DOCUMENT MICROFILMING IDENTIFICATION

G.I.-30 SEPT. 1976

GEOCRES No. 52B-9

DIST. 19 REGION

W.P. No.

CONT. No. 79-38

W. O. No.

STR. SITE No.

HWY. No. 11

LOCATION Road Distortion
5.8 km E of Kaskawulsh River

No OF PAGES - —

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT.

REMARKS:

Ontario

Ministry of
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Communications

foundation investigation and design report

This Report contains the originals of the typewritten text, figures, and Borelog sheets.

Please Return to:
Soil Mechanics Section
Room 315, Central Building
Downsview

Attention: Mr. S. Oselame

ENGINEERING MATERIALS OFFICE
PAVEMENT & FOUNDATION DESIGN SECTION

WP Cont. 79-38 DIST 19

HWY 11 STR SITE

Road Distortion Problems

5.8 km East of Kashabowie River

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FOUNDATION INVESTIGATION REPORT
For
Road Distortion Problems
Highway 11
5.8 km East of Kashabowie River
District #19, Thunder Bay
Cont. 79-38

INTRODUCTION:

This report summarizes the factual information obtained from the Regional Geotechnical Section for the above mentioned site, and provides recommendations. The data received was in the form of a soils profile completed prior to construction in 1979, field vane tests completed in 2 boreholes in October 1983, and a memorandum outlining the history of this problem area.

SITE DESCRIPTION

The site is located 5.8 km east of the Kashabowie River in the Township of Haines, District of Thunder Bay.

The land is predominantly forested and very hilly. Bedrock is generally very close to the surface except in deep valleys where extensive muskeg deposits may be encountered. This site is located in one of these valleys with an extensive muskeg deposit.

SUBSURFACE CONDITIONS

The subsoils in this area consist of 2.5 to 7 m of muskeg underlain by clay investigated to a maximum depth of 11.5 m. Field vane tests completed north and south of the embankment indicate the material to generally vary from very soft to firm, becoming very stiff at the bottom of one vane hole. The consistency was assessed using field vane shear strength values ranging from 7 to 35 kPa generally, with one reading greater than 100 kPa obtained at the bottom of borehole 2. The shear strength values are shown graphically on Fig. 1.

The groundwater table is assumed to be at the ground surface, since this site is located in a lowlying area which is a swamp.

DISCUSSION AND RECOMMENDATIONS

The Regional Geotechnical Section was requested by the district maintenance forces to review the recurring road distortion on Hwy. 11, 5.8 km east of the Kashabowie River. The site was inspected by the Regional forces on 83 08 15 and it was confirmed that remedial work is required and the Foundation Section should be called in to investigate. A memorandum outlining the history of this section of the Hwy. along with pictures were forwarded to this section. The information received indicates that fill movements were detected during construction, and a 5 ft. surcharge was then placed for 1 year prior to paving. The pavement was placed in 1980 and has been deforming since, with repaving being completed at least once a year.

The documents provided were reviewed and slope stability analysis was completed on the existing embankment. Analysis generally indicated a very marginal factor of safety against slope failure, and this along with settlement of the embankment are probably the cause of the severe pavement deformation and related problems.

Two alternatives of stabilizing the fill were examined. The first method of stabilization examined was the use of berms. A number of berm sizes were analyzed and it was found a very extensive 2 level berm would be required to stabilize the embankment. The required berm would be 18 m wide by 2.4 m high on the lower level and 6.1 m wide by 2.4 m high on the second level.

A major problem associated with the construction of berms is that the stability of the embankment will be improved but deformation of the pavement due to settlement of the fill may be increased. Thus the problems associated with pavement distortion may become worse and not reduced. Construction of berms would also require removal of the muskeg adjacent to the embankment, and this excavation could create further instability of the slope.

In light of these problems the use of lightweight fill was examined. The availability of lightweight fill was investigated and it was found that none was available except for sawdust.

Analysis was completed on an embankment employing sawdust fill and adequate factors of safety were obtained if 6 m of rock fill were replaced with sawdust. This alternative would also prove to be very impracticle and expensive due to the requirement of removing 6 m of rock fill.

It is the feeling of this office that the above-mentioned alternatives are not very feasible. The best option at this time appears to be reducing the grade as much as possible through this area, even if it is only half a metre or less. This would help to reduce the stresses on the underlying subsoils, which would help to lessen pavement distortion.

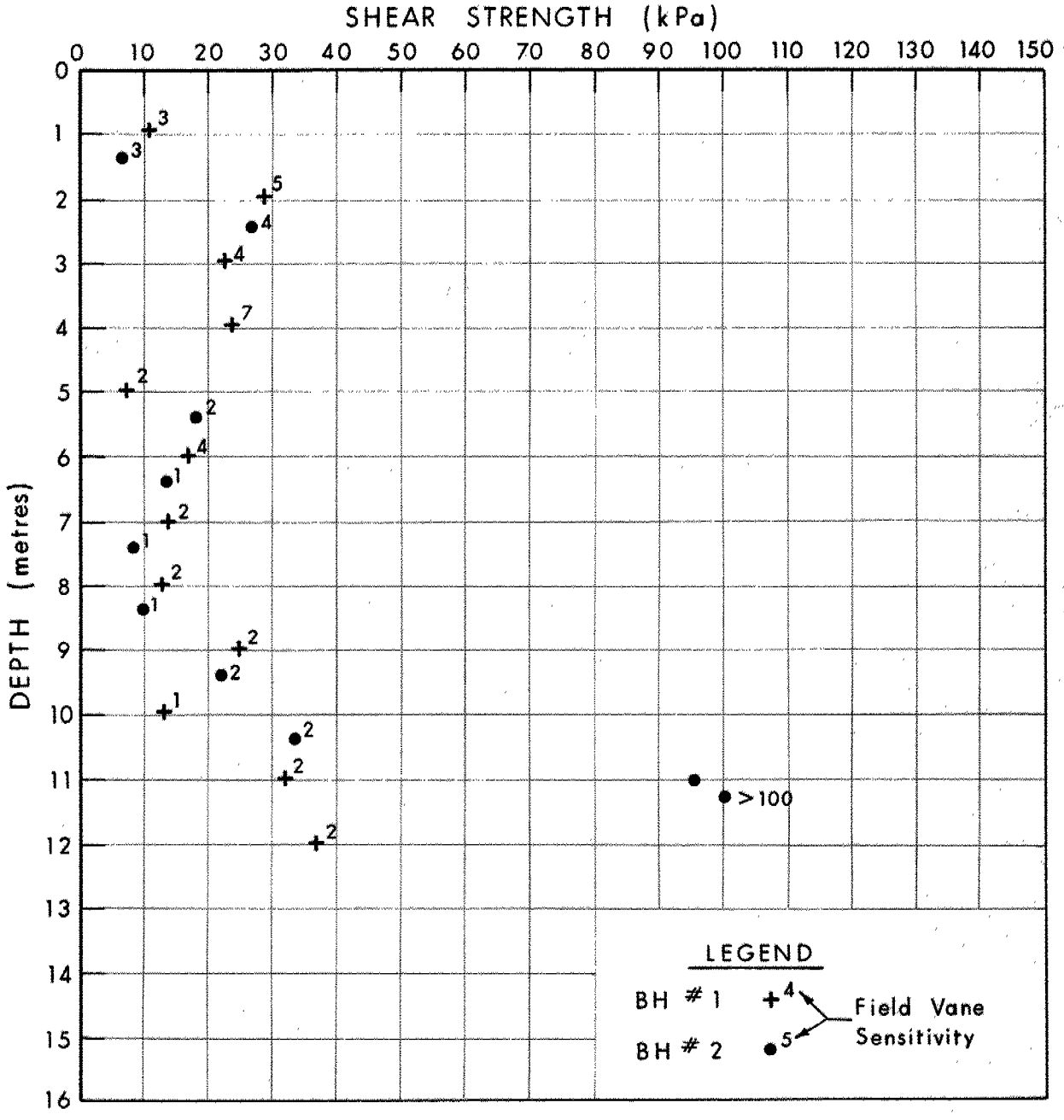
Miscellaneous

The fieldwork for this investigation was carried out under the supervision of Regional Geotechnical forces. The report was written by Mr. H.J. Sturm, Project Foundations Engineer and reviewed by Mr. M. Devata, Senior Foundations Engineer.

H. J. Sturm, P. Eng.
Project Foundations Engineer

M. Devata, P. Eng.
Senior Foundations Engineer

UNDRAINED SHEAR STRENGTH Vs DEPTH



BH # 1 STATION 291+50 % 60 m LEFT ℄ HWY 11 ELEV. 453.5
BH # 2 STATION 289+50 % 80 m RIGHT ℄ HWY 11 ELEV. 452.7

FIG No 1

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