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W. F. Callahan, Commissioner

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

Cooperative Geologic Project

Geologic Interpretation of Seismic Data  
Relocation Route 1  
Proposed Cut at Stations 127-135  
in Danvers, Mass.

by

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

and

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

2 pages of text  
2 plates ✓

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Seismic Series # \_\_\_\_\_

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General Statement

The layout for the reconstruction of the Newburyport Turnpike (Route 1) proposed cut at stations 127-135, in Danvers, Mass., shows a deep cut through the western end of a hill between stations 127 and 135. Because of the depth of this cut seismic work was done at the site in September 1949. The work constitutes part of the cooperative program of the Department of Public Works and the United States Geological Survey.

Seismic Traverses

The plan of the seismic traverses is shown on sheet 1.

Seven seismic traverses were run at this site, five to the west of the base-line and two to the east of it. Traverses A-B, B-C, and D-E were each 330 feet long. Traverses E-G and H-I were each 220 feet long. Traverse I-J was 300 feet long and B-F was 110 feet long.

The shot points for the traverses were located as follows:

A	55	feet	to	the	left	(west)	of	station	127
B	124	"	"	"	"	"	"	"	130+30
C	215	"	"	"	"	"	"	"	133+46
D	45	"	"	"	"	"	"	"	128+12
E	44	"	"	"	"	"	"	"	131+50
F	48	"	"	"	"	"	"	"	129+55
G	140	"	"	"	"	"	"	"	133+46
H	113	"	"	"	right	(east)"	"	"	134+70
I	84	"	"	"	"	"	"	"	132+54
J	98	"	"	"	"	"	"	"	129+54

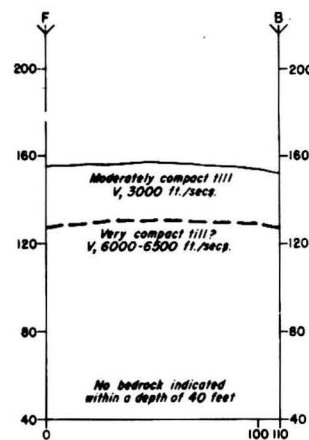
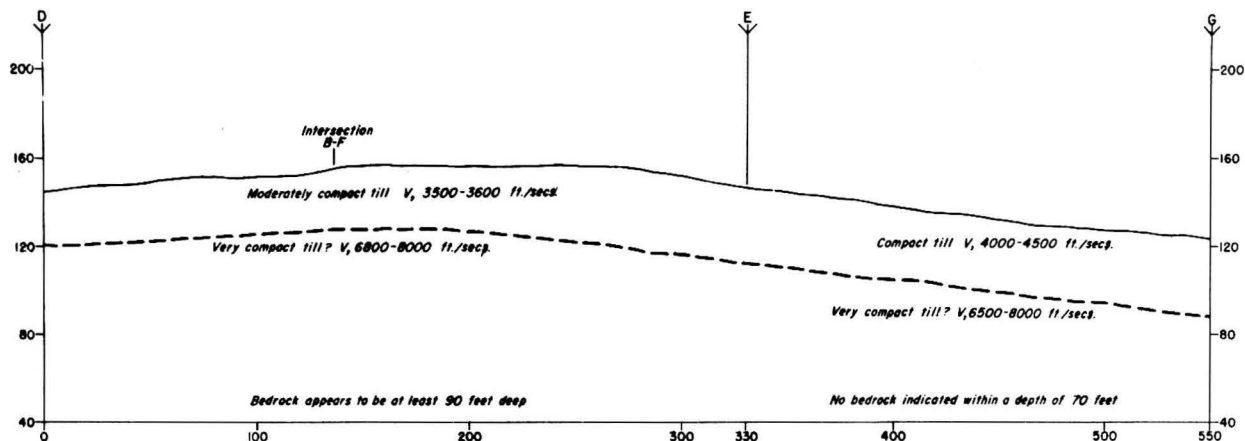
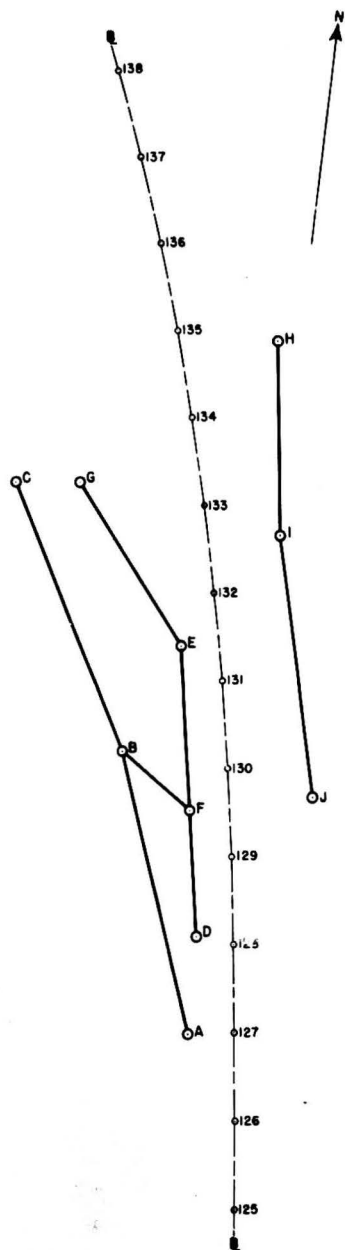
### Surface Geology and Interpretation

The form of the hill, the orientation of its longer dimension, and the absence of bedrock exposures or other indications of bedrock ledges at shallow depths, indicate that the hill is probably a drumlin, and hence composed of bouldery till. Large to medium boulders are abundant on the surface. They represent a much larger proportion of the material than is normal for the average drumlin. Small boulders <sup>are</sup> will be common.

The upper part of the cut <sup>is</sup> will probably be in fairly compact till. It is to be expected that the till in the lower part will be much more compact.

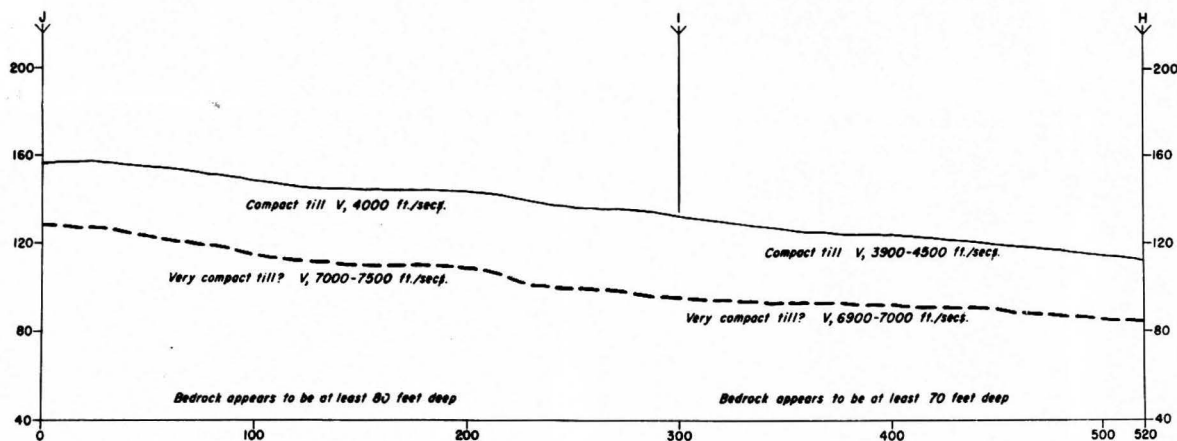
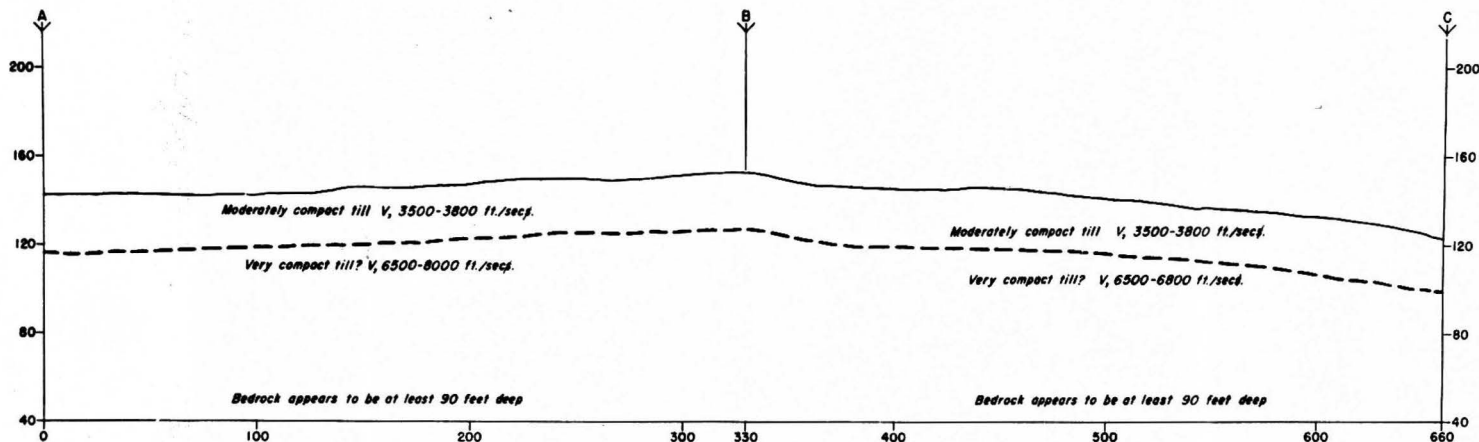
### Geologic Interpretation of Seismic Data

The geologic sections, as compiled from the surface geology and the seismic study of the site, <sup>are</sup> are shown on sheet <sup>1 and</sup> 2. At depths ranging from 24 to 37 feet from the surface of the ground, the material at this site is moderately compact to compact glacial till. Below this material is a thick zone that yields seismic velocities ranging from 6000 to 8000 feet per second. This material is probably very compact clayey till. No bedrock was indicated within the depths recorded, as <sup>shown</sup> indicated on the geologic sections (see interpretative geologic sections, sheets 1 and 2).



PLAN OF TRAVERSES
SCALE: 1 INCH = 100 FEET
Letters refer to shot points at ends of traverses Numbers refer to D.P.W. stations on baselines.

INTERPRETATIVE GEOLOGIC SECTIONS ALONG SEISMIC TRAVERSES	
DANVERS	ROUTE NO 1
RELOCATION ROUTE 1 PROPOSED CUT AT STATIONS 127-135	
SCALE 1 INCH = 40 FEET	GEOLOGY BY JAMES E. MAYNARD
↓ Shot point	SEISMIC DATA BY DANIEL LINEHAN, S. J.
V. Apparent seismic velocity (ft./sec.)	ENGINEERING BY WILLIAM H. STEAD
See sheet 2 for additional sections.	DATE SEPT. 1949
	SHEET 1 OF 2



PLAN OF TRAVERSES
SCALE: 1 INCH = FEET
Letters refer to shot points at ends of traverses (See sheet 1 for plan of traverses)

INTERPRETATIVE GEOLOGIC SECTIONS ALONG SEISMIC TRAVERSES	
DANVERS	ROUTE NO 1
RELOCATION ROUTE 1 PROPOSED CUT AT STATIONS 127-135	
SCALE: 1 INCH = 40 FEET	GEOLOGY BY JAMES E. MAYNARD
↓ Shot point V Apparent seismic velocity (ft.) in feet per second	SEISMIC DATA BY DANIEL LINEHAN, S. J.
	ENGINEERING BY WILLIAM H. STEAD
DATE: SEPT. 1949	SHEET 2 OF 2