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DIST. 9 REGION

W.P. No. 151-75-02

CONT. No. 81-58

W. O. No.

STR. SITE No. 3-151

HWY. No. 16

LOCATION Widening of Jack River
Bridge

No of PAGES -

=====

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT.

REMARKS:

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NOTE: For purposes of the contract this report supercedes all other foundation reports prepared by or for the Ministry in connection with the above mentioned project.

'N' VALUE: AN INDICATOR OF SUBSOIL QUALITY. IT IS OBTAINED FROM THE STANDARD PENETRATION TEST (CSA STD. A119.1). SPT 'N' VALUE IS THE NUMBER OF BLOWS REQUIRED TO CAUSE A STANDARD 2 INCH O.D. SPLIT-BARREL SAMPLER TO PENETRATE 12 INCHES INTO UNDISTURBED GROUND IN A BOREHOLE WHEN DRIVEN BY A HAMMER WEIGHING 140 POUNDS, FALLING FREELY A DISTANCE OF 30 INCHES. FOR PENETRATIONS OF LESS THAN 12 INCHES 'N' VALUES ARE INDICATED AS THE NUMBER OF BLOWS FOR THE PENETRATION ACHIEVED. 'N' VALUES CORRECTED FOR OVERBURDEN PRESSURE ARE DENOTED THUS N_c .

DYNAMIC CONE PENETRATION TEST (CSA STD. A119.3): CONTINUOUS PENETRATION OF A CONICAL STEEL POINT (2" O.D. 60 CONE ANGLE) DRIVEN BY 350 FT-LB IMPACTS ON 'A' SIZE DRILL RODS. THE RESISTANCE TO CONE PENETRATION IS MEASURED AS THE NUMBER OF BLOWS FOR EACH 12 INCH ADVANCE OF THE CONICAL POINT INTO THE UNDISTURBED GROUND.

SOIL QUALITY: SOILS ARE DESCRIBED BY THEIR COMPOSITION AND CONSISTENCY OR DENSITY.

CONSISTENCY: COHESIVE SOILS ARE DESCRIBED ON THE BASIS OF THEIR UNDRAINED SHEAR STRENGTH AS FOLLOWS:

S_u (PSF)	0 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 4000	> 4000
	VERY SOFT	SOFT	FIRM	STIFF	VERY STIFF	HARD

DENSENESS: COHESIONLESS SOILS ARE DESCRIBED ON THE BASIS OF SPT 'N' VALUES AS FOLLOWS:

'N' (BLOW/FT)	0 - 5	5 - 10	10 - 30	30 - 50	> 50
	VERY LOOSE	LOOSE	COMPACT	DENSE	VERY DENSE

ROCK QUALITY: ROCKS ARE DESCRIBED BY THEIR COMPOSITION AND STRUCTURAL FEATURES AND/OR STRENGTH.

RECOVERY: SUM OF ALL RECOVERED ROCK CORE PIECES FROM A CORING RUN EXPRESSED AS A PERCENT OF THE TOTAL LENGTH DRILLED IN THAT CORING RUN.

MODIFIED RECOVERY: SUM OF THOSE NATURALLY FRACTURED CORE PIECES, 4" IN LENGTH EXPRESSED AS A PERCENT OF THE LENGTH OF THE CORING RUN. THE ROCK QUALITY DESIGNATION (RQD), FOR MODIFIED RECOVERY, IS:

RQD (%)	0 - 25	25 - 50	50 - 75	75 - 90	90 - 100
	VERY POOR	POOR	FAIR	GOOD	EXCELLENT

JOINTING AND BEDDING:

SPACING	2"	2" - 12"	1' - 3'	3' - 10'	> 10'
JOINTING	VERY CLOSE	CLOSE	MOD. CLOSE	WIDE	VERY WIDE
BEDDING	VERY THIN	THIN	MEDIUM	THICK	VERY THICK

ABBREVIATIONS & SYMBOLS

LABORATORY TESTING

TRIAxIAL TESTS ARE DESCRIBED IN TERMS OF WHETHER THEY ARE CONSOLIDATED (C) OR NOT (U) ISOTROPICALLY (I) OR NOT (A) AND SHEARED DRAINED (D) OR UNDRAINED (U) WITH PORE PRESSURE MEASUREMENTS (BAR OVER SYMBOLS) EG. $\bar{C}U$ = CONSOLIDATED ISOTROPIC UNDRAINED TRIAXIAL WITH PORE PRESSURE MEASUREMENT UNLESS OTHERWISE SPECIFIED IN REPORT ALL TESTS ARE IN COMPRESSION

FIELD SAMPLING

S S SPLIT SPOON
W S WASH SAMPLE
S T SLOTTED TUBE SAMPLE
B S BLOCK SAMPLE
C S CHUNK SAMPLE
T W THINWALL OPEN
T P THINWALL PISTON
O S OSTERBERG SAMPLE
F S FOIL SAMPLE
R C ROCK CORE
P H T.W. ADVANCED HYDRAULICALLY
P M T.W. ADVANCED MANUALLY

EARTH PRESSURE TERMS

μ COEFFICIENT OF FRICTION
 δ ANGLE OF WALL FRICTION
 k_o COEFFICIENT OF EARTH PRESSURE AT REST
 k_A COEFFICIENT OF ACTIVE EARTH PRESSURE
 k_P COEFFICIENT OF PASSIVE EARTH PRESSURE
 i ANGLE OF INCLINATION OF SURCHARGE
 w SLOPE ANGLE-BACKFACE OF WALL
 β ANGLE OF SLOPE
 N_q, N_c BEARING CAPACITY FACTORS
 D_f DEPTH OF FOOTING
 B, L FOOTING DIMENSIONS

INDEX PROPERTIES

γ UNIT WEIGHT OF SOIL (BULK DENSITY)
 γ_w UNIT WEIGHT OF WATER
 γ_d UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
 γ' UNIT WEIGHT OF SUBMERGED SOIL
 G_s SPECIFIC GRAVITY OF SOLIDS
 e VOIDS RATIO
 e_o INITIAL VOIDS RATIO
 e_{max} e IN LOOSEST STATE
 e_{min} e IN DENSEST STATE
 D_r RELATIVE DENSITY = $\frac{e_{max} - e}{e_{max} - e_{min}}$
 n POROSITY
 w WATER CONTENT
 w_L LIQUID LIMIT
 w_p PLASTIC LIMIT
 w_s SHRINKAGE LIMIT
 I_p PLASTICITY INDEX = $w_L - w_p$
 I_L LIQUIDITY INDEX = $\frac{w - w_p}{w_L - w_p}$
 I_c CONSISTENCY INDEX = $\frac{w_L - w}{w_L - w_p}$
 A_c ACTIVITY = $\frac{I_p \text{ of soil}}{I_p \text{ of } \mu = 50 \text{ fraction}}$
 O_m ORGANIC MATTER CONTENT
 S_r DEGREE OF SATURATION
 S SENSITIVITY = $\frac{S_u \text{ (undisturbed)}}{S_u \text{ (remoulded)}}$

STRENGTH PARAMETERS

ϕ ANGLE OF SHEARING RESISTANCE
 τ_f PEAK SHEAR STRENGTH
 τ_R RESIDUAL SHEAR STRENGTH
 c COHESION INTERCEPT
 $\sigma_1, \sigma_2, \sigma_3$ NORMAL PRINCIPAL STRESSES
 u PORE WATER PRESSURE
 u_e EXCESS u
 r_u PORE PRESSURE RATIO
 q_u UNCONFINED COMPRESSIVE STRENGTH
 s_u UNDRAINED SHEAR STRENGTH
 ϵ LINEAR STRAIN
 γ SHEAR STRAIN
 ν POISSON'S RATIO
 E MODULUS OF ELASTICITY
 G MODULUS OF SHEAR DEFORMATION
 k_s MODULUS OF SUBGRADE REACTION
 m, D STABILITY COEFFICIENTS
 A, B PORE PRESSURE COEFFICIENTS

HYDRAULIC TERMS

h HYDRAULIC HEAD OR POTENTIAL
 q RATE OF DISCHARGE
 v VELOCITY OF FLOW
 i HYDRAULIC GRADIENT
 j SEEPAGE FORCE PER UNIT VOLUME
 η COEFFICIENT OF VISCOSITY
 k COEFFICIENT OF HYDRAULIC CONDUCTIVITY
 k_h k IN HORIZONTAL DIRECTION
 k_v k IN VERTICAL DIRECTION
 m_v COEFFICIENT OF VOLUME CHANGE
 c_v COEFFICIENT OF CONSOLIDATION
 C_c COMPRESSION INDEX
 C_r RECOMPRESSION INDEX
 d DRAINAGE PATH DISTANCE
 T_v TIME FACTOR
 U DEGREE OF CONSOLIDATION
 O_r OVERCONSOLIDATION RATIO (OCR)

NOTE: EFFECTIVE STRESS PARAMETERS ARE DENOTED BY USE OF APOSTROPHE ABOVE THE SYMBOL, THUS:
 ϕ' = EFFECTIVE ANGLE OF SHEARING RESISTANCE;
 σ' = EFFECTIVE NORMAL STRESS

FOUNDATION INVESTIGATION REPORT

For

Widening of Jock River Bridge
North of Ottawa-Carleton Regional Road 13
W.P. 151-75-02, Site 3-151
Hwy. 16, District 9, Ottawa

INTRODUCTION

This report contains the results of a foundation investigation carried out at the site of the above mentioned project. The fieldwork was carried out from January 24 to February 2, 1978 and consisted of a total of two sampled boreholes and two boreholes augered to refusal. The borings were advanced by means of continuous flight hollow stem augers to depths of 13.4 to 17.1 metres below the existing ground surface. Bedrock was proven by obtaining up to 4.0 metres of BXL size rock core.

SITE DESCRIPTION AND GEOLOGY

The site is located at the crossing of Hwy. 16 over Jock River, approximately 1.4 Kilometres north of Ottawa-Carleton Regional Road 13, in the Township of Nepean, Regional Municipality of Ottawa-Carleton.

The terrain surrounding the site is generally flat; however, the river has cut a winding valley some 50 metres wide and about 9 metres deep with bank slopes as steep as 1.5 horizontal to 1 vertical. South of the river, east and west of the approach fill and also north of the river, east of the approach fill, the topographic depressions indicate that erosional slope failures have occurred in this area a number of years ago. A cemetery is located southwest of the structure; elsewhere land use in the vicinity may be described as rural residential.

The Jock River itself originates some 55 kilometres southwest of the site near Franktown. Immediately east of the site the Jock River empties into the Rideau River, a controlled waterway. At the time of the field investigation the river was frozen and as much as 0.3 metres of ice was observed. The river water level has been located at elevation 78.05 during October 5, 1977 with a depth of water of about 0.5 metres. However, local residents claim the spring time flow is substantial, increasing the water level by as much as 4 to 5 metres above the October, 1977 water level. At the time of the investigation the site was covered by snow, but photographs indicate the river bottom is strewn with boulders.

The existing structure is a concrete and steel simple span plate girder bridge with a clear span of 35.36 metres and a deck width of 9.14 metres. The existing structure is supported on piles and appears to be in sound condition.

Physiographically this area is located in what is known as the Ottawa Valley Clay Plains. These clay plains are found to be interrupted by ridges of rock or sand. The underlying bedrock is limestone.

SUBSOIL CONDITIONS

General

Subsoil conditions across the site were found to be generally uniform. The parent surficial deposit is a granular deposit of gravelly sand to sandy gravel varying in thickness from 8.1 to 11.3 metres and increasing in relative density with depth. This deposit overlies limestone bedrock. Fill material was found to overlie the parent surficial deposit in all boreholes that were put down through the approach embankments.

The boundaries between the various subsoil types are shown on the Record of Borehole Sheets. The locations and elevations of the boreholes, together with two stratigraphical sections inferred from the borehole data are shown on Drawing No. 2.

The various subsoil and bedrock types encountered are briefly described in the paragraphs to follow.

Fill Material

All borings were put adjacent to the existing structure through the highway approach embankment and fill material was encountered extending from the surface of the embankment down to a depth of up to 5.8 metres. The composition of the fill material varies widely from a uniform sand to a sand with clayey silt. The results of grain size distribution testing on samples obtained within the fill material are shown on Figure 1. Furthermore, gravel and cobbles were encountered in layers up to 0.3 m thick in some boreholes. At one borehole location (B.H. 2) four attempts were made at augering the borehole before the fill material was successfully penetrated. The locations of the attempts, as well as depths to refusal to augering are shown on the Record of Borehole Sheet #2, as well as on Drawing No. 2. The material causing refusal is concrete and because of the variable depths of refusal it is expected this area was used for disposal of some concrete debris.

Based on the Standard Penetration Test 'N' values which range generally from 1 to 7 blows per 0.3 metres, the fill material is estimated to have undergone a light compactive effort. The high 'N' value in B.H. 1 of 70 blows per 0.15 m is attributed to the presence of gravel.

Gravelly Sand to Sandy Gravel With Some Silt

This surficial parent deposit was encountered in all boreholes immediately below the fill material and is estimated to be between 8.1 and 11.3 metres thick. The deposit is composed of gravelly sand to sandy gravel with some silt and a trace of clay. The results of grain size distribution testing performed on representative samples from this deposit are shown in envelope form on Figure 2. The upper 0.1 metre of this deposit contains hair roots and other organic matter; this zone is the parent topsoil.

The range of Standard Penetration Test 'N' values is 2 to 9 blows per 0.3 metres in the upper 6.7 metres of the deposit indicating that the relative density is very loose to loose. In the lower portion of the deposits the higher 'N' values of 17 to 69 blows per 0.3 metres indicate that the lower portion of the deposit has a compact to very dense relative density. The high 'N' value of 33 blows per 0.3 metres at the top of this deposit in B.H. 2 is attributed to the presence of concrete pieces.

Bedrock

Immediately below the gravelly sand to sandy gravel deposit is limestone bedrock. In two boreholes the bedrock was proven by obtaining up to 4 metres of BXL size rock core, whereas in the remaining two boreholes the bedrock surface was established at the point of augering refusal. The depth to bedrock below the ground surface varies from 13.41 to 17.07 metres which corresponds to elevation 67.80 to 69.27. The bedrock surface is sloping down to the north.

The bedrock may be described as limestone, light to medium grey colour, fine to medium texture, hard and generally sound.

Groundwater

Groundwater level observations were carried out at the time of the field investigation by measuring in the open boreholes. The observations indicate that the groundwater level is 3.05 to 3.35 metres below the ground surface which corresponds to a range in elevation of 79.07 to 81.93. The water level in the river was found to be at about elevation 78.0 at the time of the foundation investigation. These observations indicate the groundwater level reflects the topography and has a hydraulic gradient towards the river.


H. Szymanski
P. P. I. Tech.

M. Devata, P. Eng.
Senior Foundations Engineer

APPENDIX



RECORD OF BOREHOLE No 1

7

W P 151-75-02 LOCATION Sta. 14+773.6 o/s 9.5 m Lt. of Line 'F' ORIGINATED BY M.M.
DIST 9 HWY 16 BOREHOLE TYPE Hollow Stem Augers & BXL Rock Core COMPILED BY M.M.
DATUM Geodetic DATE January 24 and 25, 1978 CHECKED BY

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100					
82.48	Ground Surface															
0.00	Fill Sand With Gravel, Some Silt		1	SS	70/	0.15m										38 41 16 5
	Gravel, Sand Some Cobbles		2	SS	1											3 86 (11)
	Sand Uniform		3	SS	1											
78.83	Sand With Clayey Silt		4	SS	5											11 53 28 8
3.65	Trace of Clay		5	SS	2	79.13										16 51 24 9
	Gravelly Sand to Sandy Gravel, Some Silt		6	SS	2											
	Trace of Clay		7	SS	6											
	Very Loose to Loose		8	SS	4											
			9	SS	3											13 63 14 10
	Compact to Very Dense		10	SS	17											
			11	SS	69											41 43 (16)
69.07			12	RC	REC											RQD 0%
13.41	Sound Limestone Bedrock		13	BXL	85%											RQD 30%
			14	RC	REC											RQD 50%
			15	BXL	85%											RQD 70%
65.11																
17.37	End of Borehole															

+3, x5: Numbers refer to
Sensitivity

20
15 \div 5 (%) STRAIN AT FAILURE
10

RECORD OF BOREHOLE No 2

8

W P 151-75-02 LOCATION Sta. 14+812.2 o/s 8.6 m Rt of Line 'F' ORIGINATED BY TRG
DIST 9 HWY 16 BOREHOLE TYPE Hollow Stem Augers & BXL Rock Core COMPILED BY MM
DATUM Geodetic DATE January 27, 1978 CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100					
83.04	Ground Surface																
0.00	Sand, Some Gravel		1	SS	10												20 66 (14)
	Fill * Cobbles		2	SS	3												8 43 31 18
	Sand With Clayey Silt, Some Gravel		3	SS	2												20 44 25 11
			4	SS	3												14 51 30 15
			5	SS	7												44 30 19 7
78.47	Trace Org. ---		6	SS	33												
4.57	Gravelly Sand to Sandy Gravel, Some Silt, Trace of Clay		7	SS	3												
	Very Loose to Loose		8	SS	3												
			9	SS	6												31 44 16 9
			10	SS	9												
	Compact to Dense		11	SS	44												45 30 19 6
			12	SS	17												33 46 15 6
			13	SS	---												
67.80			14	BXL RC	REC 87%												RQD 0%
15.24	Sound Limestone Bedrock		15	BXL RC	REC 83%												RQD 70%
			16	BXL RC	REC 100%												RQD 100%
63.79																	
19.25	End of Borehole																

* Note: Four attempts were made at advancing this borehole through the fill material. Refusal was attributed to concrete debris. The location and depth of refusal for the unsuccessful attempts are:

B.H. #	Sta.	Location	Refusal Depth
		Offset m	Metres
2A	14+809.4	8.5 Rt	1.2
2B	14+809.4	9.0 Rt	2.7
2C	14+809.4	10.0 Rt	2.9



RECORD OF BOREHOLE No 3

9

W P 151-75-02 LOCATION Sta. 14+821.0 o/s 8.8 m Lt of & Line 'F' ORIGINATED BY TRG
DIST 9 HWY 16 BOREHOLE TYPE Hollow Stem Augering to Refusal COMPILED BY MM
DATUM Geodetic DATE February 1, 1978 CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION *	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100					
85.28	Ground Surface																
0.00	Fill						85.00										
	Occasional Cobbles						81.93										
79.49							80.00										
5.79	Gravelly Sand to Sandy Gravel Some Silt Trace of Clay						75.00										
							70.00										
68.21																	
17.07	End of Borehole Refusal to Augering Probable Bedrock * Note: Description Based on Nature of Augering Correlated With Sampled Boreholes. Boundaries Between Subsoil Types Estimated.																

* 3, x 5: Numbers refer to
Sensitivity

20
15-5 (%) STRAIN AT FAILURE
10

RECORD OF BOREHOLE No 4

W P 151-75-02 LOCATION Sta. 14+770.1 o/s 10.2 m Rt of § Line 'F' ORIGINATED BY TRG
DIST 9 HWY 16 BOREHOLE TYPE Hollow Stem Augering to Refusal COMPILED BY MM
DATUM Geodetic DATE January 31, 1978 CHECKED BY JP

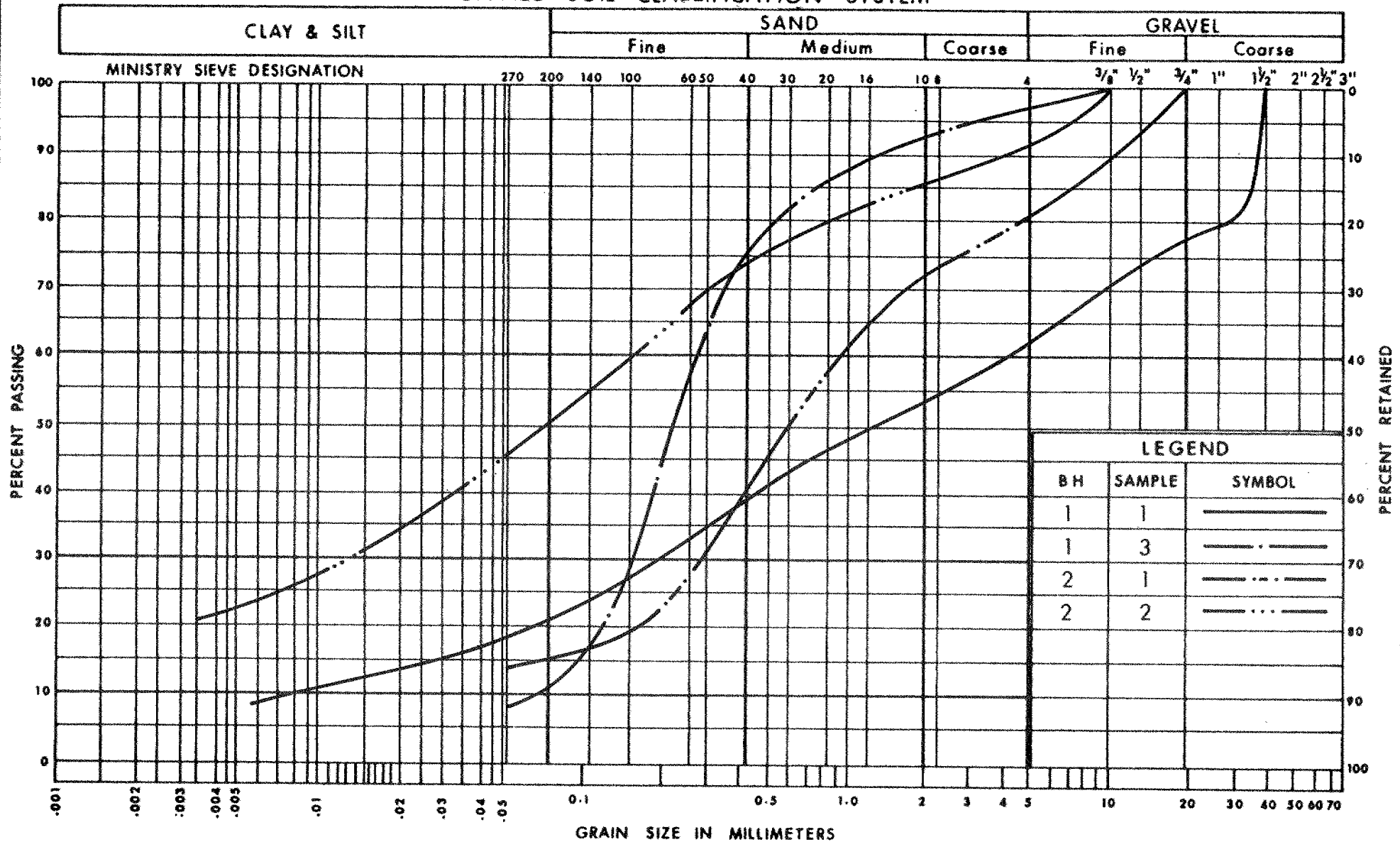
[illegible]

+3, x5 : Numbers refer to Sensitivity

15-20 (5%) STRAIN AT FAILURE

OFFICE REPORT ON SOIL EXPLORATION

UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION

FILL MATERIAL



Ministry of
Transportation and
Communications

FIG No 1

W P 151-75-02



**Ministry of
Transportation and
Communications**

GRAIN SIZE DISTRIBUTION
GRAVELLY SAND TO SANDY GRAVEL
SOME SILT, TRACES OF CLAY

FIG No 2

WP 151-75-02

ENGINEERING MATERIALS OFFICE
SOIL MECHANICS SECTION

WP 151-75-02

DIST 9

HWY 16

STR SITE 3-151

Widening of Jock River Bridge
1.4 km North of Ottawa-Carleton Reg. Road 13

CONT 81-58

DISTRIBUTION

T.C. Kingsland
E.R. Saint
C.E. Pritchard
R.W. Franks (2)

K.G. Bassi
G.A. Wrong
B.J. Giroux
R.S. Pillar

R. Hore

R. Forest)
J. Anderson) cover only
G. Sloan)

Files ✓

SAMPLE DISPOSITION NOTICE		
TYPE	DISCARD AFTER	RECOMM. BY
JARS	<i>March 15/78</i>	<i>M.S.</i>
TUBES		
ROCK CORES	<i>The removal of</i> <i>part of</i>	<i>M.S.</i>

FOUNDATION INVESTIGATION REPORT

For

Widening of Jock River Bridge
North of Ottawa-Carleton Regional Road 13
W.P. 151-75-02, Site 3-151
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The Jock River itself originates some 55 kilometres southwest of the site near Franktown. Immediately east of the site the Jock River empties into the Rideau River, a controlled waterway. At the time of the field investigation the river was frozen and as much as 0.3 metres of ice was observed. The river water level has been located at elevation 78.05 during October 5, 1977 with a depth of water of about 0.5 metres. However, local residents claim the spring time flow is substantial, increasing the water level by as much as 4 to 5 metres above the October, 1977 water level. At the time of the investigation the site was covered by snow, but photographs indicate the river bottom is strewn with boulders.

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Physiographically this area is located in what is known as the Ottawa Valley Clay Plains. These clay plains are found to be interrupted by ridges of rock or sand. The underlying bedrock is limestone.

SUBSOIL CONDITIONS

General

Subsoil conditions across the site were found to be generally uniform. The parent surficial deposit is a granular deposit of gravelly sand to sandy gravel varying in thickness from 8.0 to 11.3 metres and increasing in relative density with depth. This deposit overlies limestone bedrock. Fill material was found to overlie the parent surficial deposit in all boreholes that were put down through the approach embankments.

The boundaries between the various subsoil types are shown on the Record of Borehole Sheets. The locations and elevations of the boreholes, together with two stratigraphical sections inferred from the borehole data are shown on Drawing No. 1517502-A.

The various subsoil and bedrock types encountered are briefly described in the paragraphs to follow.

Fill Material

All borings were put adjacent to the existing structure through the highway approach embankment and fill material was encountered extending from the surface of the embankment down to a depth of up to 5.8 metres. The composition of the fill material varies widely from a uniform sand to a sand with clayey silt. The results of grain size distribution testing on samples obtained within the fill material are shown on Figure 1. Furthermore, gravel and cobbles were encountered in layers up to 0.3 m thick in some boreholes. At one borehole location (B.H. 2) four attempts were made at augering the borehole before the fill material was successfully penetrated. The locations of the attempts, as well as depths to refusal to augering are shown on the Record of Borehole Sheet #2, as well as on Drawing No. 1517502-A. The material causing refusal is concrete and because of the variable depths of refusal it is expected this area was used for disposal of some concrete debris.

Based on the Standard Penetration Test 'N' values which range generally from 1 to 7 blows per 0.3 metres, the fill material is estimated to have undergone a light compactive effort. The high 'N' value in B.H. 1 of 70 blows per 0.15 m is attributed to the presence of gravel.

Gravelly Sand to Sandy Gravel With Some Silt

This surficial parent deposit was encountered in all boreholes immediately below the fill material and is estimated to be between 8.3 and 11.3 metres thick. The deposit is composed of gravelly sand to sandy gravel with some silt and a trace of clay. The results of grain size distribution testing performed on representative samples from this deposit are shown in envelope form on Figure 2. The upper 0.1 metre of this deposit contains hair roots and other organic matter; this zone is the parent topsoil.

The range of Standard Penetration Test 'N' values is 2 to 9 blows per 0.3 metres in the upper 6.7 metres of the deposit indicating that the relative density is very loose to loose. In the lower portion of the deposits the higher 'N' values of 17 to 69 blows per 0.3 metres indicate that the lower portion of the deposit has a compact to very dense relative density. The high 'N' value of 33 blows per 0.3 metres at the top of this deposit in B.H. 2 is attributed to the presence of concrete pieces.

Bedrock

Immediately below the gravelly sand to sandy gravel deposit is limestone bedrock. In two boreholes the bedrock was proven by obtaining up to 4 metres of BXL size rock core, whereas in the remaining two boreholes the bedrock surface was established at the point of augering refusal. The depth to bedrock below the ground surface varies from 13.41 to 17.07 metres which corresponds to elevation 67.80 to 69.27. The bedrock surface is sloping down to the north.

The bedrock may be described as limestone, light to medium grey colour, fine to medium texture, hard and generally sound.

Groundwater

Groundwater level observations were carried out at the time of the field investigation by measuring in the open boreholes. The observations indicate that the groundwater level is 3.05 to 3.35 metres below the ground surface which corresponds to a range in elevation of 79.07 to 81.93. The water level in the river was found to be at about elevation 78.0 at the time of the foundation investigation. These observations indicate the groundwater level reflects the topography and has a hydraulic gradient towards the river.

DISCUSSION AND RECOMMENDATIONS

Reconstruction proposals call for the widening from two to four lanes of Hwy. 16 from Ottawa-Carleton Regional Road 13 northerly to Regional Road 15. In conjunction with this reconstruction it will be necessary to widen the existing crossing of Hwy. 16 over the Jock River. The crossing is located some 1.4 kilometres north of Regional Road 13. It is understood that reconstruction will incorporate the existing alignment and grades at the Jock River crossing. The widening of this structure will be accomplished by extensions of about 4.9 meters in width on both sides of the existing structure.

Subsoil conditions across this site are uniform consisting of 8.0 to 11.3 metres of gravelly sand to sandy gravel overlying limestone bedrock. The granular deposit is overlain by up to 5.8 metres of the structure's approach fill embankment which varies in composition from a sand with gravel to a sand with clayey silt and occasional cobbles and concrete debris.

Structure Foundations

The underlying deposit of gravelly sand to sandy gravel will not provide adequate support to found the structure widening on spread footings. The structure extensions can be supported on end bearing piles driven to bedrock surface similar to the existing foundation. The allowable pile loads would depend on the pile section chosen. For example, a 12 BP 74 steel 'H' pile may be designed for an allowable load of up to 890 kN per pile. To accommodate any differential movements between the existing structure and the widening, design should incorporate an expansion joint between those portions of the structure.

To prevent the build-up of hydrostatic pressures behind the abutment, free draining granular material should be used for backfill behind the retaining wall as per current M.T.C. standards.

Roadway Protection and Dewatering

Construction of the additional structural sections will require roadway protection. This could be accomplished by soldier beams and sheeting and any water seeping into the excavation could be removed by pumping from sumps.

Due to the nervous nature of the subsoil a temporary dewatering scheme may be required during construction of the footings if the footing excavation is carried out at or below the prevailing groundwater level. Such a dewatering scheme can be achieved by constructing a cofferdam of interlocking steel sheet piling.

The sheeting should be driven to a depth below the base of the excavation equal to the prevailing unbalanced hydrostatic head to prevent boiling of the excavation.

For estimating earth pressure a coefficient of active earth pressure of $K_a=0.3$ may be used if some movement is permitted, whereas if no movement is anticipated a coefficient of earth pressure at rest of $K_o=0.5$ may be used for design purposes.

Approach Embankments

No grade revisions are anticipated for the widening scheme and no stability problems are anticipated if the widening of the embankment is carried out according to the following construction procedures.

1. Remove the existing topsoil from plan limits of the embankment widening
2. Widening to be carried out in accordance with M.T.C. Standard Benching of Earth Slopes (DD-414)

MISCELLANEOUS

The fieldwork for this investigation was carried out under the supervision of Mr. M. MacLean, Project Engineer and Mr. R. Graham, Senior Soil Technician, Eastern Region. The equipment used was owned and operated by F.E. Johnston Drilling Co. Ltd., Ottawa.

This report was written by Mr. M. MacLean and reviewed by Mr. M. Devata, Supervising Engineer.

M MacLean

M. MacLean, P. Eng.
Project Engineer



M. Devata

M. Devata, P. Eng.
Supervising Engineer

February, 1978

APPENDIX



RECORD OF BOREHOLE No 1

W P 151-75-02 LOCATION Sta. 14+773.6 o/s 9.5 m Lt. of E Line 'F' ORIGINATED BY M.M.
DIST 9 HWY 16 BOREHOLE TYPE Hollow Stem Augers & BXL Rock Core COMPILED BY M.M.
DATUM Geodetic DATE January 24 and 25, 1978 CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100					
82.48	Ground Surface																GR SA SI CL
0.00	Fill																
	Sand With Gravel, Some Silt		1	SS	70/	0.15m											38 41 16 5
	Gravel, Sand Some Cobbles		2	SS	1												3 86 (11)
	Sand Uniform		3	SS	1												
78.83	Sand With Clayey Silt		4	SS	5												
3.65	Trace Org.		5	SS	2	79.13										1.6% Om	11 53 28 8
	Gravelly Sand to Sandy Gravel, Some Silt		6	SS	2												16 51 24 9
	Trace of Clay		7	SS	6												
	Very Loose to Loose		8	SS	4												
			9	SS	3												13 63 14 10
	Compact to Very Dense		10	SS	17												
			11	SS	69												41 43 (16)
69.07																	
13.41	Sound Limestone Bedrock		12	RC	REC												RQD 0%
			13	RC	REC												RQD 30%
			14	RC	REC												RQD 50%
			15	BXL	85%												RQD 70%
65.11																	
17.37	End of Borehole																



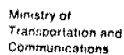
RECORD OF BOREHOLE No 2

W P 151-75-02 LOCATION Sta. 14+812.2 o/s 8.6 m Rt of ϕ Line 'F' ORIGINATED BY TRG
DIST 9 HWY 16 BOREHOLE TYPE Hollow Stem Augers & BXL Rock Core COMPILED BY MM
DATUM Geodetic DATE January 27, 1978 CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80						100	WATER CONTENT (%)
SHEAR STRENGTH																		
○ UNCONFINED + FIELD VANE																		
● QUICK TRIAXIAL x LAB VANE																		
10 20 30																		
83.04	Ground Surface															GR SA SI CL		
0.00	Sand, Some Gravel		1	SS	10		80.00							○		20 66 (14)		
	Fill * Cobbles		2	SS	3											○		8 43 31 18
	Sand With		3	SS	2											○		20 44 25 11
	Clayey Silt,		4	SS	3											○		14 51 30 15
	Some Gravel		5	SS	7											○		44 30 19 7
78.47	Trace Org.	6	SS	33														
4.57	Gravelly Sand to		7	SS	3													
	Sandy Gravel, Some		8	SS	3													
	Silt, Trace of Clay		9	SS	6													
	Very Loose to Loose		10	SS	9													
			11	SS	44													
	Compact to Dense		12	SS	17													
			13	SS	--													
			14	BXL RC	REC 87%													RQD 0%
			15	BXL RC	REC 83%													RQD 70%
			16	BXL RC	REC 100%													RQD 100%
67.80																		
15.24	Sound Limestone Bedrock						65.00											
63.79																		
19.25	End of Borehole																	

* Note: Four attempts were made at advancing this borehole through the fill material. Refusal was attributed to concrete debris. The location and depth of refusal for the unsuccessful attempts are:

B.H. #	Location	Refusal Depth	
	Sta.	Offset m	Metres
2A	14+809.4	8.5 Rt	1.2
2B	14+809.4	9.0 Rt	2.7
2C	14+809.4	10.0 Rt	2.9



RECORD OF BOREHOLE No 3

W P 151-75-02 LOCATION Sta. 14+821.0 o/s 8.8 m Lt of C Line 'F' ORIGINATED BY TRG
DIST 9 HWY 16 BOREHOLE TYPE Hollow Stem Augering to Refusal COMPILED BY MM
DATUM Geodetic DATE February 1, 1978 CHECKED BY CR

[illegible]

+3, x⁵ ; Numbers refer to Sensitivity

20
15 ϕ 5 (%) STRAIN AT FAILURE
10

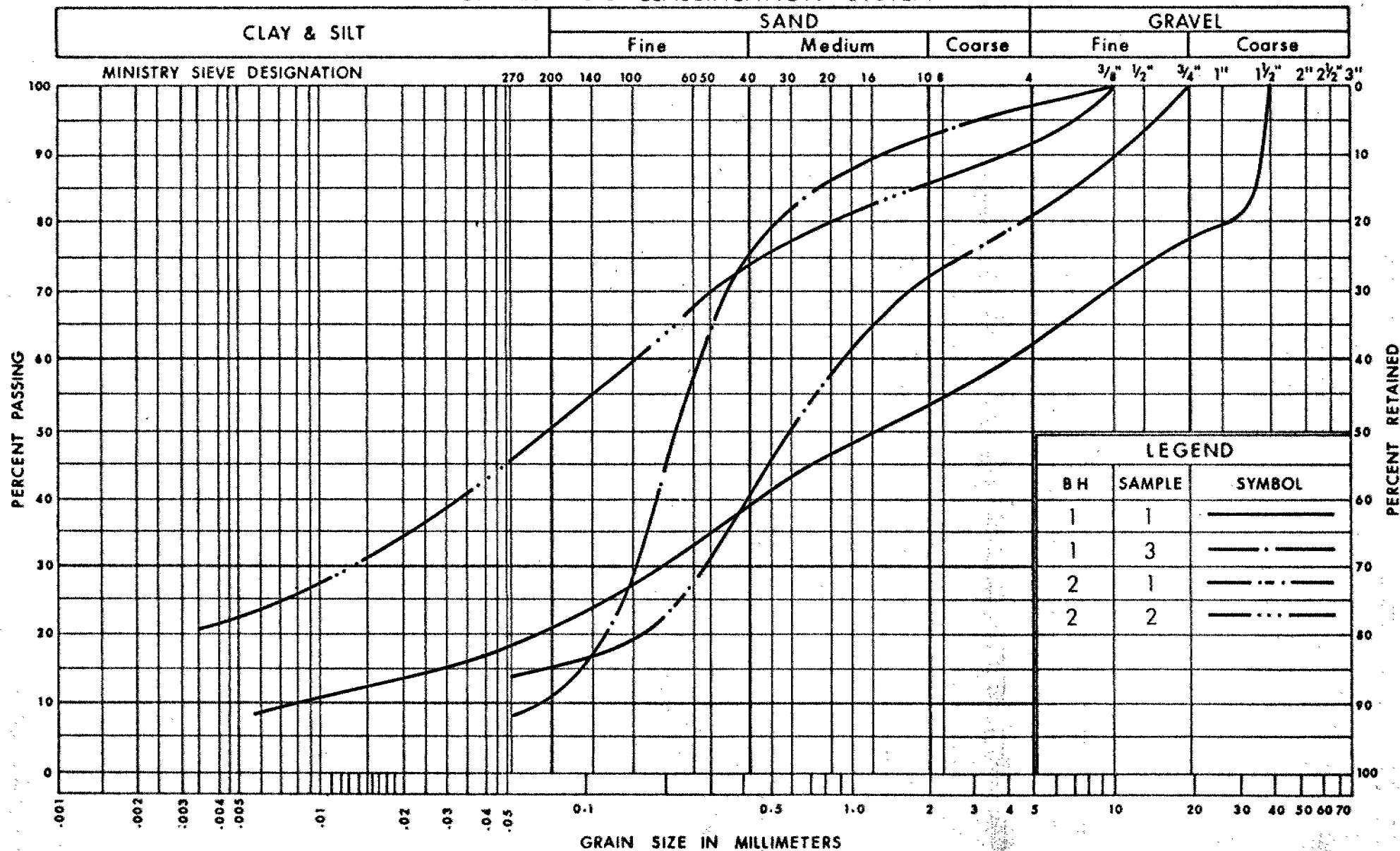
OFFICE REPORT ON SOIL EXPLORATION

RECORD OF BOREHOLE No 4

W P 151-75-02 LOCATION Sta. 14+770.1 o/s 10.2 m Rt of C Line 'F' ORIGINATED BY TRG
DIST 9 HWY 16 BOREHOLE TYPE Hollow Stem Augering to Refusal COMPILED BY MM
DATUM Geodetic DATE January 31, 1978 CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION *	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100					
82.99	Ground Surface																GR SA SI CL
0.00	Fill																
	Cobbles																
77.39	Cobbles																
5.60	Gravelly Sand to Sandy Gravel Some Silt Trace Clay																
69.27																	
13.72	End of Borehole Refusal to Augering Probable Bedrock																
	* Note: Description Based on Nature of Augering Correlated with Sampled Boreholes. Boundaries Between Subsoil Types Estimated																

UNIFIED SOIL CLASSIFICATION SYSTEM



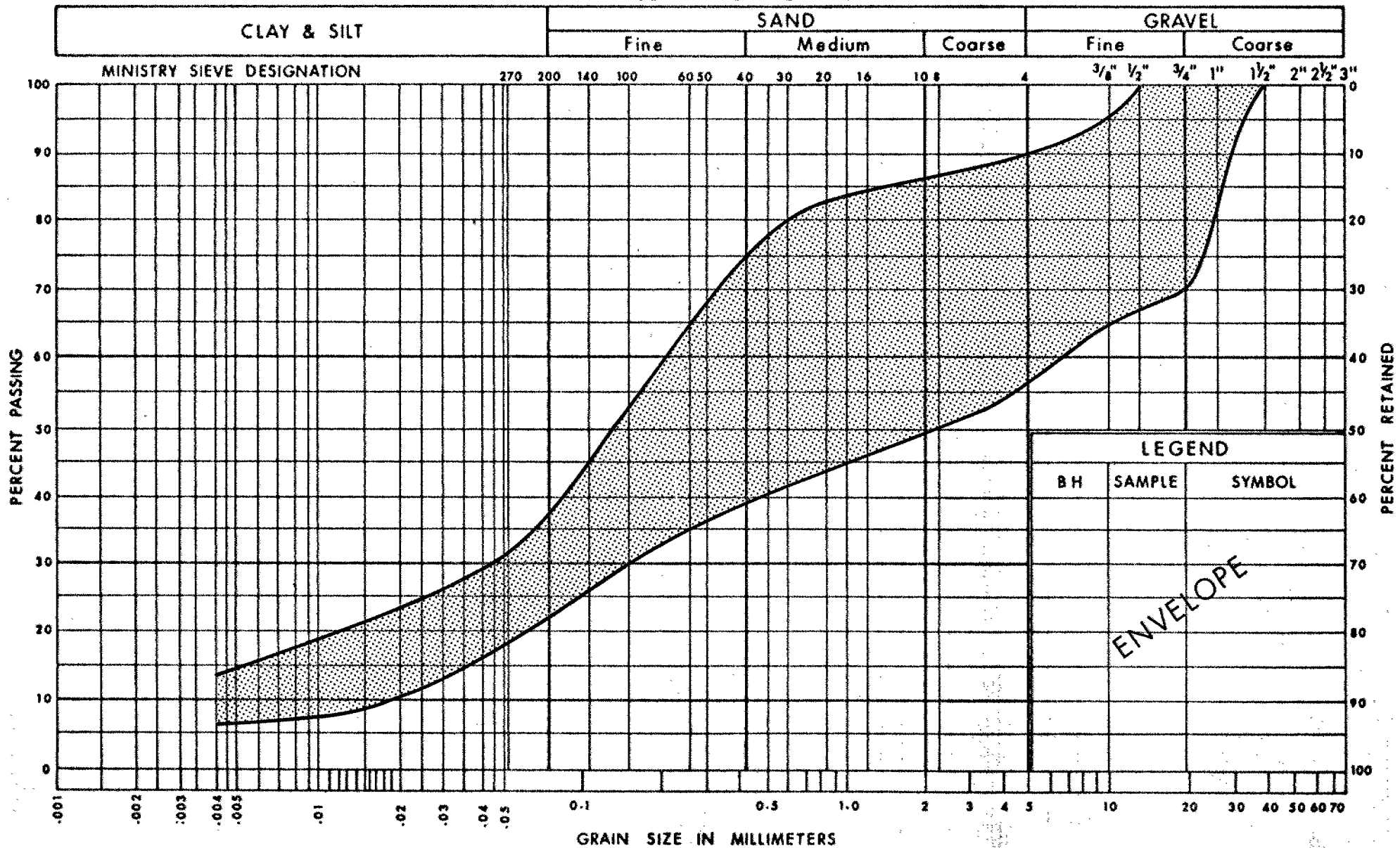
Ministry of
Transportation and
Communications

GRAIN SIZE DISTRIBUTION FILL MATERIAL

FIG No 1

W P 151-75-02

UNIFIED SOIL CLASSIFICATION SYSTEM



Ministry of
Transportation and
Communications

GRAIN SIZE DISTRIBUTION
GRAVELLY SAND TO SANDY GRAVEL
 SOME SILT, TRACES OF CLAY

FIG No 2

W P 151-75-02

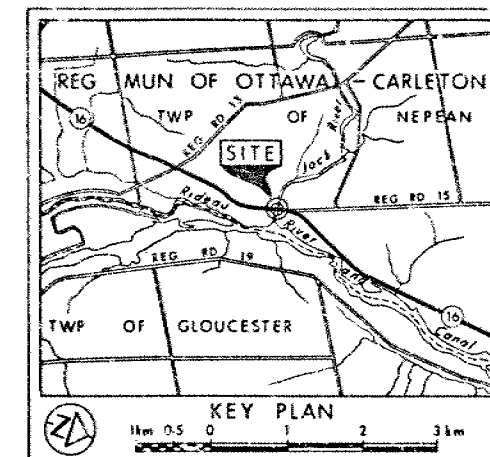
METRIC

CONT No
WP No 151-75-02



JOCK RIVER BRIDGE
[1.8 km North of Reg Road 13]
BORE HOLE LOCATIONS & SOIL STRATA

SHEET



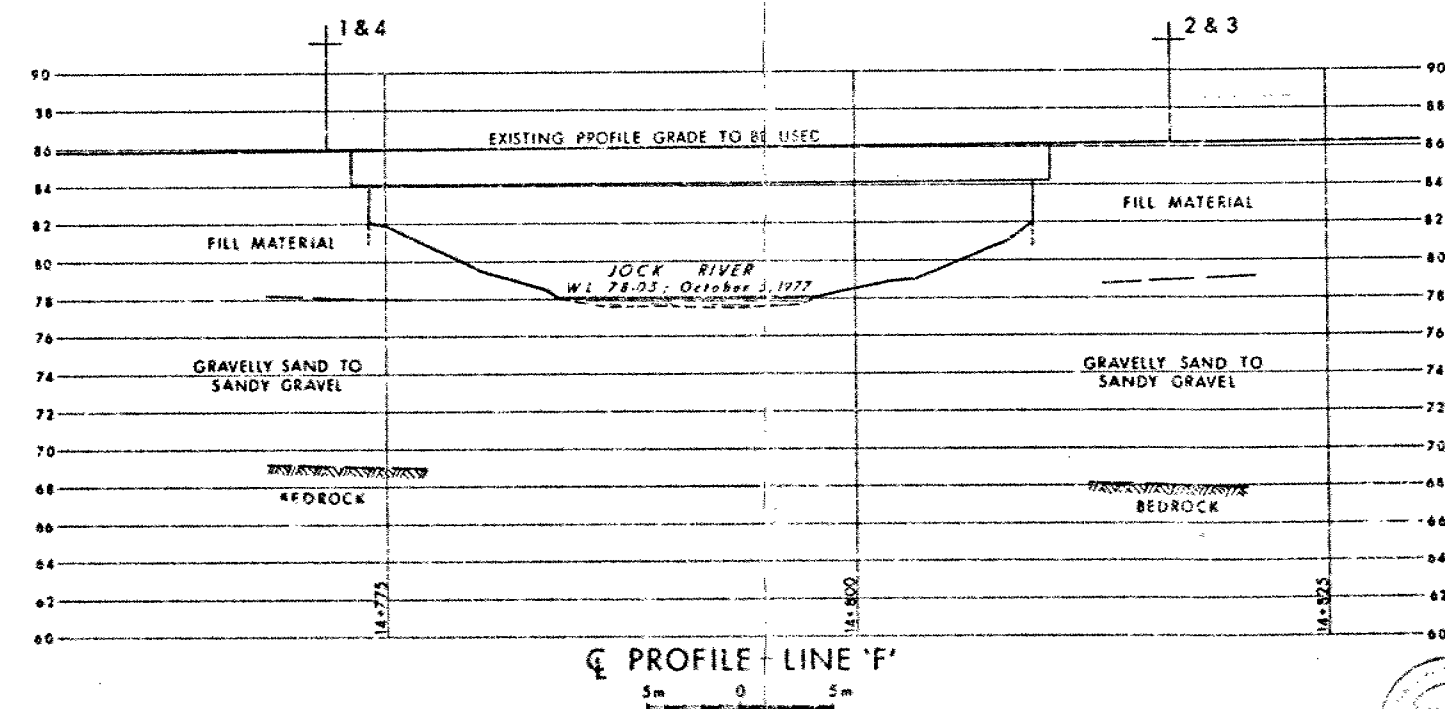
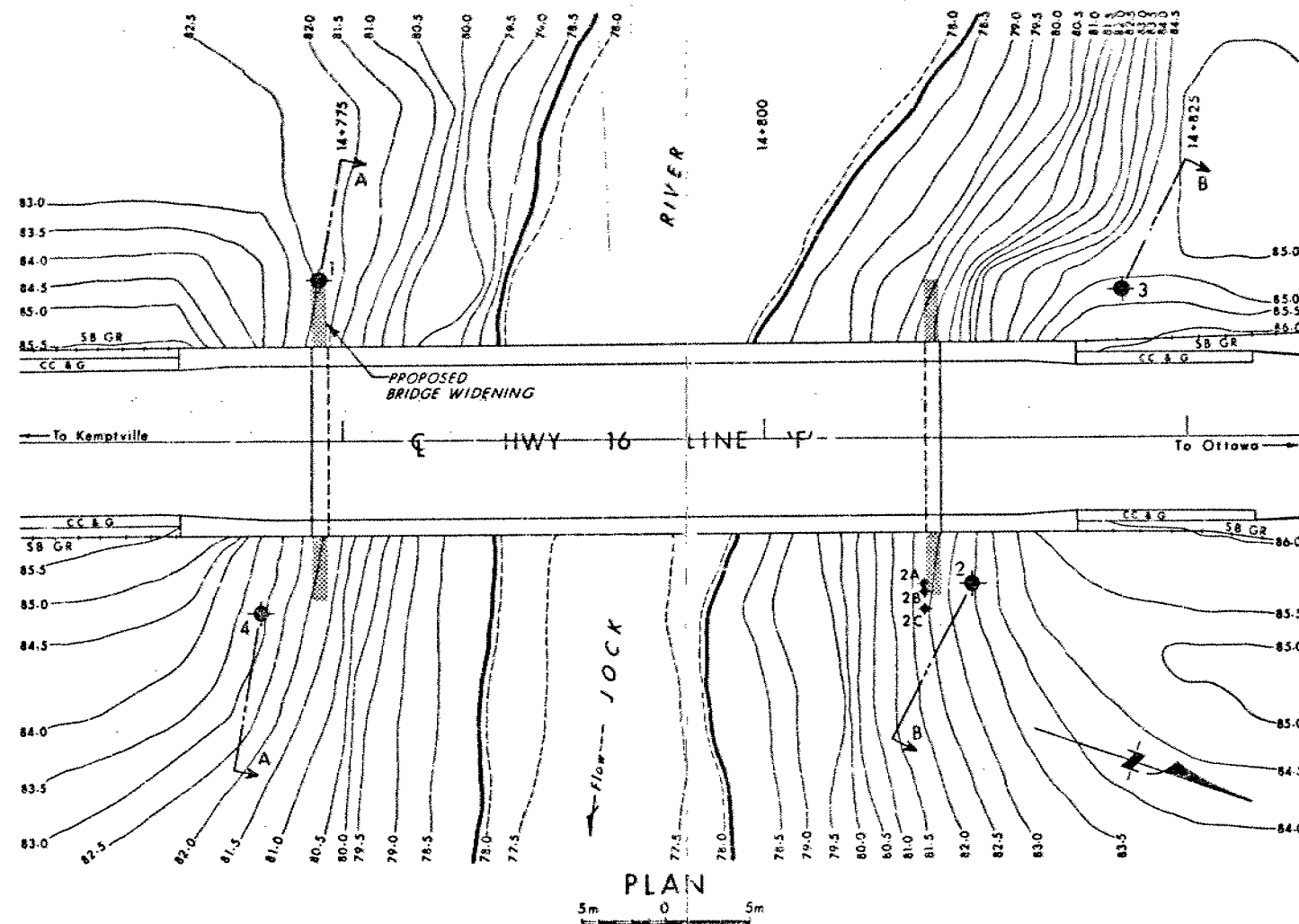
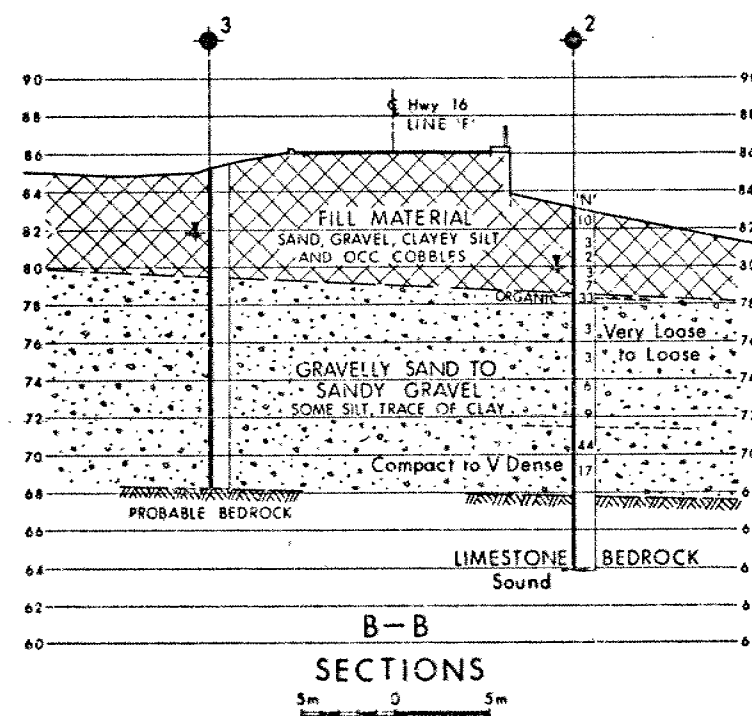
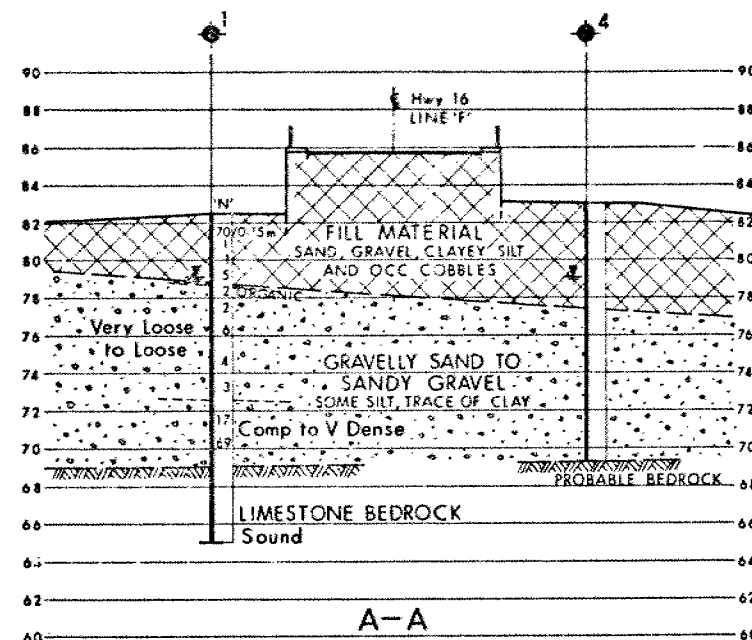
- LEGEND**
- Bore Hole
 - ⊕ Dynamic Cone Penetration Test (Cone)
 - ⊕ Bore Hole & Cone
 - 'N' Blows/0.3m (Std Pen Test, 475 J/blow)
 - CONE Blows/0.3m (60° Cone, 475 J/blow)
 - ↓ WL at time of investigation
Jan & Feb 1978
 - ◆ Bore Hole - Attempts to advance were unsuccessful due to concrete debris in the Fill Material

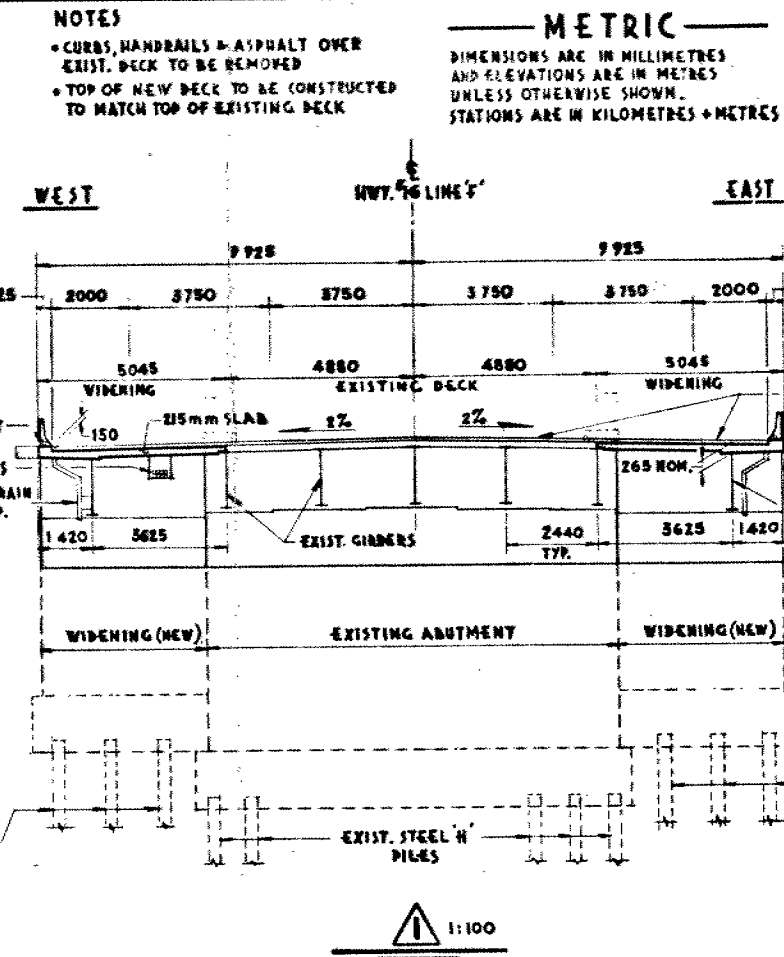
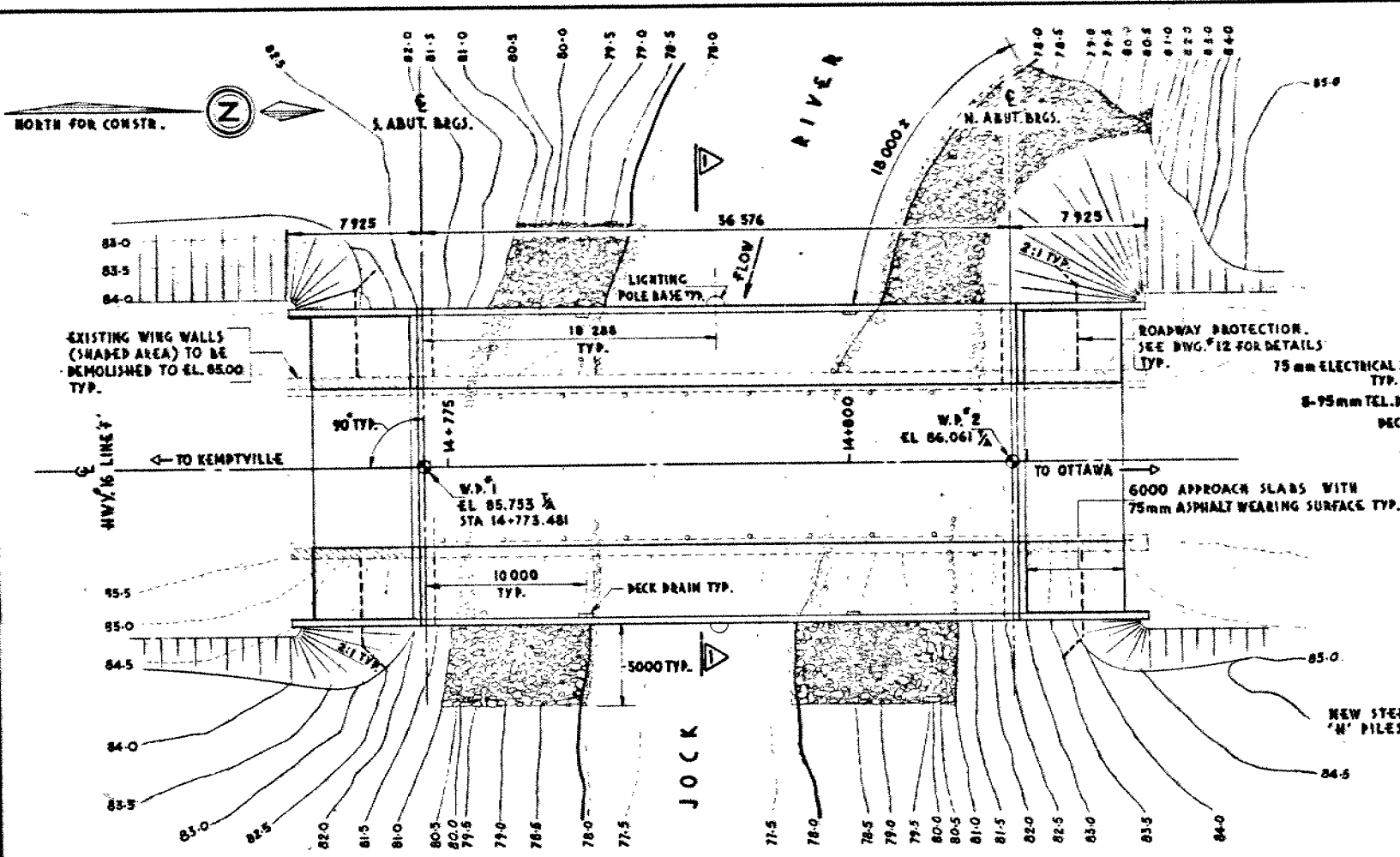
No	ELEVATION	STATION	OFFSET	REFUSAL DEPTH metres
1	82.48	14+773.6	9.5m LT	
2	83.04	14+812.2	8.6m RT	
2A		14+809.4	8.5m RT	1.2m
2B		14+809.4	9.0m RT	2.7m
2C		14+809.4	10.0m RT	2.9m
3	85.28	14+821.0	8.8m LT	
4	82.99	14+770.1	10.2m RT	

-NOTE-
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

REVISIONS	DATE	BY	DESCRIPTION
1	March 2, 1978

Geocres No 31G5-130
Hwy No 16 LINE 'F' DIST 9
SHEET 3-151
OR WAYS CHECKED DATE March 2, 1978 SHEET 3-151
OR WAYS CHECKED DATE March 2, 1978 SHEET 3-151





- SUGGESTED CONSTRUCTION SEQUENCE —**
- 1- REDUCE TRAFFIC LANE WIDTHS.
 - 2- INSTALL ROADWAY PROTECTION.
 - 3- WIDEN STRUCTURE
 - 4- DIVERT TRAFFIC TO WEST SIDE OF STRUCTURE.
 - 5- INSTALL EXPANSION JOINT ASSEMBLIES ON CLOSED SIDE.
 - 6- DIVERT TRAFFIC TO EAST SIDE OF STRUCTURE.
 - 7- REPEAT ITEM 5
 - 8- REMOVE EXISTING ASPHALT WEARING SURFACE, REPAIR DECK AS NECESSARY, PLACE WATERPROOFING & ASPHALT.
 - 9- CLEAN AND PAINT EXISTING STRUCTURAL STEEL.

- NOTES**
- **CLASS OF CONCRETE**
 DECK AND BARRIER WALLS 30 MPa.
 REMAINDER 20 MPa.
 - **REINFORCING STEEL GRADE**
 GRADE 400 OR AS NOTED ON DRAWINGS.
 REINFORCING BARS WITH DESIGNATION 'C' AT THE END OF BAR MARKS SHALL BE COATED BARS.
 - **CLEAR COVER TO REINF. STEEL**
 FOOTINGS, ABUTMENTS 75
 DECK TOP 50, DECK BOTTOM 40
 BARRIER WALLS 40
 APPROACH SLABS 50
 AND/OR AS NOTED ON DRAWINGS

• **CONSTRUCTION NOTES**

THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEAT DEAD LEVEL TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE OF ± 3 mm.

NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE CONCRETE IN THE DECK HAS BEEN PLACED.

TO ACHIEVE THE MIN. CLEAR COVER OF 50 mm SPECIFIED AT TOP OF DECK, THE TOP LAYER OF REINFORCEMENT SHALL BE PLACED, PRIOR TO CONCRETING, WITH A CLEAR COVER OF 65 \pm 15 mm TOLERANCE.

CONCRETE QUANTITIES

CONCRETE QUANTITIES ARE LISTED BELOW FOR THE APPROPRIATE CONC. LUMP SUM TENDER ITEMS.

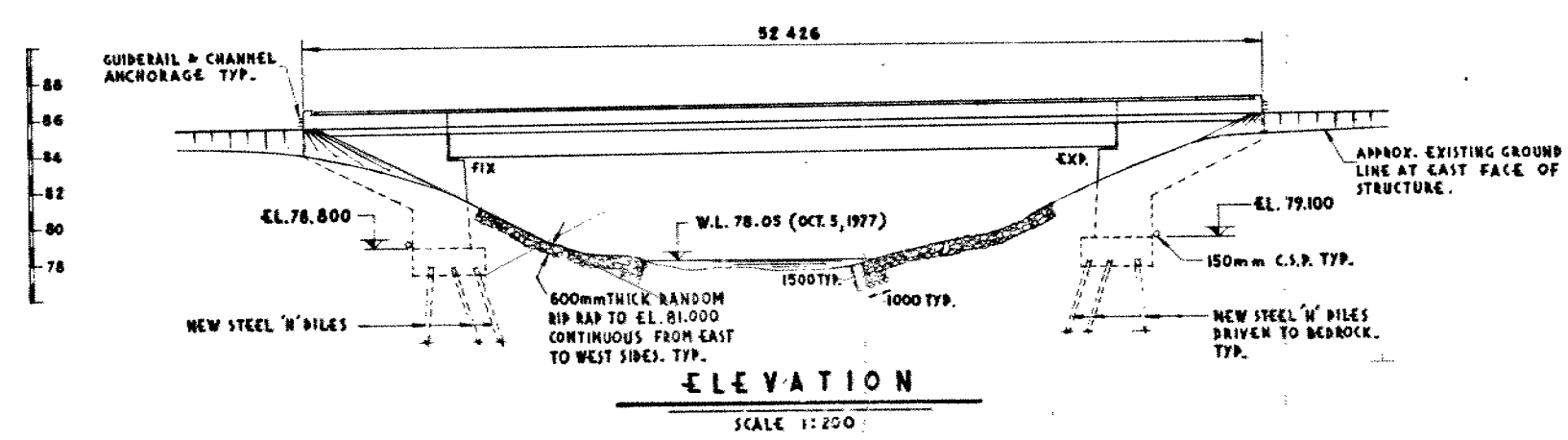
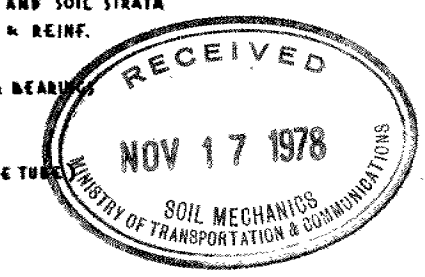
1- CONCRETE IN ABUTMENTS AND WING WALLS	233 CUM.
2- CONCRETE IN DECK	96 CUM.
3- CONCRETE IN BARRIER WALLS	17 CUM.
4- CONCRETE IN APPROACH SLABS	32 CUM.

STRUCTURAL STEEL QUANTITY 41 TONNES

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	C.E.	CHECK	LOADING H320-44 DATE OCT. 78
DRAWING	GC	CHECK	SITE No 3-151 DWG 1

LIST OF DRAWINGS

- 3-151-1 GENERAL PLAN
- 2 BOREHOLE LOCATION AND SOIL STRATA
- 3 FOUNDATION LAYOUT & REINF.
- 4 ABUTMENTS
- 5 STRUCTURAL STEEL & BEARINGS
- 6 DECK
- 7 BARRIER WALL
- 8 STEEL RAILING (SINGLE TUBES)
- 9 6000 APPROACH SLAB
- 10 STANDARD DETAILS I
- 11 STANDARD DETAILS II
- 12 STANDARD DETAILS III
- 13 STANDARD DETAILS IV
- 14 BRIDGE ELECTRICAL DETAILS - TYPE III
- 3-151-15 AS CONSTRUCTED ELEV. & DIM.



B.M. 85.835
 GEODETIC DATUM
 CUT CROSS ON SOUTH END OF
 BRIDGE 4.90 RT OF 14+765.40

NORTH FOR CONSTR. 2

S. ABUT. BRGS.

N. ABUT. BRGS.

METRIC

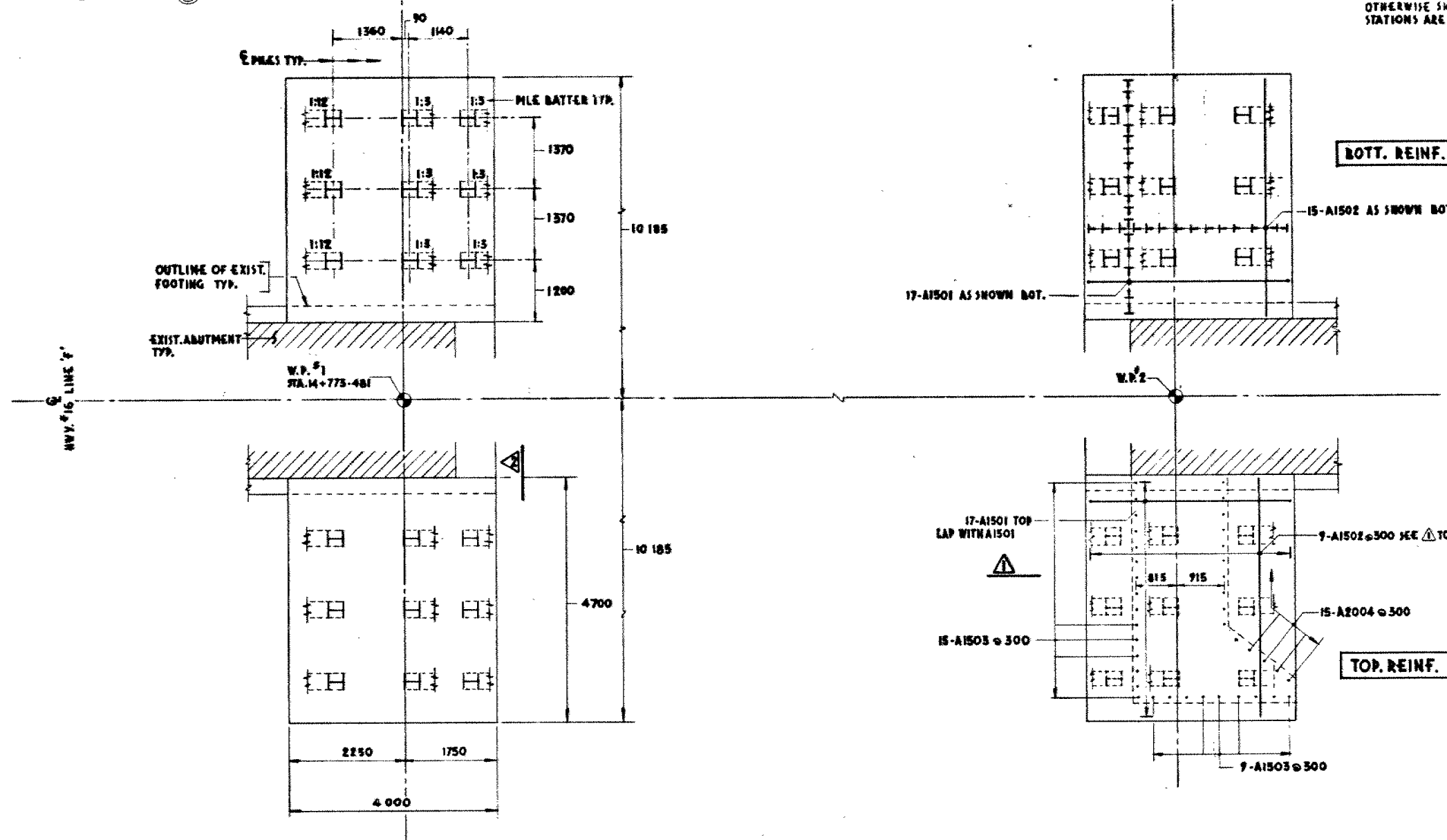
DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETRES + METRES.

CONT No
WP No 151-75-02

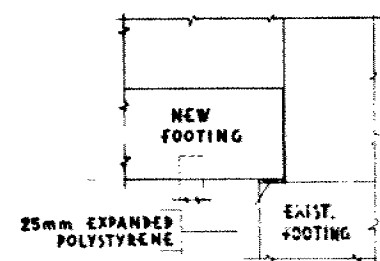
WIDENING OF JOCK RIVER BRIDGE
1.4 Km. North of Ottawa Carleton Reg. Rd. 13
FOUNDATION LAYOUT & REINF.



SHEET

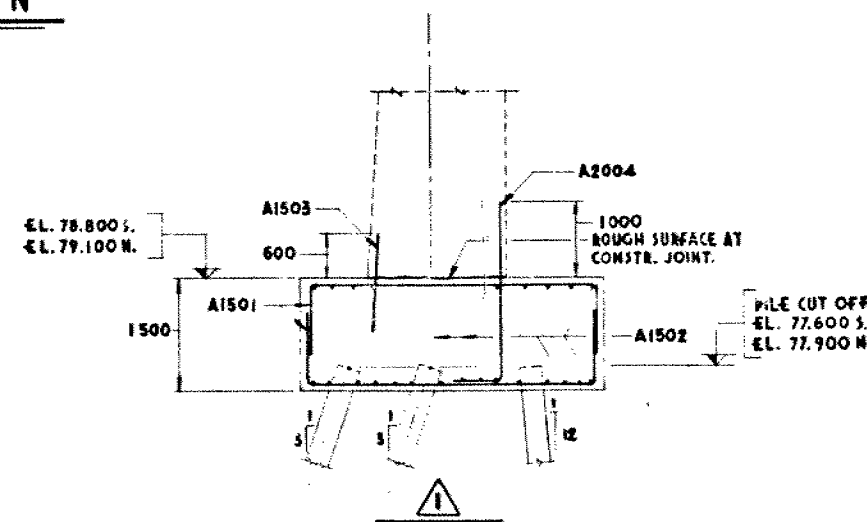


P L A N



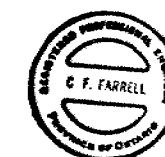
PILE DATA

LOCATION	BATTER	Nº REQD.	LENGTH	TYPE
S. ABUT.	1:12	6	9 250	HP 310x79
	1:3	12	9 750	
N. ABUT.	1:12	6	10 500	
	1:3	12	11 000	



NOTES

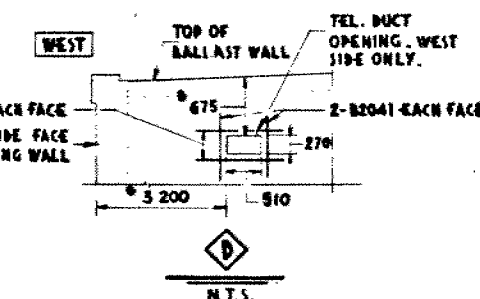
- PILE SPACINGS TO BE MEASURED AT UNDERSIDE OF FOOTINGS
- PILES TO BE DRIVEN TO BEDROCK.
- PILE LAYOUT, FOOTING DIMENSIONS & REINFORCEMENT SIMILAR FOR ALL NEW FOOTING WIDENINGS.
- FOR ROADWAY PROTECTION SEE DWG #12.
- SCALE 1:50 UNLESS OTHERWISE NOTED.



REVISIONS	DATE	BY	DESCRIPTION
DESIGN		CHECK	DATE
CHANGING		CHECK	DATE

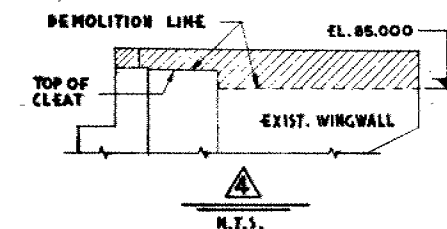
METRIC

DIMENSIONS ARE IN MILLIMETRES
AND ELEVATIONS ARE IN METRES
UNLESS OTHERWISE SHOWN.
STATIONS ARE IN KILOMETRES + METRE



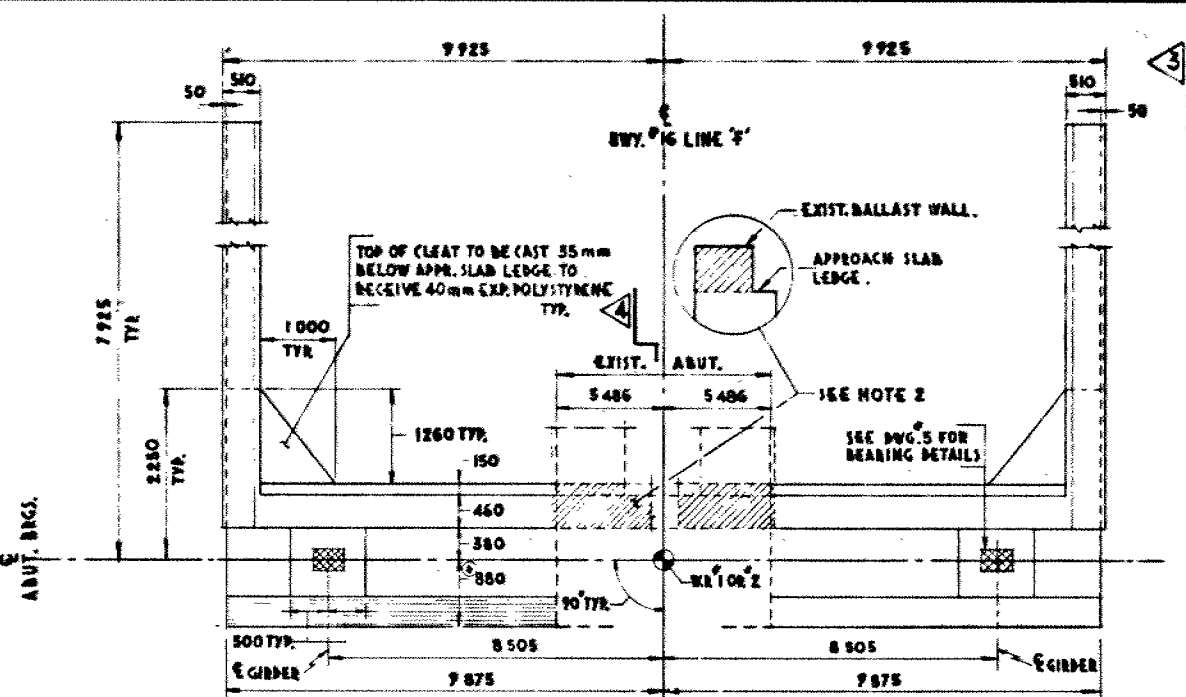
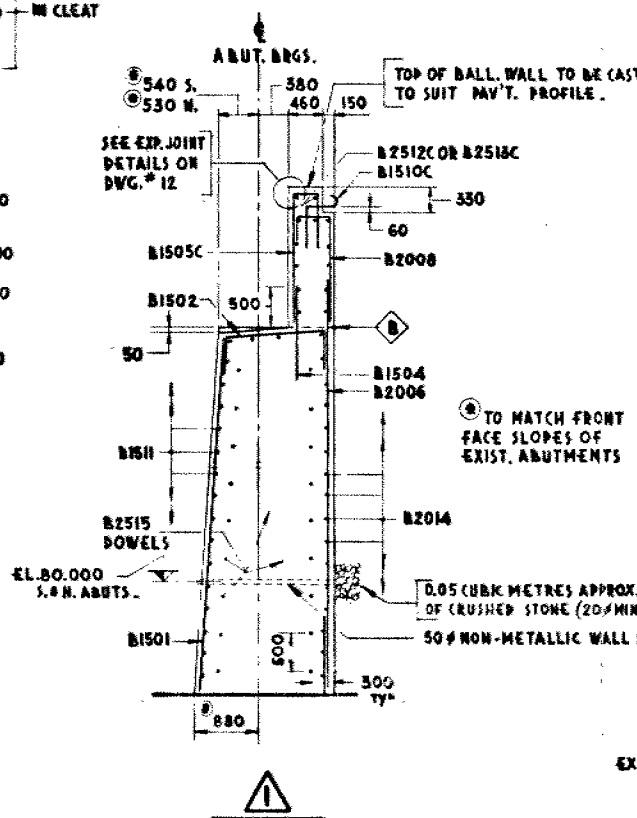
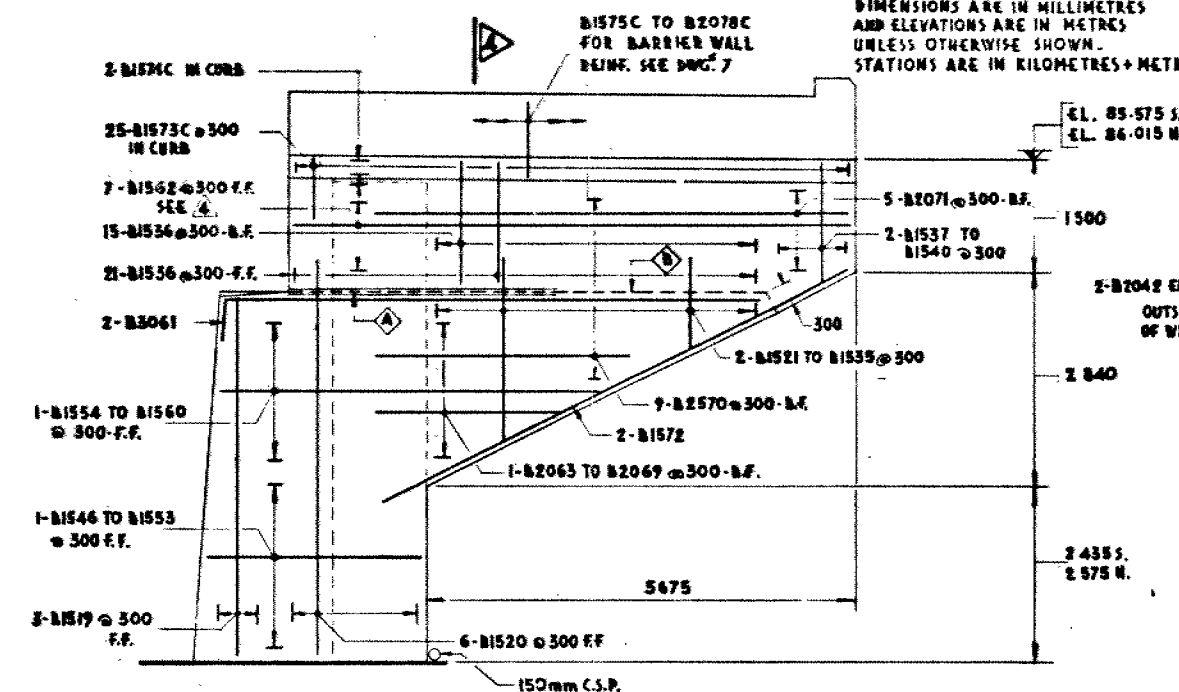
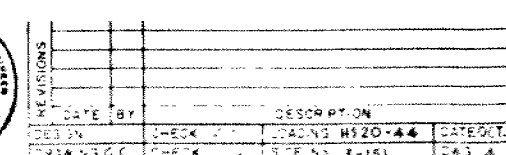
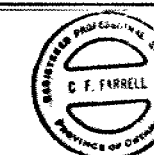
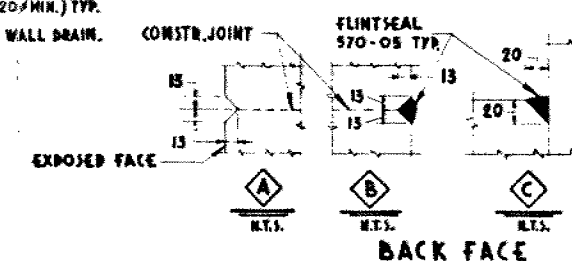
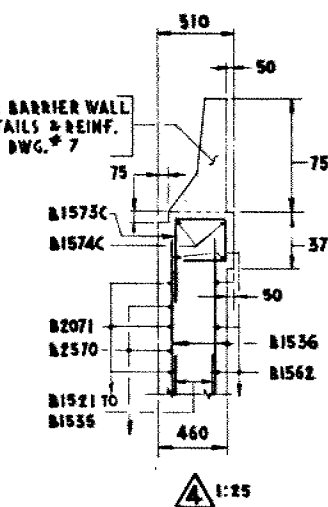
NOTES

- * DIMENSIONS ARE APPROXIMATE. EXACT LOCATION OF OPENING TO BE DETERMINED IN FIELD.
- * BAR MARKS B1505C AND B200B TO BE CUT IN FIELD TO SUIT OPENING.

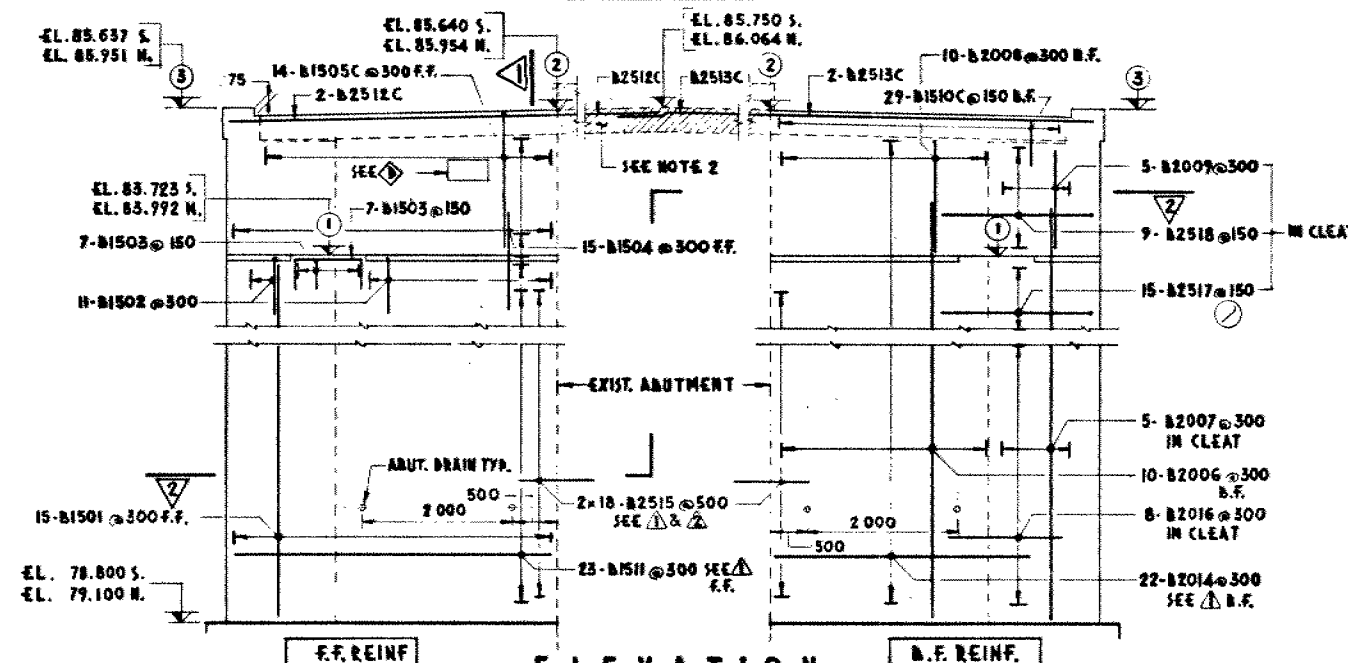


NOTES

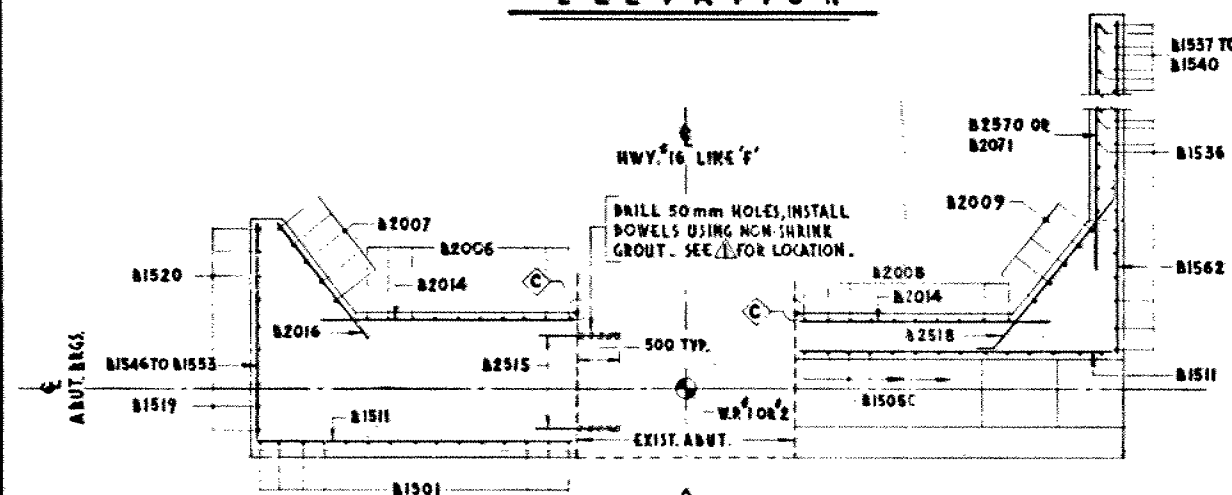
- 1- SEE "CONSTRUCTION SEQUENCE" ON DWG. 1
- 2- TOP OF EXIST. BALLAST WALL TO BE DEMOLISHED DOWN TO APPROACH SLAB LEDGE (SHADED AREA). VERTICAL REINF. IN BALLAST WALL TO BE RETAINED & CLEANED BEFORE PLACING NEW CONCRETE. SURFACES OF EXIST. CONCRETE AT CONSTR. JOINTS TO BE SAND-BLASTED AND COATED WITH NEAT CEMENT PASTE.
- 3- CURB WALLS AT EXIST. ABUTMENTS TO BE DEMOLISHED 25mm BELOW EXIST. ABUT. SEAT LEVELS, REINF. CUT FLU & SEATS TO BE REBUILT TO PREVIOUS LEVEL WITH EXPANDING GROUT.
- 4- REINFORCEMENT SIMILAR FOR EAST & WEST WIDENINGS OF SOUTH & NORTH ABUTMENTS EXCEPT WHERE NOTED.
- 5- SCALE 1:50 UNLESS OTHERWISE NOTED.
- 6 F.F. DENOTES FRONT FACE : B.F. DENOTES BACK FACE.



PLAN



ELEVATION



CONT No
WP No 151 75 02WIDENING OF JOCK RIVER BRIDGE
1.4 Km. North of Ottawa Carleton Reg. Rd. 13
STRUCTURAL STEEL & BEARINGS

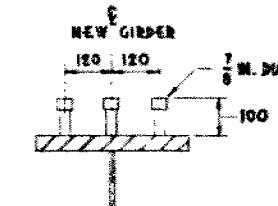
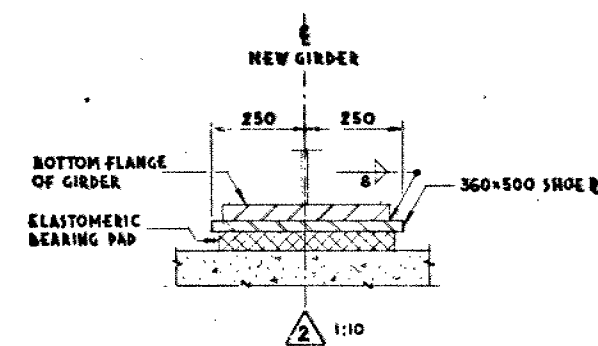
SHEET

METRIC

DIMENSIONS ARE IN MILLIMETRES
AND ELEVATIONS ARE IN METRES.
UNLESS OTHERWISE SHOWN.
STATIONS ARE IN KILOMETRES + METRES.

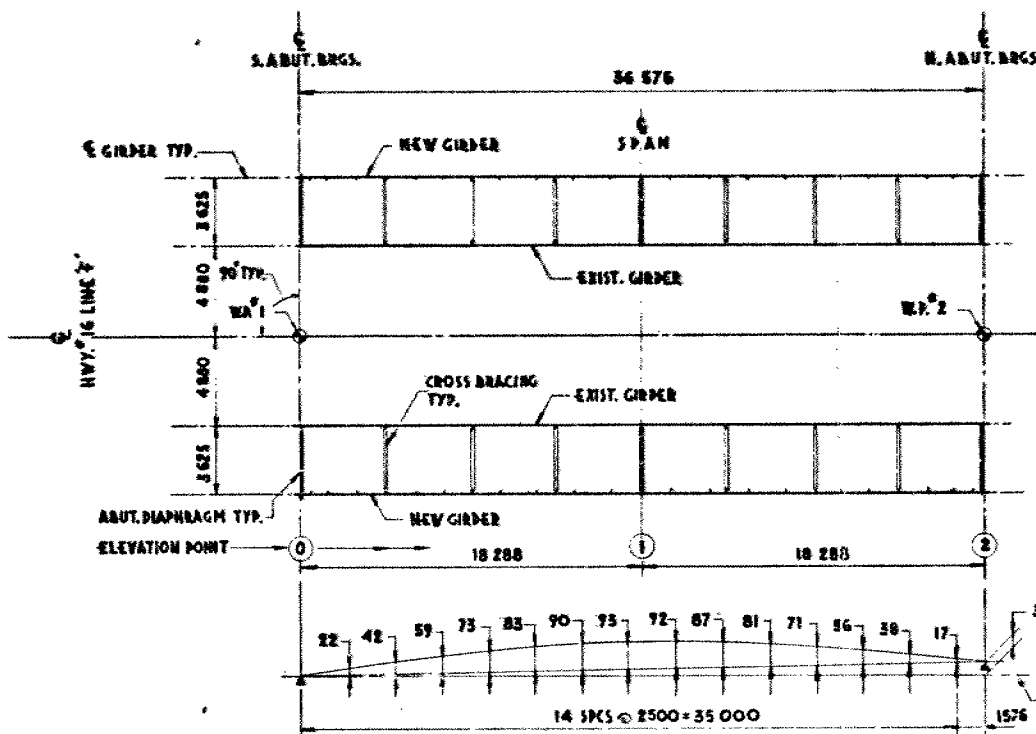
BEARING DATA

D. L.	117 K	117 K
MAX (D.L. + L.L. + I)	201 K	201 K
MAX. MOVEMENT	—	+0.90 IN.
MAX. SHEAR RATE	—	16.7 K/IN
TOTAL NO REQ'D.	2	2
SIZE	(18x12x1) IN.	(18x12x2) IN.
LOCATION	S. ABUT.	N. ABUT.

SHEAR CONNECTOR
DETAIL
SCALE 1:10

NOTES

- STEEL IN GIRDER FLANGES, WEBS, STIFFENERS, AND ALL WELDED STRUCTURAL COMPONENTS SHALL BE CSA G40.21 GRADE 50A. ALL OTHER STRUCTURAL STEEL SHALL BE CSA G40.21 GRADE 50A OR 50B.
- ALL BUTT WELDS IN WEB AND FLANGE PLATE SHOP SPLICES SHALL BE FINISHED SMOOTH AND FLUSH WITH BASE METAL BY GRINDING IN THE DIRECTION OF APPLIED STRESS.
- WELDING ELECTRODES SHALL BE AS CALLED FOR IN THE SPECIFICATIONS.
- FIELD WELDS OF SHOE R'S TO BE CARRIED OUT SO THAT NO HEAT DAMAGE WILL RESULT TO BEARINGS.
- ALL BOLTED CONNECTIONS SHALL BE OF FRICTION TYPE USING 7/8 IN. DIA. H.S. BOLTS IN ACCORDANCE WITH ASTM SPECIFICATIONS A325, TYPE 3.
- PLATE GIRDERS TO BE CAMBERED TO ORDINATES SHOWN.
- STUD SHEAR CONNECTORS SHALL BE 7/8 IN. DIA. MELWELD K.S.M. OR EQUAL.
- INACCESSIBLE SURFACES OF STEEL AT ABUTMENTS SHALL BE PAINTED WITH TWO COATS OF CASO COLD APPLIED COAL-TAR PAINT IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- BOLT HOLES ON NEW STIFFENERS ON OUTSIDE FACE OF EXISTING EXTERIOR GIRDER AT CROSS BRACING SHALL BE FIELD DRILLED AFTER CONCRETE IN DECK HAS REACHED A STRENGTH OF 23 MPa.
- ALL BOLTED CONNECTIONS AT ABUT. DIAPHRAGM AND CROSS BRACING SHALL NOT BE TIGHTENED UNTIL CONCRETE IN DECK HAS REACHED A STRENGTH OF 23 MPa.
- SHOP WELDED SPLICES TO BE FULL STRENGTH BUTT WELDS.
- ALL LENGTHS SHOWN ARE HORIZONTAL AND MEASURED AT 15°C.



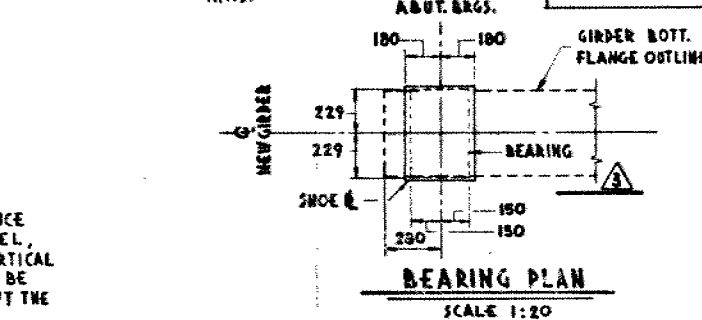
ELEVATIONS AT TOP OF GIRDERS

POINT	ELEVATION (M)
0	85.283
1	85.518
2	85.591

NOTE: ELEVATIONS AT TOP OF GIRDERS INCLUDE AN ALLOWANCE FOR NAKED GIRDER DEFLECTIONS AND VERTICAL CURVATURE OF ROADWAY.

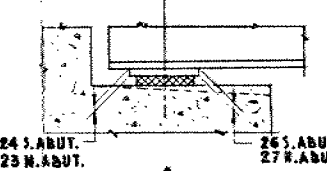
NOTE: CAMBER ORDINATES INCLUDE ALLOWANCE FOR DEFLECTION DUE TO WEIGHT OF STEEL, DECK AND WEARING SURFACE AND VERTICAL CURVATURE OF ROADWAY. GIRDERS TO BE CAMBERED TO VALUES SHOWN WITHOUT THE GIRDER DEAD LOAD ACTING.

DECK DRAIN ATTACHMENT



BEARING PLAN

SCALE 1:20



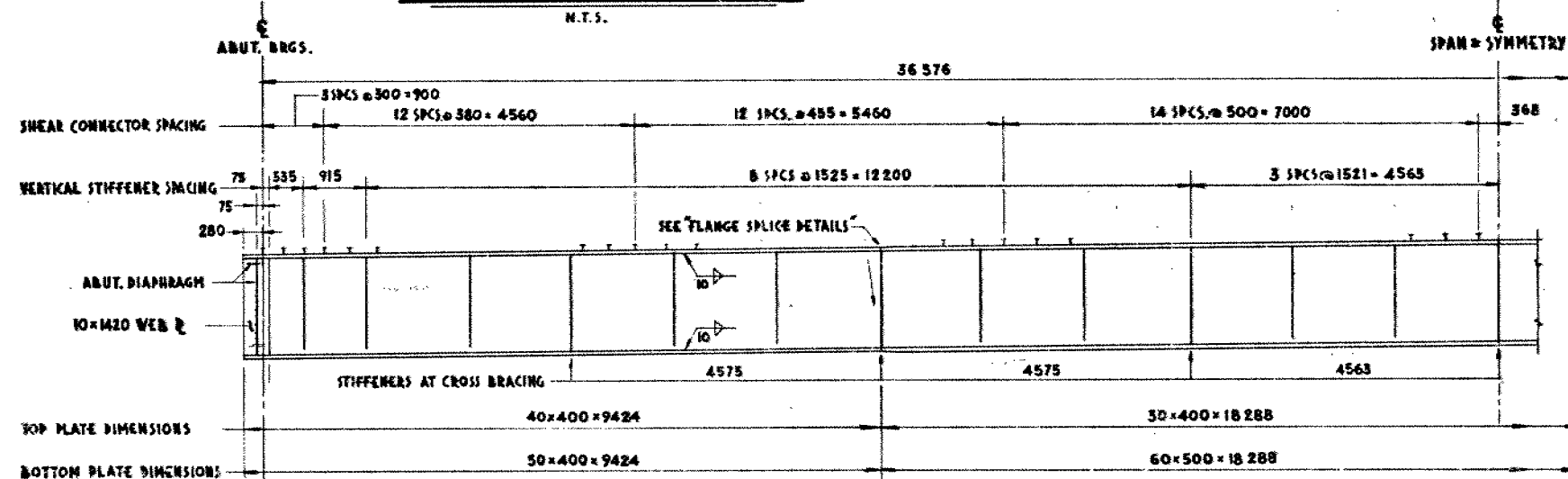
FLANGE SPLICE DETAILS

PLAN

ELEVATION

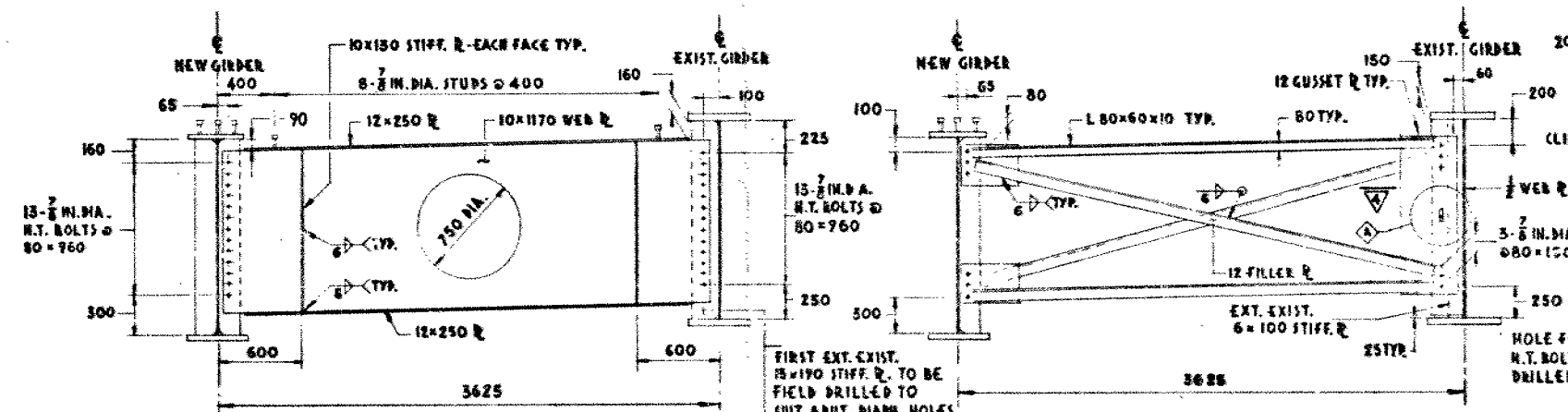
SCALE 1:20

N.T.S.



HALF GIRDER ELEVATION

SCALE 1:50

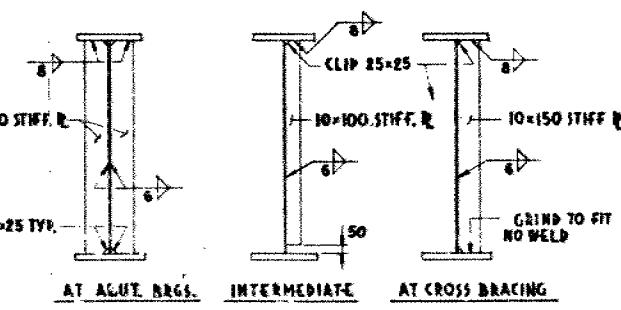


ABUT. DIAPHRAGM-TYP.

SCALE 1:25

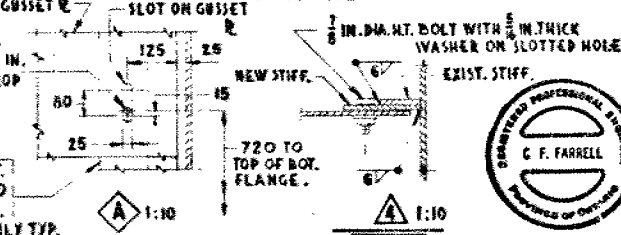
CROSS BRACING-TYP.

SCALE 1:25



STIFFENERS

SCALE 1:25



REVISIONS	DATE	BY	DESCRIPTION
DESIGN C.S.	CHECK F.C.	LOADING M3 20-44	DATE OCT 8
DRAWING S.C.	CHECK C.B.	SITE No 3-51	DWG 5

Mr. K.G. Bassi
Head, Eastern Section
Structural Office
2nd Floor, West Building

Soil Mechanics Section
Engineering Materials Office
Room 315, Central Building

78 09 20

Re: Jock River Bridge Widening
W.P. 151-75-02, Site 3-151
Hwy. 16, District 9, Ottawa

Further to your memorandum of 78 09 06 we have reviewed the final structural design including the roadway protection scheme and have the following comments to make.

Due to the high groundwater table and the pervious nature of the subsoil, it is anticipated that the 1.5 to 1 temporary slopes incorporated in the roadway protection scheme will not be stable. In view of this we suggest that the roadway protection scheme parallel and adjacent to the highway be relocated to retain two sides of the required footing excavation. On the third side of the footing excavation, the river side, we suggest employing 2:1 temporary slopes. The revised roadway protection scheme would incorporate soldier beams and timber-lagging below the maximum anticipated groundwater level (B.H. #3 elevation 82); above this elevation temporary side slopes of 1.5 to 1 will be adequate. Water seeping into the excavation could be controlled by pumping from sumps (see attached sketch).

We have no further comments at this time.

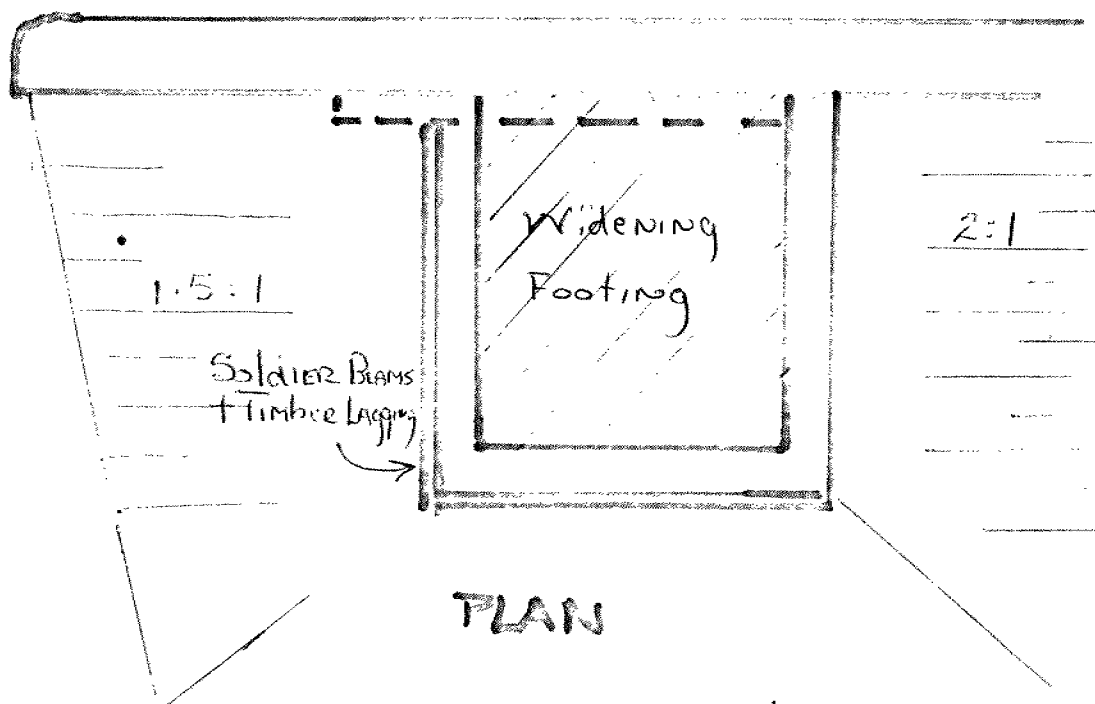
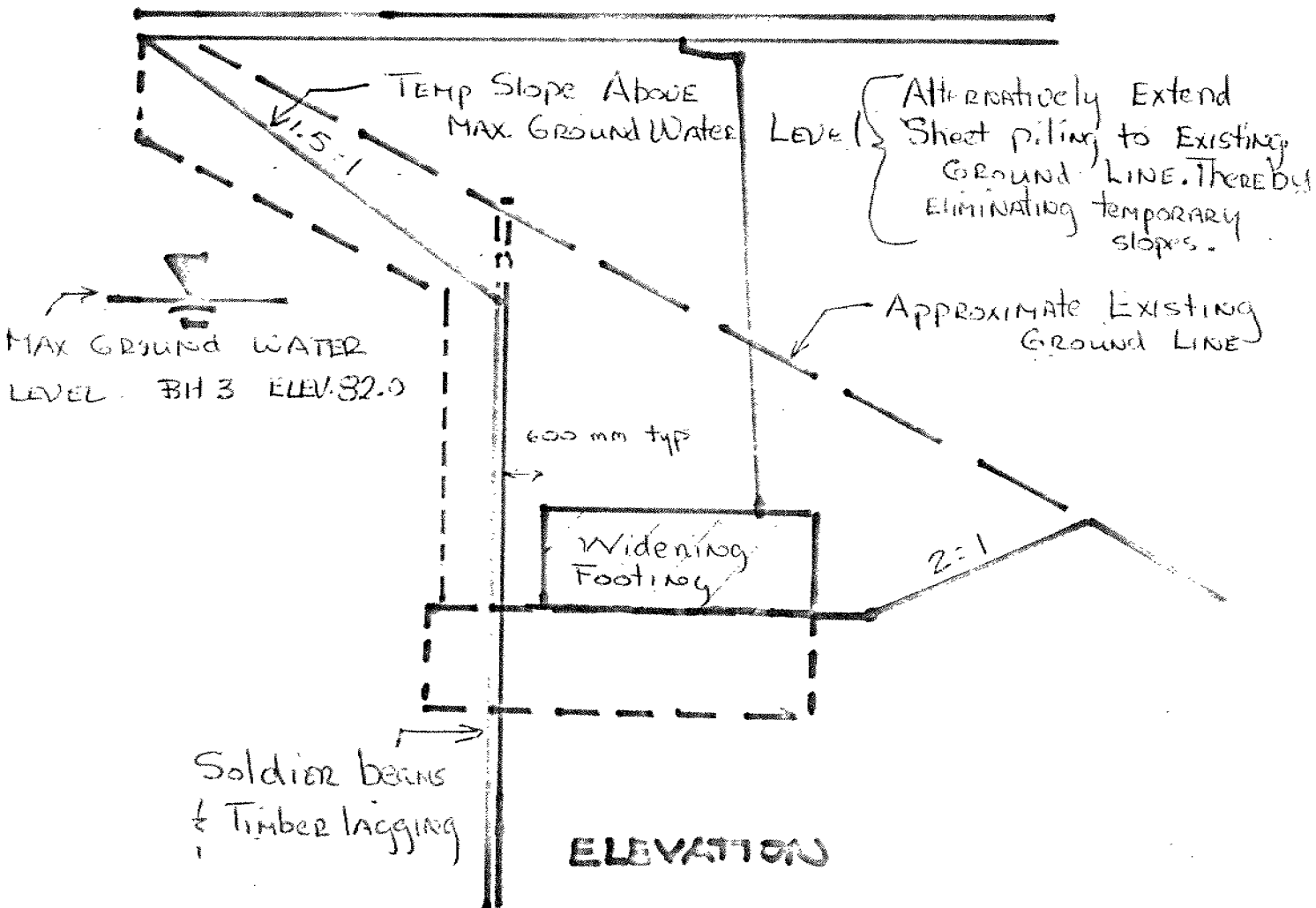
M. MacLean
Project Engineer

For: M. Devata
Supervising Engineer

MM/MD/gs

Attach.

cc: Files ✓



Mr. K. Bassi
Head, Eastern Section
Structural Office
2nd Floor, West Building

Soil Mechanics Section
Engineering Materials Office
Room 315, Central Building

78 07 04

Re: Widening of Jock River Bridge
W.P. 151-75-02, Site 3-151
District 9, Ottawa

Further to your memorandum of 78 06 22, we have reviewed the preliminary design drawing for the above structure. The drawing indicates that the widened portions of the bridge will be supported on steel H piles and the roadway protection will consist of interlocking steel sheet piling.

The steel H piles should be driven to bedrock as recommended in our report. The sheeting should be incorporated in the dewatering scheme and should be driven to a depth below the base of excavation equal to the prevailing unbalanced hydrostatic head to prevent boiling of the excavation.

Due to the presence of cobbles and concrete pieces in the approach fills, obstruction to driving the sheeting through the fill material may be anticipated.

We suggest the following construction sequences:

- install the roadway protection
- remove fill material at the new footings
- driving steel H piles

B. Ly
Senior Engineer

For: M. Devata
Supervising Engineer

BL/MD/gs

cc: Files ✓

JOCK RIVER BRIDGE
HWY # 16

SITE # 3-151

