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62-F-47

OTTAWA R.

BANK FAILURE

APPROX 2 mi

WEST OF

CUMBERLAND

Mr. H. D. McMillan,
Road Design Engineer,
Road Design Division.
Attn: Mr. S. J. Markiewicz.

Mr. A. G. Stermac,
Principal Foundation Engr.,
Foundation Section,
Materials & Research Division.
Oct. 3, 1962.

62-F-47

Re: OTTAWA RIVER BANK FAILURE -
Approx. 2 Miles West of
Cumberland, District No. 9.

In our memo of June 28, 1962, to Mr. L. E. Walker, District Engineer, Ottawa, we have recommended that the slopes of the failed area be brought to 4:1 using a granular type material. In that memo, we did not specify any grain size limits.

It is our recommendation that a granular material be used which would be equal or coarser than granular base course material, Class 'B', as specified in D.H.C. Specification No. 314.

If much coarser material is used, such as crushed rock, we would suggest that it be left bare. Sodding of such a slope would require very large quantities of topsoil because much of it would be lost in the large voids present in rock fills. Apart from that, the topsoil within the rock fill could greatly reduce its permeability and thus eliminate its main function.

If, on the other hand, sand is used, sodding will not represent any difficulty. In this case, the rip-rap recommendation as outlined in our memo of June 28, should be implemented.

AGS/MdeF

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

cc: Messrs. H. A. Tregaskes
W. Bidell
J. Ford
J. E. Gruspier
L. E. Walker
G. A. Wrong
Foundations Office
Gen. Files.

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Mr. L. E. Walker,
District Engineer,
Ottawa.

June 28, 1962.

D.H.C. FOUNDATION INVESTIGATION

M.J. 62-F-47.

Materials & Research Division,

(Foundation Section)

Re: OTTAWA RIVER BANK FAILURE -
Approx. 2 Miles West of
Cumberland, District No. 9.

In answer to your request, we have investigated the recent slide that occurred in May 1962, on the south bank of the Ottawa River some 2 miles west of the Village of Cumberland. Presently, the failure zone is some 300 ft. long and its upper end is, in places, dangerously close to the ditch of the Trans-Canada Highway (No. 17). Because of this proximity, a serious and potential danger exists to the safety of the highway. Specially endangered, is a small park situated between the highway and the failure. In places, the edge fence of the park had to be removed towards the highway because the ground failed, and in some others, the slope behind the fence is practically vertical, creating thus, a serious and dangerous situation.

The general geology of the area is known and also information is available about the behaviour of this portion of the south bank of the Ottawa River. However, to confirm the available information, two boreholes were put down by this

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section, one on the top of the slide, between the highway and the failure zone, and the other, within the failure zone itself. This investigation did not reveal any new facts, only confirmed what was known or assumed.

The present shape of the failure area and the fact that not one but more slides have taken place, ruled out the possibility of a precise stability analysis. Therefore, the problem was approached in a different way. Since it is a known fact that the slopes of the river have been failing for as long as people in the area can remember, it is warranted to assume that all of them which are presently stable, have a factor of safety which is only slightly higher than 1.0.

It was also found out that all the failures in this area have occurred in the spring after the frost has come out of the ground and after heavy and prolonged rainfalls. This fact warrants the hypothesis that the triggering factor or influence is the high pore water pressure in the ground set up by rainfalls.

When such high pore pressures and the established soil shear strength parameters are used in analyses, the banks with average slopes of 3:1 prove to be unstable. The 3:1 slopes are representative for this stretch of the river bank. It is therefore believed that when all of the most unfavourable factors coincide, the slopes fail. The prediction of when a certain slope will fail is, of course, practically impossible because it is impossible to predict when the unfavourable factors will all act or be present at the same time.

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On the basis of what was explained above, the recommended remedial measures call for the flattening of the slope to 4:1. For this purpose, granular material should be used, assuring thus, a quick drainage of surface waters and also the prevention of a high pore water pressure build-up within it. The flattening or building of the 4:1 slopes is presently recommended for only the area between Sta. 716+00 and Sta. 719+50. The proposal takes care of the park also, keeping it in its present form.

Attached to this memo, are the plan and profiles showing the present and proposed topography. As can be seen from the cross sections and the plan, in places, the toe of the proposed 4:1 slope rests on dry ground - i.e., on the ground that has slid into the river during the recent failure, while in places, it is in the river. It is recommended that in both locations the toe of the new 4:1 proposed slope be protected with rip-rap to 5 ft. above the known highest river level.

Because we have not in our possession any other cross sections, it is not possible to tie-in the proposed flattened slope to the existing ground adjacent to the failure area, and we would appreciate if you could do this. We would also appreciate if you could let us have a replica copy of the cross sections so we could prepare the necessary additional copies of our recommendation.

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We believe that the information and recommendations contained in this memo will be adequate and will enable you to proceed with the work. However, should there be any additional information that you would require, or any question you would like to discuss, please feel free to call on our office.

AGP/MSF
Encl.

A. C. Sterns
A. C. Sterns,
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. H. A. Treganess
H. D. McMillan
W. Bidell
J. Ford
J. E. Grunpiper
C. A. Strong

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P.S. -- Upon completion, drawings will be forwarded in the near future.