

OPTIMUM SEISMIC PROTECTION FOR NEW BUILDING
CONSTRUCTION IN EASTERN METROPOLITAN AREAS

NSF Grant GK-27955X

Internal Study Report No. 6

INVENTORY OF BUILDINGS FOR BOSTON
AND CAMBRIDGE

April, 1972

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Any opinions, findings, conclusions
or recommendations expressed in this
publication are those of the author(s)
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16. Abstract (Limit: 200 words) A seismic protection survey of existing buildings in Boston and Cambridge was conducted to provide a data base for the Boston area. The data base was constructed from information supplied by the Sanbord Map Co., and supplemented by that furnished by the U.S. Corps of Engineers. Building data for each structure five stories and higher included in the survey was recorded on a detailed seismic protection study form. Following a review of the compiled data, categories were finalized to provide information as follows on each building: address, number of stories and basements, year constructed, floor, exterior, foundation and frame construction, and soil conditions. Data on punch cards can be displayed using listed key codes. A sample page of a report generated by sorting out the number of stories, the lateral force system, and the frame type and construction is included, together with a list of pertinent internal study reports.				
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A survey of existing buildings in the cities of Boston and Cambridge was carried out to provide a data base for the Boston area. The data base was constructed from information provided by Sanborn Map Co., 629 5th Avenue, Pelham, New York and was supplemented by information provided by the U. S. Corps of Engineers, Natick, Massachusetts.

Sanborn Map Co. was provided with a form (Figure 1) on which the associated building data for each building included in the survey was recorded. All buildings five stories and higher were included in the survey. After the forms were returned by Sanborn, supplemental information was required to complete the data sheets. This supplement was obtained from the U. S. Corps of Engineers Civil Defense Surveys for Northeastern Massachusetts.

After a review of the data assembled, some of the detailed categories of the original form were regrouped because of lack or over lapping of data. The form of the information on punched cards for each building is as follows:

Building Address

Number of Stories

Number of Basements

Year Built

Floor Area

Building Use

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Lateral Force System

- a) Concrete Shear Wall
- b) Steel Bracing
- c) Masonry Walls
- d) Frame Action

Frame Construction

- a) Steel
- b) Concrete
- c) Wood
- d) Precast
- e) Bearing Wall

Floor Construction

- a) Framed Slab
- b) Metal Deck and Concrete Fill
- c) Flat Slab
- d) Concrete Joists
- e) Precast Plank
- f) Wood

Exterior Construction

- a) Masonry
- b) Glass or Curtain Wall
- c) Precast

Soil Conditions

Foundation Construction

- a) Piles
- b) Caissons
- c) Concrete Mat
- d) Spread Footings

At the writing of this report no information has been provided for soil conditions or foundation construction. This information is expected to be added by observing the location of the building, assessing the soil conditions and using engineering judgement to determine the probable foundation construction.

The data on cards can be displayed using the "Code Keys" shown in Figure 2. The data can be sorted and a report generated for any three of the keys listed below:

<u>Item</u>	<u>Sort Code</u>
Building Code Number	1
Year Built	2
Building Height	3
Number of Stories	4
Number of Basements	5
Building Use	8
Frame Type and Floor Construction	9
Floor Construction	10
Exterior Wall Construction	11
Lateral Force System	12

A sample page of a report generated by sorting on the number of stories, lateral force system and frame type and floor construction is shown in Figure 3.

Two complete reports for the entire data base have been generated and are available for review. Their length prohibits inclusion in this report.

SEISMIC PROTECTION STUDY

Building Code _____

BUILDING NAME: _____

City: _____

Street Address: _____

Name of Owner: _____

Street Address: _____

City or Town: _____ Tel. No. _____

Year Built: _____ Stories _____ Plan Din. _____

Bldg. Height: _____

Total Stories _____

BUILDING USE

- | | |
|---------------------------------------|--|
| 1. Apartment <input type="checkbox"/> | 5. Industrial <input type="checkbox"/> |
| 2. Hospital <input type="checkbox"/> | 6. Commercial <input type="checkbox"/> |
| 3. Schools <input type="checkbox"/> | 7. Other <input type="checkbox"/> |
| 4. Offices <input type="checkbox"/> | |

FOUNDATION CONSTRUCTION

1. Piles 2. Caissons 3. Conc. Mat. 4. Spread Footings

BUILDING CONSTRUCTION

- | <u>FRAME</u> | <u>FLOOR</u> | <u>EXTERIOR</u> |
|---|---|--|
| 1. steel frame <input type="checkbox"/> | 1. framed slab <input type="checkbox"/> | 1. conc. blk <input type="checkbox"/> |
| 2. conc. frame <input type="checkbox"/> | 2. mtl. dk & conc. <input type="checkbox"/> | 2. brick face <input type="checkbox"/> |
| 3. wood frame <input type="checkbox"/> | 3. flat slab <input type="checkbox"/> | 3. wood stud <input type="checkbox"/> |
| 4. precast frame <input type="checkbox"/> | 4. conc. joists <input type="checkbox"/> | 4. brick <input type="checkbox"/> |
| 5. bearing wall <input type="checkbox"/> | 5. precast plank <input type="checkbox"/> | 5. curtain wall <input type="checkbox"/> |
| | 6. wood <input type="checkbox"/> | 6. glass <input type="checkbox"/> |
| | | 7. precast <input type="checkbox"/> |

Field Visit: _____

Soils Condition: _____

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CODE NUMBER	AREA	CODE NUMBER	AREA	CODE NUMBER	AREA
5		11		2	4 0.272E 05 4
5		11	4	0.272E 05	4
5		51		3	3 0.124E 05 3
5		51	3	0.124E 05	3
5		56		3	46 0.871E 05 26
5		56	46	0.871E 05	26
5	53	0.126E 06	33		
5	53	0.203E 06	53		

Number of buildings with area given

All 6-story buildings

6		11		2	5 0.216E 05 3
6	Sub-total - Number of buildings with Frame and Floor Code Key	11	5	0.216E 05	3
6		23		4	2 0.107E 05 1
6		23	2	0.107E 05	1
6		36		3	2 0.000E 00 0
6		36	2	0.000E 00	0
6		51		2	1 0.741E 04 1
6		51		3	5 0.129E 05 3
6		51	6	0.203E 05	4
6	Total # of 6-story Buildings	56		3	21 0.689E 05 16
6		56	21	0.689E 05	16
6	36 0.121E 06 24				
6	36 0.182E 06 36				

Sub-total of all 6-story buildings with area reported.

Total area reported.

Total with average area multiplied by total number of buildings.

7		11		2	4 0.158E 05 4
7		11	4	0.158E 05	4
7		23		4	4 0.360E 04 1
7		23	4	0.360E 04	1
7		45		1	1 0.000E 00 0
7		45	1	0.000E 00	0
7		51		3	4 0.552E 04 3
7		51	4	0.552E 04	3
7	13	0.249E 05	3		

6

Figure #3

"CODE KEYS"

NUMBER OF STORIES

Code is the number of stories not including basements.

LATERAL FORCE SYSTEM

CODE = 1 Concrete Shear Wall
= 2 Bracing
= 3 Masonry Walls
= 4 Frame Action

FRAME & FLOOR

CODE = 10 x Frame Code and Floor Code

10 x Frame Code = 10 Steel
= 20 Concrete
= 30 Wood
= 40 Precast
= 50 Bearing Wall

Floor Code = 1 Framed Slab
= 2 Metal Deck and Concrete
= 3 Flat Slab
= 4 Concrete Joists
= 5 Precast Plank
= 6 Wood

BUILDING USE

CODE = 1 Apartment
= 2 Hospital
= 3 School
= 4 Office
= 5 Industrial
= 6 Commercial
= 7 Other

EXTERIOR

CODE = 1 Masonry
= 2 Glass or Curtain Wall
= 3 Precast

List of Internal Study Reports

1. R.V. Whitman, "Preliminary Work Plans and Schedules," August, 1971.
2. E.H. Vanmarcke and R.V. Whitman, "Background for Preliminary Expected Future Loss Computations," October, 1971.
3. P.J. Trudeau, "Identification of Typical Soil Profiles in the Boston Basin Area," November, 1971.
4. J.M. Biggs, "Comparison of Wind and Seismic Forces on Tall Buildings," December, 1971.
5. R.V. Whitman, "Contribution to State-of-the-Art Report of the Earthquake Committee of the IABSE-ASCE Tall Buildings Committee-- Economic and Social Aspects," March, 1972.