SEISMIC DESIGN DECISION ANALYSIS

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Research Appled to National Needs

Internal Study Report No: 66

PROCEDURES FOR SDDA BOSTON BUILDING INVENTORY

by
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August 1976

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Methods of obtaining building information and categorizing it with respect to seismic response for a ten-mile square area in Boston are described. A knowledge of the distribution of various types of buildings in an area is essential for estimating the consequences of a hypothetical earthquake. Problems involved in estimating the distribution of buildings generally are of two types: defining building types and associated probable consequences at various levels of shaking, and obtaining an inventory of the various building types. The first problem essentially entails reaching a compromise between the multiplicity of actual building types and the computational necessity of working with a limited number of types. The second problem is that of estimating numbers of buildings without actually counting them individually. Information was obtained from the city's assessing departments, building departments, the Sanborn Map Company, Bureau of Census tables on residential structures, aerial photography, Civil Defense data, maps and other sources. The appendix details the information obtained from these various sources.

17. Document Analysis a. Descriptors

Earthquakes
Boston
Buildings
Earthquake resistant structures
Information
Dynamic structural analysis
Design standards
Safety factor

b. Identifiers/Open-Ended Terms

Dynamic response

c. COSATI Field/Group

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Introduction

Since buildings of different construction types respond differently to earthquake shaking, the consequences of a hypothetical earthquake over a given target area (or the expected damage during some period of time) cannot be estimated without first knowing the distribution of the various types of buildings in that area.

Various categories of building types have been proposed (see Appendix A). In general, these are based on the four common building materials: wood, steel, reinforced concrete, and masonry. In addition to the structural material, the following information might also be used to define "building type": number of stories, year built (indicates what codes were in effect at the time of construction), building use, lateral force system, type of frame and floor construction, soil conditions, foundation construction and building value.

The particular area being studied is a ten-mile by ten-mile square whose center is the State House in downtown Boston. Included in whole or in part within this area are the communities of Cambridge, Revere, Malden, Everett, Chelsea, Medford, Somerville, Brookline, Arlington, Watertown, as well as Boston.

2. Sources of Information

2.1 Assessing Departments

In general, the city assessor has files or bound computer printouts containing information on each parcel of land (in most cases, there is one building on each parcel) arranged by parcel number or owner. The following data is typically kept: parcel number, name of owner, address, area, valuation, tax and use. The city of Boston, before their files were computerized, also had data on construction material and number of stories, but this type of information is not generally kept in the assessor's office.

Specific information on the numbers of various building types (e.g., single-family residence, commercial) was obtained for the city of Boston using Assessing Department data (see figure 1).

2.2 Building Departments

City building departments maintain files on individual buildings. Included in the files are such things as building permits, notices of violations and inspections, and other documents pertaining to changes that occur to the building

over time. Building permits typically contain information on construction materials, use, number of stories, soil conditions, framing, foundation type, etc. (see figure 2).

2.3 Sanborn Map Co., Pelham, NY

The Sanborn Map Company publishes detailed maps for many cities at 1" = 100' (older maps are at 1" = 50' and are color coded). All structures are outlined and some or all of the following information is printed directly on each building: number of stories, parapet height, type of construction (e.g., wood and stucco on wood frame), uses and fire protection (see figure 3). On the older maps, colors are used to denote wood, brick and stone construction. Maps for some cities (Boston, Cambridge, Somerville, Brookline, Chelsea, Everett, Winthrop, Watertown, and Arlington) are located in Rotch Library at MIT. Many cities have their own copies for public use (the Building Department in Boston's city hall has both old and new Sanborn maps for Boston).

The Sanborn Map Company has also provided data for specific buildings in Boston and Cambridge (see I.S.R. No. 6, Inventory of Buildings for Boston and Cambridge, April, 1972).

2.4 Census

The Bureau of the Census compiles various tables for individual census tracts and entire cities. Information relevant to this study is available for residential structures in Table H-2, "Structural, Equipment, and Financial Characteristics of Housing Units: 1970" (see figure 4). The number of residential structures in any census tract can be approximated; data on year built, gross rent, etc. is also compiled. Census tracts are indicated on an accompanying map (see figure 5). For the city of Boston, information on numbers and types of residential structures has been tabulated for local planning districts, e.g., East Boston and South End, by the Research Department of the Boston Redevelopment Authority using census data and Assessing Department records (see figure 6).

Data for the Boston area is published in: Census of Population and Housing: 1970, Census Tracts, Final Report PHC (1)-29 Boston, Mass. SMSA, and can be purchased from the U.S. Government Printing Office for $3.25 .

2.5 Aerial Photography

Aerial photographs have been made for Boston at 1" = 200' (24" x 36" sheets, entire city) and at 1" = 400' (40" x 47" sheet, downtown area). All structures can be seen from these photographs; guesses can be made about construction type and number of stories, and areas of similar types of construction can be defined. The photographs can be purchased from the Boston Redevelopment Authority, City Hall ($1.00 each for the small sheets, $4.00 for the large sheet).

2.6 Civil Defense

The National Fallout Shelter Survey conducted by the U.S. Department of the Army Office of Civil Defense is continuously compiling data on buildings throughout the country. All buildings five stories and above have been surveyed. The following information is available in booklets for each building or in computerized listings: name, address, physical vulnerability, code (construction type; see Appendix), height, number of stories, plan dimensions, year built, exterior wall weight, floor mass, interior partitions, and building use.

2.7. Maps

2.7.1 Land use maps are available for many cities and typically divide the city into the following zones: residential, commercial, industrial, institutional, institutional/public, and public open space. In Boston, maps are available from the Boston Redevelopment Authority, City Hall.

2.7.2 The United States Department of the Interior Geological Survey publishes detailed topographic maps at 1:24,000. Important structures such as schools, hospitals, firehouses and other public buildings are indicated. Transmission lines, oil and gas tanks, dams, bridges, roads and similar data are also indicated.

2.7.3 Soil maps: local maps of comparative earthquake hazard, indicating the stability of the ground, are available for some areas. A map of Boston and vicinity by Irving B. Crosby graded into five categories ranging from most stable to most unstable can be found in Earthquake Damage and Earthquake Insurance by John R. Freeman. A simplified map of the Boston region was compiled from various sources for this project (see figure 7).

2.8 Other Sources

Rough Estimates of the distribution and quantity of various building types can sometimes be obtained from informed sources, such as building inspectors and city engineers, or concerned groups, such as the Cambridge Historical Commission.

Data can be collected from personal observation, e.g., by surveying an area by car or on foot.

Various public and private organizations compile data on individual buildings for their particular purposes, but it is rarely in a convenient form from the point of view of this project. Examples are fire departments, insurance companies, real estate companies and marketing research firms.

Conclusion

Problems in estimating the distribution of buildings are generally of two types: 1) definition of building type (and associated probable consequences at various levels of shaking) and 2) numbers of the various building types.

The first problem is essentially to reach a compromise between the multiplicity of actual building types and the computational necessity of working with a limited number of types. Thus, the idealized types chosen must attempt to model as closely as possible the actual behavior of real structures in the area being considered without becoming unnecessarily specific.

The second problem is one of estimating numbers of buildings without actually counting them individually. While it is conceivable that in an extremely detailed study each individual structure would be classified according to type either by field examination or inspection of building department files, the effort that would be involved seems inappropriate at this stage. More approximate results can be obtained by utilizing other sources such as census tables and informed judgement to make prliminary estimates. Further studies could then determine the sensitivity of the hypothetical consequences to changes in these estimates.

Appendix A: Categories of Building Types

1. SDDA:

Wooden Frames, 1-3 stories
Brick Masonry, 1-5 stories
Steel frame, 1-5 stories
Steel frame, greater than 5 stories
Concrete frame, shear wall, 1-5 stories
Concrete frame, shear wall, greater than 5 stories
Precast Concrete, 1-5 stories
Flat Slab Concrete, 1-5 stories
Flat Slab Concrete, greater than 5 stories

2. Design Essentials in Earthquake Resistant Buildings, Architectural Institute of Japan, ed., 1970 (see contents)

wood
steel
reinforced concrete
steel reinforced concrete
shells
prestressed concrete
reinforced concrete wall construction
precast reinforced concrete wall construction
precast reinforced concrete framework and panel construction
masonry
reinforced concrete block

3. Earthquake Hazard in the San Francisco Bay Area: A Continuing Problem in Public Policy, Karl V. Steinbrugge, Institute of Governmental Studies, University of California, Berkeley, 1968, p. 40.

HAZARD COMPARISON OF NON-EARTHQUAKE-RESISTIVE BUILDINGS

Note: This table is intended for buildings not containing earthquake bracing, and in general, is applicable to most older construction. Unfavorable foundation conditions and/or dangerous roof tanks can increase the earthquake hazard greatly.

Simplified Description of Structural Type	Relative Damageability (in order of increasing susceptibility to damage)
Small wood-frame structures, i.e., dwellings not over 3,000 sq. ft., and not over 3 stories	1
Single or multistory steel-frame buildings with concrete exterior walls, concrete floors, and concrete roof. Moderate wall openings	1.5
Single or multistory reinforced-concrete buildings with concrete exterior walls, concrete floors, and concrete roof. Moderate wall openings	2
Large area wood-frame buildings and other wood-frame buildings	3 to 4
Single or multistory steel-frame buildings with unreinforced masonry exterior wall panels; concrete floors and concrete roof	4
Single or multistory reinforced-concrete frame buildings with unreinforced masonry exterior wall panels, concrete floors and concrete roof	5
Reinforced concrete bearing walls with supported floors and roof of any materials (usually wood)	5
Buildings with unreinforced brick masonry having sand-lime mortar; and with supported floors and roof of any materials (usually wood)	7 up
Bearing walls of unreinforced adobe, unreinforced hollow concrete block, or unreinforced hollow clay tile.	Collapse hazards in moderate shocks

Source: Abridged from Pacific Fire Rating Bureau Tariff Rules.

4. SDDA I.S.R. No. 6 (April, 1972) "Inventory of Buildings for Boston and Cambridge".

building address
number of basements
year built
floor area
building use
lateral force system (concrete shear wall, steel bracing, masonry walls, frame action)
frame construction (steel, concrete, wood, precast, bearing wall)
floor construction (framed slab, metal deck and concrete fill, flat slab, concrete joists, precast plant, wood)
exterior construction (masonry, glass or curtain wall, precast)
soil conditions
foundation construction (piles, caissons, concrete mat, spread footings).

5. Elementary Seismology, Charles F. Richter, 1958, p. 136
Masonry sub-classification (used in M.M. Scale, 1956 version)

Masonry A: good workmanship, mortar and design; reinforced, especially laterally; bound together using steel, concrete, etc.; designed to resist lateral forces.

Masonry B: good workmanship, mortar; reinforced, but not designed to resist lateral forces.

Masonry C: ordinary workmanship and mortar; no extreme weaknesses (e.g., failing to tie in at corners), but neither reinforced nor designed against horizontal forces

Masonry D: weak materials, (e.g., adobe); poor mortar; low standards of workmanship; weak horizontally.

6. U.S. Department of the Army Office of Civil Defense
National Fallout Shelter Survey Shielding Analysis Form

Physical Vulnerability Codes

The physical vulnerability codes given in this section are intended to represent as nearly as possible the vulnerability of typical facilities of each type described.

PV Code	Type of Facility
11	Quonset type, single-story building
	Wood-Framed buildings
21	Single-story or multistory dwelling
22	Single-story or multistory commercial or industrial building
	Wall-bearing buildings
31	Single-story dwelling
32	Single-story commercial or industrial
34	Two-story dwelling
35	Two-story commercial or industrial
36	3-5 story buildings
37	6-8 story buildings
38	Multistory monumental-type buildings
	Steel-framed buildings
41	Single-story very light steel frame industrial or commercial
42	Single-story light steel fram, no cranes or cranes of less than 10 tons, industrial
43	Multistory, conventional design, commercial
44	Multistory, light industrial
45	Single-story, industrial with 10-25 ton cranes
46	30-50 ton cranes
47	60-100 ton cranes
48	Over 100 ton cranes
49	Steel-framed multistory, earthquake resistant
	Reinforced concrete frame buildings
51	Single-story, very light frame, industrial or commercial
52	Single-story, light frame, no cranes or cranes of less than 10 tons, industrial

6. (cont'd)

PV Code	Type of Facility
53	Single-story, industrial 10-25 ton cranes
54	30-50 ton cranes
55	60-100 ton cranes
56	Over 100 ton cranes
57	Multistory, conventional commercial
58	Multistory, industrial
59	Multistory, earthquake resistant
91	Multistory, windowless blast-resistant design
	Composite-framed buildings (structural steel and concrete)
61	Single-story, no cranes or cranes of less than 10 tons
62	Single-story, 10-50 ton cranes
71	Tunnels and earth-covered structures
81	Mines and deep underground facilities

LIST OF FIGURES

BOSTON REDEVELOPMENT AUTHORITY City Hall / Room 900, 1 City Hall Square / Boston, Massachusetts 02201 / Telephone (617) 722-4300

November 5, 1975

Ms. Betsy Schumacher
Massachusetts Institute of
Technology
Room 1-1139
Cambridge, Massachusetts

Dear Ms. Schumacher:

This letter is in response to your request for the number of structures in the City of Boston by type. The best information we have is from the Assessing Department whose basic measurement unit is the "parcel". In most cases, there is only one building per parcel although sometimes there may be more. The following provides you with the number of parcels by type for the whole city:

Type	Number of Parcels
Single-family residence	30,829
Two-family residence	19,729
Three-family residence	17,143
Residences with 4 and more units	7,847
Mixed residential/commercial	2,653
Commercial	6,459
Industrial	1,073

One of the limitations of the above is that it does not include tax-exempt property, such as public housing, public buildings, churches, schools, etc.

I hope this is helpful.

Sincerely,

Susan Levine Houston

Susan Levine Houston
Research Department

/c

FIG. I - ASSESSING DEPT. DATA (COMPILED BY B.R.A.)

Each building on separate Application Blank.
Plans must be submitted with this Application.
Write legibly. OWNERSHIP and detail must be complete.

No. 1755.

Application for Permit to Build.

(3d CLASS BUILDING.)

Boston, August 4th 1896.

TO THE BUILDING COMMISSIONER:

The undersigned hereby applies for a permit to build, according to the following specifications: —

1. If in a block, how many buildings will be erected? —
2. Material? Wood
3. What is the Owner's name? Mathew Morton 64 Londale St
4. " " Architect's " —
5. " " Builder's " —
6. " " Location? Westville Street Ward 20 (new)
7. " " nearest street?
8. " purpose of building? Dwelling House
9. If a dwelling, for how many families? three
10. Is there to be a store in lower story? —
11. Size of lot, No. of feet front, 30; No. of feet rear, 30; No. of feet deep, 46.67
12. Size of building, No. of feet front, 24; No. of feet rear, 24; No. of feet deep, 36.
13. No. of stories, front, 3; rear, 3
14. No. of feet in height from the level of the ground to the highest part of the roof? 34
15. Does the proposed structure stand within 18 inches of the lines of adjoining premises? no distance, 21 inches
    If so, what is the thickness of the wall to be built? —
16. Distance from surrounding buildings, front — feet; side 8½ feet; side 15 feet; rear — feet.
17. Distance back from line of street? five feet
18. What is the height of nearest building? 35 What is nearest building used for? dwelling
19. Will the building be erected on solid or filled land? Solid
20. Will the foundation be laid on earth, rock, or piles? earth
21. If on piles, No. of rows, — distance on centres? — length of —
22. Diameter, top of? — diameter, bottom of? —
23. Size of posts? 4"x8" Spruce
24. " girts? 4"x8"
25. " floor timbers? 1st floor 2"x9", 2d 2"x9", 3d 2"x8", ~~4th~~ roof 2'8"
26. Braces, how put in? cut in
27. Building, how framed? Framed & pinned
28. What is the material of foundation? Stone Thickness? 20" Laid with half cement mortar? yes
29. Underpinning, material of Quincy Granite height of rubble 3ft
30. Will the roof be flat, pitch, mansard, or hip? Flat
31. Will the building be heated by steam, furnaces, stoves or grates? Stoves Are all the flues lined? yes
32. Will the building conform to the requirements of the law? yes
33. No. of brick walls? — and where placed? —
34. Probable cost above land? $4000

FIG. 2 – TYPICAL BUILDING PERMIT

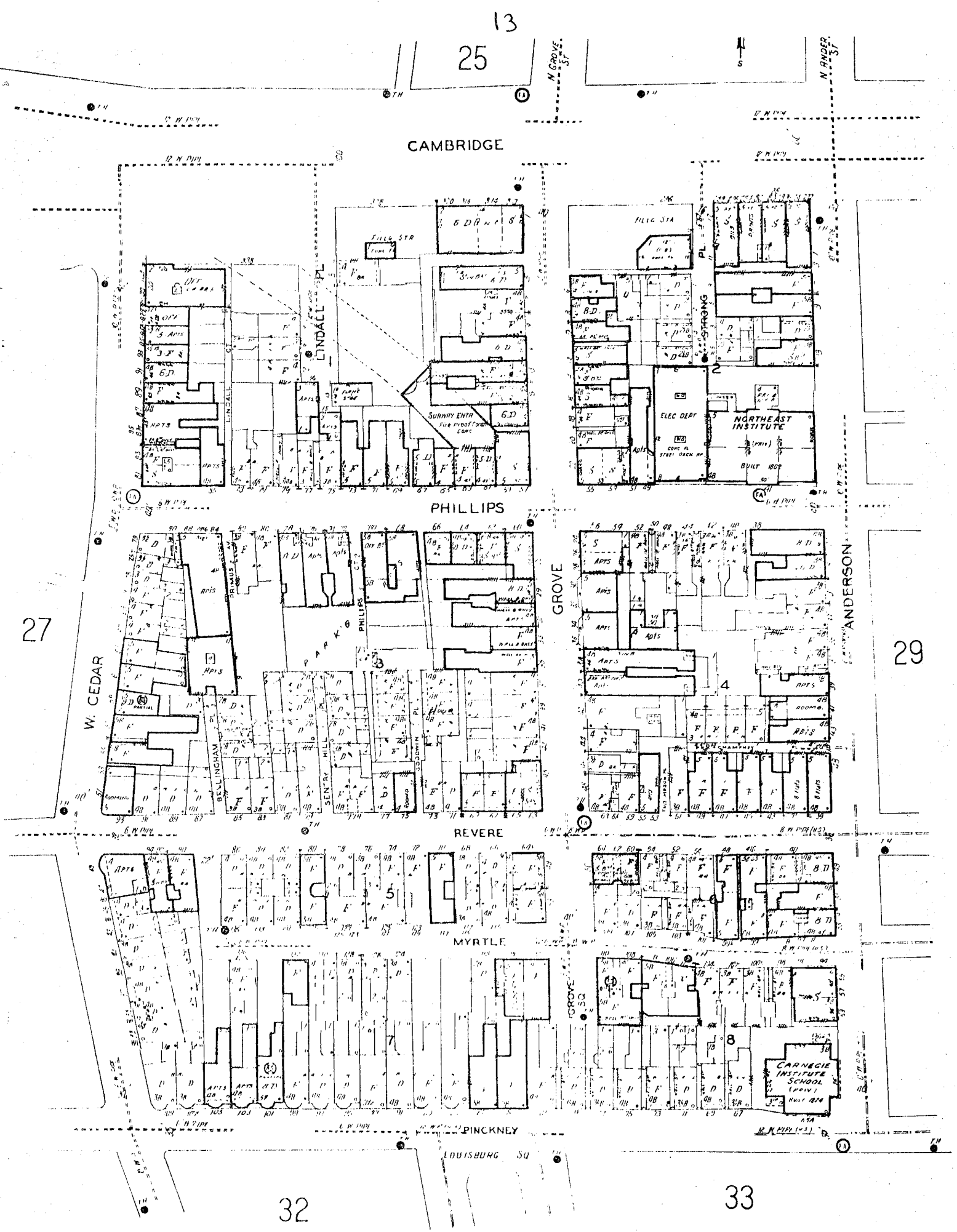

FIG. 3- TYPICAL SANBORN MAP

Table H-2. Structural, Equipment, and Financial Characteristics of Housing Units: 1970—Continued

[Data based on sample, see text. For minimum base for derived figures (percent, median, etc.) and meaning of symbols, see text]

Census Tracts	Suffolk County					Beverly						Lynn		
	Total	Boston	Chelsea	Revere	Balance	Tract 2171	Tract 2172	Tract 2173	Tract 2174	Tract 2175	Tract 2176	Tract 2051	Tract 2052	Tract 2053
All year-round housing units	**264 222**	**232 406**	**10 490**	**14 532**	**6 794**	**1 622**	**2 327**	**1 762**	**1 947**	**2 561**	**1 784**	**1 765**	**1 952**	**1 840**
UNITS IN STRUCTURE														
1 (excludes mobile home or trailer)	43 154	34 225	979	5 566	2 384	1 267	1 966	640	362	1 430	1 502	1 336	979	1 610
2	46 934	37 310	2 541	4 487	2 596	105	240	440	417	431	169	284	669	101
3 and 4	77 548	69 213	4 484	2 928	923	43	48	428	613	411	68	108	265	93
5 to 49	84 120	79 429	2 406	1 450	835	207	–	254	555	289	35	37	99	26
50 or more	12 466	12 229	80	101	56	–	73	–	–	–	10	–	–	5
YEAR STRUCTURE BUILT														
1969 to March 1970	2 441	1 990	36	117	298	118	65	–	9	–	30	10	24	25
1965 to 1968	12 384	11 349	139	776	120	148	75	22	30	37	118	154	46	63
1960 to 1964	9 130	7 800	161	1 055	114	108	80	13	27	71	259	140	105	174
1950 to 1959	16 973	13 742	585	2 172	474	561	683	298	29	265	442	191	123	297
1940 to 1949	20 124	18 134	429	1 129	432	186	255	166	42	222	112	97	51	199
1939 or earlier	203 170	179 391	9 140	9 283	5 356	501	1 169	1 263	1 810	1 966	823	1 173	1 603	1 082
HEATING EQUIPMENT														
Steam or hot water	174 039	151 624	6 215	10 670	5 530	882	1 145	782	1 092	1 397	1 167	956	1 173	1 043
Warm air furnace	47 124	42 218	1 904	2 372	630	574	982	863	706	1 074	462	749	721	714
Built-in electric units	8 366	7 365	214	416	371	134	108	10	37	28	25	10	10	27
Floor, wall, or pipeless furnace	2 482	2 135	117	165	65	32	51	14	10	11	33	15	9	19
Other means or not heated	32 211	29 064	2 040	909	198	–	41	93	102	51	97	35	39	37
BASEMENT														
All units with basement	252 069	222 454	9 994	13 385	6 236	1 431	2 064	1 736	1 898	2 546	1 450	1 742	1 878	1 804
One-family houses with basement	40 926	32 705	935	5 032	2 254	1 196	1 723	629	358	1 420	1 183	1 320	974	1 592
SELECTED EQUIPMENT														
With more than 1 bathroom	30 029	25 119	814	2 624	1 472	573	668	202	163	796	850	419	384	426
With public water supply	264 132	232 313	10 493	14 539	6 787	1 622	2 329	1 763	1 947	2 565	1 781	1 765	1 952	1 840
With public sewer	262 992	231 567	10 459	14 178	6 788	1 320	2 223	1 754	1 934	2 526	786	1 686	1 952	1 764
With air conditioning	43 773	37 696	1 957	2 798	1 322	368	423	191	159	326	223	361	371	496
Room unit(s)	38 504	32 675	1 910	2 639	1 280	360	381	179	159	319	211	342	365	496
Central system	5 269	5 021	47	159	42	8	42	12	–	7	12	19	6	–
All occupied housing units	**247 969**	**217 618**	**9 933**	**14 026**	**6 392**	**1 567**	**2 304**	**1 678**	**1 829**	**2 475**	**1 725**	**1 747**	**1 904**	**1 826**
YEAR MOVED INTO UNIT														
1968 to March 1970	85 943	78 811	2 628	2 980	1 524	324	416	433	613	567	296	235	389	179
1965 to 1967	48 120	42 623	1 894	2 525	1 078	223	321	371	363	366	348	261	299	198
1960 to 1964	37 405	32 301	1 683	2 476	945	272	325	159	256	431	311	345	358	389
1950 to 1959	37 752	31 640	1 874	2 884	1 354	515	755	384	252	533	458	493	376	577
1949 or earlier	38 749	32 243	1 854	3 161	1 491	233	487	331	345	578	312	413	482	483
AUTOMOBILES AVAILABLE														
1	112 057	95 795	4 510	7 974	3 778	712	1 201	895	985	1 342	740	1 036	1 131	1 037
2	21 716	17 309	883	2 351	1 173	623	764	344	268	657	636	510	381	533
3 or more	3 416	2 807	89	302	218	117	159	41	11	93	138	64	77	104
None	110 780	101 707	4 451	3 399	1 223	115	180	398	565	383	211	137	315	152
GROSS RENT														
Specified renter occupied units[1]	**174 484**	**157 972**	**7 113**	**6 452**	**2 947**	**295**	**327**	**886**	**1 265**	**875**	**399**	**309**	**694**	**222**
Less than $40	636	589	41	6	–	–	–	5	6	–	8	–	–	–
$40 to $59	6 425	5 862	331	193	39	19	–	48	47	57	45	5	10	9
$60 to $79	19 341	17 816	1 008	438	79	65	–	33	132	37	96	10	138	4
$80 to $99	21 825	18 946	1 649	922	308	11	40	141	207	107	47	46	45	31
$100 to $149	76 148	67 683	3 319	3 695	1 451	62	205	473	752	448	48	150	311	94
$150 to $199	33 921	31 569	600	919	833	77	55	153	102	178	34	52	153	59
$200 to $249	7 758	7 436	89	87	146	36	9	9	10	19	18	21	10	–
$250 or more	6 363	6 297	11	36	19	7	12	16	–	4	30	–	–	7
No cash rent	2 067	1 774	65	156	72	18	6	8	9	25	73	25	27	18
Median	$125	$126	$106	$119	$137	$117	$121	$121	$114	$126	$87	$130	$125	$134
GROSS RENT AS PERCENTAGE OF INCOME BY INCOME														
Specified renter occupied units[1]	**174 484**	**157 972**	**7 113**	**6 452**	**2 947**	**295**	**327**	**886**	**1 265**	**875**	**399**	**309**	**694**	**222**
Less than $5,000	70 184	64 705	2 672	2 057	750	154	133	320	461	256	202	73	284	63
Less than 20 percent	2 118	1 952	125	31	10	11	–	6	27	12	14	–	5	–
20 to 24 percent	4 318	3 989	206	107	16	12	18	23	10	23	14	5	5	–
25 to 34 percent	10 717	9 736	534	371	76	33	6	58	106	36	31	7	36	16
35 percent or more	47 847	44 218	1 661	1 395	573	87	104	227	307	160	102	51	209	34
Not computed	5 184	4 810	146	153	75	11	5	6	11	25	41	10	29	13
Median	35.0+	35.0+	35.0+	35.0+	35.0+	35.0+	35.0+	35.0+	35.0+	35.0+	35.0+	35.0+	35.0+	35.0+
$5,000 to $9,999	61 499	55 482	2 560	2 349	1 108	75	127	346	519	338	106	135	175	79
Less than 20 percent	25 162	22 083	1 635	1 061	383	21	51	134	254	148	42	51	70	19
20 to 24 percent	15 357	13 848	536	656	317	22	42	111	179	90	9	50	60	36
25 to 34 percent	14 899	13 780	351	471	297	16	22	81	67	73	32	18	40	19
35 percent or more	5 370	5 164	25	85	96	16	6	20	14	17	–	11	–	–
Not computed	711	607	13	76	15	–	6	–	5	10	23	5	5	5
Median	21.7	21.9	18.1	20.6	22.6	23.8	21.1	21.8	20.1	20.9	19.8	21.4	21.3	22.5
$10,000 to $14,999	27 880	24 499	1 231	1 458	692	48	51	189	209	237	41	78	154	55
25 percent or more	954	935	6	9	4	5	6	10	–	–	–	–	5	–
Not computed	272	224	10	10	28	7	–	8	–	–	12	10	–	–
Median	14.1	14.2	12.6	13.6	14.9	16.5	14.4	13.0	12.9	13.8	14.3	13.2	14.1	6.4
$15,000 or more	14 921	13 286	650	588	397	18	16	31	76	44	50	23	81	25
25 percent or more	238	238	–	–	–	–	–	–	–	–	–	–	–	–
Not computed	187	152	6	23	6	–	–	–	4	–	8	–	7	5
Median	10.4	10.6	10.0	10.0+	10.9	...	...	10.0+	10.0+	10.7	17.1	...	10.0+	...

[1]Excludes one-family homes on 10 acres or more.

FIG. 4- TYPICAL PAGE, CENSUS TABLE H-2

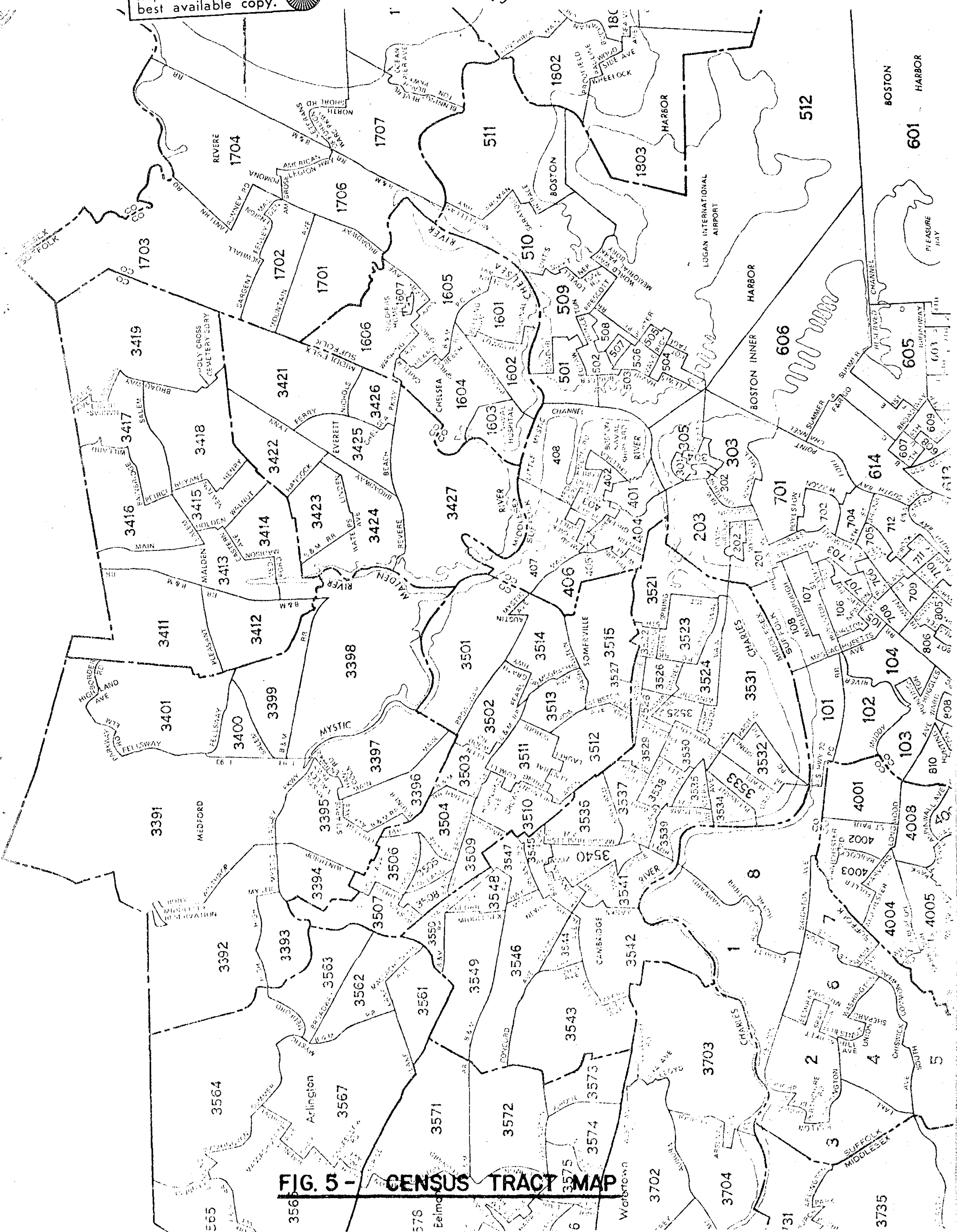

FIG. 5 - CENSUS TRACT MAP

Planning District	Single Unit Structures: Detached # of Structures	Detached # Owner-Occupied	Detached % Owner-Occupied	Attached # of Structures	Attached # Owner-Occupied	Attached % Owner-Occupied	Two Unit Structures # of (Units)	Two Unit Structures # of Structures	Two Unit Structures # Owner-Occupied	Two Unit Structures % Owner-Occupied
1. East Boston	845	716	85%	446	225	50%	(2,658)	1,329	988	74%
2. Charlestown	285	240	84%	720	556	77%	(922)	461	455	99%
3. South Boston	761	612	80%	1,328	851	64%	(2,186)	1,093	803	74%
4A. West End	11	3	27%	4	4	100%	(16)	8	2	25%
4B. North End	6	0	0%	59	51	86%	(72)	36	22	61%
4C. South Cove	10	3	30%	54	40	74%	(50)	25	10	40%
4D. Central	3	0	0%	15	6	40%	(20)	10	2	20%
5. Back Bay/Beacon Hill	141	62	44%	495	353	71%	(156)	78	48	62%
6. South End	169	77	46%	535	350	65%	(300)	150	47	31%
7. Fenway-Kenmore	87	48	55%	159	56	35%	(118)	59	35	59%
8. Allston-Brighton	1,705	1,542	90%	284	140	49%	(4,866)	2,433	2,246	92%
9. Jamaica Plain/Parker Hill	1,636	1,396	85%	218	115	53%	(2,386)	1,193	960	81%
10A. Washington Park	308	199	65%	650	71	11%	(836)	418	382	91%
10B. Campus High	34	12	35%	34	10	29%	(52)	26	9	35%
10C. Model Cities	977	733	75%	404	137	34%	(2,518)	1,259	932	74%
11A. Dorchester I	694	555	80%	134	66	49%	(1,420)	710	686	97%
11B. Dorchester II	3,717	3,335	90%	219	126	58%	(6,010)	3,005	2,633	88%
12. Roslindale	3,685	3,512	95%	141	63	45%	(3,852)	1,926	1,732	90%
13. West Roxbury	5,939	5,706	96%	182	14	8%	(2,270)	1,135	1,023	90%
14. Hyde Park	4,502	4,286	95%	318	43	14%	(3,036)	1,518	1,264	83%
15. Mattapan	1,988	1,771	89%	129	45	35%	(3,542)	1,771	1,542	87%
Total	27,503	24,808	90%	6,528	3,322	51%	(37,286)	18,643	15,824	85%

FIG. 6 - CENSUS DATA COMPILED BY B.R.A.

[1] Factor used in determining average units per structure.

3 & 4 Unit Structures					Total 1-4 Unit Structures			Unit Overview		
# of (Units)	Avg. Units/ Structure Factor[1]	# of Structures	# Owner-Occupied	% Owner-Occupied	# of Structures	# Owner-Occupied	% Owner-Occupied	(Units) in 1-4's	All Units	% of All Units In 1-4's
(7,776)	3.03	2,566	1,883	73%	5,186	3,812	74%	11,725	13,713	86%
(1,717)	3.07	585	305	52%	2,051	1,556	76%	3,724	5,145	72%
(6,045)	3.02	2,002	1,100	55%	5,184	3,366	65%	10,320	14,226	73%
(102)	3.6	28	4	14%	51	19	37%	133	1,473	9%
(1,734)	3.6	481	358	74%	582	431	74%	1,871	4,273	44%
(329)	3.6	91	49	54%	180	102	57%	443	968	46%
(184)	3.6	51	18	35%	79	26	33%	222	1,393	16%
(1,618)	3.6	449	202	45%	1,163	665	57%	2,410	16,896	14%
(3,402)	3.5	972	314	32%	1,826	788	43%	4,406	10,757	41%
(963)	3.7	260	129	50%	565	268	47%	1,327	14,002	9%
(3,782)	3.2	1,181	613	52%	5,603	4,541	81%	10,637	25,344	42%
(5,385)	3.05	1,766	1,003	57%	4,813	3,474	72%	9,625	16,558	58%
(1,925)	3.07	627	335	53%	2,003	987	49%	3,719	7,083	53%
(262)	3.25	81	21	26%	175	52	30%	557	836	67%
(8,173)	3.02	2,706	1,377	51%	5,346	3,179	60%	12,072	17,068	71%
(5,524)	3.03	1,823	1,130	62%	3,361	2,437	73%	7,772	10,627	73%
(10,332)	3.04	3,399	2,347	69%	10,340	8,441	82%	20,278	23,172	88%
(2,759)	3.06	902	628	70%	6,654	5,935	89%	10,437	12,201	86%
(578)	3.05	190	83	44%	7,446	6,826	92%	8,969	10,674	84%
(1,347)	3.09	436	301	69%	6,774	5,894	87%	9,203	11,115	83%
(5,195)	3.02	1,720	1,052	61%	5,608	4,410	79%	10,854	14,848	73%
(69,213)	3.08	22,316	13,252	59%	74,990	57,203	76%	140,570	232,406	60%

FIG. 6 (CONTINUED)

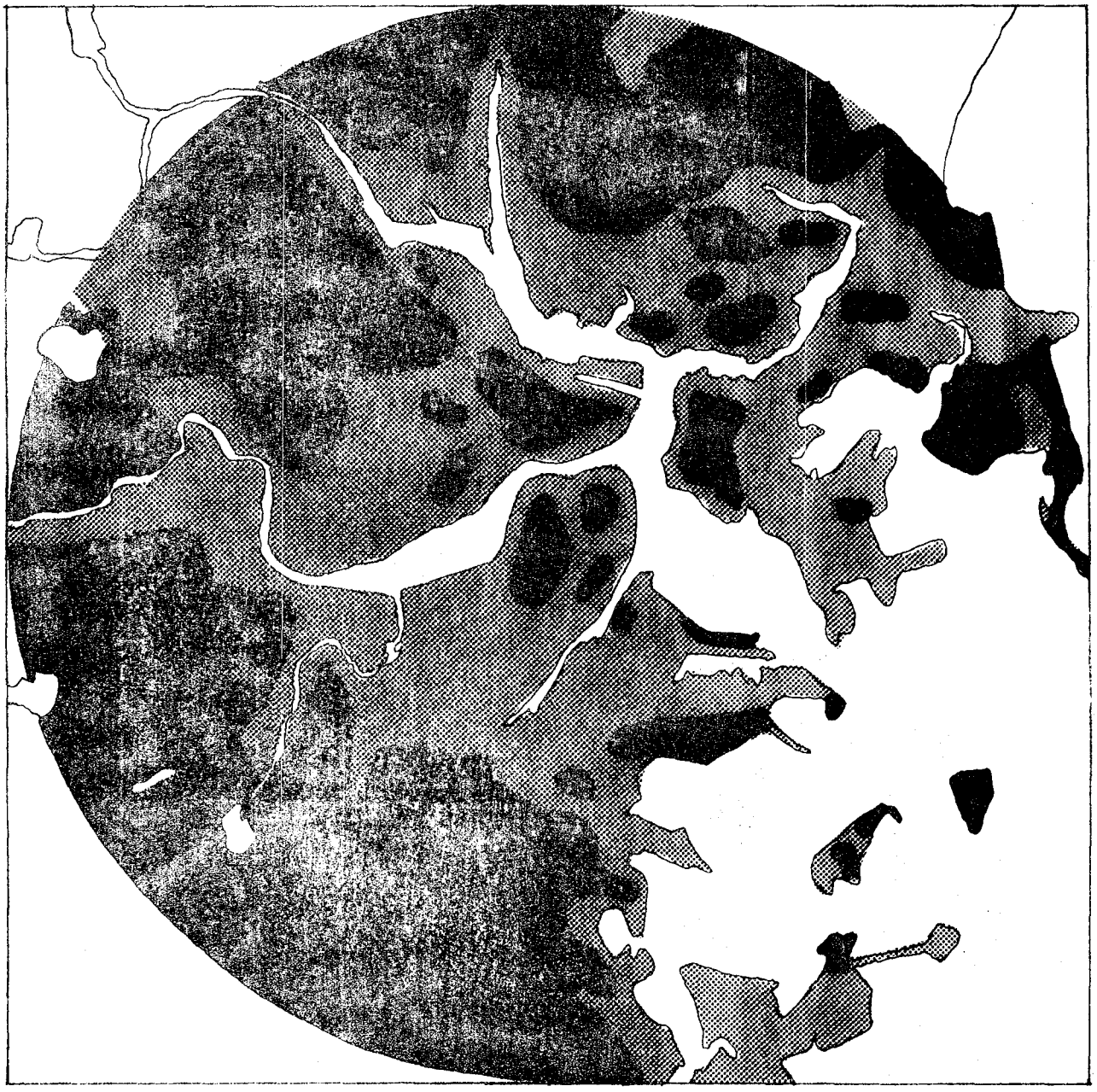

FIG. 7