BMROSS
engineering better communities

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File No. 99060

December 10, 2004

Don Seim, A.M.C.T.
Clerk-Administrator
Township of Southgate
R. R. 1
Dundalk, Ont.
N0C 1B0

Dear Sir:

RE: Holstein Flood Control Study
Revised Hydraulic Modeling
– Summary Letter Report

Introduction

In July, 2000 B. M. Ross and Associates completed the final report entitled "Holstein Flood Control Study". The main purpose of the report was to develop floodplain mapping for the Township of Egremont, and in particular, the Hamlet of Holstein. One of the main findings noted in the report was the spill condition and potential for flooding damage created by the Holstein Dam. The report identified the following main reasons for the spill condition:

- Constricted spillway capacity due to the heavy deck support beam for the existing bridge structure.
- The low area on the dam embankment created by the access road to the community centre.

In response to a later council resolution, BMROSS provided a letter, dated February 2003, which suggested two considerations to reduce the frequency of flood damages relating to flood water spills:

- Raise the existing bridge structure by 300mm.
- Construct a flood wall on the upstream side of the embankment.

The letter further recommended that the previously completed hydraulic models be modified to reflect the suggested flood wall and bridge modifications to confirm that this combination is likely to provide the required protection against the regional flow.

The purpose of this letter is to summarize the results and findings of the revised hydraulic models.

Preparation of New Models

A number of new models were created to review the potential impacts of completing the works noted above and included a number of variations as described below:

i. Raise Bridge Deck by 300mm – No Flood Wall;
ii. Raise Bridge Deck by 450mm – No Flood Wall;
iii. Remove Bridge – No Flood Wall;
iv. No adjustment to Bridge – Construct Flood Wall
v. Raise Bridge Deck by 300mm – Construct Flood Wall

The results of the above models and the resulting flood elevations are summarized in the following table:

Table 1
Summary of Modeling Results

Condition	Low Concrete of Bridge Elevation (m)	Net Bridge Adjustment Upwards (m)	Flood Wall Elevation (m)	100 Year Flood Elevation upstream of Bridge (m)	Regional Flood Elevation upstream of Bridge (m)	Flood Waters Spill-Over
Existing	407.27	nil	N/A	407.97	408.88	Yes
Raise Bridge – No Wall	407.57	300	N/A	407.92	408.77	Yes
Raise Bridge – No Wall	407.72	450	N/A	407.92	408.77	Yes
Remove Bridge	N/A	N/A	N/A	407.92	408.77	Yes
Existing Bridge – With Flood Wall	407.27	nil	411.1	407.92	410.81	No
Raise Bridge – With Flood Wall	407.57	300	409.1	407.92	408.77	No

For comparison purposes, the existing low elevation on the embankment north of the bridge is 408.47 and at the gravel drive to the park is 407.87.

Discussion of Model Results

In reviewing the results of the adjusted modeling, it is evident that in order to reduce the possibility of flooding the raising of the existing bridge and construction of a flood wall should be implemented together.

By raising the bridge, without a flood wall, the flooding elevation upstream of the structure can be reduced by a maximum of 110mm which would not prevent a spill-over. Raising the bridge beyond 300mm or removing it entirely does not provide for any additional flood relief beyond the noted 110mm reduction. It would appear that the spillway capacity becomes the limiting factor after the bridge restriction is removed.

The model results, with the existing bridge unaltered, indicate that a significantly high flood wall would be required which would increase the possibility of the bridge being damaged or jammed by debris.

Appendix 'A' includes an expanded summary of the HEC-2 results for each particular cross-section. Also enclosed in Appendix 'A' is a reduced plan from the original July 2000 report which helps to identify the location of the corresponding cross-sections.

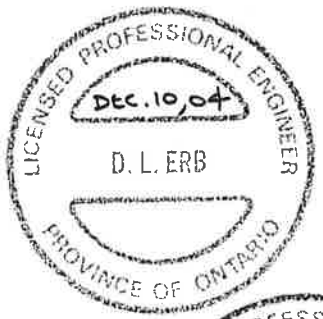
Conclusion

Based on the above results and discussion it is evident that neither raising the bridge nor constructing a flood wall independently of each other will provide for an adequate solution to preventing the possibility of downstream flooding.

As eluded to in our February 2003 letter, the final solution to reducing the potential for downstream flooding must be a combination of two projects:

1. Raise the existing bridge structure by 300mm.
2. Construct a flood wall on the upstream side of the embankment to elevation 409.0 metres. This would put the top of the wall on average about 500mm above the embankment north of the bridge.

All of which is respectfully submitted.



B. M. ROSS AND ASSOCIATES LIMITED

Per _____
Dale Erb, P. Eng.

Per _____
A. I. Ross, P. Eng.

c.c. Don Smith – Saugeen Valley Conservation Authority

APPENDIX 'A'

STUDY AREA PLAN AND HYDRAULIC MODELLING SUMMARY

Holstein Floodplain Mapping - 99060
Dam Bridge Modifications

November 26, 2004

Hec-2 Results Summary Table

Sect. No.	Flood Elevations													
	Deck raised 300mm		Deck raised 450mm		No Bridge		Ex. Bridge c/w Flood Wall: Elev. = 409.0		Ex. Bridge c/w Flood Wall: Elev. = 410.0		Ex. Bridge c/w Flood Wall: Elev. = 411.0		Raise Deck 300 mm Wall: Elev. = 410.0	
	Regional	100 yr	Regional	100 yr	Regional	100 yr	Regional	100yr	Regional	100yr	Regional	100yr	Regional	100yr
100	398.02	397.60	398.02	397.60	398.02	397.60	398.02	397.60	398.02	397.60	398.02	397.60	398.02	397.60
200	398.15	397.76	398.15	397.76	398.15	397.76	398.15	397.76	398.15	397.76	398.15	397.76	398.15	397.76
300	398.41	398.14	398.41	398.14	398.41	398.14	398.41	398.14	398.41	398.14	398.41	398.14	398.41	398.14
400	398.95	398.66	398.95	398.66	398.95	398.66	398.95	398.66	398.95	398.66	398.95	398.66	398.95	398.66
500	400.10	399.89	400.10	399.89	400.10	399.89	400.10	399.89	400.10	399.89	400.10	399.89	400.10	399.89
550	400.20	399.97	400.20	399.97	400.20	399.97	400.20	399.97	400.20	399.97	400.20	399.97	400.20	399.97
600	400.53	400.18	400.53	400.18	400.53	400.18	400.53	400.18	400.53	400.18	400.53	400.18	400.53	400.18
700	400.96	400.67	400.96	400.67	400.96	400.67	400.96	400.67	400.96	400.67	400.96	400.67	400.96	400.67
800	401.74	401.33	401.74	401.33	401.74	401.33	401.74	401.33	401.74	401.33	401.74	401.33	401.74	401.33
900	401.87	401.60	401.87	401.60	401.87	401.60	401.87	401.60	401.87	401.60	401.87	401.60	401.87	401.60
950	402.55	401.70	402.55	401.70	402.55	401.70	402.55	401.70	402.55	401.70	402.55	401.70	402.55	401.70
1000	402.94	401.78	402.94	401.78	402.94	401.78	402.94	401.78	402.94	401.78	402.94	401.78	402.94	401.78
1100	403.07	402.08	403.07	402.08	403.07	402.08	403.07	402.08	403.07	402.08	403.07	402.08	403.07	402.08
1200	403.09	402.39	403.09	402.39	403.09	402.39	403.09	402.39	403.09	402.39	403.09	402.39	403.09	402.39
1300	403.56	402.94	403.56	402.94	403.56	402.94	403.56	402.94	403.56	402.94	403.56	402.94	403.56	402.94
1350	408.08	407.53	408.08	407.53	408.08	407.53	409.04	407.53	410.04	407.53	410.81	407.53	408.09	407.53
1400	408.77	407.92	408.77	407.92	408.77	407.92	409.09	407.92	410.04	407.92	410.81	407.92	408.77	407.92
1500	408.77	407.92	408.77	407.92	408.77	407.92	409.09	407.92	410.04	407.92	410.81	407.92	408.77	407.92
1600	408.77	407.92	408.77	407.92	408.77	407.92	409.09	407.92	410.04	407.92	410.81	407.92	408.77	407.92
1700	408.77	407.92	408.77	407.92	408.77	407.92	409.09	407.92	410.04	407.92	410.81	407.92	408.77	407.92
1800	408.77	407.92	408.77	407.92	408.77	407.92	409.09	407.92	410.04	407.92	410.81	407.92	408.77	407.92
1900	408.77	407.92	408.77	407.92	408.77	407.92	409.09	407.92	410.04	407.92	410.81	407.92	408.77	407.92
2000	408.77	407.92	408.77	407.92	408.77	407.92	409.09	407.92	410.04	407.92	410.81	407.92	408.77	407.92
2100	408.78	407.93	408.78	407.93	408.78	407.93	409.10	407.93	410.04	407.93	410.81	407.93	408.78	407.93
2200	408.84	408.05	408.84	408.05	408.84	408.05	409.13	408.05	410.05	408.05	410.81	408.05	408.84	408.05
2300	408.91	408.43	408.91	408.43	408.91	408.43	409.16	408.43	410.05	408.43	410.81	408.43	408.91	408.43
2400	409.65	409.20	409.65	409.20	409.65	409.20	409.63	409.20	410.13	409.20	410.83	409.20	409.65	409.20
2500	409.91	409.48	409.91	409.48	409.91	409.48	409.91	409.48	410.16	409.48	410.84	409.48	409.91	409.48

Sect. No.	Flood Elevations													
	Deck raised 300mm		Deck raised 450mm		No Bridge		Ex. Bridge c/w Flood Wall: Elev. = 409.0		Ex. Bridge c/w Flood Wall: Elev. = 410.0		Ex. Bridge c/w Flood Wall: Elev. = 411.0		Raise Deck 300 mm Wall: Elev. = 410.0	
	Regional	100 yr	Regional	100 yr	Regional	100 yr	Regional	100yr	Regional	100yr	Regional	100yr	Regional	100yr
2600	410.70	410.12	410.70	410.12	410.70	410.12	410.70	410.12	410.67	410.12	410.96	410.12	410.70	410.12
2700	410.95	410.38	410.95	410.38	410.95	410.38	410.95	410.38	410.94	410.38	411.11	410.38	410.95	410.38
2800	411.20	410.72	411.20	410.72	411.20	410.72	411.20	410.72	411.20	410.72	411.27	410.72	411.20	410.72
2900	411.92	411.66	411.92	411.66	411.92	411.66	411.92	411.66	411.92	411.66	411.89	411.66	411.92	411.66
3000	412.74	412.52	412.74	412.52	412.74	412.52	412.74	412.52	412.74	412.52	412.76	412.52	412.74	412.52
3100	413.29	413.12	413.29	413.12	413.29	413.12	413.29	413.12	413.29	413.12	413.28	413.12	413.29	413.12
3200	413.65	413.47	413.65	413.47	413.65	413.47	413.65	413.47	413.65	413.47	413.65	413.47	413.65	413.47
3300	413.83	413.60	413.83	413.60	413.83	413.60	413.83	413.60	413.83	413.60	413.83	413.60	413.83	413.60

Cross-section at bridge

Cross-section upstream of bridge