

62-F-72

W.P. # 591-56

Hwy. # 33

COLLINS BAY

FAILURE AREA

29.

WP 581-110-110

Mr. J. S. Gruspier,
Regional Soils Engineer,
Kingston, Ontario.
Materials & Research Division,
(Foundation Section)

June 19, 1962.

Re: Collins Bay Failure Area,
Hwy. #33, near Kingston,
Cont. 60-129 - Dist. #8.

S.J. 62-F-1

Attached, we are sending you the report dealing with the failure area on Hwy. #33 at Collins Bay, East of Kingston.

We believe that the investigation has provided enough information to enable the explanation of what has actually happened and why it had occurred. Because of the very heterogeneous and irregular stratification and the nature of the predominant subsoil material (muck), any quantitative analysis and prediction of developments is unwarranted and would serve no purpose. It is our opinion that the problem has ceased to be a stability one, and has become a maintenance problem.

Should there be any additional information that you would require, please feel free to contact our office.

AGG/idef
attach.

4.5.62
G. C. Stermac,
PRINCIPAL FOUNDATION ENGINEER

cc: Mr. G. A. Wong
Foundations Office
Gen. Files.

REPORT ON

**COLLINS BAY FAILURE AREA
Hwy. #33, NEAR KIROSTON,
CONT. 60-129, DISTRICT #8.**

After Hwy. #33 was widened and resurfaced, some cracks appeared on the road surface at Collins Bay, approximate Station 98+00 to 100+00. The nature of the cracks indicated that some vertical and lateral movements must have taken place. Although appearance of cracks when road widening and grade adjustment have been completed is very often to be expected because of differential settlements resulting from uneven loading conditions, the cracks at Collins Bay were somewhat large and it was thought reasons for that should be established. Also, it was thought, if the investigation would show that any remedial measures should be required, they should be undertaken as soon as possible.

In order to provide the answer and explanation to the above question, a number of boreholes were put down in the problem area. Nine power auger boreholes and three diamond drill boreholes were completed. Their respective locations are shown on the accompanying drawing. On the same drawing, the subsoil conditions - i.e., the different materials and the stratification as revealed by the borings are also presented.

Cross section A-A shows the rough subsoil stratification parallel to the road centre line. None of these power auger borings has encountered any rock fill, only very soft weak underlain by silty clay, soft in the upper portion and becoming stiffer

with depth. The contact between the muck and the silty clay is very irregular. The borings were carried down to refusal, but the cause of refusal was not established.

Cross section B-B is perpendicular to the road's centre line and encompasses two diamond drill boreholes - No. 3 and 2) and one power auger borehole (No. 6P). There the difference in thickness of rock fill and very soft compressible muck is obvious. A more equalized condition is to be expected under the area of borehole 3 than 2. Apart from that, the very soft muck in the area of borehole 6P provides only little lateral support and therefore, movements in this direction are explainable.

Cross section C-C, being also at right angle to the road's centre line, encompasses one diamond drill borehole - (No. 1) and one power auger hole (No. 3P). No borehole was put down on the north side of the road which is performing satisfactorily. The diamond drill borehole has revealed a very irregular stratification which resulted from only a partial displacement of the soft muck by the rock fill. Here again, due to the presence of trapped muck and small lateral support, the appearance of cracks can be explained.

Because the amount of settlements decreases as time goes on and the shear strength of the subsoil in this particular case increases with time, the conditions are improving and barring any unusual or unpredictable development, equilibrium will be reached. It is practically impossible on the basis of

available data and information, to make any predictions as to when stabilization will be reached - i.e., when the movements will cease. It is our opinion that the problem has now become one of maintenance.

The field work was carried out by the Kingston Regional Soils personnel while the preparation of the drawing and the report was the responsibility of the Foundation Section.

June 1962.

MEMORANDUM

22-70-174
RE: TREATMENT
PROPOSED BY HIGH 33
EXAMINED BY
6.1.1.1.1.1.1
file ACS
with report

TO: Mr. W. Neillipovitz,
Staff Engineer of the
Executive Section,
Administration Building.

FROM: Soils Section,
Materials and Testing Office.

ATTENTION:

DATE: October 19, 1970.

OUR FILE REF.

IN REPLY TO

SUBJECT:

Highway #33, Contract 70-174
Collins Bay East Limits Easterly, 0.2 Miles
District 8, Kingston. (W.J. 62-F-72) (Cont: 60-129)

You requested that we review the treatment proposed on the above mentioned contract which has now been cancelled. It is suggested that this work be included with the follow-up grading, drainage, Granular base and paving job, W.P. 25-67 Kingston west limits westerly to Collins Bay.

It was intended under this contract to excavate and pre-load the swamp area on the proposed widening between Stations 96+00 and 115+00 in the Township of Kingston. By this pre-loading it was hoped that major settlements in the embankment widening through the swamp area could be overcome.

Mr. Rutka, Mr. Stermac and I have reviewed the treatment proposed and it appears that there are two reasonable alternatives:

- 1) to call this small contract again in early spring of 1971, or
- 2) to include this work with the remainder of the construction proposed between Kingston and Collins Bay.

If this latter alternative was selected, it would be desirable to specify by Special Provision that the pre-loading through the swamp area be carried out as one of the first operations of the contract.

Since high bid prices might again occur if this small contract is called, we would recommend that the second alternative be selected.

Cont'd.../2

October 19, 1970

Highway #33, Contract 70-174
Collins Bay East Limits Easterly, 0.2 Miles
District 8, Kingston

Without early preloading settlements can be expected through this swamp. Therefore, we would recommend that only binder course paving be required over the widening through this swamp area. The asphalt surface course and curb and gutter should be placed at a later date after the settlements have occurred.



G. A. Wrong,
Principal Soils Engineer.

GAW/sd

cc:- J. Walters
H. Tregaskès
V. Snell
J. Gruspier
S. Markiewicz
A. Sternac ✓
File

MEMORANDUM

TO: Mr. V. A. Snell
District Engineer
District 8, Kingston

FROM: Materials and Testing Office
Kingston

ATTENTION:

DATE: May 10th, 1971

OUR FILE REF.

IN REPLY TO

SUBJECT:

Contract IB 32-70, Highway 33,
Fill Widening at Collins Bay (W.P. 25-67)

DIST. 8

62-F-72

or 62-F-104

Considerable settlement has occurred on a section of the rock fill widening at Collins Bay. From Station 97+25 to Station 98+ distortions on the gravel surface south of the existing asphalt pavement are approximately 12" to 18" in depth owing to settlement of the rock fill that was placed during the winter months. From Station 98+60 to Station 99+35 there is an approximate 2" pavement elevation differential on either side of a wide meandering longitudinal crack on the north side of centreline.

It is anticipated that the settlement is due to thawing of the ice beside the fill which provided some lateral confinement immediately after construction, thawing of ice and snow within the rock fill such that rearrangement and consolidation of rock fill fragments has occurred, and to consolidation of the underlying soft clay foundation material. It is difficult to ascertain the amount each of these factors has contributed. Considerable movement was noted as the ice in the bay thawed.

In order to establish settlement rates, plates were placed on the fill widening and stubby nail control points were established on the existing pavement soon after construction was completed. However, owing to the amount of settlement and use of the fill widening grade as a car park most of these control points have been lost or destroyed. In conjunction with the construction staff, we will establish a new set of control points (with protection) such that the settlement rate associated with consolidation of the foundation material can be ascertained and taken into account when the remainder of the construction is completed this year. Pending these measurements, it may be advisable to leave the surface course pavement off this section for a certain period of time after the main construction is carried out.

Owing to the present condition of the fill widening grade, it is recommended that restoration be effected by adding required Granular 'A' from Station 97+25 to Station 98+ and by regrading

the entire gravel grade. An old guide post, showing in the vicinity of Station 97+30, should be removed in conjunction with this repair. In addition, the fore mentioned elevation differential and wide longitudinal crack on the existing pavement should be repaired with the bituminous cold mix sufficient to eliminate any traffic hazard.

A. M. Batten
A. M. Batten

A. M. Batten
Senior Soils Supervisor

AMB : m g m

for: J. E. Gruspier
Regional Materials Engineer

cc: A. G. Stermac
G. A. Wrong
H. B. McKay

CONTRACT NO 70-174

OCT 2, 1970

NOTE :

J. WALTER ADVISED THAT THE SUCCESSFUL CONTRACTOR WAS WAY ABOVE OUR ESTIMATE. COULD THIS CONTRACT BE CANCELLED AND THE WORK DONE NEXT YEAR BY THE OVERALL CONTRACT? HOW MUCH IS GAINED BY STAGING I.E. FILL BUILDING IN 1970, PAVING IN 1971?

THE AREA WAS A MAINTENANCE PROBLEM UNTIL THIS YEAR. FOR THE ORIGINAL CONSTRUCTION NO SUBSOIL INVESTIGATION WAS CARRIED OUT AND MUCK WAS PARTIALLY DISPLACED AND PARTIALLY TRAPPED. THIS CREATED SETTLEMENTS REQUIRING MAINTENANCE. (SEE REPORT 1962)

IT CAN NOT BE EXPECTED THAT THE UNDERLYING LOAM NOT SETTLE EVEN IF ALL MUCK IS EXCAVATED AND DISPLACED. MAINTENANCE WILL BE NECESSARY BECAUSE:

- (1) THE TRAPPED MUCK UNDER THE PRESENT EMBANKMENT SLOPE WILL FURTHER COMPRESS UNDER THE NEW FILL, AND
- (2) THE UNDERLYING CLAY BELOW THE NEW FILL WILL ALSO COMPRESS.

CONSEQUENTLY, NO MATTER WHEN THE EMBANKMENT IS CONSTRUCTED A FEW YEARS OF MAINTENANCE HAVE TO BE RECKONED WITH.

KES.

PROVINCE OF ONTARIO



DEPARTMENT OF HIGHWAYS

HON. GEORGE E. GOMME
MINISTER

A.T.C. McNAB
DEPUTY MINISTER

H.W. ADCOCK
ASST. DEPUTY MINISTER
(Engineering)

J. WALTER
DIRECTOR OF DESIGN



PROVINCE OF ONTARIO
DEPARTMENT OF HIGHWAYS
DESIGN BRANCH

Station 95+90 to Station 104+50

Length (miles) 0.16

Survey Plan Nos. B-19-11

Survey Profile Nos. C-19-38

Soil Profile Nos. 33K8-5

Bridge Drawings Nos. _____

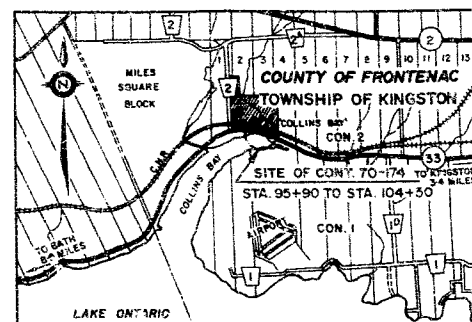
W. P. No. 35-70-01 Contract No. 70-174

Work of GRADING AND DRAINAGE

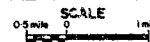
Hwy. No. 33 District No. 8 - KINGSTON

Location COLLINS BAY EAST LIMITS EASTERLY 0.2 MILES

Township of KINGSTON County of FRONTENAC



KEY PLAN



TOTTEN, SIMS, HUBICKI ASSOCIATES LIMITED
CONSULTING ENGINEERS
TORONTO WHITBY COBOURG KINGSTON

Date _____ Senior Project Design Engineer (Roads)

Date _____ Senior Project Design Engineer (Bridges)

Date _____ Regional Road Design Engineer

Date _____ Bridge Engineer

Date _____ *[Signature]* Road Design Engineer

LEGEND

REFERENCE POINTS

□ DHM	Old style Dept. of Highways conc. mon.
□ CM	Other survey conc. monument markers
□ SIBM	1" Square iron bar with a cap
○ DHRPM	Department of Highways rock post
● 1/2" ∅ IB	Odd size iron bars or pipe
● 1/2" ∅ IP	or iron tube
■ 1/2" SIB	Odd size square iron bar
□ WS	Wood stake
△	Co-ordinated monument
✚	Cut cross
∨	Cut vee
● RIS	1" or 3/4" ∅ round iron bars as planted by Engineering Surveys
■ SIB	1" square iron bars as planted by Land Surveys

RIGHT OF WAY, FENCES, ETC.

— — — — —	Right of Way or D.H.O. property limit (no fence)
— — — — —	Right of Way or D.H.O. property limit including fence, 1 foot inside R/W
— — — — —	Permanent easement
— — — — —	Temporary easement
— WF or CLF	Existing fence
— WF or CLF	Fence to be removed
— WF DD or CLF DD	Fence to be erected
— — — — —	Guide Rail existing
— — — — —	Guide Rail to be removed
— — — — —	Guide Rail to be erected

RAILWAYS

— — — — —	400' or 200' Scale, single track
— — — — —	400' or 200' Scale, double track (or more)
— — — — —	100', 50', 40' Scale, single track. Gauge to scale (4-71')
— — — — —	100', 50', 40' Scale, double track (or more) Gauge to scale (4-71')
—○— GFL	Gate and flashing light
—○— GFL-B	Gate flashing light and bell
— T — FL	Flashing light
— T — FL-B	Flashing light and bell
— T — WW	WIG-WAG
— T — WW-B	WIG-WAG and bell
— T — RCS	Railway crossing sign

UTILITIES

— SA — SA — 12"	Sanitary sewer
— G — G — 3"	Gas main
— W — W — 8"	Water main
— B — B —	Underground Bell cable
— L — L —	Underground lighting cable
— H — H —	Underground hydro cable
— OIL — OIL — 12"	Oil pipe line
— ST — ST — 18"	Storm sewer, existing
— W — W — 8"	Utility to be removed
— W — FH — W —	Fire hydrant
○ H or B or T	Hydro, Bell or Telegraph poles
—○— WV or GV	Water valve or Gas valve
—○— GM	Gas meter
⊗	Steel hydro tower

DRAINAGE

— — — — —	Manhole, Catch Basin or Ditch Inlet
— — — — —	Double Manhole, Catch Basin or Ditch Inlet
— — — — —	Manhole solid cover
— X — X —	Catch Basin or Manhole to be removed
— C & G 'A' —	Curb and Gutter type (1" = 100')
— C & G 'A' —	Curb and Gutter type (1" = 50' and larger scales)
— DD... — DD... —	Curb and Gutter transition
— — — — —	Dropped Curb
— — — — —	Gutter outlet 90°
— — — — —	Gutter outlet 45°
— — — — —	Existing ditches, watercourses, creeks etc. Width 5' or less
— — — — —	Existing ditches, watercourses, creeks etc. Width over 5'
→	Flow arrow
— DD... or Spec. Design —	Culvert to be constructed
— — — — —	Culvert with headwall to be constructed
— — — — —	Culvert existing
— — — — —	Culvert existing with headwalls
— Z ₁ —	Storm sewer to be constructed

MISCELLANEOUS

— 4' Ret. W. —	Existing retaining wall with height
— Ref. W. No. —	Retaining wall to be constructed, with reference number
— 5' — 3' —	Sidewalks with widths
— — — — —	Area to be cleared
— — — — —	Area to be grubbed
— — — — —	Area to be cleared and grubbed
— — — — —	Edge of Lake or River
— — — — —	Swamp and edge of swamp

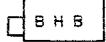
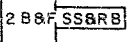

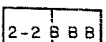
MISCELLANEOUS (CONTINUED)

— — — — —	Sodding
— — — — —	Hedge
— — — — —	Trees or fruit trees
— — — — —	Rack section in profile
— — — — —	Pavement to be removed
— — — — —	Paved shoulder
— — — — —	Granular subbase section
— — — — —	Granular 'A' section
— — — — —	Concrete section
— — — — —	Highway centre line with or without centre line symbol
— 550 —	Contour lines. Elevation on high side of line
— 552 —	Intervals —
— 554 —	1" = 20' } 2 Feet
— 554 —	1" = 40' }
— 552 —	1" = 50' }
— 550 —	1" = 100' 2 Feet or 5 Feet
— 550 —	1" = 200' 5 Feet
— 508.3 —	Every fifth contour is a thick line
→	Use decimal point of written elevation to indicate point of spot elevation
→	Traffic direction arrow
●	Well
— T —	Mail box
○ LS	Light standard
○ LSS	Light standard with sign
● TS	Traffic signal
—	Highway sign
— OSF —	Overhead sign footing
— OS —	Overhead signs

ABBREVIATIONS

Abut	Abutment	E	East	L	Length	P	Pipe	S	South	T	Telegraph Pole
ACAAP	Asphalt coated, Asbestos Anchored, Paved Invert	E	External (curve data)	L _c	Length of Curve	PA	Pipe Arch	S	Rate of Superelevation	T or Tan	Tangent Length (curve)
ACAPPI	Asphalt coated, Asbestos Protected, Paved Invert	Ea	Each	LF	Linear feet	PAS	Pipe Arch Structural Plate Bolted	Sa	Sand	TCH	Trans Canada Highway
AC	Asphalt coated	EB	East Bound	Lo	Loam	Pav	Pavement	SAB	Sand Asphalt Binder Course	Temp Conn	Temporary Connection
AC & AP	Asphalt coated and Asbestos Protected	EBL	East Bound Lane	LS	Light Standard	PCC	Point of Compound Curve	SAL	Sand Asphalt Levelling Course	T/G	Top of Gate
AC & PI	Asphalt coated and Paved Invert	EC	End of Curve	Ls	Length of Spiral Curve	PG	Plain Galvanized	SAS	Sand Asphalt Surface Course	TL	Transfer Lanes
All'ce	Allowance	EC	Earth Cut	LT	Long Tangent (Length of Tangent)	PI	Point of Intersection	SB	South Bound	TL	Traffic Light
AS	Arch Structural Plate Bolted	EF	Earth Fill	Lt	Left	POC	Point on Curve	SBL	South Bound Lane	T/O	Top of Opening
Asph	Asphalt	EFS	End of Full Superelevation	LVC	Length of Vertical Curve	PR	Property Request	SC	Spiral to Circular Curve	TP	Turning Point
ASTM	American Society for Testing and Materials	EI	Elevation	LWL	Low Water Level	PRC	Point of Reverse Curve	SCM	Standard Concrete Monument	T/P	Top of Pavement
Av	Average	Ent	Entrance	Max	Maximum	Prop	Proposed	SCS	Spiral Curve Spiral	T/R	Top of Rail
AW	Asphalt Sidewalk	EP	Edge of Pavement	MB	Mail Box	PS	Pipe Round Structural Plate Bolted	SD	Special Road Design Standard	Trans	Transformer
Az	Azimuth	Eqn	Equation	Med	Median		or Property Sale	Serv Hwy	Secondary Highway	Tr Sec	Transition Section
		ES	End of Superelevation	MH	Manhole			Serv Rd	Service Road	TS	Tangent to Spiral
B	Bell Telephone Pole	Es	External Spiral	Min	Minor			SF	Stone Fence	Twp	Township
BC	Beginning of Curve	E Sh	Edge of Shoulder	MPH	Miles per hour			Sh	Shoulder	V	Design Speed mph
Be'th	Between	EVC	End of Vertical Curve	Musk	Muskeg			Si	Silt	VC	Vertical Curve
BF	Board Fence	Exc	Excavation			R	Radius	SIB	Square Iron Bar	Vert	Vertical
BFS	Beginning of Full Superelevation	Expy	Expressway			RC	Rock Cut or Remove Adverse Crown	Sp	Spiral	VP	Vitrified Pipe
B'Fill	Backfill			N	North	Rd	Road	SR	Side Road	W	West or Well
Bld	Boulevard			NB	North Bound	Reinf	Reinforced	SRF	Snake Rail Fence	WB	West Bound
BM	Bench Mark			NBL	North Bound Lane	Ret W	Retaining Wall	ST	Spiral to Tangent or Short Tangent	WBL	West Bound Lane
B/R	Base of Rail	Fdn	Foundation	NC	Normal Crown	Rev	Revision	Sta	Station	WF	Wire Fence
BS	Back Sight	FH	Fire Hydrant	No or #	Number	RF	Rail Fence or Rock Fill	Std	Standard	WIF	Wrought Iron Fence
BS	Beginning of Superelevation	FS	Foresight	N&W	Nail & Washer	ROW	Right of Way	Str	Structure	WL	Water Level
BUCM	Bell Underground Cable Marker	Ft	Foot	OD	Outside Diameter	RP	Registered Plan			WM	Water Meter
BVC	Beginning of Vertical Curve			OG	Original Ground	Rt	Right			WP	Work Project
				ONR	Ontario Northland Railway	Rwy	Railway			WV	Water Valve
				Org	Organic Matter					WW	Wing Wall
				OS	Overhead Sign						
				OSF	Overhead Sign Footing						
CAH	Controlled Access Highway	G	Grading								
CB	Catch Basin	Ga	Gauge								
C&G	Curb and Gutter	Gal	Gallon (Imperial)								
CGUPM	Consumers Gas Underground Pipe Marker	GB	Granular Base								
Chkd	Checked	GBM	Geodetic Bench Mark								
CI	Clay	GC	Grading and Culverts								
CIP	Clay Pipe	GD	Grading and Drainage								
CL	Centre Line	GL	Ground Line or Ground Level								
CLF	Chain Link Fence	GM	Gas Meter								
CNR	Canadian National Railway	GR	Guide Rail								
Co	County	Gr	Gravel								
Coll Blvd	Collector Boulevard	Gran	Granular								
Coll L	Collector Lane	GV	Gas Valve								
Con	Concession										
Conc	Concrete	H	Hydro Pole								
Conn	Connection	H&B	Hydro and Bell Pole								
Const	Construction	HEPC	Hydro Electric Power Commission								
Cont	Contract	HG	Hydro Guy Pole								
Coo	Coordinate	HM	Hot Mix								
CP	Concrete Pipe	HOC	Hub on Curve								
CPR	Canadian Pacific Railway	Hor	Horizontal								
Cr	Creek	HOT	Hub on Tangent								
CS	Circular Curve to Spiral	HP	Horse Power								
CSA	Canadian Standards Association	HS	Highway Sign								
CSP	Corrugated Steel Pipe	HWL	High Water Level								
CSPA	Corrugated Steel Pipe Arch	Hwy	Highway								
Culv	Culvert										
CW	Concrete Sidewalk										
D	Degree of Curve										
Δ	Delta										
Δ _c	Delta Circular Curve										
Δ _s	Delta Spiral										
D ₃	Detour Number three	IB	Iron Bar								
DD	Road Design Standard	ID	Inside Diameter								
Dev Rd	Development Road	IF	Iron Fence								
DHM	Department of Highways Monument	In	Inch								
DHO	Department of Highways of Ontario	Inv El	Invert Elevation								
DI	Ditch Inlet	IP	Iron Pipe								
Diam. or Ø	Diameter	IS	Intermediate Sight								
Dist	District										
Div	Division										
Drwg	Drawing										

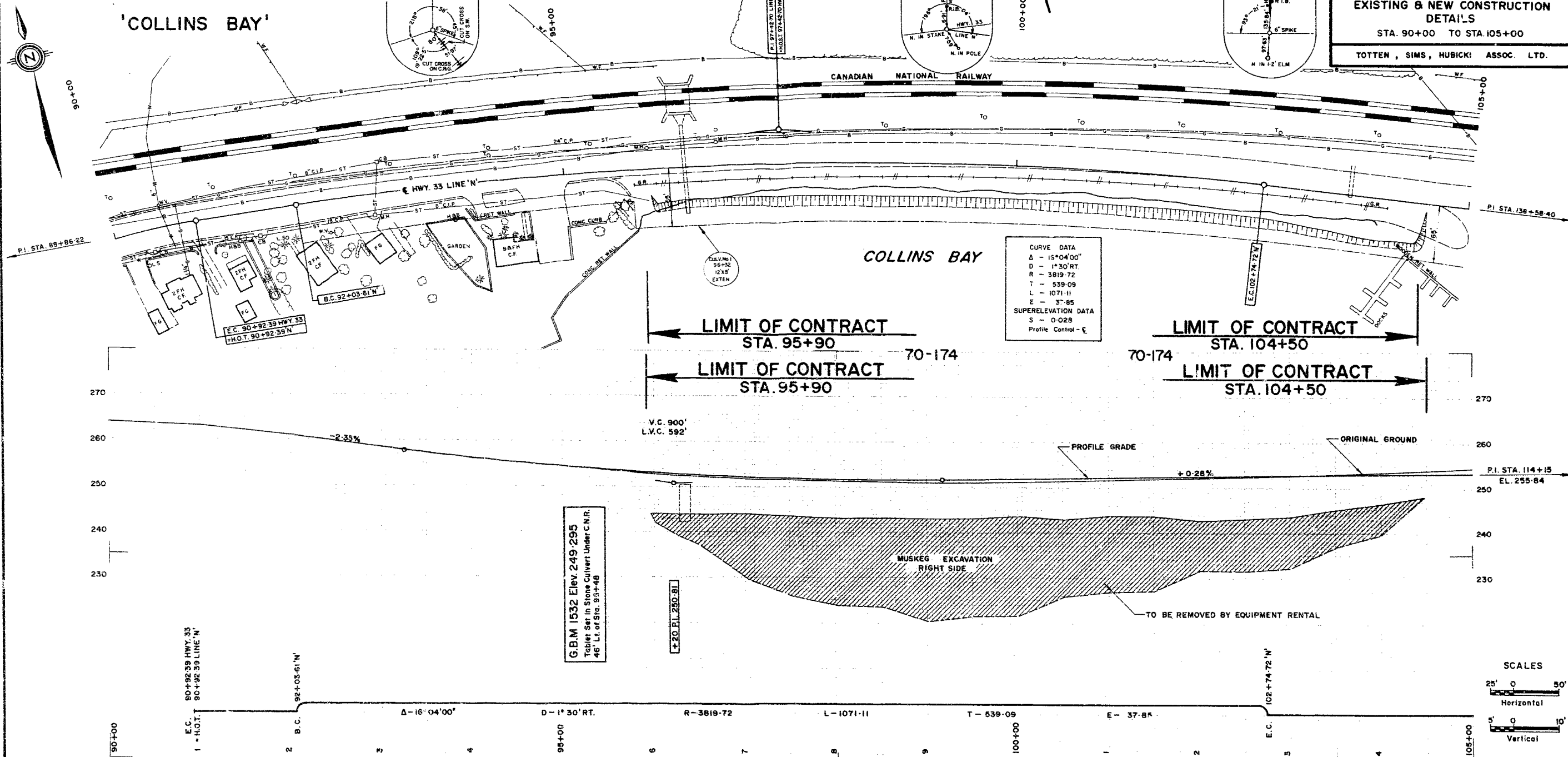
BUILDING DESCRIPTIONS

Number of Units	Number of Storeys of the building	Material used in super-structure of building	Name of Building	Basement	Remarks
A number followed by a hyphen for the number of units	A number designating the number of storeys of the building	Letter(s) preceding the name-of-building group	Letter(s) which designate the names of the building	A letter "B" after name-of-building group denotes basement.	As a general rule, if there is ambiguity in the description, then the full abbreviated or long form description must be written out as in the normal fashion.
2-	1 1/2	B (Brick) St (Stucco) S (Stone) F (Frame) C (Concrete) CB (Concrete block) M (Metal)	H (House) A (Apartment) G (Garage) F (Factory) ST (Store) O (Office) SS (Service Station) S (Shed) Gr (Greenhouse) W (Warehouse) R (Restaurant) B (Barn) C (Cabin) Or combinations of these i.e. O & F (Office and Factory) All descriptions must contain this group	B (Basement) If no letter appears after the name - the building has no basement.	Examples: School Hotel Motel Church Rec. Hall Fire Hall Library Arena Bldg. Etc.
10-	10	Or combinations of letters as a group			
If description in valves only one building this group is omitted	If description of building involves only one storey - this group is omitted	B & St (Brick & Stucco) B & S (Brick & Stone) All descriptions will contain this group			
					
one storey brick house with basement	one 2 storey brick and frame, service station and restaurant with basement	2 storey concrete block apartment with basement	two - 2 storey brick barns with basements		
EXAMPLE No 1	EXAMPLE No 2	EXAMPLE No 3	EXAMPLE No 4		

CON. 2
LOT 2COUNTY OF FRONTENAC
TOWNSHIP OF KINGSTONCON. 2
LOT 3CONTRACT No. 70-174
W.P. No. 35-70-01 ④EXISTING & NEW CONSTRUCTION
DETAILS

STA. 90+00 TO STA. 105+00

TOTTEN, SIMS, HUBICKI ASSOC. LTD.

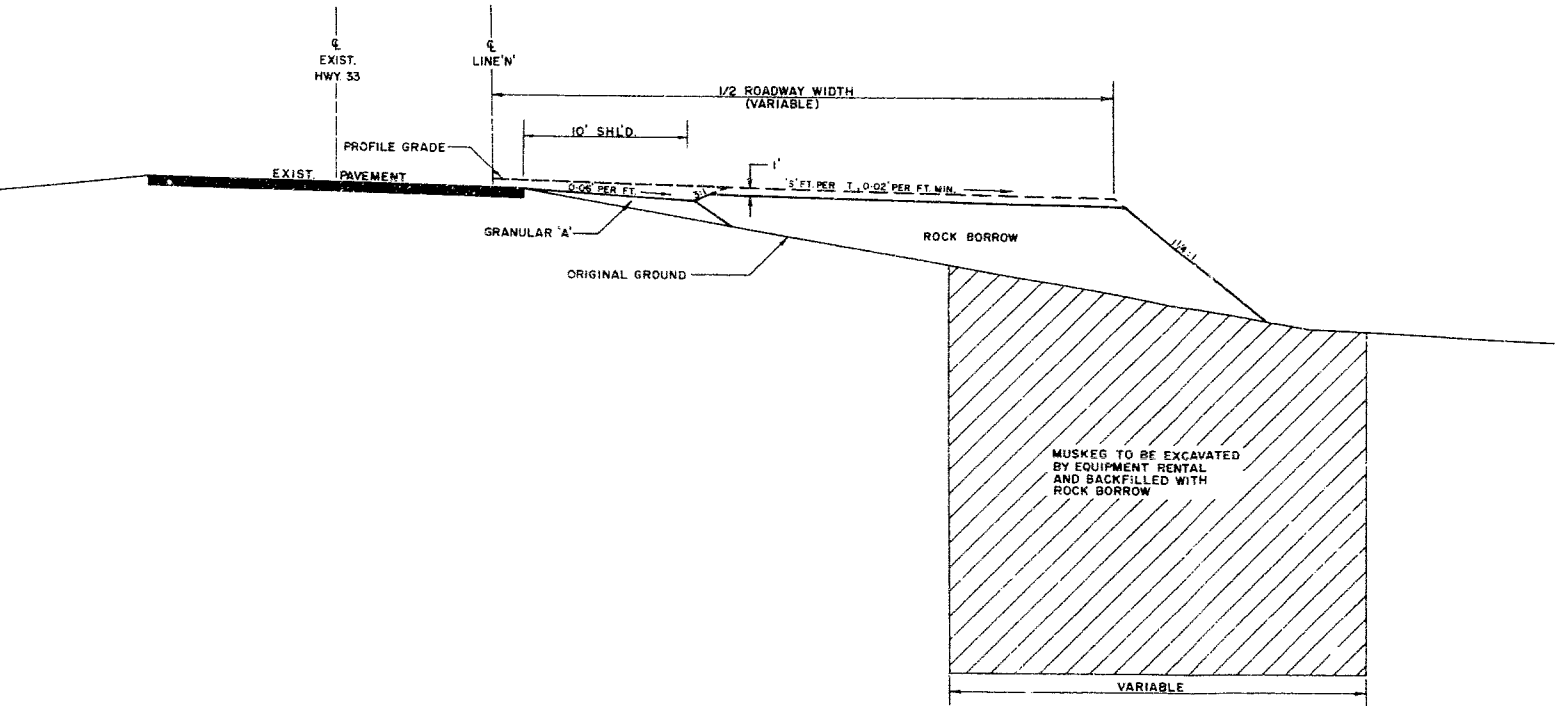


				Totals	
Earth Cut				50 CU. YD.	Earth Cut
Stripping				80 CU. YD.	Stripping
Ditching					Ditching
Muskeg Excavation					Muskeg Excav.
Earth Fill					Earth Fill
Rock Cut					Rock Cut
Shatter					Shatter
Rock Fill					Rock Fill
Muskeg Backfill					Muskeg Backfill
				4200 TONS	
				ROCK 13200 TONS	
				GRANULAR 'A'	

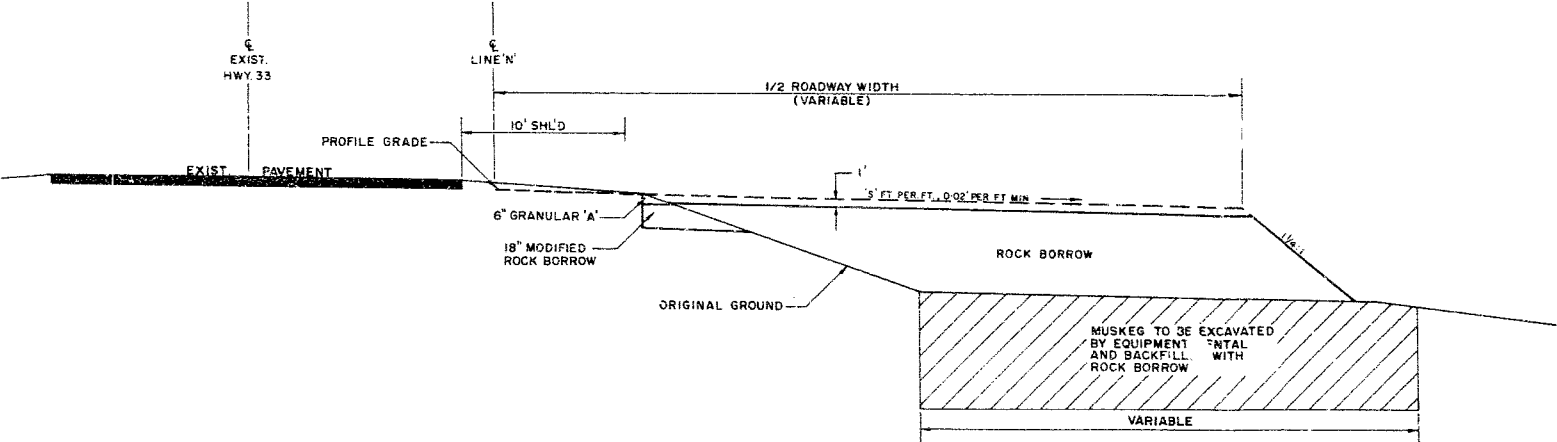
GRADING SECTIONS

STA. 95+95 TO STA. 104+45

TOTTEN , SIMS , HUBICKI ASSOC. LTD.



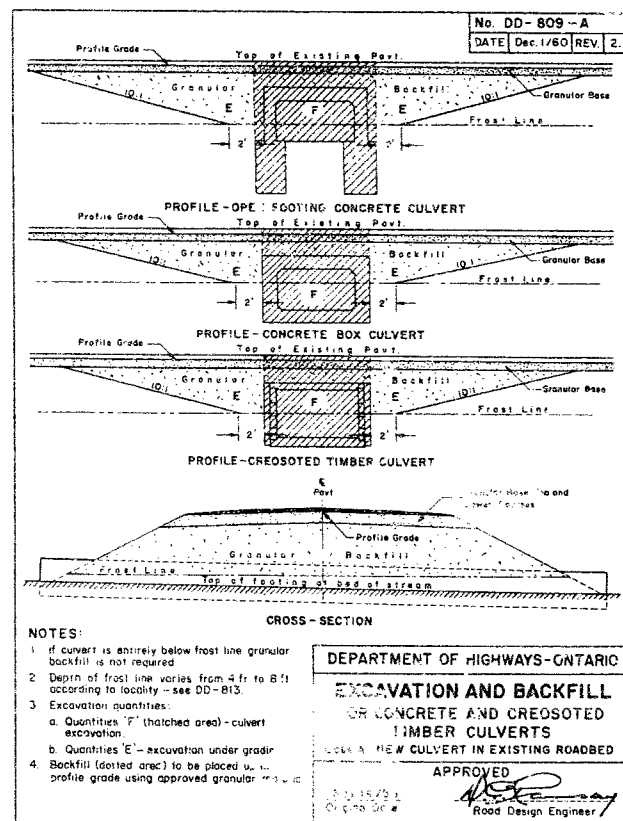
STA. 100+00



STA. 104+00

OFFSETS FROM LINE 'N' TO EDGE OF ROADWAY	
STA.	OFFSET
96+00	39.0
+25	36.2
+50	36.5
+75	36.7
97+00	37.0
+25	37.2
+50	37.5
+75	37.7
98+00	38.0
+25	38.0
+50	38.0
+75	38.0
99+00	38.0
+25	38.0
+50	38.0
+75	38.0
100+00	38.0
+25	38.0
+50	38.0
+75	38.0
101+00	38.0
+25	38.0
+50	38.0
+75	38.0
102+00	38.0
+25	38.0
+50	38.0
+75	38.0
103+00	38.3
+25	40.1
+50	42.0
+75	43.8
104+00	45.7
+25	47.5

NOTE:
THESE SECTIONS TO BE USED
IN CONJUNCTION WITH STANDARDS
DD-203 AND SD-4-37



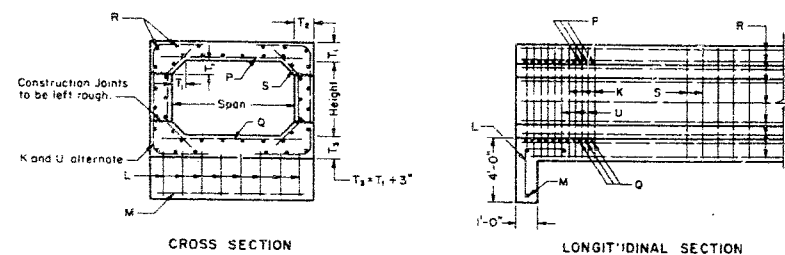


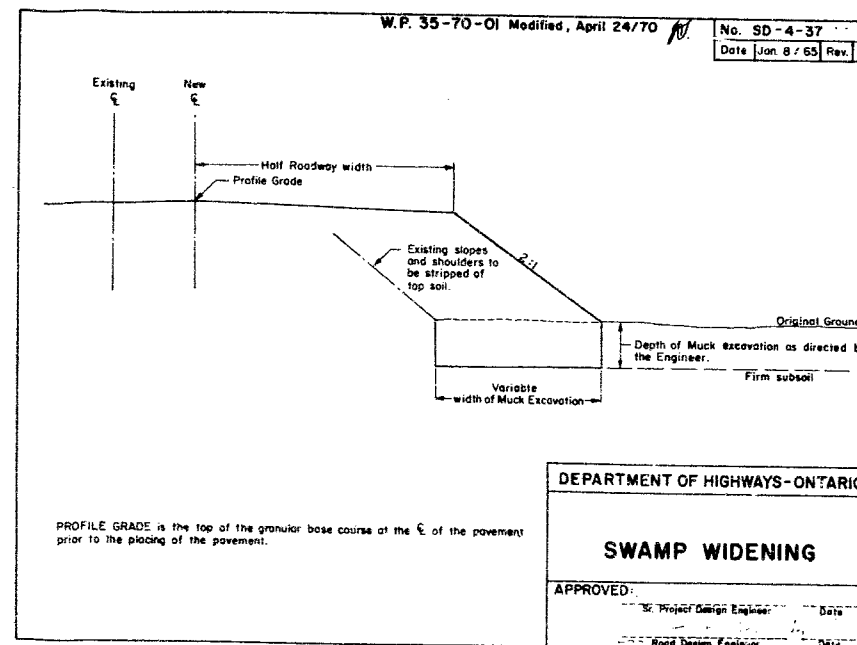
TABLE OF DIMENSIONS AND QUANTITIES

Size of Culvert		Item	Fill on Deck in feet											Approx. Steel per cu. yd. of Conc.	
			0	2	4	6	8	10	12	14	16	18	20		
1n	6 x 3	T ₁	8 1/2"						Unlimited Fill						120 lbs.
	6 x 6	T ₂	10"												
	6 x 3	Conc. cu. yd. per lin. ft.	.70												
	6 x 4		.76												
	6 x 5		.82												
1o	8 x 6	T ₁	8 1/2"											130 lbs.	
	8 x 6	T ₂	10"												
	8 x 4	Conc. cu. yd. per lin. ft.	.88												
	8 x 5		.94												
	8 x 6		1.00												
1o	10 x 4	T ₁	8 1/2"	8 1/2"	9"	9"	9 1/2"	10"	10 1/2"	10 1/2"	Unlimited Fill			140 lbs.	
	10 x 6	T ₂	10"	10"	10 1/2"	11"	11 1/2"	12 1/2"	13"	13"					
	10 x 4	Conc. cu. yd. per lin. ft.	1.00	1.00	1.06	1.08	1.14	1.22	1.26	1.26					
	10 x 5		1.07	1.07	1.13	1.15	1.21	1.30	1.36	1.36					
	10 x 6		1.13	1.13	1.19	1.22	1.28	1.37	1.43	1.43					
	10 x 7		1.19	1.19	1.26	1.28	1.35	1.43	1.52	1.52					
	10 x 8		1.25	1.25	1.32	1.35	1.42	1.53	1.60	1.60					
	12 x 5	T ₁	9 1/2"	9 1/2"	9 1/2"	10"	11"	11 1/2"	12"	12 1/2"	13"	13"			
	12 x 10	T ₂	12"	12"	12"	13"	14"	15"	15"	16 1/2"	17"	17"			
	1o	12 x 5	Conc. cu. yd. per lin. ft.	1.37	1.37	1.37	1.46	1.60	1.69	1.79	1.86	1.94	1.94		130 lbs.
12 x 6			1.44	1.44	1.44	1.54	1.69	1.79	1.89	1.97	2.04	2.04			
12 x 7			1.52	1.52	1.52	1.62	1.77	1.88	1.99	2.07	2.15	2.15			
12 x 8			1.59	1.59	1.59	1.70	1.86	1.97	2.09	2.17	2.25	2.25			
12 x 9			1.66	1.66	1.66	1.78	1.95	2.07	2.19	2.27	2.36	2.36			
12 x 10			1.74	1.74	1.74	1.86	2.03	2.16	2.26	2.37	2.46	2.46			
14 x 5		T ₁	10 1/2"	11"	11 1/2"	12"	12 1/2"	13"	14"	14 1/2"	15"	15 1/2"	125 lbs.		
14 x 10		T ₂	13"	13 1/2"	14"	14 1/2"	15 1/2"	16 1/2"	18"	19"	19 1/2"	20 1/2"			
14 x 5		Conc. cu. yd. per lin. ft.	1.65	1.73	1.81	1.89	1.99	2.10	2.28	2.39	2.47	2.58			
14 x 6			1.74	1.82	1.90	1.98	2.09	2.20	2.39	2.51	2.60	2.71			
14 x 7		1.82	1.90	1.98	2.07	2.18	2.30	2.51	2.62	2.72	2.84				
14 x 8		1.90	1.98	2.07	2.16	2.28	2.40	2.62	2.74	2.84	2.96				
1o	14 x 9		1.98	2.07	2.16	2.25	2.37	2.50	2.73	2.86	2.96	3.09			
	14 x 10		2.06	2.15	2.24	2.34	2.47	2.61	2.84	2.98	3.08	3.22			

Refer also to Standard DD-802

NOTES:

- Structure to be built in accordance with D.H.O. Specifications Form 9 and the Special Provisions as outlined in the Tender Form.
- All concrete work to conform to Section 9-04 of D.H.O. Form 9. Class of concrete: 3000 p.s.i.
- Depending on size of culvert and height of fill the size of bars P, K and U varies from No. 4 to No. 11 and the spacing varies approximately from 6" to 10".
S bars - No. 5, spacing usually double that of P
R bars - No. 5, spacing 1'-0" oc in floor and 2'-0" oc in deck and sides.
L bars - No. 5, spacing 1'-0" oc.
M bars - No. 4, ties.
- No concrete may be placed in any footing until depth of excavation and character of the foundation have been approved by the Engineer.
- All exposed corners to have one inch chamfer.
- Fill must be placed against both sides of the culvert simultaneously and evenly, as directed by the Engineer.
- Tabular concrete quantities are accurate. Tabular steel quantities are average values accurate within 2-10%.



DEPARTMENT OF HIGHWAYS-ONTARIO

STANDARD CONCRETE CULVERTS

RIGID FRAME BOX TYPE

FOR ESTIMATING PURPOSES ONLY

Drawn by: J.A.K.

Checked by: J.A.K.

Approved by: J.A.K.

Original Date: 7/7/57

Revised by: J.A.K.

Revised Date: 1/1/65

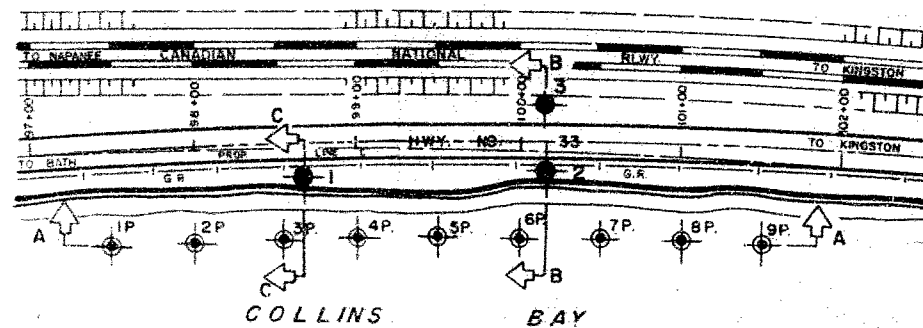
No. DD-1215-A

Date June 1/65 Rev. 2

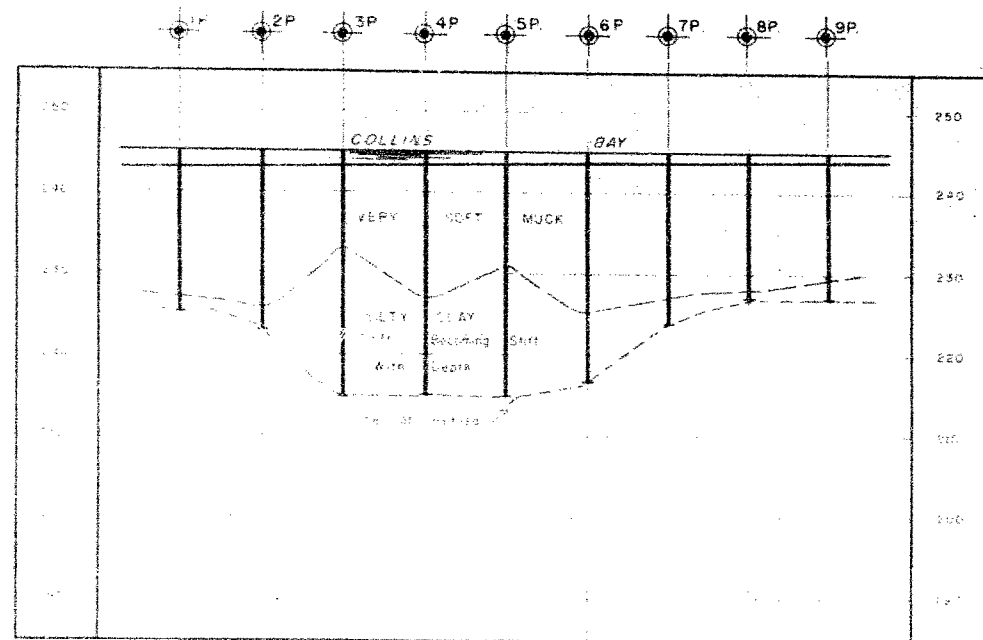
Remarks:

* Insert Totals of "Excavation for Culverts", "Granular Backfill to Culverts" and "Removal of Culverts" from the sheet "Corrugated Steel Pipe Culverts" in these spaces.

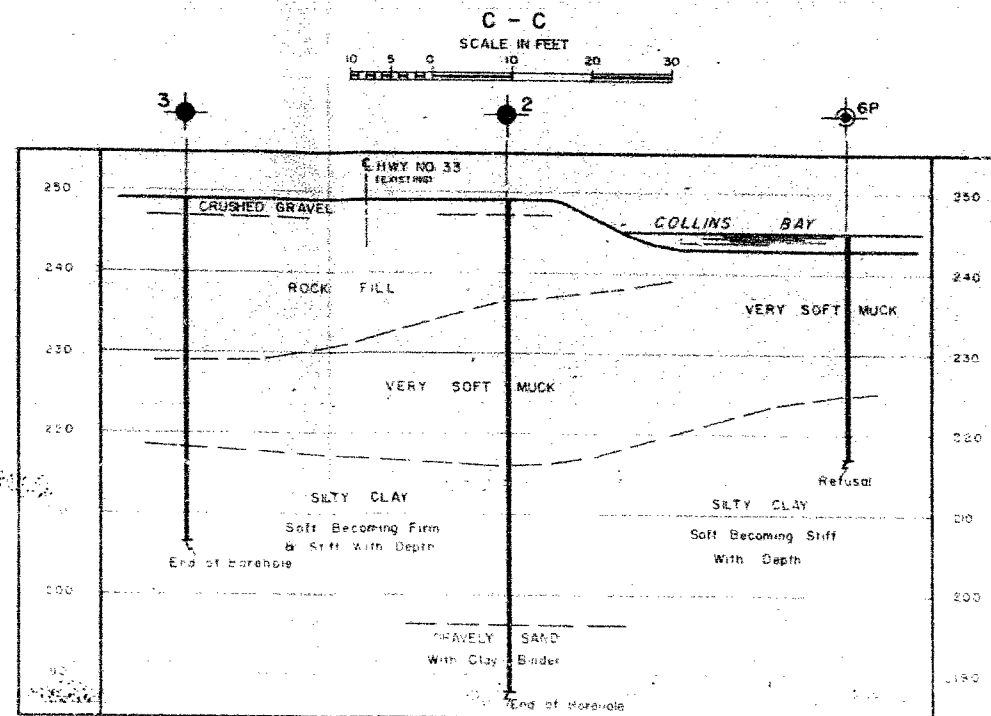
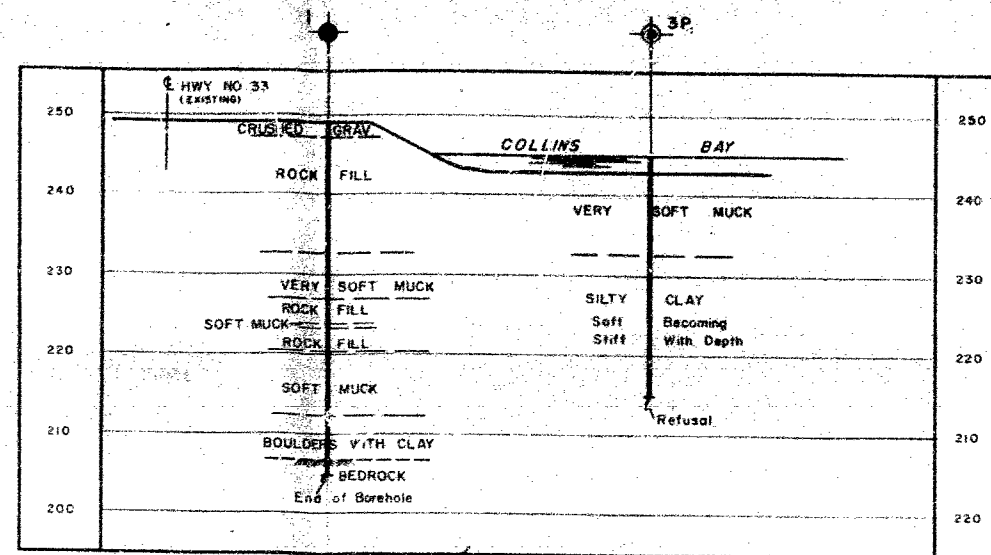
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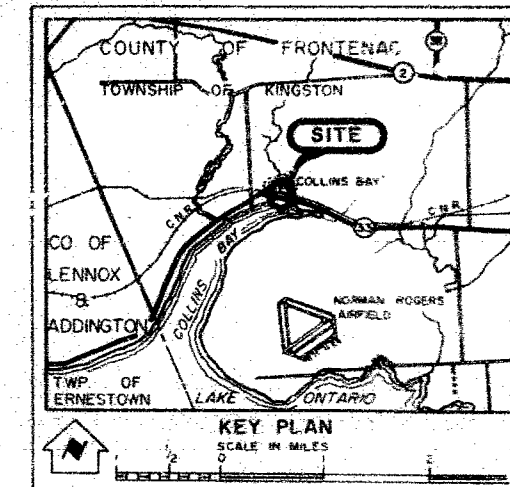
PLAN
SCALE IN FEET
0 25 50 100 150



A - A
SCALE IN FEET
0 25 50 100 150



B - B
SCALE IN FEET
0 5 10 20 30



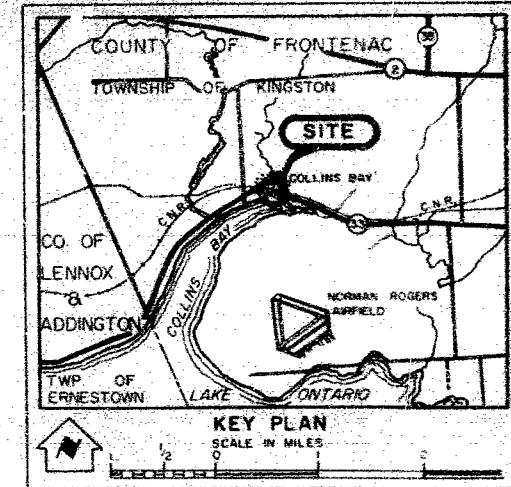
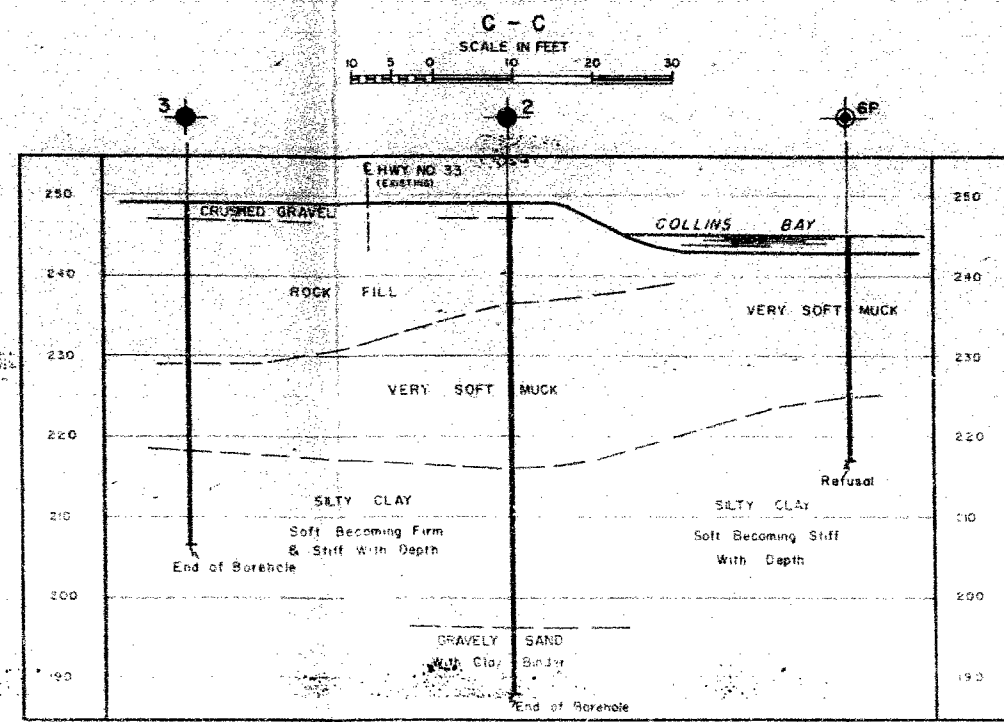
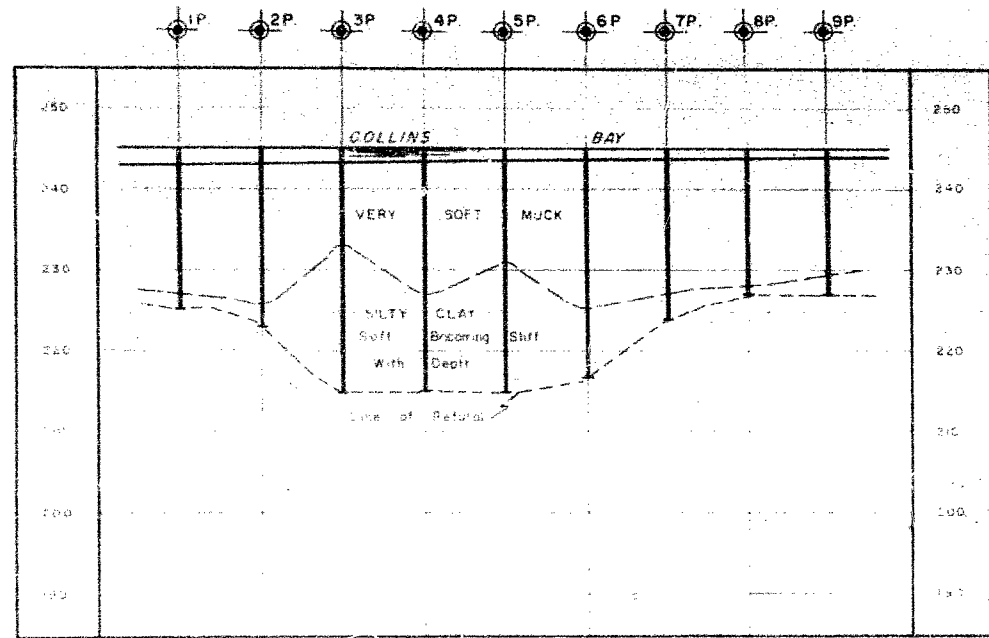
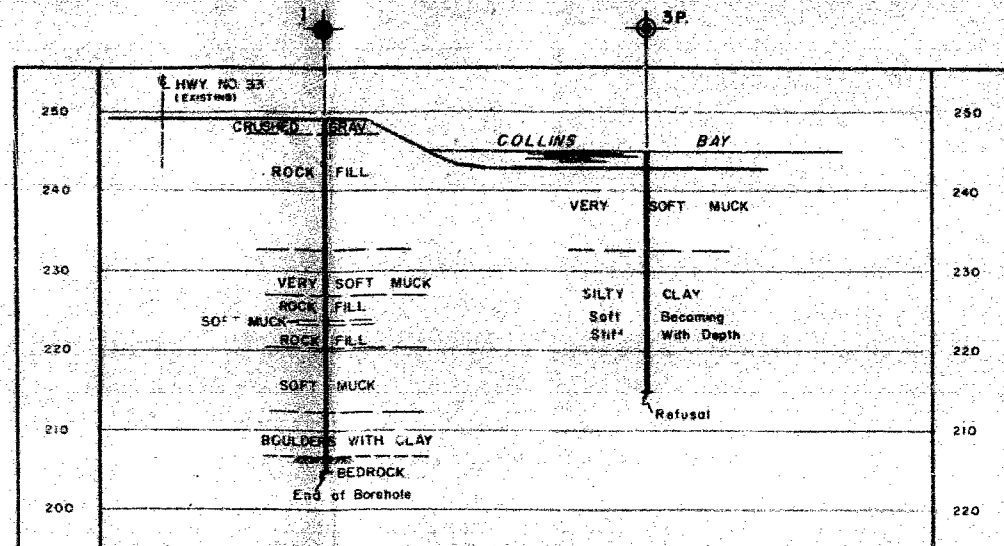
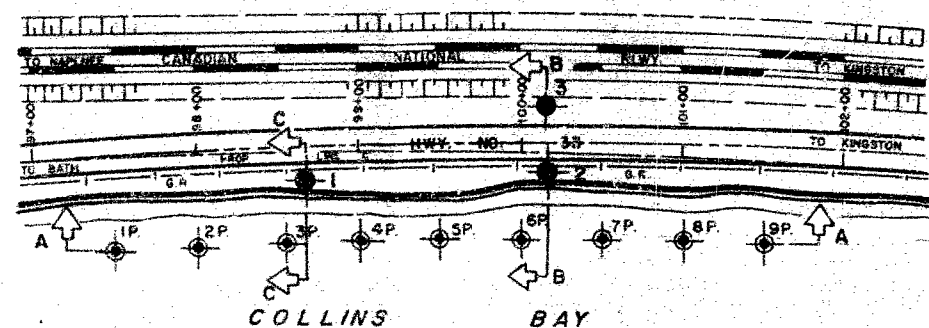
LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation		
	Power Auger Hole		
NO.	ELEVATION	STATION	OFFSET
1	249.0	98+60	23' AT
2	249.0	100+55	18' AT
3	249.0	100+15	20' LT
1P	245.0	97+50	60' RT
2P	"	98+20	"
3P	"	98+55	"
4P	"	99+10	"
5P	"	99+50	"
6P	"	100+00	"
7P	"	100+50	"
8P	"	101+00	"
9P	"	101+50	"

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.

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION

COLLINS BAY FAILURE AREA
HWY. NO. 33

PREPARED BY F. CLARK	DESIGNED BY A. H. NO.	DATE JUNE 8, 1962
CHECKED BY J. H. HARRIS	CONTRACT NO. 60-129	JOB NO. WJ. 62-F-72A
APPROVED BY J. H. HARRIS		



LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation
- Power Auger Hole

NO.	ELEVATION	STATION	OFFSET
1	249.0	98+55	20' RT
2	249.0	100+15	18' RT
3	249.0	107+15	20' LT
1P	245.0	97+50	60' RT
2P	"	98+00	"
3P	"	98+55	"
4P	"	99+00	"
5P	"	99+50	"
6P	"	100+50	"
7P	"	101+50	"
8P	"	102+00	"
9P	"	102+50	"

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.

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION

COLLINS BAY FAILURE AREA
HWY. NO. 33

DESIGNED BY	DATE	APPROVED BY	DATE
DRAWN BY	NO.	CHECKED BY	NO.
CHECKED BY	NO.	APPROVED BY	NO.

60-129