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DEPARTMENT OF HIGHWAYS OF ONTARIO
PARLIAMENT BUILDINGS
TORONTO, ONTARIO

23-67-43



FOUNDATION CONDITIONS
MADAWASKA RIVER BRIDGE
HIGHWAY NO. 515; W.P. 253-62
JEWELLEVILLE, ONTARIO

CHAINAGE EQUATION:

ADD 46 + 64.45

JAN 30. 1967

(FROM Mr. S. MacCOMBIE)

HGS.

Project: J2031

July, 1965

William Trow Associates Limited

90 Milvan Drive
Weston, Ontario
749-1290

William Trow

Project: J2031

Soil Mechanics
Consultants
W. A. Trow
MSc. MEIC. P. Eng.
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PhD. MEIC. P. Eng.
D. H. Shields
PhD. MEIC. P. Eng.



Associates Ltd.

Mr. A. Rutka, P.Eng.,
Chief Materials and Research Engineer,
Materials and Research Section,
Department of Highways of Ontario,
Parliament Buildings,
Toronto, Ontario.

July 23, 1965

Attention: Mr. A.G. Stermac, P.Eng.

Foundation Conditions
Madawaska River Bridge
Highway No. 515; W.P. 253-62
Jewelleville, Ontario

Dear Sirs:

In accordance with your letter of authorization dated May 26th, 1965, we have completed a foundation study at the above site. Comments and recommendations resulting from this investigation follow.

SUMMARY

1) The subsoil at the site consists of a variable depth of clayey silt overlying sands, gravels and boulders. On the north side of the river up to 10 feet of loose material overlies the silt..



2) Foundations for the proposed structure are recommended to be piled. An exception to this recommendation is the south pier which will be founded directly on the bedrock. The piles should consist of steel H sections driven to refusal. Refusal depths have been discussed in the body of the report.

FIELD WORK AND SUBSOIL STRATIGRAPHY

Nine sampled borings were positioned along the centre-line of the proposed structure as shown on the site plan drawing. Additional probings were placed on both sides of centreline near the pier and abutment locations. The boreholes were advanced and samples obtained using conventional equipment. All borehole elevations are referenced to the bench mark described on the site plan drawing.

The subsoil encountered in the boreholes is described in detail on the Borehole logs Dwgs. 1 to 9 and is shown in general as the profile on the site plan drawing. The stratigraphy is variable across the site, but generally consists of an alluvial sand at ground surface overlying a clayey silt which is followed by sand, gravel, rock ledges, and boulders over a sound gneiss bedrock.

The alluvial material is found on the north side of the river for a depth of 10 feet. As is typical of most recent alluvial deposit the material is heterogeneous in nature and exists in a loose state. The clayey silt is dense and randomly layered containing fine sand partings.



Beneath the silt is a variable granular material; on the north side this stratum consists of large rock ledges and boulders overlaying by a thin mantel of sand and gravel, while over the easterly area the sands and gravels predominate and few boulders were encountered. Bedrock was proven to be a pink and grey granitic gneiss.

Groundwater level is generally at river level \pm 907 feet, however; in Boreholes 3 and 4 a slight artesian condition was noted at a depth of 37 feet from ground surface.

FOUNDATIONS

The use of spread footings on overburden at this site is not practical because of the loose nature of the alluvial material and the problems in excavating below the water table to more suitable material. It is suggested that the north abutment and piers be founded on steel H piles driven to refusal. A 12 inch pile at 74 lb/ft carrying a load of 70 tons per pile or designed as a short column is recommended. The heavy section is suggested because of boulders etc. which may be encountered during driving. Refusal depths will be variable across the site but are estimated as follows:

a) North Abutment: Steel H piles at this location will meet refusal between El \pm 868 and El \pm 850 feet. The large variation is due to the extensive boulder deposit proven by boring No. 3. Dynamic cones driven near Hole 3 and at locations 16 and 17 all met refusal near El 870, however the larger steel sections are expected to penetrate beyond this depth and possibly reach bedrock near El \pm 850 feet.



b) North Pier: At this location the piles should penetrate to bedrock at or near elevation \pm 858. Variation in bedrock level in excess of 5 feet should be expected over the pier areas.

c) South Pier: At the south pier location the piles will meet refusal at the rock contact elevation \pm 878 feet.

d) South Abutment: This abutment will incorporate spread footings resting directly on sound bedrock. Provided all loose and weathered rock is removed prior to placing the footing a safe net bearing value of 20 tsf may be used at this location. Borings and cone penetration tests 9, 10 and 11 indicate that the sound bedrock will be from zero to 5 feet from present ground surface.

SCOUR AND PILE PROTECTION

At the north abutment it will be necessary to protect the foundation from scour and then possible damage by ice and river debris. This can be accomplished by driving a row of sheeting at the front of the abutment and protecting the surface with rock rip-rap. Sheet piling should penetrate to a minimum elevation, 893 feet.

Both piers can be protected using conventional cribbing. An alternative method is to place thin steel tubes over the H sections and fill the inside of the steel tube with concrete. This section can continue to near deck level where the pile cap can be incorporated into the bridge deck beam. The thin steel shell should extend from the top of pile to a depth of at least 4 feet below river bottom level.



APPROACH EMBANKMENTS

No problems associated with the stability of approach embankments exists at this site.

EARTH PRESSURES

If abutments and wing walls are used on this project, i.e. the approach fill does not spill through the abutments, they must be designed to withstand the lateral earth pressure exerted by the retained soils. The earth pressure that will act on the walls can be estimated using a value of earth pressure coefficient equal to 0.35. This value is a maximum assuming well compacted backfill and no yield of the retaining wall. A reduction to 0.25 can be effected if a slight inward yield of the wall is possible. The earth pressure, p , on the walls at any depth, h , can be found from the expression:

$$p = K (\gamma(h - h_s) + \gamma_s h_s + q)$$

where: $K = 0.35$ the recommended earth pressure coefficient assuming the walls to be rigid or $= 0.25$ will some yield of the walls.

$\gamma = 130$ pcf, the estimated unit weight of the retained soil

$\gamma_s = 60$ pcf, the estimated submerged weight of the retained soil



h_v = height of water table above the point
being considered

q = surcharge, if any, acting at the top of
the wall.

If we can be of assistance in expanding or explaining
any of our comments please do not hesitate to contact this office.

Yours very truly,

K.R. Peaker, P.Eng.

KRP/gh
Encls.

WILLIAM TROW ASSOCIATES LTD.

SITE INVESTIGATIONS · SOIL MECHANICS CONSULTATION

DRAWING No. 1.

PROJECT No. J2031.

LEGEND

PENETRATION RESISTANCE

2" O.D. SPLIT TUBE

2" I.D. SHELBY TUBE

2" DIA. CONE

SHEAR STRENGTH

UNDRAINED TRIAXIAL
AT OVERBURDEN PRESSURE

UNCONFINED COMPRESSION

VANE TEST AND SENSITIVITY (S)

NATURAL MOISTURE CONTENT
AND LIQUIDITY INDEX

ATTERBERG LIMITS

LIQUID LIMIT

PLASTIC LIMIT

SAMPLE TYPE

2" O.D. SPLIT TUBE

2" I.D. SHELBY TUBE

3" O.D. SHELBY TUBE

BOREHOLE No. 1.
PROJECT D.H.O. Bridge Site.
LOCATION Jewelleville, Ontario.
HOLE LOCATION Station 63+00.
HOLE ELEVATION 914.64 ft.
DATUM See Site Plan Dwg.

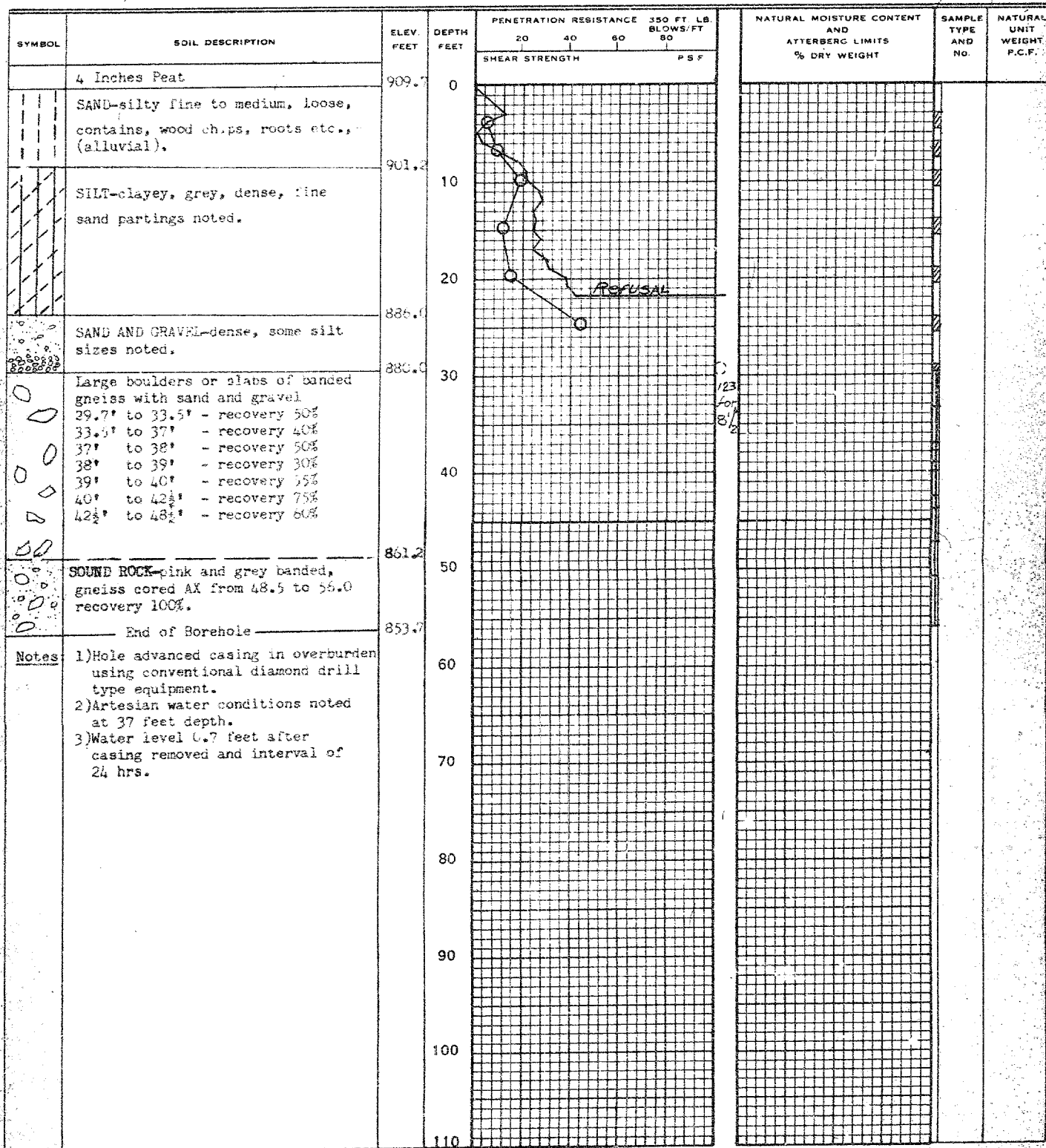
SYMBOL	SOIL DESCRIPTION	ELEV. FEET	DEPTH FEET	PENETRATION RESISTANCE	350 FT. LB. BLOWS/FT.	NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS % DRY WEIGHT	SAMPLE TYPE AND NO.	NATURAL UNIT WEIGHT P.C.F.
				20 40 60 80				
	1" Topsoil	914.6	0					
	SAND-fine, brown, medium dense.						SS1	
		907.8					SS2	
	SILT-clayey, grey slightly sandy below 10½ ft. medium dense to dense.		10				SS3	
		902.2					SS4	
	SAND-fine and medium, brown, gravel sizes dense; changing to gravel, sandy, some cobbles.						SS5	
		893.9	20				SS6	
	BEDROCK-grey felsphathic gneiss. Cored AX from 20'8" to 29'6" recovery 95%.							
	End of Borehole	885.1	30					
Notes:	1) Hole advanced cased in overburden using conventional diamond drill type equipment. 2) Water level at 1'8" after 24 hrs; hole open to 18½ feet.							
			40					

LEGEND

BOREHOLE NO. 2.
 PROJECT D.H.O. Bridge Site.
 LOCATION Jewelleville, Ontario.
 HOLE LOCATION Station 64+00.
 HOLE ELEVATION 909.66 ft.
 DATUM See Site Plan Dwg.

PENETRATION RESISTANCE
 2" O.D. SPLIT TUBE —○—○—
 2" I.D. SHELBY TUBE —*—*—*—
 2" DIA. CONE ———
 SHEAR STRENGTH
 UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE ⊕
 UNCONFINED COMPRESSION ⊗
 VANE TEST AND SENSITIVITY (S) †

NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX X^{LI}
 ATTERBERG LIMITS
 LIQUID LIMIT —○—
 PLASTIC LIMIT ———
 SAMPLE TYPE
 2" O.D. SPLIT TUBE ⊠
 2" I.D. SHELBY TUBE ⊡
 3" O.D. SHELBY TUBE ⊢



LEGEND

BOREHOLE No. 3.
PROJECT D.H. O. Bridge Site.
LOCATION Jewelleville, Ontario.
HOLE LOCATION Station 65+00.
HOLE ELEVATION 908.10 ft.
DATUM See Site Plan Lwg.

PENETRATION RESISTANCE

2" O.D. SPLIT TUBE —○—○—○—
2" I.D. SHELBY TUBE —x—x—x—x—
2" DIA. CONE ————
SHEAR STRENGTH
UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE ⊕
UNCONFINED COMPRESSION ⊗
VANE TEST AND SENSITIVITY ⊕ ⊗

NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX

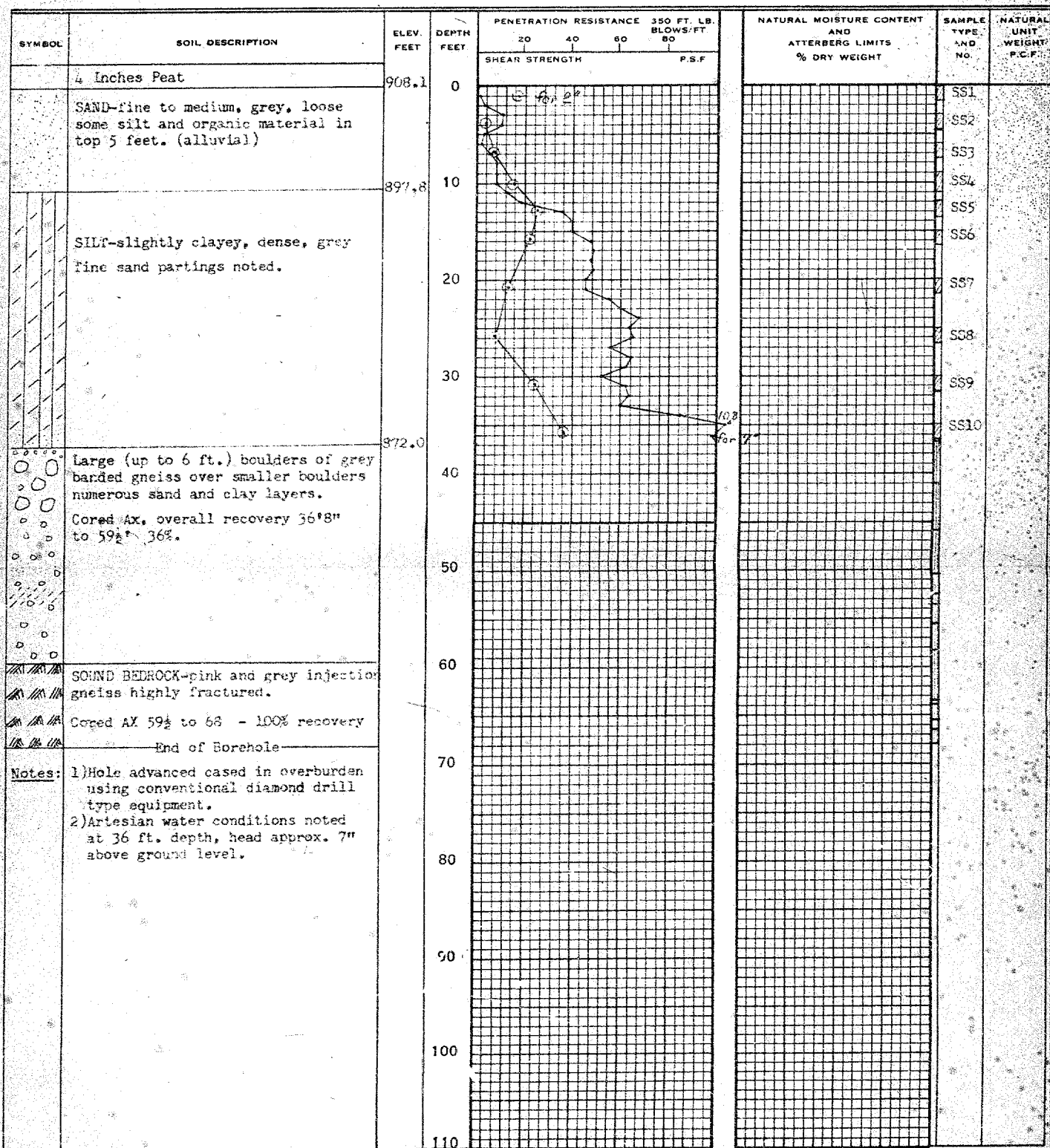
ATTERBERG LIMITS

LIQUID LIMIT —○—

PLASTIC LIMIT ———




SAMPLE TYPE

2" O.D. SPLIT TUBE —■—
2" I.D. SHELBY TUBE —■—
3" O.D. SHELBY TUBE —■—






BOREHOLE NO. 4.
 PROJECT D.H.O. Bridge Site.
 LOCATION Jewellville, Ontario.
 HOLE LOCATION Station 65+49.
 HOLE ELEVATION 905.26 ft.
 DATUM See Site Plan Dwg.

PENETRATION RESISTANCE



2" O.D. SPLIT TUBE 
 2" I.D. SHELBY TUBE 
 2" DIA. CONE 

SHEAR STRENGTH




UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE 
 UNCONFINED COMPRESSION 
 VANE TEST AND SENSITIVITY (S) \pm 

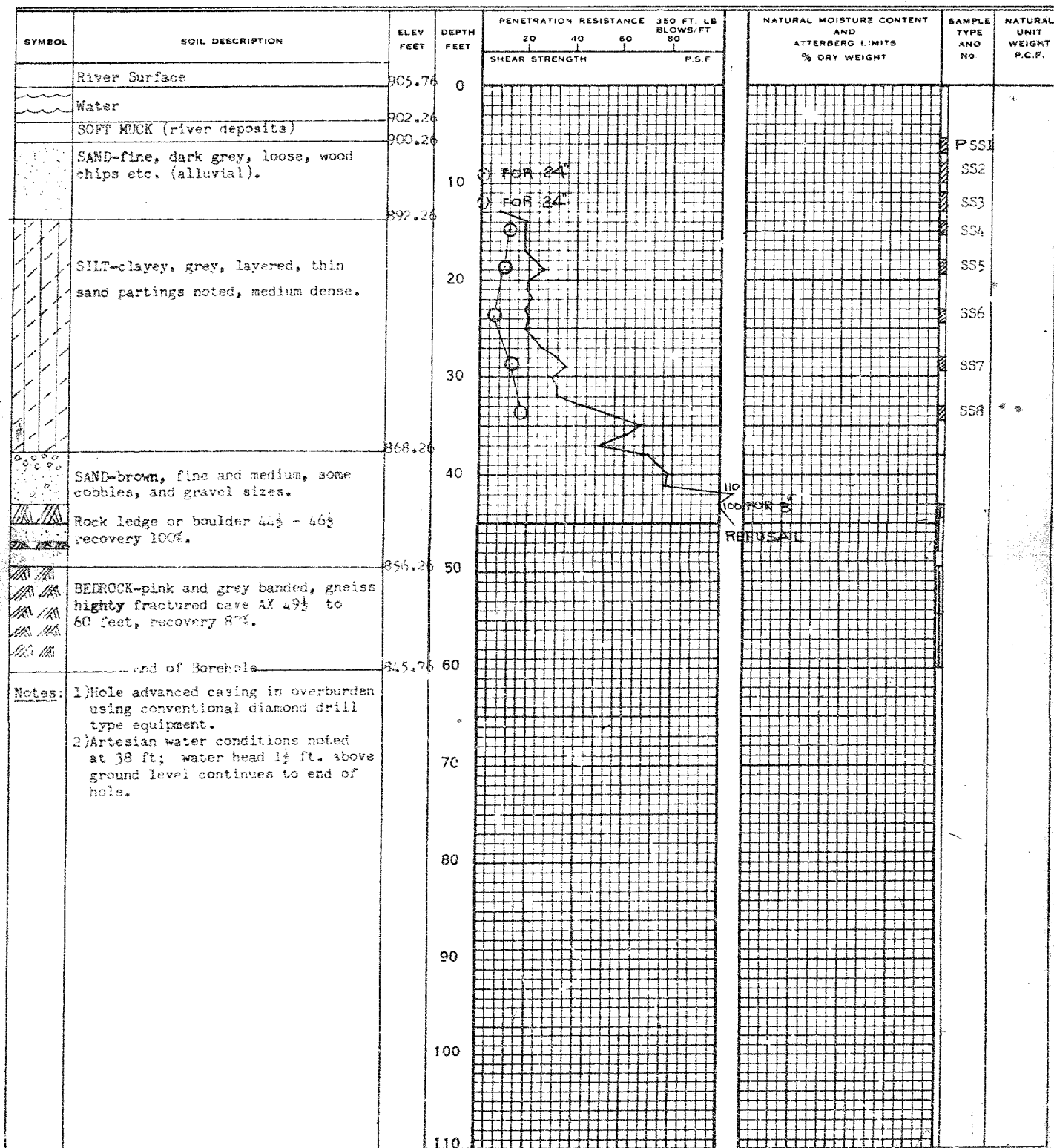
NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX

ATTERBERG LIMITS

LIQUID LIMIT PLASTIC LIMIT 

SAMPLE TYPE

2" O.D. SPLIT TUBE 
 2" I.D. SHELBY TUBE 
 3" O.D. SHELBY TUBE 



LEGEND

BOREHOLE NO. 5.
 PROJECT D. & O. Bridge Site.
 LOCATION Jewelleville, Ontario.
 HOLE LOCATION Station 66+05.
 HOLE ELEVATION 905.73 ft.
 DATUM See Site Plan (Dw.).

PENETRATION RESISTANCE

2" O.D. SPL. TUBE —○—○—○—
 2" I.D. SHELBY TUBE —x—x—x—
 2" DIA. CONE ————

SHEAR STRENGTH

UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE ⊕
 UNCONFINED COMPRESSION ⊗
 VANE TEST AND SENSITIVITY 15_1°

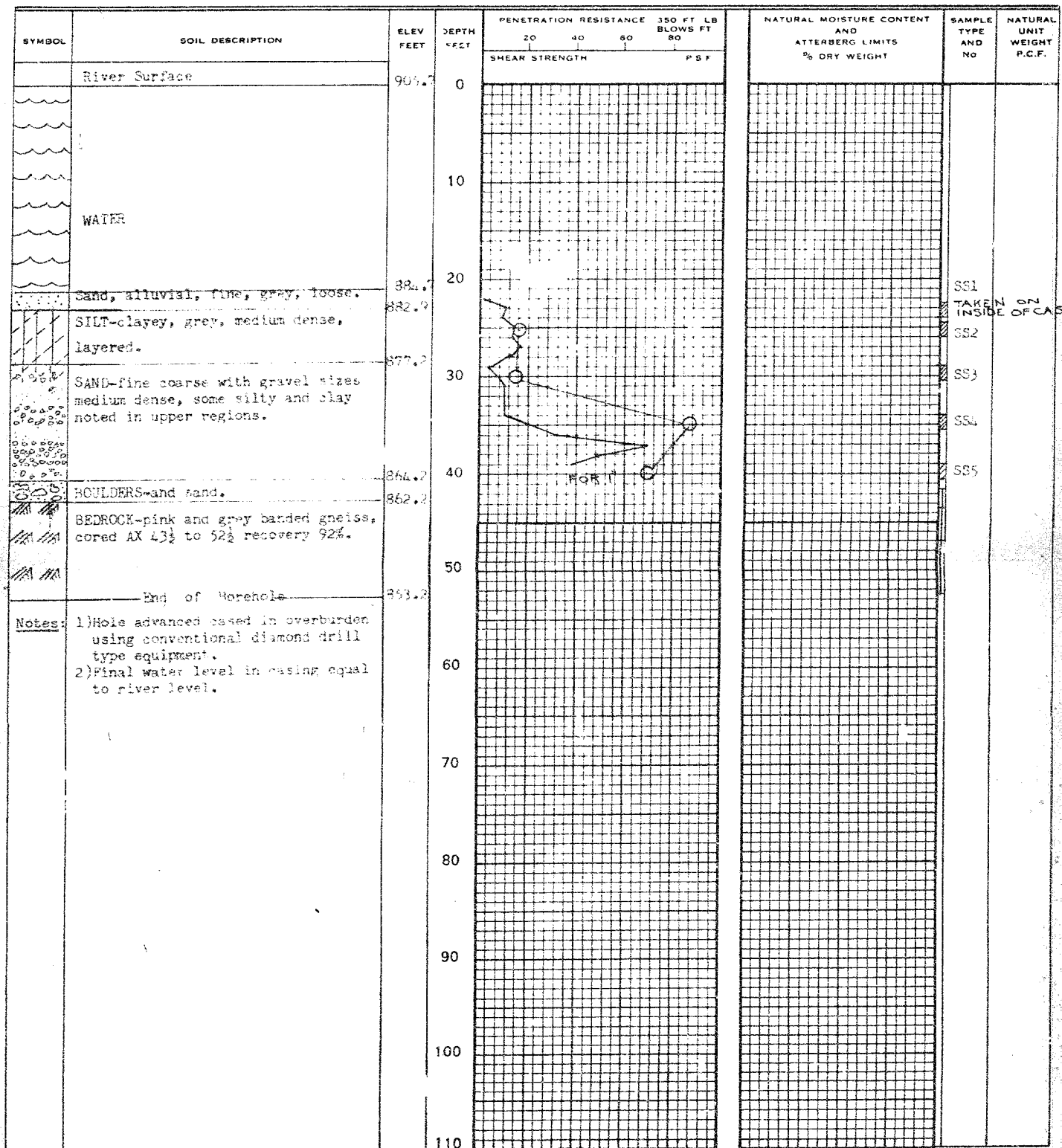
NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX

ATTERBERG LIMITS

LIQUID LIMIT —○—
 PLASTIC LIMIT ———




SAMPLE TYPE

2" O.D. SPLIT TUBE ———
 2" I.D. SHELBY TUBE ———
 3" O.D. SHELBY TUBE ———






BOREHOLE NO. 6.
 PROJECT D.H.O. Bridge Site.
 LOCATION Jewelleville, Ontario.
 HOLE LOCATION Station 66+50.
 HOLE ELEVATION 905.68 ft.
 DATUM See Site Plan Dwg.

PENETRATION RESISTANCE

2" O.D. SPLIT TUBE 
 2" I.D. SHELBY TUBE 
 2" DIA. CONE 

SHEAR STRENGTH




UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE 
 UNCONFINED COMPRESSION 
 VANE TEST AND SENSITIVITY (S)  \pm

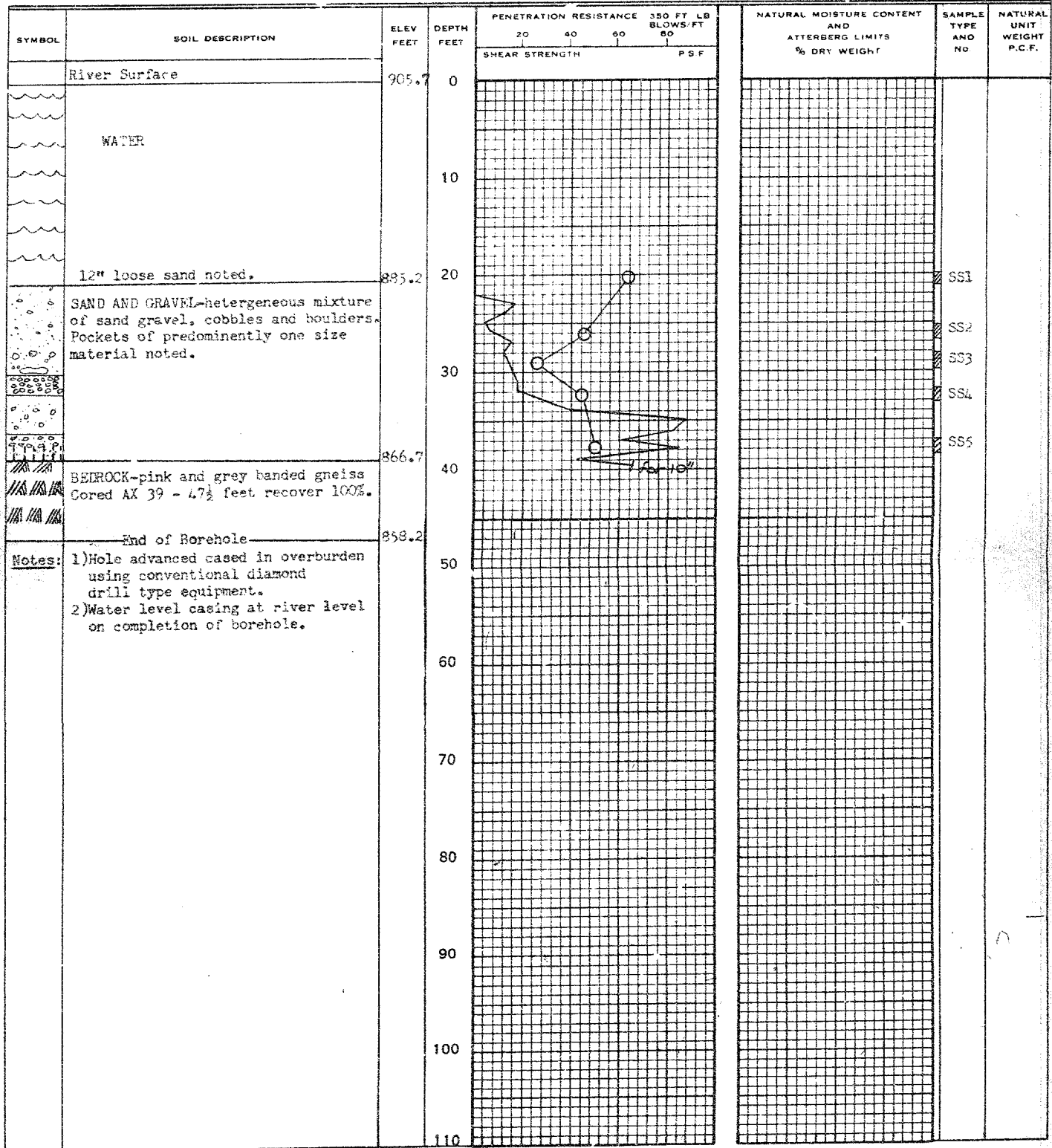
NATURAL MOISTURE CONTENT
 AND LIQUIDITY INDEX X^{LI}

ATTERBERG LIMITS

LIQUID LIMIT 
 PLASTIC LIMIT 

SAMPLE TYPE

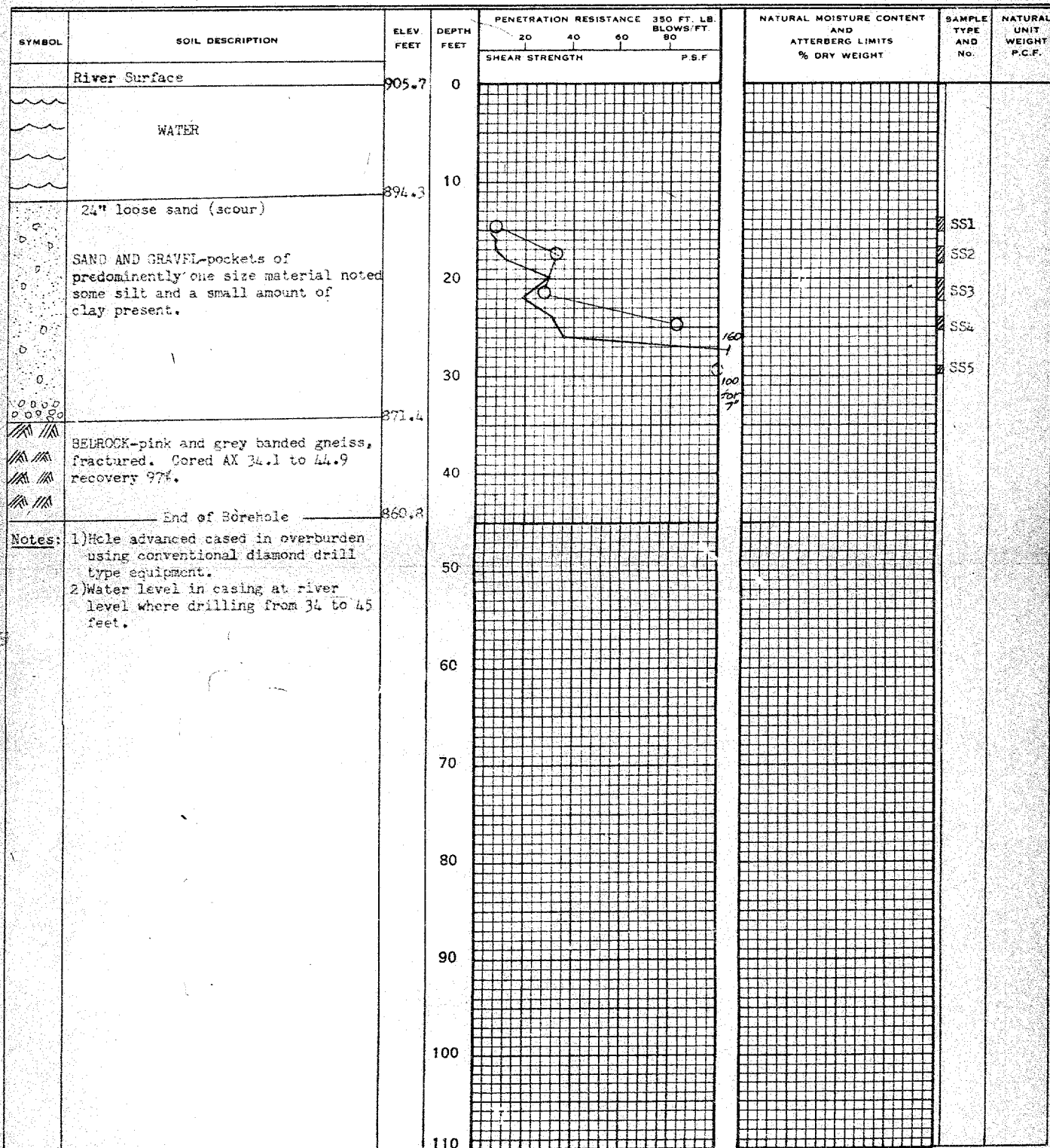
2" O.D. SPLIT TUBE 
 2" I.D. SHELBY TUBE 
 3" O.D. SHELBY TUBE 



BOREHOLE NO. 7.
PROJECT D.H.O. Bridge Site.
LOCATION Jewellville, Ontario.
HOLE LOCATION Station 67+00.
HOLE ELEVATION 905.70 ft.
DATUM See Site Plan Dwg.

PENETRATION RESISTANCE
2" O.D. SPLIT TUBE
2" I.D. SHELBY TUBE
2" DIA. CONE
SHEAR STRENGTH
UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE
UNCONFINED COMPRESSION
VANE TEST AND SENSITIVITY (S)_v

NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX
ATTERBERG LIMITS
LIQUID LIMIT
PLASTIC LIMIT
SAMPLE TYPE
2" O.D. SPLIT TUBE
2" I.D. SHELBY TUBE
3" O.D. SHELBY TUBE



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SITE INVESTIGATIONS - SOIL MECHANICS CONSULTATION


DRAWING No. 8.


PROJECT No. J2031.

BOREHOLE No. 8.
 PROJECT D.H.O. Bridge Site.
 LOCATION Jewelleville, Ontario.
 HOLE LOCATION _____
 HOLE ELEVATION 905.7 ft.
 DATUM See Site Plan Dwg.

LEGEND

PENETRATION RESISTANCE

2" O.D. SPLIT TUBE 


2" I.D. SHELBY TUBE 

2" DIA. CONE 

SHEAR STRENGTH

UNDRAINED TRIAXIAL
 AT OVERBURDEN PRESSURE 

UNCONFINED COMPRESSION 

VANE TEST AND SENSITIVITY (S) 

NATURAL MOISTURE CONTENT
 AND LIQUIDITY INDEX 

ATTERBERG LIMITS

LIQUID LIMIT 

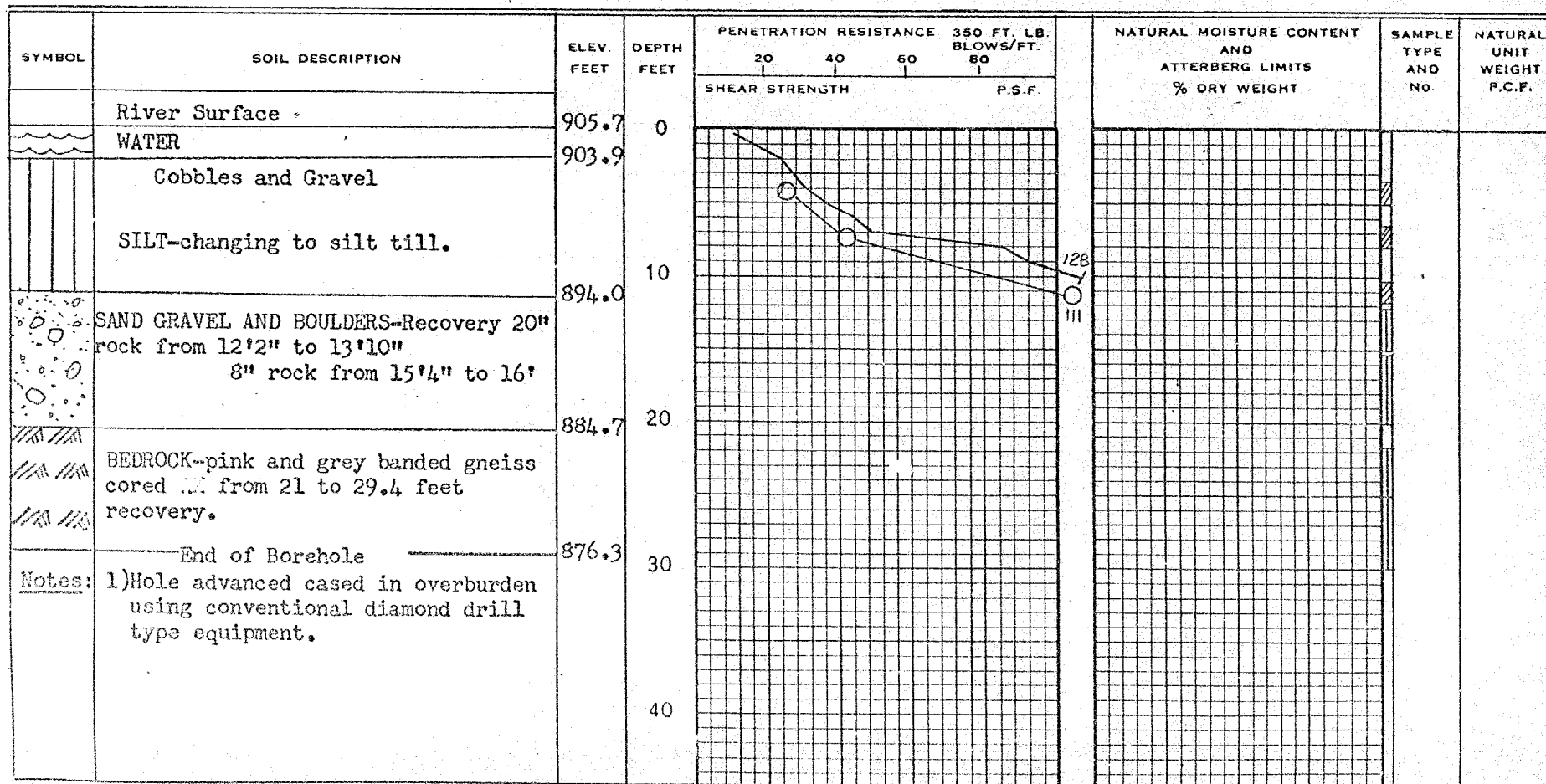
PLASTIC LIMIT 

SAMPLE TYPE

2" O.D. SPLIT TUBE 

2" I.D. SHELBY TUBE 




3" O.D. SHELBY TUBE 






LEGEND

BOREHOLE No. 9.
PROJECT D.H.O. Bridge Site.
LOCATION Jewelleville, Ontario.
HOLE LOCATION See Site Plan Dwg.
HOLE ELEVATION 920.19 ft.
DATUM See Site Plan Dwg.

PENETRATION RESISTANCE



2" O.D. SPLIT TUBE 
2" I.D. SHELBY TUBE 
2" DIA. CONE 

SHEAR STRENGTH



UNDRAINED TRIAXIAL
AT OVERBURDEN PRESSURE 
UNCONFINED COMPRESSION 
VANE TEST AND SENSITIVITY (S) 

NATURAL MOISTURE CONTENT
AND LIQUIDITY INDEXX^{LI}

ATTERBERG LIMITS

LIQUID LIMIT PLASTIC LIMIT 

SAMPLE TYPE

2" O.D. SPLIT TUBE 2" I.D. SHELBY TUBE 3" O.D. SHELBY TUBE 

SYMBOL	SOIL DESCRIPTION	ELEV. FEET	DEPTH FEET	PENETRATION RESISTANCE 350 FT. LB. BLOWS/FT.				NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS % DRY WEIGHT	SAMPLE TYPE AND NO.	NATURAL UNIT WEIGHT P.C.F.
				20	40	60	80			
	Bedrock at surface.	920.2	0	SHEAR STRENGTH P.S.F.						
	BEDROCK-pink and grey granite gneiss									
	End of Borehole	910.0	10							
Notes:	1) Hole advanced cased in overburden using conventional diamond drill type equipment.		20							
			30							
			40							

WILLIAM TROW ASSOCIATES LTD.


SITE INVESTIGATIONS - SOIL MECHANICS CONSULTATION

LEGEND

DRAWING No. 9. A
PROJECT No. J2031

BOREHOLE No. CONE TEST. NO. 9.
PROJECT D.H.O. Bridge Site.
LOCATION Jewelleville, Ontario.
HOLE LOCATION See Site Plan Dwg.
HOLE ELEVATION 920.19 ft.
DATUM See Site Plan Dwg.

PENETRATION RESISTANCE

2" O.D. SPLIT TUBE 

2" I.D. SHELBY TUBE 

2" DIA. CONE 

SHEAR STRENGTH

UNDRAINED TRIAXIAL
AT OVERBURDEN PRESSURE 

UNCONFINED COMPRESSION 

VANE TEST AND SENSITIVITY (S) 

NATURAL MOISTURE CONTENT
AND LIQUIDITY INDEX


LI
X

ATTERBERG LIMITS

LIQUID LIMIT 

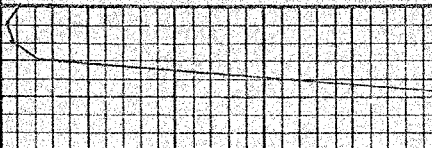

PLASTIC LIMIT 

SAMPLE TYPE

2" O.D. SPLIT TUBE 

2" I.D. SHELBY TUBE 

3" O.D. SHELBY TUBE 

SYMBOL	SOIL DESCRIPTION	ELEV. FEET	DEPTH FEET	PENETRATION RESISTANCE		NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS % DRY WEIGHT	SAMPLE TYPE AND NO	NATURAL UNIT WEIGHT P.C.F.
				20	40			
				350 FT. LB. BLOWS/FT.				
				SHEAR STRENGTH				
				P.S.F.				
		920.19	0					
		915.7						
	DYNAMIC CONE TEST ONLY		10					
			20					
			30					
			40					

LEGEND

PENETRATION RESISTANCE

2" O.D. SPLIT TUBE —○—○—○—
2" I.D. SHELBY TUBE *—*—*—*—
2" DIA. CONE —————

SHEAR STRENGTH

UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE ⊕
UNCONFINED COMPRESSION ⊗
VANE TEST AND SENSITIVITY (S) +^s

NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX

X LI

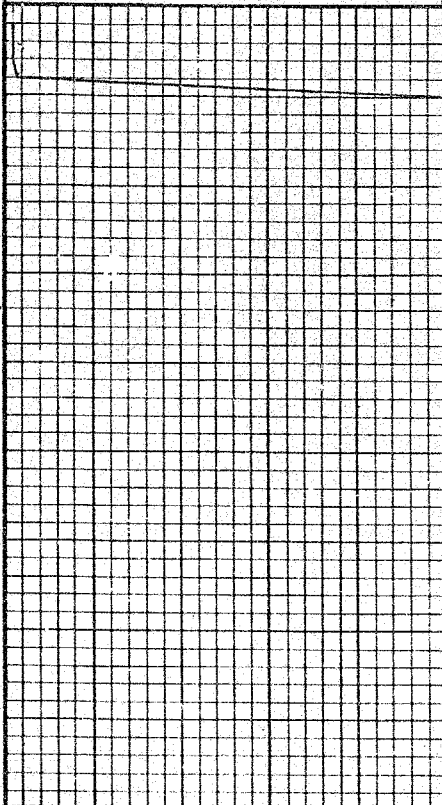
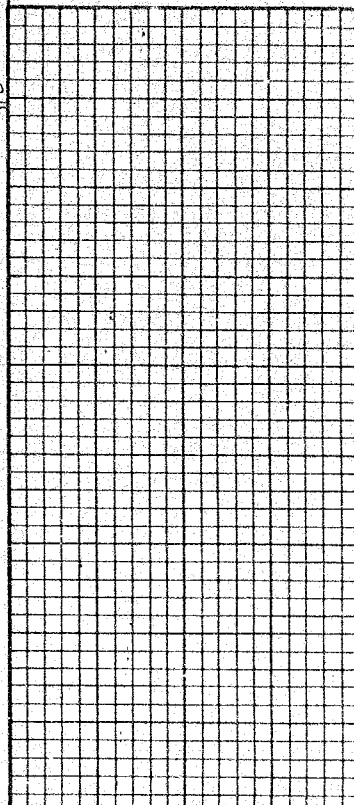
ATTERBERG LIMITS

LIQUID LIMIT —○—
PLASTIC LIMIT ———

SAMPLE TYPE

2" O.D. SPLIT TUBE [Symbol]
2" I.D. SHELBY TUBE [Symbol]
3" O.D. SHELBY TUBE [Symbol]


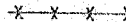

BOREHOLE No. CONE TEST 10.
PROJECT D.H.O. Bridge Site.
LOCATION Jewelleville, Ontario.
HOLE LOCATION See Site Plan Dwg.
HOLE ELEVATION 918.81 ft.
DATUM See Site Plan Dwg.

SYMBOL	SOIL DESCRIPTION	ELEV. FEET	DEPTH FEET	PENETRATION RESISTANCE 350 FT. LB. BLOWS/FT.		NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS % DRY WEIGHT	SAMPLE TYPE AND No.	NATURAL UNIT WEIGHT P.C.F.
				20	40			
				SHEAR STRENGTH P.S.F.				
		918.81	0					
		914.90						
			10					
			20					
			30					
			40					
	DYNAMIC CONE TEST ONLY							




LEGEND

BOREHOLE No. CONE TEST 11.
PROJECT D.H.O. Bridge Site.
LOCATION Jewelleville, Ontario.
HOLE LOCATION See Site Plan Dwg.
HOLE ELEVATION 921.14 ft.
DATUM See Site Plan Dwg.

PENETRATION RESISTANCE

2" O.D. SPLIT TUBE 
2" I.D. SHELBY TUBE 
2" DIA. CONE 

SHEAR STRENGTH

UNDRAINED TRIAXIAL
AT OVERBURDEN PRESSURE 
UNCONFINED COMPRESSION 
VANE TEST AND SENSITIVITY (S) 




NATURAL MOISTURE CONTENT
AND LIQUIDITY INDEX

LI
X

ATTERBERG LIMITS

LIQUID LIMIT 
PLASTIC LIMIT 

SAMPLE TYPE

2" O.D. SPLIT TUBE 
2" I.D. SHELBY TUBE 
3" O.D. SHELBY TUBE 

SYMBOL	SOIL DESCRIPTION	ELEV. FEET	DEPTH FEET	PENETRATION RESISTANCE				NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS % DRY WEIGHT	SAMPLE TYPE AND NO.	NATURAL UNIT WEIGHT P.C.F.
				20	40	60	350 FT. LB. BLOWS/FT. 80			
	,Refusal at 2"	921.14	0	SHEAR STRENGTH						
	DYNAMIC CONE TEST ONLY		10							
			20							
			30							
			40							

LEGEND

BOREHOLE No. CONE TEST 13.
PROJECT D.H.O. Bridge Site.
LOCATION Jewelleville, Ontario.
HOLE LOCATION See Site Plan Dwg.
HOLE ELEVATION 903.60 ft.
DATUM See Site Plan Dwg.

PENETRATION RESISTANCE

2" O.D. SPLIT TUBE —○—○—○—
2" I.D. SHELBY TUBE —X—X—X—X—
2" DIA. CONE —————

SHEAR STRENGTH

UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE ⊕
UNCONFINED COMPRESSION ⊙
VANE TEST AND SENSITIVITY (S) +^s

NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX

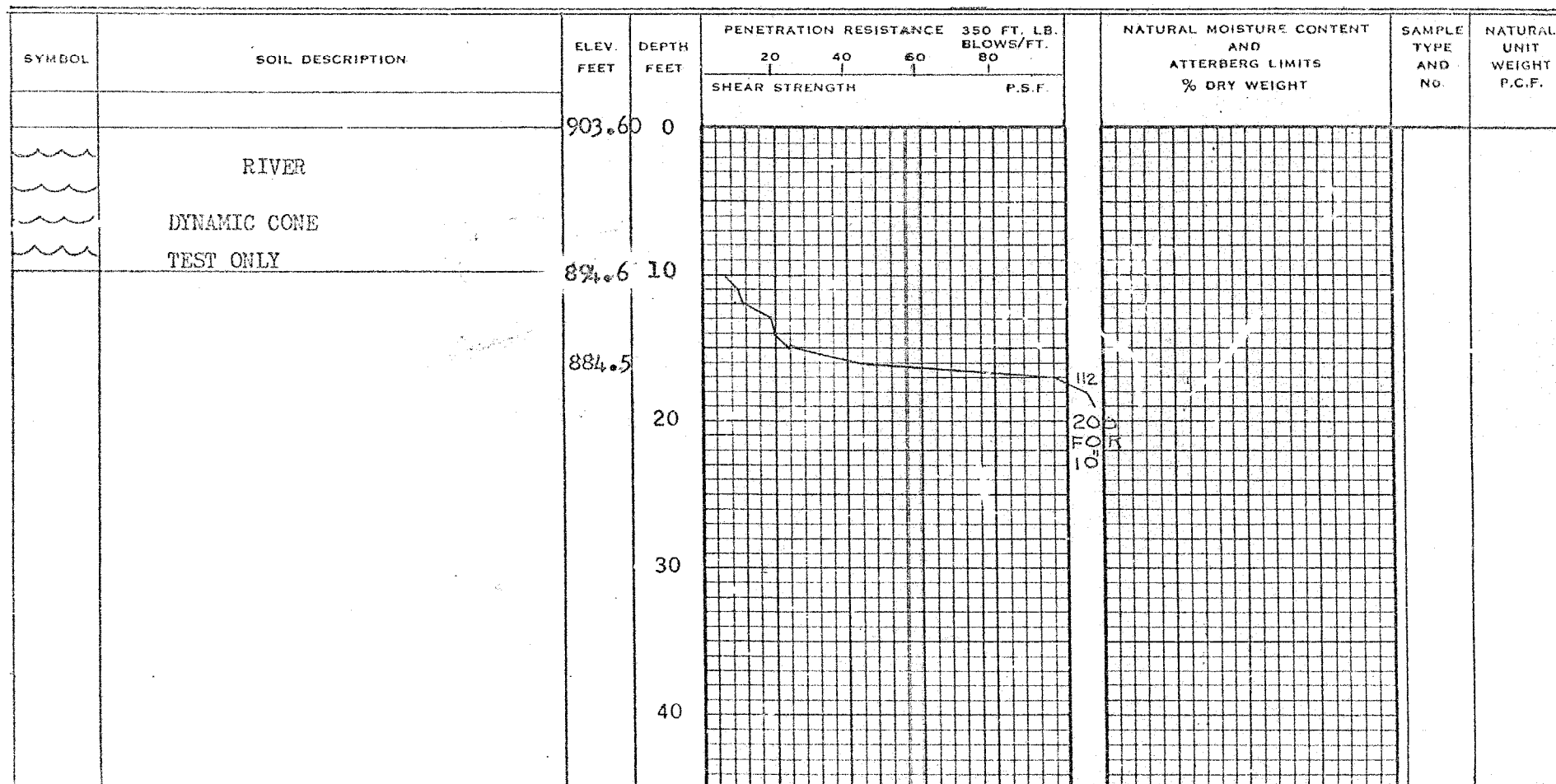
LI
X

ATTERBERG LIMITS

LIQUID LIMIT —○—
PLASTIC LIMIT ———

SAMPLE TYPE


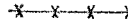

2" O.D. SPLIT TUBE ———
2" I.D. SHELBY TUBE ———
3" O.D. SHELBY TUBE ———






BOREHOLE NO. CONE TEST 14.
 PROJECT D.H.O. Bridge Site.
 LOCATION Jewellville, Ontario.
 HOLE LOCATION See Site Plan Dwg.
 HOLE ELEVATION 903.60 ft.
 DATUM See Site Plan Dwg.


LEGEND

PENETRATION RESISTANCE

2" O.D. SPLIT TUBE 
 2" I.D. SHELBY TUBE 
 2" DIA. CONE 

SHEAR STRENGTH




UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE 
 UNCONFINED COMPRESSION 
 VANE TEST AND SENSITIVITY (S) 


NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX 

ATTERBERG LIMITS

LIQUID LIMIT 
 PLASTIC LIMIT 

SAMPLE TYPE

2" O.D. SPLIT TUBE 
 2" I.D. SHELBY TUBE 
 3" O.D. SHELBY TUBE 

SYMBOL	SOIL DESCRIPTION	ELEV. FEET	DEPTH FEET	PENETRATION RESISTANCE		NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS % DRY WEIGHT	SAMPLE TYPE AND NO.	NATURAL UNIT WEIGHT P.C.F.
				20	40			
				350 FT. LB. BLOWS/FT. SHEAR STRENGTH P.S.F.				
	WATER	903.60	10					
	DYNAMIC CONE TEST ONLY	895.	20					
			30					
			40					
		861.30	40					
			50					
				FOR 3' BOUNCING				

LEGEND

PENETRATION RESISTANCE

2" O.D. SPLIT TUBE —○—○—○—

2" I.D. SHELBY TUBE *—*—*—*—

2" DIA. CONE ————

SHEAR STRENGTH

UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE ⊕

UNCONFINED COMPRESSION ⊗

VANE TEST AND SENSITIVITY (S) †

NATURAL MOISTURE CONTENT
AND LIQUIDITY INDEXX^{LI}

ATTERBERG LIMITS

LIQUID LIMIT —○—

PLASTIC LIMIT ———

SAMPLE TYPE

2" O.D. SPLIT TUBE —■—

2" I.D. SHELBY TUBE —■—

3" O.D. SHELBY TUBE —■—

BOREHOLE No. CONE TEST 15.

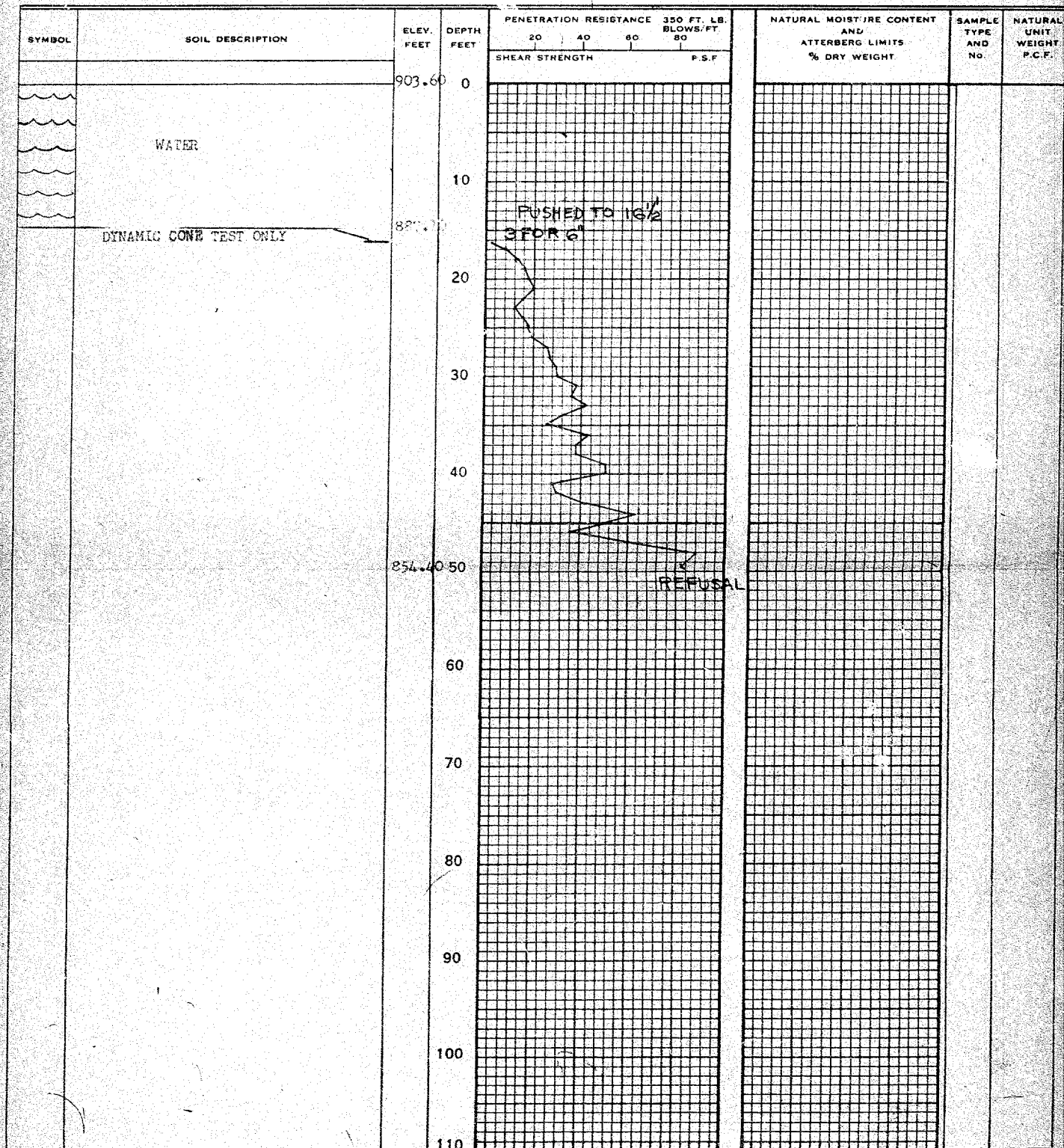
PROJECT D.H.O. Bridge Site.

LOCATION Jewelleville, Ontario.

HOLE LOCATION See Site Plan Dwg.

HOLE ELEVATION 903.60 ft.


DATUM See Site Plan Dwg.




LEGEND

BOREHOLE No. CONE TEST 16.
 PROJECT D.H.O. Bridge Site.
 LOCATION Jewelleville, Ontario.
 HOLE LOCATION See Site Plan Dwg.
 HOLE ELEVATION 908.02 ft.
 DATUM See Site Plan Dwg.


PENETRATION RESISTANCE

2" O.D. SPLIT TUBE 2" I.D. SHELBY TUBE 2" DIA. CONE 



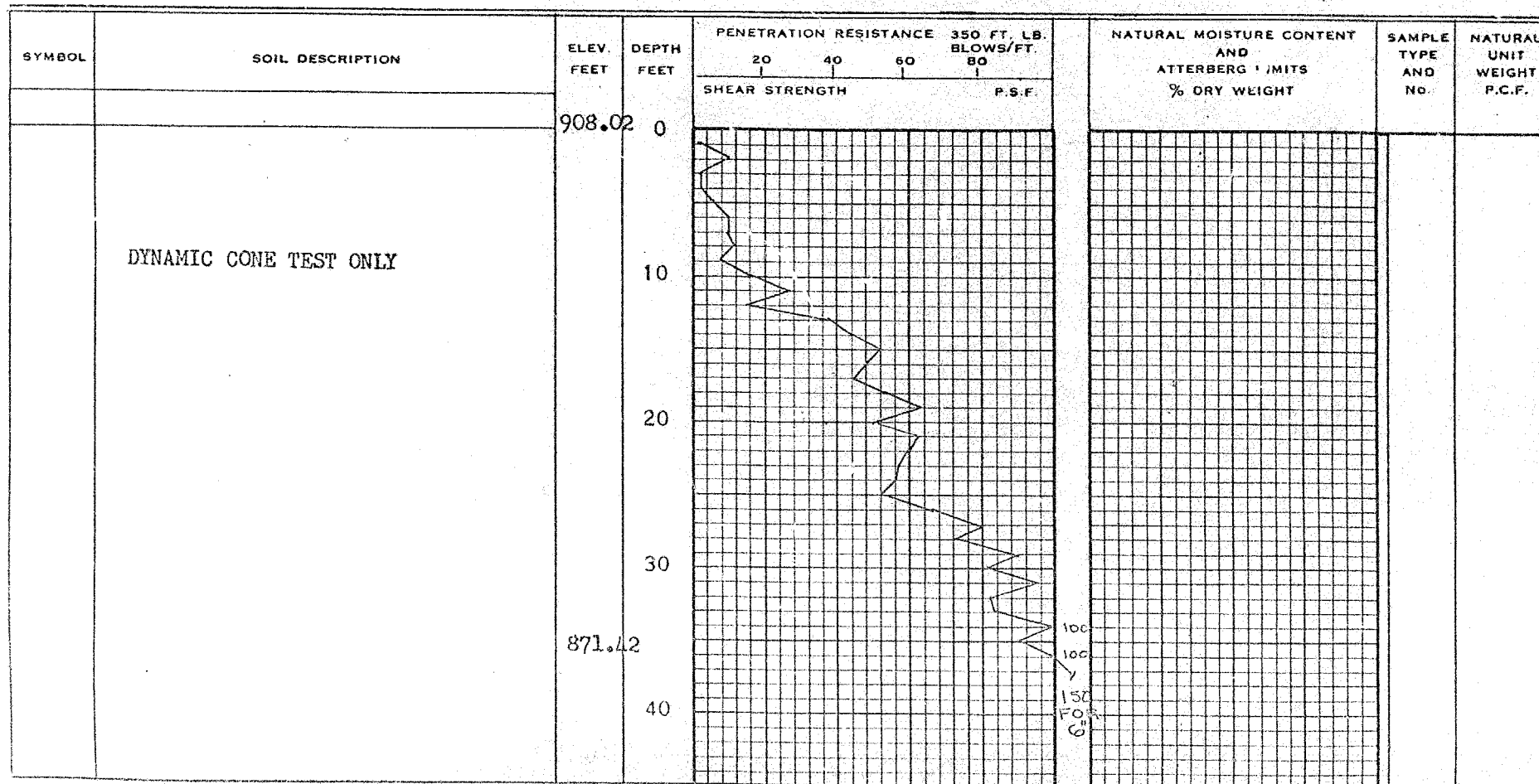

SHEAR STRENGTH

UNDRAINED TRIAXIAL
AT OVERBURDEN PRESSURE UNCONFINED COMPRESSION VANE TEST AND SENSITIVITY (S) NATURAL MOISTURE CONTENT
AND LIQUIDITY INDEXX^{LI}

ATTERBERG LIMITS

LIQUID LIMIT PLASTIC LIMIT 

SAMPLE TYPE

2" O.D. SPLIT TUBE 2" I.D. SHELBY TUBE 3" O.D. SHELBY TUBE 

LEGEND

BORERHOLE No. CONE TEST 17.
 PROJECT D.H.O. Bridge Site.
 LOCATION Jawelleville, Ontario.
 HOLE LOCATION See Site Plan Dwg.
 HOLE ELEVATION 907.78 ft.
 DATUM See Site Plan Dwg.

PENETRATION RESISTANCE

2" O.D. SPLIT TUBE —○—○—○—

2" I.D. SHELBY TUBE —X—X—X—X—

2" DIA. CONE ————

SHEAR STRENGTH

UNDRAINED TRIAXIAL
AT OVERBURDEN PRESSURE ⊕

UNCONFINED COMPRESSION ⊗

VANE TEST AND SENSITIVITY (S) +^sNATURAL MOISTURE CONTENT
AND LIQUIDITY INDEX X^{LI}

ATTERBERG LIMITS

LIQUID LIMIT —○—

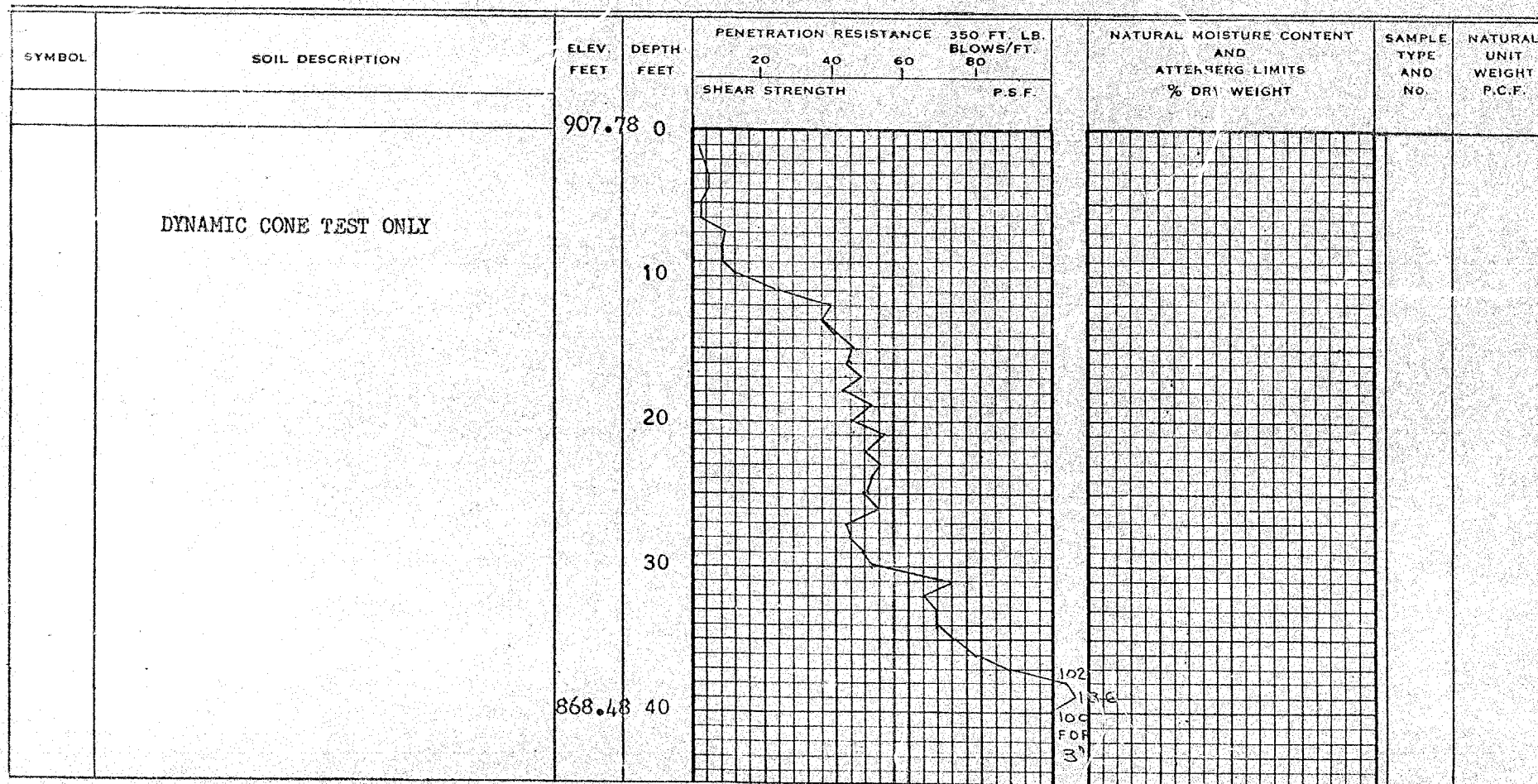
PLASTIC LIMIT ———

SAMPLE TYPE

2" O.D. SPLIT TUBE ————

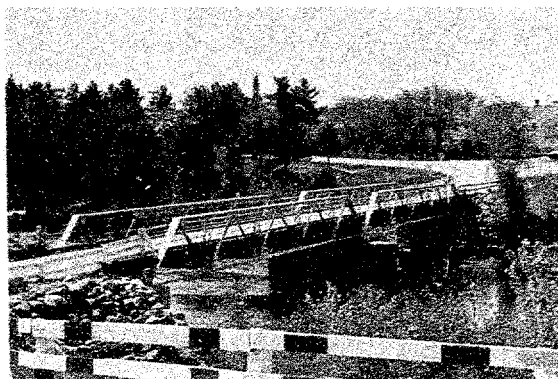
2" I.D. SHELBY TUBE ————

3" O.D. SHELBY TUBE ————

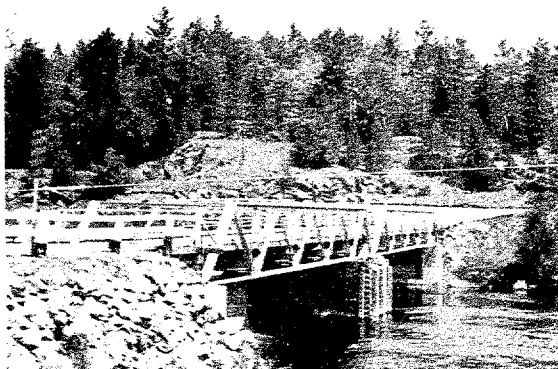




View Looking North
Proposed Centre Line
To West



View Looking South



View Looking North
Proposed Centre Line
To West



View Looking South

Mr. B. E. Davis,
Bridge Engineer,
Bridge Division.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

Attention: Mr. E. McCosbie

July 27, 1965

FOUNDATION INVESTIGATION REPORT BY:
William A. Trow & Associates, Limited.
Madawaska River Bridge, Hwy. No. 515;
W.P. 253-62 -- District No. 10

Attached, please find the above-mentioned report submitted by the Consultant, Wm. A. Trow and Associates.

We have reviewed the report and found the factual information well presented and adequate. We would like to draw your attention to the recommendations pertaining to the length of steel H-piles. Due to the presence of boulders, variations in penetration depths could be encountered and, therefore, necessary provisions should be provided in the Contract to account for such a possibility.

The sandy materials are scourable and positive measures should be undertaken to assure the permanency of all foundations.

We feel that the information contained in the report is adequate for your further design work. However, should there be any additional questions that you would like to discuss, please feel free to contact our office.

ACE/MdeF

Attach.

cc: Messrs. B. E. Davis (2)
H. A. Tregaskes
D. W. Farran
J. Ford
J. E. Callaghan
J. E. Gruspier
A. Watt

A. C. Sternac
A. C. Sternac,
PRINCIPAL FOUNDATION ENGINEER

Foundations Office
Gen. Files

Mr. F. G. Gascoyne,
Regional Functional Planning
Engr.,
Eastern Region (Kingston)

Foundation Section,
Materials and Testing Div.,
Room 107, Lab. Bldg.

June 15, 1965

Madawaska River Bridge at
Jewellville, Sec. Hwy. 515,
District No. 10 (Bancroft)

W.P. 253-62

This is to inform you that from the preliminary information obtained at the site by the Soils Consultant, a proposed structure at the location is feasible from the foundation point of view.

It appears that the south pier and abutment may be founded directly on rock, while for the north pier and abutment, piles of the order of 40 ft. are required.

This information should not be taken as final as field work is still underway, but rather as preliminary, for the sole purpose of expediting your work.

A detailed report will be forthcoming when both field and laboratory work are completed.

KYL/EdEF


K. E. Le,
SUPERVISING FOUNDATION ENGINEER

cc: Messrs. I. Campbell
J. E. Gruspier
A. Watt

Foundations Office
Gen. Files

Rwy. 401 & Keesle St.
Downsview, Ontario.

May 26, 1965

Materials and Testing Division

Ms. A. Trow and Associates, Ltd.,
90 Milvan Drive,
Weston, Ontario.

Attention: Mr. E. Becker

Re: W.P. 253-62, Secondary Highway 515,
Jawollville Structure, Dist. 10 - Bancraft.

Dear Sir:

Please consider this your authority to carry out a foundation investigation for the above site.

The investigation is to be carried out for functional planning study and, therefore, preliminary plans and profiles are not yet available. Arrangements will be made, however, through Mr. J. E. Crispier, Regional Materials Engineer, to have the proposed line staked out in the field for your work.

The site is readily accessible from the south. On the north side, some amount of clearing may be necessary. A raft may also be required. Further relevant information may be obtained from Mr. J. E. Crispier.

It is understood that a qualified Soils Engineer will be in charge of the field work at all times.

Should you, during the course of the investigation, become aware of conditions that indicate that by moving the alignment slightly, more favourable conditions from the foundation point of view can be realized, you are requested to advise us of this immediately. This will enable other parties concerned with this job to analyze and study the problem and your crew, while still at the site, could be instructed to carry out additional investigations.

Twelve (12) copies of the completed foundation report, with one additional copy of each subsoil profile, should be submitted to the Foundation Section as soon as possible. Previous requirements as to preliminary borehole information and laboratory testing program, should be followed.

May 26, 1965

Because the drawings accompanying the foundation reports, showing the location of borings, the inferred subsoil conditions, etc., are to become contract drawings, you are requested to prepare them in accordance with the B.M.C. standards. To enable you to do this, we are supplying you with sample drawings with all the necessary explanations, together with linen sheets for your drawings. You are also requested to provide us with Cronaflex copies of the drawings.

Charges for the work performed will be in accordance with your Schedule of Rates, dated November 19, 1962, and invoice to be addressed to the attention of the undersigned.

We are attaching Purchase Order # 34783, covering the purchase of any new material required for this work, in order that you may use this as a basis for exemption from the Federal Tax for such purchases. The Exemption Certificate is printed thereon.

Yours very truly,



A. Rutka,
MATERIALS & TESTING ENGINEER

RM/MSF
Attach.

cc: Messrs. S. McCombie
J. Ford
J. E. Graspier
J. E. Callaghan
W. D. Smith (2)
H. Konings

Foundations Office (2) ✓
Gen. Files (2)

Mr. K. Y. Lo

Mr. R. Gascoyne,
Regional Functional
Planning Engineer,
Kingston Region.

Mr. A. Rutka,
Materials & Testing Engineer,
Downsview.

May 18, 1965.

Your Memo May 13, 1965

W.P. 253-62, Secondary Highway 515,
Jewellville Structure, Dist. 10 - Bancroft.

It is a sound plan to obtain preliminary information on structure foundations when there is some doubt about the subsoil conditions. I will pass this request on to Mr. Lo of the Foundation Section, and will ask that he get in touch with our regional people and arrange to undertake the necessary investigation.

In future you can make these requests directly through Mr. Gruspier, who can contact our Foundation Section and arrange for the investigations.

AR/pa

A. Rutka,
Materials & Testing Engineer.

c.c. K. Lo,
J. Gruspier.

Note to K. Lo: Would you please arrange for the preliminary investigation, as requested by Mr. Gascoyne.

I think it would be best if we arrange such investigations through our Regional Materials Engineer, who might in many cases, be in a position to undertake some work with a power auger. Also many sites are quite easy and have no problems, and therefore the regional people could be in a position to decide on whether detailed investigations by core drills would be required.

A.R.

Called Joe to arrange for a site visit re: 10/5/65

MEMORANDUM

To: Mr. A. Rutka,
Materials and Testing Engineer,
Materials and Testing Division,
Downsview.

From: Functional Planning Section,
Kingston.

Date: May 13th, 1965

Our File Ref.

In Reply To

Subject: W. P. 253-62, Secondary Highway 515,
Jewellville Structure, Dist. 10 - Bancroft

This section is in the final stages of the preparation for Functional Report for the above project. On future projects involving a structure we will be requesting preliminary borings for foundation investigation at those locations where this type of information is required prior to recommendation and approval of final line and will necessitate an opinion from the Foundation Section as to the suitability of the site and any recommendations they would offer in this regard. We would request that this information be obtained and a recommendation made for the proposed structure site on the above project at the earliest possible date.

Arrangements have been made in the Region to have representatives from Engineering Surveys and Functional Planning to meet your party at this site to establish line and ties so that your bore holes can be tied to final survey. May this request be treated as urgent and this office be notified when the investigating party will be on the site so the Regional Representatives can be available with the necessary information to establish line locally and secure your work for future reference.

R. Gascoyne.

R. Gascoyne,
Regional Functional Planning Engineer

LPS/cam

c. c. A. G. Boucher
J. E. Gruspier

Mr. G. Scott,
Regional Bridge Location Engr.,
Regional Office (Kingston).

Attention: Mr. J. A. Fisher

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

August 8, 1966

W.P. 253-62 - Site 29-92 - Madawaska River Bridge,
Jewelville, Hwy. 515, District 10 (Bangorft).

With respect to your letter of August 3, 1966, regarding the Preliminary Plan D-5792-F1 of the above structure, we herewith submit our comments for your consideration:

The steel H-piles (12 BP 74) for the south pier are shown to have "Oslo" points. In view of the subsoil conditions at this site, layer of sand and gravel with cobbles and boulders, and the relatively small dip in the bedrock surface, we feel that the use of "Oslo" points is not warranted.

Because of the possibility that the piles may encounter boulders, persistent hard driving will be necessary. This, of course, is inconsistent with the driving of piles with the "Oslo" point. We would recommend that the pile tip be rather, reinforced as per present D.H.O. standards. The rock penetration of such piles, in our opinion, will be adequate.

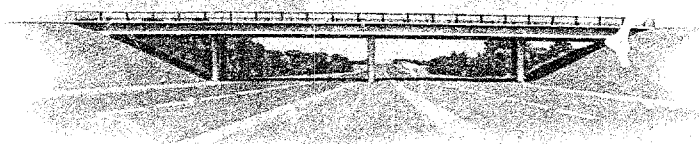
We would also suggest that the subsoil description on the drawing be changed to conform with the description given in the foundation report.

We would also like to question whether the 0.25" wall thickness of the 24" steel tube piles is necessary. These piles are to be filled with concrete, and we therefore feel that a thinner wall thickness would suffice.

AGS/MdeF

cc: Foundations Office ✓
Gen. Files

A. G. Stermac
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER



DEPARTMENT OF HIGHWAYS

Bridge Office, Postal Bag 4000, Kingston, Ontario.

August 3, 1966.

Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Building,
DOWNSVIEW, Ontario.

RE: W.P. 253-62 - Site 29-92 - Madawaska River Bridge - Jewelville -
Hwy. 515 District 10.

Dear Sir:

Enclosed herewith please find one print of Preliminary Plan D-5792-PI of the
above structure, your written comments on same will be appreciated.

Yours truly,

A handwritten signature in cursive script, reading "J. A. Fisher".

J. A. Fisher,
For: G. Scott,
REGIONAL BRIDGE LOCATION ENGINEER.

JAF/GS/mb

#65-F-260

W.P. #253-62

Hwy. #515 :

MADAWASKA

RIVER



LOT 23
CON. ~~XIV~~

NOTE: ELEV. OF
FROM DECK

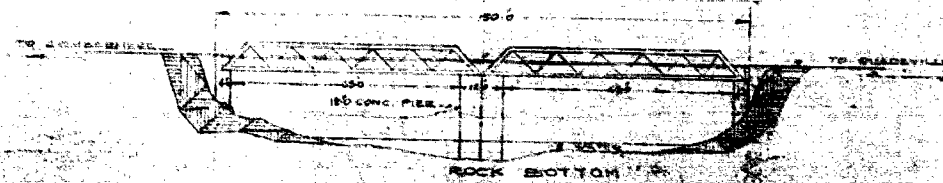
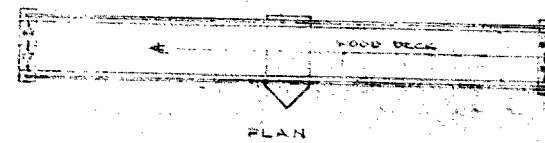
RD ALLICE BEE
60+00

LOT 23
CON. ~~XVIII~~

DRAINAGE EQUATION:
ADD 46 + 64.45
JAN 30, 1927 1926

ELEVATION OF
WOOD BRIDGE
FROM DECK
NOT TO SCALE

LOT 23
CON. ~~XIV~~

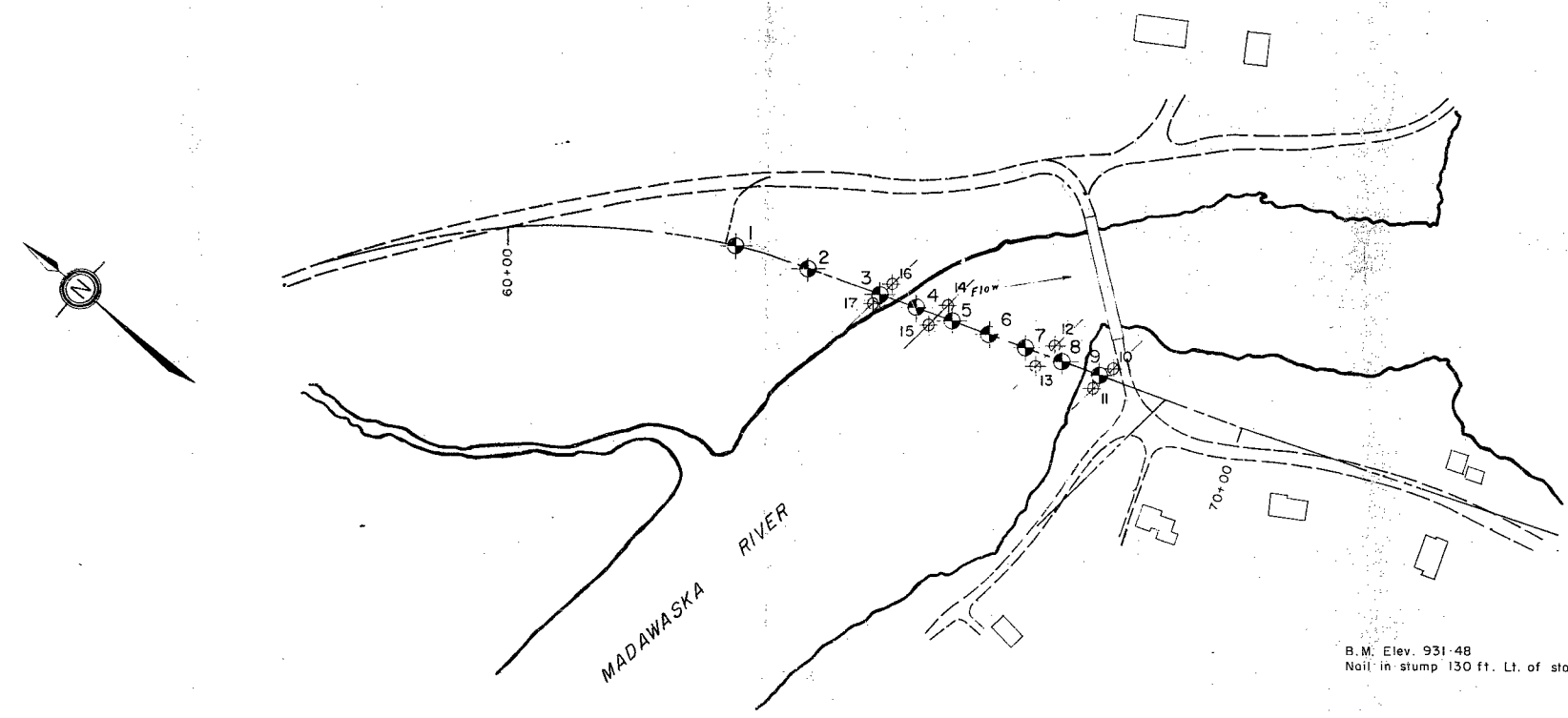
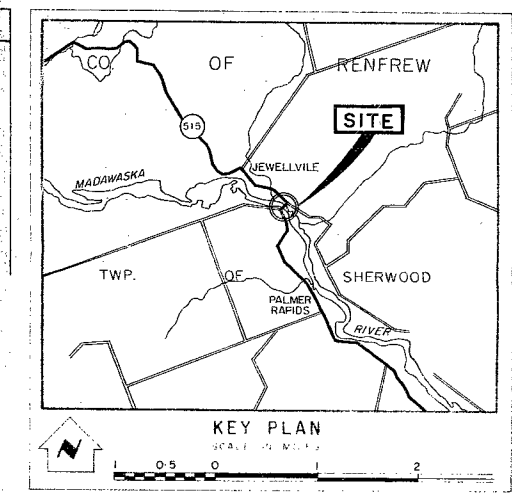


ELEVATION OF
TWO 65'-0" SPAN CONG. & STEEL BRIDGE
NOT TO SCALE

302950 E
3022200 N 18 31F5 E

NO	ELEVATION	STATION	OFFSET	REFUSAL
10	918.81	68+20	15' LT.	914.90
11	921.14	68+00	15' RT.	920.92
12		67+35	15' LT.	
13	903.60	67+25	15' RT.	884.50
14	903.60	65+85	15' LT.	861.30
15	903.60	65+75	15' RT.	854.0
16	908.02	65+10	15' LT.	871.42
17	907.78	64+95	15' RT.	868.48

NOTE - FOR CONES ONLY



B.M. Elev. 931.48
Nail in stump 130 ft. Lt. of sta. 63+00

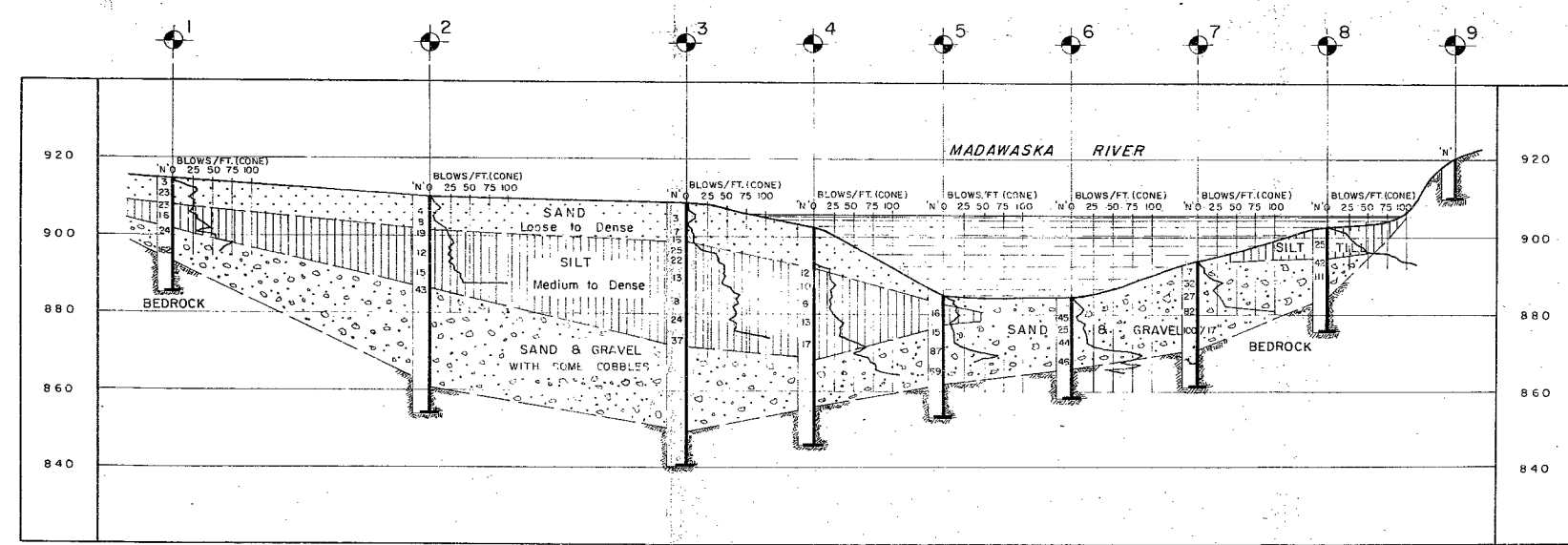
PLAN

SCALE 1" = 200 FEET

LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation		

NO.	ELEVATION	STATION	OFFSET
1	914.64	63+00	€
2	909.66	64+00	€
3	908.10	65+49	€
4	905.75	65+49	€
5	905.73	66+05	€
6	905.68	66+50	€
7	905.60	67+00	€
8	905.80	67+50	€
9	920.19	68+00	€

- NOTE -
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.



PROFILE

SCALE
HORIZ. 1" = 30 FEET
VERT. 1" = 20 FEET

REVISIONS	DATE	BY	DESCRIPTION

WILLIAM TROW ASSOCIATES LIMITED
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIV. - FOUNDATION SECTION

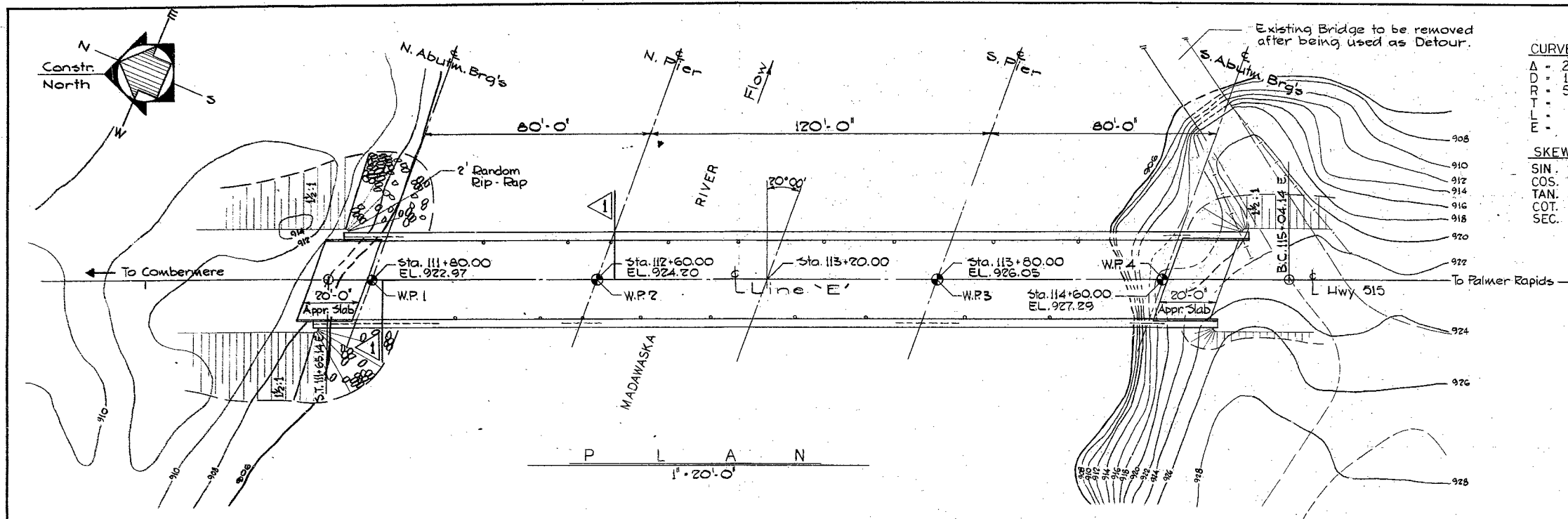
MADAWASKA RIVER

KING'S HIGHWAY NO. 515 DIST. NO. 10
CO. RENFREW
TWP. SHERWOOD LOT 23-24 CON. XVIII

BORE HOLE LOCATIONS & SOIL STRATA

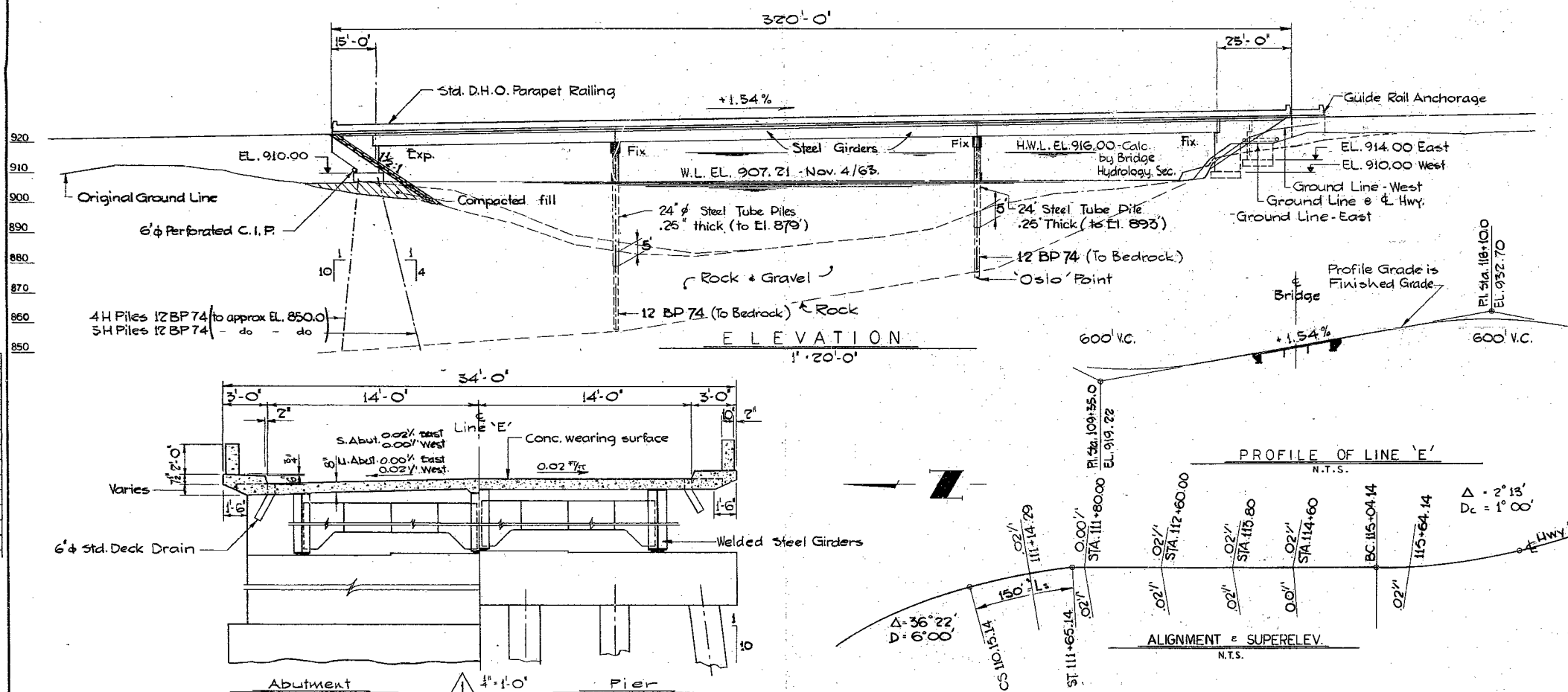
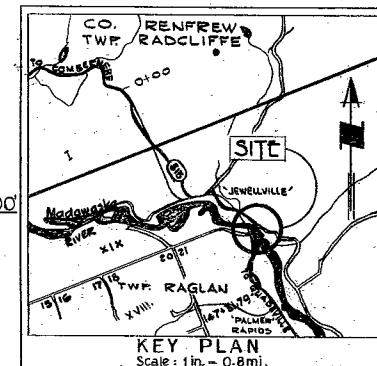
SUB'D. K.P.	CHECKED E.F.K.	WP NO. 253-62	MARK AREA NO. 10
DRAWN E.F.K.	CHECKED K.P.	JOB NO.	2031
DATE JUNE, 1965	SITE NO.	PROJECT DATA NO.	
APPROVED	DATE	CONT. NO.	

CHAINAGE EQUATIONS: ADD 46+64.45
JAN 30, 1967 AGS



CURVE DATA
 $\Delta = 2^\circ 13'$
 $D = 1^\circ 00' \text{ LT}$
 $R = 5729.58$
 $T = 110.85$
 $L = 221.67$
 $E = 1.07$

SKEW DATA FOR $20^\circ 00'$
 $\text{SIN} = 0.34202$
 $\text{COS} = 0.93969$
 $\text{TAN} = 0.36397$
 $\text{COT} = 2.74748$
 $\text{SEC} = 1.06418$



G.B.M. No. 523, EL. 953.34
 Conc. arch culv. under C.N. Ry., 1700 feet east of
 Station. East end of North face of coping of North
 Headwall. Bolt set horizontally.
 PUBLICATION 19. BARRY'S BAY.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
MADAWASKA RIVER BRIDGE AT JEWELLVILLE			
KING'S HIGHWAY No. 515		DIST. No. 10	
CO. RENFREW		CON. XVIII	
TWP. RAGLAN		LOT 23+24	
PRELIMINARY			
APPROVED		SITE No. 29-92	
DESIGN		W.P. No. 253-62	
DRAWING		CONTRACT	
DATE		DRAWING	
JULY 1966		D-5792-P1	