OPTIMUM SEISMIC PROTECTION FOR NEW BUILDING CONTRUCTION IN EASTERN METROPOLITAN AREAS

NSF Grant GK-27955X

Internal Study Report No. 18

BORINGS ON MIT CAMPUS NEAR WESTGATE II

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List of Internal Study Reports

1. R.V. Whitman, "Preliminary Work Plans and Schdules," August, 1971.

2. E.H. Vanmarke 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.

6. J.E. Brennan and R.J. McNamara, "Inventory of Buildings for Boston and Cambridge," April, 1972.

7. C.A. Cornell and H.A. Mertz, "Analysis of the Seismic Risk on Firm Ground for Sites in the Central Boston Metropolitan Area, January, 1972.

8. R.V. Whitman, J.W. Reed, P. Marshall, "1967 Caracas Venezuela Earthquakes," May, 1972.

9. R.V.Whitman, E.H. Vanmarke, "Damage Statistics from Japanese Earthquakes," May, 1972.

10. E.H. Varnarke, J.W. Reed, and D. Roth, "Evaluation of Expected Losses and Total Present Cost: Preliminary Sensitivity Analysis," July, 1972

11. R.V. Whitman, et al., "1964 Alaskan Earthquake Tall Building Damage Review," July, 1972.

12. R.V. Whitman and J.W. Reed, "San Fernando Earthquake Data Base Computer Storage Format," August, 1972.

List of Internal Study Reports

Continued

13. J.W. Reed, and R.V. Whitman, "San Fernando Earthquake Damage Statistics," August, 1972.

14. R.V. Whitman, and S. Anagnostopoulos, "Elastic Analysis of Pilot Building," August, 1972.

15. John Protonotarios, "Soil-Amplification Analyses on Typical Boston Soil Profiles," September, 1972.

16. S. Anagnostopoulos, and J.M. Roesset, "Description and User's Manual of the Inelastic Dynamic Analysis Program," September, 1972.

17. R.V. Whitman, J.T. Christian, P.J. Trudeau, "Ground Motions Measured by VM-1", September, 1972.

During the month of February, 1972, American Drilling and Boring Company installed four borings in the parking lot between the Joyce Chen Restaurant on Memorial Drive and Westgate II on the MIT campus for the Boston Quake Study Project (see Figure 1 for location plan). There were several reasons for making these borings. One was to provide open holes in which Weston Geophysical Research, Inc. could conduct seismic tests to measure in situ the shear wave velocity of the Boston Blue Clay. Another reason was to provide the Boston Quake Study Project with high quality undisturbed samples of the Boston Blue Clay for laboratory testing to determine the shear wave velocity using MIT's Hardin Oscillator and compare the results with those obtained in the field. A further purpose of these borings was to ascertain which typical profile (see Internal Study Report #3, November, 1971) was located at this site. The results of the borings are shown in Figures 2 through 5 and a comparison with other borings in the area indicated in Figure 6.

These 6" diameter wash borings were made using a truck-mounted rotary rig. Due to caving of the layer of sand and gravel between the depths of 15 and 45 feet, 6" diameter steel casing was installed for the first 50 feet of these holes. The holes were extended through the clay and clayey sand from 50 feet to 175 feet using drilling mud to keep them open. At a depth of 175 feet a very dense (120 blows/4 inches) fine sand layer was encountered and the holes were discontinued. At the completion of each hole, 4 inch O.D. plastic (PVC) pipe in 20 foot lengths connected with 4-3/4 inch O.D. couplings was installed in the holes. This plastic casing was lowered open-ended inside the 6" steel

casing. At a depth of about 100 feet this casing required pushing--first by hand, and then the last two sections with the use of the hydraulic jack on the truck-mounted rotary rig. After the plastic casing was installed, the drillers then lowered A-rods with which they washed out the material that had collected inside the plastic casing. The 6" steel casing was then removed using the conventional "bumping out" procedure.

In Hole #1 undisturbed samples (3" shelby tubes) were taken continuously through the clay layer (from a depth of about 50 feet to about 110 feet). These samples were taken with a fixed piston type sampler. Laboratory testing will be performed on these samples to obtain values of the shear wave velocity and also to obtain the parameters necessary for use in empirical relationships.

Acknowledgements

We of the Boston Quake Study Project would like to express our appreciation for the assistance of Mr. William Dickson, Director of Physical Plant at M.I.T., of Mr. John Barbato, Resident Engineer of M.I.T., and of Mr. Mark Haley who supervised and logged these borings. We would also like to thank Mr. Charles Guild, President of American Drilling and Boring Company of Providence, Rhode Island who contributed these borings to our research program.

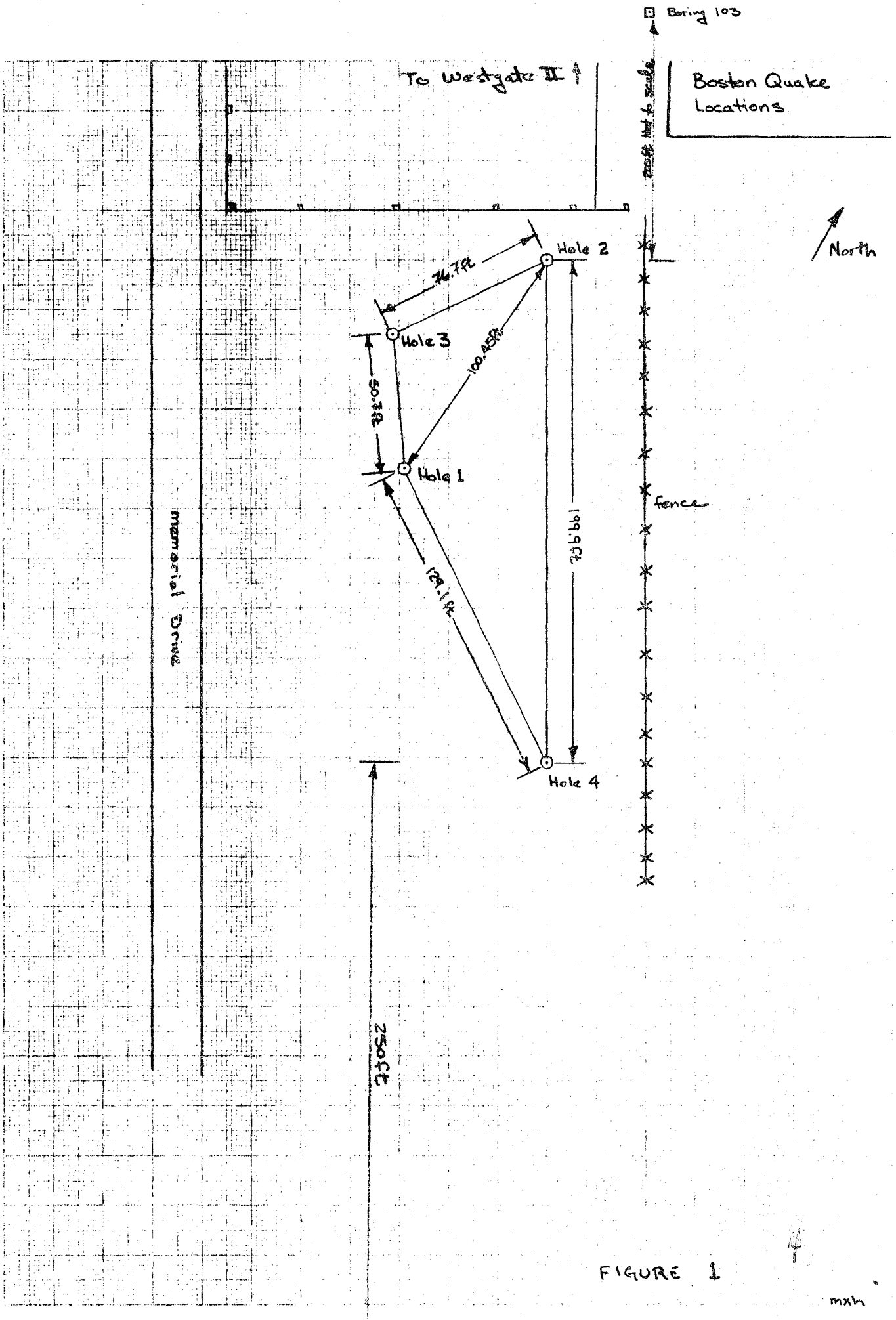
Boring 103
Boston Quake Locations
To Westgate II
Material Drive
Hole 2
Hole 3
Hole 1
Hole 4
76.7ft
100.45ft
50.42ft
199.99ft
129.14ft
250ft
fence
North

FIGURE 1

mxh

Boston Quake
Hole No 1
installed 1 March 72

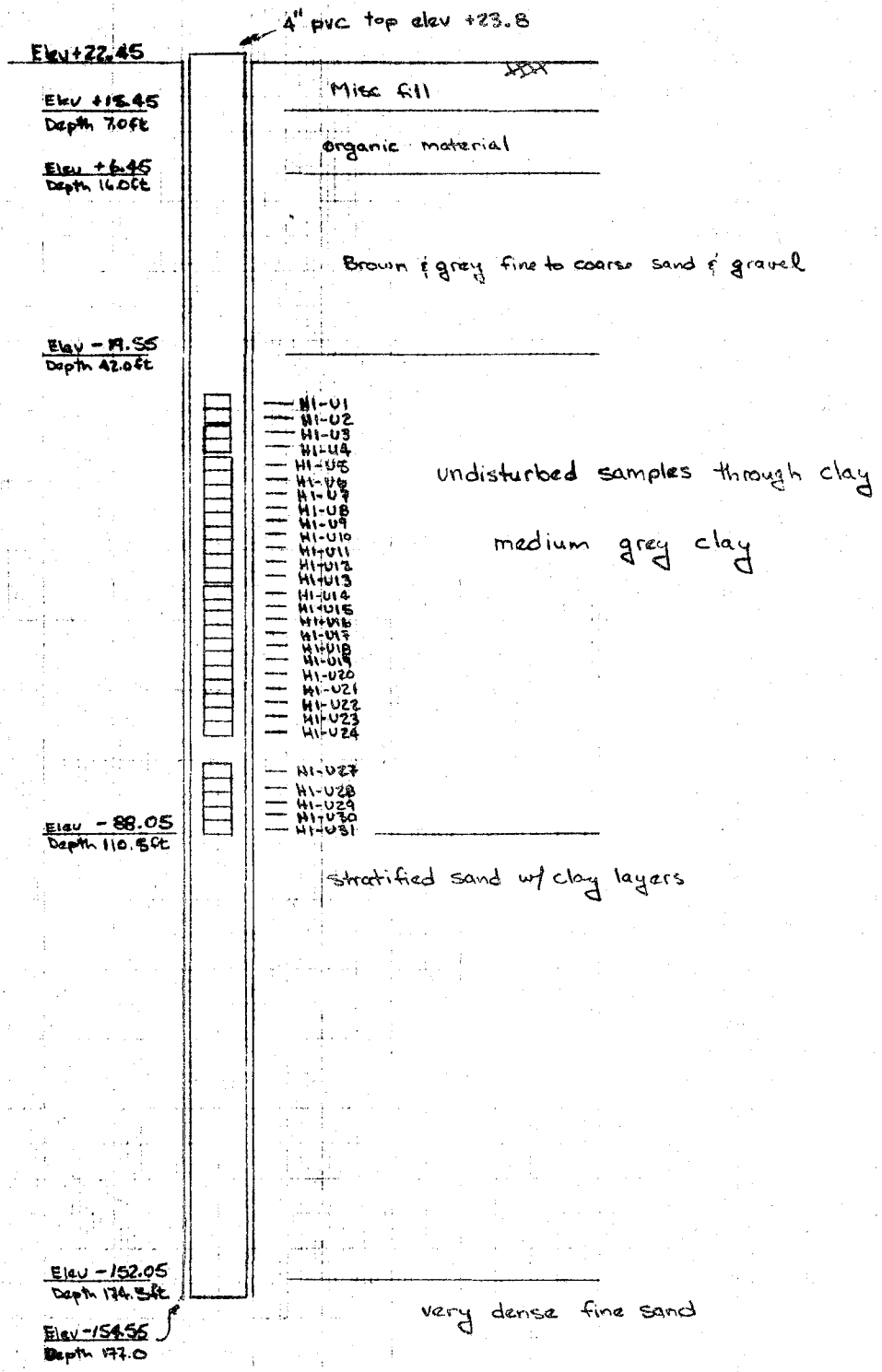

FIGURE 2

mxh

Boston Quake
Hole No 2
installed 8 Feb 72

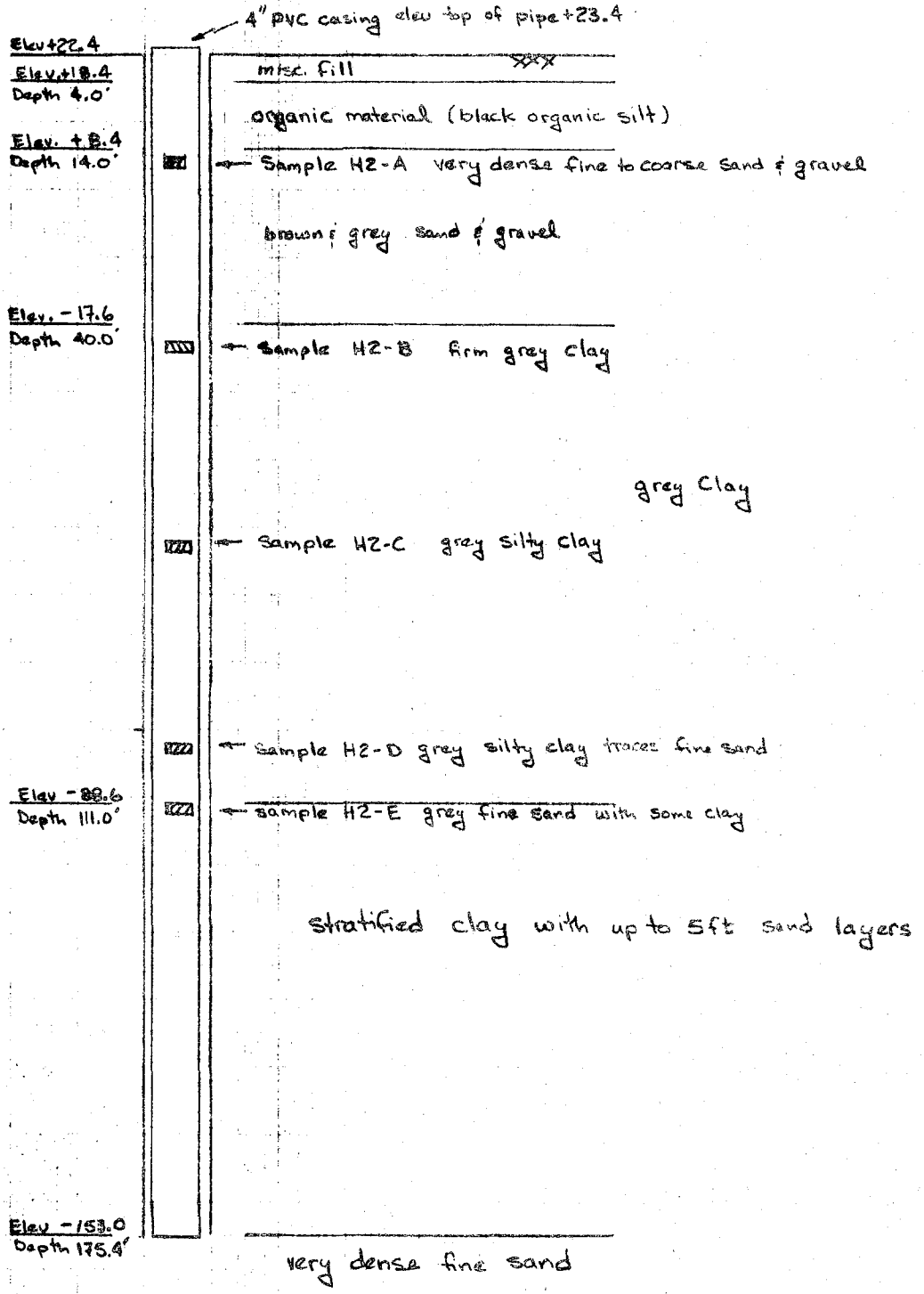

FIGURE 3

MKH

Boston Quake
Hole No. 3
installed 16 Feb 72

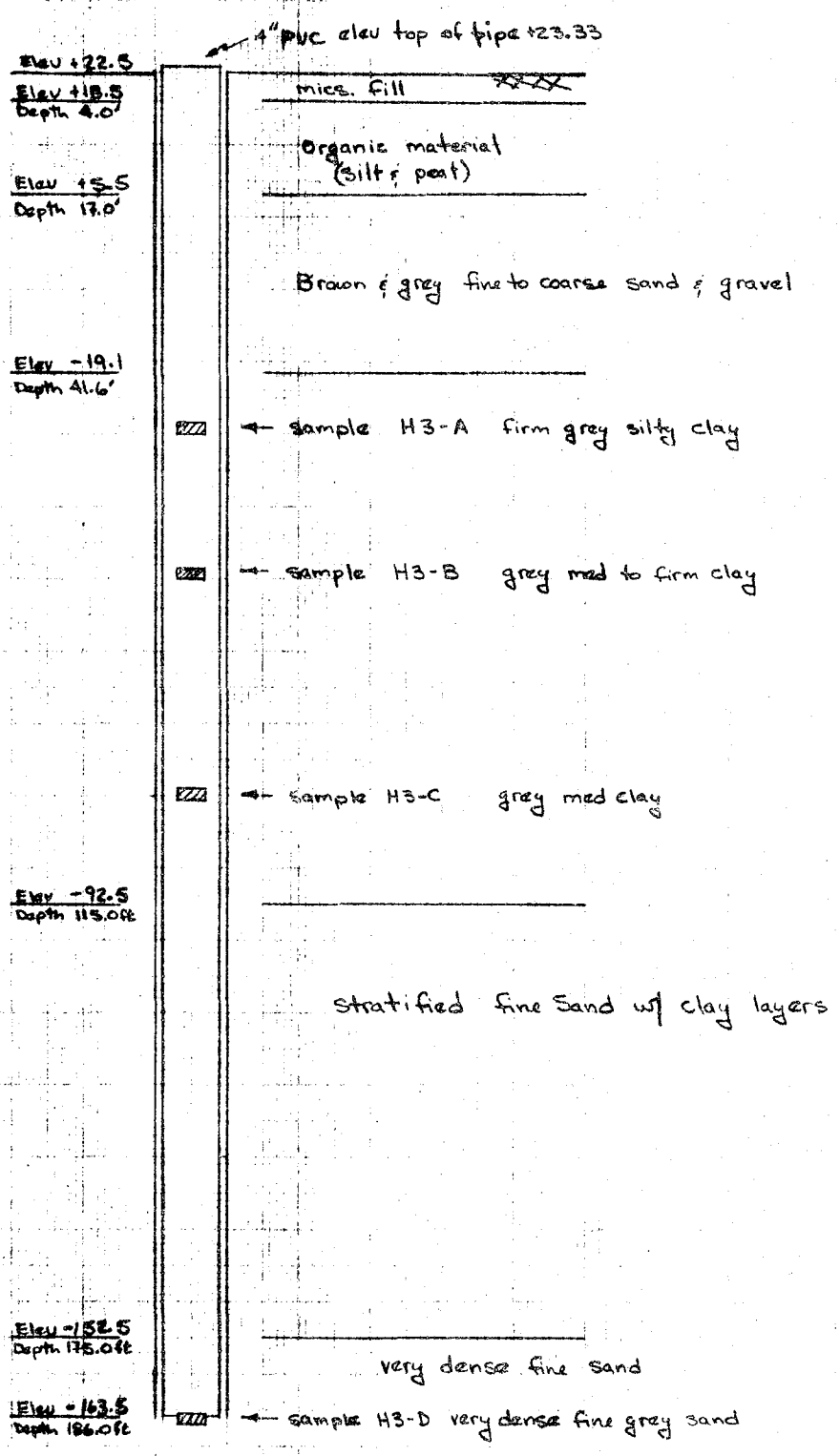

FIGURE 4

mxh

Boston Quake
Hole No 4
installed 10 Feb 72

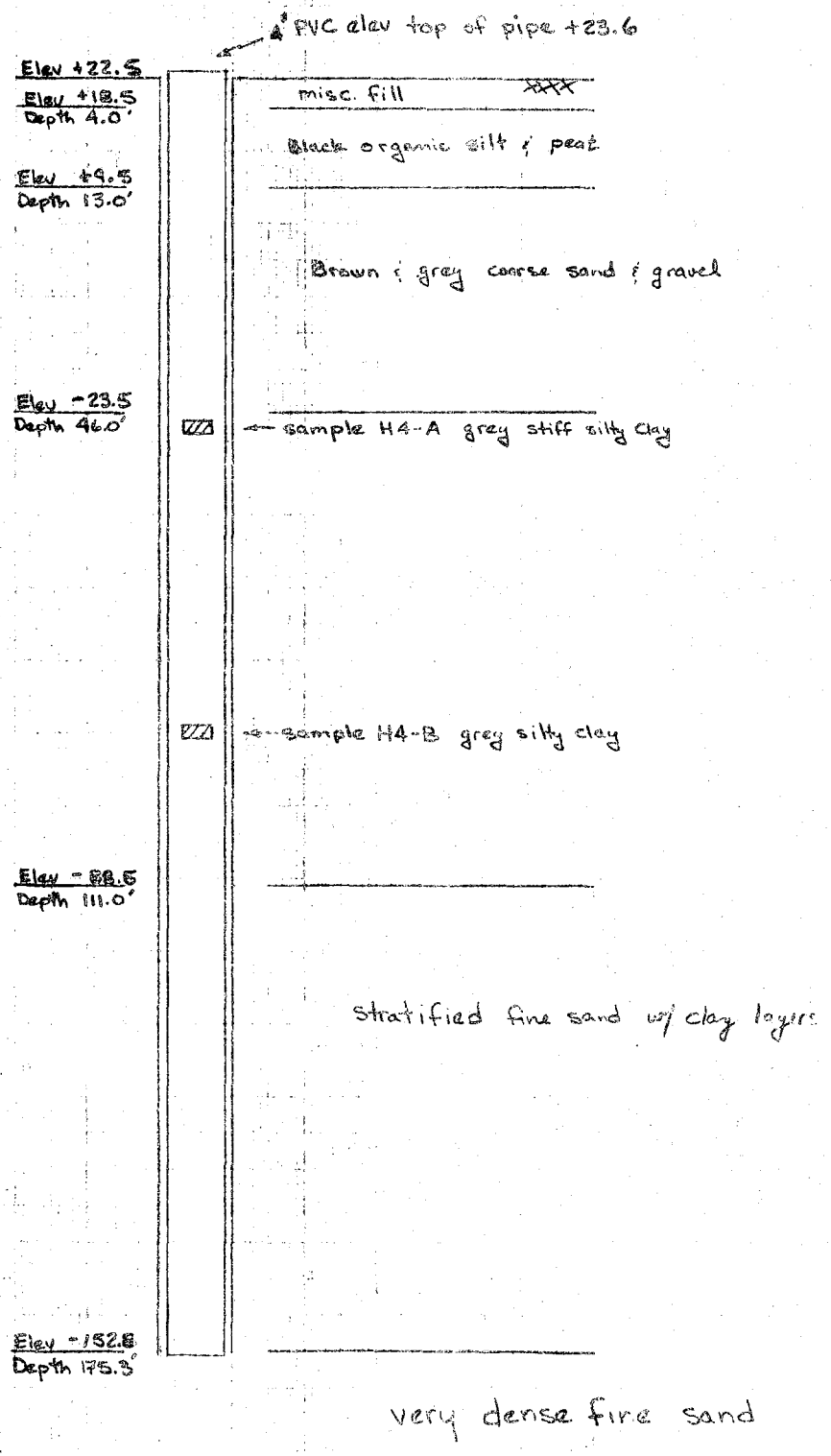

FIGURE 5

mxH