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RECONNAISSANCE STUDY FOR A DRY DOCK AT REYÐARFJÖRÐUR ICELAND

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I. INTRODUCTION

The scope of the reconnaissance study was to find any layering and the nature of eventual beds on the potential sites for a dry-dock at Reyðarfjörður (-fjord). For this purpose the seismic refraction method, using a 12-channel ABEM seismometer, was employed, together with borro soundings.

Three areas were studied. The alluvial plain at the head of the fjord, the delta Hrúteyri and the Eyri spit 15 km from the town of Reyðarfjörður on the south coast of the fjord.

On the alluvial plain the seismic method did not provide any definite layering within the sediments. Nearest of the hillside bedrock can be found at approx. 14 m dept at the south side of the plain and at 5-10 m on approx. 100 m stretch at the north side. Otherwise bedrock was not recorded, but is definitely below 50 m.

On Hrýteyri bedrock is found at increasing depth from the hillside towards the sea, at 10-15 m closest to the cliff, but at approx. 40 m on the point at the sea.

On Eyri seismic profiles were shot in two areas, on Eyrarbót and on the sand spit east of the old farm house. On Eyrarbót the depth to bedrock is more than 10 m, but irregular. On the spit it varies from 5 to 15 m.

After the seismic survey, borro soundings and undisturbed sampling were attempted. The seismic survey was carried out on August 22 to 27 and the borro soundings on October 12 to 15 1975.

II. INTERPRETATION

The alluvial plain at the head of Reyðarfjörður is build out of sediments deposited since the last glacial period, i.e. during the last 10.000 years or so.

The sedimentary column is expected to be composed of three main units. The lowest unit is thought to be glacial moraine, the middle unit to be fluvi-glacial sediments mainly silts and fine sand. These two units should be fairly well consolidated and impermeable. The top unit and the only one that is visible on surface is made of unconsolidated fine grained fluvial sediments.

Fig. 1 shows the location of the seismic profiles on the alluvial plain. Seven profiles were run on the Leirur (L 1 - L 7), which is a tidal flat only a meter or two lower than the alluvial plain where 18 profiles were run (RF 1 - RF 18). At profile Leirur-1 bedrock is encountered at 5-10 m depth. This profile is 40 m off the road comming from town (route 92). The next profile was shot 150 m from this road. Here bedrock was not positively defined, but is below 20 m. Bedrock is recorded again at Leirur-7 at the depth of 14 m. Leirur-7 is 50 m off route 96 on the other site of the alluvial plain.

The p-wave velocity in the sediments was found to be 1,6-1,8 km/sec and no trace of an interface was found on the tidal flat. However, further inland on the alluvial plain higher p-wave velocities, +2 km/sec, were recorded in the sediments. At profile RF-5, which extends inland from the backshore, the depth to this interface is 10-11 m. Similar results are obtained from RF-11 and RF-13, which may indicate some horizontal layering in the sediments at this depth.

The penetration resistance of the borro soundings, as a function of depth, is shown on Fig. 3. The borro soundings show bedrock at

11,4 m 100 m from route 92 on Leirur (see H-2), which is in good agreement with the seismic survey. The penetration resistance at H-1 indicates layering within the sediments at 11,5 m and 14,5 m depths. Sampling from these layers was attempted, but was unsuccessful due to the inability of the drilling equipment.

Four seismic profiles were run at Hrúteyri. All of them recorded bedrock at 10-40 m, increasing away from the hill-side. The sediments at Hrúteyri are primarily deltas from Hrúteyri river. One such delta from post-glacial times has been raised above sea level and is presently used as a borrow pit for gravel. Therefore, Hrúteyri is primarily built up of alluvium and course gravel and is not comparable to the alluvial plain previously described.

At Eyri 7 seismic profiles were run (Fig. 2). On the sand spit the depth to bedrock in approx. 10-15 m over a condiderable area. The p-wave velocities correspond to badly consolidated sediments overlaying basaltic lava. No marine was recorded on top of the basalt, but that does not exclude the possibility of its presence as its thickness has to be $\gtrsim$ 5 m to be recorded at this depth.

Eyrarbót is a depression cut by glacier into the basalt lavas. Later the sea had filled up the depression by sand and gravel. It is evident from the surrounding terrain that the bedrock surface is undulated and irregular. Generally, the seismic survey recorded the depth to bedrock at more than 10 m.

The borro soundings at Eyrarbót showed lower depth values than the seismic survey. On the shore-bar the borro stopped on rock (?) at 1,8 m and 5,8 m depths and in moraine at 8,1 (see Fig. 3). At 100 m inland from the bar it indicated rock at 11,3 m. Here, rocks within the moraine may have been hit but not the actual bedrock.

III. ON SEISMIC SURVEY

The results obtained by the seismic survey may be assumed to present the depth of an interface above 10 m depth to the nearest meter with fair degree of accuracy, but for deeper interfaces with 10% accuracy. Surface layers thinner than 2-3 m are hardly deteced by the refraction method. For layers at greater depths the thickness has to be still greater. Because of this no moraine is recorded on top of the basaltic bedrock although it may be present. For the same reason layers thinner than approx. 5 m are not recorded in the sediments on the alluvial plain.

IV. RECOMMENDATIONS FOR FURTHER STUDIES

The present study is not capable of determining the feasibility of the alternative sites. However, the borro soundings indicated layering within the sediment at Leirur, and at Eyri the seismic survey gave promising results. Further studies should therefore be aimed at these two areas. Borro sounding and undisturbed sampling for soil-mechanical studies will be of greatest value. Care should be taken to have a standard cone point to secure correct penetration values for the borro. As for the sampling, good piston samplers are available, but they can only be used with a rotary drilling rig.

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REYÐARFJÖRÐUR DRY-DOCK

Location of seismic profiles on the alluvial plain.

'76-08-16. S.V.P/Ö.D.
Tnr. 35
B - 83
Fnr. 14488

Fig. 1

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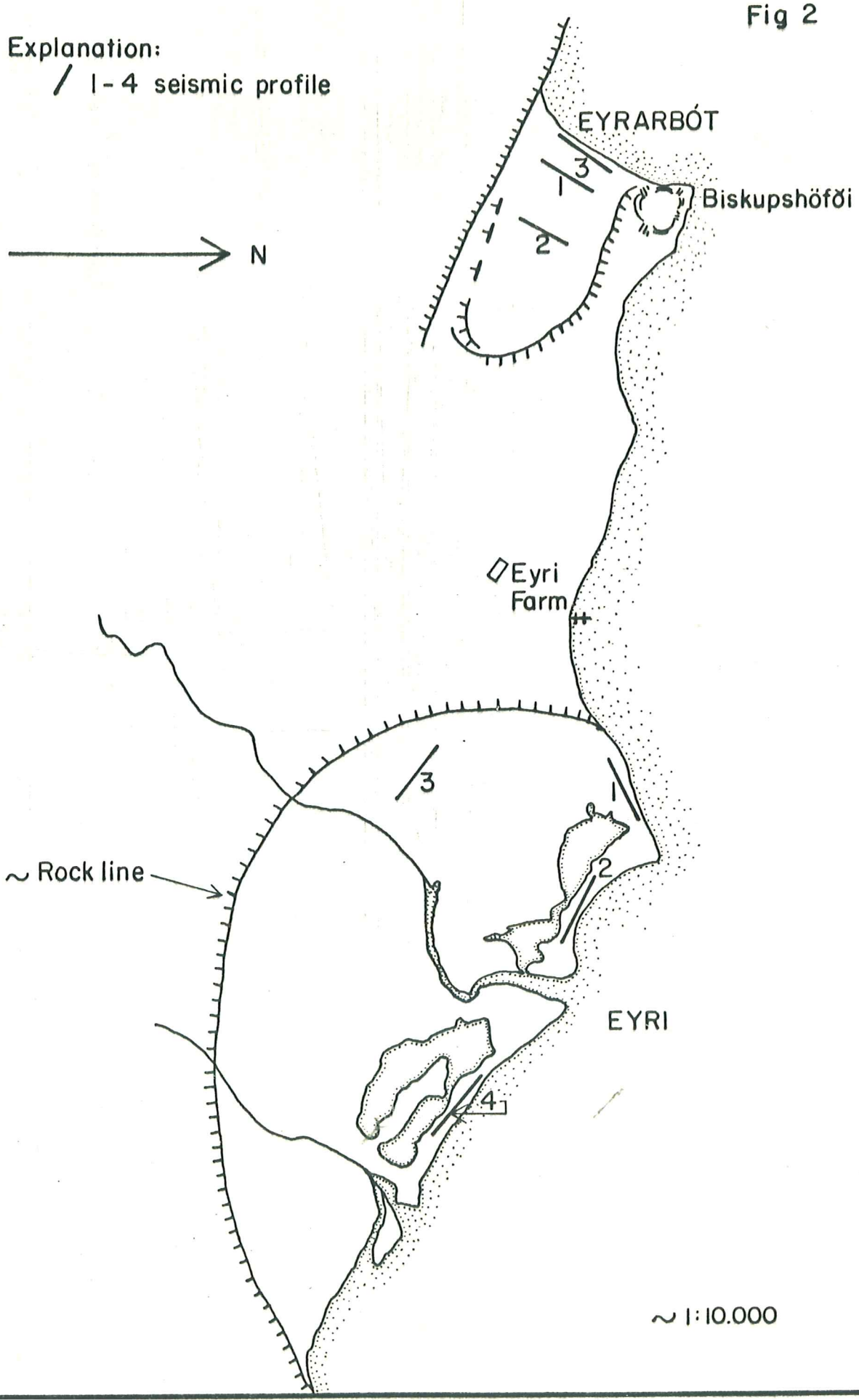
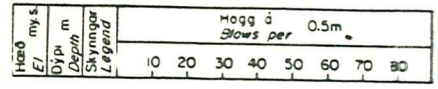
REYÐARFJÖRÐUR DRY-DOCK

Location of seismic profiles at Eyri

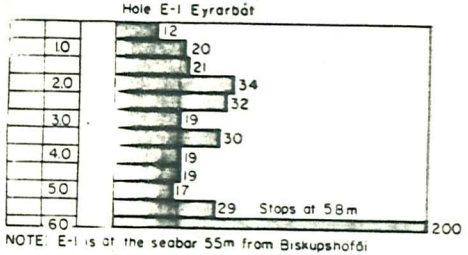
'76-08-16. S.V.Þ. /Ó.D.	
Tnr.	36
B -	83
Fnr.	14489

Fig 2



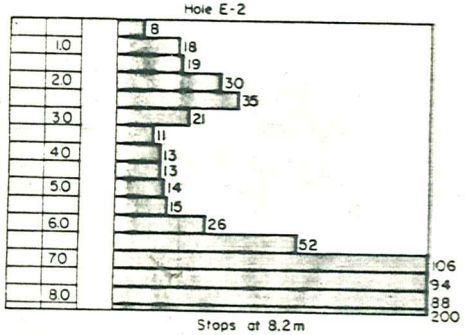


Hole E-1 Eyrarbát

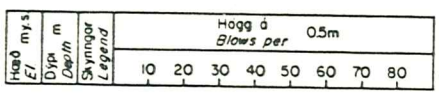


NOTE: E-1 is at the seabar 55m from Biskupshöfði

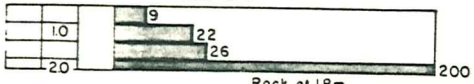
Hole E-2



NOTE: E-2 is at the seabar ~100m from Biskupshöfði

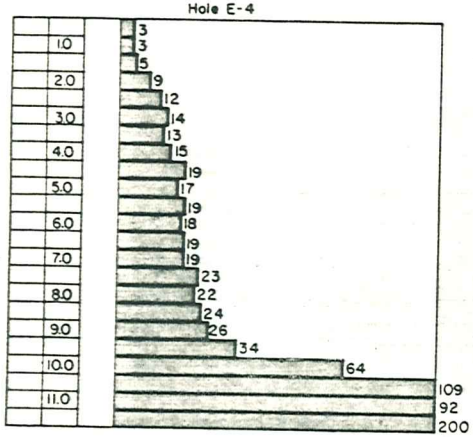


Hole E-3

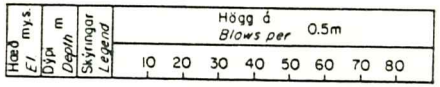


NOTE: E-3 is at the seabar ~150m from Biskupshöfði

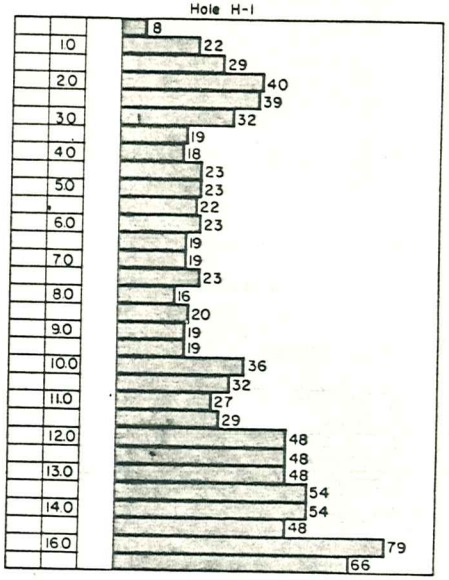
Hole E-4



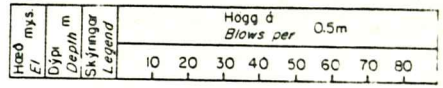
NOTE: E-4 is on Eyrarbát 100m from seabar.



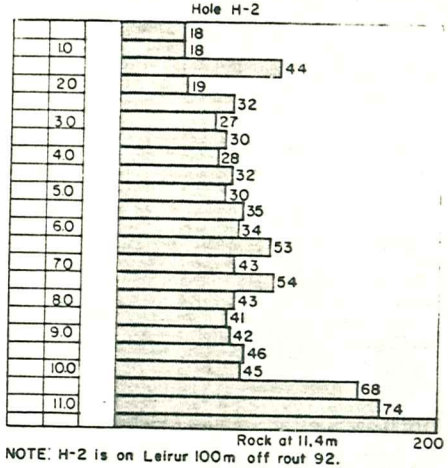
Hole H-1



NOTE: H-1 is on Leirur 300m off route 92.



Hole H-2



NOTE: H-2 is on Leirur 100m off rout 92.

Fig 3

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REYÐARFJÖRÐUR DRY-DOCK

Borro soundings E 1-4 og H1-2

25.11.75. SVÞ/GSJ	Thr. 34 Thc.170	Fnr. 13642
	B-83 B-Borrob.	