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U.S. Geological Survey,  
[Reports - Open file series]

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2 Geological Interpretation of lineaments on the aeromagnetic map  
3 of southern New England

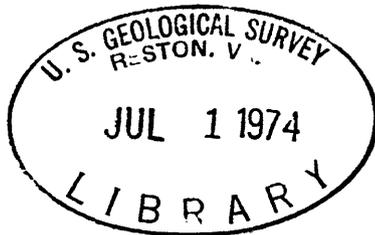
4  
5 by

6 Patrick J. Barosh, Maurice H. Pease, Jr., Robert W. Schnabel,  
7  
8 Kenneth G. Bell and John D. Peper

9 U. S. Geological Survey

10 OPEN FILE MAP 74-87

11 This map is preliminary and has  
12 not been edited for conformity  
13 with Geological Survey standards  
14 or nomenclature.



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1 A geologic interpretation of lineaments on the aeromagnetic map  
2 of southern New England (Zietz, Gilbert, and Kirby, 1972) is shown on  
3 Plate 1. The map (Plate 1) includes Massachusetts, Rhode Island,  
4 Connecticut, adjoining parts of New York, Vermont and New Hampshire;  
5- and offshore areas of the Atlantic ocean and Long Island Sound. The  
6 aeromagnetic map at a scale of 1:250,000 and with a 100-gamma contour  
7 interval is available in open file and should be on hand in order to  
8 utilize this interpretation. A complementary interpretation of the  
9 aeromagnetic map (Barosh and Pease, 1974), delineating areas of  
10- distinctive magnetic character, which correspond to areas of differing  
11 geologic structure and stratigraphy, should also be referred to.

12 Several types of lineaments are present on the magnetic map.  
13 Those paralleling anomalies along <sup>the</sup> flank or axis, those paralleling  
14 a particular magnetic contour, and those drawn along lines of magnetic  
15- discontinuity. The last, which are generally the most structurally  
16 significant, are drawn along aligned changes in the magnetic pattern,  
17 such as terminations or dislocations of anomalies and abrupt changes  
18 in anomaly trends. In some cases it is possible to measure offsets  
19 in the magnetic patterns across such lineaments.

1 After an analysis of the magnetic data was completed, we compared  
2 it with all of the available published and unpublished geologic,  
3 topographic, and geophysical data. We then devised the variety of  
4 line symbols shown on the lineament map to illustrate the degree of  
5- correspondence of these lineaments with the mapped geology. It  
6 should be noted that lineaments are unlikely to correspond exactly in  
7 location with geologic boundaries as one is dependent upon magnetic  
8 characteristics and the other on lithologic differences mappable in  
9 the field. Magnetic boundaries that reflect stratigraphic control  
10- should, however, be essentially parallel to stratigraphic contacts.  
11 Magnetic lineaments that reflect linear structures such as faults  
12 should, on the other hand, correspond rather precisely to the location  
13 of the geologic feature, but the prominence of such a magnetic feature  
14 is not necessarily a measure of the importance of the geologic feature.

15- The lineaments shown on Plate 1 are interpreted as corresponding  
16 either to mapped geology or to extensions of mapped geology, or are  
17 shown as lineaments of indeterminate nature. Contacts of some non-  
18 linear but magnetically expressed geologic units are also shown.  
19 Faults and some contacts not forming obvious magnetic lineaments or  
20- delineating magnetic features are also included for continuity. The  
21 boundaries of the Triassic and Carboniferous are shown separately as  
22 are those of intrusive rocks.

23 The map, Plate 1, has been discussed in part by Barosh (1972),  
24 Bell (1972), Bell and Schnabel (1972), Pease (1972), Peper (1972),  
25- and Schnabel (1972).

1 The study was carried out under cooperative programs between the  
2 U. S. Geological Survey with the Massachusetts Department of Public  
3 Works and the Connecticut Geological and Natural History Survey. Part  
4 of the data for New Hampshire was also obtained through a state  
5- cooperative program.

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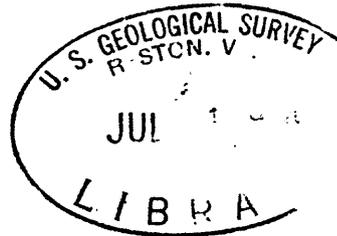
1 Explanation for Plate 1

U. S. Geological Survey  
OPEN FILE MAP 74-817

2 Magnetic Lineaments

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- 3  mapped fault ✓
- 4  possible fault ✓
- 5-  mapped contact ✓
- 6  possible contact ✓
- 7  indeterminate ✓



8 Geologic Boundaries not forming obvious magnetic lineaments

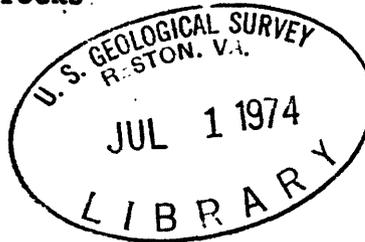
- 9  Fault, ✓  possible fault ✓
- 10-  Contact ✓

11 Special Lithologic symbols (used in combination with above lines)

- 12  basic dike ✓
- 13  intrusive contact ✓
- 14  Boston Basin-Narragansett Basin sedimentary rocks ✓
- 15-  Triassic Basin sedimentary rocks ✓

16 Strike and dip of layering

- 17  0°- 30° dip
- 18  30°- 60° dip ✓
- 19  60°- 90° dip ✓



20 Folds

- 21  Anticline, showing plunge, and direction of overturning ✓
- 22  Syncline, showing plunge, and direction of overturning ✓
- 23  Dome ✓

1 **Lithologic Symbols**

- 2
- 3 A acidic intrusive
- 4 B basic intrusive
- 5- S schist, <sub>s</sub> sulphidic, <sub>b</sub> biotite, <sub>m</sub> muscovite
- 6 g gneiss, <sub>f</sub> felsic, <sub>a</sub> amphibolitic, <sub>b</sub> biotite, <sub>m</sub> muscovite
- 7 p phyllite
- 8 q quartzite
- 9 l limestone
- 10- v metavolcanic rocks
- 11 ss clastic sedimentary rocks
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OPEN FILE MAP 74-87

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Supplementary statement on

Geologic reconnaissance along proposed relocation  
of route 2 in Maynard, Westford and Ayer quadrangles

By

L. W. Currier, Geologist

Since the report on the projected highway segment was transmitted, the proposed centerline of the highway has been relocated in several places. For most of the line the original file report will serve adequately. It is necessary, however, to provide geologic descriptions of three sections of the relocated line to supplant corresponding descriptions in the original report; these three sections are described below. The relocated line has been indicated on the originally prepared map by a long-dash line.

(1) Hosmer Street, to Boxboro Road

For a distance of about 2,800 feet westerly from Hosmer Street, Acton, the centerline traverses an area underlain by sand and gravel. Within this section two narrow gravel ridges (eskers) are crossed; they provide a local source of coarse granular fill material to which access should be favorable. Also, the ends of two small swamps are traversed, but it is expected that the swamp deposits are thin and will offer no particular difficulties.

From a point about 500 feet east of Taylor Road to a point about 700 feet west of Arlington St., the line crosses a general area of till and bedrock. Outcrops are numerous from Taylor Road to Hayward Road and sparse from Hayward Road to Arlington Street, but everywhere along the section bedrock will be at shallow depths.

For a distance of 700 feet northwestward from Arlington Street, a till area is crossed in which bedrock is undoubtedly near the surface. One outcrop was found just north of the centerline, at the edge of the swamp; from this point for about 1,900 feet, the line runs northwesterly across 3 narrow swamp areas with intervening sand and gravel deposits; the gravel ridge, indicated by a on the map, should provide about 30,000 cubic yards of coarse granular fill. The swamp areas in this section probably rest on sand and together with the intervening sand and gravel deposits comprise part of the fill of a buried rock-walled valley; in this valley fill the ground water surface probably stands persistently high.

Northwest of the swamp, about mid-way between Arlington Street and Nashoba Road, the centerline crosses a bedrock ridge and thence crosses a general till area to a point about 1,000 feet west of Nashoba Road. The few outcrops in this area together with the land forms indicate that here the line crosses a bedrock ridge with a comparatively thin till cover throughout. Between this bedrock ridge and Littleton Street, the line descends to a low, flat, sand plain.

For a distance of approximately 1,500 northwesterly from Littleton Road, the centerline crosses an area indicated as till, but in which bedrock, though not exposed, is undoubtedly close to the surface, so that the

surface topography is determined by the topography of the bedrock surface.

From the point 1,500 feet northwest of Littleton Road to Bexboro Road the terrain is essentially bedrock throughout.

(2) Taylor Street, Littleton, to point 700 feet southeast of Littleton Road, Harvard

Between Taylor Street, and Whitcomb Ave., low hills and ridges of sand and gravel and a wide swamp area are crossed by the relocated segment. A considerable source of granular fill material is available in this section, the coarser materials being in the ridges and hillocks indicated by a and b, respectively, on the map. The swamp area should be investigated carefully as to its foundation qualities, for it is apt to be underlain by a considerable thickness of muck and peat. The sand, gravel, and swamp deposits between Taylor and Whitcomb Streets occupy a major rock-walled, pre-glacial valley, and for the entire segment within this area the general ground water level should be approximately at swamp level, rising somewhat within the flat-topped hill, marked c on the map, on the West side of Taylor Street.

West of Whitcomb Street, the centerline crosses a bedrock ridge and a narrow and shallow valley, and thence rises across the broad Oak Hill ridge. Bedrock is at or very close to the surface throughout this section, except for a few hundred feet where it crosses small ridges of gravel and sand in the narrow valley.

(3) Boston and Maine R.R., Harvard, to west boundary of quadrangle

In this section, the relocated line crosses swamps, and low plain areas of generally fine-textured sand and silt. The soft swamp deposits may be thin in places but they probably rest on lake clays and silts similar to the materials that underlie the areas indicated on the map by the symbol p.

Foundation and ground water conditions need to be carefully investigated along this entire section.