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Commonwealth of Massachusetts
Department of Public Works
W. F. Callahan, Commissioner

U. S. Department of the Interior
Geological Survey
W. E. Wratner, Director

Cooperative Geologic Project

SUPPLEMENTARY REPORT

Geologic Interpretation of Seismic Data

Northern Circumferential Highway (Route 128)

Grade Separation at South Main Street

in Reading, Mass.

by

James E. Maynard, geologist, U. S. Geological Survey,

and

Rev. Daniel Linehan, S. J., seismologist, Weston College

4 pages of text
3 plates

Seismic Series #_____

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General Statement

In July 1947 a preliminary seismic study was made for a projected grade separation of the Northern Circumferential Highway (Route 128) at South Main Street, in Reading, Mass. The results of that study were reported by James B. Maynard and Rev. Daniel Linehan in an open-file report of July 1947. At that time four seismic profiles were run, three for the northwest ramp and one for the northeast ramp. The surface geology and the seismic data indicated that the greater portion of the cuts would be in bedrock, ranging in composition from coarse-grained granite to medium-grained crystalline melanite (a dark-colored rock similar in texture to granite).

At the request of the Massachusetts Department of Public Works, 15 additional seismic traverses were made in July 1948. This report comprises the results of these traverses, together with some revision of the earlier study; three sheets of plans and sections are attached.

Seismic Traverses

Sheets 1 and 2 show the interpreted sections, and sheet 3 shows the plan

of traverses for this supplementary report. None of the traverses that were made for the preliminary study are shown on this plan, but they should be used along with the more recent data in estimating the materials to be excavated from the cuts.

Seven seismic traverses - A-B, B_1-C, D-E, F-G_1, H_1-I, J-K, and L-M - were made at the northeast ramp. A-B and B_1-C were each 270 feet long; the others were each 110 feet long. The locations of the shot points at the ends of these traverses, with respect to Department of Public Works centerline stations, are as follows:

A	-	station	6+55						
B	-	"	3+85						
B_1	-	"	3+80						
C_1	-	"	1+10						
D	-	"	2+85						
E	-	110	feet	to	the	right	(south)	of station	2+05
F	-	80	"	"	"	left	(north)	" "	2+03
G_1	-	30	"	"	"	right	(south)	" "	2+75
H_1	-	20	"	"	"	left	(north)	" "	4+00
I	-	90	"	"	"	right	(south)	" "	4+00
J	-	25	"	"	"	left	(north)	" "	1+75
K	-	65	"	"	"	right	(south)	" "	1+75
L	-	15	"	"	"	left	(north)	" "	4+86
M	-	62	"	"	"	right	(south)	" "	5+03

The layout of the seismic traverses and the relationship of the bedrock exposures to them is shown on sheet 3. For reference, traverse G-M of the preliminary survey is also located on this plan; shot point G is 30 feet to the right (south) of station 2+65 and shot point M 15 feet to the right (south) of station 1+75.

Eight seismic traverses - N-O, O-R, P-S, S_1-U, S-T, T-V, O-W, and W-X - were made for the northwest ramp; N-O was 330 feet long and S_1-U 233 feet long; O-R and W-X were each 165 feet long. The remaining traverses were each 220 feet long. The locations of the shot points at the ends of these

traverses with respect to D.F.M. stations are as follows:

N	-	station	0+65
O	-	"	3+95
P	-	40 feet to the left (southeast) of station	1+40
Q	-	40 " " " " " " "	3+60
Q_1	-	32 " " " " " " "	3+55
R^1	-	122 " " " " " " "	2+85
S	-	25 " " " right (northwest) " "	1+40
T	-	40 " " " " " " "	3+80
U	-	16 " " " left (southeast) " "	5+85
V	-	40 " " " right (northwest) " "	5+78
W	-	station	6+15
		"	7+80

Depths to Bedrock

For the northeast ramp the depths to bedrock calculated from seismic data at the shot points are:

NORTHEAST RAMP		NORTHEAST RAMP	
Station	Depth (feet)	Station	Depth (Feet)
A	8	N	5
B	6	O	6
B_1	6	P	8
C^1	6	Q	5
D	6	Q_1	5
E	6	R^1	7
F	6	S	8
G	6	T	5
G_1	6	U	5
H^1	4	V	6
H_1	8	W	6
J^1	5	X	12
K	8		
L	10		
M	6		
Estimated			
I	10		

Interpretation of Seismic Data

The geologic sections interpreted from the seismic data are shown on sheets 1 and 2. These sections, in general, show that the bedrock is shallow, from 4 to 8 feet below the surface of the ground. The greatest depth to bedrock is probably not more than 15 feet. Along section H_1-I the altitude of the bedrock surface from I to a point 55 feet from I toward H_1 was estimated, as the time-travel curve in shooting from I to H was not available. It can, however, be assumed reasonably accurate. The altitudes and shapes of the bedrock surfaces in the vicinities of shot points J, U, and X are shown by dotted lines, as the time-travel data for these segments was either lacking or somewhat confused. The dotted lines as shown, however, are believed to represent the most logical interpretation.

The new data for the northwest ramp show good correlation with the data obtained from the preliminary survey. The additional seismic work for the northeast ramp has necessitated revision in the position of the bedrock surface along section G-H as shown on sheet 1 of the preliminary report. The new interpretation is shown on sheet 3, attached to this report.