

60-F-271C

W.P. # 141-60

Hwy #10 C.P.R.

CROSSING 0.4 MI.

N. OF HWY #5

COOKSVILLE

Mr. A. M. Toye,

September 26, 1960.

Bridge Engineer.

FOUNDATION INVESTIGATION REPORT

Materials & Research Section.

by: Racey, MacCallum & Assoc., Ltd.

Attention: Mr. S. MacCombie.

Re: C.F.S. Crossing, Hwy. #10, 0.4 Miles
North of Hwy. #5, Cocksville, Ontario,
W.P. 141-60 -- District 6.

Attached, we are forwarding to you the report for the above mentioned structure, submitted by Racey, MacCallum and Associates, Ltd.

We have reviewed the report, and on the basis of the factual data presented, agree with the recommendations contained in the report.

Should there be any additional questions in connection with the Consultants' report, please feel free to call on our Office.

AL/AdEF

Attach.

cc: Messrs. A. M. Toye (2)
H. A. Tregaskes
D. G. Ramsay
I. Campbell
C. Fraser
T. J. Kovich
A. Watt

L. G. Sodeman,
PRINCIPAL FOUNDATIONS ENGR.
Per:


(A. Stermac,
FOUNDATIONS OFFICE ENGR.)

Foundations Office ✓
Gen. Files.

23-67-275

RACEY, MACCALLUM AND ASSOCIATES

LIMITED

A COMPANY OWNED, DIRECTED AND OPERATED BY

Consulting Engineers
AND ASSOCIATED STAFF

MONTREAL  VANCOUVER

TORONTO

TORONTO DIVISION
27 CARLTON STREET

DONALD C. MACCALLUM, B.ENG., M.E.I.C., P.ENG.

H. JOHN RACEY, B.SC., M.E.I.C., P.ENG.

GEORGE L. HOUGHTON, A.M.I.MECH.E., M.E.I.C., P.ENG.

Reference: S-500/T-2485
- Report -

14th September, 1960

Department of Highways for Ontario,
Materials and Research Section,
C/o Parliament Buildings,
TORONTO - Ontario.

Attention: Mr. L. Soderman,
C/o Mr. A. Rutka.

RE: FOUNDATION INVESTIGATION
FOR C.P.R. CROSSING HWY.#10, 0.4 MILES
NORTH OF HWY.#5, COOKSVILLE - ONTARIO.
DISTRICT 6. W.P.141-60.

Dear Sirs,

We have completed our investigation at the above site and present our report herein.

FIELD WORK :

Field work commenced on the 24th August and terminated on the 31st August, 1960. The drilling was done by a D.H.O. team using D.H.O. diamond drilling equipment under the supervision of Racey, MacCallum and Associates. Four holes were made at the locations shown on Enclosure No 1, and dynamic cone penetration tests were made adjacent to each hole. The drive hammer for the casing weighed 250 lbs and dropped 19 inches; for the split spoon sampling and cone tests the hammer weighed 140 lbs and dropped 30 inches. NX casing was used to line the holes and AX core barrel for coring bedrock, this being the only size of core barrel available.

SUBSOIL CONDITIONS :

The results of the borings are summarised in engineering data sheets, Enclosures No 2 to 5. A layer of loose red oxidised sand overlies a layer of stiff grey clay which becomes a firm grey shale at a relatively shallow depth, around Elevation 400 feet to

Reference: S-500/T-2485
- Report - Continued.

14th September, 1960

405 feet. At holes No 1, 2 and 4 the cone and split-spoon sampler met refusal at 6 to 9 inches below the surface of the shale. At hole No 3 where the shale was encountered several feet higher, it was also much softer and the cone and split spoon penetrated about 30 inches.

Cross sections on either side of the road are shown in Enclosure No 6 and it appears that the abutments of the existing bridge must lie below the level of the top of the shale.

The percentage of core recovered at each run is relatively low in most cases. However, the drill appeared to carry pressure continuously and the core recovered was quite sound. It would be quite possible that much better recovery results were to be obtained if an hydraulic drill head and a ball-bearing type BX-size core barrel had been available. It was felt, however, that the additional expense for changing equipment was not warranted, as it is very likely that only a fraction of the maximum allowable stresses will be utilised.

No ground water table was encountered, although some surface run-off was observed at the contact between the sand and clay layer.

RECOMMENDATIONS :

As no changes in grade are anticipated, the subway footings will be on the shale. Although the top of the shale is somewhat weathered, a safe bearing capacity of 5 tons per square foot can be allowed at roughly Elevation 400 feet. At boring No 3 this means removal of up to 6 feet of weathered shale. It is suggested to remove as much of the weathered shale by excavation as is necessary to obtain a level base, and check for soft seams by star-drill. If no soft seams are encountered in the next 2 - 3 feet, the 5 ton bearing pressure can be applied safely. If all weathered shale is removed, up to 25 tons per square foot can be allowed. In the case under consideration this would be of little practical value.

CONCLUSIONS :

The results of this investigation may be summarized as follows :

1. The soil at the site consists of a loose sand (which is partly fill) overlying stiff clay changing into shale.

Reference: S-500/T-2485
- Report - Continued.

14th September, 1960

CONCLUSIONS : Continued -

2. No ground water table was encountered, but some surface run-off was observed at the sand-clay contact.
3. Foundations can be placed on the weathered shale at approximately Elevation 400 feet, and a safe bearing capacity of 5 tons per square foot can be allowed for any size footings. The shale should be probed by star drills to locate soft seams too close to the exposed surface.
4. If foundations are carried down to the sound shale (approximately 2 - 5 feet below shale surface) up to 25 tons per square foot can be allowed for footings.

We hope the above information is adequate for your present requirements. Please contact the writer if you have any queries.

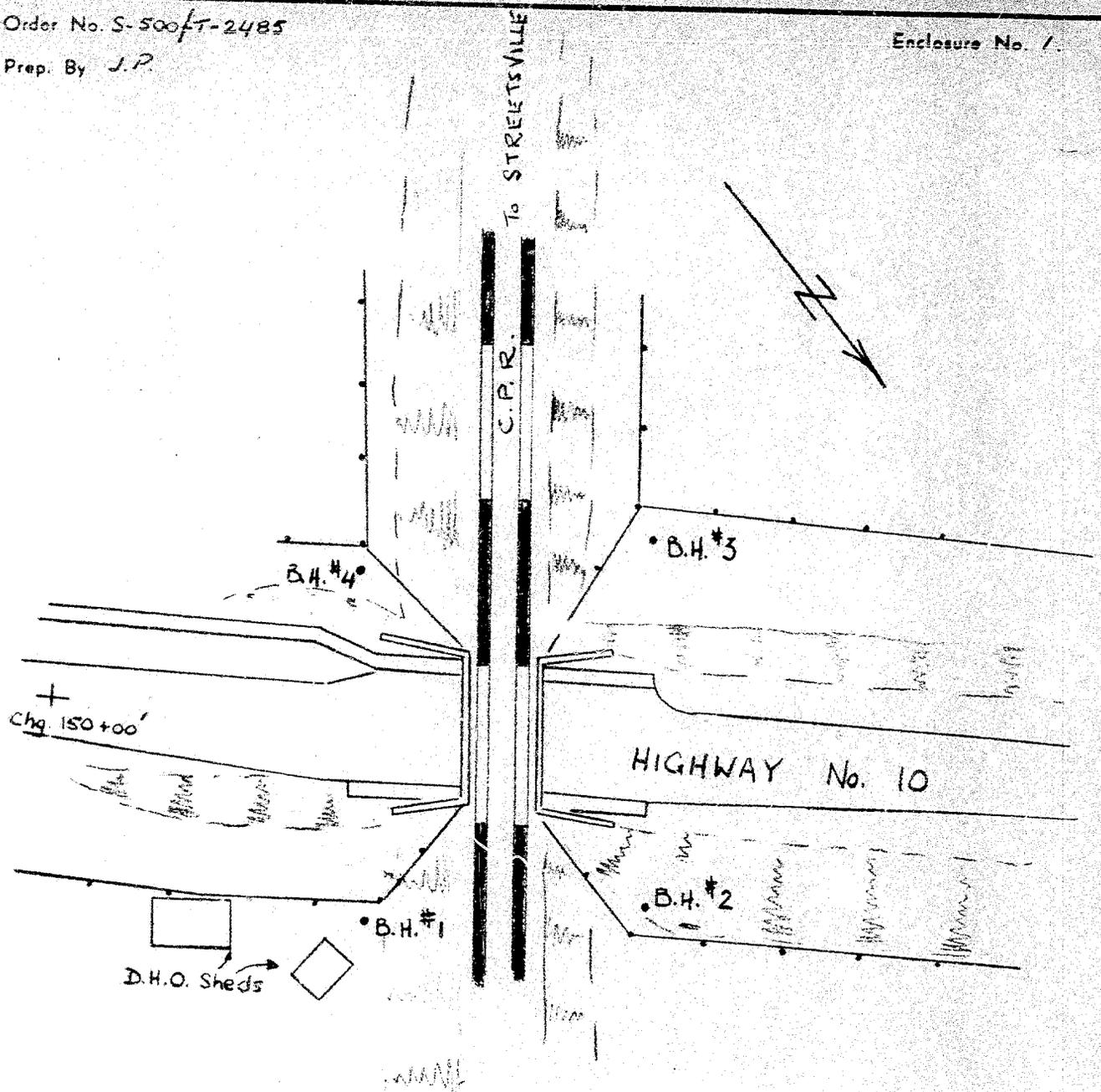
Yours very truly,
RACEY, MacCALLUM AND ASSOCIATES LIMITED,


J. J. Schoustra, P.Eng.,
Divisional Soil Engineer.

JJS/YDP

Enclosures.

Prep. By J.P.



C.P.R. CROSSING HIGHWAY No. 10
LOCATION OF BOREHOLES

Scale: 1" to 50'

RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: 1

Project: C.P.R. CROSSING HIGHWAY #10.
 Location: COOKSVILLE, ONTARIO.
 Hole Location: See Enclosure No 1.
 Hole Elevation and Datum: 409.4 feet M.S.L.
 Field Supervisor: J.P. Prep.: J.P.
 Driller: J.D. (DHO) checked: J.S. Date: 24.8.60

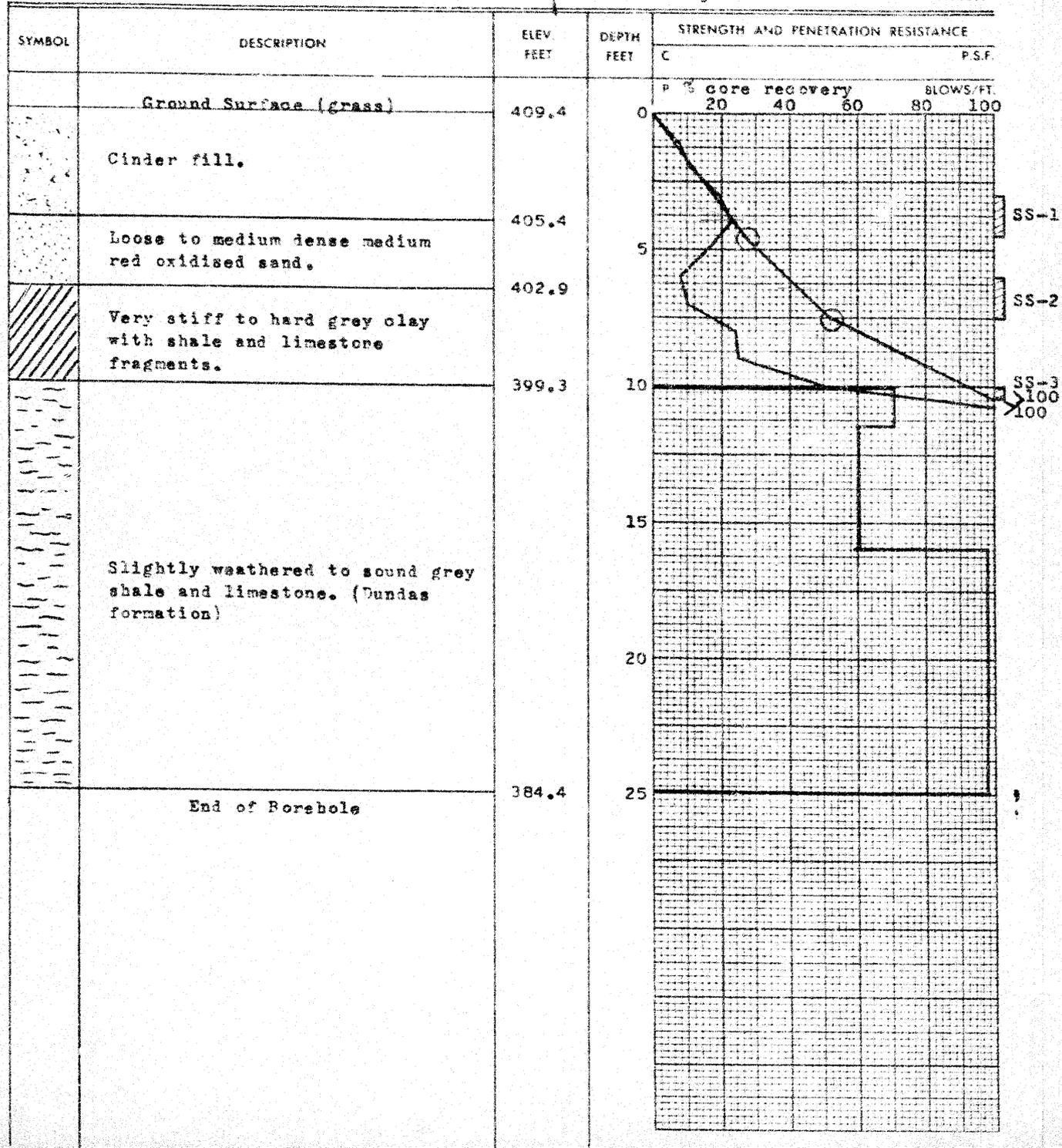
LEGEND

Shear Strength (C)

Unconfined compression
 Vane test and sensitivity (S)

Penetration Resistance (P)

2" Split tube
 2" Dia. Cone
 Casing



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Foundation Engineering Division

Engineering Data Sheet for Borehole: 2

Project: C.P.R. CROSSING HIGHWAY #10.
 Location: COOKSVILLE, ONTARIO.
 Hole Location: See Enclosure No 1.
 Hole Elevation and Datum: 411.2 feet M.S.L.
 Field Supervisor: J.P. Prep.: J.P.
 Driller: J.D. (DHO) Checked: J.S. Date: 29/30.8.60

LEGEND

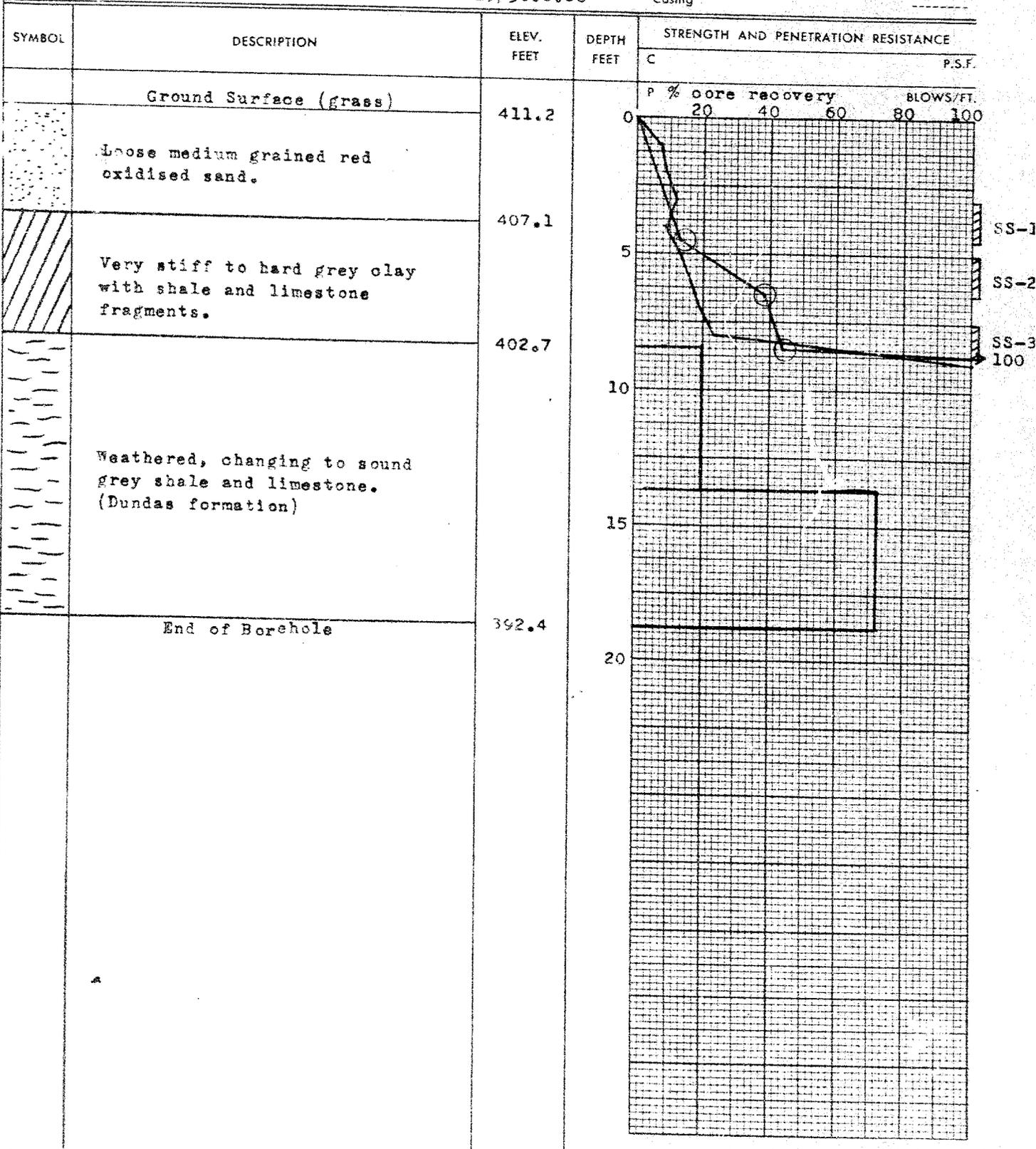
Shear Strength (C)

Unconfined compression
 Vane test and sensitivity (S)

Penetration Resistance (P)

2" Split tube
 2" Dia. Cone
 Casing

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RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: 3

Project: C.P.R. CROSSING HIGHWAY #10,
 Location: COOKSVILLE, ONTARIO.
 Hole Location: See Enclosure No 1.
 Hole Elevation and Datum: 417.0 feet M.S.L.
 Field Supervisor: J.P. Prep.: J.P.
 Driller: J.D. (DUO) Checked: J.S. Date: 30.8.60

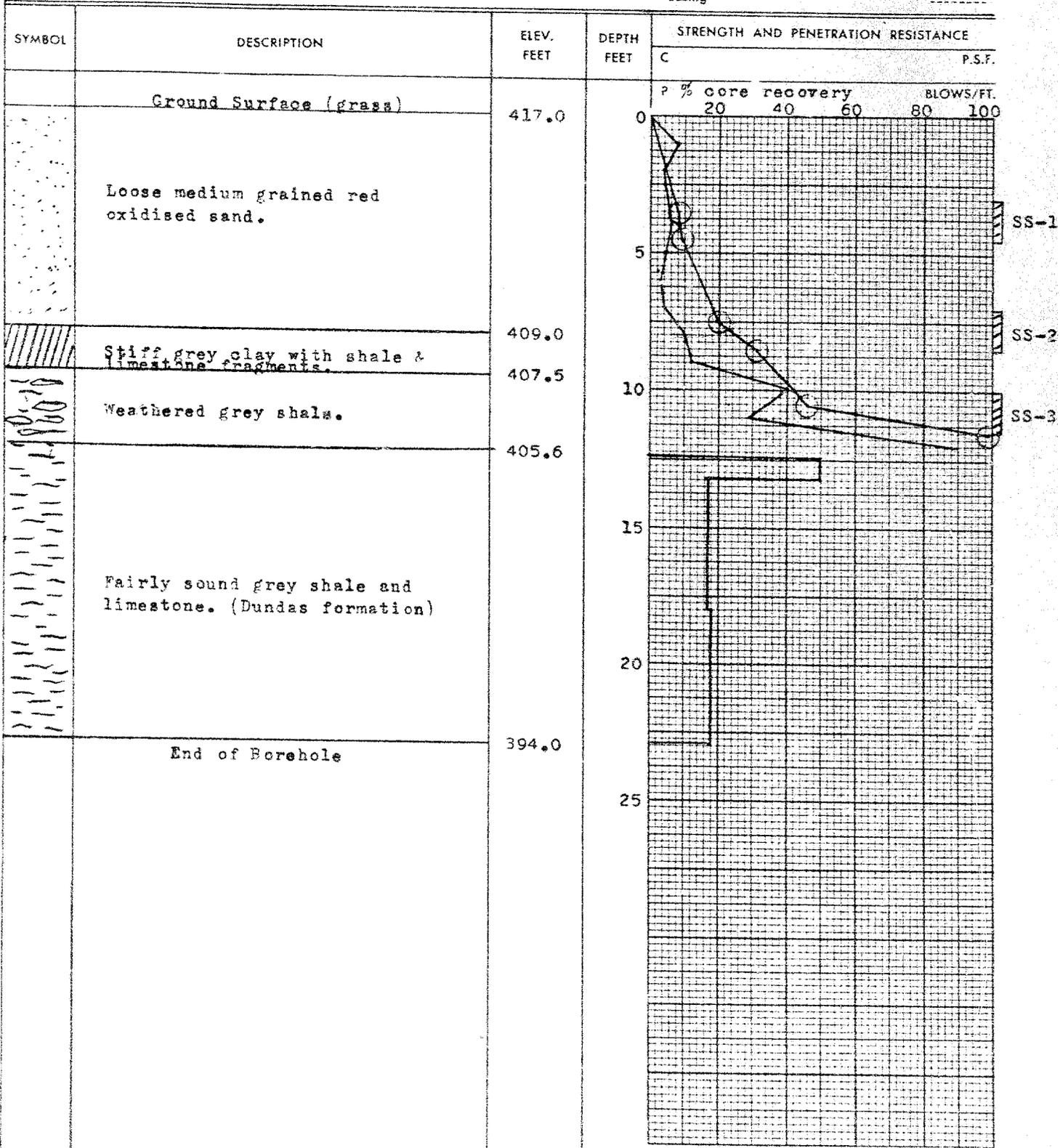
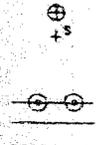
LEGEND

Shear Strength (C)

Unconfined compression
 Vane test and sensitivity (S)

Penetration Resistance (P)

2" Split tube
 2" Dia. Cone
 Casing



RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: 4

Project: C.P.R. CROSSING HIGHWAY #10,
 Location: COOKSVILLE, ONTARIO.
 Hole Location: See Enclosure No 1.
 Hole Elevation and Datum: 409.5 feet M.S.L.
 Field Supervisor: J.P. Prep.: J.P.
 Driller: J.D. (DHO) Checked: J.S. Date: 26.8.60

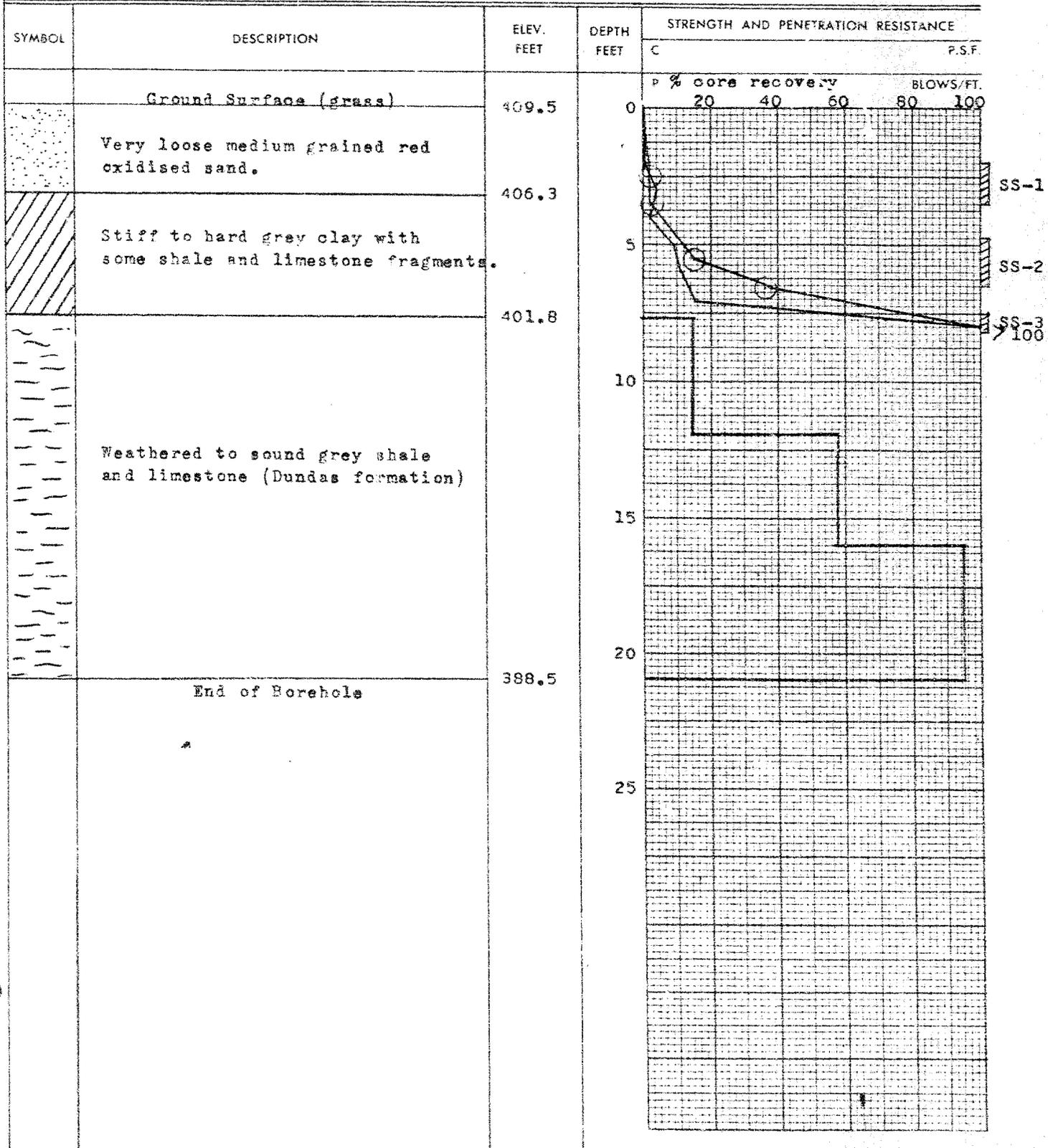
LEGEND

Shear Strength (C)

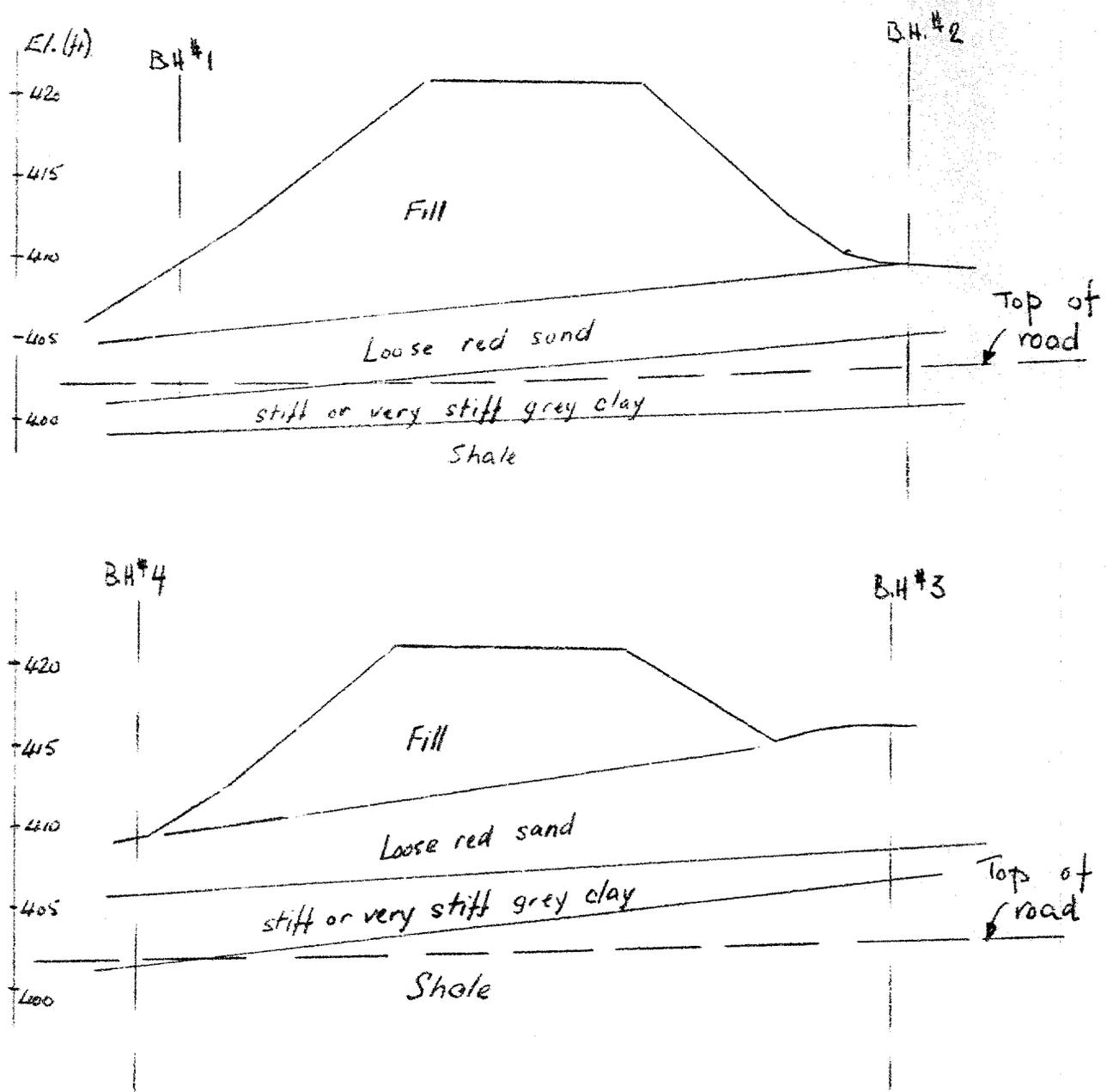
Unconfined compression
 Vane test and sensitivity (S)

Penetration Resistance (P)

2" Split tube
 2" Dia. Cone
 Casing



Prep. By J.P.



Sections showing strata and position of existing road.