

G.I.-30 SEPT. 1976

GEOCRES No. _____

DIST. 53 REGION _____

W.P. No. _____

CONT. No. _____

W. O. No. 46-11002

STR. SITE No. _____

HWY. No. 65LOCATION Slope Failure - 17 km N of
Elr. Lake at Hwy 65No of PAGES -

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OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. _____

REMARKS: _____



memorandum

To: J. McDougall, P. Eng.
Head, Geotechnical Section
Northern Region
P.O. Box 3030
447 McKeown Avenue,
North Bay, Ont., P1B 8L2

1996 05 02

Attn.: Lynda Boyd, P. Eng.

From: Pavements and Foundation Section
Room 315, Central Building
Downsview, Ontario

Re: Embankment failure at Hwy. 65
approximately 18 km south of the Junction of Hwy. 65/66
W.O. 96-11002, Hwy. 65, District 53, New Liskeard

This is further to our site meeting of April 25, 1996 and your memo to us dated May 2, 1996 on the above captioned project. Our comments and recommendations are as follows:

Background

On April 24, 1996 the Northern Region Geotechnical Section advised the Pavement and Foundation Section that a slope failure had taken place on Hwy. 65 about 18km south of the Junction of Hwy. 65/66 (Station 186+00, Contract 78-29 ETR). The following details were provided:

The slope failure occurred on April 23, 1996 after 7:00 a.m. It was estimated that the entire failure took place within 20 minutes.

The slope failure took place within 200m length, right from the bank of the Montreal River to the shoulder of the highway. The width of the slope failure near the river was

about 50m and near the highway 15m. The depth of the failure near the river was about 25m and about 6m beside the highway.

About two third of the river width was covered with material from the slope failure which was mainly silty sand.

The travelled portion of the highway was not affected by the slope failure. The highway remained open for traffic.

There was a CSP arch culvert about 2.4m by 1.8m in size located about 400m north of the site which was plugged by ice and was not running in full capacity. As a result some of the overflow of storm water ran in the area where the failure took place.

At the site, there was a CSP culvert under Hwy 65 which was about 1m in diameter. The storm water would run through this culvert under Hwy 65 from the west side to the east.

The District Maintenance office monitored the area to ensure safety of the traffic on the highway. They opened up the plugged arch culvert north of the site to allow water flow only through the culvert. The district staff monitored the site for any possible damage to the highway and safety of the traffic.

The District office of MTO had contacted the MOEE & MNR authorities and the Regional Environmental and Geotechnical staff of MTO. They assessed the situation on April 24, 1996 and took necessary actions.

Site Visit

The staves from Pavement and Foundation Design Section along with the staff of Northern Geotechnical Section visited the site on April 25, 1996. Their findings were as follows:

The extent and nature of the failure was as reported above.

The failure was not a deep seated type. The failure took place due to the erosion of the material which was mainly silty sand. The failure appeared to be from natural causes. It was concluded that the erosion had started at the embankment toe near the river bank and proceeded towards the highway (towards the west) which was about 200m away from the river.

At the time of our site visit the maintenance work was already complete. About 1000 m³ granular material (pit run, mainly sandy gravel) was placed at the east shoulder of the highway making the side slope of the shoulder about 4H:1V. The source of the pit run was situated about 5 km north of highway junction 560/65 on the west side. (Aggregate No. C22-18).

Recommendations

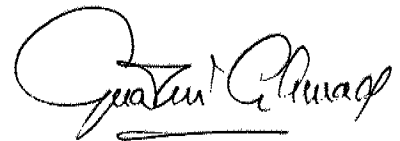
At present the highway embankment appears to be stable. There is no immediate concern of any slope failure within the right of way of the highway. However, to avoid any future distress to the highway at this location we recommend the following.

The water through the CSP culvert runs over and through the shoulder of the highway which is made of sandy gravel material. It is possible that in due course of time the water flow from the pipe will cause loss of ground and erosion. It is recommended that a erosion protection scheme consisting of armoured channel should be implemented. As an alternative, the CSP should be extended with a half size CS channel or equivalent so that no water flows over the shoulder of the highway.

The ditch on the west side of the highway should be graded so that only the storm water from the local area runs through the 1m diameter CSP culvert at the site.

At the beginning of the spring thaw season, the large CSP arch culvert, north of the site should be inspected to make sure it is not plugged with ice.

We hope you will find our recommendation satisfactory. If there is any questions please advise.



S.Q. (Ken) Ahmad, P. Eng.
Foundation Engineer

For

T.C. Kim, P. Eng.
Senior Foundation Engineer

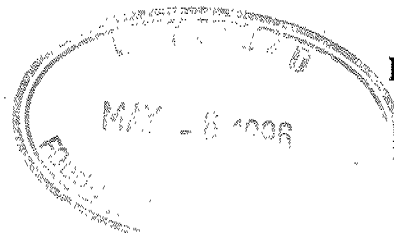
memorandum



To: File

From: Geotechnical Section
Northern Region

Date: May 1, 1996



Re: Embankment failure at Hwy. 65, approximately 18 km south of the Jct. of Hwy. 66/65.

I have attached a sketch of the failure area including copy of topographic map and pertinent ETR sheets to show location of failure.

Issue

At about 7:00 a.m. Tuesday, April 23, 1996, Patrol Supervisor passed site on way to Elk Lake. Failure took place within 20 minutes of his leaving site. Embankment failure extended from the shoulder of the road to the river, blocking the river with silty sand to approximately $\frac{2}{3}$ of its width. The highway driving lanes were left in tact and open to traffic. MOE & MNR was contacted by District staff. Regional Environmental and Geotechnical staff were called to site to assess the situation.

Background

See sketch for impression and note details as outlined here.

- Approximate distance from \mathbb{C} of highway to the river is 200m.
- Width of failure at highway was 15m widening to about 50m at river.
- Depth of failure at highway was 6m deepening to about 25m at river.
- Size of CSPA north of failure site was 8' by 6'.
- Size of CSP at failure site was 36".
- Failure took place at sta 186+00 from contract 78-29 ETR sheets, approximately 18 km south of the Junction of Hwy. 66/65.

Interim Measures

- District maintenance immediately monitored the area to ensure safety of traffic on Hwy. 65.
- District staff took immediate action to ensure that the pipe arch north of the failure was open.
- District staff remained at the site overnight to ensure traffic was aware of problem and further possible damage to highway.

- MOE and MNR, as well as, Ministry Geotechnical and Environmental staff were on site Wednesday to assess the situation.
- Concerns were raised by MNR over the pickerel spawning beds north of Elk Lake, but the nature of the material (silty sand) was not a concern.
- Elk Lake and Latchford were notified to ensure that they monitored their water treatment operations.
- Hydro dam personnel, north of the failure, were notified in case additional waters from the river end eroded more of the embankments.

Remedial Action

In consultation with the Geotechnical staff, a clean "bony" pit run was placed to stabilize the roadbed. Approximately 1000 m³ of the material was placed. The pit run source was located 5 km north of Jct. 560/65 on west side. (Agg. No. C22-18)

Investigation

Regional Geotechnical staff and the Foundations staff from Head Office reviewed the site on Thursday to see if further action would be required.

The failure appeared to be from natural causes. The erosion from the river at the embankment toe; undermining of the embankment from underground water sources; and saturation of the embankment material during the spring thaw were all contributing factors.

The road bed is stabilized, the highway in tact. And, since the culvert site under normal conditions runs dry, NO further action is recommended by Geotechnical Section at this time.

Foundations office will review this report.



Lynda Boyd, P. Eng.
Geotechnical Engineer
Northern Region

LB/pf
Attachments

<p>MTO Distribution: M. Major Maint. Supervisor, New Liskeard D. Mongeon Assistant Dist. Eng. Cochrane K. Ahmad Foundations Engineer, Downsview</p>



36" csp.

15m

50m

Silty sand

Plan Sketch

Highway 65

250m

Placed 'bony' material to right of way limits.

original ground

25m

bottom of failure
Profile Sketch

Cross Section View

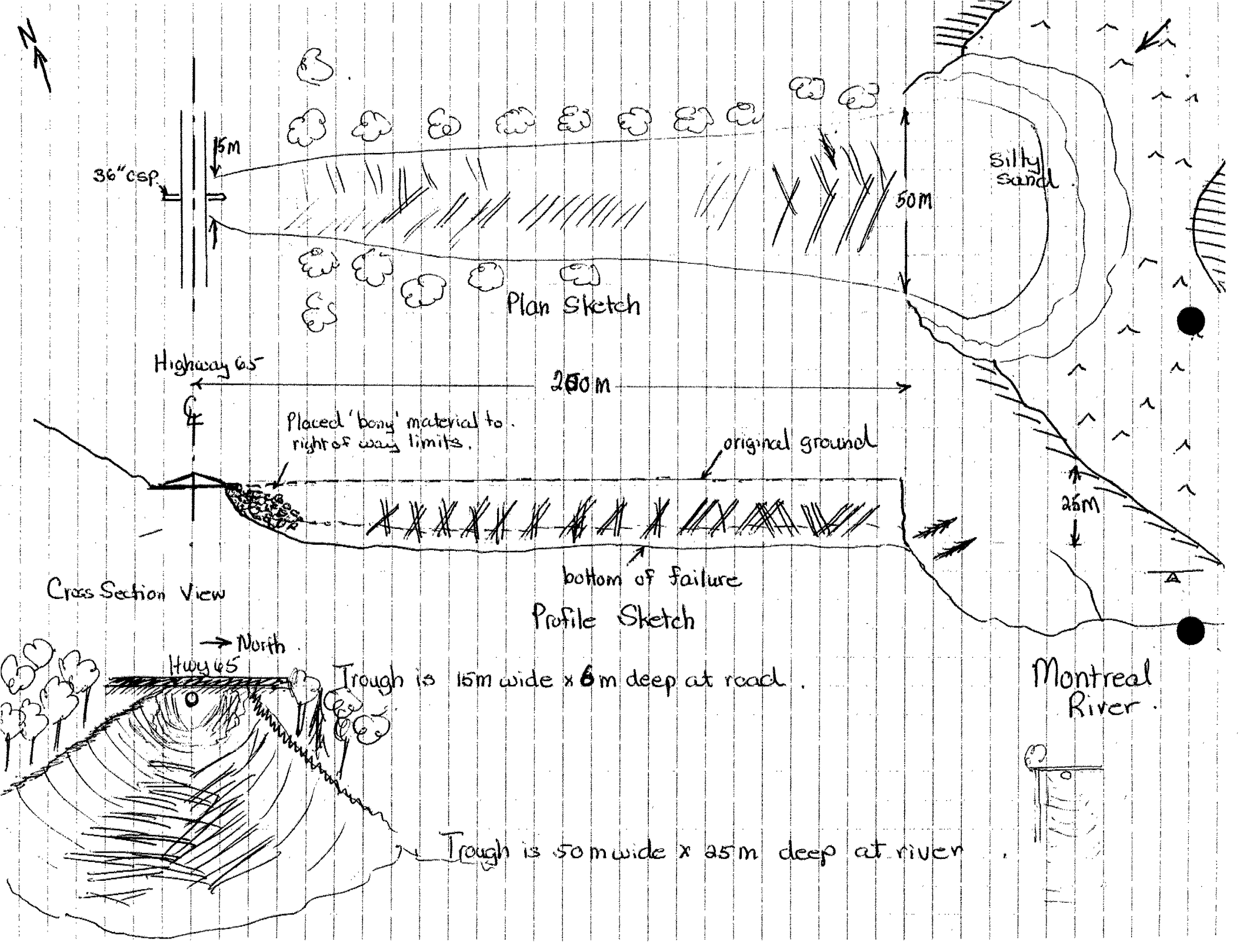
North

Hwy 65

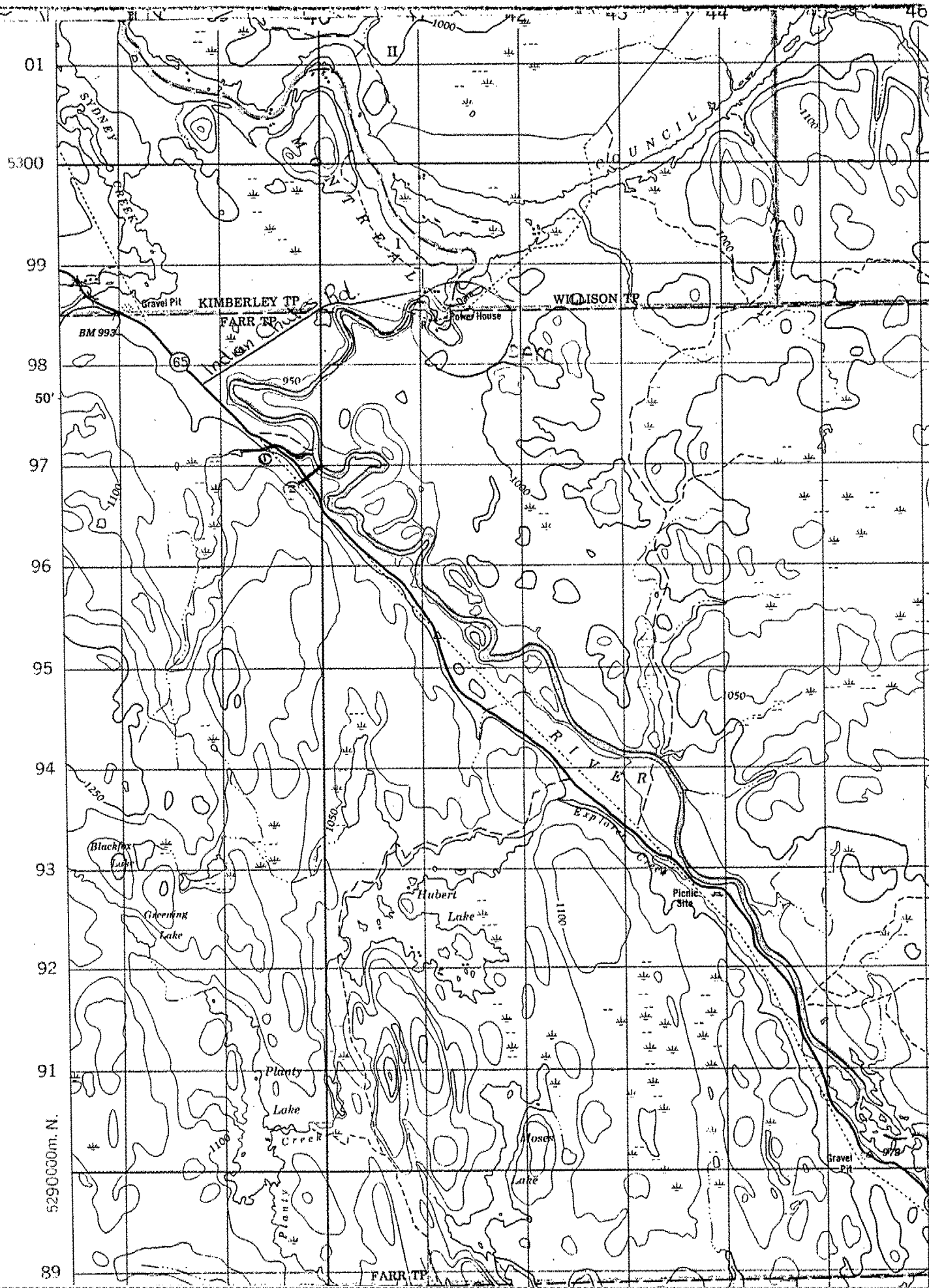
Trough is 15m wide x 6m deep at road.

Montreal River

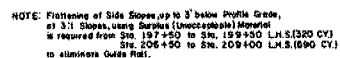
Trough is 50m wide x 25m deep at river



① 8'x6'
CSPA
② 36" csp
site of
failure



SHEET
11



Contour Grade Abandoned Portions of Existing Highway,
Sta. 196+50 to 210+00 Lt. as Directed by the Engineer.
Payment by Grader Rental.



Sta 180	Sta 195
EC	2300 CY
SI	1150 CY
ED	CY
ME	CY
WF	CY
EF	2800 CY
SC	CY
RC	CY
MO	CY
MA	CY
GB	2400 CY
GSB	3900 ton
Sta 195	Sta 210
EC	26400 CY
SI	350 CY
ED	CY
ME	CY
WF	4200 CY
RC	400 CY
SC	CY
MO	CY
MA	CY
GB	2400 ton
GSB	3750 ton

SCALES

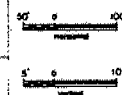
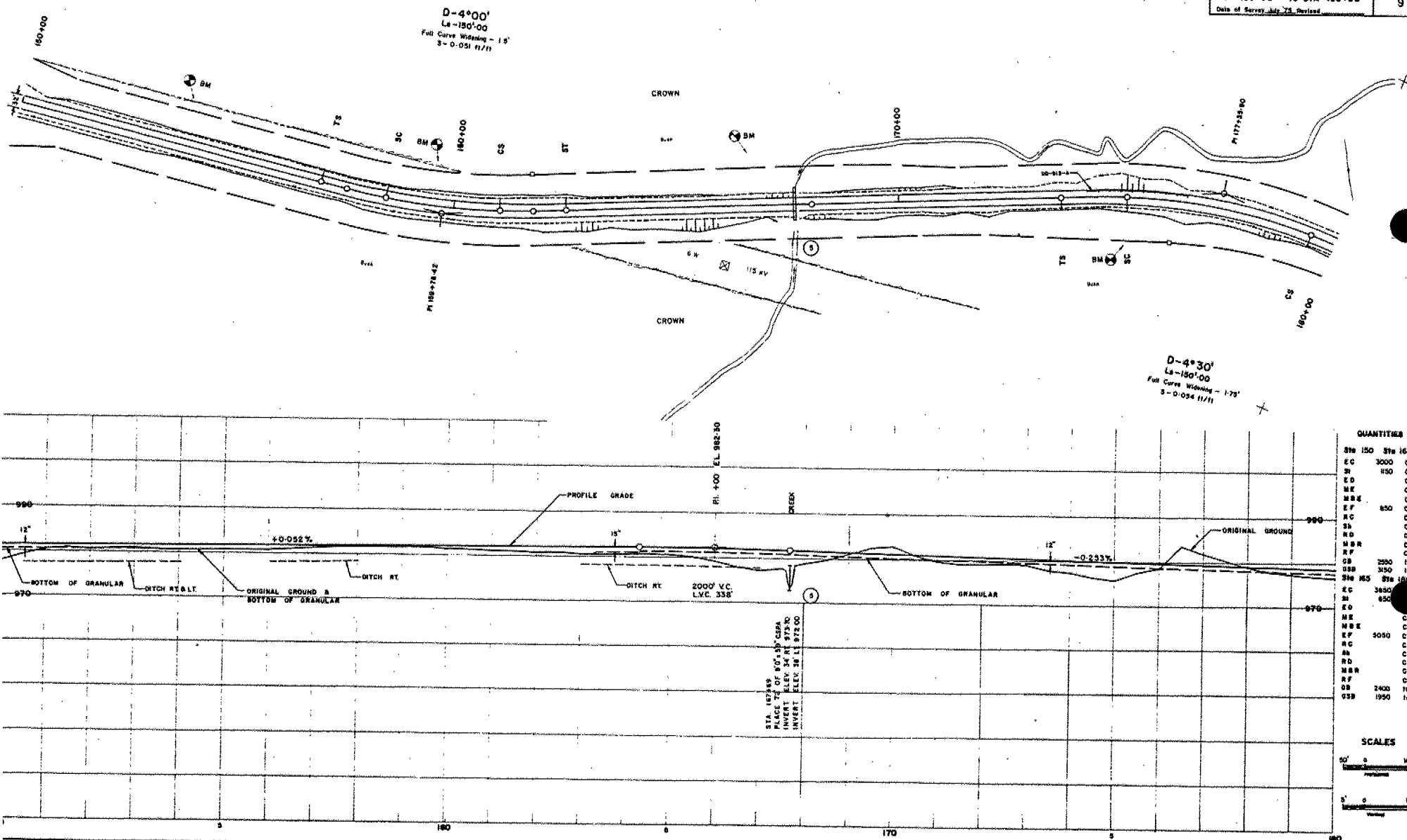


PLATE No 555-65/8-0
 CONT No 78-29
 WP No 61-73-01



NEW CONSTRUCTION
 STA 150+00 TO STA 180+00
 Date of Survey July 73 Revised

SHEET
 9



QUANTITIES

Sta 150	Sta 165
EC	3000 CY
SH	150 CY
ED	CY
ME	CY
MBE	CY
EF	850 CY
RC	CY
SH	CY
RD	CY
MBR	CY
RF	CY
GB	2500 ton
GBB	350 ton
Sta 165	Sta 180
EC	3450 CY
SH	850 CY
ED	CY
ME	CY
MBE	CY
EF	5050 CY
RC	CY
SH	CY
RD	CY
MBR	CY
RF	CY
GB	2400 ton
GBB	1950 ton

SCALES

