

Commonwealth of Massachusetts
Department of Public Works
John A. Volpe, Commissioner

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

✓
Cooperative Geologic Project

SUPPLEMENTARY REPORT

Geologic Interpretation of Seismic Data

Relocation of Route 3; Cut, Stations 364-382

in Billerica, Mass.

by

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

2 pages of text
3 plates ✓

This report has been prepared for open file only, and has not been edited for conformity with U. S. Geological Survey standards and nomenclature.

Boston, Massachusetts
December 1953.

U. S. GEOLOGICAL SURVEY MASS. DEPT. OF PUBLIC WORKS
COOPERATIVE GEOLOGIC PROGRAM
OPEN FILE REPORT

Seismic Series # _____

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General Statement

Geologic and seismic studies were made of this site in October 1951, primarily for the purpose of obtaining data that would aid in establishing a grade for the proposed highway. A report on the geology of the site together with the interpretation of the seismic data that were obtained at this time was submitted by James E. Maynard and Robert M. Haslewood (file report of October 1952). Additional seismic work was performed at this site in March 1953; Mr. M. E. Chandler, Engineer, Massachusetts Department of Public Works, operated the seismic equipment at this time. This later work was done to obtain information that would augment the data of the preliminary survey sufficiently to permit estimates to be made of the quantities of materials to be excavated from the cut. This report contains the geologic interpretation of the supplementary seismic data that were obtained during the March 1953 survey. The work was performed as a part of a cooperative project of the Massachusetts Department of Public Works and the United States Geological Survey.

Seismic Traverses

Seventeen additional seismic traverses were made at this site. The locations of the shot points and the arrangement of the traverse lines as surveyed and plotted by the State Engineers are shown on sheet one.

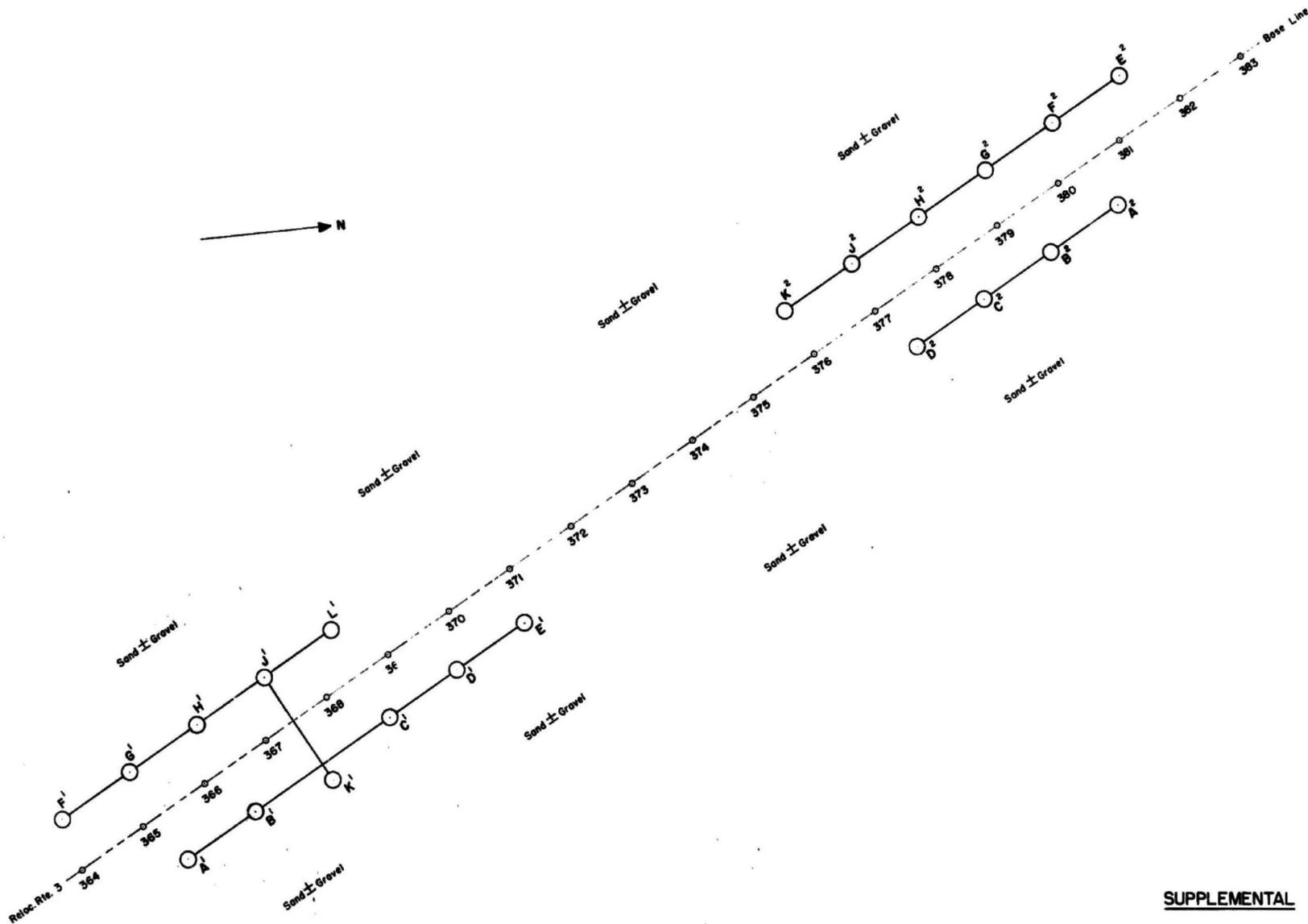
Subsurface Interpretation

The geologic sections as interpreted from the surface geology and the seismic data are shown on sheets two and three. The surface profile sections for these geologic sections were prepared by the State Engineers.

With the exception of section F'-G', all of the sections show bedrock at relatively shallow depths, 3 to 14 feet below the surface of the ground; along section F'-G' the maximum depth is 25 feet.

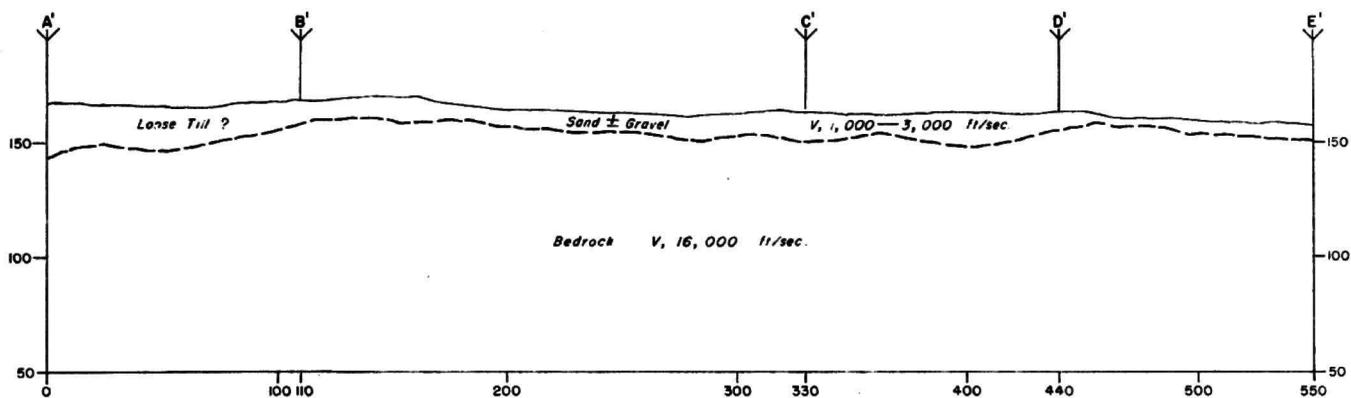
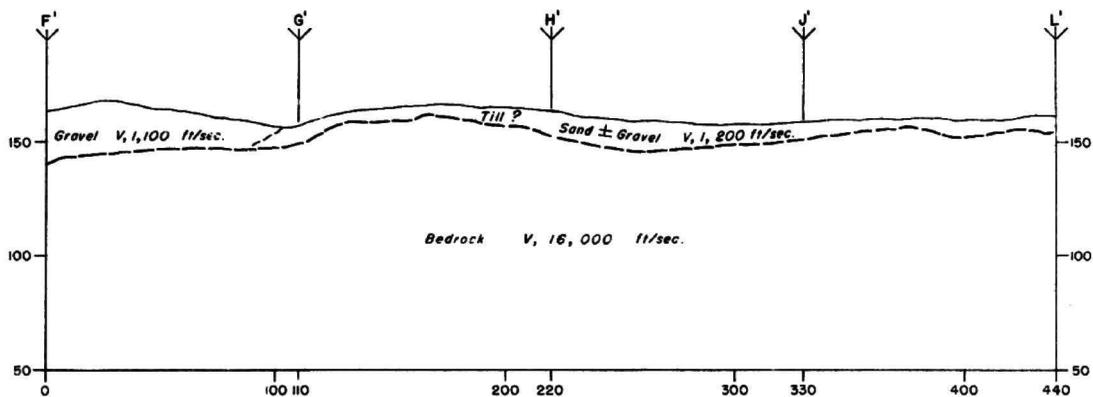
Because the seismic work for this project was performed in the winter, the results submitted in this report may have a lower order of reliability than would be true if the work had been performed during a more favorable season of the year. The reason for this is that a zone of frozen soil makes it very difficult to obtain good seismograms that will yield reliable velocity data that can be interpreted with confidence.

The comparative indefiniteness of the data on which the bedrock profiles are based was caused primarily by the shallow depths to bedrock and the presence of a discontinuous layer of frozen material occurring several inches below the surface of the ground. Although the bedrock profiles are shown by smooth curves, the actual bedrock surface is undoubtedly more irregular than these generalized curves would indicate, so that numerous small knobs, ridges and depressions may occur both above and below the plotted bedrock profiles.



SUPPLEMENTAL REPORT

COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS U.S. DEPARTMENT OF THE INTERIOR GEOLOGICAL SURVEY COOPERATIVE GEOLOGIC PROJECT	PLAN OF TRAVERSES		INTERPRETATIVE GEOLOGIC SECTIONS ALONG SEISMIC TRAVERSES			
	SCALE: 1 INCH = 100 FEET	Shot point. V - Apparent seismic velocity (ft) in feet per second. Dotted bedrock lines indicate inconclusive seismic data. Vertical measurements refer to elevations above mean sea level (datum 1929). Numbers at shot points indicate depths to bedrock,	GEOLOGY BY: JAMES E. MAYNARD	BILLERICA	ROUTE NO. 3	
	Letters refer to shot points at ends of traverses.	Numbers refer to D.P.W. stations on baseline.	SEISMIC DATA BY: MERWIN E. CHANDLER	STATIONS 364-382		
			ENGINEERING BY: WARREN L. CARNEY	SCALE: 1 INCH = 40 FEET	DATE: MARCH 1953	SHEET 1 OF 3



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 baseline.

INTERPRETATIVE GEOLOGIC SECTIONS ALONG SEISMIC TRAVERSES

Y Shot point.
 V - Apparent seismic velocity(ies) in feet per second.
 Dotted bedrock lines indicate inconclusive seismic data.
 Vertical measurements refer to elevations above mean sea level (datum 1929).
 Numerals at shot points indicate depths to bedrock, as shown by Y₁₈ and Y₁₉.

GEOLOGY BY: JAMES E. MAYNARD

SEISMIC DATA BY: MERWIN E. CHANDLER

ENGINEERING BY: WARREN L. CARNEY

BILLERICA

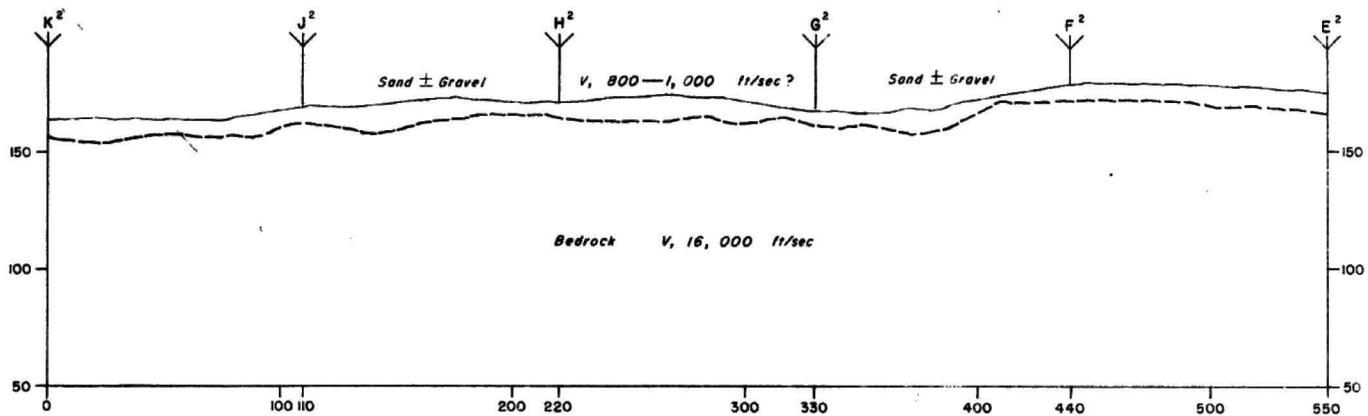
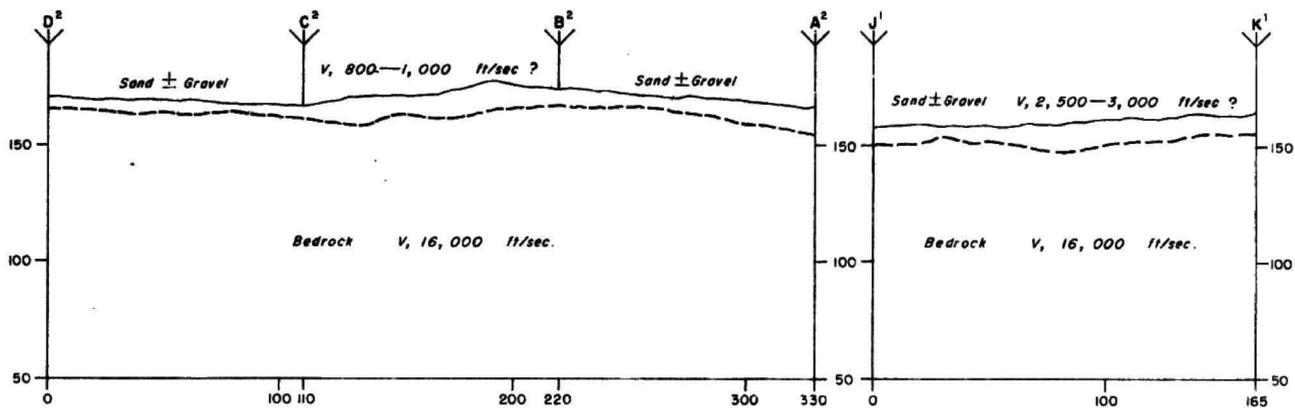
ROUTE NO. 3

STATIONS 364-382

SCALE: 1 INCH = 40 FEET

DATE: MARCH 1953

SHEET 2 OF 3



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.

Y Shot point.

V - Apparent seismic velocity(ies) in feet per second.

Dotted bedrock lines indicate inconclusive seismic data. Vertical measurements refer to elevations above mean sea level (datum 1929).

Numbers at shot points indicate depths to bedrock, in feet.

INTERPRETATIVE GEOLOGIC SECTIONS ALONG SEISMIC TRAVERSES

GEOLOGY BY: JAMES E. MAYNARD

BILLERICA

ROUTE NO. 3

SEISMIC DATA BY: MERWIN E. CHANDLER

STATIONS 364-382

ENGINEERING BY: WARREN L. CARNEY

SCALE: 1 INCH = 40 FEET

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SHEET 3 OF 3