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Station 327-335

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Cooperative Geologic Project

File Report

Geologic Interpretation of Seismic Data

STURBRIDGE

Union-Washapaug Road Reconstruction

Stations 327-335

by

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

and

Rev. Daniel Linenan, S. J., seismologist, Boston College

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COOPERATIVE GEOLOGIC PROJECT

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Seismic Series _____

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General Statement

The Massachusetts Department of Public Works plans to reconstruct Union-Washapaug Road (Route 15) between Brimfield Road (Route 130) and the Connecticut line. The work on which this report is based was done to obtain geologic information that would be of aid in selecting the most suitable location for one of the segments of this highway. Field work was done in June 1949 as a part of a cooperative program of the Massachusetts Department of Public Works and the United States Department of the Interior, Geological Survey.

Surface Geology

At this location seismic studies were made of a north-south elongated gravel hillock that occurs 100 feet to the east of Union-Washapaug Road between Brimfield Road and Maple Street. The hillock rises approximately 20 feet above the grade of Union-Washapaug Road. Where examined at the surface the gravel was of medium to fine texture. An outcrop of bedrock (granite) approximately 70 feet long and with a maximum width of about 35 feet occurs in the gravel hillock 100 feet to the east of station 328+80.

Seismic Traverses

Two consecutive seismic traverses A-B and B₁-C, each 220 feet long, were run nearly parallel to, and to the east of, Union Road. Shot point A was located approximately 130 feet to the right (East) of station 333+0, B and B₁ approximately 125 feet to the right of station 330+70 and C approximately 92 feet to the right of station 325+52. Two cross-traverses, F-E and F-G, each 110 feet long, were also made. For traverse E-E shot point E was located approximately 152 feet to the right of station 329+81, and shot point F was located approximately 40 feet to the right (East) of station 330+17. Traverse E-E intersected traverse B₁-C at a point 80 feet from B₁ and 41 feet from E.

For traverse F-G shot point F was located approximately 157 feet to the right (East) of station 331+28, and shot point G approximately 50 feet to the right of station 331+46; traverse F-G intersected traverse A-B at a point 30 feet from F and 50 feet from B.

Another traverse, H-I, was located with shot point I approximately 63 feet to the right (East) of station 333 and shot point H approximately 173 feet to the right of the same station; H-I intersected A-B at a point 10 feet from A and 30 feet from B. The seismic data obtained from this traverse, however, were too irregular and confused, probably owing to lack of energy transmission, to permit construction of a satisfactory velocity curve. Therefore, an interpreted geologic section for this traverse is not included with this report. It does not appear advisable, however, to re-run this traverse at this time, because of the exploratory nature of the work and the satisfactory data obtained from the other traverses.

The layout of the seismic traverses is shown on sheet one.

Depths to Bedrock and Interpretation of Seismic Data

The calculated depths to bedrock at the mirage points below the shot points are: A, 12 feet; B, 10 feet; B₁, 8 feet; C, 5 feet; D, 10 feet; E, 7 feet; G, approximately 13 feet.
(see note)

The interpreted depths to bedrock between the shot points are shown on the geologic sections, sheet one. These depths must be used with caution as they represent approximations interpreted from the seismic velocity curves, some of which are quite complex.

The interpretative geologic sections show that the gravel hillock in the general location of the seismic studies is underlain by bedrock at a relatively shallow depth, in general, at depths from 5 to 20 feet below the surface. In places, as illustrated by sections D-E and F-G, the bedrock surface is somewhat irregular with many ridges, benches and probably pinnacles. It is also possible that low knobs, ridges or pinnacles may be found where the bedrock surfaces are indicated on the sections by smooth lines.

NOTE: Actually, the depth is calculated for a "mirage point", not exactly beneath the shot point, but a very few feet toward the other end of the traverse, the exact distance being a function of the depth to bedrock. This explains why two shots made at a given shot point but for separate traverses, may indicate different depths, these depths being for points on the bedrock surface that are separated by a few feet horizontally.