TO SCREENING STRATA

There were 15 properties selected in the property record search sample that were not assigned to screening strata, either because the information required to do so was unobtainable or because the information obtained was found to be incorrect. Typically, the local assessor's records from which the items in Table 8 were to be abstracted were either not obtainable or obtained too late to be used for the assignments.

These properties were ineligible for selection in the stratified screening sample; though they might have been selected in the conditional screening sample, in fact none were. Consequently, none of these properties was eligible for selection in the baseline sample. They are thus disregarded in the steps of the sample selection procedure subsequent to Phase II, Step 2.

These properties cannot be so ignored in making population estimates with our sample; it is necessary to make some assumptions concerning the distributions of random variables for these properties. For each, we make an assumption based upon the property record search stratum to which the property is assigned and any information obtained on the property. As an example of the latter, we were able in some cases to ascertain that a property is residential, even though we could not obtain complete property records.

Below we list each unique assumption and under each the set of properties to which it applies. Each assumption is labelled with a *distribution code* by which to reference it.

Distribution Code 101

Assume these properties to have distributions identical to those properties from property record search stratum 12 that were assigned to screening strata.

1-12-164-C
3-806-C-1
3-806-C-7

Distribution Code 102

Assume these properties to have distributions identical to those properties from property record search stratum 15 that were assigned to screening strata.

12-165
12-211-3
16-631-1

Distribution Code 103

Assume these properties to have distributions identical to those properties from property record search stratum 12 *and* screening strata 1 to 21.

1-2-663
1-8-30

Distribution Code 104

Assume these properties to have distributions identical to those properties from property record search stratum 15 *and* screening strata 1 to 21.

16-193-1
16-908
16-916

Distribution Code 105

Assume this property to have distributions identical to properties in screening stratum 23.

3-361-V-6

Distribution Code 106

Assume these properties to have distributions identical to properties in screening stratum 26.

1-16-173
2-W-D-79-1

Distribution Code 107

Assume this property to have distributions identical to those properties from property record search stratum 10 *and* screening stratum 10.

4-R-178-1

Appendix C

COMPARISON OF STRATIFIED POPULATION ESTIMATES BASED ON SAMPLE
SELECTION PROCEDURE AND 1970 CENSUS

This appendix presents a table that compares stratified population estimates based upon sample selection procedure data immediately subsequent to the screening stratification and 1970 census data. It was on the basis of this comparison that we found that many rental properties, mostly single-family, had not been identified and that we instituted special procedures to identify them. This is discussed in Phase II, Step 4.

Table C.1

COMPARISON OF STRATIFIED POPULATION ESTIMATES BASED ON
SAMPLE SELECTION PROCEDURE AND 1970 CENSUS

Screening Stratum Number	Description	Sample Selection Procedure Estimate ^a	1970 Census Estimate	Absolute Difference	Percentage Difference
1	Urban, rental, single-family	2,012	2,592	-580	-22.4
2	Urban, rental, 2-4 units	3,572	3,582	-10	-0.3
3	Urban, rental, 5+ units	249	192	+57	+29.7
10	Rural, rental	376	985	-609	-61.8
12	Urban, ownership, first value quartile	5,481	5,641	-160	-2.8
13	Urban, ownership, second value quartile	6,934	6,182	+752	+12.2
14	Urban, ownership, third and fourth value quartiles	13,107	12,049	+1,058	+8.8
15	Rural, ownership, first and second value quartiles	3,327	3,062	+265	+8.7
16	Rural, ownership, third and fourth value quartiles	2,731	2,522	+209	+8.3

SOURCE: Table 12 and estimates by HASE staff based on the 1970 Census of Housing.

^aThe sample selection procedure estimate for each *rental* stratum was simply the number of properties identified for the stratum as given in Table 12. The estimates for each *ownership* stratum were computed as the number of properties from Table 12, divided by the appropriate (urban or rural) nonrental sampling rate as given in Table 7.

Appendix D
PROPERTIES IN THE SCREENING SURVEY SAMPLE
NOT ASSIGNED TO POST-SCREENING STRATA

There were 41 properties selected in the screening survey sample that were not assigned to post-screening strata; 60 percent of these assignments were not made because properties could not be located in the field to administer the screening survey due to unresolvable address problems. It was pointless to assign these to any strata and thus make them eligible for selection in the baseline sample inasmuch as they could not, of course, be located to administer the baseline survey either. The other assignments were not made typically because of erroneous misclassifications discovered too late to collect the information necessary to make the correct assignments. An example are the eight properties thought to be nonresidential that were found to be residential too late to obtain the information by which to stratify them.

Because these properties were not assigned to post-screening strata, they were ineligible for selection in the baseline sample. They are thus ignored in the sample selection procedure subsequent to Phase III, Step 2.

These properties cannot be so ignored, however, when it comes to making population estimates. It is necessary to make some distributional assumptions regarding them. For each property we make an assumption based on the property record search and screening strata to which the property is assigned and any information obtained on the property.

Below we list each of the assumptions made and under each the parcel numbers of properties to which it applies. Each assumption is labelled with a *distribution code* by which to reference it.

Distribution Code 101

Assume these properties to have distributions identical to those properties from property record search stratum 1 and screening stratum 1 that were assigned to post-screening strata.

1-P-270-1-1
1-P-2571
1-2-685-A
1-5-1465
1-8-308
1-SC-64-1
1-6H-1632
2-E-1049
2-E-1128-E-9
3-183
22-747-E-35

Distribution Code 102

Assume this property to have distributions identical to those properties from property record search stratum 12 *and* screening stratum 2 that were assigned to post-screening strata.

4-U-696-12

Distribution Code 103

Assume these properties to have distributions identical to those properties from screening stratum 12 that were assigned to post-screening strata.

1-1-500
1-6-245
1-6-275
1-6-2393
1-6H-1174
1-6H-1224-2
2-E-1469-1

Distribution Code 104

Assume these properties to have distributions identical to those properties from screening stratum 13 that were assigned to post-screening strata.

1-P-828-1
1-P-1335-1
1-7-396
1-14-35-A
1-18-1068

Distribution Code 105

Assume these properties to have distributions identical to those properties from property record search stratum 12 *and* screening strata 1 to 21.

1-P-324-1-3
1-P-1347-1
1-P-2202-2-1
1-P-2263-2
1-P-2263-9
1-1-827
1-4-81
3-136-17

Distribution Code 106

Assume this property to have distributions identical to those properties in property record search stratum 1, screening stratum 17, *and* post-screening stratum 17.

1-P-457-4

Distribution Code 107

Assume these properties to have distributions identical to those properties in property record search stratum 1 or 12 *and* post-screening stratum 26.

1-P-603
3-806-G-4

Distribution Code 108

Assume these properties to have distributions identical to those properties in property record search stratum 10, screening stratum 19, *and* post-screening stratum 19.

9-311
9-313
18-1134
19-558
19-978
19-999