RB-MSM 18
Your file: 383-2

19551129

CALGARY, November 29, 1955.

MEMORANDUM FOR MR. J. D. McLEOD:

Reference is to your memorandum of 16 November 1955 on the proposed Milk River erosion study and your request for our comments concerning the time and other work involved in preparing the data you mention.

2. No doubt you are familiar with the survey of the Milk River made in 1915 in anticipation of the possibility of damage claims arising from erosion, after the introduction of American water from the St. Mary River. However, in case this matter has not been brought to your attention, we might say that a detailed traverse survey was made of the entire reach between the North Branch crossing and the Eastern Crossing. Cross-sections were surveyed every two or three miles and many photographs taken. The survey was tied into existing land lines and bench marks located.

The survey was plotted on 4 rolls and the land lines were added later. The rolls were submitted to Ottawa on June 14, 1916, and were later approved by the Surveyor General. The rolls were given the reference number 1209 in Ottawa. Correspondence with the Calgary office was conducted on Ottawa file No. 2660 Irr. The photographs and cross-sections were presumably filed in Ottawa with the rolls and no doubt all this material is readily available there. We have not located prints of the survey here although we have a complete file of correspondence concerning it.

3. It occurs to us and no doubt to you, that the 1915 survey might be compared with the following other surveys of different dates:

(a) International boundary survey of 1908 - Only a small reach at each of the three boundary crossings is covered.

(b) Original land surveys shown on the township plans - The high water mark of the river is plotted on these plans as a basis for acreage computations - No doubt major erosion since that date would be revealed.

(c) Photographic surveys of the past ten or fifteen years upon which the land lines could be plotted as a basis for comparison with the 1915 survey.

4. Concerning the request for cross-section data from our discharge measurements, we have the following comments:

(a) Of the four stations mentioned in your memorandum, only at the Eastern Crossing station is the cableway, from which higher discharge measurements are made, located at the site of the gauge. Furthermore, it has never been the practice in this District to maintain a subsidiary gauge at the cableway section. Wading measurements are made when possible and at various sections depending upon the stage. Of course, the gauge height is recorded at the time of all discharge measurements, but there may be significant variations in the cross-sections or slopes at the gauge and metering sections. Consequently, the gauge datum is not an accurate basis for establishing the datum at the measuring section. In other words, in comparing the soundings from two measurements, the difference in gauge height is available but this is not necessarily a measure of the difference in stage at the cableway. As the datum for sounding is always the water surface, the difficulty of relating one cross-section to another is obvious. Ordinarily the two cross-sections can be fitted by visual inspection but

we would feel that the changes in bed elevation would be of such a quantity that a comparison of this nature would not be accurate enough for your purpose. A further complication would arise from the fact that cableways have been reconstructed, repainted and possibly re-located from time to time. It is unfortunately true that in most cases a constant initial point for chainage to sounding points has not been maintained over the years. Thus a lateral shift in the cross-section might be difficult to prove. To summarize, a great many discharge measurements at each of the gauging stations could be supplied, complete with soundings from an initial point and gauge readings at the time of the measurement. With some reasonable [illegible] adjust most of the gauge readings to a common datum for each station. However, in view of the difficulties introduced by the separation of the cableway site from the gauge and the probable lateral movement from time to time of the initial chainage point for soundings, we would like to be assured that the cross-section data from these discharge measurements would be of use before embarking on the task.

5. As far as the time for assembling the cross-section data is concerned, we could probably make a lot of it available to you in one month's time. Of course, other pressing tasks might have to be set aside. As you know, this is the season during which we prepare our international computations for a review which must be completed by about the end of January. Meanwhile, the Milk River review of past records is continuing and we would hesitate to postpone it because it is getting behind schedule in any case. A study and report on the "return flow" situation in the Bow River basin irrigation districts has also been promised for January 1, 1956, and we are now preparing that report.

6. It is interesting to note here that the assembling of the required data would be facilitated if the type of information on gauge data, locations, etc., which a review of past records produces, were available now. Unfortunately, our review of past records in the Milk River basin started at the other end and the upper stations have not yet been covered. This request, however, is a good example of the argument for a review of past records. As it is, we would have to make a research of past files to relate the various gauge data, etc. as a part of this task.

7. Another feature of the problem of supplying the cross-section data is that a great many of the measurements made at these stations were by U.S.G.S. engineers. We do not have a copy of the soundings for these measurements and, if they are required, we would have to request that the notes be loaned to us by the Helena office. We have no doubt that this can be arranged if necessary, although it will impose on their time to some extent.

8. With reference to your paragraph 6, we now have a man in the field, who is making a general reconnaissance of the major points of erosion. His report will be available in about a week and we will incorporate it with other observations on erosion, roughness factors, etc. in a further memorandum at that time. In closing, may we repeat that we would appreciate your careful consideration of the comments in paragraph 4 above and your further specific instructions on the assembling of the cross-section data in view of those comments. If it is decided that this data is still required, please let us know whether the cross-sections are to be plotted here or whether we may submit the soundings and chainage points in tables of data.

E. P. Collier,
District Engineer.

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19551213

CONFIDENTIAL

CALGARY, December 13, 1955.

MEMORANDUM FOR Mr. J. A. Hutton

The undersigned was requested by the Assistant Deputy Minister, Mr. Cote, at the time of his recent visit to the Calgary office, to arrange a visit with officials of the Alberta Water Resources Department and also with Mr. F. Blench of the University of Alberta and to discuss various aspects of the Milk River erosion problem. The chief purpose of these conversations was to develop the background behind the recent request to our department by the Alberta Minister of Agriculture for assistance in combatting the erosion difficulties on the Milk River.

Fortunately, the occasion arose to offer a ride to Edmonton to Mr. J. L. Reid, Secretary of the Alberta Power Commission and an engineer on the staff of the Alberta Water Resources department. The situation was discussed with Mr. Reid on this trip and again with Mr. F. L. Grindley, Director of Alberta Water Resources, on the following day, December 9. An interview with Mr. Blench at the University of Alberta was also arranged on December 9. The following is an outline of the information and impressions obtained by the undersigned in these three conversations.

Conversation with Mr. J. L. Reid -

Mr. Reid spoke more freely than did Mr. Grindley on the following day, probably because of the circumstances or because he has no direct responsibility in the matter and also because he is of a rather talkative nature. He stated that the Victor Dobrecsane project has cost the Province about $35,000 to $40,000 and that the expenses "snow-balled" after the job was originally undertaken. The work was under the direct supervision of the late Frank Young and apparently Mr. Young was subjected to severe criticism by his superiors when the costs grew much larger than originally anticipated. It is Mr. Reid's firm opinion that the matter would never have got out of the Alberta Water Resources Department if the costs had been confined to the small amount originally expected. He believes that it is also very significant that most of the Milk River in Canada is in the constituency represented by the Minister of Agriculture in the Alberta government. All the protective work done by the province lies in this constituency. To use Mr. Reid's phrase, this makes the situation "rough". My impression was that the work was undertaken with political undertones and, when the costs soared and the situation received attention outside the Department, the various officials involved are now trying to get assistance to get "bailed out" of an awkward situation.

Mr. Reid is also of the opinion that provincial authorities are now worried about the precedent in protective work which has been established and whether it will lead to more expensive requests on the Milk River and in other streams.

Mr. Reid also informed me that Mr. Blench is held in high regard by the Director of Water Resources and that he has been used as a consultant by them on more than one occasion. However, he intimated that Mr. Blench's reputation is not as good with the P.F.R.A., Calgary Power, etc. and that he feels that any report by Mr. Blench would be subject to close scrutiny and perhaps severe criticism by agencies other than the province. His inference may not be a fair one and I mention it only for what it may be worth.

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Conversation with Mr. F. L. Grindley, Director of Water Resources, Province of Alberta -

Mr. Grindley feels very sure that the diversion water from the St. Mary River has had an appreciable effect on Milk River erosion in Canada. He mentioned that the subject had been broached with our department by Mr. Russell, when the latter was Director of Water Resources in Edmonton, and that Mr. Russell had been very unsatisfied with the reaction by our Mr. Patterson at that time and that he, Mr. Russell, had intended to pursue the matter further.

Mr. Grindley stated that the total cost of all their protective works on the Milk River had now reached $55,000 (including the Dobrecane and Weir projects and two other small groins).

He mentioned that the province had discussed the possibility of a model study with Mr. Blench but had decided against conducting the study themselves, principally because of the expense involved.

Otherwise, Mr. Grindley was relatively non-committal and I gained the impression that Mr. Reid's picture of the situation was probably correct. Mr. Grindley stated that the province was expecting a little co-operation in this matter from the government of Canada and I gather that, having made their move in this direction, they were now standing pat. I have the feeling that they are expecting Canada to offer them a "50-50" or some such division of their expenses but that they are probably not prepared to press the matter too far against serious opposition. Of course, I may be very wrong in this opinion.

In the course of the conversation, Mr. Grindley mentioned the opinion of Mr. George Ross that all the significant erosion on the Milk River has occurred since the introduction of the diversion water. Mr. Ross is a very large-scale rancher who has operated along the Milk River, on both sides of the boundary, for many years. He is reputed to be a "millionaire" and, I would suggest, has considerable political weight in the constituency.

Conversation with Mr. T. Blench -

Mr. Blench is now on the faculty of Civil Engineering at the University of Alberta. He is reputed to be an authority on meandering streams. He stated that he is quite sure that the diversion water has appreciably affected the erosion on the North Branch of the Milk River above the junction with the South Branch. It is interesting to note that there apparently have been few complaints or protective works undertaken on this Branch.

Concerning the main stem, Mr. Blench was not so specific in his opinion, after considerable discussion. He pointed out that the quantity of diversion water flowing most of the summer was in the same order as many of the natural, annual peak stages during spring runoff on the North Branch. On the main stem, however, where the complaints have arisen, the diverted flows during the summer only raise the discharge to the medium flow range, as compared to the natural spring runoff peaks. Mr. Blench feels that this condition would make it much more difficult to establish the effect of the diverted water on erosion on the main stem. He is of the opinion that the diverted water would accelerate the erosion even if it did not increase the total ultimate meander on the main stem.

I mentioned the possible effect of ice movements during the natural spring break-up and he admitted that he had not given this aspect serious consideration, perhaps because his experience has been largely in India and he is only now becoming familiar with western Canadian streams. I felt that this was a weakness in his case, especially in view of the statements

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by local residents Hoyt and [illegible], as mentioned in our Mr. Coulson's report. Both these men mentioned seeing the shearing of the cut-banks by ice cakes during spring break-up and at a time when there is no diversion water in the stream.

Mr. Blench felt that a model study would contribute to our knowledge of the stream but he emphasized certain weaknesses in the model approach. He felt that there would be plenty of room for criticism in the results from any model tests. He particularly mentioned the capillary factor in the banks in the model and also possibility of criticism of entrance and exit conditions, inability to exactly duplicate erodability, etc. He states that he would undertake a model study at the University but that the cost might reach $30,000 and take as much as two summers' time. He would also require the assistance of one man to supervise the day-by-day operation of the model for perhaps two summers. My general impression was that he would be glad to get the job but that he was very dubious about being able to make the results of any model test stand up to adverse criticism. He would apparently prefer to base his opinion on a statistical study based on the few fundamental principles, which have been more or less established in the available literature. He intimated that he could probably derive an opinion as to the quantitative effect of the diverted water on the erosion of the North Branch but that this would be much more difficult in the case of the main stem, for the reasons mentioned above.

<u>Hon. L. C. Halmrast, Minister of Agriculture</u> -

I was not able to arrange an interview with the Minister during my short stay in Edmonton but Mr. Grindley had an appointment immediately after my visit with him. I asked Mr. Grindley to let the Minister know that I had been discussing the Milk River problem with him. A few hours later I received a call from Mr. Grindley's office to say that the Minister was very glad to know that I had been in Edmonton and that we were looking into the Milk River matter in our department.

M. P. Collier,
District Engineer.