Pls make copies for the Mayor + all Councillors
— Ralph

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To Don Seim		Date Jun 21	# of pages 3
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Township of Southgate
R. R. #1
Dundalk, Ontario
N0C 1B0

Attention: **Bonnie Riddell**
Clerk-Administrator

Dear Bonnie

RE: Holstein Dam

In response to your council resolution 425-02 we have reviewed the surface features and bridge of the Holstein dam and we wish to report our observations and recommendations.

The site was reviewed by the undersigned on February 19, 2003. At the time of the review the ground and bridge deck were under a considerable depth of snow and the spillway of the dam was coated in ice. Some detail dimensions were recorded for the bridge and the general arrangement of the embankment was reviewed but we did not take other detail measurements or levels during this visit.

As we understand it there are two considerations, related to the dam, to possibly help reduce the potential for flooding at the regional storm. This was discussed in the Holstein Flood Control Study we prepared earlier.

Restriction Caused by the Bridge over the Dam

The dam served as a railway embankment in the past and the bridge was designed to carry railway loads. The abutments have a clear span of about 14.68 m. The bridge superstructure was built in 1944 from two pre-cast concrete beams to create a T-shaped section. Concrete curbs and gravel ballast were added. Concrete ballast walls were poured-in-place around the ends of the beams to hold them in place and complete the abutments.

Although dimensions were difficult to confirm because of the ice accretion on the weir of the spillway, we expect the normal distance from the low concrete of the bridge to the weir is about 1.35 m. This is made up of a horizontal offset of 0.94 m and a vertical difference of 0.97 m. Our flow analysis for the study indicated that the concrete bridge would restrict the regional flow with this size of opening. It was considered that a practical solution would be to remove the existing bridge and replace it with a lighter, shallower structure appropriate for pedestrian traffic. This made sense since the existing bridge is much stronger than required for current loads. However, when considering the costs involved it is likely less expensive to break out the existing beams and set them at a higher level and re-cast the ballast walls. To remove the existing beams, break them up and dispose of the material is likely to cost a significant amount because of the size and strength of them. Then a new structure would have to be built.

Raising the existing beams by about 300 mm would increase the vertical height of opening from 0.97 m to 1.27 m but the section would have to be computer modeled to determine the likely affect on flood flows. Ramping would have to be done at the ends of the bridge to adjust the grade of the trail. This could be partly offset by removing some ballast from the bridge deck. The cost of this work is likely to be as follows:

1	Removal of concrete from ballast walls 10.0 m^3 @ \$1,000	\$ 10,000
2	Jack or hoist bridge onto new bearings	\$ 9,000
3	Pour new concrete ballast walls 10 m^3 @ \$1,200	\$ 12,000
4	Excavate and backfill	\$ 2,000
5	gravel ramps each end	\$ 500
	Subtotal	\$ 33,500
	Engineering	\$ 6,700
	Net 3% GST	\$ 1,200
	Total	\$ 41,400

Flood Wall

The Flood Control Study identified a potential for the former railway embankment to be overtopped by the regional flood. The first place of overtopping would be just south of the bridge where the road leads to the park gates. The study showed that the pond elevation at the regional flow would be about elevation 408.88. The average embankment elevation north of the bridge is about 408.65. This would indicate a general raise of the embankment is required. However, if the bridge level is raised as discussed above, it may be that the pond level would be lowered to a satisfactory level by the increased flow capacity at the spillway. For now, we will assume that the general embankment does not need to be raised.

South of the bridge, the low spot created by the lane to the park is below elevation 408.0 m. Fill could be used to bring the grade up at this location but it would make the grade of the lane unacceptably steep. Instead, it is recommended that a concrete flood wall be constructed on the upstream side of the embankment. Such a wall would extend from the south bridge abutment to the park lane and turn eastwards towards the park gate, a distance of about 65 m. The wall would be reinforced with steel bars to limit cracking and it would have a foundation 1.2 m below grade for frost protection. We have assumed that the design top of wall would be the flood elevation of 408.88m. The probable cost of such a wall may be as follows:

1	Excavate and backfill		\$ 6,000
2	Reinforced concrete 56 m^3 @ \$450		\$ 25,200
		Subtotal	\$ 31,200
		Engineering	\$ 5,500
		Net 3% GST	\$ 1,100
		Total	\$ 37,800

The final solution may be the combination of these two projects for a total budget of about \$79,200. Further costs will be required if it is determined that the general height of the railway embankment must be raised. We recommend that the flow model be run again with the flood wall in place and the bridge raised to confirm that this combination is likely to provide the required protection against the regional flow.

Yours very truly

B. M. ROSS AND ASSOCIATES LIMITED

Per ______________________

A. I. Ross, P. Eng.

AIR:dvb

c.c. Frank Vanderloo, BMROSS

79,200