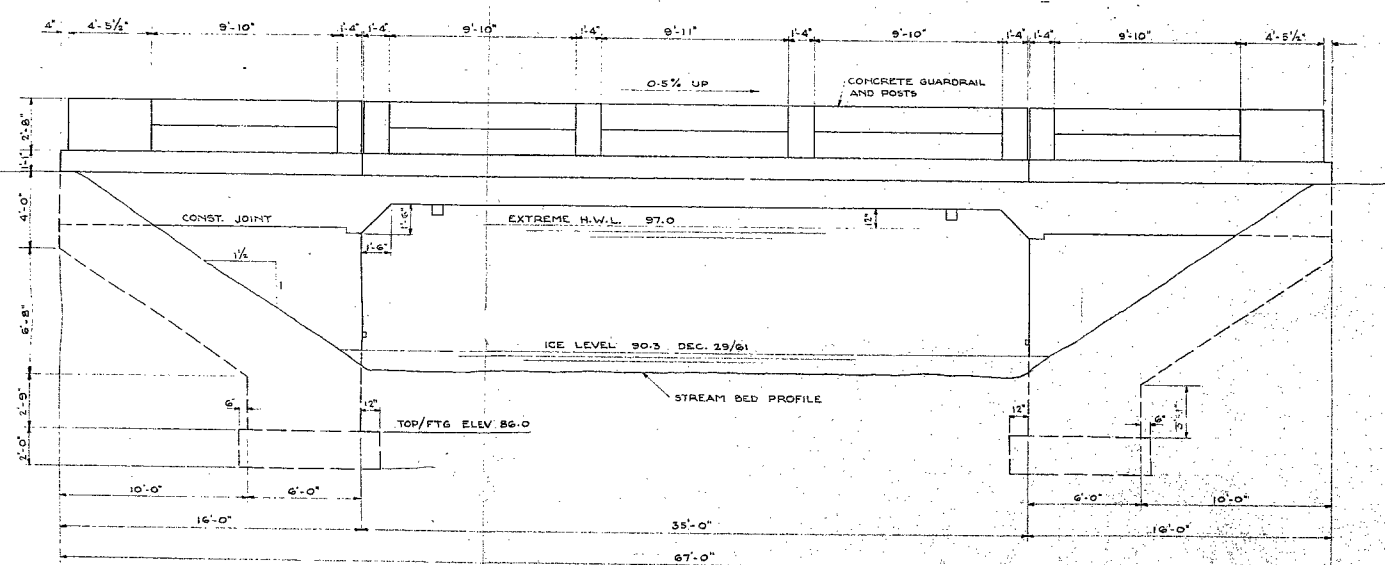
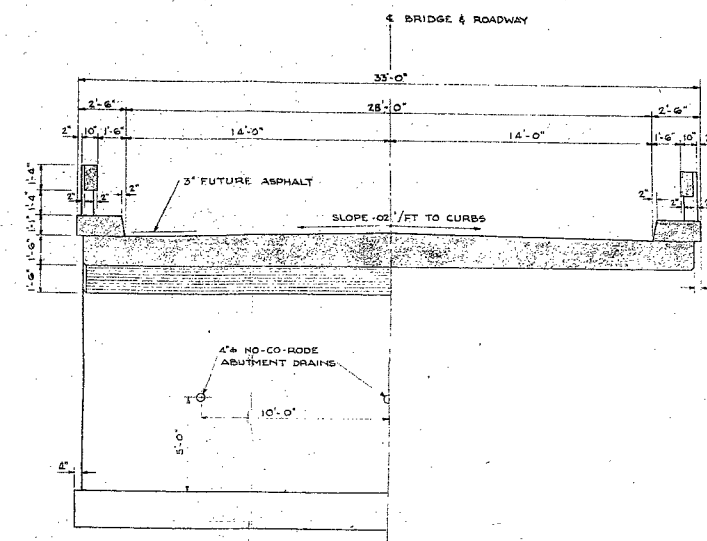
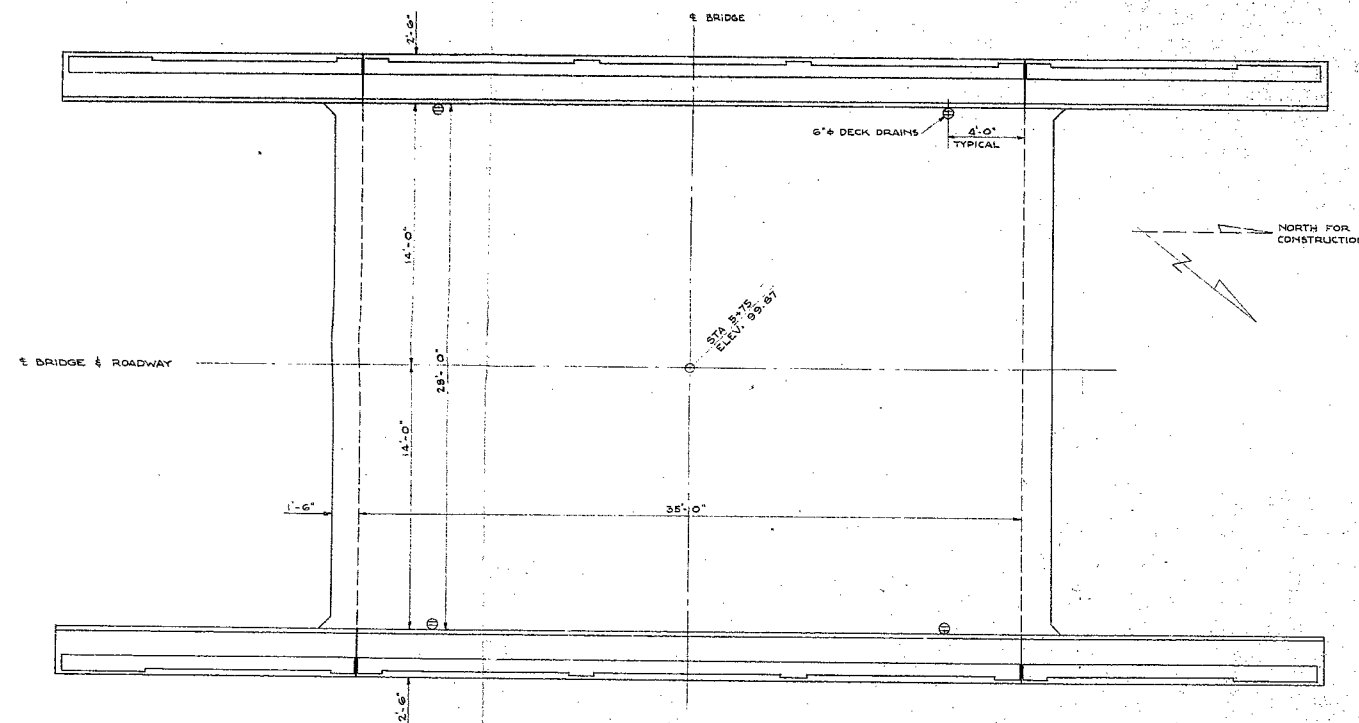


#62 - F - 319 M

GOODS BRIDGE

LOT 12/13, CON. NER

WILMOT TWP.



GOODS BRIDGE
LOTS 12 & 13 CON. NER
COUNTY OF WATERLOO
WILMOT TOWNSHIP

GENERAL ARRANGEMENT

V. R. ASTROP

CONSULTING ENGINEER

DESIGNED BY	VRA
DRAWN BY	VRA
CHECKED BY	VRA
SCALE	AS NOTED
DATE	JAN 15/62
DRAWING NO.	2

Mr. A. M. Toye,

February 15, 1962.

Bridge Engineer.

Materials & Research Division, and REVIEW OF FOUNDATION REPORT by
Dominion Soil Investigation, Ltd.
(Foundation Section) PRELIMINARY PLAN by V.R. Astrop.

Attention: Mr. K. L. Kleinstelber.

Re: Twp. of Wilmot, Goods Bridge,
County of Waterloo, Lot 12/13,
Con. N.E.R., Report File BA1343.

We have reviewed the foundation investigation report prepared by Dominion Soil Investigation, Ltd. (No. 2-1-5), and the Preliminary Plan prepared by V. R. Astrop, Consulting Engineer. We would like to make the following comments pertaining to the foundation design:-

1) Spread Footings:

The Foundation Section contacted the soil consultant and ascertained that the bearing values quoted in the foundation report are "gross bearing values", not "net pressures". Therefore, we would like to point this out to the attention of the designer.

The preliminary drawing shows the structure on spread footings. In view of the permeable nature of the subsoil above the footing elevation, serious dewatering problems can be anticipated. We therefore, recommend that the designer should show in detail, the proposed dewatering scheme as suggested by the soil consultants.

2) Filed Foundation:

If short treated timber piles are used for foundation support, these should be driven to practical refusal in the dense fill stratum. The pile driving should be controlled by the Hiley formula as per D.H.C. Standards DD-1218 and DD-1219.

Should there be any additional questions pertaining to this, please contact our Office.

MD/MdeF

cc: Foundations Office
Gen. Files.

A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER
Per:

M. Devata
(M. Devata,
SR. PROJECT FOUNDATION ENGR.)

**DOMINION SOIL INVESTIGATION
LIMITED**

Foundation Engineering - Soil Mechanics

Soil Boring & Rock Diamond Drilling

Field & Laboratory Testing

NOTE! NEW ADDRESS

HEAD OFFICE
77 CROCKFORD BLVD.
SCARBOROUGH, ONTARIO
Tel. GA. 1-2567

BRANCH OFFICE
363 QUEENS AVENUE
LONDON, ONTARIO
Tel. General 3-3851

Scarborough, Ontario,
January 8th, 1962.

Mr. V. R. Astrop,
Consulting Engineer,
105 Pine Street,
ANCASTER, Ontario.

Re: Goods Bridge,
Lots 12 & 13, Con. NER,
Wilmot Twp., Waterloo County,
Our Ref. No. 2-1-5

R E P O R T

Gentlemen:

62-F-319M

The soil investigation has been completed for the above project in accordance with your letter of authorization dated January 2nd, 1962. The results of the subsurface exploration together with our concluded recommendations are presented in this report.

Field Work

Field work was carried out on January 4th and 5th, 1962 and comprised two boreholes and one dynamic cone penetration test at the locations shown on enclosure #1. The positions of the test holes were set out on the site with the assistance of a drawing No. 1 provided to us. The location of borehole No. 1 was slightly altered to avoid difficult set-up conditions. Elevations were measured relative to the spike in a hydro pole, on the east side of the road, south of the existing bridge (= EL. 100.00 ft.) also marked on the above-mentioned drawing.

The boreholes were of 2½ in. diameter. They were lined (or partly lined) with Bx casing advanced to the required sampling depths by the repetitious procedure of alternately driving and augering.

SUPER IMPOSED DOCUMENT MAY
APPEAR AS MULTI-FIELD ON FILM.

Cont'd

- 2 -

Standard penetration tests were made at frequent intervals using a 2 in. outside diameter split spoon driven into the bottom of the clean borehole by a constant driving energy (140 pound hammer dropping 30 inches). The dynamic cone penetration test is one type of deep sounding in which the Ek rods with a 2 in. diameter 60 degree apex cone driving point are driven into the subsoil without casing and applying the same driving energy as above. The former test provided disturbed samples of the substrata indicating their relative density and consistency and the latter a continuous record of soil density.

In addition to the split spoon and thin walled tube samples, some sub-surface material brought up by the auger was also preserved.

The samples were shipped to our laboratory where they were thoroughly examined.

This analysis together with the penetration test results obtained in the field comprise the basis on which the geotechnical properties of the subsoil are being evaluated.

The stratification of the subsoil, sampling depths and the results of the penetration tests are recorded on engineering data sheets comprising enclosures #2 and #3.

Description of Site and Geology

The proposed bridge will be located about ten miles west of Kitchener and about three miles north of Highways #7 and #8. It will carry Wilmot Township Road #16 above the creek. The closest town is Baden. The surrounding area is generally known as the Waterloo Hills.

The subsoil is of glacial origin and hills are scattered everywhere. These hills are the so-called kames. These kames are glacial moraines, consisting almost entirely of gravel and sand. The hollows between the hills are

Cont'd

filled up with outwash sand.

The territory is mainly agricultural and well drained.

Subsurface Conditions

Both borholes were drilled near the shoulder of the approach fill to the existing bridge. The top elevations are almost the same. The first several feet consisted of a loose fill, sand, gravel and silt. It is in a very wet condition, mainly because of seepage from above. It is loose and contains the remains of the original topsoil and wood pieces.

Around elevation 90, alluvial silt and fine sand were encountered. The layered structure of this soil suggests that it was deposited by the creek during flood periods. The traces of glacial outwash sand were also found within this layer, together with gravel and grits. It is completely saturated, loose close to the top and increasingly dense towards the bottom, where some clay and silt were found indicating the change into the next stratus.

Around elevation 85, a hard, damp, grey silt and clay mixture was found. The moisture content is low and it has been compressed to a great degree by the enormous weight of the glaciers having lain above it. Gravel and grits are scattered everywhere in the main material. The deposit was explored to a depth of 15 ft. and it was found that its favourable properties did not change.

The ground water table was encountered around elevation 89 in both borholes.

Recommendations

The new bridge will be a part of a general stream diversion and regulation. It will be a 35 ft. span bridge of concrete rigid frame design.

Cont'd ...

Our recommendations are based on this information.

Two alternative methods are suggested for the foundation of the bridge.

(1) Spread Footings

The fill and the alluvial silt and fine sand are not capable of supporting the bridge; therefore, elevation 84 is suggested as the highest possible footing level. The allowable bearing pressure is 4,000 lb. per sq. ft. which may be increased to 8,000 lbs. per sq. ft. at elevation 80 or below.

Interpolation is not recommended between elevations 84 and 80. Settlement will be negligibly small and will not endanger the structure.

The construction of the footings may present some problems. The first 10 ft. of the subsoil is permeable, thus the water moves relatively quickly through the pores. Any excavation, therefore, must be kept dry while the footings are being constructed. The most economical method in this case would be to drive sheet piles into the grey, clay silt layer, thus enclosing an area from the sides and from the bottom. Excavation can be done from within this site and any seepage water can be collected in a temporary sump and removed by pumping. The sheet piles may as well serve as form work for the foundations.

(2) Pile Foundations

Short, treated timber piles of a bearing capacity of approximately 20 tons are capable of supporting the structures. These piles will reach refusal between elevation 80 and 75 ft. No settlement will occur in this type of soil. Construction difficulties are not

expected and the pile cap can be as high as practicable and its elevation is not influenced by consideration of frost protection.

The relative merits of the two methods will be evaluated by economic considerations. From the engineering point of view, the pile foundations are preferable to spread footings. Differential settlements are reduced to practically zero and the construction will be simpler and most probably cheaper.

We are glad to have had this opportunity of being of service to you and should any questions arise in connection with the report, please do not hesitate to contact us.



Encl. (3)

Yours very truly,

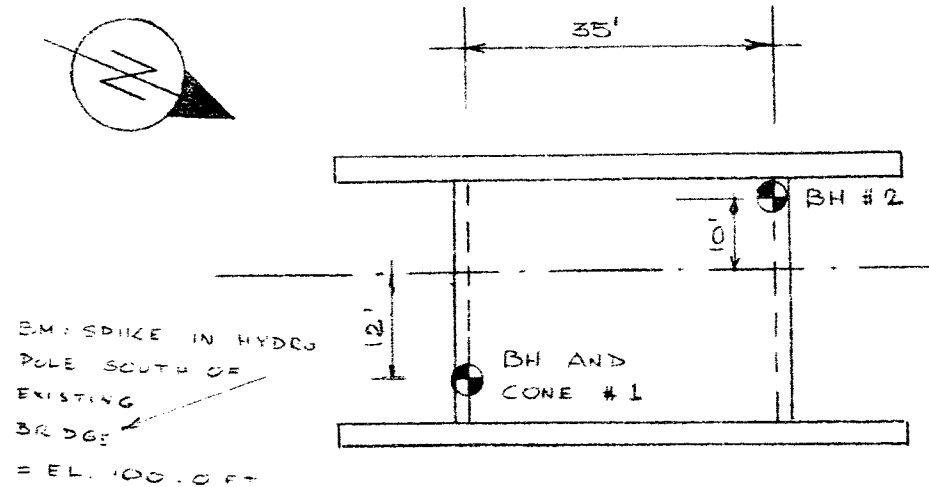
DOMINION SOIL INVESTIGATION LIMITED

A handwritten signature in cursive script, appearing to read "L. R. Szalatkay".

L. R. Szalatkay, P. Eng.,
Senior Soils Engineer.

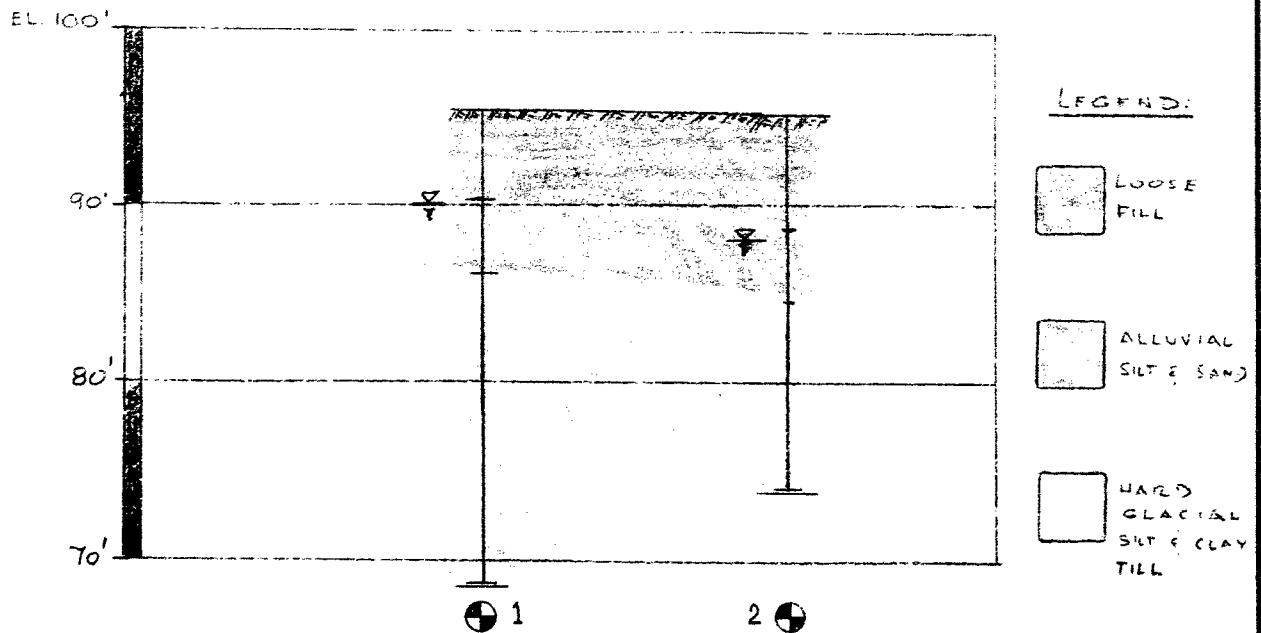
E n c l o s u r e s

Prep. By LS



LAYOUT OF BOREHOLES

SCALE: 1" TO 20'



SUBSURFACE PROFILE

VERTICAL SCALE: 1" TO 10'

Dominion Soil Investigation Ltd.

Engineering Data Sheet for Borehole: 1

Date: JAN. 8, 1962

Project: GOODS BRIDGE
 Location: WILMOT TOWNSHIP
 Hole Location: SOUTH ABUTMENT
 Hole Elevation and Datum: 95.4
 Field Supervisor: LS Prep.: LS
 Driller: GG Checked: LS

LEGEND

Shear Strength (C)

Unconfined compression
 Vane test and sensitivity (S)

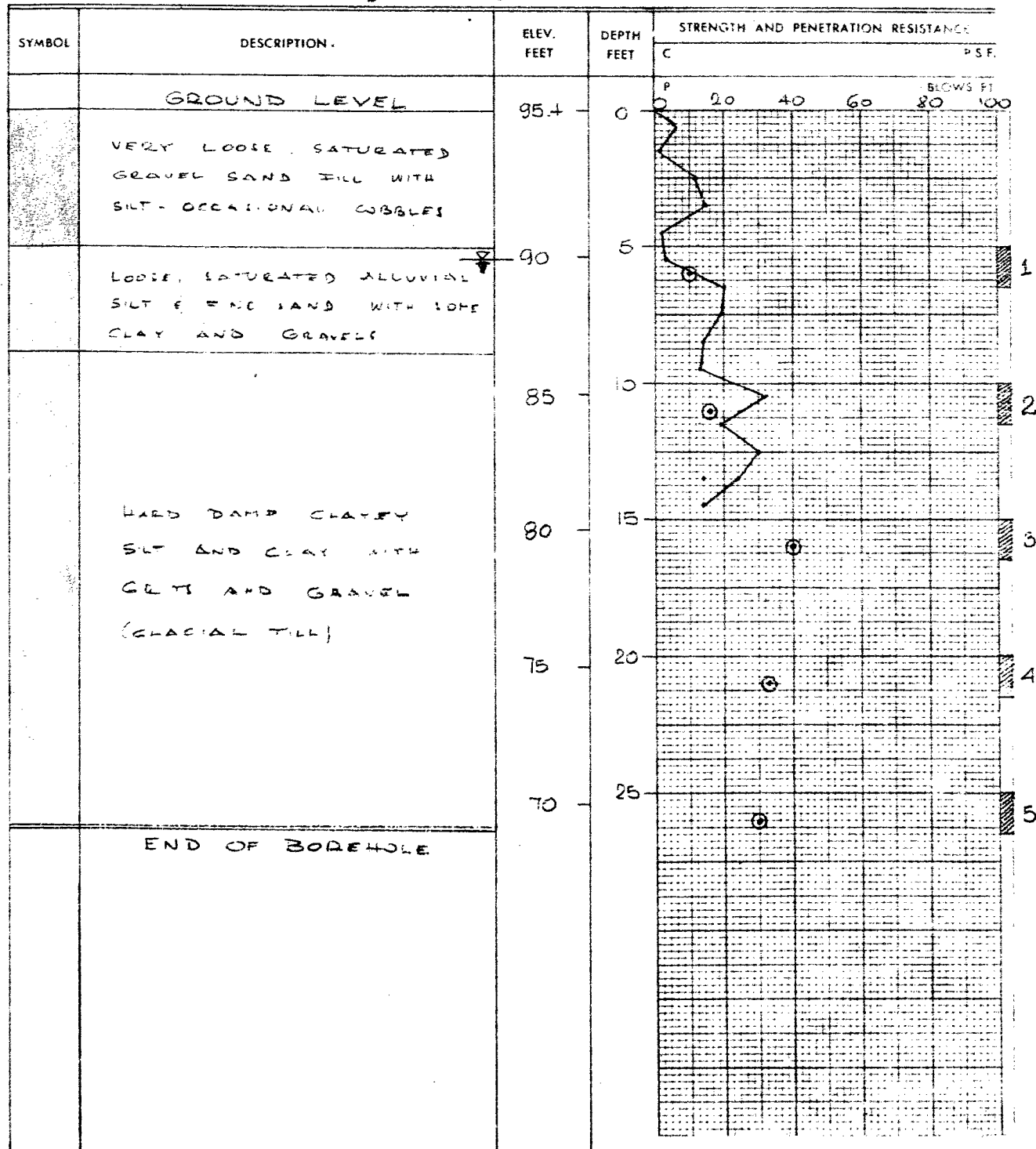
Penetration Resistance (P)

2" Split tube
 2" Dia. Cone
 Casing

Sampling Method

2" Dia. split tube

2" Shelby tube



Dominion Soil Investigation Ltd.

Engineering Data Sheet for Borehole: 2

Date: JAN. 8, 1962

Project: GOODS BRIDGE

Location: WILMOT TOWNSHIP

Hole Location: NORTH ABUTMENT

Hole Elevation and Datum: 95.2

Field Supervisor: LS Prep.: LS

Driller: GG Checked: LS

LEGEND

Shear Strength (C)

Unconfined compression

Vane test and sensitivity (S)

Penetration Resistance (P)

2" Split tube

2" Dia. Cone

Casing

⊕
4^s

⊕ ⊕

Sampling Method

2" Dia. split tube

2" Shelby tube

