

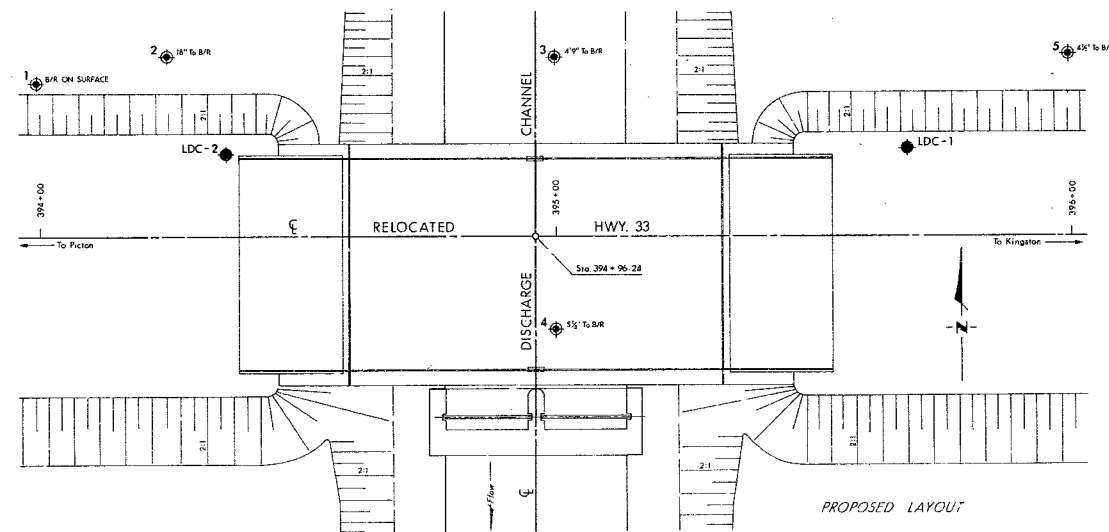
CONT. 71-205

LENNOX

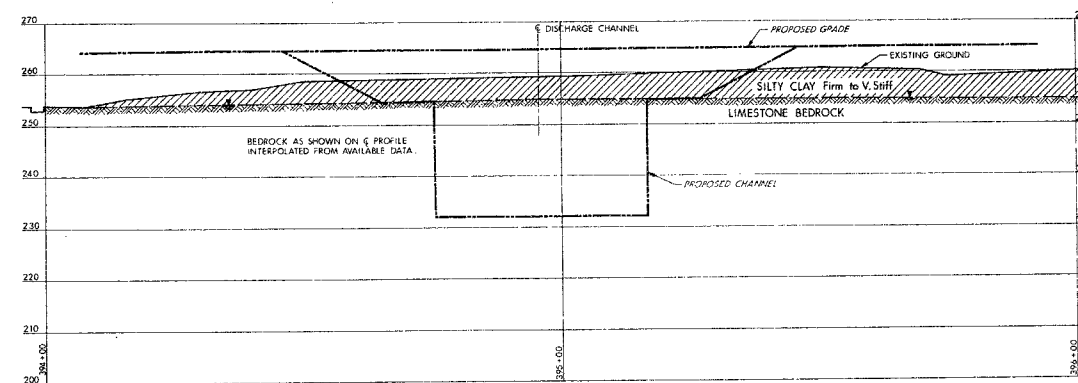
GENERATING STA.

HWY. 33 DIST. 8

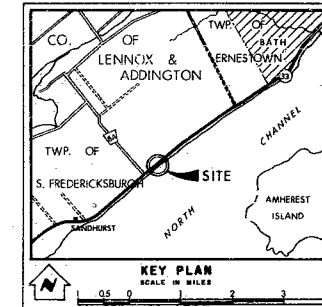
31C-5



PLAN
1" = 20 FT.



PROFILE - HWY. 33
1" = 20 FT.



LEGEND

- Bore Hole by Ontario Hydro
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation, Aug. 1970.
- Auger Holes by Soils Office (D.H.O.)

NO.	ELEVATION	STATION	OFFSET
1	253.0	393+99	30' LT.
2	256.0	394+24.5	35' LT.
3	261.2	395+00	35' LT.
4	259.2	395+00	16' RT.
5	261.0	395+99	25' LT.
LDC-1	260.1	395+68	17' LT.
LDC-2	257.1	394+36	16' LT.

NOTE

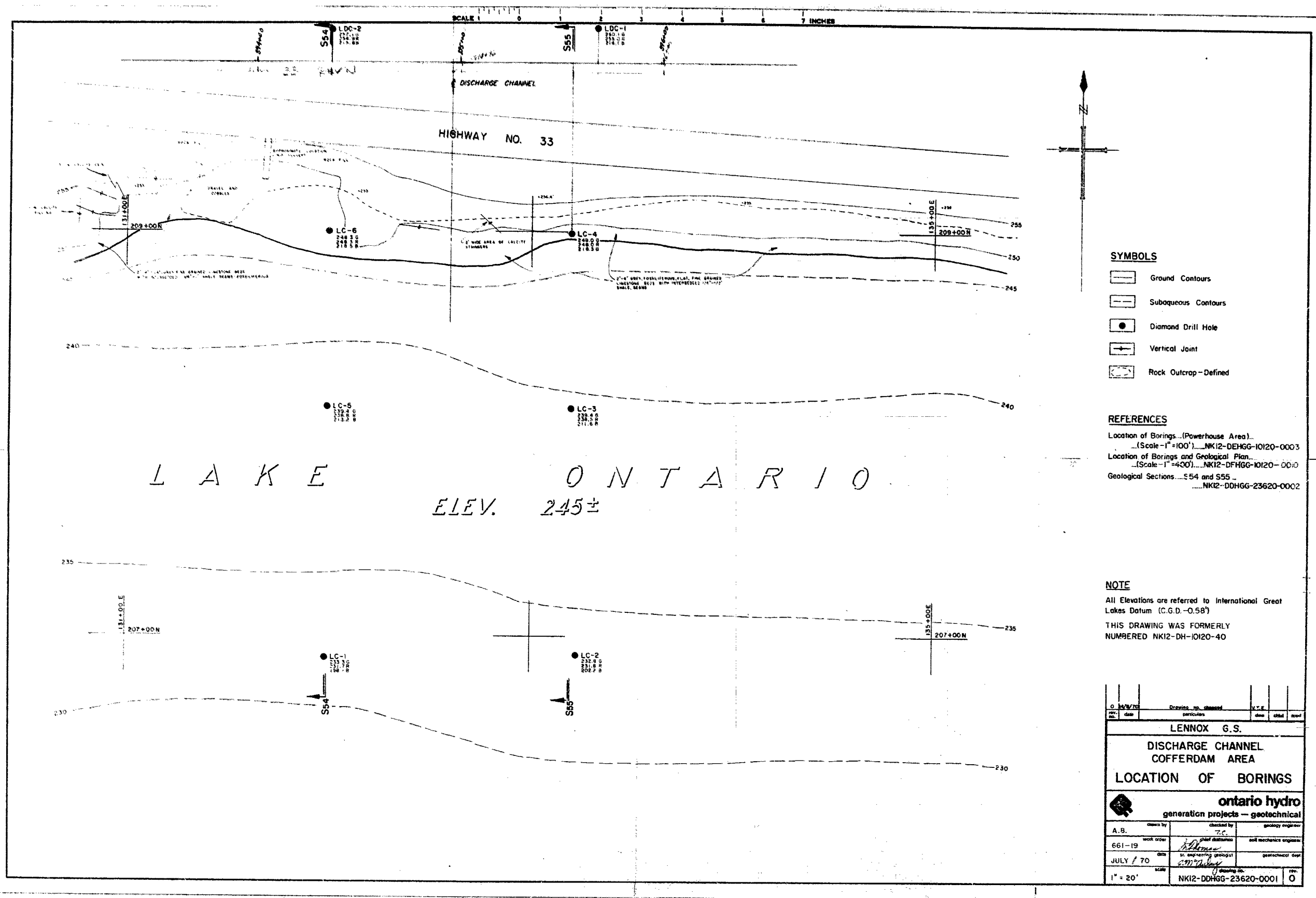
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

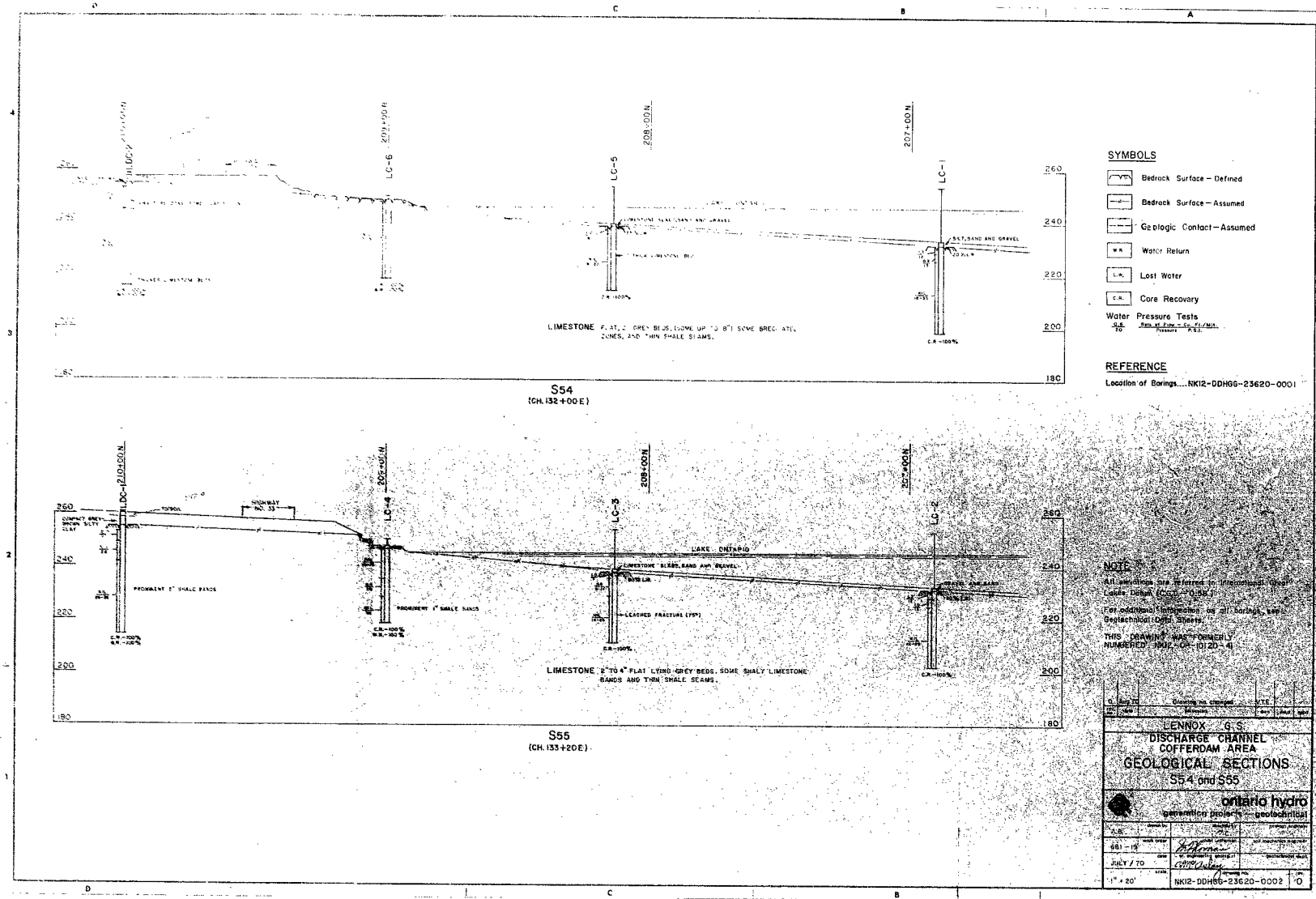
DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE - FOUNDATION SECTION
H.E.P.C. LENNOX GENERATING STATION
DISCHARGE CHANNEL
KING'S HIGHWAY NO. 33 REVISION DIST. NO. 8
CO. LENNOX & ADDINGTON
TWP. S. FREDERICKSBURG LOT 18 CON. 1
BORE HOLE LOCATIONS & SOIL STRATA
DATE APRIL 29, 1971 SITE NO. 17-119
DRAWN BY S.B. CHECKED BY S.B. DATE MAY 1, 1971
APPROVED BY S.B. DATE MAY 1, 1971

REF No. D-6996 - P2 (De Leuw Corbett)
NK12 - DOHGG-23620-0001 (Ont. Hydro)
NK12 - DOHGG-23620-0002 (Ont. Hydro)

GEORES NO. 31C-5





MEMORANDUM

31 C - 5
GEOCREs No.

77-209
Acs

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Office,
Admin. Bldg.

FROM: Foundation Section,
Materials & Testing Office,
Room 107, Lab. Bldg.

ATTENTION:

DATE: April 8, 1971

OUR FILE REF.

IN REPLY TO

SUBJECT:

H.E.P.C. Lennox Generating Station
Bridge over Discharge Channel and Stop Log Structure
Site No. 17-119, Highway #33, District #8 (Kingston)
W.P. 78-70-02 -- W.O. 71-11031

CONT 71-205

A Preliminary Bridge Plan Drawing D-6996-P1 was received by this Section on March 25, 1971, and it was discovered that there was no foundation investigation carried out by the Department at the above mentioned structure location. Subsequently we have ascertained that Ontario Hydro carried out some borings in this general area for their Lennox Generating Station. As a result of this, we requested Mr. W. B. Chong, Supervising Design Engineer, Lennox Engineering Department of Ontario Hydro, to provide us with all the available geotechnical data which will enable us to provide the foundation requirements for the proposed structure at the crossing of Hwy. #33 and the Discharge Canal. Recently, this Section received another Preliminary Plan (D-6996-P2) dated April 5, 1971, from the Bridge Office requesting our comments. We are now in possession of all the geotechnical data of the Ontario Hydro in this area, and also information obtained by shallow borings put down by the Regional Materials Section of the Kingston Region. Our comments with regard to the above mentioned structure, are as follows:

The bedrock is limestone with thin horizontal bands of shale and shaley limestone up to 1 inch thick, being generally sound with core recoveries in the order of 100%. The surface of the rock was found to vary between elev. 255.0 (north end) and elev. 248.0 (south end) of the structure area (Ref. B.E. #L.D.C.-1, 2 and L.C.-4, 6 of Ontario Hydro).

According to available information, the excavations for the Discharge Channel in the vicinity of the structure will not be carried out by Ontario Hydro. Since excavations in this area will be carried out by the structure contractor, we recommend that care must be exercised in blasting limestone bedrock for the Discharge Channel, so that there may not be any excessive breakage of the rock where footings will be constructed. In addition, a note should be included on the Contract Documents stating that,

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Office - Admin. Bldg.

2

April 8, 1971

Re: H.E.P.C. Lennox Generating Station --
Bridge over Discharge Channel and Stop Log Structure
Site No. 17-119, Hwy. #33, Dist. #8 - W.P. 78-70-02
W.O. 71-11031

any shattered rock beneath the structure foundations should be stripped for its full depth and replaced with mass concrete to the footing formation level.

A drawing showing the subsurface conditions, incorporating the geotechnical data obtained from Ontario Hydro, may be prepared by the Foundation Section, if required, to be included in the Contract Documents.

This memorandum summarizes all our comments with regard to your Preliminary Bridge Plans for the structure at the crossing of Discharge Channel and Hwy. #33. If you have any other queries pertaining to foundations of this structure, please contact our Office.

MD/WdeF

cc: Messrs. K. G. Bassi
T. C. Kingsland
J. E. Gruspier
S. J. Markiewicz

M. Devata
M. Devata
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac
PRINCIPAL FOUNDATION ENGR.

Foundations Files
Gen. Files

Ontario hydro

ontario hydro
620 university avenue
toronto 2, ontario, canada
telephone 368 6767

70-11031

March 25, 1971

Mr. M. Devata
Supervising Foundation Engineer
Materials & Testing Division
Department of Highways
DOWNSVIEW, Ontario

address reply attention of
N.H. Robinson

OUR FILE: NK12-00513 T

Dear Sir:

Lennox GS
Highway Underpass

As per your telephone request of March 25, 1971,
we enclose herewith for your use, one print of each of the
following geological drawings and data sheets:

- NK12-DDHGG-23620-0001 R0 Discharge Channel - Cofferdam Area
Location of Borings
- NK12-DDHGG-23620-0002 R0 Discharge Channel - Cofferdam Area
Geological Sections
S54 and S55

Geotechnical Data Sheets for Borings LCl-6 inclusive, LDC-1
and LDC-2.

Yours truly,



W.B. Chong
Supervising Design Engineer
Lennox Engineering Department

GEOTECHNICAL DATA - HOLE NO. LC-1

PROJECT LENNOX G.S. SITE COFFERDAM HOLE TYPE ROTARY DIAMOND
 LOCATION 206+89.3 N. 131+99.2 F. DIP 90° HOLE SIZE BX
 DATUM I.G.L.D. BEARING DATE - Start JUNE 9 '70 Finish JUNE 9 '70

COMPILED By R.W.H.
 CHECKED By E.
 APPROVED By J.M.

PROFILE		SAMPLES			PENETRATION TEST		PERMEABILITY COEFFICIENT "K" & FIELD & LABORATORY ft./min		GRAIN-SIZE DISTRIBUTION			REMARKS	
DESCRIPTION	STRATIGRAPHY PLOT	NUMBER	TYPE & DIAM.	NO. OF BLOWS per 6" or as noted	SAMPLER CONE Converted to blows/ft	WATER INFORMATION			No mm	% PASSING			
						DRILLING WATER RETURN	PRESS TESTS	OBSER'D WATER LEVELS		0	50		100
ELEV. 251.8 DATUM													
DEPTH 0.0													
245.3 WATER													
6.5'													
WATER													
233.3 GROUND													
22.5'													
SILT, GRAVEL													
21.2' AND SAND													
22.1'													
LIMESTONE													
HORIZONTAL BEDS. ABUNDANT, 1/2"-1" SHALY BANDS WITH ALTERNATE MEDIUM GRAINED CRYSTALLINE, "L" BANDS OF GRAY LIMESTONE													
48.6'													
SHALY LIMESTONE													
WAVY AND THIN SHALE BANDS WITH SOME ECCENTRIC													
158.1'													
35.7' END OF HOLE													

ORGANICS
 FILL
 GRAVEL
 SAND
 SILT
 CLAY

WATER SURFACE
 DEPTH
 BEDROCK SURFACE
 FRACTURE OR JOINT (J)
 LOST CORE

Q.D.
 60
 RATE OF FLOW - cu. ft./min. WATER PRESS. TEST
 PRESSURE - psi

BOTTOM OF CASING

C.C.
 C.R.
 br.
 gr.
 sil.
 fr's
 fr'd
 weath'd
 fossilif.
 carb.
 brecc'd
 poss.
 fr.
 CORE CONDITION -
 CORE RECOVERY
 BROWN
 GREY
 BITUMINOUS
 FRACTURED
 FRACTURED
 WEATHERED
 FOSSILIFEROUS
 CARBONATE
 BRECCIATED
 POSSIBLE
 HIGHLY

DEPTH SCALE: 1 inch = 10 feet

LC-2

COMPILED By *A.K.W.*

DIP 90°

HOLE SIZE BX

CHECKED By *[Signature]*

BEARING

DATE - Start JUNE 10 '70

APPROVED BY *[Signature]*

Finish, JUNE 10 '70






LAKE ONTARIO

DRILLED BK CASING TO 22.6
WEATHERED SURFACE ROCK

GRADUATIONAL CONTACT

GRAVITY GROUPING

1. RAGE CENTER

- | | |
|---|-----------------------|
|  | WATER SURFACE |
|  | DEPTH |
|  | BEDROCK SURFACE |
|  | FRACTURE OR JOINT (J) |
|  | LOST CORE |

DATE OF FLOW - 4/11/2002 WATER PRESS. TEST

A - 1" O.D. SPLIT ROBIN CARTRIDGE

C.C.	CORE CONDITION
C.R.	CORE RECOVERY
br	BROWN
gr	GREY
bit	SITUATION
fr's	FRACTURES
fr'd	FRACTURED
weath'd	WEATHERED
fossilif.	FOSILIFEROUS
carb.	CARBONATE
brecc'd	BRECCIATED
poss	POSSIBLE
hi	HIGHLY

DEPTH SCALE: 1 inch = 10 feet

GEOTECHNICAL DATA - HOLE NO. **LC-3**

PROJECT LENNOX G.S. SITE COFFERDAM HOLE TYPE ROTARY DIAMOND

LOCATION 208+12.8 N

133+19.6 E

DATUM I.G.L.D.

DIP 90°

BEARING

HOLE SIZE BX

DATE - Start JUNE 11 70

Finish JUNE 11 70

COMPILED By P.K.W. *AK*

CHECKED By *AK*

APPROVED By *AK*

PROFILE		SAMPLES		PENETRATION TEST		PERMEABILITY COEFFICIENT "K" A FIELD & LABORATORY ft./min.		GRAIN-SIZE DISTRIBUTION			REMARKS	
DESCRIPTION	STRATIGRAPHY PLOT	NUMBER	TYPE & DIAM.	NO. OF BLOWS per 6" or as noted	SAMPLER CONE Converted to blows/ft.	WATER INFORMATION			Dia mm	% PASSING		
						DRILLING WATER RETURN	PRESS TESTS	OBSER.'S WATER LEVELS		0		50
ELEV. 254.3 DEPTH 0.0												
245.3 239.4 238.5 238.5 15.8												
WATER GROUND LIMESTONE SLABS SAND AND GRAVEL												LAKE ONTARIO
LIMESTONE FLAT-LYING, FOSSILIF. BANDS TO 1" THICK WITH MANY WAVY, THIN BANDS OF SHALE												DRILLED BY CASING TO 15.8' WEATHERED SURFACE ROCK
12.6' LIMESTONE 2" BEDS WITH THICK BEDDED 16" BLACK SHALE SLABS												GRADATIONAL CONTACT
211.6 22.7' END OF HOLE												GRAVITY GROUTED:- 1 1/2 BAGS CEMENT

GEOTECHNICAL DATA - HOLE NO. **LC-4**

PROJECT LENNOX G.S. SITE COFFERDAM HOLE TYPE ROTARY DIAMOND
 LOCATION 208+99.5 N
133+19.5 E DIP 90° HOLE SIZE BX
 DATUM I.G.L.D. BEARING --- DATE - Start JUNE 11, 70
 Finish JUNE 12, 70

COMPILED By R.M.H.
 CHECKED By E
 APPROVED By [Signature]

PROFILE		SAMPLES			PENETRATION TEST		PERMEABILITY		GRAIN-SIZE DISTRIBUTION			REMARKS
DESCRIPTION	STRATIGRAPHY PLOT	NUMBER	TYPE & DIAM.	NO. OF BLOWS per 6" or as noted	SAMPLER CONE Converted to blows/ft.	COEFFICIENT "K" & FIELD & LABORATORY ft./min.	WATER INFORMATION			D ₁₀ mm	% PASSING 0 50 100	
							DRILLING WATER RETURN	PRESS TESTS	OBSERVED WATER LEVELS			
ELEV. 280.2 DATUM												
DEPTH 0.0												
2.2												NO OVERBURDEN
LIMESTONE THIN, WHITE, GREY BEDS WITH INTERBEDDING THIN SHALY LIMESTONE AND SHALE BEDS EVERY 8"-6". COQUINA - LIKE BEDS FROM 6.0-6.2, 8.7-9.0 AND IN THIN SANDS AT 11.9, 14.0 AND 17.0; FLAT BEDDED												WATER LOSS IN BEDROCK TO 3.2" THROUGH EXPOSED BEDROCK FACE WEATHERED SURFACE ROCK
31.7												
LIMESTONE 1" BEDDED BLACK SHALE SANDS WITH FINE GRAIN TO MEDIUM GRAINED CRYSTALLINE												ADDITIONAL CONTACT
218.2												
31.0 END OF HOLE												GRAVITY GROUTED: 1 BAG CEMENT

GEOTECHNICAL DATA - HOLE NO. **LC-5**

PROJECT LENNOX G.S. SITE HOLE TYPE ROTARY DIAMOND
 LOCATION 208+13.2 N.
131+99.7 E
 DATUM I.G.L.D. DIP 90° HOLE SIZE BX
 BEARING DATE - Start JUNE 12 '70
Finish JUNE 12 '70

COMPILED By P.L. IV
 CHECKED By
 APPROVED By

PROFILE		SAMPLES			PENETRATION TEST		PERMEABILITY COEFFICIENT & FIELD & LABORATORY		GRAIN-SIZE DISTRIBUTION			REMARKS
DESCRIPTION	STRATIGRAPHY PLOT	NUMBER	TYPE & DIAM.	NO. OF BLOWS per ft. or as noted	SAMPLER TYPE & CONE	Converted to blows/ft.	ft./min	Do mm	% PASSING			
									0	50	100	
WATER INFORMATION							DRILLING WATER RETURN	PRESS TESTS	OBSERVED WATER LEVELS			
ELEV. 255.4	DATUM											
DEPTH 0.0'												
245.5	WATER											
245.1	GROUND											
238.8	LIMESTONE SLABS AND GRAVEL											LAKE ONTARIO
13.2	LIMESTONE THIN, FINE GRAINED, GREY, HORIZONTAL, SHALY BANDS EVERY 2"											DRILLED BY CASING TO 13.2'
23.6'	LIMESTONE VERY FINE GRAINED, THICKER BEDDED, SHALE BANDS, THICKER TO 2"											GRADATIONAL CONTACT
214.2	END OF HOLE											GRAVITY GROUTED - 1 1/2 BAGS CEMENT

GEOTECHNICAL DATA - HOLE NO. **LC-6**

PROJECT... **LENNOX G.S.**... SITE... HOLE TYPE... **ROTARY DIAMOND**
 LOCATION... **209+00.2 N**... HOLE SIZE... **BX**
 ...**132+00.3 E**... DIP... **90°**
 DATUM... **I.G.L.D.**... BEARING... **---** DATE - Start... **JUNE 12 '70**
 Finish... **JUNE 15 '70**

COMPILED By... **P.H. 15/70**
 CHECKED By... **P.H.**
 APPROVED By... **P.H.**

PROFILE		SAMPLES		PENETRATION TEST		PERMEABILITY		GRAIN-SIZE DISTRIBUTION		REMARKS
DESCRIPTION	STRATIGRAPHY PLOT	NUMBER	TYPE & DIAM.	NO. OF BLOWS per 6" or as noted	SAMPLER CONE Converted to blows/ft.	COEFFICIENT "k"		0 to mm	% PASSING 0 50 100	
						A FIELD	A LABORATORY			
ELEV. 249.5										NO OVERBURDEN
DEPTH 0.0'										
1.2'										GRADATIONAL CONTACT
LIMESTONE FLAT, THIN, FINE GRAIN, WITH SHALY BANDS EVERY 1/2" OCCASIONAL 1" THICK, MEDIUM GRAIN, LIMESTONE BANDS.										
14.0'										GRAVITY GROUTED - 1 BAG CEMENT
LIMESTONE THIN BEDDED, INCREASING AMOUNT OF SHALY BANDS, BRECCIA BELOW 26.0'										
219.5										
31.0' END OF HOLE										

GEOTECHNICAL DATA - HOLE NO. **LDC-1**

PROJECT LENNOX G.S. SITE HOLE TYPE ROTARY DIAMOND
 LOCATION 210+00.5 N
133+19.9 E DIP 90° HOLE SIZE 3X
 DATUM I.G.L.D. BEARING — DATE - Start JUNE 15 '70
 Finish JUNE 16 '70

COMPILED By RAW. AM
 CHECKED By 7.2
 APPROVED By AM

PROFILE	STRATIGRAPHY	SAMPLES			PENETRATION TEST	PERMEABILITY COEFFICIENT "K" FIELD & LABORATORY ft./min.	GRAIN-SIZE DISTRIBUTION			REMARKS
		NUMBER	TYPE & DIAM.	NO. OF BLOWS per 12" or as noted			D ₁₀ mm	% PASSING		
								0	50	
ELEV. 250.6	DATUM									
DEPTH 0.0	GROUND									
0.5	TOPSOIL	1	A	1						
BROWN TO GREY-BROWN, COMPACT TO DENSE SILTY CLAY		2	A	7						
250.6		3	A	8						
5.6	LIMESTONE									
NAVY, SHALE, LAYERS FLAT LYING, SOME THIN SHALE LAYERS										
17.8										
LIMESTONE										
THICKER (TO 3") LAYERS AND SHALE (TO 1") LAYERS OCCUR AT CLOSE INTERVALS. FINE PARTINGS IN MOST SHALE BANDS. ALL BEDS HORIZONTAL.										
214.3										
214.3	END OF HOLE									

DRILLED BY CASING TO 5.6'
 5.1' WEATHERED SURFACE
 100%

GRADATIONAL CONTACT

2.5" G. PIPE LEFT IN HOLE

LDC-2

HOLE TYPE... ROTARY DIAMOND

HOLE SIZEBX

COMPILED By *P. H. W. H.*

DIP.....90°

DATE - Start JUNE 17, 70

CHECKED By *[Signature]* ZS

BEARING.

Finish JUNE 18 70

APPROVED By 62-3117

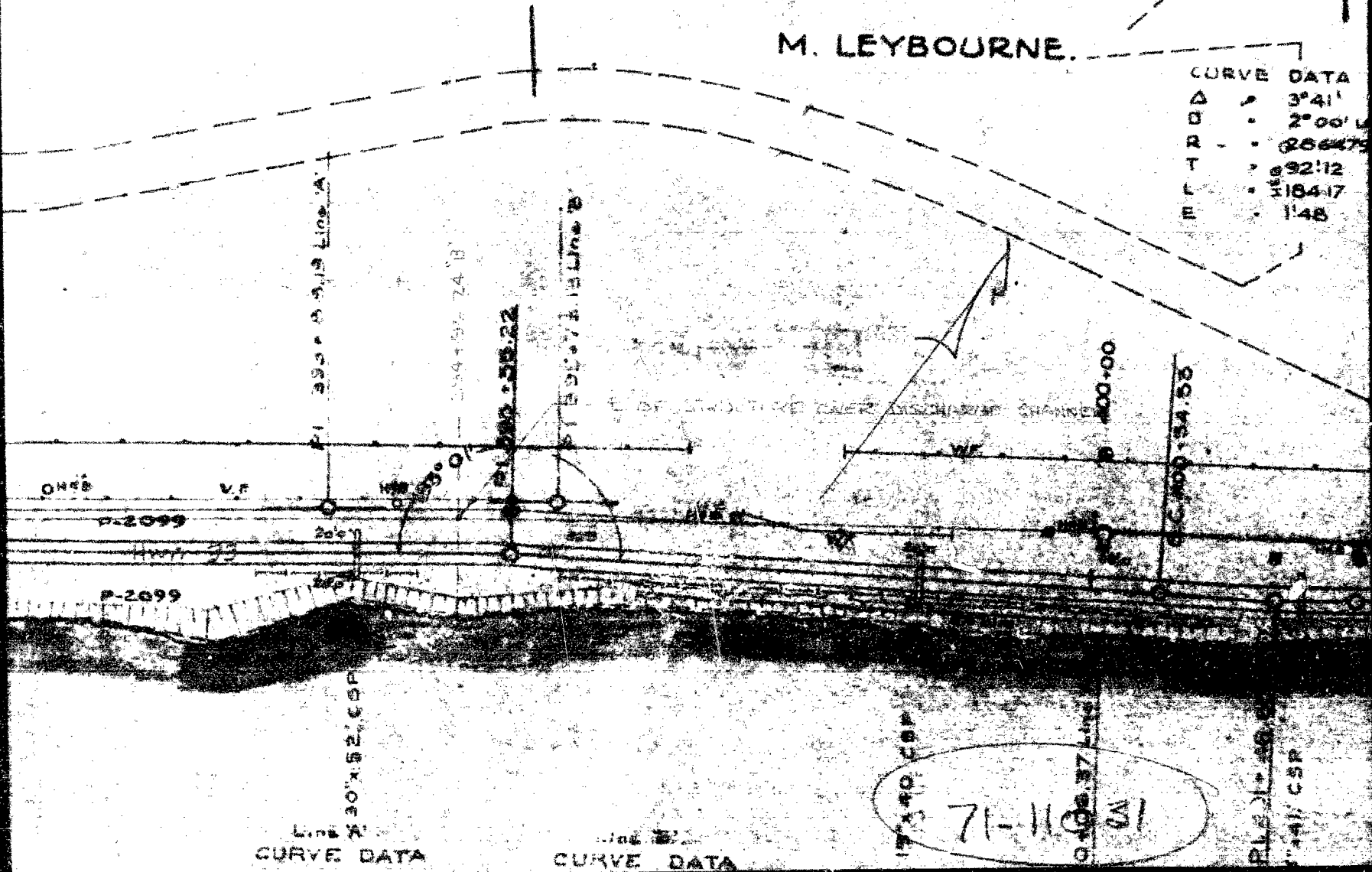
[illegible]

CON. 1
LOT 18

TWP. OF FREDRICKSBURG, S.
 CO. OF LENNOX & ADDINGTON

M. LEYBOURNE.

CURVE DATA	
Δ	3°41'
D	2°00'
R	266475
T	92'12"
L	1184'17"
E	1'48"



Department of Highways Ontario

Copy for the information of
Foundation Office.

Mr. A. Stermac,

~~Principal Foundation Engineer,~~
Room 107, Lab. Bldg.

C. S. Grebski,
Bridge Office.

May 10, 1971.

H.E.P.C. Lennor Generating Station
W.P. #78-70-02 Site No. 17-119
Highway #33, District #8.

71-4-31

Attached herewith we are submitting the final bridge drawings which show the foundation design for this structure.

Kindly give us your comments at your earliest convenience.

C. S. Grebski,
Bridge Design Engineer.

CSG/mh

ENCL*

cc: Foundation Office

MEMORANDUM

71-11031

To: Mr. A.G. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Bldg.

FROM: K.G. Bassi,
Bridge Office

ATTENTION: Mr. M. Devata

DATE: April 15, 1971


OUR FILE REF:

IN REPLY TO:

SUBJECT: H.E.P.C. Lennox Generating Station
Bridge over Discharge Channel & Stop Log Structure
W.P. 78-70-02, Site 17-119
Highway #33, District #8 - Kingston

Referring to your memo of April 8, 1971, and our subsequent telephone conversation this morning, this will confirm that the Bridge Office will require a mylar tracing showing the subsurface conditions at the above-noted location for inclusion in the contract documents.

Attached is a copy of the site key plan for your use.


K.G. Bassi,
Regional Bridge Design Engineer

KGB:rd

Attach:

c.c. T.C. Kingsland

Department of Highways Ontario

Copy for the information of

Mr. A. Sternac

~~Mr. E.C. Kingsland,~~

Reg. Bridge Planning Engineer,
Kingston Regional Office,
Kingston, Ontario

Bridge Office,
Downsview

April 5, 1971

71-11231

H.E.P.C. Lennox Generating Station
Bridge over Discharge Channel
and Stop Log Structure,
W.P. 78-70-02, Site No. 17-119
Highway 33, District No. 8

Attached herewith are prints of the revised Preliminary Plan Drawing D-6936-P2 showing the bridge and the stop log structure at the above-noted location.

The estimated cost of the proposed bridge and the stop log structure is \$75,000, which includes tender, materials, engineering and sundry construction.

Three prints of this plan have been sent directly to Mr. Chong of Ontario Hydro as suggested by you. The Consultant has been instructed to proceed with the preparation of the detail drawings for the bridge but no further work will be done on the stop log structure until you receive Hydro approval of this plan.

The Consultant's completion date for this project is April 15, 1971. We would therefore request that all comments be sent to us as soon as possible.

C.S. Grebski,
Bridge Design Engineer

CSC:rd

Attach.

c.c. B. Davis
A. Sternac (2)
J. Anderson
R. Forrest

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

~~Mr. T.C. Ringland,~~

Eng. Bridge Planning Engineer,
Kingston Regional Office,
Kingston, Ontario

Bridge Office,
Downsview

March 22, 1971

W.E.P.C. Lennox Generating Station
Bridge Over Discharge Channel
W.P. 78-70-02, Site No. 17-119
Highway 33, District No. 8

Attached herewith are prints of the revised Preliminary Bridge Plan Drawing D-6996-P1 for the above-noted structure.

The estimated cost of the proposed structure is \$55,000, which includes tender, materials, engineering and sundry construction.

Three prints of this plan have been sent directly to Mr. Chong of Ontario Hydro as suggested by you. We are not proceeding with any further work on this bridge until you receive Hydro approval of this plan.

The Consultant's completion date for this project is April 15, 1971. We would therefore request that all comments be sent to us as soon as possible.

C.B. Grebski,
Bridge Design Engineer

CSG:rd

Attach.

c.c. B. Davis
A. Stermac (2)
J. Anderson
A. Forrest

71-11031

Department of Highways - Ontario

Copy for the information of

Mr. A. Stermac

Mr. T.C. Kingland.

Reg. Bridge Planning Engineer,
Kingston Regional Office,
Kingston, Ontario

C.S. Grebski,
Bridge Office

March 8, 1971

E.E.P.C. Lennox Generating Station
Discharge Culvert
W.P. 78-70-02, Site No. 17-119
Highway 33, District #9

Attached herewith are prints of the Preliminary Bridge Plan Drawing O-6996-P for the above-noted culvert.

The estimated cost of the proposed culvert is \$92,000, which includes tender, materials, engineering and sundry construction.

Three prints of this plan have been sent directly to Mr. Chong of Ontario Hydro as suggested by you.

The consultant's completion date for this project is March 24, 1971. We would therefore request that all comments be sent to us as soon as possible.

C.S. Grebski,
Bridge Design Engineer

CSC:rd

Attach.

c.c. B. Davis

A. Stermac (2)

J. Anderson

R. Forrest