Council Meeting Agenda

Monday, September 25, 2017

Regular Council Meeting

Council Chambers

7:00 P.M.

1. MOTION TO CONVENE INTO CLOSED SESSION (IF NECESSARY)

2. MOTION TO RECONVENE IN OPEN SESSION (IF NECESSARY)

3. MOMENT OF SILENCE

4. ADDITIONS TO THE AGENDA

5. DISCLOSURE OF PECUNIARY INTEREST UNDER THE MUNICIPAL CONFLICT OF INTEREST ACT

6. MINUTES OF PREVIOUS MEETINGS

6.1 Council Meeting Minutes September 11, 2017.

Recommendation

THAT the minutes of the following meeting be adopted as presented:

Council Meeting September 11, 2017.

7. PUBLIC MEETINGS

8. PRESENTATIONS/DELEGATIONS

8.1 Jon Linton, CMC, Director, TCI Management Consultants

Greg Young, CMC, Director, TCI Management Consultants

Township of Wilmot Arts and Culture Master Plan

9. REPORTS

9.1 CAO – no reports

9.2 CLERK'S SERVICES

9.2.1 REPORT NO. CL 2017-22

Waterloo Area Municipal Ombuds Office

2016-17 Annual Report

Township of Wilmot

Recommendation

THAT the Waterloo Area Municipal Ombuds Office Annual Report for 2016-2017, be received for information purposes.

9.3 FINANCE – no reports

9.4 PUBLIC WORKS

9.4.1 REPORT NO. PW-2017-18

Holland Mills Road Bridge – Structure No. 17B/B-T13

Schedule "B" Class Environmental Assessment

and Preliminary Design – Project File Report

Recommendation

THAT the Township of Wilmot take the following actions with respect to the Class Environmental Assessment for the Holland Mills Road Bridge – Structure No. 17B/B-T13:

i) Approve the preliminary design for construction of the preferred alternative – Concrete Box Girder as described in Report PW-2017-18, dated September 25, 2017;

ii) Direct staff to file the Notice of Study Completion for this Class Environmental Assessment Schedule "B" Study by means of advertisements in the local newspapers, Township website and direct mailings, and place the Project File Report on the public record for a period of 45 days;

AND THAT, following the 45-day waiting period, that K. Smart & Associates be instructed to complete the detailed design and contract document preparation for the replacement structure.

9.5 DEVELOPMENT SERVICES

9.5.1 REPORT NO. DS 2017-18

Agreement with respect to time of payment of Development Charges

300 Snyder's Road East, Baden

Westcap Development Inc.

Recommendation

THAT the Township enter into an agreement between the Township of Wilmot and Westcap Development Inc. pursuant to Section 3.14 of the Township Development Charge By-law 2014-34 to extend the time for which a redevelopment allowance is calculated as follows:

1. Prior to October 26, 2019 a redevelopment allowance shall be available calculated based on the development charge rates in place at the time of issuance of a building permit, and in consideration of the demolition of 16,374sq.ft of commercial floor area and 3 single detached dwellings.
2. Between October 27, 2019 and June 24, 2020 a redevelopment allowance shall be available if any allowance from Clause 1 remains, but not exceeding 1 single detached dwelling and calculated based on the development charge rates in place at the time of issuance of a building permit.
3. No extensions to the time frames set out in this agreement will be available.

9.6 FACILITIES AND RECREATION SERVICES

9.6.1 REPORT NO. PRD-2017-11

RFP 2017-23

Consultant Services for the Engineered Design of the Kirkpatrick Park Parking Lot and Wilmot Street Parking Enhancements, New Hamburg

Recommendation

THAT GM Blueplan Engineering Limited be hired to complete an Engineered Design of the Kirkpatrick Park Parking Lot and Wilmot Street Parking Enhancements, as per their proposal received on August 31, 2017 for the bid price of $42,590.00 plus applicable taxes.

9.7 FIRE – no reports

9.8 CASTLE KILBRIDE – no reports

10. CORRESPONDENCE

10.1 Wilmot Agricultural Society – Acknowledgement and Thank You Letter for Donation

Recommendation

THAT Correspondence Item 10.1 be received for information.

11. BY-LAWS

11.1 By-law No. 2017-45 – By-law to Appoint the Chief Building Official and Inspectors

Recommendation

THAT By-law No.'s 2017-45 be read a first, second and third time and finally passed in Open Council.

12. NOTICE OF MOTIONS

13. QUESTIONS/NEW BUSINESS/ANNOUNCEMENTS

14. BUSINESS ARISING FROM CLOSED SESSION

15. CONFIRMATORY BY-LAW

15.1 By-law No. 2017-46

Recommendation

THAT By-law No. 2017-46 to Confirm the Proceedings of Council at its Meeting held on September 25, 2017 be introduced, read a first, second, and third time and finally passed in Open Council.

16. ADJOURNMENT

Recommendation

THAT we do now adjourn to meet again at the call of the Mayor.

TOWNSHIP OF WILMOT

Council Meeting Minutes

Monday, September 11, 2017

Regular Council Meeting

Council Chambers

7:00 P.M.

Members Present: Mayor L. Armstrong, Councillors A. Junker, P. Roe, B. Fisher, J. Gerber and M. Murray

Staff Present: Chief Administrative Officer G. Whittington, Director Clerk's Services B. McLeod, Deputy Clerk D. Mittelholtz, Director of Public Works J. Molenhuis, Director of Facilities and Recreation Services S. Nancekivell, Director of Development Services H. O'Krafka, Director of Finance P. Kelly

1. MOTION TO CONVENE INTO CLOSED SESSION (IF NECESSARY)

2. MOTION TO RECONVENE IN OPEN SESSION (IF NECESSARY)

3. MOMENT OF SILENCE

4. ADDITIONS TO THE AGENDA

4.1 REPORTS – CLERK'S SERVICES – REPORT NO. CL2017-21 – Appointment of Engineer, Petition for Municipal Drainage Works, From AGCOM / Stewart Snyder, For Lot 18, Concession North of Bleams Road, Township of Wilmot, Regional Municipality of Waterloo

Resolution No. 2017-144

Moved by: A. Junker **Seconded by: M. Murray**

THAT Item 9.2.3 be added to the agenda under REPORTS – CLERK'S SERVICES – REPORT NO. CL2017-21 – Appointment of Engineer, Petition for Municipal Drainage

Works, From AGCOM / Stewart Snyder, For Lot 18, Concession North of Bleams Road, Township of Wilmot, Regional Municipality of Waterloo.

CARRIED.

5. DISCLOSURE OF PECUNIARY INTEREST UNDER THE MUNICIPAL CONFLICT OF INTEREST ACT

None disclosed.

6. MINUTES OF PREVIOUS MEETINGS

6.1 Council Meeting Minutes August 28, 2017.

Resolution No. 2017-145

Moved by: P. Roe **Seconded by: J. Gerber**

THAT the minutes of the following meetings be adopted as presented:

Council Meeting August 28, 2017; and,

Special Council Meeting August 28, 2017.

CARRIED.

7. PUBLIC MEETINGS

8. PRESENTATIONS/DELEGATIONS

9. REPORTS

9.1 CAO – no reports

9.2 CLERK’S SERVICES

9.2.1 ADDENDUM TO REPORT NO. CL2017-10

Summary of Public Feedback

Final Recommendations

Draft By-law to Include Dog Designations, Establishment of Appeal Committee and Appeal Process

Resolution No. 2017-146

Moved by: M. Murray **Seconded by: A. Junker**

THAT Report No. CL2017-10, dated June 26, 2017, and Addendum dated September 11, 2017 prepared by the Director of Clerk's Services and the Senior MLEO, outlining the proposed inclusion of Dog Designations and the establishment of an Appeal Committee/Process be endorsed;

AND FURTHER that By-law No. 2017-14, Being a By-law to Regulate Dogs and License Dog Kennels, be adopted.

CARRIED.

The Director of Clerk's Services highlighted the report.

In response to Councillor A. Junker, the Director of Clerk's Services confirmed that the definition used for Guide Dog or Service Dog is consistent with Accessibility for Ontarians with Disabilities Legislation. The Deputy Clerk added that the definition used within this By-law is for dog licensing purposes only and has no weight with other government agencies or private businesses.

9.2.2 REPORT NO. CL2017- 20

Proposed Council Meeting Schedule – 2018

Resolution No. 2017-147

Moved by: J. Gerber **Seconded by: P. Roe**

THAT the following schedule for Regular Council Meetings be adopted:

January 15, 2018	February 12, 2018
	February 26, 2018
March 5, 2018	April 9, 2018
March 26, 2018	April 23, 2018
May 7, 2018	June 4, 2018
May 28, 2018	June 25, 2018
July 23, 2018	August 27, 2018
September 10, 2018	October 1, 2018

September 24, 2018

November 5, 2018

November 19, 2018 December 3, 2018 (Inaugural).

CARRIED.

9.2.3 REPORT NO. CL2017-21

Appointment of Engineer

Petition for Municipal Drainage Works

From AGCOM / Stewart Snyder

For Lot 18, Concession North of Bleams Road

Township of Wilmot, Regional Municipality of Waterloo

Resolution No. 2017-148

Moved by: P. Roe **Seconded by: M. Murray**

THAT K. Smart & Associates Inc. of 85 McIntyre Drive, Kitchener be appointed as the Engineer relative to the Petition for Drainage Works from AGCOM / Stewart Snyder, for Lot 18, Concession North of Bleams Road, Township of Wilmot, Regional Municipality of Waterloo and be authorized to prepare a report under Section 8 (1) of the Drainage Act, R.S.O. 1990, Chapter D. 17.

CARRIED.

The Director of Clerk's Services confirmed for Councillor A. Junker that staff will continue to work with the Drainage Engineer to ensure that reasonable timelines are followed and legal requirements are met with regards to the Drainage Act.

9.3 FINANCE

9.3.1 REPORT NO. FIN-2017-32

Clean Water and Wastewater Fund – Transfer Payment Agreement

Resolution No. 2017-149

Moved by: M. Murray **Seconded by: J. Gerber**

That the Township of Wilmot enter into a Transfer Payment Agreement (TPA) with the Minister of Infrastructure under the Clean Water and Wastewater Fund (CWWF); and further,

That the Mayor and Clerk be authorized to execute said Transfer Payment Agreement, for a funding allocation of up to $820,035, towards community infrastructure projects.

CARRIED.

The Director of Finance highlighted the report.

9.4 PUBLIC WORKS

9.4.1 REPORT NO. PW-2017- 17

Reforestation Program – Quotation Award

Resolution No. 2017-150

Moved by: A. Junker **Seconded by: M. Murray**

That RFQ 2017-21 Reforestation Program quotation be awarded to Mar-John's Nursery Ltd. to complete the 2017 Reforestation Program at an estimated cost of $43,159.00 plus HST.

CARRIED.

The Director of Public Works highlighted the report.

The Director of Public Works advised Councillor B. Fisher that tree survival rates are generally the same for fall and spring plantings and that road salt does not appear to impact tree health.

9.5 DEVELOPMENT SERVICES – no reports

9.6 FACILITIES AND RECREATION SERVICES – no reports

9.7 FIRE – no reports

9.8 CASTLE KILBRIDE – no reports

10. CORRESPONDENCE

11. BY-LAWS

11.1 By-law No. 2017-14, Being a By-law of The Corporation of The Township of Wilmot to Regulate Dogs and License Dog Kennels and to Repeal By-law No. 2008-01

11.2 By-law No. 2017-43, Being a By-law to Authorize the Execution of the Clean Water and Wastewater Fund – Transfer Payment Agreement

Resolution No. 2017-151

Moved by: P. Roe **Seconded by: A. Junker**

THAT By-law No.'s 2017-14 and 2017-43 be read a first, second and third time and finally passed in Open Council.

CARRIED.

12. NOTICE OF MOTIONS

13. QUESTIONS/NEW BUSINESS/ANNOUNCEMENTS

13.1 Councillor J. Gerber reminded Council of his absence on September 25, 2017 as he will be hosting student leader delegates at the Canadian Student Leadership Conference.

13.2 Council Meeting Schedule Amendment

Resolution No. 2017-152

Moved by: J. Gerber **Seconded by: B. Fisher**

THAT the December 4, 2017 Council Meeting be changed to December 11, 2017.

CARRIED.

13.3 Members of Council highlighted several of the events occurring around Wilmot in the coming weeks:

- Wilmot Agricultural Society Fall Fair, September 14 to 17, 2017.
- Doors Open Waterloo Region, September 16, 2017 including several locations in Wilmot.
- Wilmot Terry Fox Run, September 17, 2017 with several events occurring leading up to the run itself.
- New Dundee Board of Trade Fish Fry, September 20, 2017.
- Food Fest in the Burg, September 23, 2017.

14. BUSINESS ARISING FROM CLOSED SESSION

15. CONFIRMATORY BY-LAW

15.1 By-law No. 2017-44

Resolution No. 2017-153

Moved by: J. Gerber **Seconded by: M. Murray**

THAT By-law No. 2017-44 to Confirm the Proceedings of Council at its Meeting held on September 11, 2017 be introduced, read a first, second, and third time and finally passed in Open Council.

CARRIED.

16. ADJOURNMENT (7:25 P.M.)

Resolution No. 2017-154

Moved by: P. Roe **Seconded by: M. Murray**

THAT we do now adjourn to meet again at the call of the Mayor.

CARRIED.

____
Mayor

____
Clerk

Why Arts & Cultural Planning is Important

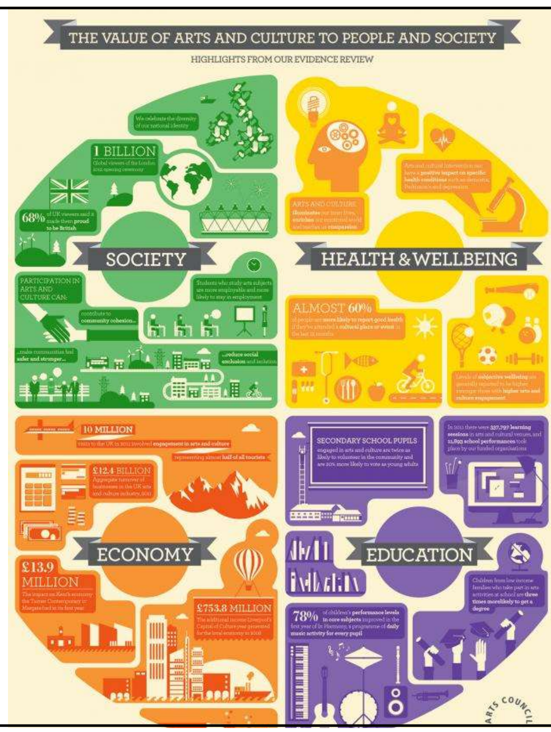
- It complements the excellent parks and recreation master plan that has just recently been developed by providing another set of opportunities for residents
- It ensures that the arts, culture and heritage-related aspirations of residents are heard and understood
- It contributes to a high quality of life
- It conveys a message to the outside world that arts and culture is important and cared for: positive branding
- It ensures that Wilmot is seen as a desirable place in which to live and invest

Economic Value of Culture in Ontario

- 2010 study by Statistics Canada:
  - *- industry worth $22 billion in Ontario*
  - *- 222,000 jobs in the province (4.1%)*
  - *- Ontario has half of all culture jobs in the nation*
  - *- 3.7% of the provincial economy*
- 69 municipalities (15% of all in province) have culture plans – but these represent over ¾ of population of Canada

Township of Wilmot
Arts & Culture Master Plan
Putting The Pieces Together

*- **Ontario Culture Strategy Background Document**, 2016*



Scope of Work *(from RFP)*

The Arts and Culture Master Plan shall be an integrated community and Council/Staff plan that considers all aspects of tangible and intangible cultural assets within Wilmot Township. The comprehensive plan shall define the goals, objectives and priorities for the municipality and serve as a community development tool for planning and for developing a better understanding of the needs of our residents and cultural community.

Specific Study Objectives

- To develop a Master Plan that will guide the municipality's investment in arts, culture and heritage activities
- Plan is to cover a 5-year period, but set direction for the next decade
- Note that guiding philosophy is that the municipality is a partner with the community in the development of the plan
- Role is to be responsive to the community and supportive of arts and culture aspirations, but not to provide everything directly

Study Process

Phase 1 –
Data Collection & Situation Analysis

Phase 2 –
Strategy Development

Phase 3 –
Implementation

Casting the Net Wide

- Want to ensure that **everyone** is aware of the development of the strategy
  …and that **everyone** has an opportunity to participate

- So:
  - *active social media plan*
  - *community survey*
  - *business survey*
  - *appearances at community events*
  - *Town hall / public meetings*

Key Tasks – Phase 1

- Review of materials
- Interviews
- Community survey
- Business survey
- Town Hall; public meetings; event attendance
- Benchmarking
- Inventory of cultural assets
- Long list of possibilities
- Situation analysis report

Key Tasks – Phase 2

- Workshop session
- Discussion paper
- Second round meetings
- Steering Committee meeting

Key Tasks – Phase 3

- Draft of Plan & Implementation
- Second Workshop Session
- Steering Committee meeting

Township of Wilmot

Arts & Culture Master Plan

Putting The Pieces Together

Active Social Media Program

- **Video:** *http://www.wilmot.ca/en/living-here/ArtsCultureMasterPlan.aspx*
- Regular tweets
- Facebook page
- Vehicles to direct to community survey

Township of Wilmot

Arts & Culture Master Plan

Putting The Pieces Together

Timeframe

- Phase 1 – complete by end October
- Phase 2 – complete by early December
- Phase 3 – aiming for year-end

Some Preliminary Findings – Community Survey

- 68 responses so far: very complete and insightful responses – will be very useful
- Overall, very positive regarding stance of Township to arts, culture, heritage & very appreciative that this study is being undertaken
- Survey up until mid-October, so still time for more response
- **BUT:**
  - ❑ 2/3 respondents women – *so need more male respondents*
  - ❑ Only 3% under 30 - *so need more younger respondents*
  - ❑ *No single parents*

Some Preliminary Findings – Business Survey

- 10 responses so far: similarly, very complete and insightful responses – will be very useful
- But, only 10, so need more!

Recent and Upcoming Venues for Participation

- Summer Concert Series (Sept 11)
- 23rd Annual Poor Boy's Luncheon
- Others to be arranged

Thank You !

… and now, the video, followed by Q & A

Township of Wilmot REPORT

REPORT NO.	**CL2017-22**
TO:	**Council**
PREPARED BY:	**Barbara McLeod, Director of Clerk's Services**
DATE:	**September 25, 2017**
SUBJECT:	**Waterloo Area Municipal Ombuds Office 2016-17 Annual Report Township of Wilmot**

Recommendation:

THAT the Waterloo Area Municipal Ombuds Office Annual Report for 2016-2017, be received for information purposes.

Background:

Pursuant to Section 223 of the *Municipal Act, 2001*, municipalities may appoint an Ombudsman who reports to Council, whose function is to investigate in an independent manner, any decision or recommendation made or act done or omitted in the course of the administration of the municipality.

The *Ombudsman Act* was amended effective January 1, 2016 to expand the jurisdiction of the Ontario Ombudsman to include municipalities, municipal boards and their agencies. Further to the expanded area of jurisdiction bestowed on the Ontario Ombudsman, municipalities are also able to appoint a local ombudsman.

In the spring of 2016, Council approved the appointment of Agree Inc., who acts as the Ombudsman on behalf of The Township of Wilmot, the Region of Waterloo, the Cities of Cambridge and Waterloo and the Townships of Wellesley and Woolwich. The 'Waterloo Area Municipal Ombuds Office' is the name that has been established for the joint service and is one of the first of its kind across the Province in forming a joint partnership of municipalities in the Region.

Discussion:

The agreement with the Ombuds Office requires that an annual report on the activities be reported to Council. As noted in the Office's first report, the timeline is for nine months. Future reporting will be based on one year of activity.

Strategic Plan Conformity:

The report is in conformity with the Township's Strategic Plan by communicating municipal matters and strengthening customer service.

Financial Considerations:

An annual retainer is provided to the Ombuds Office for their services, this retainer is shared with the participating partners and is based on population count. Wilmot's portion is approximately $300 annually. In addition, the annual report and inquiry costs are budgeted based upon anticipated activity levels.

Conclusion:

The Ombudsman is required to provide a report on the activities of the office directly to The Township of Wilmot on an annual basis, which is attached to this report as Appendix 1.

The Ombuds report is for information purposes and provides a breakdown of inquiries received by the Municipal Ombudsman since the official appointment in 2016.

Barbara McLeod	Grant Whittington
Director of Clerk's Services	Reviewed by CAO

Annual Report

Township of Wilmot

Agree™

Waterloo Area
Municipal Ombuds Office

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THE OMBUDSMAN'S MESSAGE

This Report is the first of its kind to the Township of Wilmot. The Waterloo Area Municipal Ombuds Office began operation on September 1, 2016 and provides service to the Region, the Cities of Cambridge and Waterloo and the Townships of Wilmot, Woolwich and Wellesley. This reporting period runs from September 1, 2016 to May 31, 2017, a period of nine (9) months. Future reports will cover twelve months running from June 1st – May 31st.

I visited each of the six (6) municipalities that our office serves and met with the Region's Corporate Leadership Team on October 12, 2016. These meetings were to help to develop the working relationships the Ombuds Office needs to be effective in resolving issues as well as to make senior leadership aware of the Waterloo Area Municipal Ombuds Office's complaint resolution process and mandate. I noted good acceptance and understanding of the mandate for the office and genuine interest based on the questions that were asked.

The office received one (1) Inquiry and (1) Complaint over the course of nine months. Rose Bowden, the Early Resolution Consultant and I were surprised by the scant number of inquiries, which was reflective of what other municipal organizations were receiving, one of which received none at all.

One of the inquiries was subject to referral while the other was formalized by filing a Complaint, Consent and Confidentiality Form and either resolved through shuttle diplomacy (which is what we call informal mediation over the phone or electronically) or through mediation. Neither of the matters gave rise to a formal investigation.

The cases we intervened in throughout the subject municipalities were largely resolved through opening or reopening lines of communication (when people grow frustrated many stop talking), challenging both citizens and municipal decision makers to listen to what the other person was saying and to give the matter a careful second look. In some instances we were able to facilitate agreement, in others we provided an Initial View letter which set out how I saw the matter based on the facts as I had learned them and this formed the basis of resolution.

Looking forward for the upcoming year, I will be meeting with the Ombuds Advisory Committee (the municipal Clerks) about how we might reach out to citizens to ensure that they are aware of the Waterloo Area Municipal Ombuds Office and how to go about approaching the Office. I will also be soliciting input about how the Office is perceived within their municipalities and how we can provide educational opportunities to municipal administrators, including those at the Region.

Rose Bowden and I look forward to evolving the services of the Office to meet the needs of the vital and growing Region of Waterloo we serve.

Richard A. Russell

Richard A. Russell B.A., LL.B., C. Med. C. Arb.
Ombudsman, Waterloo Area Municipal Ombuds Office

ABOUT OUR OFFICE

Waterloo Area Municipal Ombuds Office

What is an Ombudsman?

An ombudsman is an Officer of Council responsible for looking into whether administrators are properly applying the by-laws and policies of the municipal corporation. While the ombudsman has no power to overturn decisions, they do make recommendations and can bring matters to the highest levels of the municipality for consideration.

The ombudsman has the authority to consider complaints that administrators are misusing their power, failing to use their discretion or acting unfairly. They will conduct a thorough and fair investigation and make findings based on evidence.

An ombudsman will also provide information and guidance to citizens and work between municipal administration and individuals to solve problems informally when possible.

An ombudsman provides an Annual Report to Council with recommendations for any changes to policies or practices that he or she feels are needed.

Jurisdiction

The Waterloo Area Municipal Ombuds Office derives its legal authority from the Ombudsman Act of Ontario, which under section 14 (4.3) sets out the jurisdiction of the municipal Ombudsman. In effect the Municipal Ombudsman has all of the same rights to investigate as would the Provincial Ombudsman.

Our Philosophy

“Partnering With”, rather than “Oversight Of” is the service orientation that we have sold. We view Complaints as a Resource that municipalities can learn and grow from. We are remedial and not punitive in our orientation toward the institutional clients.

Scope of Services

Matters that *__ARE__* within the Ombuds' Mandate to Investigate are:

1. Where the Region/City or Township has not followed appropriate procedures in arriving at a decision;
2. Where the Region/City or Township has acted in a way that is contrary to its own rules, procedures or By-laws;
3. Where the Region/City or Township has made a decision that is outside of its powers to make;
4. Where the Region/City or Township has failed to take a specific action that it is required to under its rules, procedures or By-laws;
5. Any decision or recommendation made, act done or omitted to be done in the course of the administration of the Region/City or Township, so long as it does not fall under the list of matters that are *not within our mandate to investigate (see below).*

Matters that are *__NOT__* within the Ombuds' Mandate are:

1. Any Region/City or Township decision, recommendation, act or omission in respect of which there is a right of appeal, review or objection to any court or tribunal, until that right of appeal, review or objection has been exercised, or the time for the exercise of that right has expired;
2. Cases where the inquirer has not taken their complaint to the Region/City or Township first;
3. Decisions, recommendations, acts or omissions of a legal advisor or counsel to the Region/City or Township;
4. Complaints regarding closed meetings of Council;
5. Complaints that are within the mandate of the Integrity Commissioner;
6. Complaints where the subject matter is deemed to be trivial, frivolous, vexatious or an abuse of the Ombuds Office process or which are not made in good faith, in the opinion of the Ombuds Office;
7. Cases *where more than one (1) year has passed* since the inquirer learned of the facts on which the complaint or inquiry is based, unless special circumstances exist.
8. Issues related to labour and employment matters.

Process

Inquirers must provide (within one year as above) a completed and signed Complaint Form with consent to disclose such evidence and information as is necessary to conduct a full, fair and impartial inquiry or investigation. Complaints and Inquiries ***must*** originate with the affected party; the Ombuds does not accept complaints from interested, but unaffected third parties.

Initial Review

An Initial Review is conducted to decide whether a file may be investigated. During the Review, the following questions are considered:

- Did the inquirer already go through the Region/City or Township's internal complaint process? If not, the inquirer will be referred to the appropriate Region/City or Township office;
- Is the complaint or concern within the Ombuds Office's mandate?

Inquirers and the respondent, where appropriate, are advised of the outcome of the Initial Review.

An Initial Review may result in the inquirer and the Region/City or Township being advised that the issue may be investigated. It may also result in an Initial Review Letter advising the Inquirer (and respondent if appropriate) that the file is being closed because the inquiry is not within the Ombuds Office mandate, together with a referral to the appropriate body to lodge a complaint, wherever possible.

Early Resolution

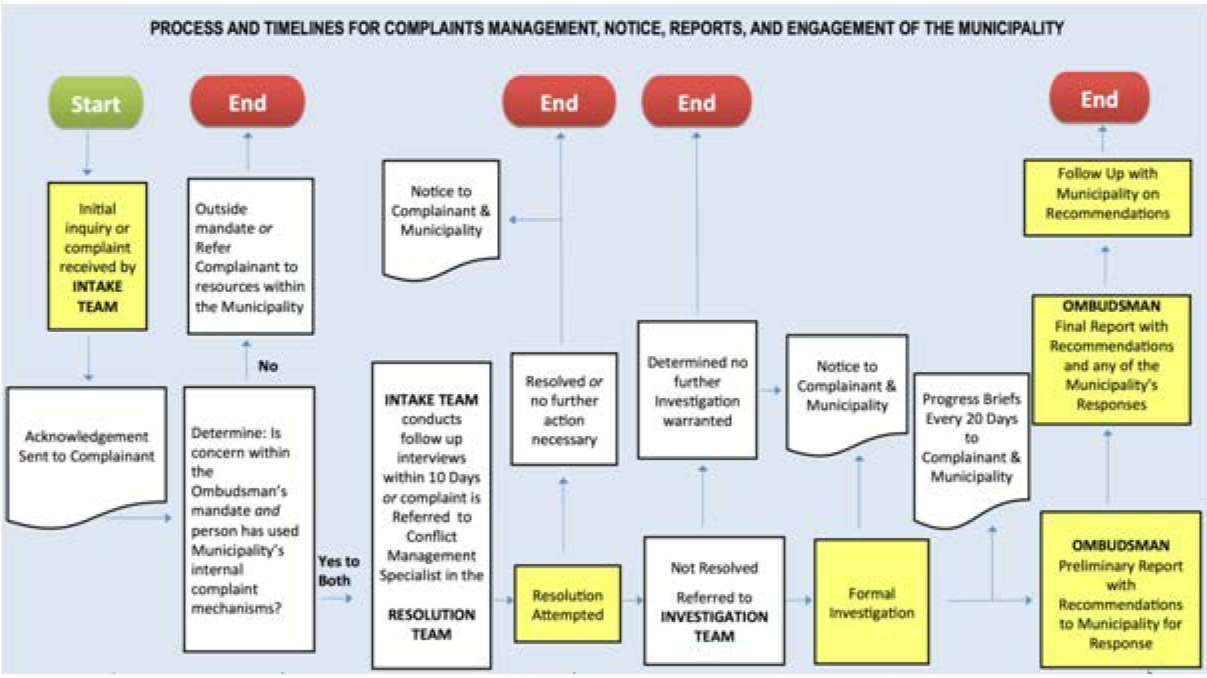
For inquiries that proceed, the Investigator will review all of the documentation that was provided by both the inquirer and the Region/City or Township. If the Investigator believes that the issue(s) may be able to be resolved consensually, the matter may be referred for early resolution through a Conflict Management Professional.

Investigation

If a resolution is not possible, the matter will be referred back to the Investigator who will continue investigating the complaint and who may contact the inquirer and the Region/City or Township to schedule interviews and gather information.

The Report will contain the Investigator's findings, either *recommending a remedy* for the concern to the Region/City or Township or rejecting the complaint. In either case, the Report will contain reasons for the decision. Ombuds Offices *cannot order* a municipality or an inquirer to take any steps, but may make recommendations with persuasive reasons. Such recommendations are often followed.

Process Flowchart



Privacy at Waterloo Area Municipal Ombuds Office

Waterloo Area Municipal Ombuds Office collects personal information from Inquirers and Member Regions, Cities or Townships for the purpose of resolving disputes. Waterloo Area Municipal Ombuds Office ensures that the personal information of our clients remains confidential and secure. This Privacy Policy ("Policy") describes the ways Waterloo Area Municipal Ombuds Office is committed to ensuring that all private and confidential information is protected for both the Inquirer and the Member Region, City or Township. This Policy is intended to ensure that the privacy of individuals is protected in the use, collection, disclosure, and storage of personal and/or confidential information by Waterloo Area Municipal Ombuds Office. This Policy complies with and supplements the guidelines and mandates of Canada's federal private sector privacy law, the Personal Information Protection and Electronic Documents Act.

Waterloo Area Municipal Ombuds Office will manage personal information in an open and transparent way. This Policy will be available to anyone free of charge.

Waterloo Area Municipal Ombuds Office Commitment

Waterloo Area Municipal Ombuds Office is committed to keeping all personal information private and confidential. With written consent, we will collect personal information from the Member Region, City or Township and the Inquirer in order to investigate the complaint. Any and all information collected from the Member Region, City or Township and the Inquirer will only be used for the purpose of determining the proper resolution and/or recommendations. Waterloo Area Municipal Ombuds Office is committed to protecting the security of the files it maintains and there are security measures implemented in order to maintain the security.

Information Collected

While the personal information that Waterloo Area Municipal Ombuds Office collects depends on the nature of the complaint, the personal information may include your home address and telephone number, and any and all personal and identifiable information that is obtained by the region, city or town about the Inquirer. We collect personal information from the Inquirer, the Member Region, City or Township, and others as necessary, to facilitate the investigation and resolution of a complaint. We will limit the amount and type of personal information we collect by ensuring we only collect such information that is reasonably necessary and directly related with the complaint in dispute. All personal information will be collected by lawful and fair means.

Accountability

Waterloo Area Municipal Ombuds Office is accountable for all personal information in its possession or control. Policies and procedures have been established to comply with this Policy.

Consent Required

We will not collect, use, or disclose any personal information without first obtaining consent, except where required or permitted by law. Consent may be withdrawn at any time. Further assistance in resolving the complaint may not be available if consent is withdrawn.

Use of Personal Information

Waterloo Area Municipal Ombuds Office will only use or disclose your personal information for the intended and identified purposes and reasons for which the information was collected, except where required and permitted by law. Waterloo Area Municipal Ombuds Office will take such reasonable steps as necessary to ensure that the personal information collected is accurate, complete, relevant, and up to date. We will inform individuals of the purpose for which personal information will be used before or when they consent to its collection.

Access to Personal Information

A person may access their personal information held by Waterloo Area Municipal Ombuds Office that has been provided to us and is in our possession. Parties should contact their region, city or township directly to access their personal information provided to us by that Member Region, City or Township in the course of our dispute resolution process.

Website

Our online website www.civicombuds.ca is hosted on servers that are owned and managed by a third party.

Security

Waterloo Area Municipal Ombuds Office has taken the proper and necessary steps to ensure all information pertaining to our clients' files is secured and protected against theft, unauthorized use, modification, and loss. Security-protected databases are used to store online files, and specific security measures are used to ensure the files are monitored through multiple security scans of the online content as well as numerous checks to prevent common website hacks like cross-site scripting, SQL injection, brute-force password attacks, etc.

Breach of Privacy

A complaint about a breach of privacy must be in writing, and directed to Waterloo Area Municipal Ombuds Office. The individual making the privacy complaint must give Waterloo Area Municipal Ombuds Office sixty (60) days to respond.

Wilmot Summary

2 Messages – split into…

1 Inquiries – resolved at Early Resolution

1 Pertaining to water / plumbing

1 Complaints – went to Ombudsman

1 Pertaining to Parking

Facilitated a resolution

Township of Wilmot :

Inquiries: 1

The Ombuds Office defines an inquiry as a contact with a person about an issue which may or may not fall within the Office's jurisdiction. These are often in the nature of "touches" where we act as a conduit from the Inquirer to the appropriate resource to resolve their issue(s). The threshold is that with inquiries the individual is not asked to provide a Complaint, Consent and Confidentiality Submission Form which permits us to talk with persons on the other side of a complaint. Typically these are dealt with by our Intake & Early Resolution Consultant with little input from the Ombudsperson.

1. This Inquirer expressed concerns with work that the Township had done to the nearby sewage system. She noted that, since the Township had completed its work she had begun to experience problems with the operation of her toilet and pipes. She believed that the Township was somehow tampering with her pipes, resulting in difficulties with her toilet. The Complainant was referred to the Public Works department of the Township to see whether they could look into her concerns and offer any suggestions to resolve them.

Complaints: 1

A Complaint is defined by the Ombuds Office as an allegation that may or may not be within the jurisdiction of the Waterloo Area Municipal Ombuds Office but which requires further fact finding to determine in what way the Office may assist. It usually involves the completion of the Complaint, Consent and Confidentiality Submission Form outlining in writing the nature of the complaint, and giving the Office permission to begin to gather information, disclose information to civic officials, facilitate discussions, make suggestions and recommendations, as well as to investigate as required.

1. This file was a Complaint about street parking over the winter season. The Township had been working with the Complainants but they were unhappy with the administration of a parking program; particularly parallel parking on the apron of adjoining semi-detached dwellings.

   We recommended mediation between the Complainants and their neighbours. The Township convened a mediation session, but only the Complainant attended. The municipality took extraordinary steps around enforcement to ensure the neighbours' compliance and modified their policy somewhat to satisfy the Complainants and to ensure safe access and egress from their residence. These Complainants were very pleased with the outcome and with the work of the By-law enforcement department and Township Clerk's Office. They wrote a letter thanking the Waterloo Area Ombuds Office for our assistance in facilitating a resolution to their concerns.

Agree™ Waterloo Area Municipal Ombuds Office

Contact Information

http://www.civicombuds.ca

36 Dundas Street, Dundas, ON L9H 1A2

Local: 905-627-2033 | Toll Free: 1-888-224-2488

Fax: 905-627-5362

Email: ombuds@civicombuds.ca

Township of Wilmot
REPORT

REPORT NO.	**PW-2017-18**
TO:	**Council**
PREPARED BY:	**Jeff Molenhuis, Director of Public Works**
DATE:	**September 25, 2017**
SUBJECT:	**Holland Mills Road Bridge – Structure No. 17B/B-T13 Schedule "B" Class Environmental Assessment and Preliminary Design – Project File Report**

Recommendation:

THAT the Township of Wilmot take the following actions with respect to the Class Environmental Assessment for the Holland Mills Road Bridge – Structure No. 17B/B-T13:

i) Approve the preliminary design for construction of the preferred alternative – Concrete Box Girder as described in Report PW-2017-18, dated September 25, 2017;
ii) Direct staff to file the Notice of Study Completion for this Class Environmental Assessment Schedule "B" Study by means of advertisements in the local newspapers, Township website and direct mailings, and place the Project File Report on the public record for a period of 45 days;

AND THAT, following the 45-day waiting period, that K. Smart & Associates be instructed to complete the detailed design and contractdocument preparation for the replacement structure.

Background:

Bridge No. 17/B-T13 is a through truss type bridge constructed around 1910 and understood to be relocated to Holland Mills Road over the Nith River between 1925 and 1930. The bridge was rehabilitated most recently in 2007 with repairs including deck, curbs, abutments, railings, deck drains and truss structure. The most recent appraisal, completed in 2015, listed the bridge in fair to poor condition and recommended future replacement. The bridge has been posted with a 3 tonne load limit since 2007, and possibly longer.

It is understood that, in May 2016, a large number of vehicles, including vehicles that most likely exceeded the load limit, were detoured using the Holland Mills Road around a highway closure. As a result of both the increased traffic and loads in excess of the posted load limit, the bridge suffered severe structural damage. The bridge was inspected by Township staff and ultimately closed. K. Smart Associates Limited were contracted to complete a follow-up inspection following

Ontario Regulation 104/97 Standards for Bridges in accordance with the Canadian Highway Bridge Design Code and the Ontario Structure Inspection Manual. After a visual inspection, it was confirmed by K. Smart that the bridge should remain closed. It was noted that significant structural distresses and failures were present throughout the bridge structure.

Subsequently in August 2016, Council approved the following recommendation:

> *"THAT a Class Environmental Assessment and Preliminary Design be completed for Bridge No. 17/B-T13 located on Holland Mills Road;*
>
> *AND FURTHER THAT K. Smart Associates Limited be retained to complete the Class Environmental Assessment and Preliminary Design;*
>
> *AND FURTHER THAT $86,300, plus applicable taxes be allocated within the 2017 Capital Budget for this project."*

Discussion:

Class EA Study/Public Comments

In September 2016, property owners, various agencies and stakeholder groups were mailed a copy of the Notice of Study Commencement for the Class EA study associated with the Holland Mills Road bridge. Advertisement was placed in the New Hamburg Independent in September and October 2016.

The problem definition for this project consisted of the following statement:

> *"Given that the existing structure is deficient in terms of loading capacity and structure width, as well as the structure currently being closed, the Township of Wilmot is considering options to eliminate all deficiencies as well as to provide improved levels of traffic service and overall safety."*

On May 11, 2017 a Public Information Centre (PIC) was held at the Haysville Community Centre where a total of five alternatives were presented to address the deteriorating bridge structure. The alternatives presented were evaluated based on criteria in the following categories:

1) The natural environment;
2) The socio-economic environment;
3) The cultural environment;
4) Technical considerations; and
5) Cost.

The matrix is equally-weighted so that each criterion takes the same priority among all options received, and so that one criteria doesn't take more weight over another.

A preferred alternative of replacement was presented to the public, including three design options for a replacement structure. Comments were received from the public at the PIC in relation to the preferred alternative and options presented. Responses from representatives of the various affected utilities, Regulatory Agencies and stakeholder groups were also received as a follow-up to this information session. The Preferred Alternative preliminary design was further refined after evaluation of the comments received.

Within in each area of evaluation, there are sub-sets of regulations that must be met through the final project process. Regulatory agencies and stakeholder groups provided their comments in relation to the evaluation and preferred alternative, which are addressed within the final report document.

As summarized in the attached report, a large portion of the public and stakeholder comments received did not object to, or were in favour of, the preferred alternative, that being replacement of the current structure with a concrete box girder structure. Comments received from agencies included:

1) Mitigation of the hydraulic impacts from the preferred alternative to river flow;
2) Mitigation of construction impacts on the natural environment considerations with respect to Species At Risk; and
3) Consideration to heritage impacts, with conservation/documentation of elements, where possible, of the existing structure.

Many of the detailed comments received from the stakeholder groups were addressed through correspondence over the course of the project with stakeholder groups, as well as within the final report document.

Preferred Alternative

Based on the various detailed investigations undertaken for this study, input received and results of the evaluation, replacement of the existing structure in the current location was the most preferred. Further consideration to three replacement options is outlined in the Study report, with concrete box girder, bailey bridge and truss bridge being further evaluated. As the report outlines, the concrete box girder replacement option is recommended for the following reasons:

1) It has the lowest evaluation score, meaning this option has the lowest overall negative impact to the group of evaluation areas;
2) It addresses the problem statement with respect to safety, operational deficiencies and improved level of service with respect to traffic;
3) It is a cost-effective, long-term solution to address safety, operational deficiencies and improved level of service with respect to traffic;
4) It meets the technical considerations with respect to river hydraulics, traffic loading and deck width;
5) It mitigates the impacts to the natural environment with respect to Species at Risk, among other natural environment considerations; and
6) It can incorporate an element of “sympathetic design” to recognize the heritage aspect of the current deteriorated structure.

Cultural Heritage Evaluation Report and Heritage Impact Assessment (CHER/HIA)

The process of heritage evaluation for bridge structures in Ontario is well defined. This evaluation is integrated into the Environmental Assessment process. The process of evaluation is undertaken by a provincially licensed, qualified heritage professional, who evaluates the structure using the Municipal Engineers Association Checklist for determination if heritage value may be present, and thereby identifies the need for further Heritage Impact Assessment study. If the Heritage Impact Assessment is warranted, the professional heritage planner evaluates the structure within the Ontario Heritage Act Regulation 9/06 with respect to criteria for assessing heritage value.

Using the structural inspection reporting, the report concludes that repairing the bridge for the purpose of re-opening the road would require extensive repairs, requiring much of the original structure to be replaced. Further, the repair option would not resolve the loading deficiencies, width deficiencies and life-cycle costs for maintenance and would require future, more advanced cycles of continual rehabilitation. The integrity of the original structure would be compromised through this option, as would the project goals of rectifying operational deficiencies, safety deficiencies and routine maintenance deficiencies.

Under the Ontario Heritage Act Regulations, structures with heritage value must be considered for conservation or mitigation. The retention or restoration of the existing structure for the purpose of road operations is outlined as not reasonable within the CHER/HIA document. Retaining of the structure for alternative use at this location or another municipal location is not a reasonable solution either. Therefore, the recommendation with respect to heritage considers the following:

1) Removal and replacement of the structure with sympathetic design;
2) Where feasible, incorporating elements of the current structure into a new structure, monument or display; and
3) Undertaking of a full recording and documentation of the existing structure.

The preferred alternative and recommendation within the final report document meets the requirements of the Regulations and generally satisfies the approval requirements of the Ministry of Tourism, Culture and Sports (MOTCS) with respect to heritage. The Environmental Assessment final report document further outlines options with respect to salvaging structure materials.

Next Steps

Should Council accept the Preferred Alternative within the attached Study, the Class EA Project File Report must then be advertised and “filed” for 45 days under the Schedule “B” Class EA guidelines. The advertisement will advise interested parties that they can review the project documentation. Should members of the public or an external agency feel that the study did not fully address all the issues, and feel they cannot be resolved during this review period, they have an opportunity within the filing period to register an objection to the project with the Minister of the Environment.

If no objections to the project are registered during the 45-day period, the project is considered approved under the Environmental Assessment Act, and detailed design and construction can proceed.

The first funding milestone under the Township’s agreement with the Province of Ontario outlines February 2018 as a date where design and tender work must be complete. In order to meet the timelines outlined, including project completion by December 2018, the design preparation for contracting services to remove the existing structure and construct the new structure needs to be advanced immediately following the 45-day waiting period. Considering the current date, this timeframe would have detailed design commencing in mid-November, which is a short timeline to reach to the tender and construction documentation milestone for February 2018. Therefore, this report also recommends initiating the detailed design process immediately following the 45-day waiting period.

Strategic Plan Conformity:

Maintaining Township infrastructure, caring for our rivers and communicating municipal matters ensures that we are an engaged community that protects our environment while having a prosperous economy.

Financial Considerations:

The 2017 Capital Budget includes funding in the amount of $281,300 to complete the Class EA, begin design/engineering and undertake preliminary site works for the preferred design.

As described in Finance Report FIN 2017-15 which, was presented to Council on March 6, 2017 the 10-year capital forecast has included an estimate of $1,541,300 for this project in 2018 and we have received a funding allocation from the Ontario Community Infrastructure Fund (OCIF) top-up program in the amount of $1,198,193. Therefore, the project will be funded by OCIF with the remainder coming through the Township's Infrastructure Reserve Fund for Transportation.

The preferred alternative is currently within the budget allocated, with further refinement of budget figures expected at the time of detailed design.

Conclusion:

After the Project File Report has been adopted by Council, it will be placed on the public record for a 45-day period as required under the Class Environmental Assessment Act. Following that period, Staff will proceed with implementing the preferred option in late 2017 and 2018.

Jeff Molenhuis	Grant Whittington
Director of Public Works	Reviewed by CAO

PROJECT FILE

BRIDGE 17/B-T13
(HOLLAND MILLS ROAD BRIDGE)

TOWNSHIP OF WILMOT

SEPTEMBER 2017

FILE NO. 16-298

K. SMART ASSOCIATES LIMITED
85 MCINTYRE DRIVE
KITCHENER ON N2R 1H6

\\server\KSdata\Data\2016\16-298\Correspondence\EA\16-298 Project File.docx

PROJECT FILE

BRIDGE 17/B-T13
(HOLLAND MILLS ROAD BRIDGE)

TOWNSHIP OF WILMOT

CONTENTS

1.

BACKGROUND, CATEGORY AND PROCESS OF THIS ENVIRONMENTAL ASSESSMENT

- Background
- Category and Process of this Environmental Assessment

BACKGROUND

The Ontario Environmental Assessment Act (EA Act) is to provide for "*the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management in Ontario of the environment*" (Ontario Environmental Assessment Act, R.S.O 1990 Part I-Section 2). The EA Act further defines the "environment" as:

a) air, land or water;
b) plant and animal life, including human life;
c) the social, economic and cultural conditions that influence the life of humans or a community;
d) any building, structure, machine or other device or thing made by humans;
e) any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities;
f) any part of combination of the foregoing and the interrelationships between any two or more of them

In applying the requirements of the EA Act to an undertaking (i.e. a project such as a road, bridge, etc.), the EA Act identifies two types of environmental assessment planning and approval processes:

- Individual Environmental Assessments
  Projects for which a Terms of Reference and an individual environmental assessment is carried out and submitted to the Minister of the Environment for review and approval

- Class Environmental Assessments
  Projects which are approved subject to compliance with an approved class environmental assessment process with respect to a class of undertakings. Provided the approved process followed, a proponent has complied with the EA Act.

The Municipal Engineers Association (MEA) has produced a document titled "Municipal Class Environmental Assessment" which defines a five phase planning procedure that Municipalities (such as the Township of Wilmot) can use to plan, design, construct, operate, maintain, rehabilitate and retire the majority of infrastructure projects. The idea is to eliminate the need to seek individual approvals for every project a Municipality may undertake. The five phase planning procedure is as follows:

- Phase 1
  Identify the problem or opportunity

- Phase 2
  Identify, assess, and evaluate alternative solutions

- Phase 3
  Identify and evaluate alternative design concepts for the preferred solution

- Phase 4
  Prepare an Environmental Study Report

- Phase 5
  Implementation

As projects typically undertaken by municipalities vary in their environmental impact, the following types or schedules of projects have been defined. These schedules are as follows:

- Schedule A
  - May follow through to implementation without following the full Class EA planning process.
  - Activities include normal or emergency operational maintenance activities with minimal environmental impacts.

- Schedule A$^+$
  - The project has been previously approved and requires the public to be advised prior to project implementation.
  - Agency consultation may still be required.

- Schedule B
  - In general it includes improvements and minor expansions to existing facilities.
  - There is potential for some adverse environmental impacts.
  - The proponent is required to proceed through a screening process including public and agency consultation.

- Schedule C
  - Generally includes major expansions to existing facilities and construction of new facilities.
  - These projects proceed through the full municipal EA planning process.

Consultation is a major component of the EA process. Communication between the proponent and affected/interested stakeholders provides opportunities for the exchange of information and to allow those affected to influence decisions being made. As per Municipal Class Environmental Assessment, stakeholders include the general public, review agencies, other municipalities as well as First Nations and Aboriginal Peoples. The timing and quantity of consultation is also important, the following dictates the minimum level of consultation and with whom for Schedule A, A$^+$, B and C projects:

- Schedule A
  - No contact with the public, review agencies, other municipalities, First Nations and Aboriginal Peoples required.

- Schedule A$^+$
  - Formal advisory contact with the public required.

- Schedule B
  - Two points of contact with the public, review agencies, other municipalities, First Nations and Aboriginal Peoples required.

- Schedule C
  - Three points of contact with the public, review agencies, other municipalities, First Nations and Aboriginal Peoples required.

CATEGORY AND PROCESS OF THIS ENVIRONMENTAL ASSESSMENT

The potential works involved to reconstruct Bridge 17/B-T13 (Holland Mills Road Bridge), assuming the financial limit is less than $2.2 million, fall under a **Schedule B** project as per Item 25 - General Operation and Maintenance of Linear Paved Facilities and Related Facilities, Appendix 1 – Project Schedules of Municipal Class Environmental Assessment. Item 25 includes the reconstruction of a water crossing where the reconstructed facility will not be for the same purpose, use, capacity or at the same location (capacity refers to either hydraulic or road capacity).

As such, the following process will be used to satisfy the requirements of the EA Act.

- Phase 1
  - Identify the problem or opportunity
  - 1st point of mandatory public and agency consultation

- Phase 2
  - Identify possible alternative solutions
  - Evaluate alternatives and select a preferred alternative
  - 2nd point of mandatory public and agency consultation
  - Complete preliminary design
  - Complete Project File Report

- Phase 3
  - Not applicable for Schedule B projects

- Phase 4
  - Not applicable for Schedule B projects

- Phase 5
  - Complete detailed design (drawings, specifications and tender documents)
  - Proceed to construction and operation

2.

PROBLEM DEFINITION AND EXISTING CONDITIONS

- Problem Definition
- Existing Conditions
- Excerpts from 2015 Structural Evaluation Report for Bridge 17/B-T13
- 2015 OSIM Report for Bridge 17/B-T13
- Letter to Township of Wilmot regarding Recommendations Following Emergency Closure

PROBLEM DEFINITION

Bridge 17/B-T13 (Holland Mills Road Bridge) is an existing structure spanning the Nith River on Holland Mills Road between Bleams Road and Huron Road. The structure consists of a single-span one-lane steel truss bridge. The bridge was constructed in 1910± and is deficient in width and loading capacity in relation to current standards. The bridge is currently closed to all vehicular traffic.

Given that the existing structure is deficient in terms of loading capacity and structure width as well as the structure currently being closed, the Township of Wilmot is considering options to eliminate all deficiencies as well as to provide improved levels of traffic service and overall safety.

EXISTING CONDITIONS

Socio-Economic Environment

The study area is within the lower tier municipality of the Township of Wilmot in the Region of Waterloo. The immediate study area is comprised of a mixture of rural agricultural and rural residential properties. The surrounding area is rural agriculture. At the bridge site itself, people are known to fish in the river as well operate paddled vessels in the river. Noise and vibration is minimal because of the very low traffic counts on Holland Mills Road and as of May 2016, the traffic is near zero due to the bridge being closed to all vehicles. Air quality can be said to be very good for the very same reasons. This site could be considered "picturesque" because the river and associated flood plain is clearly visible from the roadway and the fact the crossing consists of a steel truss bridge.

Adjacent Landowners

There are four (4) adjacent landowners located in the vicinity of the study area. Potential impacts to this resident include property acquisition, loss of access, delayed access to emergency services, etc. Additional impacts to abutting property owners would be limited to property acquisition.

Traffic

As Holland Mills Road is currently closed at the Nith River, impacts to vehicular traffic are considered minimal. Local residents must detour around the site. The estimated length of detour around the site is 9.5km.

First Nations/Aboriginal Peoples

There are no First Nations or Aboriginal Peoples communities near the study area. No native archaeological sites are known to exist near the study area. There are no known land claims.

Heritage Impacts

As part of this EA Study, a Cultural Heritage Evaluation Report and Heritage Impact Assessment were completed and can be found in the applicable sections of this report.

Archaeological Impacts

An archaeologic potential checklist has been completed and can be found in the applicable section of this report.

Environmental Impacts

As part of this EA Study, a Scoped Environmental Screening Report was completed and can be found in the applicable section of this report.

The Corporation of the
Township of Wilmot

Structural Evaluation Report
for
Bridge No. 15/B-NH
Bridge No. 17/B-T13
Bridge No. 34/B-T9
Bridge No. 37/B-OXF
2015

K. Smart Associates Limited
Kitchener, Ontario

September 2015

I N D E X

September 2015 File No. 15-102

STRUCTURAL EVALUATION REPORT

FOR

BRIDGE NO. 15/B-NH
BRIDGE NO. 17/B-T13
BRIDGE NO. 34/B-T9
BRIDGE NO. 37/B-OXF

TOWNSHIP OF WILMOT

1.0 INTRODUCTION

K. Smart Associates Limited (KSA) was retained by the Township of Wilmot to inspect, complete a structural analysis and provide recommendations for gross weight limits on each of the following bridges:

Bridge No. 15/B-NH located on Shade Street
Bridge No. 17/B-T13 located on Holland Mills Road
Bridge No. 34/B-T9 located on Bridge Street
Bridge No. 37/B-OXF located on the Oxford-Waterloo Road

A visual inspection and examination of the four structures was carried out on April 23, 2015 and April 30, 2015 by Allan Garnham, P. Eng. and Darryl Schwartzentruber.

The visual inspection was performed in accordance with the Ontario Structure Inspection Manual (OSIM) and included measurements of all structure members and a recording of all visual deterioration. For details of the visual inspection, refer to the OSIM Report.

The structural evaluation was made in accordance with Section 14 of the Canadian Highway Bridge Design Code 2006.

2.0 EVALUATION METHODOLOGY

The evaluator normally has access to original design drawings to obtain actual member sizes, connection details and specified steel strengths, however no drawings for this structure are available. This requires that individual members be measured in the field and records taken so that either a common section size can be assigned to the member or so that any required section properties can be calculated.

The ultimate limit state will be used in the determination of the load-carrying capacity and load posting of the bridges as outlined in the Canadian Highway Bridge Design Code 2006, Section 14.

The resistance of any member is based on the field measured cross-section less loss of material (5% min. unless otherwise stated) to allow for corrosion and deterioration.

The properties of the original existing materials are not known. A reference is made to Section 14 of the Canadian Highway Bridge Design Code 2006 to establish the grade of steel according to its vintage.

To keep the analysis simple, the structure was modeled assuming truss behavior of the superstructure i.e. only axial forces in each truss member. This is a valid assumption considering the structure was most likely designed as a truss given the date of construction and lack of modern analysis programs. When resistances of individual members were calculated, it was assumed that pin ended connections were present (k=1). It was soon evident that this assumption was not suitable for some members of the truss because unrealistic member resistances were found. As a result, different end conditions (partial fixidity, k=0.8) were assumed for these members and this resulted in satisfactory results. This is summarized in detail later in the report.

Three levels of Ontario truck or lane loading will be used in the load rating and posting of the structures.

This evaluation refers to the capacity of the superstructure only. Section 14 Evaluation does not make reference to the evaluation of the substructure.

The following drawings were made available by the Township of Wilmot:

a) Rehabilitation drawing for Bridge 15/B-NH - 2010
b) Original truss detail drawing for Bridge 17/B-T13
c) Rehabilitation drawing for Bridge 34/B-T9 – 1982 & 2010
d) Rehabilitation drawing for Bridge 37/B-OXF – 1990 & 2014

3.0 EVALUATION

3.1 General

Type of Structure:	Single span steel through truss
Material:	Steel and concrete or timber deck
Highway Classification:	Class C
Deck Finish:	Concrete/wood wearing surface as the case may be
Number of Design lanes:	2 for Bridge No. 15/B-NH, 1 for rest
Design Criteria:	Canadian Highway Bridge Design Code 2006

3.2 Material Strengths

Original construction drawings are either not available or grade of materials are not called for. Reference is made to Section 14 of CHBDC.

Steel

Bridge No. 15/B-NH	Bridges No. 17, 34 & 37
Fy = 230 MPa	Fy = 210 MPa
Fu = 420 MPa	Fu = 420 MPa
(for 1933 to 1975 vintage)	(for 1905 - 1932 vintage)

3.3 Dimensions, Thicknesses, Etc.

Sectional dimensions of all structural members were measured in the field. A reduction for deterioration and loss of materials was used in the analysis.

3.4 Analysis

The trusses are analyzed on the assumption that their members are interconnected through pin connections. The maximum axial load in each truss member was computed using Dr. Frame 2.0.2 software. The bending moments and shears in the floor beams and stringers were calculated from first principles (hand calculations) and verified using Dr. Beam software.

3.5 Evaluation Load Factor

The Canadian Highway Bridge Design Code 2006 relates the evaluation load factor to target reliability index of the structure.

3.6 Target Reliability Factor

"The life safety criterion that forms the basis for the reliability indices considers only loss of life resulting directly from the failure of the structure."

The philosophy behind the evaluation of existing bridges is to maintain a consistent level of risk to human life for each element of the bridge. The failure of bridge elements which receive regular inspection, show warning of failure and can redistribute load to other elements are less likely to result in loss of life than the failure of an element lacking one or all of these traits. Therefore, a consistent level of risk to human life is maintained, through the entire structure if a higher probability of failure is accepted in elements which are less likely to produce a loss of life if failure occurs." (CHBDC Commentary)

The risk to human life can be expressed as the probability of failure times the consequences of failure. For bridge evaluation, the annual (or notional) probability of failure (P_f) is used for the determination of a reliability index.

$$P_f = \frac{A\,k}{w\,\sqrt{n}}$$

For normal traffic evaluation

A = 3.0

$k = 10^{-4}$
$w = 1.0$ for no warning of failure expected
$n = 10$

$$P_f = \frac{3 \times 10^{-4}}{1 \sqrt{10}}$$
$$= 9.5 \times 10^{-5}$$

This notional probability is then reduced in a systematic way to account for improved warning of failure which comes from the following:

a) System Behaviour
The target reliability index is reduced as the effect of failure of an element on the overall integrity of the structure is reduced.

b) Element Behaviour
The target reliability index is reduced for elements which fail in a ductile manner.

c) Inspection Level
The target reliability index is reduced as the level of inspection increases.

3.7 Determination of Load Factor and Dynamic Load Allowance (DLA)

The following table shows the Target Reliability Index (β), Load Factor (∝) and DLA.

	CATEGORY		
	Stringer	Floor Beam	Trusses
System Behaviour	S3	S2	S2
Element Behaviour	E3	E3	E2
Inspection Level	INSP3	INSP3	INSP3
β	2.50	2.75	3.00
∝D	1.05 & 1.10	1.10	1.07
∝L	1.35	1.42	1.49
DLA	1.30	1.30	1.25 or 1.3*

Reference is made to Section 14.11 of the CHBDC 2006.
* *Depending on number of axles. See CHBDC 2006.*

3.8 Live Load Capacity Factor (LLCF)

Live load capacity factor is a factor of the residual loading capacity of the element under consideration.

The CHBDC commentary describes the LLCF as follows:
"The live load capacity factor, F, is the factor by which the evaluation live load has to be multiplied so that the factored capacity of the bridge is not exceeded for the continuation of permanent and live loads under consideration."

For the bridge to carry full loading, i.e. no post load limit, the LLCF must not be less than 1.0. When the LLCF is less than 1.0, posting load limits on the bridge would be recommended. When the LLCF is less than 0.3, closing the bridge to vehicular traffic is recommended.

5.0 BRIDGE NO. 17/B-T13 – HOLLAND MILLS

5.1 Description of Structure

The bridge is located on Holland Mills Road (Township Road 13) over the Nith River and is approximately 0.25 km south of Bleams Road (Regional Road 4). The bridge was constructed in 1910.

The structure consists of a 29.7m single span steel through truss with an exposed wood deck road surface. The deck width at the bridge is 4.9m for one lane of traffic. The railing consists of 3 metal pipes.

The structure is posted for 3 t maximum load.

The bridge was rehabilitated in July 2007. The extent of the repairs was limited to replacing the timber deck, repairing one truss pin, shimming a loose floor beam, repair or replacing stringers, repair railings, reface abutments and repair overhead cross bracing.

5.2 Field Findings

.1 Superstructure

Decks
- Composed of transverse vertical laminated 38mm x 89mm (2 x 4) planks
- Replaced in July 2007, however deck top now exhibits light to medium wearing throughout

Barriers
- Railings consist of steel pipe
- Extended beyond bridge during July 2007 rehabilitation.
- Railings are generally loose due to poor connections at floor beam locations.
- Connections between post and rail are loose or broken at several locations where the railing was extended beyond the structure

Beams
- 5 deteriorated stringers replaced with new steel sections, 6 more stringers repaired
- Remainder of stringers exhibit minor surface rusting
- Floor beams exhibit severe rusting with approximately 50% loss of material in top flange and some perforations in the webs at the south side.

Trusses
- Top and bottom chords are in poor-to-fair condition typically exhibiting medium surface rust, no cracks were observed.
- Missing overhead cross bracing replaced in July 2007.
- One loose truss pin secured in place (July 2007).
- Diagonal knee brace at south portal has disconnected from the top chord at the southwest corner.

.2 Substructure

Abutments
- North abutment completely refaced in July 2007

- South abutment wall partially refaced where badly spalled
- All steel bearings are seized.
- Roller bearings present at south abutment and fixed bearings present at north abutment.

Wingwalls
- Northwest and northeast wingwalls completely refaced in July 2007 rehabilitation
- South wingwalls (corners) are refaced in July 2007 rehabilitation
- Remaining upper portions at top half of south wingwalls (both corners) exhibit delamination

5.3 Summary of Structural Evaluation

DECK FRAMING

a) BENDING

					Load Capacity (t)		
Member	MDL	MLL	Mr	LLCF	Level 1	Level 2	Level 3
Floor Beam	22.0	398.0	184.0	0.4	22	15	9
Stringers	3.0	85.0	27.0	0.28	12	9	5
Deck	0.02	4.64	4.62	0.56	35	25	14
(2 x 4 Laminated Wood)							

All loads are factored and include DLA where applicable.
Moments are in kN·m

b) SHEAR

Sheer forces/effects are not evaluated as they would not be a governing factor.

TRUSSES

					Load Capacity (t)		
Member	DL-kn	LL-kn	R-kn	LLCF	Level 1	Level 2	Level 3
Top Chord							
U1U2	+86	+282	+837	1.28	NRP	NRP	NRP
U2U3	+97	+277	+837	1.28	NRP	NRP	NRP
Bottom Chord							
L1L2	-54	-184	-395	0.95	58	44	24
L2L3	-54	-184	-381	0.91	56	42	20
L3L4	-97	-260	-766	1.32	NRP	NRP	NRP
Diags. and Verticals							

L1U1	+79	+275	+616	0.94	58	44	24
L2U1	-23	-130	+359	1.32	NRP	NRP	NRP
L3U1	-47	-192	+576	1.41	NRP	NRP	NRP
L3U2	+12	+83	+258	1.44	NRP	NRP	NRP
L3U3	-0	0	-101		NRP	NRP	NRP
L4U2	-16	-114	-316	1.35	NRP	NRP	NRP
L4U3	-0	0	+258		NRP	NRP	NRP

+ Compression
- Tension

NPR - No posting required
Dead loads are factored, live loads are unfactored and without DLA
See Drawing 2 (***Appendix A***) for joint identification and locations

5.4 Evaluation Findings and Recommendations

The evaluation analysis has indicated that the structure is not adequate to support a full Ontario Highway Truck Loading. The load capacity is limited by the steel stringers.

The bridge loading capacity is as follows:

a) Single posting - 5 t

b) Triple posting
- 5 t single truck
- 9 t single truck and trailer
- 12 t single truck and more than one trailer

c) Axial weights posting
- 2 t single
- 3 t tandem
- 5 t tridem

Due to the condition of the floor beams (mainly the web perforations), the bridge should remain load posted for 3 tonnes.

It is strongly recommended to repair the floor beams as soon as possible in order to keep this structure open and serviceable for the immediate future.

APPENDIX A

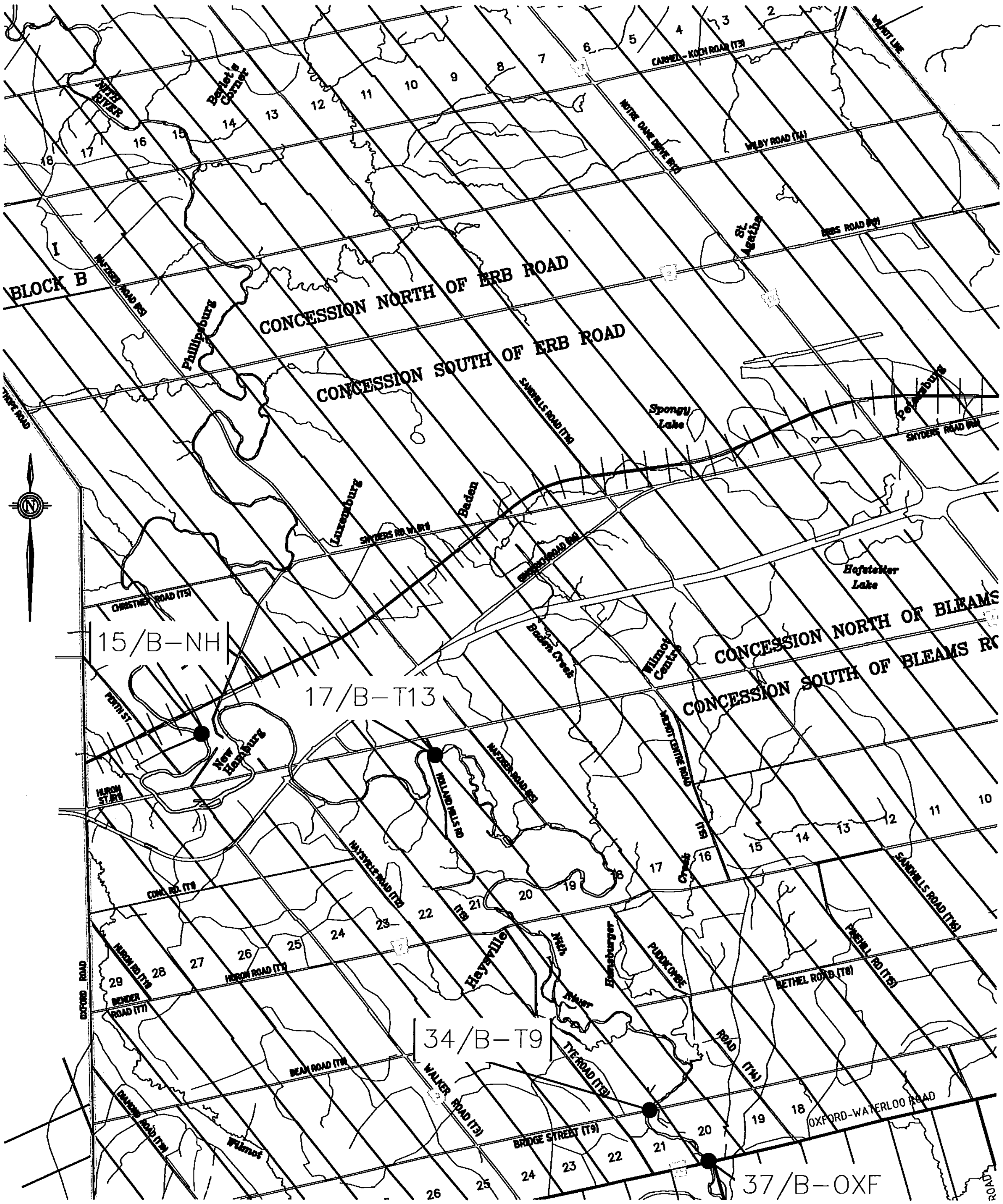
KEYPLAN – LOCATION OF STRUCTURES

DRAWING 1 – BRIDGE NO. 15/B-NH

DRAWING 2 – BRIDGE NO. 17/B-T13

DRAWING 3 – BRIDGE NO. 34/B-T9

DRAWING 4 – BRIDGE NO. 37/B-OXF



N.T.S.

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER NEW LISKEARD SUDBURY RAINY RIVER

KEY PLAN

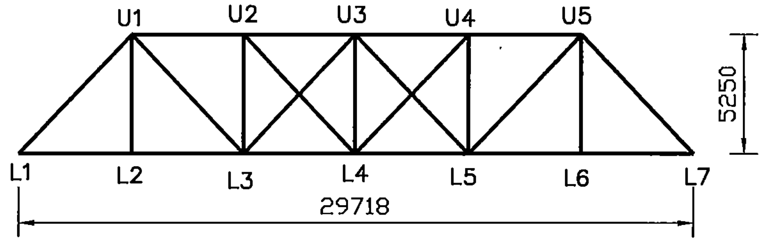
TOWNSHIP OF WILMOT
REGION OF WATERLOO

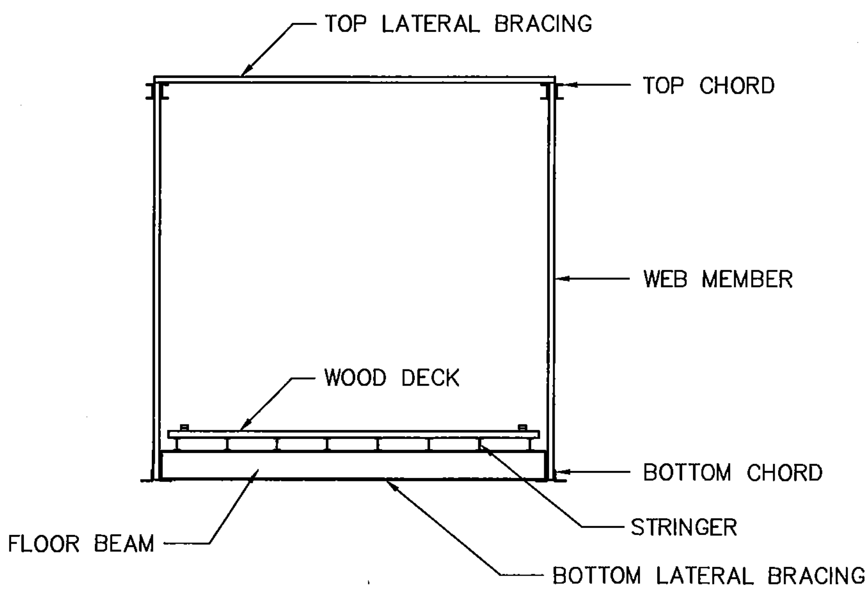
JOB NUMBER
15-102

SEPT 2015

FIGURE
1

\\server\data\2015\15-102\Drafting\KEY MAP FOR STRUCTURE EVALUATION REPORT.dwg KEY PLAN 11-Sep-15 11:12:54 AM





TYPICAL CROSS-SECTION

- NEW WOOD DECK (2007)
- SEVERLY CORRODED STRINGERS WERE REPLACED OR REPAIRED IN 2007
- ONE BROKEN TRUSS PIN WAS REPAIRED
- TRUSSES EXHIBIT SURFACE RUST

DRAWING 2

BRIDGE NO. 17/B-T13
TOWNSHIP OF WILMOT

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Inventory Data:

Structure Name	17/B-T13 – Holland Mills Road (Township Road 13)		
Main Hwy/Road #		On ☐ Under ☐	Crossing Type: Navig. Water ☑ Non-Navig. Water ☐ Rail ☐ Road ☐ Ped. ☐ Other ☐
Road Name	Holland Mills Road (Township Road 13)		
Structure Location	0.26 km South of Bleams Road (Regional Road 4)		
Latitude		Longitude	
Owner(s)	Township of Wilmot	Heritage Designation:	Not Cons. ☑ Cons./not App. ☐ List/not Desig. ☐ Desig./not List ☐ Desig. & List ☐
MTO Region *	Southwestern	Road Class:	Freeway ☐ Arterial ☐ Collector ☐ Local ☑
MTO District *	London/Stratford	Posted Speed	No. of Lanes: 1
Old County *	Waterloo	AADT	% Trucks
Geographic Twp. *	Wilmot	Special Routes:	Transit ☐ Truck ☐ School ☐ Bicycle ☐
Structure Type *	Through Truss	Detour Length Around Bridge	(km)
Total Deck Length	30.50 (m)	Fill on Structure	(m)
Overall Str. Width	4.90 (m)	Skew Angle	(Degrees)
Total Deck Area	149.50 (sq.m)	Direction of Structure	N to S
Roadway Width	3.80 (m)	No. of Spans	1 (m)
Span Lengths	28.7m (m)		

Historical Data:

Year Built	1910	Year of Last Major Rehab.	2007
Last OSIM Inspection	2013	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	3 (tonnes)
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey		Min. Vertical Clearance	(m)

Rehab. History: (Date/description)

2007 Refacing of north abutment and wingwalls, refacing of corners of south abutment, repair of stringers, repair of floor beam connection, repair of bottom truss pin, replacement of timber deck, repair of railing system, placement of timber posts at approaches and repair of overhead crossing bracing.

Field Inspection Information:			
Date of Inspection:	April 30, 2015	Type of Inspection:	☑ OSIM ☐ Enhanced OSIM
Inspector:	Allan Garnham, P. Eng.		
Others in Party:	Darryl Schwartzentruber		
Access Equipment Used:	Tapes, Hammer, Chain, Camera, Safety Equipment, Binoculars		
Weather:	Sun & Cloud		
Temperature:	10°C		

Additional Investigations Required:	Priority None	Priority Normal	Priority Urgent	Estimated Cost
Material Condition Survey				
Detailed Deck Condition Survey:	x			0
Non-destructive Delam. Survey of Asphalt-Covered Deck:	x			0
Concrete Substructure Condition Survey:	x			0
Detailed Coating Condition Survey:	x			0
Detailed Timber Investigation	x			0
Post-Tensioned Strand Investigation	x			0
Underwater Investigation:	x			0
Fatigue Investigation:	x			0
Seismic Investigation:	x			0
Structure Evaluation:	x			0
Monitoring (deformations, settlements, movements, crack widths)	x			0
Load Posting – Estimated Load			Total Cost	0
Investigation Notes:				

Overall Structure Notes:	
Overall Comments:	Monitor bridge for overall structural stability every 6 months.
Date of Next Inspection:	Every 6 months, October 2015.

Overall Bridge Condition:							
% Poor in Deck	0	% Poor in Beams	100	% Poor in Substructure	0	% Poor in Barrier	0
						BCI_p=	65

Suspected Performance Deficiencies

- 01 Load carrying capacity
- 02 Excessive deformations (deflections & rotations)
- 03 Continuing settlement
- 04 Continuing movements
- 05 Seized bearings
- 06 Bearing not uniformly loaded/unstable
- 07 Jammed expansion joint
- 08 Pedestrian/vehicular hazard
- 09 Rough riding surface
- 10 Surface ponding
- 11 Deck drainage
- 12 Slippery surfaces
- 13 Flooding/channel blockage
- 14 Undermining of foundation
- 15 Unstable embankments
- 16 Other

Maintenance Needs

- 01 Lift and Swing Bridge Maintenance
- 02 Bridge Cleaning
- 03 Bridge Handrail Maintenance
- 04 Painting Steel Bridge Structures
- 05 Bridge Deck Joint Repair
- 06 Bridge Bearing Maintenance
- 07 Repair to Structural Steel
- 08 Repair of Bridge Concrete
- 09 Repair of Bridge Timber
- 10 Bailey bridges - Maintenance
- 11 Animal/Pest Control
- 12 Bridge Surface Repair
- 13 Erosion Control at Bridges
- 14 Concrete Sealing
- 15 Rout and Seal
- 16 Bridge Deck Drainage
- 17 Scaling (Loose Concrete or ACR Steel)
- 18 Other

Element Data

Element Group:*	Abutments		Length:			
Element Name: *	Abutment Walls		Width:	7.20m		
Location:	North and South		Height:	2.80m		
Material: *	Cast-in-place concrete		Count:	2		
Element Type: *	Conventional closed		Total Quantity:	40.30 sq.m.		
Environment:	Benign / Moderate / Severe		Limited Inspection ☐			
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m^2 / m / each / % / all	0.00	0.00	40.30	0.00	

Comments:

North: Refaced in 2007. Numerous medium vertical cracks. Pattern cracking in isolated areas.

South: Delaminated and spalling corners refaced in 2007. Vertical cracks with efflorescence throughout.

Recommended Work: ☐ Rehab ☐ Replace ☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None	Maintenance Needs: ☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Abutments		Length:			
Element Name: *	Bearings		Width:			
Location:	North and South		Height:			
Material: *			Count:	4		
Element Type: *			Total Quantity:	4 each		
Environment:	Benign / Moderate / Severe		Limited Inspection ☑			
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m^2 / m / each / % / all	0	0	2	2	

Comments: Small roller bearing present at south abutment which are seized. Fixed bearings at north abutment.

Recommended Work: ☐ Rehab ☐ Replace ☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None	Maintenance Needs: ☐ Urgent ☐ 1 year ☐ 2 year

Element Data

Element Group:*	Abutments	Length:	
Element Name: *	Wingwalls	Width:	
Location:	Corners of bridge	Height:	
Material: *	Cast-in-place concrete	Count:	4
Element Type: *	Reinforced concrete	Total Quantity:	4 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0.00	0.00	3.00	1.00	

Comments:
Northwest: Refaced in 2007. Numerous medium vertical cracks at bottom half.
Northeast: Refaced in 2007. 3 medium vertical cracks.
Southwest: Delaminated at top half, remainder in fair condition.
Southeast: Delaminated at top half, remainder in fair condition.

Recommended Work: ☐ Rehab ☐ Replace	Maintenance Needs:
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None	☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Accessories	Length:	
Element Name: *	Signs	Width:	
Location:	4 Quadrants	Height:	
Material: *	Aluminum	Count:	6
Element Type: *		Total Quantity:	6
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all		6			

Comments:
4 hazard markers in good condition
2 load postings in good condition

Recommended Work: ☐ Rehab ☐ Replace	Maintenance Needs:
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None	☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Approaches	Length:	
Element Name: *	Barriers	Width:	
Location:	Corners of structure	Height:	
Material: *		Count:	4
Element Type: *	Timber Post	Total Quantity:	4 (All)
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0	2	1	1	

Comments: Timber posts with reflectors installed at each corner of structure. There are some missing posts at the northeast quadrant. No significant defects noted. Railing at south has severe impact damage. Bottom rail at Southwest has completely detached and is laying in roadside ditch.

Recommended Work: ☐ Rehab ☐ Replace	Maintenance Needs:
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None	☐ Urgent ☐ 1 year ☐ 2 year

Element Data

Element Group:*	Approaches	Length:	
Element Name: *	Wearing Surface	Width:	
Location:	North and South	Height:	
Material: *		Count:	2
Element Type: *		Total Quantity:	2.00 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			Perform. Deficiencies

Condition Data:	Units	Exc.	Good	Fair	Poor*
	m^2 / m / each / % / all	0.00	0.00	2.00	0.00

Comments: Roadway approaches consist of gravel roadway except for a short length of asphalt adjacent to the structure. South approach has settled 25mm next to end dam. North approach has settled approximately 20mm.

Recommended Work: ☑ Rehab ☐ Replace
☐ Urgent ☑ 1-5 years ☐ 6-10 years ☐ None
Repair approach asphalt

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Barriers	Length:	29.60m
Element Name: *	Railing Systems	Width:	
Location:	East and West	Height:	
Material: *		Count:	2
Element Type: *	3 Rail Metal Railing - Steel	Total Quantity:	59.20m
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			Perform. Deficiencies

Condition Data:	Units	Exc.	Good	Fair	Poor*
	m^2 / m / each / % / all	0.00	0.00	59.00	0.00

Comments: Railing consists of 3 steel pipes fastened to the side of each truss. No end treatments present. Railing generally loose due to poor connections at floor beam locations. Railing bent and loose at southeast corner due to impact.

Recommended Work: ☑ Rehab ☐ Replace
☐ Urgent ☑ 1-5 years ☐ 6-10 years ☐ None
Repair railing as required.

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Beams / MLE's	Length:	4.90m
Element Name: *	Floor Beams	Width:	
Location:	All	Height:	
Material: *	Steel	Count:	5
Element Type: *	I type	Total Quantity:	1 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			Perform. Deficiencies

Condition Data:	Units	Exc.	Good	Fair	Poor*
	m^2 / m / each / % / all	0.00	0.00	0.00	1.00

Comments: Severe rusting with some loss of section. Severe corrosion with perforations at first and second beams from south abutment.

Recommended Work: ☑ Rehab ☑ Replace
☑ Urgent ☐ 1-5 years ☑ 6-10 years ☐ None
Repair floor beams now.
Replace structure in 6-10 years.

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Data

Element Group:*	Beams / MLE's	Length:	29.70m
Element Name: *	Stringers	Width:	
Location:	All	Height:	
Material: *	Steel	Count:	8
Element Type: *	I type	Total Quantity:	1 Each
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0	0	0	1	

Comments: Severe rusting on longitudinal stringers supporting the timber deck. Several stringers were repaired or replaced as part of the most recent rehabilitation.

Recommended Work: ☐ Rehab ☑ Replace	Maintenance Needs:
☐ Urgent ☐ 1-5 years ☑ 6-10 years ☐ None	☐ Urgent ☐ 1 year ☐ 2 year
Replace structure in 6-10 years.	

Element Group:*	Bracing	Length:	
Element Name: *	Bracing	Width:	
Location:	All	Height:	
Material: *	Steel	Count:	
Element Type: *		Total Quantity:	1 each
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0	0	0	1	

Comments: Severe rusting. Overhead bracing at south bay has been replaced. Some braces at north are sagging.

Recommended Work: ☐ Rehab ☑ Replace	Maintenance Needs:
☐ Urgent ☐ 1-5 years ☑ 6-10 years ☐ None	☐ Urgent ☐ 1 year ☐ 2 year
Replace structure in 6-10 years.	

Element Group:*	Coating	Length:	
Element Name: *	Railing Systems / Hand Railings	Width:	
Location:	East & West Railings	Height:	
Material: *	Hot Dip Galvanizing	Count:	
Element Type: *		Total Quantity:	1 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0.00	0.00	0.00	1.00	

Comments: Coating on railing is generally in poor condition.

Recommended Work: ☐ Rehab ☐ Replace	Maintenance Needs:
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None	☐ Urgent ☐ 1 year ☐ 2 year

Element Data

Element Group:*	Coating	Length:	
Element Name: *	Structural Steel	Width:	
Location:	All steel members	Height:	
Material: *		Count:	
Element Type: *		Total Quantity:	1 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0.00	0.00	0.00	1.00	

Comments: No sign of any coatings. All members are covered with surface rust.

Recommended Work: ☐ Rehab ☐ Replace
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Decks	Length:	29.60m
Element Name: *	Deck Top	Width:	4.30m
Location:	All	Height:	
Material: *	Wood	Count:	
Element Type: *	Wood planks	Total Quantity:	127.30 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0.00	127.30	0.00	0.00	

Comments: Timber deck replaced in 2007. Timber deck also acts as the wearing surface. Some light to medium wearing of deck noted.

Recommended Work: ☐ Rehab ☐ Replace
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Decks	Length:	29.60m
Element Name: *	Soffit – Thin Slab	Width:	4.30m
Location:	All	Height:	
Material: *	Wood	Count:	
Element Type: *		Total Quantity:	127.30 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0.00	127.30	0.00	0.00	

Comments: New laminated wood deck in summer of 2007. No significant defects noted.

Recommended Work: ☐ Rehab ☐ Replace
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Data

Element Group:*	Embankments & Streams		Length:			
Element Name: *	Embankments		Width:			
Location:			Height:			
Material: *			Count:			
Element Type: *			Total Quantity:	1 All		
Environment:	Benign / Moderate / Severe		Limited Inspection ☐			
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m^2 / m / each / % / all	0	0	1	0	

Comments: No significant defects noted on north side. South embankments are typically steep although stable.

Recommended Work: ☐ Rehab ☐ Replace	Maintenance Needs:
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None	☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Embankments & Streams		Length:			
Element Name: *	Streams & Waterways		Width:			
Location:			Height:			
Material: *			Count:			
Element Type: *			Total Quantity:	1 All		
Environment:	Benign / Moderate / Severe		Limited Inspection ☐			
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m^2 / m / each / % / all	0	0	0	1	

Comments: River is meandering at this location and flows from west to east. Severe erosion along southwest shoreline at water level. Rocks and concrete pieces in front of both abutments.

Recommended Work: ☑ Rehab ☐ Replace	Maintenance Needs:
☐ Urgent ☑ 1-5 years ☐ 6-10 years ☐ None	☐ Urgent ☐ 1 year ☐ 2 year
Place rock protection in front of abutments and wingwalls.	

Element Group:*	Joints		Length:	4.90m		
Element Name: *	Armouring/retaining devices		Width:			
Location:	North and South		Height:			
Material: *	Steel		Count:	4		
Element Type: *			Total Quantity:	19.60m		
Environment:	Benign / Moderate / Severe		Limited Inspection ☐			
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m^2 / m / each / % / all	0.00	0.00	19.60	0.00	

Comments: Light rusting especially at wheel paths

Recommended Work: ☐ Rehab ☐ Replace	Maintenance Needs:
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None	☐ Urgent ☐ 1 year ☐ 2 year

Element Data

Element Group:*	Joints	Length:	
Element Name: *	Concrete end dams	Width:	
Location:	North and South	Height:	
Material: *	Cast-in-place concrete	Count:	
Element Type: *		Total Quantity:	1.00 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0.00	1.00	0.00	0.00	

Comments: No significant defects noted.

Recommended Work: ☐ Rehab ☐ Replace	Maintenance Needs:
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☐ None	☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Joints	Length:	
Element Name: *	Seals	Width:	
Location:	North and South	Height:	
Material: *		Count:	2
Element Type: *	Unsealed	Total Quantity:	2 (Each)
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0	0	0	2	

Comments: No seal present at ends of timber deck

Recommended Work: ☐ Rehab ☑ Replace	Maintenance Needs:
☐ Urgent ☑ 1-5 years ☐ 6-10 years ☐ None	☐ Urgent ☐ 1 year ☐ 2 year
Install seals at end of timber deck.	

Element Group:*	Trusses/ Arches	Length:	
Element Name: *	Bottom chords	Width:	
Location:	East and West	Height:	
Material: *	Steel	Count:	
Element Type: *		Total Quantity:	1 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0.00	0.00	0.00	1.00	

Comments: Bottom chords generally exhibit medium surface rusting with no loss of section. No cracks were observed.

Recommended Work: ☐ Rehab ☐ Replace	Maintenance Needs:
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None	☐ Urgent ☐ 1 year ☐ 2 year

Element Data

Element Group:*	Trusses / Arches	Length:	
Element Name: *	Connections	Width:	
Location:	All	Height:	
Material: *	Steel	Count:	
Element Type: *		Total Quantity:	1 each
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			Perform. Deficiencies

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0.00	0.00	0.00	1.00	

Comments: All connectors are generally in fair to poor condition. Broken bolt on gusset plate at northwest portal. Bottom pin at 2nd floor beam from northwest corner is tilted.

Recommended Work: ☑ Rehab ☐ Replace
☐ Urgent ☑ 1-5 years ☐ 6-10 years ☐ None
Repair broken portal brace connection.

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Trusses / Arches	Length:	
Element Name: *	Top Chords	Width:	
Location:	East & West	Height:	
Material: *	Steel	Count:	
Element Type: *		Total Quantity:	1 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			Perform. Deficiencies

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0.00	0.00	0.00	1.00	

Comments: Top chord members are generally in fair to poor condition with severe rippling of top plates between rivets. Severe surface rusting on individual members. No cracks observed.

Recommended Work: ☐ Rehab ☑ Replace
☐ Urgent ☐ 1-5 years ☑ 6-10 years ☐ None
Replace structure in 6-10 years.

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Trusses / Arches	Length:	
Element Name: *	Verticals/Diagonals	Width:	
Location:	All verticals and diagonals	Height:	
Material: *	Steel	Count:	
Element Type: *		Total Quantity:	1 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			Perform. Deficiencies

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0.00	0.00	0.00	1.00	

Comments: Vertical and diagonal members are generally in fair to poor condition. Medium surface rusting on members.

Recommended Work: ☐ Rehab ☐ Replace
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☐ None

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Municipal Structure Inspection Form

Repair and Rehabilitation Required:		Priority				Estimated Structural Cost
Element[1]	Repair and Rehabilitation Required[2]	6 to 10 years	1 to 5 years	Within 1 year	Urgent	
Structure	Demolition					
Structure	Replacement	x				$1,250,000
OR						
Deck	Rehab. =					
Sidewalk/Curb	Rehab. =					
Barrier	Rehab. =					
Joints	Rehab. =					
Beams	Rehab. = Repair floor beams			x		$50,000
Abutment	Rehab. =					
Pier	Rehab. =					
Other						
Estimated Rehabilitated or Replacement Structure Dimensions[3]		Total Structural Cost				$1,300,000
Total Deck Length (m) 30.0	Overall Str. Width (m) 10.5					

1 - Indicate specific costs for structure replacement OR for rehabilitation under the given headings.
2 - Give a very brief description of the rehabilitation work required.
3 - Estimated structure dimensions after completion of the proposed work – if it is expected to change.

Associated Work[4]:	Comments	Estimated Associated Work Cost
Approaches[5]		
Detours		
Traffic Control		
Utilities		
Other	Engineering and Contract Administration	$250,000
	Total Associated Work Cost	$250,000

Total Construction Cost	$1,550,000

4 - Includes other construction costs associated with the structure. Engineering fees for reports, environmental studies, designs, project management and contingencies are not included as associated work and should be specified on the Building Canada Fund – Communities Component (BCF-CC) Bridge Technical Schedule.
5 - Approach cost is for work (fill, pavement, guide rail, etc.) immediately adjacent to the structure to adjust for minor changes in horizontal or vertical alignment and for barrier end treatments at the structure. For BFC-CC applications, approaches longer than 30m (per end) require a separate Local Road Infrastructure Technical Schedule to be completed for that portion of road.

Justification:

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

July 14, 2016

File No. 16-192

Gary Charbonneau, CET
Director of Public Works
Township of Wimot
60 Snyder's Road West
Baden ON N3A 1A1

**RE: STRUCTURE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
RECOMMENDATIONS FOLLOWING EMERGENCY CLOSURE**

Dear Gary:

In response to your request to conduct an emergency inspection of Structure 17/B-T13 and prepare a follow-up report, we offer the following:

May 30, 2016 Inspection by KSAL

- On May 30, 2016 around 1:30pm, the undersigned attended the structure to complete a visual inspection.
- The main findings from this inspection include a failure of the southernmost floor beam, severe structural distress of the northernmost floor beam, structural distress in the remaining "middle" floor beams, very severe wearing and deflection of the timber deck on the south side of the bridge as well as medium wearing of the timber deck on the north side of the bridge.
- The remainder of the truss superstructure itself still appears to be in fair-to-poor condition overall. We did not note any damage to the physical properties of the truss, specifically the hangers or pins themselves during our visual inspection. We do note, however, that damage (such as stretching or cracking) to the truss may not be evident during a visual inspection.
- The concrete substructure appears to be in good-to-fair condition.

Alternatives

Alternative 1 – Permanent Closure

- Holland Mills Road would be permanently closed at the Nith River. Permanent barricades and fencing would need to be erected on either side of the bridge to prevent vehicles and/or pedestrians from using the bridge.
- The Township could remove the existing bridge, or convert the bridge to pedestrian use only.
- Repairs would still be required whether the Township wants to convert this bridge to pedestrian use only or just close the bridge to vehicular traffic.

- Unless the bridge is completely removed, pedestrians, bicycles and off road vehicles will still use the bridge which may be a liability issue given the poor condition of the deck and floor beams.
- Cost wise, this alternative will vary from about $5,000 (the cost to erect fences and barricades) to $100,000 (the cost to completely remove the bridge).
- In terms of engineering and contract administration costs, the cost of engineering and contract administration to close the bridge would be nil whereas to permanently close the bridge with full removal would be $35,000.
- This alternative would classify as a Schedule "A+" or "B" project under the Municipal Class EA process dependent on whether the existing bridge was closed, converted to a pedestrian bridge or completely removed.
- The advantage of this alternative is cost. This alternative, assuming complete long term closure of the bridge and no removal, has minimal cost to implement and maintain.
- The disadvantage of this alternative is the loss of this crossing over the Nith River.
- This alternative could be implemented as a short term solution (1-5 years) until the bridge is replaced or as a permanent solution (75+ years).

Alternative 2 –Repair Existing Structure

- The existing structure would be repaired under this alternative and reopened, albeit load posted, as before.
- The repairs would include removing the existing timber deck and curbs, removal of the existing steel stringers, replacement of the floor beams, installation of new steel stringers, installation of a new timber deck and curbs and miscellaneous repairs of the superstructure as may be required.
- The remaining truss members (pins, hangers, chords, etc.) would require further inspection to confirm they are not damaged. We would recommend non-destructive testing be completed on the steel "eye' bar chords to look for cracking.
- In lieu of reinstalling a timber deck, other decking options such as fiberglass, steel (orthotropic, corrugated, open mesh grating, etc.) or proprietary systems could be considered.
- Assuming the repairs described in point 2 are implemented, the estimated construction cost would be $100,000 to $120,000 with engineering and contract administration estimated at $35,000. These costs do not include HST.
- In terms of compliance with the Municipal Class EA process, we would deem this alternative to be a Schedule "A" project.
- The Township should also be aware that repairs to the existing structure, such as replacing the deck, stringers and floor beams, will increase the load carrying capacity (i.e. increase the 3 tonne load posting) by a marginal amount.
- In terms of advantages, this alternative would allow the structure to be re-opened (albeit load posted) while a replacement structure was being designed and funding sourced.
- The disadvantage of this alternative is that the proposed repair work will do nothing to extend the remaining useful life of the truss superstructure itself. Complete replacement of the bridge itself will still be required within 6-10 years.
- This alternative is considered a short term solution (6-10 years).

Alternative 3 –Replace Superstructure

- This alternative would involve removing the existing deck, stringers, floor beams and trusses and installing a new superstructure on the existing concrete foundations.
- The new superstructure could be a steel truss style (sympathetic to the original design), modular style (bailey bridge) or slab-on-girder style.

- In terms of the deck itself, again there are many options including concrete, timber, steel, fiberglass and various proprietary systems.
- The new superstructure would be designed for full truck loading in accordance with current design standards (CHBDC).
- The estimated construction cost range for this alternative (assuming a bailey bridge with steel decking complete with anti-skid coating) is \$450,000 to \$500,000 with engineering and contract administration estimated at \$70,000 to \$80,000. These costs do not include HST.
- Unfortunately, this alternative would not permit changes to the geometry of Holland Mills Road (lane width, horizontal and vertical alignments, etc.) adjacent to the bridge as the existing foundations would need to remain undisturbed.
- In terms of compliance with the Municipal Class EA process, this alternative would be deemed a Schedule "B" project.
- The main advantage of this alternative is that the Township would essentially be getting a new bridge at this location without the expense and duration of a full replacement.
- The disadvantage of this alternative is that while the new superstructure could last for 75 years, the overall life of the foundations are less. Major rehabilitation to replace the foundations could be required in 30-50 years. Also, the replacement superstructure would still be a one lane bridge.
- This alternative is considered a medium term solution (30-50 years).

Alternative 4 –New Bridge in Same Location with Minor Roadway Improvements

- This alternative is similar to Alternative 3 except instead of saving the existing foundations, new bridge foundations would be constructed.
- This alternative would also consider improvements to the south roadway approach such as realigning Holland Mills Road to improve the 90 degree bend near the river.
- Improvements to the south roadway approach, however, do not need to be completed simultaneously with constructing the new bridge.
- The vertical alignment of Holland Mills Road would, unfortunately, likely need to remain unchanged to satisfy hydraulic design criteria (Regional Storm water level).
- Other design criteria such as the design speed, number of lanes, lane width and horizontal alignment would be chosen based on current Township of Wilmot standards (i.e. 60 or 80 km/hr design speed, 2 lanes, lane width of 3.35m, shoulder width of 1.0m and horizontal radii to suit).
- In terms of the new bridge, the most likely candidate would be a slab-on-girder structure comprised of precast concrete box beams and cast-in-place concrete deck. The bridge could be founded on either large spread footings with semi-integral abutments or founded on steel piles and be fully integral. The new structure would not be constructed with expansion joints. A steel box beam railing mounted on a concrete curb could be used for the railings of the new bridge, however other options are available.
- Proprietary structures such as a modular (bailey bridge) or steel truss bridge could also be used. These proprietary structures could also be implemented with various decking options such as timber, fiberglass, steel or concrete depending on the Township's preference.
- The new bridge would not require load posting.
- The estimated construction cost for this alternative (assuming a 32.0m span bridge consisting of concrete box girders, concrete deck, steel box beam railing and semi-integral abutments with spread footings) is \$1,100,000 with engineering and contract administration estimated at \$100,000 to \$120,000. These costs do not include HST.
- There will be additional costs to reconstruct the roadway approaches leading up to the new bridge and these costs will vary depending on the extent of the roadwork and what improvements to the existing roadway geometry are implemented. The costs to reconstruct

the roadway approaches are estimated at $50,000 to $250,000. The upper range takes into account the costs associated with acquiring private property should the Township elect to improve the 90 degree bend on the south roadway approach.

- The advantage of this alternative is a permanent and reliable crossing over the Nith River that will not require further maintenance for many years at this location.
- The main disadvantage of this alternative is that the north part of Holland Mills Road would still be subject to flooding over the road in the spring and during severe rainstorms.
- In terms of compliance with the Municipal Class EA process, we would deem this alternative to fall under a Schedule "B" project.
- This alternative is considered a permanent solution (75+ years).

Alternative 5 –New Bridge in New Location with Major Roadway Improvements

- This alternative further refines Alternative 4 by changing the vertical alignment of Holland Mills Road thereby eliminating any flooding over the road.
- The new structure would likely be a 2 or 3 span bridge. Based on other Nith River crossings in the area, the new bridge would likely be a slab-on-girder structure comprised of precast concrete "I" girders and a cast-in-place concrete deck. The new bridge would be either semi-integral or fully integral thereby eliminating the need for expansion joints. There would be multiple options for the railing system including concrete parapet wall, concrete barrier wall and steel box beam railing.
- The new bridge would not require load posting.
- The estimated construction cost of this alternative is $2,000,000 to $2,500,000 with engineering estimated at $200,000 to $250,000. These costs do not include HST.
- The costs to reconstruct the roadway approaches are estimated at $250,000 to $300,000. Major changes to the horizontal and vertical alignment will be required under this alternative hence the high estimate.
- This alternative would have the same advantages as Alternative 4, that being a permanent reliable crossing over the Nith River at this location.
- The main disadvantage of this alternative is the high construction cost as well as a complicated and lengthy approvals process.
- In terms of compliance with the Municipal Class EA process, we would deem this alternative to fall under a Schedule "B" or "C" type project.
- This alternative is considered a permanent solution (75+ years).

Summary of Alternatives

The alternatives presented above are summarized in the table below:

Alternative	Municipal Class EA Schedule	Approximate Construction Cost of Bridge	Approximate Engineering and Contract Administration	Estimated Useful Life	Cost per Year
1a*	A+	$5,000	0	2.5 years	$2,000
1b**	B	$100,000	$35,000	75 years	$1,800
2	A	$110,000	$35,000	8 years	$18,125
3	B	$475,000	$75,000	40 years	$13,750
4	B	$1,100,000	110,000	75 years	$16,133
5	B or C	$2,250,000	225,000	75 years	$33,000

* Alternative 1a involves closing the bridge and erecting barricades and fences to prevent pedestrians and recreational vehicles from crossing the bridge.

** Alternative 1b involves closing the bridge and completely removing the existing structure.

*** Roadwork costs are not included in the above table. The extent, and subsequent cost, of roadwork will vary depending on what improvements to the existing roadway the Township wishes to make.

Municipal Class EA Study

- All alternatives presented above are subject to completion of a Municipal Class EA Study. While certain work, such as repairs, could be completed as a Schedule "A" project, the majority of alternatives would classify as Schedule "B" projects which require input from the general public. Assuming both the preliminary design and the EA Study phases for this project were completed simultaneously, the estimated cost range would be $90,000 to $110,000 not including HST and not including any additional studies. The cost range for this engineering work could be reduced if the number of possible alternatives to be considered in the EA Study were reduced to 4 or 5 (i.e. do nothing, repair, rehabilitate, replacement type 1 and/or replacement type 2).
- Alternatives which include replacing or removal of the existing structure will require the Township to complete a Heritage Impact Assessment (HIA) and Cultural Heritage Evaluation Report (CHER) to determine if the existing steel truss bridge has any historical or cultural significance. These studies would need to be completed by a consultant with expertise in this field and who are recognized by the Ministry of Tourism, Culture and Sport. The estimated cost range to complete this study is $5,000 to $10,000 not including HST.
- Alternatives which include relocating portions of the roadway will require the Township to complete an Archaeologic Assessment to determine if any archaeologic potential exists within the new Right-of-Way. Again, this study would need to be completed by a consultant with expertise in this field. The estimated cost range to complete this study is $5,000 to $10,000 not including HST.
- Alternatives which include in-water work will require the Township to complete, at the very minimum, a Preliminary Environmental Screening Report to determine if any species at risk are present and what mitigation measures may be required. Again, a specialist would need to be retained to complete this study. The estimated cost range to complete this study is $10,000 to $15,000 not including HST.
- The additional studies are recommended to be completed simultaneously with the EA Study and only when requested by a Regulatory Agency (i.e. GRCA, MNR, DFO, etc.).
- Consultation with the general public is a major component of the EA process and the Township should ensure that sufficient notice about open houses and invitations to submit comments is provided to local residents, community groups as well as being posted in public spaces. Given the sensitive nature of this project and the potential to lose what could be considered a historic structure, the Township should take steps to ensure the public is well informed of all decisions made on this project.

Recommendations

- Strictly speaking and considering cost only, Alternative 3 has the lowest cost per year and would be the recommended alternative for the Township of Wilmot to pursue in order to reopen this structure. Alternative 3 would provide a crossing with no load limit in a cost effective manner. However, this alternative would only provide a one-lane structure and would not allow for improvements to the existing roadway geometry. The other drawback to this alternative is the relatively short lifespan compared to the lifespan of a new bridge.

- Alternative 4, however, has a similar cost per year and could be implemented by the Township instead. Alternative 4 offers more advantages and fewer disadvantages compared to Alternative 3, but may be cost prohibitive due to the Township's limited budget and the relatively large construction cost.
- Perhaps the best way for the Township to select the preferred alternative, assuming this structure is even required, is to decide if 1 or 2 lanes are required and whether the Township can tolerate flooding over the roadway. If the Township requires a 2 lane bridge Alternative 4 or 5 must be pursued whereas if only 1 lane is required Alternative 3 could be pursued. If flooding over the roadway cannot be tolerated then Alternative 5 is the only viable option.
- Then again, Alternative 2 could be combined with Alternative 5. Implementation of Alternative 2 would allow the existing bridge to be reopened, albeit load posted, while the requisite engineering work for Alternative 5 is being completed and funding sourced.

Closing

We entrust that the preceding information is sufficient to allow the Township of Wilmot to begin discussions on the future of Structure 17/B-T13. In the short term, a decision to either close or repair the bridge can be made without an extensive Municipal Class EA study.

We wish to note that the cost estimates provided are very preliminary and are for discussion purposes only. Once the Township has selected the preferred alternative, we would be happy to refine our estimate for budget purposes.

We can meet with you at any time to discuss the information presented above

If you have any questions or if we can be of any further assistance in this matter, please contact the undersigned at any time.

Yours truly,

Allan Garnham, P. Eng.
Project Engineer

EXTERNAL INVOLVEMENT

Notice of Study Commencement
- Correspondence with Ministry of Environment and Climate Change
- Correspondence with Ministry of Natural Resources and Forestry
- Correspondence with Ministry of Tourism, Culture and Sport
- Correspondence with Ministry of Indigenous Relations and Reconciliation
- Correspondence with Grand River Conservation Authority (GRCA)
- Correspondence with Department of Fisheries and Oceans (DFO)
- Correspondence with Region of Waterloo
- Correspondence with Wilmot Heritage Advisory Committee
- Correspondence with the Haudenosaunee Confederacy
- Correspondence with Métis Consultation Unit
- Correspondence with Mississaugas of the New Credit First Nation
- Correspondence with Six Nations of the Grand First Nation

Notice of Public Information Centre (PIC)
- PIC Presentation Materials
- Sign-In Sheets
- Comment Sheets
- Correspondence with Ministry of Environment and Climate Change
- Correspondence with Ministry of Natural Resources and Forestry
- Correspondence with Ministry of Tourism, Culture and Sport
- Correspondence with Ministry of Indigenous Relations and Reconciliation
- Correspondence with Grand River Conservation Authority (GRCA)
- Correspondence with Department of Fisheries and Oceans (DFO)
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- Correspondence with Métis Consultation Unit
- Correspondence with Mississaugas of the New Credit First Nation
- Correspondence with Six Nations of the Grand First Nation

Notice of Study Completion
- Correspondence with Ministry of Environment and Climate Change
- Correspondence with Ministry of Natural Resources and Forestry
- Correspondence with Ministry of Tourism, Culture and Sport
- Correspondence with Ministry of Indigenous Relations and Reconciliation
- Correspondence with Grand River Conservation Authority (GRCA)
- Correspondence with Department of Fisheries and Oceans (DFO)
- Correspondence with Region of Waterloo
- Correspondence with Wilmot Heritage Advisory Committee
- Correspondence with the Haudenosaunee Confederacy
- Correspondence with Métis Consultation Unit
- Correspondence with Mississaugas of the New Credit First Nation
- Correspondence with Six Nations of the Grand First Nation

TOWNSHIP OF WILMOT

CLASS ENVIRONMENTAL ASSESSMENT

BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)

HOLLAND MILLS ROAD AT THE NITH RIVER

NOTICE OF STUDY COMMENCEMENT

The Township of Wilmot is studying the structural and physical deficiencies associated with Bridge 17/B-T13. Some options currently being considered in order to eliminate all deficiencies and provide improved levels of traffic service and overall safety include:

- Permanent closure and removal of the existing bridge;
- Major rehabilitation of the existing bridge;
- Replacement of the bridge with or without realignment of Holland Mills Road adjacent to the new bridge.

The project is being planned under Schedule B of the Municipal Class Environmental Assessment.

Public input and comments are invited and will be received until November 1, 2016. Subject to comments received and receipt of necessary approvals, the Township of Wilmot intends to proceed with the planning, design and construction of this project subject to available funding.

If you wish to comment on this project or provide input or require further information, please contact:

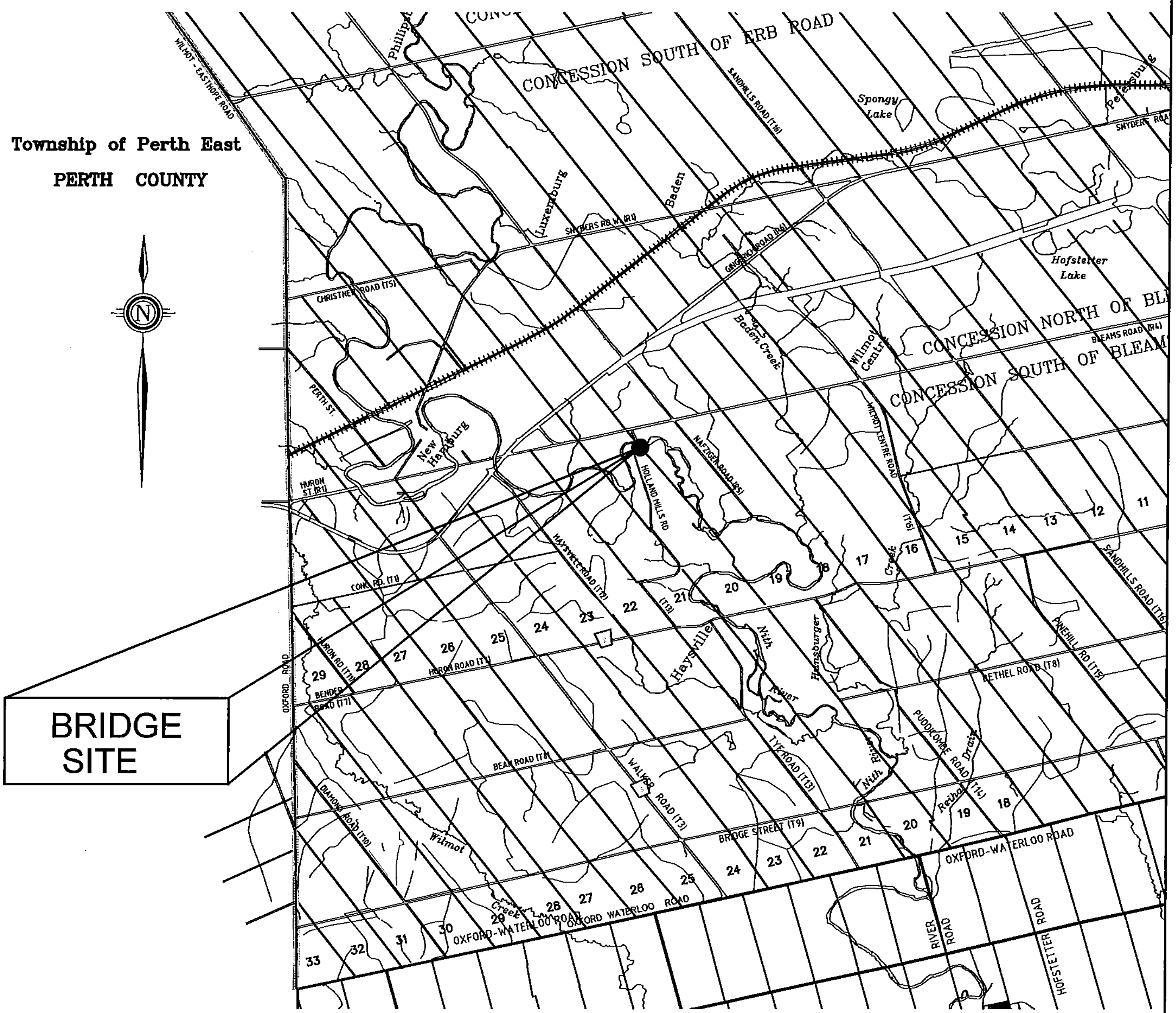
Mr. Allan Garnham, P. Eng.	or	Mr. Gary Charbonneau, CET
Project Manager		Director of Public Works
K. Smart Associates Limited		Township of Wilmot
85 McIntyre Drive		60 Snyder's Road West
Kitchener ON N2R 1H6		Baden, ON N3A 1A1
Phone: 519-748-1199 ext 246		Phone: 519-634-8444 ext 238
Fax: 519-748-6100		Fax: 519-634-5044
E-mail: agarnham@ksmart.ca		E-mail: gary.charbonneau@wilmot.ca

BRIDGE 17/B-T13

(HOLLAND MILLS ROAD BRIDGE)

TOWNSHIP OF WILMOT

REGION OF WATERLOO



KEY PLAN

N.T.S.

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER NEW LISKEARD SUDBURY RAINY RIVER

\\server\data\2016\16-298\Drafting\16-298 COVER PAGE.dwg Key Plan 21-Sep-16 1:48:22 PM

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

September 22, 2016

File No. 16-298

Regional Environmental Assessment Coordinator
Ministry of Environment and Climate Change
Southwestern Region
733 Exeter Road
London, ON N6E 1L3

**RE: BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Sir or Madam:

The Township of Wilmot has initiated a study to look at the structural and physical deficiencies associated with Bridge 17/B-T13. Your input and comments are requested.

Bridge 17/B-T13 is an existing steel pony truss structure with a span of 29.7m over the Nith River. The structure is located on Holland Mills Road south of Bleams Road in the Township of Wilmot in the Region of Waterloo.

The project is being planned under Schedule B of the Municipal Class Environmental Assessment.

Please find enclosed for your information a copy of the Notice of Study Commencement and a key plan showing the location of the structure.

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET Township of Wilmot

Ministry of the Environment and Climate Change
West Central Region

119 King Street West
12th Floor
Hamilton, Ontario L8P 4Y7
Tel.: 905 521-7640
Fax: 905 521-7820

Ministère de l'Environnement et de l'Action en matière de changement climatique
Direction regionale du Centre-Quest

119 rue King Quest
12e étage
Hamilton (Ontario) L8P 4Y7
Tél. : 905 521-7640
Téléc. : 905 521-7820

October 5, 2016

Mr. G. Charbonneau
Township of Wilmot

Mr. A. Garnham
K. Smart Associates Ltd.

Dear Messrs. Charbonneau and Garnham:

Re: Class EA for Bridge 17/B-T13 (Holland Mills Road Bridge)
Township of Wilmot, Region of Waterloo
Response to Notice of Commencement

This letter is our response to the Notice of Commencement for the above noted project. This response acknowledges that the Township of Wilmot has indicated that its study is following the Schedule "B" process under the MEA Class EA in order to determine how to best address the deteriorating conditions of this bridge and meet the local community's needs for improved levels of traffic and overall safety. Thank you for the opportunity to comment on this project.

Cultural Heritage Considerations

As part of the Environmental Assessment Act process, the Ministry of Tourism, Culture and Sport has an interest based on its mandate to conserve Ontario's cultural heritage, including:

- Archaeological resources, including land-based and marine;
- Built heritage resources, including bridges and monuments; and,
- Cultural heritage landscapes.

The Municipal Engineers Association (MEA) has developed a checklist and background material to screen Municipal Class Environmental Assessment (EA) bridge projects for cultural heritage. This checklist must be completed and included in the Project File and Report.

Part A of the checklist determines the Municipal Class EA schedule (A, A+, B or C) for the project.

Part B of the checklist determines whether a Cultural Heritage Evaluation Report (CHER) for the bridge is required: this is always the case if a bridge is over 40 years old, unless it is rigid frame, precast with concrete deck, a culvert or simple span, or steel Beam/concrete deck construction built after 1956. A bridge less than 40 years old requires a CHER if it is has already been identified as having cultural heritage value or interest by separate International, Federal, Provincial or Municipal governments, or is viewed as a landmark or gateway by a local community. CHERs must be carried out by a qualified person.

Part C of the checklist determines whether the CHER has identified the bridge as being of cultural heritage value or interest, and if so, whether these heritage features will be impacted by the project. If heritage features may be impacted, a Heritage Impact Assessment (HIA) must be carried out by a qualified person. The report should be sent to the Ministry of Tourism, Culture and Sport to be reviewed by a Heritage Planner. The heritage impact assessment should also be forwarded to the local municipality and municipal heritage committee for their review and comment. The report and its recommendations should be considered as part of the EA decision making process. For more information on HIA work, refer to Ministry of Culture Info Sheet#5: Heritage Impact Assessments and Conservation

Plans accessible through the following link:
http://www.mtc.gov.on.ca/en/publications/Heritage_Tool_Kit_Heritage_PPS_infoSheet.pdf.

As detailed in Part D of the checklist, the subject property is determined to have archaeological potential based on provincial archaeological criteria unless:

- The entire project area has been subject to disturbance more intensive and extensive than the scope of the proposed work; or
- The project area has been subject to archaeological assessment and the report recommending no further work has been entered into the Ontario Public Register of Archaeological Reports.

Unless otherwise documented, an archaeological assessment by an archaeologist licensed under the Ontario Heritage Act may be required for this project prior to any ground disturbance and/or site alterations. The assessment report(s) must be in compliance with the Ministry of Culture's Standards and Guidelines for Consultant Archaeologists. The licensed archaeologist will forward all completed archaeological assessment reports to the Ministry of Tourism, Culture and Sport for review by an Archaeological Review Officer.

Consultation with First Nation and Métis Communities

Your proposed project may have the potential to affect Aboriginal communities who hold or claim Aboriginal or treaty rights protected under Section 35 of Canada's *Constitution Act* 1982.

The Crown has a duty to consult First Nation and Métis communities when it knows about established or credibly asserted Aboriginal or treaty rights, and contemplates decisions or actions that may adversely affect them. Although the Crown remains responsible for ensuring the adequacy of consultation with potentially affected Aboriginal communities, it may delegate procedural aspects of the consultation process to project proponents. The environmental assessment process requires proponents to consult with interested persons and government agencies, including those potentially affected by the proposed project. This includes a responsibility to conduct adequate consultation with First Nation and Métis communities. The Ministry relies on consultation conducted by proponents when it assesses the Crown's obligations and directs proponents during the regulatory process.

Where the Crown's duty to consult is triggered in relation to your proposed project**,** the Ontario Ministry of the Environment is delegating the procedural aspects of rights-based consultation to you through this letter.

A follow up letter will be sent with a list of the First Nations and Metis groups that should be contacted for this project.

Source Water Protection

Per the recent amendments to the Municipal Engineers Association (MEA) Class EA parent document approved October 2015, proponents undertaking a Municipal Class EA project must identify early in the process whether a project is occurring within a source water protection vulnerable area. This must be clearly documented in a Project File report or ESR. If the project is occurring in a vulnerable area, then there may be policies in the local Source Protection Plan (SPP) that need to be adhered to (requirements under the Clean Water Act). The proponent should contact and consult with the appropriate Conservation Authority/Source Protection Authority (CA/SPA) to discuss potential considerations and policies in the SPP that apply to the project.

Please include a section in the report on Source Water Protection. Specifically, it should discuss whether or not the project is located in a vulnerable area and provide applicable details about the area. If located in a vulnerable area, proponents should document whether any project activities are a prescribed drinking water threat and thus pose a risk to drinking water (this should be consulted on with the appropriate CA/SPA). Where an activity poses a risk to drinking water, the proponent must document and discuss in the Project File Report/ESR how the project adheres to or has regard to applicable policies in the local SPP. This section should then be used to inform and should be reflected in other sections of the report, such as the identification of net positive/ negative effects of alternatives, mitigation measures, evaluation of alternatives etc. (As a note, even if the project activities in a vulnerable area are deemed to not to be a drinking water risk, there may be other policies that apply and so consultation with the local CA/SPA is important).

You must contact the Director, Environmental Approvals Branch if you have reason to believe that your proposed project may **adversely affect an Aboriginal or treaty right**, **consultation has reached an impasse**, or if a Part II Order is anticipated. The Ministry will then assess the extent of any Crown duty to consult in the circumstances, and will consider whether additional steps should be taken and what role you will be asked to play in them.

Should you or any members of your project team have any questions regarding the material above, please contact me either at (905) 521-7864 or at Barbara.slattery@ontario.ca

Yours truly,

Barbara Slattery

Barbara Slattery
EA/Planning Coordinator

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

September 22, 2016

File No. 16-298

Ontario Ministry of Natural Resources
Guelph District Office
1st Floor
1 Stone Road West
Guelph, ON N1G 4Y2

**RE: BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Sir or Madam:

The Township of Wilmot has initiated a study to look at the structural and physical deficiencies associated with Bridge 17/B-T13. Your input and comments are requested.

Bridge 17/B-T13 is an existing steel pony truss structure with a span of 29.7m over the Nith River. The structure is located on Holland Mills Road south of Bleams Road in the Township of Wilmot in the Region of Waterloo.

The project is being planned under Schedule B of the Municipal Class Environmental Assessment.

Please find enclosed for your information a copy of the Notice of Study Commencement and a key plan showing the location of the structure.

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET Township of Wilmot

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K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

September 22, 2016

File No. 16-298

Ontario Ministry of Tourism, Culture and Sport
Culture Services Unit
Toronto Office
Hearst Block, 9th Floor
900 Bay Street
Toronto, ON
M7A 2E1

**RE: BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Sir or Madam:

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If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET Township of Wilmot

Ministry of Tourism, Culture and Sport

Heritage Program Unit
Programs and Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7
Tel: 416 314 7145
Fax: 416 212 1802

Ministère du Tourisme, de la Culture et du Sport

Unité des programmes patrimoine
Direction des programmes et des services
401, rue Bay, Bureau 1700
Toronto ON M7A 0A7
Tél: 416 314 7145
Téléc: 416 212 1802

Ontario

October 31, 2016 (EMAIL ONLY)

Allan Garnham, P.Eng.
K. Smart Associates Limited
85 McIntyre Drive
Kitchener, ON N2R 1H6
E: AGarnham@ksmart.ca

RE: MTCS file #: 0005694
Proponent: Township of Wilmot
Subject: Notice of Commencement, Municipal Class Environmental Assessment Bridge 17/B-T13 (Holland Mills Road Bridge at Nith River)
Location: Township of Wilmot, Regional Municipality of Waterloo, Ontario

Dear Allan Garnham:

Thank you for providing the Ministry of Tourism, Culture and Sport (MTCS) with the Notice of Commencement for your project. MTCS's interest in this EA project relates to its mandate of conserving Ontario's cultural heritage, which includes:

- Archaeological resources, including land-based and marine;
- Built heritage resources, including bridges and monuments; and,
- Cultural heritage landscapes.

While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation. Aboriginal communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Aboriginal communities includes a discussion about known or potential cultural heritage resources that are of value to these communities. Municipal Heritage Committees, historical societies and other local heritage organizations may also have knowledge that contributes to the identification of cultural heritage resources. Some background information on the subject bridge has been compiled by a Historic Bridges NGO.

Municipal Heritage Bridges Cultural, Heritage & Archaeological Resources Assessment Checklist

Under the EA process, the proponent is required to determine a project's potential impact on cultural heritage resources. The Municipal Engineers Association provides screening criteria for work on bridges that falls under the Municipal Class EA with a *checklist* and *background material* available online, developed in coordination with MTCS.

Part A – Municipal Class EA Activity Selection

Please use the *checklist* and *background material* to document that the Municipal Class EA schedule B process is being followed by the project. Completing the remainder of this checklist determines what technical heritage studies may be required.

Part B - Cultural Heritage Assessment

If Part B of the checklist determines that the bridge or study area warrants preparation of a Cultural Heritage Evaluation Report (CHER), and undertaking of a Heritage Impact Assessment, our Ministry's *Info Sheet #5: Heritage Impact Assessments and Conservation Plans* outlines the scope of HIAs. CHERs and HIAs are to be prepared by qualified consultants. Please send HIAs to MTCS for review, and make copies available to local organizations or individuals who have expressed an interest in cultural heritage.

Part C – Heritage Assessment

If Part C of the checklist determines that the CHER has identified heritage features on the project and recommends that a Heritage Impact Assessment (HIA) be undertaken, our Ministry's *Info Sheet #5: Heritage Impact Assessments and Conservation Plans* outlines the scope of HIAs. CHERs and HIAs are to be prepared by qualified consultants. Please send HIAs to MTCS for review, and make copies available to local organizations or individuals who have expressed an interest in cultural heritage.

Part D – Archaeological Resources Assessment

If Part D of the checklist establishes that an archaeological assessment is required, it is to be conducted by an archaeologist licenced under the *Ontario Heritage Act* (*OHA*), who is responsible for submitting the report directly to MTCS for review. MTCS archaeological sites data are available at *archaeology@ontario.ca*.

After completing the checklist, please update MTCS on the project Class EA schedule and whether any technical heritage studies will be completed for the project. Please provide all technical heritage studies to MTCS before issuing a Notice of Completion.

Environmental Assessment Reporting

All technical heritage studies and their recommendations are to be addressed and incorporated into EA projects. If your screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file.

Thank-you for consulting MTCS on this project: please continue to do so through the EA process, and contact me for any questions or clarification.

Sincerely,

Joseph Muller, RPP, MCIP
Heritage Planner
Joseph.Muller@Ontario.ca

Copied to: Gary Charbonneau, CET, Township of Wilmot

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. MTCS makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MTCS be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Please notify MTCS if archaeological resources are impacted by EA project work. All activities impacting archaeological resources must cease immediately, and a licensed archaeologist is required to carry out an archaeological assessment in accordance with the Ontario Heritage Act and the Standards and Guidelines for Consultant Archaeologists.

If human remains are encountered, all activities must cease immediately and the local police as well as the Cemeteries Regulation Unit of the Ministry of Government and Consumer Services must be contacted. In situations where human remains are associated with archaeological resources, MTCS should also be notified to ensure that the site is not subject to unlicensed alterations which would be a contravention of the Ontario Heritage Act.

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

September 22, 2016

File No. 16-298

Ministry of Indigenous Relations and Reconciliation
Consultation Unit
4th Floor
160 Bloor Street East
Toronto, ON M7A 2E6

**RE: BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Sir or Madam:

The Township of Wilmot has initiated a study to look at the structural and physical deficiencies associated with Bridge 17/B-T13. We would like assistance with identifying First Nations and Metis communities which might be affected or interested with this project.

Bridge 17/B-T13 is an existing steel pony truss structure with a span of 29.7m over the Nith River. The structure is located on Holland Mills Road south of Bleams Road in the Township of Wilmot in the Region of Waterloo.

The project is being planned under Schedule B of the Municipal Class Environmental Assessment.

Please find enclosed for your information a copy of the Notice of Study Commencement and a key plan showing the location of the structure.

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

September 22, 2016

File No. 16-298

Andrea Terella, Resource Planner
Grand River Conservation Authority
400 Clyde Road
PO Box 729
Cambridge, ON N1R 5W6

**RE: BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Andrea Terella:

The Township of Wilmot has initiated a study to look at the structural and physical deficiencies associated with Bridge 17/B-T13. Your input and comments are requested.

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If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET Township of Wilmot

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Allan Garnham

From: Andrea Terella <aterella@grandriver.ca>
Sent: November-03-16 9:27 AM
To: 'gary.charbonneau@wilmot.ca'
Cc: Allan Garnham
Subject: Bridge 17/B-T13 (Holland Mills Road Bridge) Class EA - Notice of Study Commencement

Good Morning Gary,

The GRCA is in receipt of the Notice of Study Commencement for Bridge 17/B-T13 (Holland Mills Road Bridge) Class EA. The study area is traversed by the Nith River and contains a portion of its associated Regional Storm floodplain which is regulated by the Grand River Conservation Authority (GRCA). This study is of interest to GRCA due to the identified watercourse, and floodplain. Therefore, GRCA staff would like to notify the Township of Wilmot that we wish to participate in the study review as the study area is within an area of interest to the GRCA.

If you have any questions or require additional information, please do not hesitate to contact me to discuss.

Regards,
Andrea

Andrea Terella | *Resource Planner*
Grand River Conservation Authority
400 Clyde Road, PO Box 729, Cambridge ON N1R 5W6
Phone: (519) 621-2763 x. 2292 | *Fax: (519) 621-4945*
www.grandriver.ca

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

September 22, 2016

File No. 16-298

Fisheries and Oceans Canada
520 Exmouth Street
Sarnia, ON N7T 8B1

**RE: BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Sir or Madam:

The Township of Wilmot has initiated a study to look at the structural and physical deficiencies associated with Bridge 17/B-T13. Your input and comments are requested.

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Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

September 22, 2016

File No. 16-298

Planning, Development and Legislative Services
Community Planning Division
Region of Waterloo
150 Frederick Street
Kitchener, ON N2G 4J3

**RE: BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Sir or Madam:

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Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET Township of Wilmot

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CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

September 22, 2016

File No. 16-298

Wilmot Heritage Advisory Committee
c/o
Nicholas Bogaert, Senior Planner
MHBC Planning, Urban Design and Landscape Architecture
Suite 200
540 Bingemans Centre Drive
Kitchener, ON N2B 3X9

RE: BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Sir or Madam:

The Township of Wilmot has initiated a study to look at the structural and physical deficiencies associated with Bridge 17/B-T13.

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Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET Township of Wilmot

Allan Garnham

From: Nick Bogaert <nbogaert@mhbcplan.com>
Sent: November-08-16 3:19 PM
To: Allan Garnham; gary.charbonneau@wilmot.ca
Subject: Holland Mills Road Bridge (17/B-T13) - Environmental Assessment

Good afternoon,

Thank you for circulating a copy of the Notice of Study Commencement to the Heritage Wilmot Advisory Committee. I provided a copy of the notice to Committee members at our October 5th meeting, and we discussed the project briefly. Members noted that the bridge is historic and one of very few bridges of this type remaining in the Region of Waterloo. You may be aware that the Holland Mills Road Bridge has been identified by the Regional Municipality of Waterloo as a cultural heritage resource, as noted in a heritage assessment of Waterloo Region truss bridges undertaken in 2007 (see 'Spanning the Generations', which can be provided upon request). Heritage Wilmot is interested in following the progress of this Environmental Assessment project, and we look forward to future communications as work progresses and various options are examined through the study.

Thank you,

Nick

Nicholas P. Bogaert
Chairperson

Heritage Wilmot
www.heritagewilmot.ca

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

November 8, 2016

File No. 16-298

Haudenosaunee Confederacy
c/o
Haudenosaunee Development Institute
Suite 417
16 Sunrise Court
PO Box 714
Ohsweken, ON N0A 1M0

**RE: BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Sir or Madam:

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Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

November 8, 2016

File No. 16-298

Métis Consultation Unit
Métis Nation of Ontario Head Office
Unit D
500 Old St. Patrick Street
Ottawa, ON K1N 9G4

**RE: BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Sir or Madam:

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Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET Township of Wilmot

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CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

November 8, 2016

File No. 16-298

Mississaugas of the New Credit
2789 Mississauga Road
RR 6
Hagersville, ON N0A 1H0

**RE: BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Sir or Madam:

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If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET Township of Wilmot

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K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

November 8, 2016

File No. 16-298

Lonny Bomberry, Land and Resources Director
Six Nations of the Grand – Lands and Resources Office
2498 Chiefswood Road
PO Box 5000
Ohsweken, ON N0A 1M0

**RE: BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Lonny Bomberry:

The Township of Wilmot has initiated a study to look at the structural and physical deficiencies associated with Bridge 17/B-T13. Your input and comments are requested and will be accepted up to December 15, 2016.

Bridge 17/B-T13 is an existing steel pony truss structure with a span of 29.7m over the Nith River. The structure is located on Holland Mills Road south of Bleams Road in the Township of Wilmot in the Region of Waterloo.

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If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET Township of Wilmot

TOWNSHIP OF WILMOT

CLASS ENVIRONMENTAL ASSESSMENT

BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)

HOLLAND MILLS ROAD AT THE NITH RIVER

NOTICE OF PUBLIC INFORMATION CENTRE (PIC)

The Township of Wilmot is studying the structural and physical deficiencies associated with Bridge 17/B-T13. In order to eliminate most deficiencies and provide improved levels of traffic service and overall safety, the Township is considering complete replacement of the existing structure.

This project is being planned as a **Schedule "B"** project under the **Municipal Class Environmental Assessment**. A Public Information Centre (PIC) is planned to provide further information to the public on the proposal and to receive input and comment from interested persons:

Public Information Centre (PIC):

Time: 5:00 – 7:00 PM
Date: Thursday, May 11, 2017
Location: Haysville Community Centre, 3433 Huron Road, New Hamburg (Haysville)

Following the public information centre (PIC), further comments are invited, for incorporation into the planning and design of this project, and will be received until Friday, May 25, 2017.

For further information, please contact:

Alastair Duncan, CET
Township of Wilmot
60 Snyder's Road West
Baden, Ontario, N3A 1A1
Phone: 519-634-8444 X263
Fax: 519-634-5044
E-mail: alastair.duncan@wilmot.ca

Allan Garnham, P.Eng.
K. Smart Associates Limited
85 McIntyre Drive
Kitchener, Ont., N2R 1H6
Phone: 519-748-1199 X246
Fax: 519-748-6100
E-mail: agarnham@ksmart.ca

Subject to comments received as a result of this Notice, the Township of Wilmot intends to proceed with the detailed design of this project and a Project File will be prepared and placed on the public record for a minimum 45 day review period.

With the exception of personal information, all comments will become part of the public record.

HOLLAND MILLS ROAD BRIDGE REPLACEMENT

(WILMOT BRIDGE 17/B-T13)

SCHEDULE B MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

BUILDING A SURE FOUNDATION

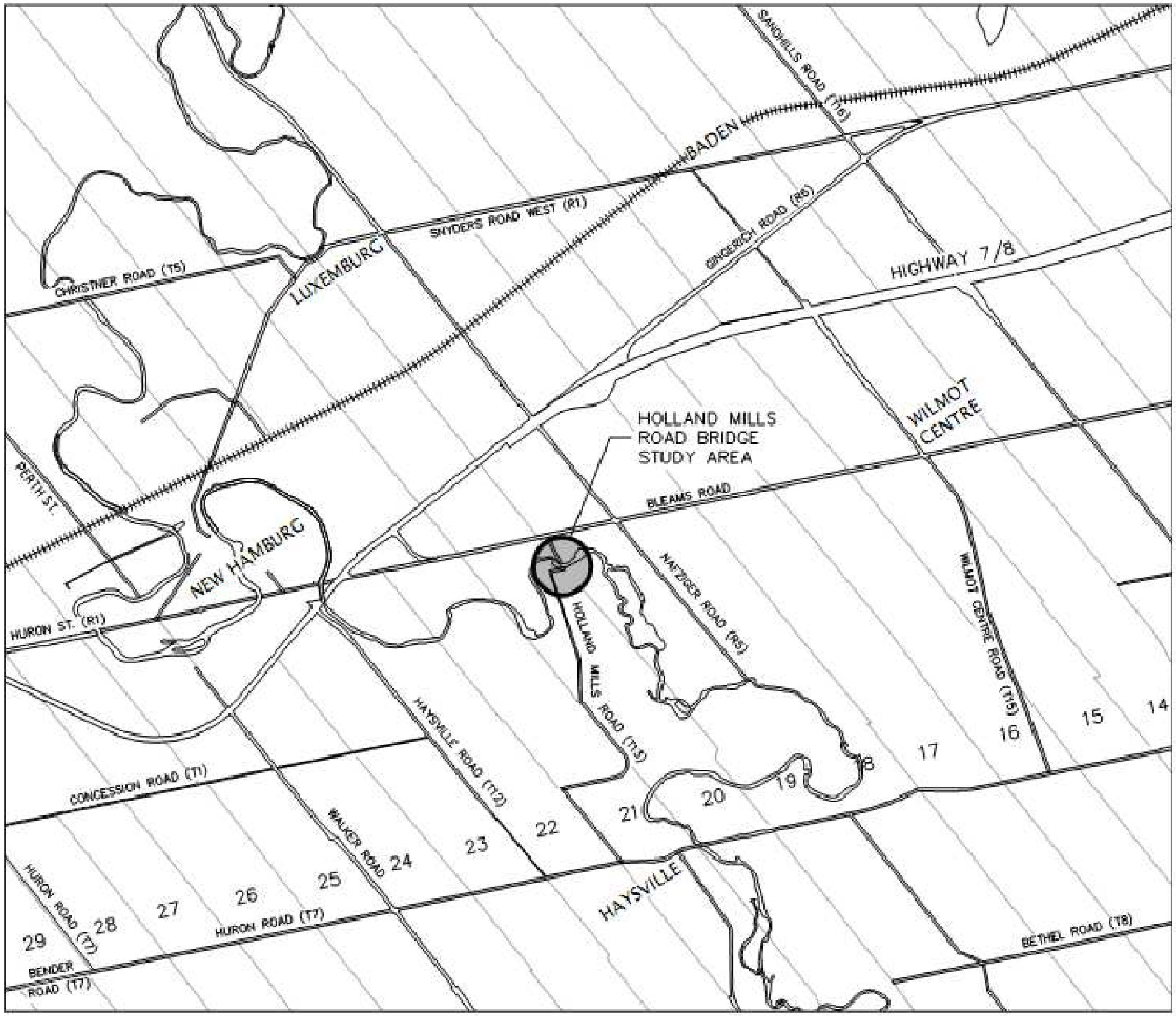
Public Information Centre

Haysville Community Centre
3433 Huron Road, Haysville

5:00 - 7:00pm
Thursday, May 11, 2017

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER SUDBURY

Public Information Centre



SCALE: N.T.S.

WELCOME

Municipal Class Environmental Assessment Process

Phase 1: Identify the Problem/Opportunity

Phase 2: Alternative Solutions (We are here)

- Identify reasonable alternative solutions to the problem(s)
- Inventory natural, social and economic environments
- Identify impacts of the alternative solutions on the environment and mitigating measures
- Evaluate the alternative solutions and identify the recommended solutions
- Consult review agencies and the public
- Select the preferred solution

Phase 5: Implementation

- Complete contract drawings
- Proceed to design/construction of the project
- Monitor for environmental provisions and commitments

Note: Phase 3 & 4 Do Not Apply to Schedule B Projects

Study Background and Location

West / Upstream Elevation (looking northeast)

- Holland Mill Road Bridge spans the Nith River on Holland Mills Road approximately 250 meters south of Bleams Road (R.R. 4).
- Holland Mills Road bridge is in overall poor condition and was closed in 2016. Prior to closure, it was deficient in roadway width, vertical clearance, and loading capacity.
- The study is being completed as a Schedule ‘B’ project, following the Municipal Class Environmental Assessment (October 2000, as amended)
- The Municipal Class EA provides a decision-making process to ensure that all relevant engineering and environmental features are considered in the planning and design of municipal infrastructure. The process requires public and agency involvement.

Study Objective

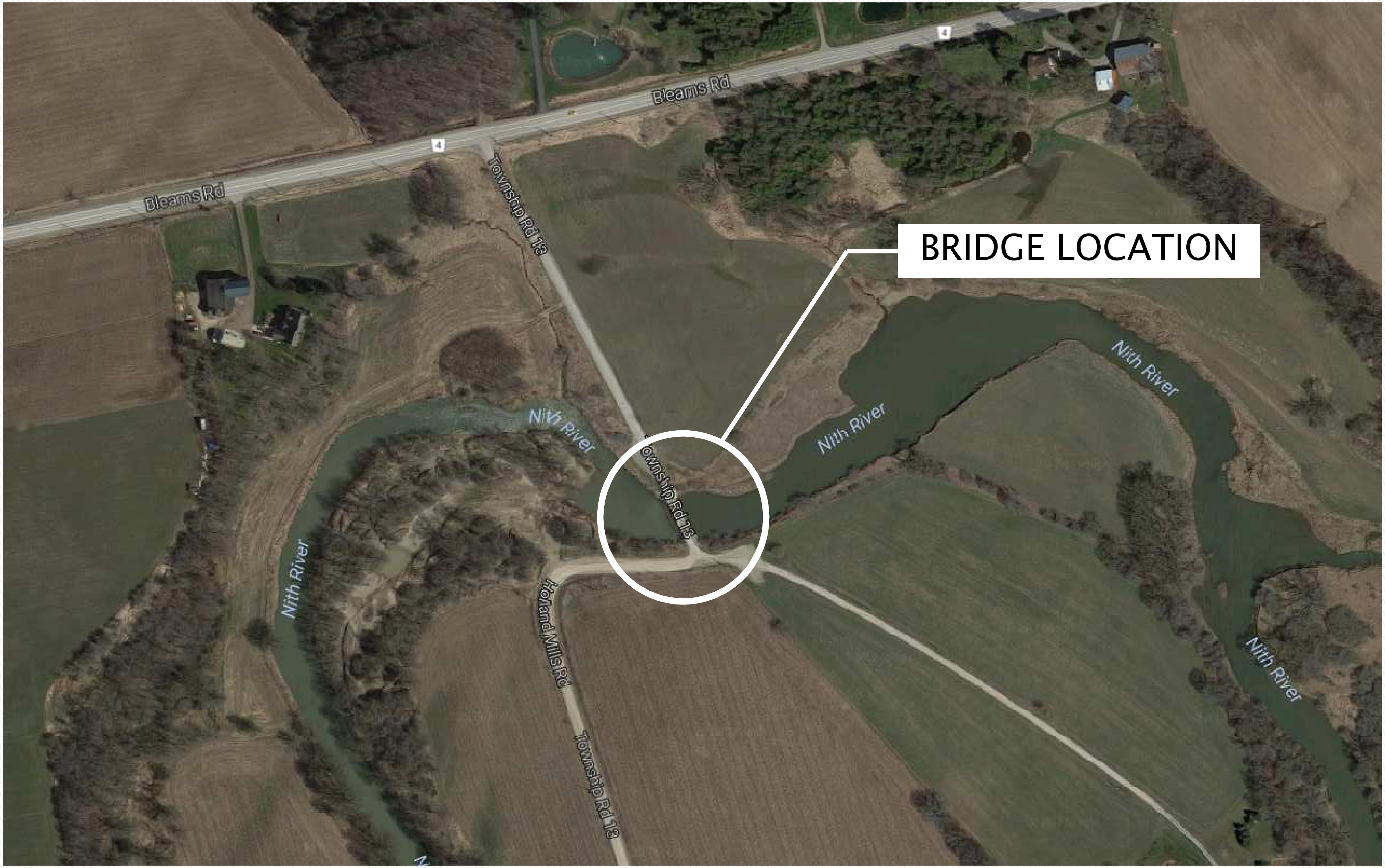
Problem/Opportunity Statement:

To investigate possible improvements to Holland Mills Road Bridge to eliminate deficiencies and provide improved levels of traffic service and overall safety.

North Approach (looking south)

The goal of this public information centre is to display background information, present the evaluation of alternatives considered to address the problem identified, and receive input on the preferred alternative.

https://www.google.ca/maps/@43.3725773,-80.6718678,5717m/data=!3m1!1e3



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Far North Approach (looking south)

North Approach (looking south)

East Elevation (looking west)

Deck Surface

Looking Upstream (looking west)

Looking Downstream (looking east)

Bridge Soffit (underside)

Severely Deteriorated Floor Beam

Table 1 - Evaluation of Alternatives

Criteria Group	Criteria	Alternative 1 (Do Nothing)	Alternative 2 (Repair Existing Bridge)	Alternative 3 (Replace Superstructure)	Alternative 4 (Replace Bridge in Current Location)	Alternative 5 (Replace Bridge in New Location)	Comment
Natural Environment	Impact to fisheries and aquatic life	1	2	3	4	5	Considers disruption to fish and other aquatic creatures
	Impact to vegetation and flora	1	2	3	4	5	Considers loss of vegetation and flora
	Impact on wildlife	1	2	3	4	5	Considers loss of wildlife habitat
	Impact on groundwater and surface water quality and quantity	1	2	3	4	5	Considers increase in run-off and water quality
	Impact on stream flow	1	2	3	4	5	Considers potential changes to stream width and depth
Socio-Economic Environment	Impact on existing communities	2	1	3	4	5	Considers change to "sense of place"
	Impact on residential areas	5	4	3	2	1	Considers change to the quality and quantity of residential areas
	Impact on agriculture	5	3	2	1	4	Considers change to the quality and quantity of farming
	Impact on future development	5	4	3	2	1	1 encourages future development whereas 5 hinders future development
	Impact on recreation	4	1	2	3	5	Considers potential changes to recreation such as fishing and boating
	Need for property acquisition	2.5	2.5	2.5	2.5	5	5 requires the purchase of property 2.5 does not require property to be purchased
	Length of construction	1	2	3	4	5	1 being the shortest time and 5 being the longest time
	Improvement to traffic movement	5	4	3	2	1	1 having the most improvement and 5 being the least
	Changes to noise and vibration levels	1	2	3	4	5	Measures the change to noise and vibration levels
	Impact on air quality	1	2	3	4	5	
	Access to Emergency Services	5	4	3	2	1	
Cultural Environment	Impact to archeology	1	2	3	4	5	
	Impact to heritage	1	2	3	4	5	
Technical Considerations	Extent the option meets the problem statement	5	4	3	2	1	1 meets the problem statement 5 does not address the problem
	Elimination of Width Restriction	4	4	4	1.5	1.5	1.5 eliminates width restriction 4 does not eliminate width restriction
	Elimination of Load Posting	4.5	4.5	2	2	2	2 eliminates load posting 4.5 does not eliminate load posting
	Ability to modify roadway design criteria	4	4	4	1.5	1.5	1.5 will allow modifications 4 will not allow modifications
	Ability to improve hydrology conditions	4	4	4	1.5	1.5	1.5 will allow for improvements 4 will not provide improvements
	Constructability	1	2	3	4	5	1 is the easiest to construct 5 is the most difficult to construct
	Improvements to safety	5	4	3	2	1	1 provides many improvements 5 provides no improvements
	Construction timeline	1	2	3	4	5	1 is the shortest construction timeline 5 is the longest construction timeline
	Lifespan	5	4	3	1	2	1 is the longest lifespan 5 is the shortest lifespan
	Need for ongoing maintenance	1	5	4	2	3	1 requries little or no maintenance 5 requires frequent maintenance
Cost	Purchase of private property	2.5	2.5	2.5	2.5	5	2.5 does not require purchasing property 5 requires purchasing private property
	Maintenance costs	2	5	4	1	3	1 is the lowest cost 5 is the highest cost
	Cost to mitigate impacts to the natural environment	1	2	3	4	5	1 requires no mitigation 5 requires substantial mitigation
	Construction costs	1	2	3	4	5	1 would be the lowest cost 5 would be the highest cost
	Sum	84.5	92.5	97	91.5	114.5	

Alternative 4 is chosen because it has the lowest overall score and addressess the problem statement.

Notes:
Alternatives are ranked 1-5 with 1 having the least impact with 5 having the most impact except where noted.
Each row equals 15 points to ensure each criterion is weighted the same.

Table 2 - Refinement of Preferred Alternatives

Criteria Group	Criteria	Option 1 (Box Beam Bridge)	Option 2 (Bailey Bridge)	Option 3 (Truss Bridge)	Comment
Natural Environment	Impact to fisheries and aquatic resources	0 points (No alternatives result in loss of fish habitat)			Considers loss of fish habitat as a result of the proposed construction
	Impact to vegetation and flora	0 points (No alternatives result in permanent loss of vegetation/flora)			Considers permanent loss of vegetation/flora as a result of constructing the alternative
	Impact on wildlife	0 points (No alternatives result in permanent loss of wildlife habitat)			Considers loss of habitat for wildlife such as birds and animals
	Impact on surface water	1	3	2	Considers both increase and level of contamination of runoff
	Impact on ground water	0 points (No alternatives impact groundwater)			Considers changes to the quality or quantity of groundwater
	Impact on stream flow	0 points (No alternatives result in changes to the watercourse alignment)			Considers changes to the overall alignment of the watercourse
Socio-Economic Environment	Impact on existing communities	2	3	1	Considers change to "sense of place" 1 being the least change and 3 being the most change
	Impact on residential areas	0 points (No alternative is expected to alter the quantity and quality of residential areas)			Considers potential changes to the quantity and quality of residential areas
	Impact on agricultural areas and farming	1	2	3	Measures the potential improvements to agriculture and farming
	Impact on future development	1	3	2	1 encourages future development whereas 3 hinders future development
	Impact on recreation	0 Points (No changes to recreation are expected)			Considers changes to recreatation, such as fishing or boating, as a result of implementing the alternative
	Increase in traffic volume and speeds	3	1	2	Considers potential for increase in number of vehicles and the speed of said vehicles
	Increase in noise levels	1	3	2	1 would be the least amount of noise during use whereas 3 would be the most amount of noise during use
	Increase in vibration	1	3	2	1 would be the least amount of vibration during use whereas 3 would be the most amount of vibration during use
	Impact on air quality	3	1	2	Considers increase in air polution from traffic 1 being the least increase 3 being the most increase
	Aesthetics	2	3	1	Considers overall appearance
Cultural Environment	Impact to archeology	0 Points (No impacts to archeology expected)			
	Impact to heritage	3	2	1	
Technical Considerations	Ability to source materials	1	2	3	1 is readily available 3 is difficult to source
	Improvements to traffic movement	1	3	2	1 would be the most improvement 3 would be the least improvement
	Ability to eliminate "expansion joints" at ends of bridge	1	2.5	2.5	1 does not require expansion joints 2.5 requries expansion joints
	Constructability	2	1	3	1 is the most constructable 3 is the least constructable
	Construction timeline	2	1	3	1 is the shortest construction 3 is the longest construction
	Lifespan	1	3	2	1 is the longest lifespan 3 is the shortest lifespan
	Need for ongoing maintenance	1	3	2	1 requries little or no maintenance 3 requires frequent maintenance
Cost	Purchase of private property	0 points (No alternative is expected to require the purchase of property)			0 requires no property 1 requires some property
	Maintenance costs	1	3	2	1 is the lowest cost 3 is the highest cost
	Mitigation measures	2	3	1	1 requires no mitigation 3 requires substantial mitigation
	Construction costs	2	1	3	1 would be the lowest cost 3 would be the highest cost
	Sum	32	46.5	41.5	

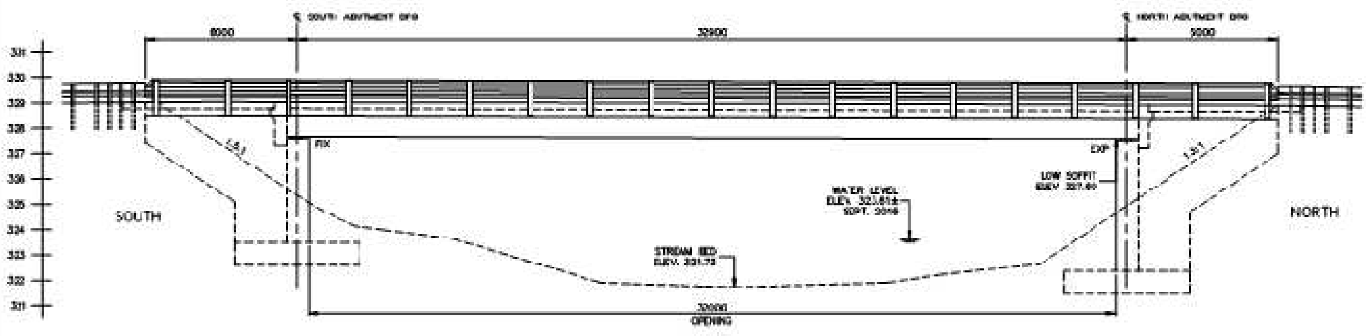
Option 1 is chosen because it has the lowest overall score

Notes:
Alternatives are ranked 1-3 with 1 having the least impact with 3 having the most impact except where noted.
Each row equals 6 points to ensure each criterion is weighted the same.

Option 1

SAMPLE PICTURE OF CONCEPT REPLACEMENT STRUCTURE
(RAILING TO VARY)

SAMPLE PICTURE OF CONCEPT REPLACEMENT STRUCTURE
(RAILING TO VARY SLIGHTLY)



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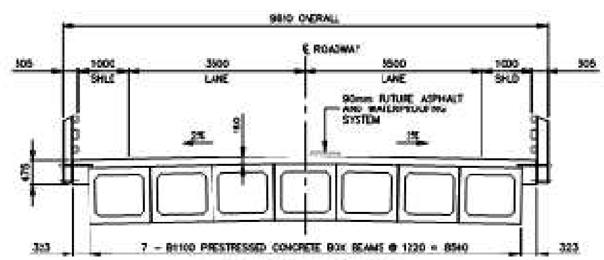


DECK CROSS-SECTION
SCALE 1:50

THIS REPLACEMENT ALTERNATIVE HAS AN ESTIMATED CONSTRUCTION COST OF $1,230,000

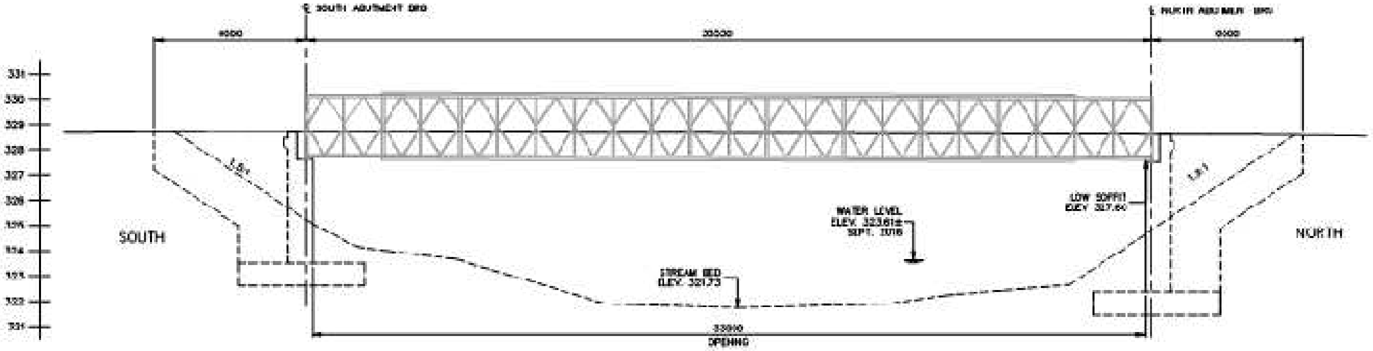
No.	REVISION	DATE		SCALE					
			DESIGNED BY: A.A.	AS NOTED			HOLLAND MILLS BRIDGE REPLACEMENT TOWNSHIP OF WILMOT REGION OF WATERLOO	K. SMART ASSOCIATES LIMITED CONSULTING ENGINEERS AND PLANNERS KITCHENER SUDBURY	JOB NUMBER 16-298
			CHECKED BY:						DATE MAY 2017
			DRAWN BY:						
			CHECKED BY: A.G.				BOX BEAM CONCEPT DRAWING - OPTION 1		DRAWING NUMBER OPTION 1
			FIELD BOOK:						

\\server\ksdata\Data\2016\16-298\Drafting\16-298 Holland Mills Bridge Replacement.dwg GA Box Beam Concept 12-Apr-17 1:51:50 PM

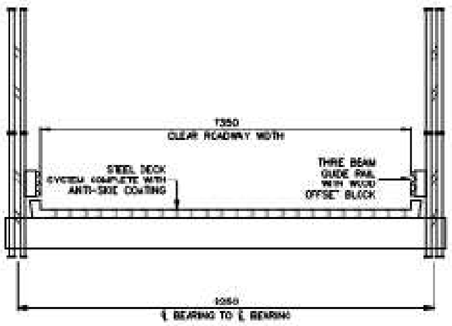
Option 2

SAMPLE PICTURE OF CONCEPT REPLACEMENT STRUCTURE

SAMPLE PICTURE OF CONCEPT REPLACEMENT STRUCTURE



ELEVATION
SCALE 1:100



DECK CROSS-SECTION
SCALE 1:50

THIS REPLACEMENT ALTERNATIVE HAS AN ESTIMATED CONSTRUCTION COST OF $1,400,000

NO.	REVISION	DATE		SCALE					JOB NUMBER
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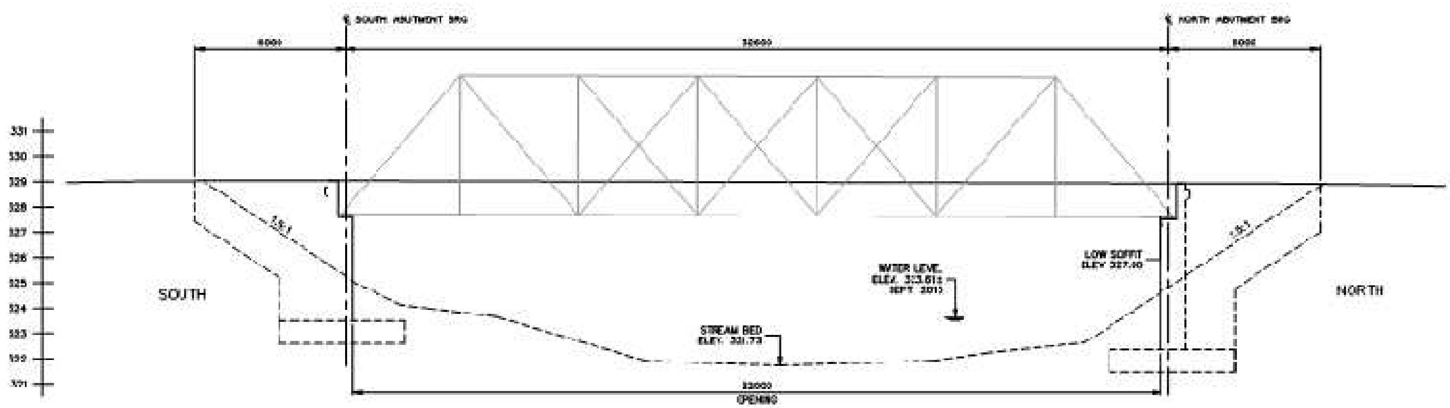
			CHECKED BY: --				TOWNSHIP OF WILMOT / REGION OF WATERLOO	CONSULTING ENGINEERS AND PLANNERS	DATE: MARCH 2017
			DRAWN BY: A.A.				BAILEY CONCEPT DRAWING - OPTION 2		DRAWING NUMBER
			CHECKED BY: A.A.						OPTION 2
			FIELD BOOK:						

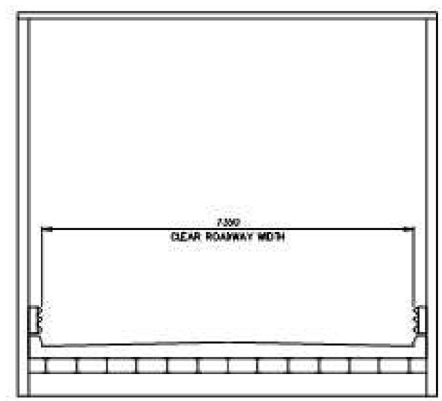
Option 3

SAMPLE PICTURE OF CONCEPT REPLACEMENT STRUCTURE

SAMPLE PICTURE OF CONCEPT REPLACEMENT STRUCTURE



ELEVATION
SCALE 1:100



DECK CROSS SECTION
SCALE 1:50

THIS REPLACEMENT ALTERNATIVE HAS AN ESTIMATED CONSTRUCTION COST OF $1,770,000

No.	REVISION	DATE		SCALE					
			DESIGNED BY:	AS NOTED			HOLLAND MILLS BRIDGE REPLACEMENT	K. SMART ASSOCIATES LIMITED	JOB NUMBER 16-298
			CHECKED BY:				TOWNSHIP OF WILMOT — REGION OF WATERLOO	CONSULTING ENGINEERS AND PLANNERS	DATE MARCH 2017
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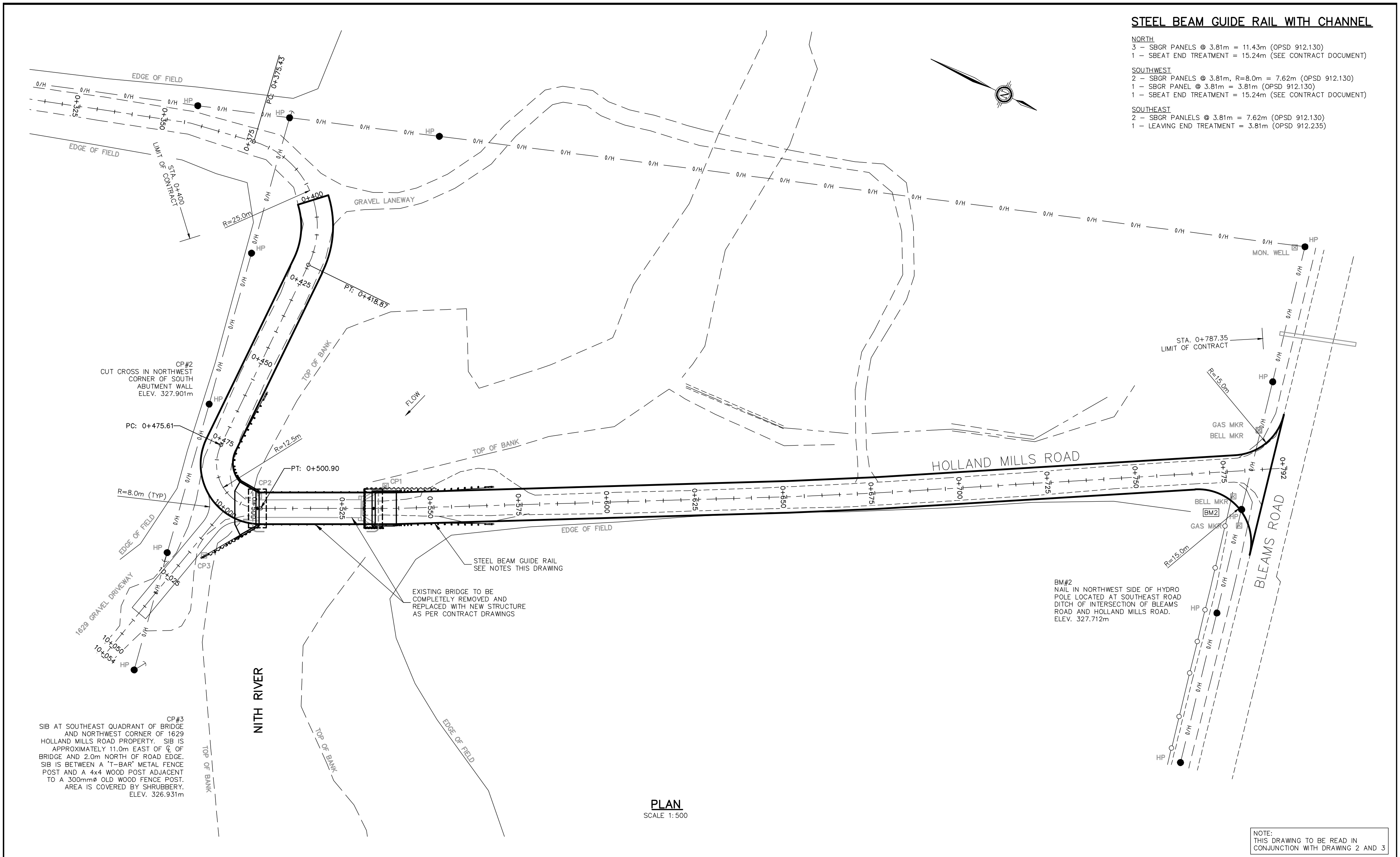
			CHECKED BY:						
			FIELD BOOK:						

Preferred Alternative



No.	REVISION	DATE
1.	ISSUED FOR PIC	MAY 05/17

DESIGNED BY: A.G.
CHECKED BY: --
DRAWN BY: D.S.
CHECKED BY: A.G.
FIELD BOOK:

SCALE 1:500
5.0m 0 10.0m
(ON 24 x 36 PAPER)

HOLLAND MILLS BRIDGE REPLACEMENT
TOWNSHIP OF WILMOT — REGION OF WATERLOO

PLAN

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER — SUDBURY

JOB NUMBER: 16–298
DATE: MAY 2017
DRAWING NUMBER: 1

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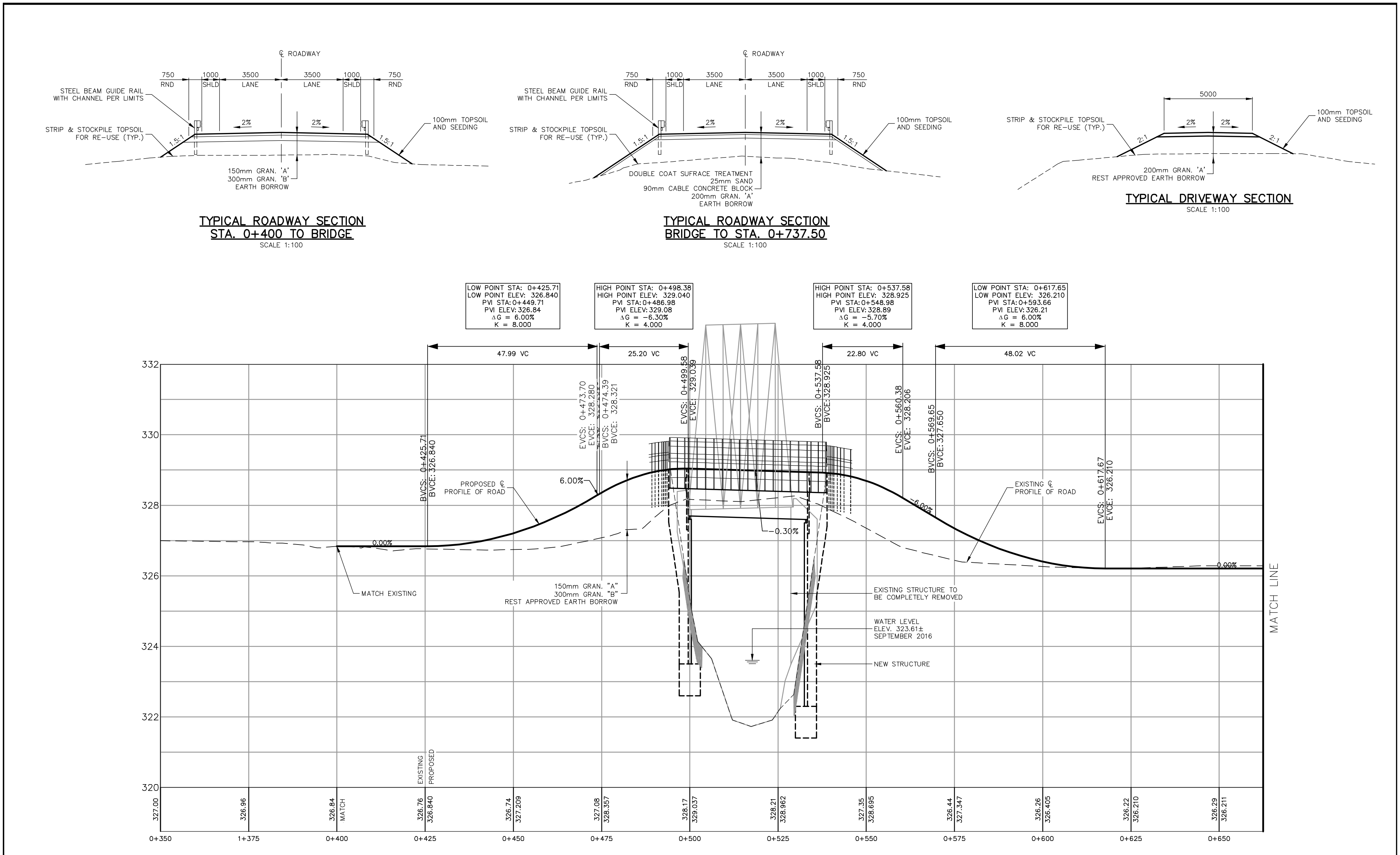

No.	REVISION	DATE
1.	ISSUED FOR PIC	MAY 05/17

DESIGNED BY: A.G.
CHECKED BY: --
DRAWN BY: D.S.
CHECKED BY: A.G.
FIELD BOOK:

SCALE
HORIZ. 1:500
VERT. 1:50
(ON 24 x 36 PAPER)

HOLLAND MILLS BRIDGE REPLACEMENT

TOWNSHIP OF WILMOT — REGION OF WATERLOO

PROFILE

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER — SUDBURY

JOB NUMBER 16-298
DATE MAY 2017
DRAWING NUMBER 2

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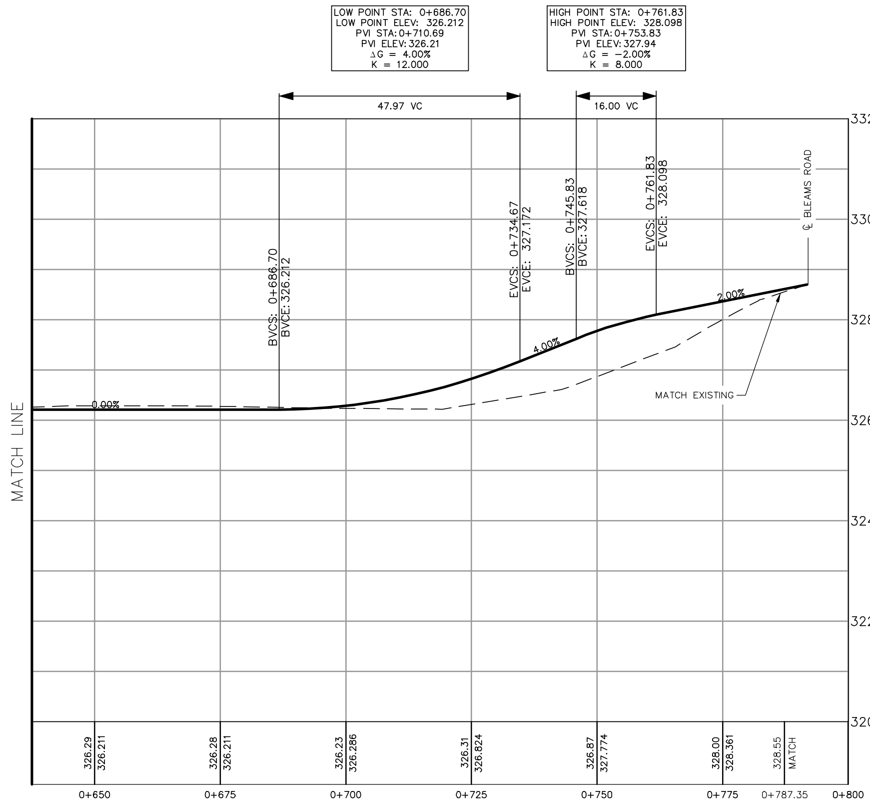

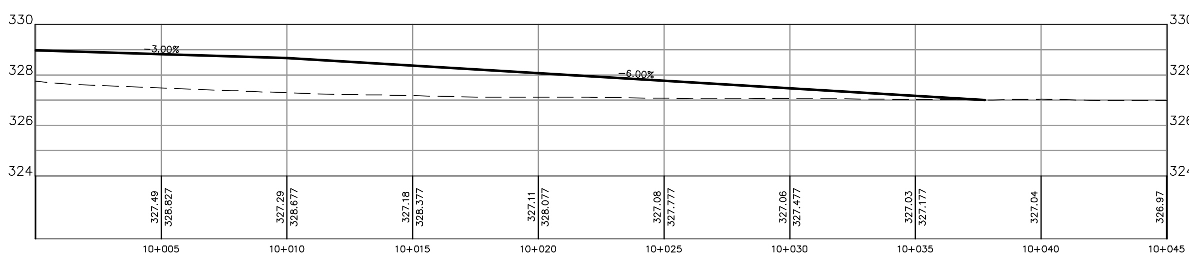

DRIVEWAY PROFILE – STA. 0+490

No.	REVISION	DATE
1.	ISSUED FOR PIC	MAY 05/17

DESIGNED BY: A.G.
CHECKED BY: --
DRAWN BY: D.S.
CHECKED BY: A.G.
FIELD BOOK:

SCALE
HORIZ. 1:500
VERT. 1:50
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(ON 24 x 36 PAPER)

HOLLAND MILLS BRIDGE REPLACEMENT

TOWNSHIP OF WILMOT — REGION OF WATERLOO

PROFILE - CONTINUED

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER — SUDBURY

JOB NUMBER: 16-298
DATE: MAY 2017
DRAWING NUMBER: 3

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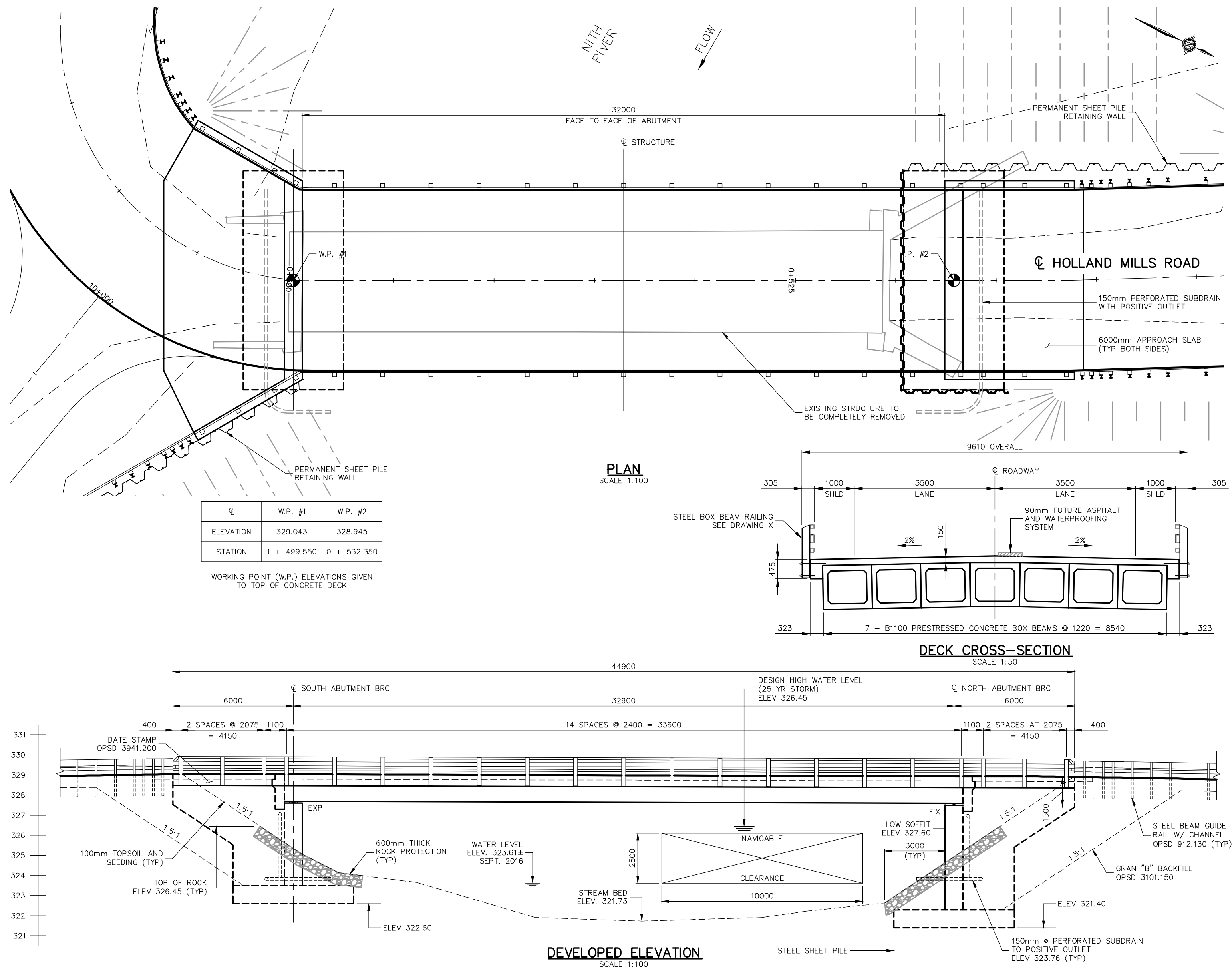
Preferred Alternative



℄	W.P. #1	W.P. #2
ELEVATION	329.043	328.945
STATION	1 + 499.550	0 + 532.350

WORKING POINT (W.P.) ELEVATIONS GIVEN TO TOP OF CONCRETE DECK

CONSTRUCTION NOTES

1. STRUCTURE DESIGNED FOR CL–625 (ONT) LOADING PLUS 90mm OF ASPHALT IN ACCORDANCE WITH THE CANADIAN HIGHWAY BRIDGE DESIGN CODE (CHBDC) 2014.
2. WORK ON THE STRUCTURE MUST NOT BE COMMENCED UNTIL MONUMENTS TO FIX CONTROL POINTS HAVE BEEN ERECTED AND CHECKED BY THE CONTRACT ADMINISTRATOR.
3. STRUCTURE TO BE BUILT IN ACCORDANCE WITH THE MOST CURRENT OPS SPECIFICATIONS AND DRAWINGS AS WELL AS THE CONTRACT ADMINISTRATOR'S SPECIFICATIONS.
4. THE COMPLETE SOIL INVESTIGATION BY ______________ FORM PART OF THE CONTRACT DOCUMENTS. THE CONTRACT ADMINISTRATOR DOES NOT GUARANTEE THE ACCURACY OF THIS REPORT. THE CONTRACTOR SHALL REVIEW THE REPORT AND DETERMINE HIS OWN METHOD TO CONTROL GROUND WATER DURING THE EXCAVATION.
5. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS ON THE JOB AND REPORT ANY DISCREPANCIES TO THE CONTRACT ADMINISTRATOR BEFORE PROCEEDING WITH THE WORK.
6. CLASS OF CONCRETE

CAST–IN–PLACE CONCRETE	35 MPa C–1 MIX
PRESTRESSED CONCRETE	REFER TO RELEVANT DRAWINGS

   ALL CONCRETE SHALL INCLUDE AN APPROVED AIR ENTRAINING ADMIXTURE
7. CLEAR COVER TO REINFORCING STEEL TO BE:

FOOTINGS	100 ± 25mm
REMAINDER (UNLESS NOTED OTHERWISE)	70 ± 20mm
PRESTRESSED CONCRETE	SEE PRESTRESSED DWGS

8. REINFORCING STEEL SHALL BE GRADE 400. BARS MARKED WITH POSTFIX "S" DENOTE STAINLESS STEEL BARS. UNLESS OTHERWISE SHOWN, TENSION LAP LENGTHS NOT INDICATED ON THE CONTRACT DRAWINGS SHALL BE CLASS "B". BAR HOOKS SHALL BE MINIMUM LENGTH AND STIRRUPS SHALL HAVE MINIMUM HOOKS, UNLESS INDICATED OTHERWISE.
9. MINIMUM LAP OF REINFORCING STEEL SHALL BE IN ACCORDANCE WITH CHBDC (2014)
10. ALL CONCRETE SHALL BE PLACED IN THE DRY.
11. NO CONCRETE SHALL BE PLACED BEFORE MATERIALS, FORMWORK AND REINFORCING HAVE BEEN CHECKED AND APPROVED BY THE CONTRACT ADMINISTRATOR.
12. A.LL EXPOSED EDGES SHALL BE CHAMFERED 19mm UNLESS OTHERWISE NOTED. ALL ACUTE ANGLES TO BE FILLED AS INDICATED.
13. CONSTRUCTION JOINTS NOT SHOWN ON THE PLANS MUST BE APPROVED BY THE CONTRACT ADMINISTRATOR.
14. FOOTING DEPTHS ARE SUBJECT TO REVISION BY THE CONTRACT ADMINISTRATOR. FOOTINGS DESIGNED FOR A BEARING CAPACITY OF XXX kPa (ULS) AND XXX kPa (SLS).
15. BEARING SEATS TO BE FINISHED DEAD LEVEL TO THE SPECIFIED ELEVATIONS TO A TOLERANCE OF ±3mm.
16. THE BRIDGE DECK SHALL BE FINISHED USING AN APPROVED FINISHING MACHINE IN ACCORDANCE WITH OPS.MUNI 904.
17. ANY EXCAVATED OR IMPORTED MATERIAL SHALL BE STOCKPILED WELL AWAY FROM THE EDGE OF THE EXCAVATION AND AT APPROVED LOCATIONS.
18. NO BACKFILL SHALL BE PLACED UNLESS APPROVED BEFOREHAND BY THE CONTRACT ADMINISTRATOR. NATIVE MATERIAL SHALL NOT BE REMOVED FROM THE CONSTRUCTION SITE WITHOUT WRITTEN APPROVAL FROM THE CONTRACT ADMINISTRATOR.
19. ROCK PROTECTION SHALL BE 300mm NOMINAL SIZE WITH 50% LARGER THAN 300mm AND 50% SMALLER THAN 300mm. ROCK PROTECTION SHALL BE PLACED ON GEOTEXTILE UNDERLAY.

No.	REVISION	DATE
1.	ISSUED FOR PIC	MAY 05/17

DESIGNED BY: A.G.
CHECKED BY: --
DRAWN BY: D.S.
CHECKED BY: A.G.
FIELD BOOK:

SCALE: AS NOTED

HOLLAND MILLS BRIDGE REPLACEMENT

TOWNSHIP OF WILMOT — REGION OF WATERLOO

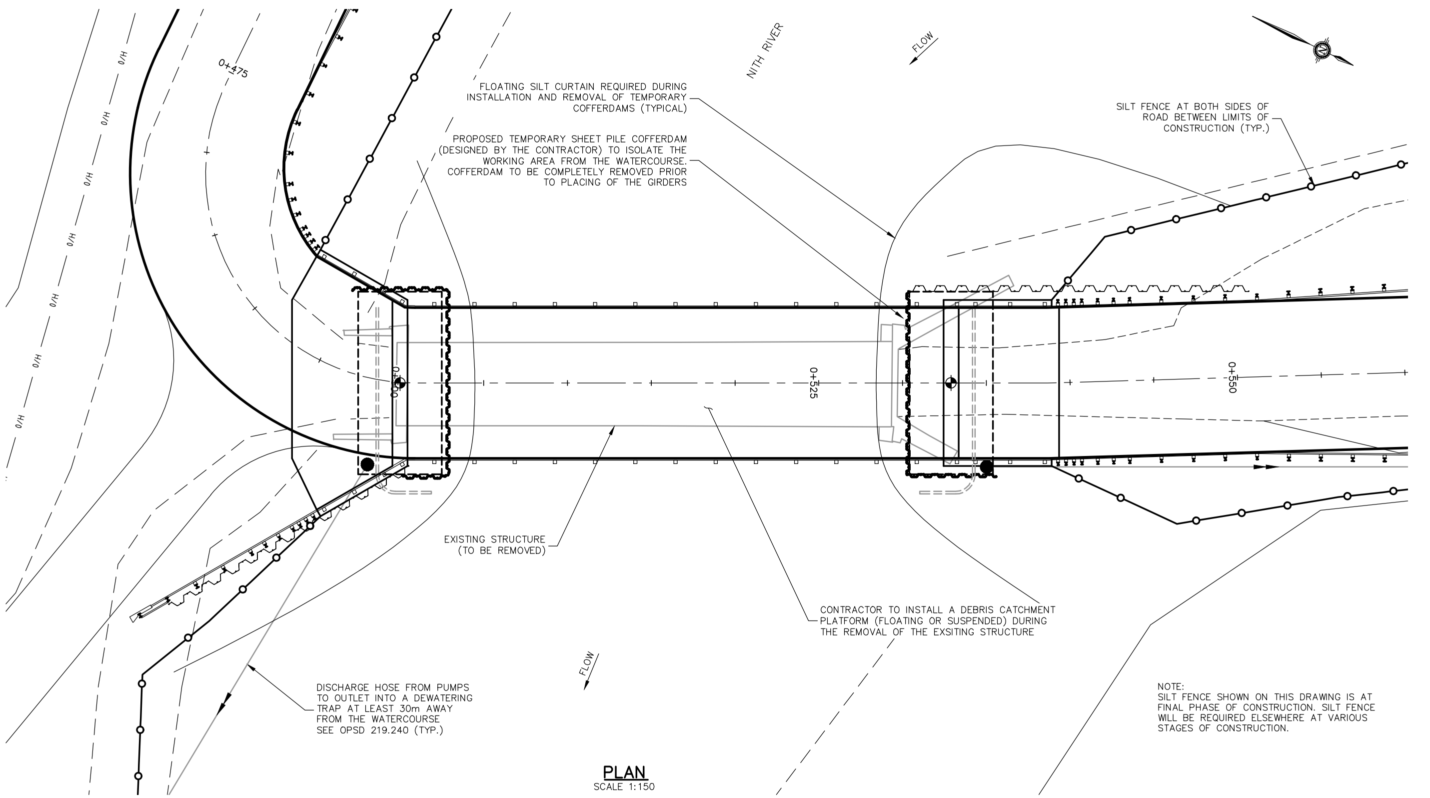
GENERAL ARRANGEMENT

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER — SUDBURY

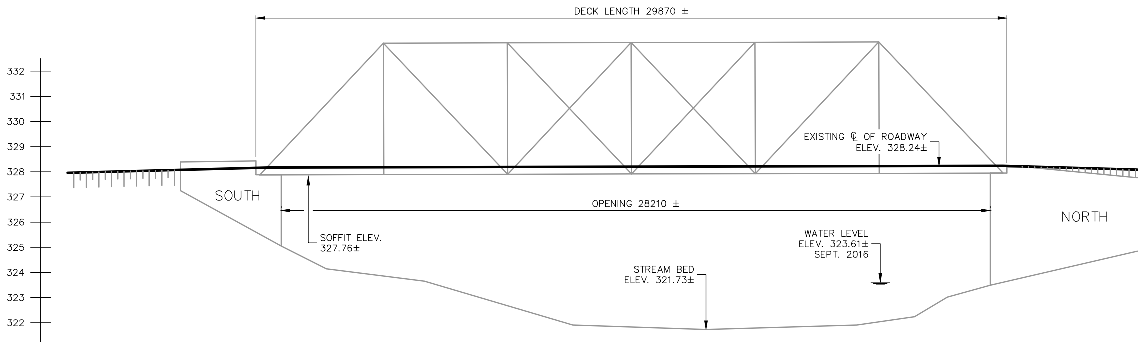
JOB NUMBER: 16–298
DATE: MAY 2017
DRAWING NUMBER: 4

\\server\KSdata\Data\2016\16–298\Drafting\16–298 Holland Mills Bridge Replacement.dwg GA 11–May–17 9:08:01 AM

Preferred Alternative



PLAN
SCALE 1:150



EXISTING STRUCTURE
SCALE 1:100

EROSION CONTROL – BRIDGE RECONSTRUCTION

1. ALL WORK SHALL BE DONE IN THE DRY.
2. NO IN-WATER WORK SHALL TAKE PLACE BETWEEN APRIL 1 AND JUNE 30.
3. DEWATERING OF THE SITE SHALL BE ACHIEVED BY THE INSTALLATION OF COFFERDAMS TO ISOLATE THE WORKING AREA, AND THE PLACEMENT OF CONVENTIONAL SUMP PUMPS WHERE REQUIRED. THE CONTRACTOR'S SPECIFIC METHOD SHALL BE APPROVED BEFOREHAND BY THE CONTRACT ADMINISTRATOR. ALTERNATIVE METHODS OF DEWATERING MAY BE POSSIBLE PENDING THE WRITTEN APPROVAL OF THE CONTRACT ADMINISTRATOR.
4. THE CONTRACTOR SHALL APPLY AND OBTAIN A PERMIT TO TAKE WATER (PTTW) SHOULD PUMPING EXCEEED 50,000 LITRES PER DAY.
5. DISCHARGE FROM PUMPING OPERATIONS SHALL FIRST OUTLET INTO A SILTING POND OR SEDIMENT TRAP BEFORE THE WATER IS ALLOWED TO RE-ENTER THE RIVER OR ANOTHER WATERCOURSE.
6. COFFERDAMS SHALL BE DESIGNED BY THE CONTRACTOR AND SUBMITTED TO THE CONTRACT ADMINISTRATOR FOR APPROVAL.
7. ALL DISTURBED AREAS INCLUDING BANKS ABOVE WATER LEVEL SHALL BE REGRADED, TOPSOILED AND SEEDED TO THE SATISFACTION OF THE CONTRACT ADMINISTRATOR AS SOON AS POSSIBLE.
8. ALL EROSION CONTROL MEASURES (SILT FENCE, ROCK DAMS, SILTATION POND/DEWATERING TRAP, ETC.) SHALL BE CHECKED DAILY DURING ON-SITE WORK AND BE MAINTAINED IN GOOD STATE SO THAT THEY ARE FUNCTIONING PROPERLY. SILT FENCE AND STRAW BALE CHECK DAMS TO BE LEFT IN PLACE FOR 12 MONTHS OR UNTIL SUCH TIME AS THE SITE STABILIZES (THESE ARE LOCATED ABOVE HIGH WATER LEVEL).
9. NO MACHINERY SHALL CROSS THE RIVER AT ANY TIME. ANY MACHINERY THAT IS REQUIRED ON THE OTHER SIDE OF THE RIVER WHILE THE BRIDGE IS DISMANTLED OR UNDER CONSTRUCTION SHALL BE HAULED BY FLOAT OR DRIVEN AROUND ON ROADS. MACHINERY, VEHICLES, EQUIPMENT PUMPS, ETC., WILL NOT BE REFUELED WITHIN 30 METRES OF THE WATERCOURSE. MACHINERY SHALL NOT BE CLEANED WITHIN 30 METRES OF THE RIVER.
10. ALL WASTE MATERIAL FROM CONSTRUCTION SHALL BE STORED AWAY AND ABOVE THE HIGH WATERMARK AND AT NO TIME SHALL SUCH MATERIAL ENTER IN THE WATER.
11. FOR TYPICAL CHECK DAMS REFER TO OPSD 219.210
12. FOR SILT FENCE REFER TO OPSD 219.110.

ADDITIONAL ENVIRONMENTAL MEASURES TO BE ADHERED TO:

1. SEDIMENT AND EROSION CONTROL MEASURES SHOULD BE IMPLEMENTED PRIOR TO WORK, AND MAINTAINED DURING THE WORK PHASE, TO PREVENT THE ENTRY OF SEDIMENT INTO THE WATER OR THE MOVEMENT OF RE-SUSPENDED SEDIMENT.
2. A FLOATING TURBIDITY CURTAIN OR SILT FENCE SHOULD BE PLACED IMMEDIATELY AROUND THE WORK SITE PRIOR TO THE INSTALLATION OF COFFERDAMS.
3. ALL DISTURBED WORK AREAS SHOULD BE STABILIZED AND RE-VEGETATED AS REQUIRED UPON THE COMPLETION OF WORK AND RESTORED TO A PRE-DISTURBED STATE OR BETTER.
4. SEDIMENT AND EROSION CONTROL MEASURES SHOULD BE LEFT IN PLACE UNTIL ALL DISTURBED AREAS HAVE BEEN STABILIZED.
5. EXISTING STREAM FLOWS SHOULD BE MAINTAINED DOWNSTREAM OF THE DE-WATERED WORK AREA WITHOUT INTERRUPTION, DURING ALL STAGES OF WORK. THERE SHOULD BE NO INCREASE IN WATER LEVELS UPSTREAM OF THE DE-WATERED WORK AREA.
6. FISH SHOULD BE REMOVED FROM THE WORK AREA PRIOR TO DE-WATERING AND RELEASED ALIVE IMMEDIATELY DOWNSTREAM.
7. SILT OR DEBRIS THAT HAS ACCUMULATED AROUND THE TEMPORARY COFFERDAMS SHOULD BE REMOVED PRIOR TO THE WITHDRAWAL.
8. NATURAL STRUCTURES SUCH AS LOGJAMS AND IN-STREAM WOODY COVER SHOULD NOT BE REMOVED UNLESS THEY REPRESENT A BARRIER TO FLOWS OR FISH MOVEMENT.
9. OPERATE HEAVY MACHINERY ON LAND AND IN A MANNER THAT MINIMIZES DISTURBANCE TO THE BANKS OR BED OF THE RIVER.
10. ENSURE THAT MACHINERY ARRIVES ON SITE IN A CLEAN, WASHED CONDITION AND IS MAINTAINED FREE OF FLUID LEAKS.
11. WASH, REFUEL AND SERVICE MACHINERY AND STORE FUEL AND OTHER MATERIALS FOR THE MACHINERY AWAY FROM THE WATER TO PREVENT ANY DELETERIOUS SUBSTANCE FROM ENTERING THE WATER OR SPREADING ONTO THE ICE SURFACE.
12. KEEP AN EMERGENCY SPILL KIT ON SITE IN CASE OF FLUID LEAKS OR SPILLS FROM MACHINERY.
13. STABILIZE ANY WASTE MATERIALS REMOVED FROM THE WORK SITE TO PREVENT IT FROM ENTERING THE WATERBODY. THIS COULD INCLUDE COVERING STOCKPILES WITH BIODEGRADABLE MATS OR TARPS, OR PLANTING STOCKPILES WITH GRASS OR SHRUBS.
14. ALL UNSTABLE BANKS OF THE WATERCOURSE SHOULD BE STABILIZED AND SIDE RUN-OFF DITCHES SHOULD BE CONSTRUCTED TO DIVERT ROAD RUN-OFF THROUGH THE GREENBELT BEFORE ENTERING THE STREAM.
15. VEGETATE AND STABILIZE ANY DISTURBED AREAS BY SEEDING AND PLANTING TREES, SHRUBS, OR GRASSES.
16. STREAM CROSSINGS SHOULD ALLOW FOR UNIMPEDED UPSTREAM AND DOWNSTREAM MOVEMENT OF FISH.
17. CONCRETE LEACHATE IS ALKALINE AND HIGHLY TOXIC TO FISH AND AQUATIC LIFE AND MEASURES MUST BE TAKEN TO PREVENT ANY INCIDENCE OF CONCRETE OR CONCRETE LEACHATE FROM ENTERING THE WATERCOURSE. ALL CAST-IN-PLACE CONCRETE, GROUT, MORTARS, ETC. SHOULD BE TOTALLY ISOLATED FROM PRECIPITATION AND THE WATERS OF THE CANAL FOR A MINIMUM 48 HOUR PERIOD OR UNTIL SIGNIFICANTLY CURED TO ALLOW THE pH TO REACH NEUTRAL LEVELS. CONTAINMENT FACILITIES SHOULD BE PROVIDED AT THE SITE FOR THE WASH-DOWN FROM CONCRETE DELIVERY TRUCKS, CONCRETE PUMPING EQUIPMENT, AND OTHER TOOLS AND EQUIPMENT AS REQUIRED.

DEWATERING SEQUENCE

1. INSTALL SILT FENCE, STRAW BALE CHECK DAMS AND ANY OTHER EROSION CONTROL MEASURES WHICH MAY BE REQUIRED.
2. CONSTRUCT DEMOLITION PLATFORM UNDERNEATH EXISTING BRIDGE AND REMOVE EXISTING SUPERSTRUCTURE.
3. CLEAN DEBRIS, DUST AND SLURRY FROM DEMOLITION PLATFORM AND REMOVE PLATFORM.
4. PLACE FLOATING SILT CURTAINS UPSTREAM AND DOWNSTREAM OF WORKING AREA.
5. INSTALL SHEET PILE COFFERDAMS OR OTHER CONTAINMENT SYSTEM AS REQUIRED.
6. COMPLETE DEMOLITION OF THE EXISTING BRIDGE.
7. EXCAVATE AS REQUIRED IN ORDER TO CONSTRUCT NEW FOUNDATION AND ABUTMENTS.
8. PLACE BACKFILL AS REQUIRED ON BOTH SIDES OF ABUTMENT TO FACILITATE REMOVAL OF COFFERDAMS. PLACE ROCK PROTECTION.
9. REMOVE COFFERDAMS.
10. REMOVE FLOATING SILT CURTAINS.
11. COMPLETE REMAINING CONSTRUCTION OF THE BRIDGE.
12. COMPLETE ROADWORK.
13. INSTALL PERMANENT SILT FENCE AND STRAW BALE CHECK DAMS.

No.	REVISION	DATE
1.	ISSUED FOR PIC	MAY 05/17

DESIGNED BY: A.G.
CHECKED BY: --
DRAWN BY: D.S.
CHECKED BY: A.G.
FIELD BOOK:

SCALE: AS NOTED

HOLLAND MILLS BRIDGE REPLACEMENT

TOWNSHIP OF WILMOT — REGION OF WATERLOO

EROSION AND SEDIMENT CONTROL

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER — SUDBURY

JOB NUMBER: 16-298
DATE: MAY 2017
DRAWING NUMBER: 5

\\server\KSdata\Data\2016\16-298\Drafting\16-298 Holland Mills Bridge Replacement.dwg ESC 11-May-17 10:29:09 AM

Next Steps:

- **Receive feedback on preferred alternative.**
- **Finalize the 'Project File'**
- **Publish a 'Notice of Completion' and distribute via the New Hamburg Independent, Township of Wilmot Website, and private notice to interested agencies and residents adjacent to the study area. The notice will identify the opportunity to review the 'Project File' over a 45 calendar day period.**
- **Assuming that comments raised during the 45 day review period can be resolved, the Township will proceed with the Detailed Design, Tendering, and Construction.**

Comments regarding this PIC will be received until May 25, 2017. Please complete a comment sheet and place in the comment box or submit via e-mail to:

Mr. Alastair Duncan, C.E.T.
Township of Wilmot
60 Snyder's Road West
Baden, ON N3A 1A1
Phone: 519.634.8444 ext. 263
Email: alastair.duncan@wilmot.ca

Mr. Allan Garnham, P. Eng.
K. Smart Associates Limited
85 McIntyre Drive
Kitchener, ON, N2R 1H6
Phone: 519-748-1199 ext. 229
Email: agarnham@ksmart.ca

THANK YOU FOR ATTENDING

Township of Wilmot

Public Information Centre

Sign In Sheet

K. Smart Associates Limited

X - Check this box if you would like to receive an e-mail containing the information displayed today.

Name	Phone Number	Municipal / Mailing Address	E-mail Address	X
Clift Kennel	[redacted]	1257 Holland Mills Rd.	[redacted]	
Dennis Cliffin	[redacted]	3377 Huron Rd	[redacted]	
GIMIANO SALBÉ	[redacted]	1509 HOLLAND MILLS RD	[redacted]	
DAN SCHEID	[redacted]	1527 HOLLAND MILLS RD	[redacted]	
MANFRED SCHEID	[redacted]	1527 HOLLAND MILLS Rd.		
PETER SCHEID	[redacted]	62 Ritz Cr.		
YVONNE ZYMA	[redacted]	28 BLEAMS RD. E. NH	[redacted]	
Bill McLeod	[redacted]	1399 Holland Mills Rd.		
Roland Good	[redacted]	1263 Holland Mills Rd	[redacted]	
Peter Roe	[redacted]	482 Wilmot Line	[redacted]	
Patty Clarke	[redacted]	2675 Wilby Rd. Baden N3A 3M8	[redacted]	
Stephen Clarke	[redacted]	"	[redacted]	
AL JUNKER	[redacted]	27 MILL ST - PO BOX 235 NEW DUNDEE N0B 2E0	[redacted]	

Township of Wilmot

Public Information Centre

Sign In Sheet

K. Smart Associates Limited

X - Check this box if you would like to receive an e-mail containing the information displayed today.

Name	Phone Number	Municipal / Mailing Address	E-mail Address	X
Matt Hammell	[redacted]	159 Forrest ave New hamburg		
Gary Bendr	[redacted]	3406 Huron Rd. N.H.		
Wayne & Wendy Gingrich	[redacted]	3385 BLEAMS RD N.H.		
FRIEDER LAEPPLE	[redacted]	1629 HOLLAND MILLS RD		
Bev & Steve Belk	[redacted]	1172 Holland Mills Rd N.H		
Karli, Adam Barr	[redacted]	1296 Holland Mills Rd N.H	[redacted]	✓
Ruth MacCar	[redacted]	1509 Holland Mills Rd NH.		
Maurice R Good	[redacted]	3470 Bleams Rd. N.H.		
Arlene Barr	[redacted]	1296 Holland Mills Rd N.H.		

COMMENT SHEET

Public Information Center

Holland Mills Road Bridge Replacement

Holland Mills Road approximately 250m South of Waterloo Region Road 4 (Bleams Road)

Township of Wilmot

Thursday, May 11, 2017

Comments:

The option #1 seems to be the most practical of the three. It would be a shame if we let this opportunity to replace the bridge pass. The Ontario govt is basically paying the bulk of the cost. A two lane bridge improves emergency response times and gives local farmers a safe alternative to move farm equipment.

Name: [redacted]

Phone Number: [redacted]

Address: [redacted]

E-mail Address: [redacted]

COMMENT SHEET

Public Information Center

Holland Mills Road Bridge Replacement

Holland Mills Road approximately 250m South of Waterloo Region Road 4 (Bleams Road)

Township of Wilmot

Thursday, May 11, 2017

Comments:

I like the 1.2 million bridge (Option 1)

All we need in my opinion is a good 1 lane bridge & if it can be turned a bit to take out the hard turn, that would be great.

Please don't put up a ~~st~~ bridge like is there now!

Name: [redacted]

Phone Number: [redacted]

Address:

E-mail Address:

COMMENT SHEET

Public Information Center

Holland Mills Road Bridge Replacement

Holland Mills Road approximately 250m South of Waterloo Region Road 4 (Bleams Road)

Township of Wilmot

Thursday, May 11, 2017

Comments:

We are looking at this not strictly from an ease perspective but also from a Safety perspective. If there is need for an ampulance, precious time is wasted since emergency personel will need to travel at least an extra 10 minutes around the bridge. As well, in the winter, a transport truck flipped on the first conner of the road making it impossible for residents to leave since both ends of the road were blocked.

Name: [redacted]

Phone Number: [redacted]

Address: [redacted]

E-mail Address: [redacted]

COMMENT SHEET

Public Information Center

Holland Mills Road Bridge Replacement

Holland Mills Road approximately 250m South of Waterloo Region Road 4 (Bleams Road)

Township of Wilmot

Thursday, May 11, 2017

Comments:

Sounds great, OPTION #1
Good tonnage
CAN HARDLY WAIT !!

NOT A Heritage BRIDGE
FOR WLOO ANYWAY
WAS ORIGINALLY IN SARNIA
AREA.

Name: [redacted]

Phone Number: [redacted]

Address: [redacted]

E-mail Address: [redacted]

COMMENT SHEET

Public Information Center

Holland Mills Road Bridge Replacement

Holland Mills Road approximately 250m South of Waterloo Region Road 4 (Bleams Road)

Township of Wilmot

Thursday, May 11, 2017

Comments:

GOOD OPTION, CAN'T WAIT TO SEE IT

Name: [redacted]

Phone Number: [redacted]

Address:

E-mail Address:

COMMENT SHEET

Public Information Center

Holland Mills Road Bridge Replacement

Holland Mills Road approximately 250m South of Waterloo Region Road 4 (Bleams Road)

Township of Wilmot

Thursday, May 11, 2017

Comments:

I am quite fond of continuing to make it look like a Heritage Bridge but can understand if that is not feasible. It still my preference and is in keeping with the heritage nature of New Hamburg.

I would also like to keep the current configuration of the road in order to keep speeding down. It will also have less environmental impact.

For the state of the road, I hope it will stay gravel as there is enough speeding on it already. If it becomes paved, it will be a thoroughfare and a speed strait. Many people walk, ride and run

Name: [redacted]

Phone Number: [redacted]

Address: [redacted]

E-mail Address: [redacted]

on this road for the peace and low impact it offers. This is also one of the reasons, we bought on this road.
No pavement please!!

COMMENT SHEET

Public Information Center

Holland Mills Road Bridge Replacement

Holland Mills Road approximately 250m South of Waterloo Region Road 4 (Bleams Road)

Township of Wilmot

Thursday, May 11, 2017

Comments:

Very good plan if we must go with 2 lane bridge. Keep the road the way it is will help to control speeders. The sooner we can us the new bridge the better. The bridge is used by many people runners, byclas walking and farm equipment. It takes a long time to drive around to go to my sons farm on Holland Mills Road. We sure are looking forward to seeing a new bridge

Name: [redacted]

Phone Number: [redacted]

Address: [redacted]

E-mail Address: [redacted]

COMMENT SHEET

Public Information Center

Holland Mills Road Bridge Replacement

Holland Mills Road approximately 250m South of Waterloo Region Road 4 (Bleams Road)

Township of Wilmot

Thursday, May 11, 2017

Comments:

- As a member of Heritage Wilmot, I strongly support repairing the existing bridge. It is the only option that recognizes the historical, cultural & tourism value of the structure
- Table 1 - The Preferred alternative (4) scores 91.5. The Repair option (2) scores only 1 POINT HIGHER (92.5)
- The bridge is recognized by the Region of Waterloo in "Spanning the Generations" (2004, 2007) →

a) "is also significant as it is the oldest bridge in Wilmot that has been pin-jointed together" p.33 Phase 3

b) "Today the... bridge is the only remaining structure... that reminds people of those past developments" p.33 Phase 3 (ie mills)

- Removing this bridge & replacing it with something like in → OVER

Name: [redacted]

Phone Number: [redacted]

Address: [redacted]

E-mail Address: [redacted]

Haysville would be modern, but ugly

- Since the roadway will not be straightened, a large bridge is not necessary - at least pedestrian accessibility should be supported

COMMENT SHEET

Public Information Center

Holland Mills Road Bridge Replacement

Holland Mills Road approximately 250m South of Waterloo Region Road 4 (Bleams Road)

Township of Wilmot

Thursday, May 11, 2017

Comments:

- I AM IN AGREEMENT WITH THE PREFERRED PLAN OF A 2 LANE CONCRETE BRIDGE. IT IS THE LONGEST LASTING SOLUTION AT THE LOWEST PRICE
- I WOULD ONLY COMMENT THAT THERE SHOULD BE A SLIGHT RE-ALLIGNMENT OF THE BRIDGE AND ROAD. (SEE ATTACHED DIAGRAM) I UNDERSTAND THE ROAD SURFACE OF THE BRIDGE WILL BE APPROX 3 FEET HIGHER. WITH THE PRESENT 90° APPROACH

Name: [redacted]

Phone Number: [redacted]

Address: [redacted]

E-mail Address: [redacted]

COMMENT SHEET

Public Information Center

Holland Mills Road Bridge Replacement

Holland Mills Road approximately 250m South of Waterloo Region Road 4 (Bleams Road)

Township of Wilmot

Thursday, May 11, 2017

Comments:

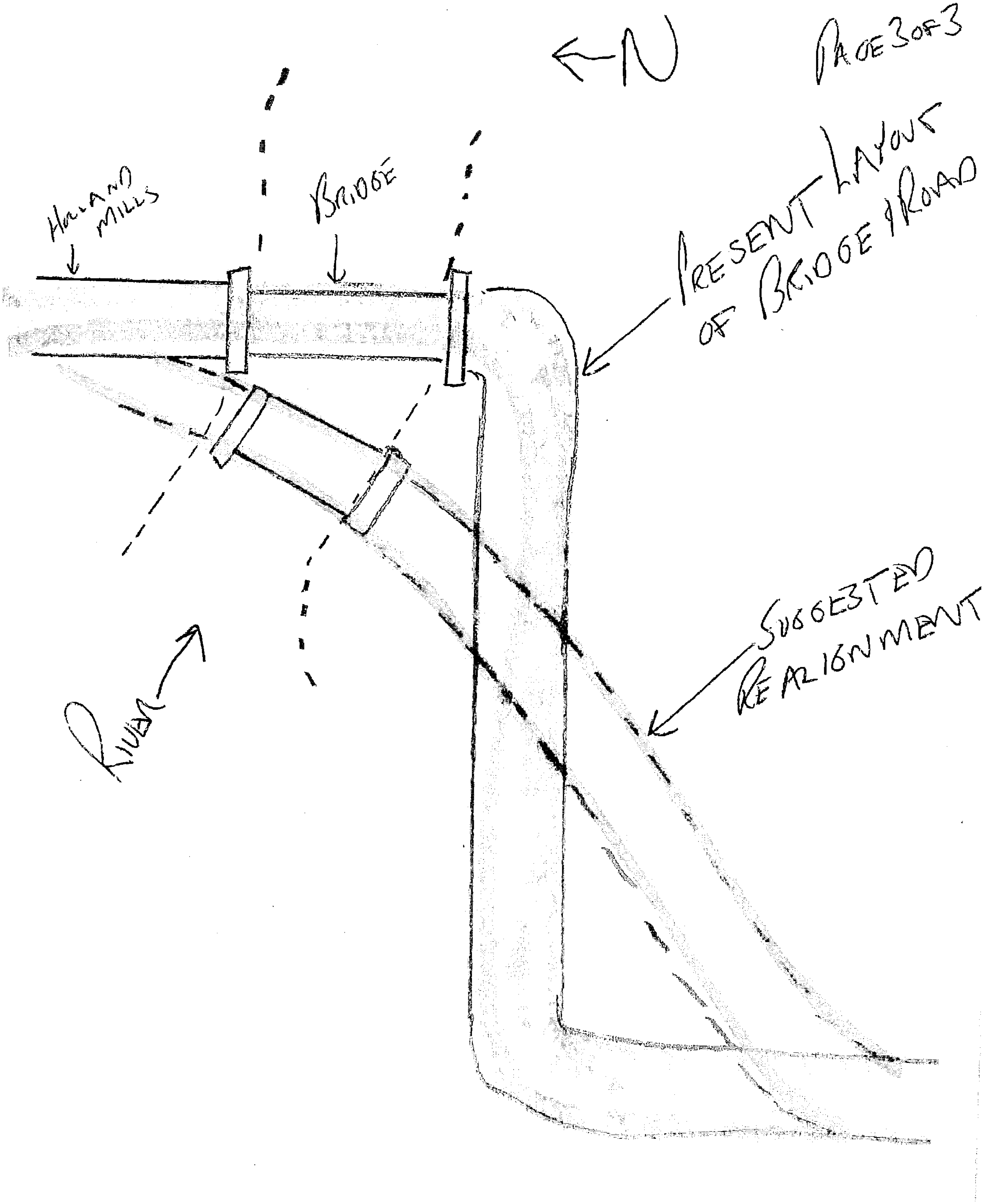
COMING NORTHBOUND IT WOULD BE VERY DIFICULT TO TRAVEL UPHILL WHILE MAKING A 90° TURN. IF IT WAS ICY TRACTION MIGHT BE A PROBLEM.

Name:

Phone Number:

Address:

E-mail Address:


N
HOLLAND MILLS
BRIDGE
PRESENT LAYOUT OF BRIDGE & ROAD
SUGGESTED REALIGNMENT
RIVER

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

April 25, 2017

File No. 16-298

Barbara Slattery, EA/Planning Coordinator
Ministry of Environment and Climate Change
West Central Region
119 King Street West, 12th Floor
Hamilton, ON
L8P 4Y7

RE: NOTICE OF PUBLIC INFORMATION CENTRE (PIC)
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Barbara,

As a follow up to previous correspondence informing you about a Schedule "B" Environmental Assessment with respect to Bridge 17/B-T13 in the Township of Wilmot, please see the attached notice inviting you to a Public Information Centre (PIC).

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

al r

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

April 25, 2017

File No. 16-298

Ontario Ministry of Natural Resources
Guelph District Office
1st Floor
1 Stone Road West
Guelph, ON
N1G 4Y2

RE: NOTICE OF PUBLIC INFORMATION CENTRE (PIC)
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Sir or Madam,

As a follow up to previous correspondence informing you about a Schedule "B" Environmental Assessment with respect to Bridge 17/B-T13 in the Township of Wilmot, please see the attached notice inviting you to a Public Information Centre (PIC).

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

al R

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

April 25, 2017

File No. 16-298

Joseph Muller, RPP, MCIP, Heritage Planner
Ontario Ministry of Tourism, Culture and Sport
Culture Services Unit
Toronto Office
401 Bay Street, Suite 1700
Toronto, ON
M7A 0A7

RE: NOTICE OF PUBLIC INFORMATION CENTRE (PIC)
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Sir or Madam,

As a follow up to previous correspondence informing you about a Schedule "B" Environmental Assessment with respect to Bridge 17/B-T13 in the Township of Wilmot, please see the attached notice inviting you to a Public Information Centre (PIC).

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET, Township of Wilmot

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PIC.docx

Allan Garnham

From: Muller, Joseph (MTCS) <Joseph.Muller@ontario.ca>
Sent: May-25-17 9:54 AM
To: Allan Garnham
Cc: alastair.duncan@wilmot.ca
Subject: RE: Bridge 17/B-T13 (Holland Mills Road Bridge at Nith River)

Hello Allan:

Thank-you again for the presentation material. Given that some cultural heritage value/interest is identified and the draft heritage impact assessment (HIA) is underway, there needs to be documentation on how this report is informing the optional replacement bridges being identified in the refinement of preferred alternatives.

As outlined in the draft HIA, when bridges of cultural heritage value or interest are subject to repair, rehabilitation or proposed for replacement, a number of conservation options or strategies must be considered. As replacement is the preferred alternative identified to date, option 8 is most relevant and states:

Bridge removal and replacement with a sympathetically designed structure:
a. where possible, salvage elements/members of bridge for incorporation into new structure or for future conservation work or displays; and
b. undertake full recording and documentation of existing structure.

Given this guidance (from the MTO heritage bridge guidelines), the identification of additional replacement bridge options is warranted (such as a pony truss), and details on how sympathetic/commemorative design may be incorporated into the replacement bridge as well as further commemoration reflected in the overall design (salvage, heritage plaques, etc.) on and off-site.

Please contact me if you have any questions, or would like to further discuss the file, and thank-you for your assistance,

Joe

Joseph Muller, RPP, MCIP

Heritage Planner
Ministry of Tourism, Culture and Sport
Culture Division | Programs and Services Branch | Heritage Program Unit

401 Bay Street, Suite 1700
Toronto, Ontario M7A 0A7

Tel. 416.314.7145 | Fax. 416.212.1802

From: Allan Garnham [mailto:AGarnham@ksmart.ca]
Sent: May 23, 2017 2:46 PM
To: Muller, Joseph (MTCS)
Cc: alastair.duncan@wilmot.ca
Subject: RE: Bridge 17/B-T13 (Holland Mills Road Bridge at Nith River)

Joe,

My apologies, I thought this was already done.

I believe you've already seen the CHER/HIA report prepared by Owen Scott of CHC Limited.

Thanks,

Allan Garnham, P. Eng.
K. Smart Associates Limited
85 McIntyre Dr. Kitchener ON N2R 1H6 | http://www.ksmart.ca
T: 519.748.1199 x246 | F: 519.748.6100 | AGarnham@ksmart.ca

From: Muller, Joseph (MTCS) [mailto:Joseph.Muller@ontario.ca]
Sent: May-23-17 2:34 PM
To: Allan Garnham <AGarnham@ksmart.ca>
Cc: alastair.duncan@wilmot.ca
Subject: RE: Bridge 17/B-T13 (Holland Mills Road Bridge at Nith River)

Hello Allan Garnham:

If you can let me know whether digital presentation materials will be available (or not) for the May 11, 2017, public information centre prior to the commenting deadline, I'd be grateful. Thank-you for your assistance,

Joe

Joseph Muller, RPP, MCIP

Heritage Planner
Ministry of Tourism, Culture and Sport
Culture Division | Programs and Services Branch | Heritage Program Unit

401 Bay Street, Suite 1700
Toronto, Ontario M7A 0A7

Tel. 416.314.7145 | Fax. 416.212.1802

From: Muller, Joseph (MTCS)
Sent: May 15, 2017 4:12 PM
To: 'AGarnham@ksmart.ca'
Cc: 'alastair.duncan@wilmot.ca'
Subject: Bridge 17/B-T13 (Holland Mills Road Bridge at Nith River)

Hello Allan Garnham:

I was unable to attend the May 11, 2017, public information centre for this project and am interested in whether/when the presentation materials will be posted online, or if I could otherwise be sent a digital copy. Thank-you for your assistance,

Joe

Joseph Muller, RPP, MCIP

Heritage Planner
Ministry of Tourism, Culture and Sport
Culture Division | Programs and Services Branch | Heritage Program Unit

401 Bay Street, Suite 1700
Toronto, Ontario M7A 0A7

Tel. 416.314.7145 | Fax. 416.212.1802

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

File No. 16-298

RESPONSE TO COMMENTS

Subject: Bridge 17/B-T13 (Holland Mills Road Bridge)
Township of Wilmot
Response to PIC Comments from MOTCS

In response to comments received from MOTCS with respect to the PIC, we respond as follows:

Comment

"The identification of additional replacement bridge options (such as a pony truss) is warranted."

Response

Refer to Section 6 – Refinement of the Preferred Alternative – Alternative Bridge Types Considered. The last paragraph states why other options are not considered viable.

Comment

"…details of how sympathetic/commemorative design may be incorporated into the replacement bridge…"

Response

Refer to Section 7 – Cultural Heritage Evaluation Report and Heritage Impact Assessment – Memorandum – CHER and HIA Findings and Overall Recommendations.

Comment

"…further commemoration on and off site."

Response

Refer to Section 7 – Cultural Heritage Evaluation Report and Heritage Impact Assessment – Memorandum – CHER and HIA Findings and Overall Recommendations.

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

April 25, 2017

File No. 16-298

Ministry of Indigenous Relations and Reconciliation
Consultation Unit
4th Floor
160 Bloor Street East
Toronto, ON
M7A 2E6

**RE: NOTICE OF PUBLIC INFORMATION CENTRE (PIC)
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Sir or Madam,

As a follow up to previous correspondence informing you about a Schedule "B" Environmental Assessment with respect to Bridge 17/B-T13 in the Township of Wilmot, please see the attached notice inviting you to a Public Information Centre (PIC).

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

al h

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

April 25, 2017

File No. 16-298

Beth Brown, Supervisor of Resource Planning
Grand River Conservation Authority
400 Clyde Road
PO Box 729
Cambridge, ON
N1R 5W6

**RE: NOTICE OF PUBLIC INFORMATION CENTRE (PIC)
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Beth,

As a follow up to previous correspondence informing the GRCA about a Schedule "B" Environmental Assessment with respect to Bridge 17/B-T13 in the Township of Wilmot, please see the attached notice inviting you to a Public Information Centre (PIC).

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

April 25, 2017

File No. 16-298

Fisheries and Oceans Canada
520 Exmouth Street
Sarnia, ON
N7T 8B1

**RE: NOTICE OF PUBLIC INFORMATION CENTRE (PIC)
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Sir or Madam,

As a follow up to previous correspondence informing you about a Schedule "B" Environmental Assessment with respect to Bridge 17/B-T13 in the Township of Wilmot, please see the attached notice inviting you to a Public Information Centre (PIC).

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

al M

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET, Township of Wilmot

PIC.docx

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K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

April 25, 2017

File No. 16-298

Kate Hagerman, Cultural Heritage Specialist
Region of Waterloo
150 Frederick Street, 8th Floor
Kitchener, ON
N2G 4J3

**RE: NOTICE OF PUBLIC INFORMATION CENTRE (PIC)
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Kate,

As a follow up to previous correspondence informing you about a Schedule "B" Environmental Assessment with respect to Bridge 17/B-T13 in the Township of Wilmot, please see the attached notice inviting you to a Public Information Centre (PIC).

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET, Township of Wilmot

Region of Waterloo

Planning, Development and Legislative Services

Cultural Services Division

Date: May 30, 2017

Memorandum

To:	Rod Regier, Commissioner of Planning, Development & Legislative Services
Cc:	Alastair Duncan, Engineering Technician, Wilmot Township Allan Garnham, K. Smart Associates Limited Tracy Loch, Curator/Director, Wilmot Township
From:	Members of the Heritage Planning Advisory Committee
Subject:	Cultural Heritage Comments Related to the Holland Mills Road Bridge

The Public Information Centre materials from the Holland Mills Road Bridge Replacement project were presented at the May 11, 2017 Region of Waterloo Heritage Planning Advisory Committee (HPAC) meeting. Committee members had the following comments, which through this memo are being shared with Wilmot Township staff and the project consultants.

The Region of Waterloo has undertaken a three phase study of old bridges located within the Region, entitled Spanning the Generations. Phase I documented all pre-1950 structures, Phase 2 undertook a detailed study of the top ten most historically significant structures, and Phase 3 was a heritage assessment of truss bridges.

The Holland Mills Road Bridge was found to be part of a collection of twelve historic truss bridges that span 80 years (1873-1953) of bridge development in the Region. The bridge study details the individual bridges and their unique placement within the larger context of the social and technical development of region. The Holland Mills Road Bridge is the third oldest truss bridge in the Region and is a single lane, pin-jointed through truss bridge, located on a low-traffic rural road. The Committee, through their research, has found the bridge to be a significant cultural heritage asset that is worthy of conservation, and sees the Holland Mills Road Bridge project, as a potential opportunity for an infrastructure improvement undertaking that could prioritize heritage conservation.

The Alternative Solutions being considered in the Environmental Assessment for the Holland Mills Road Bridge include: 1. Do Nothing; 2. Repair Existing Bridge; 3. Replace Superstructure; 4. Replace Bridge in Current Location; and 5. Replace Bridge in New Location. The Preferred Alternative, selected using an evaluation matrix containing 32 individual criteria, is Alternative 4, Replacement of the Bridge in the Current Location using a box beam bridge.

The Committee reviewed the Evaluation of Alternatives and had the following questions and comments:

- Does the current evaluation matrix provide effective guidance on a preferred alternative? Would is be more constructive if the 5 criteria groups (and/or the 32 individual criteria) were weighted to represent overall project values? Currently heritage conservation represents only 1/32 of the overall decision-making criteria. Given the age and rarity of the resource, the impacts to heritage should be a more significant consideration.
- Are the alternatives ranked in the appropriate order under heritage impact? For example: Alternative 1 (Do Nothing) is not the necessarily the best alternative, as the bridge is in need of repair. Alternative 5 (Replace the Bridge in New Location) could be a pro-conservation option, if the existing bridge is allowed to remain in situ.
- Would scoring, rather than ranking, provide a more accurate representation of the scope of heritage related impacts? For example: Replacing the bridge in its current location would require full demolition and loss of the structure, a significant negative impact. Repairs to the structure, depending on how the work was undertaken, could be a significant positive impact.
- As several of the alternatives are quite closely ranked, small changes to the evaluation matrix could significantly vary the overall results.
- Lastly, has the Township explored alternative routes that could address the community need for improved traffic service and overall safely in the area, should the historic bridge, with its current deficiencies, be retained?

HPAC looks forward to hearing how the Township can address their comments and questions, and to being kept informed as the project progresses.

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

File No. 16-298

RESPONSE TO COMMENTS

Subject: Bridge 17/B-T13 (Holland Mills Road Bridge)
Township of Wilmot
Response to PIC Comments from ROW

In response to comments received from the Region of Waterloo with respect to the PIC, we respond as follows:

Comment

Does the current evaluation matrix provide effective guidance on a preferred alternative? Would (it) be more constructive if the 5 criteria groups (and/or the 32 individual criteria) were weighed to represent overall project values? Currently heritage conservation represents only 1/32 of the overall decision-making criteria. Given the age and rarity of the resource, the impacts to heritage should be a more significant consideration.

Response

Refer to Section 5 – Selection of Preferred Alternative – Memorandum – Selection of Preferred Alternative. To eliminate the possibility of one stakeholder group from having more influence over another stakeholder group, criteria are all given the same weight. While heritage is a consideration, it is not the only consideration.

Comment

Are the alternatives ranked in the appropriate order under heritage impact? For example: Alternative 1 (Do Nothing) is not necessarily the best alternative, as the bridge is in need of repair. Alternative 5 (Replace the Bridge in New Location) could be a pro-conservation option, if the existing bridge is allowed to remain in situ.

Response

We believe the alternatives are appropriately ranked under heritage impact in Table 1. It is our opinion that the repairs required to reopen the bridge would alter its physical appearance whereas doing nothing would not change its physical appearance. In terms of Alternative 5, it is unusual to leave the old bridge in place if the roadway is realigned, hence why it is ranked 5.

Comment

Would scoring, rather than ranking, provide a more accurate representation of the scope of heritage related impacts? For example: Replacing the bridge in its current location would require full demolition and loss the structure, a significant negative impact. Repairs to the existing structure, depending on how the work was undertaken, could be a significant positive impact.

Response

Refer to Section 5 – Selection of Preferred Alternative – Memorandum – Selection of Preferred Alternative.

The ranking system used reflects that there is less impact to heritage in a repair or “do nothing” alternative compared to a replacement alternative.

Comment

As several of the alternatives are quite closely ranked, small changes to the evaluation matrix could significantly vary the overall results.

Response

Refer to Section 5 – Selection of Preferred Alternative – Memorandum – Summary of Evaluation and Preferred Alternative Recommendation.

It is not unusual for 2 or 3 alternatives to be “quite close” over the remaining alternatives.

Referring to the Memorandum listed above, it can be seen that Alternatives 1 and 2 really don’t address the problem statement as well as Alternative 4.

Comment

Lastly, has the Township explored alternative routes that could address the community need for improved traffic service and overall safety in the area, should the historic bridge, with its current deficiencies, be retained?

Response

Yes, this was considered as a variation of the “do nothing” alternative. The main issue with this type of alternative is the length of the detour should no connecting roads be constructed between Holland Mills Road and Haysville Road.

This was also considered in Alternative 5 where a new bridge in a new location be provided over the Nith River.

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

April 25, 2017

File No. 16-298

Wilmot Heritage Advisory Committee
c/o
Nicholas Bogaert, Senior Planner
MHBC Planning, Urban Design and Landscape Architecture
Suite 200
540 Bingemans Centre Drive
Kitchener, ON
N2B 3X9

RE: NOTICE OF PUBLIC INFORMATION CENTRE (PIC)
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Nicholas,

As a follow up to previous correspondence informing you about a Schedule "B" Environmental Assessment with respect to Bridge 17/B-T13 in the Township of Wilmot, please see the attached notice inviting you to a Public Information Centre (PIC).

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET, Township of Wilmot

Allan Garnham

From: Nick Bogaert <nbogaert@mhbcplan.com>
Sent: June-16-17 9:52 PM
To: Darryl Schwartzentruber; Allan Garnham
Cc: Grant Whittington; Tracy Loch; alastair.duncan@Wilmot.ca
Subject: EA for Bridge 17/B-T13 (Holland Mills Road Bridge)

Good evening,

Thank you for continuing to keep Heritage Wilmot apprised of the progress of this study, and for extending an invite to the recent PIC meeting held regarding the findings to date. Members of Heritage Wilmot attended the meeting, and our Committee further discussed the project at our meeting on June 7th.

Members of Heritage Wilmot noted that some of the options scored very close to one another in the overall ranking, with replacing the bridge only ranking slightly higher than repairing the bridge. There was interest expressed that the history and age of the bridge could be further confirmed by a Ministry of Tourism, Culture & Sport bridge expert through further examining the structure and construction techniques. It was thought that this would assist in evaluating the significance of the structure, and the Committee requested that this be pursued.

Heritage Wilmot also discussed the comments provided by the Region of Waterloo HPAC, and the Committee agreed that further information is welcome regarding the evaluation process and consideration of the heritage value of the existing bridge. The Committee felt that more weight should be given to the options regarding retention and repairs to the existing bridge.

We look forward to continuing to be notified of future opportunities for input into this project.

Regards,

Nick

Nicholas P. Bogaert
Chairperson

Heritage Wilmot
www.heritagewilmot.ca

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

File No. 16-298

RESPONSE TO COMMENTS

Subject: Bridge 17/B-T13 (Holland Mills Road Bridge)
Township of Wilmot
Response to PIC Comments from Heritage Wilmot

In response to comments received from Heritage Wilmot with respect to the PIC, we respond as follows:

Comment

Members of Heritage Wilmot noted that some of the options scored very close to one another in the overall ranking, with replacing the bridge only ranking slightly higher than repairing the bridge.

Response

Refer to Section 5 – Selection of Preferred Alternative – Memorandum – Summary of Evaluation and Preferred Alternative Recommendation.

It is not unusual for 2 or 3 alternatives to be "quite close" over the remaining alternatives.

Referring to the Memorandum listed above, it can be seen that Alternatives 1 and 2 really don't address the problem statement as well as Alternative 4 does.

Comment

There was interest expressed that the history and age of the bridge could be further confirmed by a Ministry of Tourism, Culture and Sport bridge expert through further examining the structure and construction techniques. It was thought that this would assist in evaluating the significance of the structure, and the Committee requested that this be pursued.

Response

The Township already retained Owen Scott of CHC Limited to prepare a CHER/HIA at the request of the Ministry of Tourism, Culture and Sport (MOTCS). Owen Scott has a wealth of experience, as evidenced by his CV, and has completed numerous Heritage Studies for a variety of projects. Owen Scott does mention in his report that he feels this structure is worthy of designation under the Ontario Heritage Act.

MOTCS reviewed this report and have no major objections with it nor with the preferred alternative, provided that sufficient mitigation measures be implemented.

We feel that no real benefit would be gained by retaining another consultant to prepare essentially the same report. As such, no further Heritage Reports will be obtained for this particular project.

Comment

Heritage Wilmot also discussed the comments provided the Region of Waterloo HPAC, and the Committee agreed that further information is welcome regarding the evaluation process and consideration of the heritage value of the existing bridge.

Response

If additional information is obtained, it will be provided to Heritage Wilmot.

Responses to comments from the Region of Waterloo HPAC are provided in a separate response document.

Comment

The Committee felt that more weight should be given to the options regarding retention and repairs to the existing bridge.

Response

Refer to Section 5 – Selection of Preferred Alternative – Memorandum – Selection of Preferred Alternative as well as to Section 5 – Selection of Preferred Alternative – Memorandum – Concerns with Potential Rehabilitation of Existing Structure.

We have specifically stated that no particular stakeholder group should have more influence on the decision making process over any other stakeholder group. In this respect, providing more weight to options which retain the existing bridge defeats this purpose.

Additionally, we've addressed concern with the practicality of repairing or strengthening the existing bridge. The major concern is that there is no effective way to prevent vehicles which exceed the posted load limit from traversing the structure. It is our opinion that Holland Mills Road Bridge, even after repairs and strengthening, is all but one overloaded truck away from significant damage, partial collapse or full collapse.

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

April 25, 2017

File No. 16-298

Haudenosaunee Confederacy
c/o
Haudenosaunee Development Institute
Suite 417
16 Sunrise Court
PO Box 714
Ohsweken, ON
N0A 1M0

**RE: NOTICE OF PUBLIC INFORMATION CENTRE (PIC)
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Sir or Madam,

As a follow up to previous correspondence informing you about a Schedule "B" Environmental Assessment with respect to Bridge 17/B-T13 in the Township of Wilmot, please see the attached notice inviting you to a Public Information Centre (PIC).

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

al

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

April 25, 2017

File No. 16-298

Métis Consultation Unit
Métis Nation of Ontario Head Office
Unit D
500 Old St. Patrick Street
Ottawa, ON
K1N 9G4

RE: NOTICE OF PUBLIC INFORMATION CENTRE (PIC)
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Sir or Madam,

As a follow up to previous correspondence informing you about a Schedule "B" Environmental Assessment with respect to Bridge 17/B-T13 in the Township of Wilmot, please see the attached notice inviting you to a Public Information Centre (PIC).

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

al h

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET, Township of Wilmot

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K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

April 25, 2017

File No. 16-298

Mississaugas of the New Credit
2789 Mississauga Road
RR 6
Hagersville, ON
N0A 1H0

**RE: NOTICE OF PUBLIC INFORMATION CENTRE (PIC)
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Sir or Madam,

As a follow up to previous correspondence informing you about a Schedule "B" Environmental Assessment with respect to Bridge 17/B-T13 in the Township of Wilmot, please see the attached notice inviting you to a Public Information Centre (PIC).

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

al R

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100
Email: ksmart@ksmart.on.ca

April 25, 2017

File No. 16-298

Lonny Bomberry, Land and Resources Director
Six Nations of the Grand – Lands and Resources Office
2498 Chiefswood Road
PO Box 5000
Ohsweken, ON
N0A 1M0

RE: NOTICE OF PUBLIC INFORMATION CENTRE (PIC)
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Lonny,

As a follow up to previous correspondence informing you about a Schedule "B" Environmental Assessment with respect to Bridge 17/B-T13 in the Township of Wilmot, please see the attached notice inviting you to a Public Information Centre (PIC).

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET, Township of Wilmot

PIC.docx

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TOWNSHIP OF WILMOT

CLASS ENVIRONMENTAL ASSESSMENT

BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)

HOLLAND MILLS ROAD AT THE NITH RIVER

NOTICE OF STUDY COMPLETION

To address loading, width and capacity deficiencies as well as to reopen Holland Mills road at the Nith River, the Township of Wilmot is proposing to replace Bridge 17/B-T13 (Holland Mills Road Bridge).

The project is being planned under Schedule B of the Municipal Class Environmental Assessment. Subject to comments received as a result of this Notice, the Township intends to obtain the necessary approvals and proceed with the design and construction of this project to be completed in 2018.

To obtain a copy of the Project File or to comment on this project, please contact:

Mr. Allan Garnham, P. Eng.
Project Manager
K. Smart Associates Limited
85 McIntyre Drive
Kitchener ON N2R 1H6
Phone: 519-748-1199 ext 246
Fax: 519-748-6100
E-mail: agarnham@ksmart.ca

or

Mr. Jeff Molenhuis, P. Eng.
Director of Public Works
Township of Wilmot
60 Snyder's Road West
Baden, ON N3A 1A1
Phone: 519-634-8444 ext 238
Fax: 519-634-5044
E-mail: jeff.molenhuis@wilmot.ca

Interested persons should provide written comment to the Township on the proposal within 45 calendar days from the date of this Notice. Comments should be directed to the Director of Public Works noted above.

If concerns arise regarding this project, which cannot be resolved in discussion with the Township, a person may request that the Minister of Environment make an order for the project to comply with Part II of the Environmental Assessment Act (referred to as a Part II Order), which addresses individual environmental assessments. Requests must be received by the Minister at the address below within 45 Calendar days of this Notice. A copy of the request must also be sent to the Township. If there are no requests received by November 15, 2017, this project will proceed to design and construction as presented:

Minister of the Environment
135 St Clair Avenue West
12th Floor, Toronto, ON
M4V 1P5

This Notice issued September 25, 2017.

Allan Garnham, P. Eng.
K. Smart Associates Limited

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

September XX, 2017

File No. 16-298

Barbara Slattery, EA/Planning Coordinator
Ministry of Environment and Climate Change
West Central Region
119 King Street West, 12th Floor
Hamilton, ON
L8P 4Y7

Re: NOTICE OF STUDY COMPLETION
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Barbara:

Please find enclosed for your records a Notice of Study Completion for the above referenced structure.

The Township of Wilmot has identified replacement of the existing structure with a new single span concrete box girder bridge as the preferred solution.

A Project File documenting the EA process will be available for review upon request.

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Jeff Molenhuis, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

September XX, 2017

File No. 16-298

Ontario Ministry of Natural Resources
Guelph District Office
1st Floor
1 Stone Road West
Guelph, ON
N1G 4Y2

Re: NOTICE OF STUDY COMPLETION
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Sir or Madam:

Please find enclosed for your records a Notice of Study Completion for the above referenced structure.

The Township of Wilmot has identified replacement of the existing structure with a new single span concrete box girder bridge as the preferred solution.

A Project File documenting the EA process will be available for review upon request.

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Jeff Molenhuis, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

September XX, 2017

File No. 16-298

Joseph Muller, RPP, MCIP, Heritage Planner
Ontario Ministry of Tourism, Culture and Sport
Culture Services Unit
Toronto Office
401 Bay Street, Suite 1700
Toronto, ON M7A 0A7

**Re: NOTICE OF STUDY COMPLETION
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Joseph:

Please find enclosed for your records a Notice of Study Completion for the above referenced structure.

The Township of Wilmot has identified replacement of the existing structure with a new single span concrete box girder bridge as the preferred solution.

A Project File documenting the EA process will be available for review upon request.

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Jeff Molenhuis, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

September XX, 2017

File No. 16-298

Ministry of Indigenous Relations and Reconciliation
Consultation Unit
4th Floor
160 Bloor Street East
Toronto, ON
M7A 2E6

**Re: NOTICE OF STUDY COMPLETION
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Sir or Madam:

Please find enclosed for your records a Notice of Study Completion for the above referenced structure.

The Township of Wilmot has identified replacement of the existing structure with a new single span concrete box girder bridge as the preferred solution.

A Project File documenting the EA process will be available for review upon request.

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Jeff Molenhuis, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

September XX, 2017

File No. 16-298

Beth Brown, Supervisor of Resource Planning
Grand River Conservation Authority
400 Clyde Road
PO Box 729
Cambridge, ON
N1R 5W6

Re: NOTICE OF STUDY COMPLETION
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Beth:

Please find enclosed for your records a Notice of Study Completion for the above referenced structure.

The Township of Wilmot has identified replacement of the existing structure with a new single span concrete box girder bridge as the preferred solution.

A Project File documenting the EA process will be available for review upon request.

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Jeff Molenhuis, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

September XX, 2017

File No. 16-298

Fisheries and Oceans Canada
520 Exmouth Street
Sarnia, ON
N7T 8B1

Re: NOTICE OF STUDY COMPLETION
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Sir or Madam:

Please find enclosed for your records a Notice of Study Completion for the above referenced structure.

The Township of Wilmot has identified replacement of the existing structure with a new single span concrete box girder bridge as the preferred solution.

A Project File documenting the EA process will be available for review upon request.

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Jeff Molenhuis, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

September XX, 2017

File No. 16-298

Kate Hagerman, Cultural Heritage Specialist
Region of Waterloo
150 Frederick Street, 8th Floor
Kitchener, ON
N2G 4J3

Re: NOTICE OF STUDY COMPLETION
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Kate:

Please find enclosed for your records a Notice of Study Completion for the above referenced structure.

The Township of Wilmot has identified replacement of the existing structure with a new single span concrete box girder bridge as the preferred solution.

A Project File documenting the EA process will be available for review upon request.

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Jeff Molenhuis, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

September XX, 2017

File No. 16-298

Wilmot Heritage Advisory Committee
c/o Nicholas Bogaert, Senior Planner
MHBC Planning, Urban Design and Landscape Architecture
Suite 200
540 Bingemans Centre Drive
Kitchener, ON
N2B 3X9

Re: NOTICE OF STUDY COMPLETION
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Nicholas:

Please find enclosed for your records a Notice of Study Completion for the above referenced structure.

The Township of Wilmot has identified replacement of the existing structure with a new single span concrete box girder bridge as the preferred solution.

A Project File documenting the EA process will be available for review upon request.

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Jeff Molenhuis, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

September XX, 2017

File No. 16-298

Haudenosaunee Confederacy
c/o Haudenosaunee Development Institute
Suite 417
16 Sunrise Court
PO Box 714
Oshweken, ON
N0A 1M0

Re: NOTICE OF STUDY COMPLETION
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Sir or Madam:

Please find enclosed for your records a Notice of Study Completion for the above referenced structure.

The Township of Wilmot has identified replacement of the existing structure with a new single span concrete box girder bridge as the preferred solution.

A Project File documenting the EA process will be available for review upon request.

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Jeff Molenhuis, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

September XX, 2017

File No. 16-298

Métis Consultation Unit
Métis Nation of Ontario Head Office
Unit D
500 Old St. Patrick Street
Ottawa, ON
K1N 9G4

Re: NOTICE OF STUDY COMPLETION
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Sir or Madam:

Please find enclosed for your records a Notice of Study Completion for the above referenced structure.

The Township of Wilmot has identified replacement of the existing structure with a new single span concrete box girder bridge as the preferred solution.

A Project File documenting the EA process will be available for review upon request.

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Jeff Molenhuis, Township of Wilmot

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

September XX, 2017

File No. 16-298

Mississaugas of the New Credit
2789 Mississauga Road
RR 6
Hagersville, ON
N0A 1H0

Re: NOTICE OF STUDY COMPLETION
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT

Dear Sir or Madam:

Please find enclosed for your records a Notice of Study Completion for the above referenced structure.

The Township of Wilmot has identified replacement of the existing structure with a new single span concrete box girder bridge as the preferred solution.

A Project File documenting the EA process will be available for review upon request.

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Jeff Molenhuis, Township of Wilmot

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September XX, 2017

File No. 16-298

Lonny Bomberry, Land and Resources Director
Six Nations of the Grand – Lands and Resources Office
2498 Chiefswood Road
PO Box 5000
Oshweken, ON
N0A 1M0

**Re: NOTICE OF STUDY COMPLETION
BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Lonny:

Please find enclosed for your records a Notice of Study Completion for the above referenced structure.

The Township of Wilmot has identified replacement of the existing structure with a new single span concrete box girder bridge as the preferred solution.

A Project File documenting the EA process will be available for review upon request.

If you have any questions or more information is required, please contact the undersigned.

Yours truly,

Allan Garnham, P. Eng.

cc: Jeff Molenhuis, Township of Wilmot

4.

IDENTIFICATION OF POSSIBLE ALTERNATIVES

- Alternatives Considered

ALTERNATIVES CONSIDERED

Five alternatives are considered to address the deficiencies associated with the bridge. A "Do Nothing" alternative is considered as recommended in the EA Manual:

Alternative 1 – Do Nothing

This would entail leaving the structure in its current condition with Holland Mills Road remaining closed.

Alternative 2 – Repair Existing Bridge

This would involve strengthening and/or replacing truss members, installing new floor beams and stringers and replacing the timber deck.

Alternative 3 – Replace Superstructure

The existing steel truss would be removed and a new superstructure such as a bailey bridge or truss bridge installed overtop the existing foundations.

Alternative 4 – Replace Bridge in Current Location

A new structure would be constructed over the river in approximately the same location with some minor realignment of the roadway approaches

.

Alternative 5 – Replace Bridge in a Different Location

This alternative is similar to Alternative 4 except the new bridge would be constructed at a new location with major realignment of the roadway.

Other alternatives, such as a tunnel, may exist to address the deficiencies associated with this bridge, but are not considered viable because of either insufficient hydrologic/hydraulic capacity and/or cost

5.

SELECTION OF PREFERRED ALTERNATIVE

- Memorandum - Selection of Preferred Alternative
- Table 1 - Evaluation of Alternatives
- Memorandum – Concerns with Potential Rehabilitation of Existing Structure
- Memorandum - Results of Evaluation and Preferred Alternative Recommendation

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

File No. 16-298

MEMORANDUM

Subject: Bridge 17/B-T13 (Holland Mills Road Bridge)
Township of Wilmot
Selection of Preferred Alternative

This memorandum is to summarize the process used determine the preferred alternative.

The general methodology used to compare and evaluate the 5 possible alternatives is a tabular ranking system. For a given criteria, alternatives are ranked 1-5 with 1 having the least impact and 5 having the most impact except as noted in the comment field. To ensure each criterion is weighted the same, each row equals 15 points.

Criterion are grouped into 5 main groupings. Those being Natural Environment, Socio-Economic Environment, Cultural Environment, Technical Considerations and finally Cost. These groups are taken directly from the EA Manual.

Criterion to be considered are taken from the EA Manual, Part B – Municipal Road Projects – Water Crossings with additional criterion added. The additional criterion have been added to reflect site specific conditions and to provide technical considerations. The EA Manual does not provide any technical considerations.

Further to the EA Manual, there are no specific instructions or recommendations regarding how alternatives are to be compared or evaluated. There is also no guidance on whether groupings are to be weighted or unweighted, nor is there any guidance or whether criterion are to be ranked or scored.

To simplify the evaluation process to eliminate the possibility of one stakeholder group from having more influence over the decision making process over another stakeholder group, a ranking system will be used. Criterion will all be given the same weight. It can be said that one particular criterion is no more important than any other criterion.

Although this ranking system will be controversial to some stakeholders, there is no other reasonable methodology to compare alternatives.

Regards,

Allan Garnham, P. Eng.
Project Manager

Table 1 - Evaluation of Alternatives

Criteria Group	Criteria	Alternative 1 (Do Nothing)	Alternative 2 (Repair Existing Bridge)	Alternative 3 (Replace Superstructure)	Alternative 4 (Replace Bridge in Current Location)	Alternative 5 (Replace Bridge in New Location)	Comment
Natural Environment	Impact to fisheries and aquatic life	1	2	3	4	5	Considers disruption to fish and other aquatic creatures
	Impact to vegetation and flora	1	2	3	4	5	Considers loss of vegetation and flora
	Impact on wildlife	1	2	3	4	5	Considers loss of wildlife habitat
	Impact on groundwater and surface water quality and quantity	1	2	3	4	5	Considers increase in run-off and water quality
	Impact on stream flow	1	2	3	4	5	Considers potential changes to stream width and depth
Socio-Economic Environment	Impact on existing communities	2	1	3	4	5	Considers change to "sense of place"
	Impact on residential areas	5	4	3	2	1	Considers change to the quality and quantity of residential areas
	Impact on agriculture	5	3	2	1	4	Considers change to the quality and quantity of farming
	Impact on future development	5	4	3	2	1	1 encourages future development whereas 5 hinders future development
	Impact on recreation	4	1	2	3	5	Considers potential changes to recreation such as fishing and boating
	Need for property acquisition	2.5	2.5	2.5	2.5	5	5 requires the purchase of property 2.5 does not require property to be purchased
	Length of construction	1	2	3	4	5	1 being the shortest time and 5 being the longest time
	Improvement to traffic movement	5	4	3	2	1	1 having the most improvement and 5 being the least
	Changes to noise and vibration levels	1	2	3	4	5	Measures the change to noise and vibration levels
	Impact on air quality	1	2	3	4	5	
	Access to Emergency Services	5	4	3	2	1	
Cultural Environment	Impact to archeology	1	2	3	4	5	
	Impact to heritage	1	2	3	4	5	
Technical Considerations	Extent the option meets the problem statement	5	4	3	2	1	1 meets the problem statement 5 does not address the problem
	Elimination of Width Restriction	4	4	4	1.5	1.5	1.5 eliminates width restriction 4 does not eliminate width restriction
	Elimination of Load Posting	4.5	4.5	2	2	2	2 eliminates load posting 4.5 does not eliminate load posting
	Ability to modify roadway design criteria	4	4	4	1.5	1.5	1.5 will allow modifications 4 will not allow modifications
	Ability to improve hydrology conditions	4	4	4	1.5	1.5	1.5 will allow for improvements 4 will not provide improvements
	Constructability	1	2	3	4	5	1 is the easiest to construct 5 is the most difficult to construct
	Improvements to safety	5	4	3	2	1	1 provides many improvements 5 provides no improvements
	Construction timeline	1	2	3	4	5	1 is the shortest construction timeline 5 is the longest construction timeline
	Lifespan	5	4	3	1	2	1 is the longest lifespan 5 is the shortest lifespan
	Need for ongoing maintenance	1	5	4	2	3	1 requries little or no maintenance 5 requires frequent maintenance
Cost	Purchase of private property	2.5	2.5	2.5	2.5	5	2.5 does not require purchasing property 5 requires purchasing private property
	Maintenance costs	2	5	4	1	3	1 is the lowest cost 5 is the highest cost
	Cost to mitigate impacts to the natural environment	1	2	3	4	5	1 requires no mitigation 5 requires substantial mitigation
	Construction costs	1	2	3	4	5	1 would be the lowest cost 5 would be the highest cost
	Sum	84.5	92.5	97	91.5	114.5	

Alternative 4 is chosen because it has the lowest overall score and addressess the problem statement.

Notes:
Alternatives are ranked 1-5 with 1 having the least impact with 5 having the most impact except where noted.
Each row equals 15 points to ensure each criterion is weighted the same.

K. SMART ASSOCIATES LIMITED
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KITCHENER, ONTARIO N2R 1H6
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File No. 16-298

MEMORANDUM

Subject: Bridge 17/B-T13 (Holland Mills Road Bridge)
Township of Wilmot
Concerns with Potential Rehabilitation of Existing Structure

This memorandum is to voice concerns with respect to an alternative which involves rehabilitating the existing structure.

Reference is made to the previously completed structural evaluation completed for this structure. This structural evaluation confirms that the loading capacity of the structure is limited by the weakest member. For this particular structure, the weakest members are the floor beams, stringers and deck. The load posting for the structure (prior to its closure) was 3 tonnes.

It is noted that this bridge was closed in May 2016 due to a partial collapse of the floor beams and deck.

In order for this bridge to be reopened, all 5 floor beams, stringers and deck would require complete replacement. While some of these elements, the deck and stringers, are simple to replace, replacement of the floor beams themselves would be virtually impossible. The floor beams are supported by saddles which are rusted solid. Since the saddles are rusted solid, replacement of the floor beams would require the saddles to be cut away and replaced. The act of cutting the saddles would likely cause damage to the bottom truss pins. Damage to the truss pins will cause the structure to collapse. It would be virtually impossible to replace these truss pins due to them being rusted solid.

Even if a contractor was successful in repairing or rehabilitating the structure, the structure would still require load posting. The main concern with load posted structures is that compliance with the posting limit lies with drivers. There is no effective way to prevent vehicles which exceed the posted load limit from traversing the structure. In the case of this particular structure, it would be our opinion that the bridge, even after repairs and strengthening, is all but one overloaded truck away from significant damage, partial collapse or full collapse.

For these reasons, we deem a rehabilitation alternative not feasible and not recommended.

Regards,

Allan Garnham, P. Eng.
Project Manager

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CONSULTING ENGINEERS AND PLANNERS

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KITCHENER, ONTARIO N2R 1H6

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File No. 16-298

MEMORANDUM

Subject: Bridge 17/B-T13 (Holland Mills Road Bridge)
Township of Wilmot
Summary of Evaluation and Preferred Alternative Recommendation

This memorandum is to summarize the results of the evaluation and to state the preferred alternative.

Per Table 1 – Evaluation of Alternatives, the following final scores were determined:

Alternative 1 (Do Nothing)	84.5
Alternative 2 (Repair Existing Bridge)	92.5
Alternative 3 (Replace Superstructure)	97
Alternative 4 (Replace Bridge in Current Location)	91.5
Alternative 5 (Replace Bridge in New Location)	114.5

From the above listed results, it is clear that Alternative 1 has the lowest score. In theory, this should be the preferred alternative. However, a "do nothing" approach does not address the problem statement whatsoever. Recall that the problem statement is to eliminate deficiencies with respect to the bridge being closed, structure width and insufficient loading capacity. Since this alternative does not address any of the current problems, this alternative is not viable.

If Alternative 1 is not viable, then the second lowest score is Alternative 4 – Replace Bridge in Current Location. This alternative, by its very nature, addresses the problem statement in all regards. A new bridge would obviously be open to normal traffic, would be designed to current standards in terms of loading (i.e. would not be load posted) and could be designed for any width. This alternative is viable.

Alternative 2, which has a very similar score to Alternative 4, could also be considered a viable solution. However, repairing the bridge would only address a small aspect of the problem statement. No amount of repairs would address the structure being deficient in width. Furthermore, substantial modifications would need to be made to the existing structure to address the deficiency in loading. In fact, it's likely that the entire structure would require replacement in order to provide a structure capable of withstanding current loading requirements. Another possibility might be to repair the existing bridge, to allow it to be reopened albeit load posted. These repairs would only be temporary in nature as further repairs would quite likely be needed due to the age and condition of this structure. For these reasons, Alternative 2 is deemed not viable.

Alternative 5 and 3 scored the highest and second highest and will not be considered.

In conclusion, Alternative 4 is the most viable alternative to address the problem statement. It is recommended to proceed with Alternative 4.

Regards,

Allan Garnham, P. Eng.
Project Manager

6.

REFINEMENT OF THE PREFERRED ALTERNATIVE

- Alternative Bridge Types Considered
- Construction Cost Estimate for Option 1 – Box Beam Bridge
- Construction Cost Estimate for Option 2 – Bailey Bridge
- Construction Cost Estimate for Option 3 – Truss Bridge
- Memorandum – Selection of Preferred Option
- Table 2 – Evaluation to Determine the Preferred Option
- Memorandum - Results of Evaluation and Preferred Option Recommendation
- Letter to GRCA regarding modified hydraulic design criterion
- Response from GRCA accepting modified hydraulic design criterion
- Memorandum – Proposed Alignment of Holland Mills Road Adjacent to Nith River
- Memorandum – Proposed Horizontal and Vertical Alignment Design Criteria

ALTERNATIVE BRIDGE TYPES CONSIDERED

The following alternative bridge types have been considered:

Option 1 – Box Beam Bridge

This type of bridge consists of precast, prestressed concrete box girders which span between concrete abutments supported on spread footings. This style of bridge is common in Ontario. This style of bridge offers a shallow construction depth (i.e. depth of girders plus thickness of concrete deck) compared to a steel girder bridge or concrete "I" girder bridge. The railing system for these types of bridges can be steel box beam, concrete parapet wall (with or without combinations of rails at the top) or concrete barrier (again with or without combinations of rails at the top).

Option 2 – Bailey Bridge

This type of bridge is also known as a modular bridge. Bailey bridges are comprised of prefabricated modular steel panels which are connected at their ends to form a truss. The truss spans over the river and is supported by concrete abutments and spread footings. This style of bridge was developed during World War 2 for military use. This type of bridge is not as common as girder bridges, but has been used quite successfully in northern Ontario for rural and low volume roads. The railing system on this type of bridge is generally thrie beam or normal guide rail. This style of bridge also has relatively shallow construction depth.

Option 3 – Truss Bridge

This type of bridge would be very similar to the existing bridge except it would be constructed from modern materials. The bridge would span between concrete abutments and would be supported on spread footings. This type of bridge is not commonly constructed for roadway bridges in Ontario. This style of bridge also offers a shallow construction depth.

Other options, such as a steel pony truss, concrete rigid frame, or pipe arch, are not considered viable options for the replacement structure.

Concrete Box Girder Alternative

Last Updated: April 6, 2017 by D.S., Review by A.G. April 7

Item No.	Description	Unit	Quantity	Unit Price	Total
1	Mobilization & demobilization	LS	1	$ 25,000.00	$ 25,000.00
2	Bonding and Insurance	LS	1	$ 23,000.00	$ 23,000.00
3	Earth Borrow	t	1700	$ 15.00	$ 25,500.00
4	Double Coat Surface Treatment at North Roadway Approach	m2	2100	$ 6.00	$ 12,600.00
5	Cable Concrete for Roadway	m2	1050	$ 60.00	$ 63,000.00
6	Granular A for road	t	580	$ 25.00	$ 14,500.00
7	Granular B for road	t	500	$ 20.00	$ 10,000.00
8	Granular B backfill to structure	LS	1	$ 30,000.00	$ 30,000.00
9	150mm Dia. perforated subdrain	m	40	$ 60.00	$ 2,400.00
10	Removal of existing structure	LS	1	$ 90,000.00	$ 90,000.00
11	Rock Protection	m3	100	$ 100.00	$ 10,000.00
12	Steel beam guide rail	m	45.72	$ 150.00	$ 6,858.00
13	SBEAT End Treatment	ea	3	$ 3,500.00	$ 10,500.00
14	Topsoil	m3	55	$ 50.00	$ 2,750.00
15	Hydraulic seeding and mulching	m2	550	$ 2.00	$ 1,100.00
16	Light duty silt fence barrier	m	325	$ 10.00	$ 3,250.00
17	Straw bale check dam	ea	2	$ 250.00	$ 500.00
18	Earth excavation for new structure, dewatering, etc.	LS	1	$ 100,000.00	$ 100,000.00
19	Concrete working slab	LS	1	$ 3,500.00	$ 3,500.00
20	Concrete in footings	LS	1	$ 61,000.00	$ 61,000.00
21	Concrete in abutments and wingwalls	LS	1	$ 116,000.00	$ 116,000.00
22	Concrete in deck	LS	1	$ 91,000.00	$ 91,000.00
23	Concrete in approach slabs (provisional)	LS	1	$ 19,000.00	$ 19,000.00
24	Uncoated reinforcing steel	t	21.6	$ 2,000.00	$ 43,200.00
25	Retaining Wall at NW	m2	40	$ 650.00	$ 26,000.00
26	Side Mount Steel box beam railing on structure	LS	1	$ 60,000.00	$ 60,000.00
27	Prestressed Concrete Beams	LS	1	$ 311,000.00	$ 311,000.00
28	Bearings	LS	1	$ 7,500.00	$ 7,500.00
29	Contingency (5%)	LS	1	$ 57,000.00	$ 57,000.00
				Total =	1,226,158.00

Bailey Superstructure Alternative Last Updated: April 6, 2017 by D.S.					
Item No.	Description	Unit	Quantity	Unit Price	Total
1	Mobilization & demobilization	LS	1	$ 25,000.00	$ 25,000.00
2	Bonding and Insurance	LS	1	$ 26,000.00	$ 26,000.00
3	Earth Borrow	t	1100	$ 15.00	$ 16,500.00
4	Surface Treatment at North Roadway Approach	m2	2100	$ 6.00	$ 12,600.00
5	Cable Concrete for Roadway	m2	1000	$ 60.00	$ 60,000.00
6	Granular A for road	t	550	$ 25.00	$ 13,750.00
7	Granular B for road	t	440	$ 20.00	$ 8,800.00
8	Granular B backfill to structure	LS	1	$ 30,000.00	$ 30,000.00
9	150mm Dia. perforated subdrain	m	40	$ 60.00	$ 2,400.00
10	Removal of existing structure	LS	1	$ 90,000.00	$ 90,000.00
11	Rock Protection	m3	100	$ 100.00	$ 10,000.00
12	Steel beam guide rail	m	45.72	$ 150.00	$ 6,858.00
13	SBEAT End Treatment	ea	3	$ 3,500.00	$ 10,500.00
14	Topsoil	m3	45	$ 50.00	$ 2,250.00
15	Hydraulic seeding and mulching	m2	450	$ 2.00	$ 900.00
16	Light duty silt fence barrier	m	325	$ 10.00	$ 3,250.00
17	Straw bale check dam	ea	2	$ 200.00	$ 400.00
18	Earth excavation for new structure, dewatering, etc.	LS	1	$ 100,000.00	$ 100,000.00
19	Concrete working slab	LS	1	$ 3,600.00	$ 3,600.00
20	Concrete in footings	LS	1	$ 67,000.00	$ 67,000.00
21	Concrete in abutments and wingwalls	LS	1	$ 132,000.00	$ 132,000.00
22	Concrete in ballast walls	LS	1	$ 10,000.00	$ 10,000.00
23	Concrete in approach slabs (provisional)	LS	1	$ 19,000.00	$ 19,000.00
24	Uncoated reinforcing steel	t	19.1	$ 2,000.00	$ 38,200.00
25	Retaining Wall at NW	m2	40	$ 650.00	$ 26,000.00
26	Thrie beam railing on structure	LS	1	$ 10,000.00	$ 10,000.00
27	Supply Modular (bailey) bridge	LS	1	$ 500,000.00	$ 500,000.00
28	Install Modular (bailey) bridge	LS	1	$ 105,000.00	$ 105,000.00
29	Ballast wall nosing angle	LS	1	$ 4,000.00	$ 4,000.00
30	Contingency (5%)	LS	1	$ 65,000.00	$ 65,000.00
				Total =	1,399,008.00

Truss Superstructure Alternative

Last Updated: April 6, 2017 by D.S.

Item No.	Description	Unit	Quantity	Unit Price	Total
1	Mobilization & demobilization	LS	1	$ 25,000.00	$ 25,000.00
2	Bonding and Insurance	LS	1	$ 33,000.00	$ 33,000.00
3	Earth Borrow	t	1700	$ 15.00	$ 25,500.00
4	Surface Treatment at North Roadway Approach	m2	2100	$ 6.00	$ 12,600.00
5	Cable Concrete for Roadway	m2	1050	$ 60.00	$ 63,000.00
6	Granular A for road	t	580	$ 25.00	$ 14,500.00
7	Granular B for road	t	500	$ 20.00	$ 10,000.00
8	Granular B backfill to structure	LS	1	$ 30,000.00	$ 30,000.00
9	150mm Dia. perforated subdrain	m	40	$ 60.00	$ 2,400.00
10	Removal of existing structure	LS	1	$ 90,000.00	$ 90,000.00
11	Rock Protection	m3	100	$ 100.00	$ 10,000.00
12	Steel beam guide rail	m	45.72	$ 150.00	$ 6,858.00
13	SBEAT End Treatment	ea	3	$ 3,500.00	$ 10,500.00
14	Topsoil	m3	55	$ 50.00	$ 2,750.00
15	Hydraulic seeding and mulching	m2	550	$ 2.00	$ 1,100.00
16	Light duty silt fence barrier	m	325	$ 10.00	$ 3,250.00
17	Straw bale check dam	ea	2	$ 250.00	$ 500.00
18	Earth excavation for new structure, dewatering, etc.	LS	1	$ 100,000.00	$ 100,000.00
19	Concrete working slab	LS	1	$ 3,600.00	$ 3,600.00
20	Concrete in footings	LS	1	$ 67,000.00	$ 67,000.00
21	Concrete in abutments and wingwalls	LS	1	$ 137,000.00	$ 137,000.00
22	Concrete in ballast walls	LS	1	$ 12,000.00	$ 12,000.00
23	Concrete in approach slabs (provisional)	LS	1	$ 19,000.00	$ 19,000.00
24	Uncoated reinforcing steel	t	19.1	$ 2,000.00	$ 38,200.00
25	Retaining Wall at NW	m2	40	$ 650.00	$ 26,000.00
26	Thrie beam railing on structure	LS	1	$ 10,000.00	$ 10,000.00
27	Truss Bridge Supply	LS	1	$ 710,000.00	$ 710,000.00
28	Truss Bridge Install	LS	1	$ 215,000.00	$ 215,000.00
29	Ballast wall nosing angle	LS	1	$ 4,000.00	$ 4,000.00
30	Contingency (5%)	LS	1	$ 82,000.00	$ 82,000.00
				Total =	**$ 1,764,758.00**

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

File No. 16-298

MEMORANDUM

Subject: Bridge 17/B-T13 (Holland Mills Road Bridge)
Township of Wilmot
Selection of Preferred Option

This memorandum is to summarize the process used determine the preferred option.

The general methodology used to compare and evaluate the 3 possible options is a tabular ranking system similar to that used to compare alternatives. For a given criteria, options are ranked 1-3 with 1 having the least impact and 3 having the most impact except as noted in the comment field. To ensure each criterion is weighted the same, each row equals 6 points.

Criterion are grouped into 5 main groupings identical to those used to compare alternatives. Those being Natural Environment, Socio-Economic Environment, Cultural Environment, Technical Considerations and finally Cost. These groups are taken directly from the EA Manual.

Criterion to be considered are again similar to those used to compare alternatives.

To simplify the evaluation process to eliminate the possibility of one stakeholder group from having more influence over the decision making process over another stakeholder group, a ranking system will be used. Criterion will all be given the same weight. It can be said that one particular criterion is no more important than any other criterion.

Although this ranking system will be controversial to some stakeholders, there is no other reasonable methodology to compare alternatives.

Regards,

Allan Garnham, P. Eng.
Project Manager

Table 2 - Evaluation to Determine the Preferred Option

Criteria Group	Criteria	Option 1 (Box Beam Bridge)	Option 2 (Bailey Bridge)	Option 3 (Truss Bridge)	Comment
Natural Environment	Impact to fisheries and aquatic resources	0 points (No alternatives result in loss of fish habitat)			Considers loss of fish habitat as a result of the proposed construction
	Impact to vegetation and flora	0 points (No alternatives result in permanent loss of vegetation/flora)			Considers permanent loss of vegetation/flora as a result of constructing the alternative
	Impact on wildlife	0 points (No alternatives result in permanent loss of wildlife habitat)			Considers loss of habitat for wildlife such as birds and animals
	Impact on surface water	1	3	2	Considers both increase and level of contamination of runoff
	Impact on ground water	0 points (No alternatives impact groundwater)			Considers changes to the quality or quantity of groundwater
	Impact on stream flow	0 points (No alternatives result in changes to the watercourse alignment)			Considers changes to the overall alignment of the watercourse
Socio-Economic Environment	Impact on existing communities	2	3	1	Considers change to "sense of place" 1 being the least change and 3 being the most change
	Impact on residential areas	0 points (No alternative is expected to alter the quantity and quality of residential areas)			Considers potential changes to the quantity and quality of residential areas
	Impact on agricultural areas and farming	1	2	3	Measures the potential improvements to agriculture and farming
	Impact on future development	1	3	2	1 encourages future development whereas 3 hinders future development
	Impact on recreation	0 Points (No changes to recreation are expected)			Considers changes to recreatation, such as fishing or boating, as a result of implementing the alternative
	Increase in traffic volume and speeds	3	1	2	Considers potential for increase in number of vehicles and the speed of said vehicles
	Increase in noise levels	1	3	2	1 would be the least amount of noise during use whereas 3 would be the most amount of noise during use
	Increase in vibration	1	3	2	1 would be the least amount of vibration during use whereas 3 would be the most amount of vibration during use
	Impact on air quality	3	1	2	Considers increase in air polution from traffic 1 being the least increase 3 being the most increase
	Aesthetics	2	3	1	Considers overall appearance
Cultural Environment	Impact to archeology	0 Points (No impacts to archeology expected)			
	Impact to heritage	3	2	1	
Technical Considerations	Ability to source materials	1	2	3	1 is readily available 3 is difficult to source
	Improvements to traffic movement	1	3	2	1 would be the most improvement 3 would be the least improvement
	Ability to eliminate "expansion joints" at ends of bridge	1	2.5	2.5	1 does not require expansion joints 2.5 requries expansion joints
	Constructability	2	1	3	1 is the most constructable 3 is the least constructable
	Construction timeline	2	1	3	1 is the shortest construction 3 is the longest construction
	Lifespan	1	3	2	1 is the longest lifespan 3 is the shortest lifespan
	Need for ongoing maintenance	1	3	2	1 requries little or no maintenance 3 requires frequent maintenance
Cost	Purchase of private property	0 points (No alternative is expected to require the purchase of property)			0 requires no property 1 requires some property
	Maintenance costs	1	3	2	1 is the lowest cost 3 is the highest cost
	Mitigation measures	2	3	1	1 requires no mitigation 3 requires substantial mitigation
	Construction costs	2	1	3	1 would be the lowest cost 3 would be the highest cost
	Sum	32	46.5	41.5	

Option 1 is chosen because it has the lowest overall score

Notes:
Alternatives are ranked 1-3 with 1 having the least impact with 3 having the most impact except where noted.
Each row equals 6 points to ensure each criterion is weighted the same.

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

File No. 16-298

MEMORANDUM

Subject: Bridge 17/B-T13 (Holland Mills Road Bridge)
Township of Wilmot
Summary of Evaluation and Preferred Option Recommendation

This memorandum is to summarize the results of the evaluation and to state the preferred option.

Per Table 2 – Evaluation to Determine the Preferred Option, the following final scores were determined:

Option 1 (Box Beam Bridge)	32
Option 2 (Bailey Bridge)	46.5
Option 3 (Truss Bridge)	41.5

From the above listed results, it is clear that Option 1 has the lowest score. The remaining options have much higher scores and are therefore not recommended. Option 1 will also be the recommended option to pursue.

In addition, Option 1 also has the lowest construction cost estimate.

In terms of lifecycle costs, Option 1 is perceived to have the lowest lifecycle costs compared to the other 2 options. This perception is based on the fact that a box beam bridge could be constructed without expansion joints (i.e. semi-integral abutments) whereas both the Bailey bridge and truss bridge would require expansion joints. Expansion joints are known to leak thereby allowing salt laden runoff to cause damage (rusting) to the bearings, ballast walls as well as the ends of the superstructure.

In conclusion, Option 1 – Box Beam Bridge is the preferred option. It is recommended to proceed with Option 1.

Regards,

Allan Garnham, P. Eng.
Project Manager

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

January 17, 2017

File No. 16-298

Andrea Terella, Resource Planner
Grand River Conservation Authority
400 Clyde Road
PO Box 729
Cambridge, ON N1R 5W6

**RE: BRIDGE 17/B-T13 (HOLLAND MILLS ROAD BRIDGE)
HOLLAND MILLS ROAD AT NITH RIVER
TOWNSHIP OF WILMOT**

Dear Andrea Terella:

Further to our previous email correspondence concerning hydraulic design criterion for Holland Mills Road Bridge, we offer the following:

- We have now completed a detailed analysis of the existing hydraulic conditions. Based on our topographic engineering survey of the Nith River site, the low point of the north and south roadway approaches are 326.21 and 326.80 respectively, the soffit elevation is 327.x and the opening width of the existing structure is 28.2m. Flow rates for a 10, 25, 100 year design storms and Regional storm are 327.5, 412.7, 514.6, and 926.3 m^3/s respectively. Calculations show the water level elevations with the existing bridge and roadway for the 10, 25, 100 year design storms, and Regional storm are 326.70, 326.90, 327.10 and 327.55 respectively.

- The analysis indicates that Holland Mills Road is essentially subject to flooding over the roadway at every design storm considered. This correlates well with reports of flooding over the north roadway approach during the spring freshet every few years.

- The analysis also indicates that the existing bridge sits above the Regional flood plain. This helps to explain why this structure is still intact since it is considerably shorter in span compared to other structures on the Nith River.

- Given that Holland Mills Road is a local road, current design criteria require that a replacement structure and the immediate roadway approaches be designed to convey a 25 year design storm, provide a minimum clearance to the soffit of 300mm and provide 300mm of freeboard at this same design storm. There is also a requirement to not significantly change the profile of the Regional Storm.

- In order to satisfy the design criteria identified in our previous point, considerable changes would be required to the Holland Mills Road site. We would think that Holland Mills Road would need to be raised about 2-3 metres on either side of the bridge and the proposed bridge itself would likely need to be several spans with a total length of at least 100 metres.

- It is our opinion that it is not logical or financially feasible to attempt to design a replacement structure to satisfy the design criteria listed above.

In order to complete this project to allow Holland Mills Road Bridge to reopen, we would propose the following:

- The opening area of the proposed structure be maintained as close as possible to the existing opening area.
- That flooding overtop Holland Mills Road (overtop the north roadway approach) be permitted such that there is no increase (i.e. zero) in the water level at the 10, 25 and 100 year design storms.
- Holland Mills Road between the existing structure and Bleams Road be lined with cable concrete or similar to prevent scouring of the road bed during times of overland flow.
- A marginal increase, 100mm maximum, to the profile of the Regional Storm be considered.
- The proposed new structure be constructed above the proposed Regional Storm flood plain as existing
- That the depth of the superstructure (i.e. combined depth of girders and deck) be minimized so that the associated changes to the roadway approaches can also be minimized.

We would be happy to attend a meeting to further discuss this project and our suggestions/recommendations listed above.

Please let us know if the GRCA is generally agreeable to our proposal given the unique circumstances at this structure and roadway approaches.

All of which is respectfully submitted.

Yours truly,

Allan Garnham, P. Eng.

cc: Gary Charbonneau, CET Township of Wilmot

Allan Garnham

From: Andrea Terella <aterella@grandriver.ca>
Sent: March-21-17 12:21 PM
To: Allan Garnham
Subject: RE: Holland Mills Road Bridge

Hello Allan,

In follow to my email, engineer staff have now had an opportunity to review the letter provided concerning hydraulic design criterion for the Holland Mills Road Bridge. The engineer has confirmed that in regards to the replacement of the structure that there will be no concern with designing the bridge to a lower design criteria as proposed.

GRCA staff would like to continue to participate in the EA review as the study progresses and anticipate submission of final report for review and comment.

Please be further advised that pursuant to Ontario Regulation 150/06 a permit from the GRCA will be required prior to the replacement of the bridge.

If you have any questions or require additional information please feel free to contact me to discuss.

Regards,
Andrea

Andrea Terella | *Resource Planner*
Grand River Conservation Authority
400 Clyde Road, PO Box 729, Cambridge ON N1R 5W6
Phone: (519) 621-2763 x. 2292 | Fax: (519) 621-4945
www.grandriver.ca

From: Andrea Terella
Sent: February 23, 2017 10:46 AM
To: 'Allan Garnham'
Subject: RE: Holland Mills Road Bridge

Hello Allan,

I have received the letter you provided, thank you for providing these additional details in regards to your inquiry this should assist the engineer in their review. The information and additional details have been circulated to our Engineer for review and comment. I will follow up with you as soon as I have received comments.

Regards,
Andrea

Andrea Terella | *Resource Planner*
Grand River Conservation Authority
400 Clyde Road, PO Box 729, Cambridge ON N1R 5W6
Phone: (519) 621-2763 x. 2292 | Fax: (519) 621-4945
www.grandriver.ca

From: Allan Garnham [mailto:AGarnham@ksmart.ca]
Sent: February 1, 2017 11:11 AM

To: Andrea Terella
Cc: Gary Charbonneau; Alastair Duncan; Trevor Hoard
Subject: Holland Mills Road Bridge

Hello Andrea,

I'm following up on my emails I sent you on December 19, 2017.

Did you receive the letter?

Thanks,

Allan Garnham, P. Eng.
K. Smart Associates Limited
85 McIntyre Dr. Kitchener ON N2R 1H6 | http://www.ksmart.ca
T: 519.748.1199 x246 | F: 519.748.6100 | AGarnham@ksmart.ca

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

File No. 16-298

MEMORANDUM

Subject: Bridge 17/B-T13 (Holland Mills Road Bridge)
Township of Wilmot
Proposed Alignment of Holland Mills Road Adjacent to Nith River

This memorandum is to summarize the proposed alignment of Holland Mills Road adjacent to Nith River.

As a result of conversations between Township of Wilmot Public Works and K. Smart Associates, it was agreed that no realignment of Holland Mills Road adjacent to Nith River (and the subject bridge) is to occur. That is, Holland Mills road as well as the proposed new bridge will remain in the same locations as they are now.

This decision is based on the following:

- Major alignment improvements at the Nith River crossing will not correct what is generally a straight road. i.e. major improvements to other parts of Holland Mills Road would be required to provide a roadway with a posted speed limit above 60-80 km/hr;

- Any improvements to the roadway on the south side would involve significant acquisition of private property. This property acquisition would be expensive and could be quite lengthy (especially if the respective owners don't have a willingness to sell);

- Modifications to the design of the bridge can be made now, which would have minimal impact to the overall cost of the project, to allow realignment of Holland Mills Road in the future.

- Budgetary reasons.

In conclusion, Holland Mills Road and the proposed new bridge should remain in their current locations.

Regards,

Allan Garnham, P. Eng.
Project Manager

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

File No. 16-298

MEMORANDUM

Subject: Bridge 17/B-T13 (Holland Mills Road Bridge)
Township of Wilmot
Proposed Horizontal and Vertical Alignment Design Criteria

This memorandum is to summarize the proposed horizontal and vertical alignment design criteria to be followed.

Horizontal Alignment

Reference is made to a previous memorandum which concluded that the existing alignment of Holland Mills Road is to be maintained.

In terms of roadway geometry, two (2) areas of concern exist. These being the horizontal curve between the bridge and the east-west alignment (noted as HC-1) as well as the horizontal curve between the north-south alignment and the east-west alignment (noted as HC-2).

For HC-1, an intersection design philosophy will be assumed. This essentially means that a design vehicle will be travelling at a design speed near zero (0). Turning circles run in AutoCAD confirm that a centreline radius of 12.5m will work for a tractor-trailer combination with an inside radius (edge of pavement) of 8.0m and an outside radius of 19.0m (edge of pavement).

For HC-2, turning circles run in AutoCAD confirm that a 25.0m centreline radius will work for the same tractor-trailer combination used for HC-1. The inside radius should be 20.5m (edge of pavement) and the outside radius should be 29.5m (edge of pavement).

Vertical Alignment

The vertical alignment of Holland Mills Road will be upgraded to a 40 km/hr design speed adjacent to the proposed structure. This will involve raising the roadway overtop the structure to provide a 0.3% longitudinal grade across the bridge. The north and south roadway approaches immediately adjacent to the bridge will be raised to 6%. Sag and crest vertical curves will be used to tie these grades to the existing approach and proposed structure grades respectfully. The roadway approach grades further away from the structure will be left intact.

The vertical alignment of Holland Mills Road where it intersects with Bleams Road will be upgraded to a 50 km/hr design speed and to provide a “landing zone” to improve site distance and turning movements. This will involve extending the 2% (assumed) cross-fall grade from Bleams Road onto Holland Mills Road and providing a 4% transition grade between the existing approach grade and the cross-fall grade. Sag and crest vertical curves will be provided to tie all the grades together.

Regards,

Allan Garnham, P. Eng.
Project Manager

7.

CULTURAL HERITAGE EVALUATION REPORT

AND

HERITAGE IMPACT ASSESSMENT

- Cultural Heritage Evaluation Report and Heritage Impact Assessment prepared by CHC Limited November 28, 2016
- Memorandum – CHER and HIA Findings and Overall Recommendations
- Memorandum – Possible Salvage of Existing Structure by Others

Cultural Heritage Evaluation Report & Heritage Impact Assessment

Bridge No. 17/B-T13
‘Holland Mills Road Bridge’
Township of Wilmot
Region of Waterloo, Ontario

prepared by

CHC Limited
87 Liverpool Street, Guelph, ON N1H 2L2
(519) 824-3210
email oscott87@rogers.com

November 28, 2016

Table of Contents

all photographs by Owen R. Scott of CHC Limited, November 1, 2016 unless otherwise noted.

1.0 BACKGROUND - CULTURAL HERITAGE EVALUATION REPORT

This Cultural Heritage Evaluation Report (CHER) has been conducted following the *Municipal Heritage Bridges Cultural, Heritage and Archaeological Resources Assessment Checklist Revised April 11, 2014* (MEA) and the Ministry of Tourism, Culture & Sport's *Standards & Guidelines for Conservation of Provincial Heritage Properties, Heritage Identification & Evaluation Process, Sept. 1, 2014*.

CHC Limited was contracted by K. Smart Associates Limited, on behalf of the Township of Wilmot, to conduct this heritage assessment of the Holland Mills Road Bridge, Township of Wilmot, Regional Municipality of Waterloo, Ontario. The Pratt through truss single-span steel bridge crosses the Nith River on Holland Mills Road east of New Hamburg (Figure 3).

This CHER/HIA has been conducted as a two-part process of the Environmental Assessment. A CHER is required as the first phase of the work to identify the degree of heritage significance of a bridge as information for the Schedule "B" Municipal Class Environmental Assessmen (EA) process. The metal, 6 panel, pin-connected, Pratt through truss, fixed bridge is documented in *Historic Bridges.org* as being built in 1910 by the Hamilton Bridge Company as a "rare and gorgeous bridge -- threatened by a sinking abutment"[1]. It is listed in *Arch Truss and Beam, The Grand River Heritage Bridge Inventory* (2013) as "the oldest pin-jointed structure in the Township and is representative of the era in which it was built";[2] however, it was likely originally in Northern Ontario and moved here *circa* 1925 - 1930. It "has been considered for replacement due to safety concerns"[3]. The Holland Mills Road Bridge is not listed on the Township's Heritage Register of Non-Designated Properties, nor is it designated under the *Ontario Heritage Act*. Neither is it on Ontario's Heritage Bridge List (Appendix A2: Municipally Owned Heritage Bridges)[4].

This report is presented as part of the planning and design process for municipal roads projects subject to a Schedule "B" Municipal Class Environmental Assessment. The Municipal Class EA provides a decision-making process to ensure that all relevant engineering and environmental features are considered in the planning and design of municipal infrastructure. The Holland Mills Road Bridge is posted with a weight limit of 3 tonnes and was closed May 30, 2016 and barricaded to vehicular traffic (Figures 1 & 2). Given that the existing structure is deficient in terms of loading capacity and structure width as well as the structure currently being closed, the Township of Wilmot is considering options to eliminate all deficiencies as well as to provide improved levels of traffic service and overall safety. Five alternatives are being considered to address the deficiencies associated with the bridge:

Figure 1 load limit sign

Figure 2 bridge closed

1 Historic Bridges: Waterloo Region, Ontario, *Historic Bridges.org* website

2 *Arch Truss and Beam, The Grand River Heritage Bridge Inventory* (2013) p. 137

3 *Ibid*

4 *Ontario Heritage Bridge Guidelines (Interim)* – Jan 11, 2008

1. Do Nothing - this would entail leaving the structure in its current condition with Holland Mills Road remaining closed;
2. Repair Existing Bridge - this would involve strengthening and/or replacing truss members, installing new floor beams and stringers and replacing the timber deck;
3. Replace Superstructure - the existing steel truss would be removed and a new superstructure such as a bailey bridge or truss bridge installed over the existing foundations;
4. Replace Bridge in Current Location - a new structure would be constructed over the river in approximately the same location with some minor realignment of the roadway approaches;
5. Replace Bridge in Current Location - similar to alternative 4. except the new bridge would be constructed at a new location with major realignment of the roadway.

The objectives of this report are to provide an historical overview of the bridge within the broader context of the Township of Wilmot; describe existing conditions and heritage integrity; evaluate the bridge within the *Municipal Heritage Bridges Cultural, Heritage and Archaeological Resources Assessment Checklist* and the *Standards & Guidelines for Conservation of Provincial Heritage Properties, Heritage Identification & Evaluation Process* (applying the criteria from *Regulation 9/06*) and draw conclusions about the heritage attributes of the structure; ascertain sensitivity to change in the context of identified heritage attributes; and present and evaluate alternatives. Appropriate mitigation measures are recommended where adverse effects are anticipated. The assessment was conducted under the project direction of Owen R. Scott, CAHP.

Figure 3 project site location in Wilmot Township - *GRCA mapping*

2.0 THE CULTURAL HERITAGE EVALUATION REPORT

2.1 Historical Research, Site Analysis and Evaluation

> *Wilmot Township was designated a Crown Reserve following the Canada Act of 1791 which created Upper and Lower Canada. Following a government survey in 1824, Mennonites from Waterloo Township and Amish from Europe claimed lots and began clearing roadways and farms. The Canada Land Company opened the Huron Road through the southern part of Wilmot Township in 1828. Soon after, Roman Catholics and Lutherans from Alsace and Germany, Anglicans from the British Isles and others joined the initial settlers in clearing land and building roads, mills, shops, churches, schools and villages. Along the settlements three main roads were cleared for passage from one to the other. They named the roads Oberstrasse (Upper Street), Mittlestrasse (Middle Street) and Unterstrasse (Lower Street). These roads are now known as Erb's Road, Snyder's Road and Bleams Road. In 1840, Wilmot Township became part of the District of Wellington. The Baldwin act, passed in May 1849, established a new framework for municipal government. Townships and incorporated villages were recognized as rural units of government. They gained power to elect their own local officials and to tax land owners for local improvements. On January 21, 1850, the first elected Council of the Township of Wilmot met in Wilmot Centre.*[5]

The historic settlement of Holland Mills is the location of the subject bridge. Holland Mills was a locale in Wilmot Township between New Hamburg and Haysville, where a woolen mill and a grist mill were located on a small stream or raceway joining two points on the Nith River (Figure 4).

Figure 4 excerpt from 1861 Tremaine Map - current bridge location shown, mills and raceway shown upstream

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[5] History of Wilmot Township, Township webpage
http://www.wilmot.ca/en/living-here/History-of-Wilmot-Township.aspx

Figure 5 overlay of current *GRCA mapping* on *1861 Tremaine Map*
changes in the course of the Nith River are evident

> *The Nith River was normally a quiet stream, leading to early settlers to believe it safe to erect buildings close to its banks on low lying lands. When the floods came it became a raging torrent. One of the worst of these came in August 1883 when heavy and continues rains washed out dams and bridges. This same flood caused the river ta change its course just north and east of our farm. Instead of circling an area of about fifty acres, it establishing a course cutting off this section, leaving it an island in times of high water.*
>
> *The village of Holland Mills was also located at the place where the river changed its course. It is said that at one time, New Hamburg, Haysville and Holland Mills were approximately the same size. Holland Mills was the site of house, a flour mill and possibly a woollen mill. The mills were probably lost in the flood. The land as well as the flour mill were owned by a Mr. Neville or Nivills. Today all traces of Holland Mills have disappeared ...* [6]

The farm mentioned in Ms. Koch's Tweedsmuir History article is the one in the large southerly oxbow of the Nith

[6] Alice Koch, *Haysville Tweedsmuir History Book A* - Tweedsmuir Histories, 2001, Heritage Wilmot

River in Figure 4. The name on the Tremaine Map is "T. G. S. Nevills" who owned the land in the oxbow and the mills. Titus Geer Simons Neville was born in 1820, and in 1850 his occupation was listed as merchant, miller, carder, fuller & spinner, all of which relate to the flour and woolen mills in Holland Mills. He also operated a store in New Hamburg. In 1858 he was elected Reeve/Mayor of New Hamburg.

> *According to E. W. B. Snider, Neville had a sawmill and a flour mill which operated for some time, but eventually "the water freshets made conditions very unfortunate, destroying mill dam and damaging buildings, so that where formerly a thriving business was done, today there is barely a trace left of the industries.*[7]

In 1871 Neville had moved to Ailsa Craig in Middlesex County, then to Cheboygan, Michigan where he had a tailoring shop in 1885 . He died in 1886 and is buried in Cheboygan.

By 1881, and likely earlier, the mills were no longer extant, as shown in the 1881 Historical Atlas of Waterloo and Wellington Counties (Figure 6). The location of the current bridge is shown by the red asterisk.

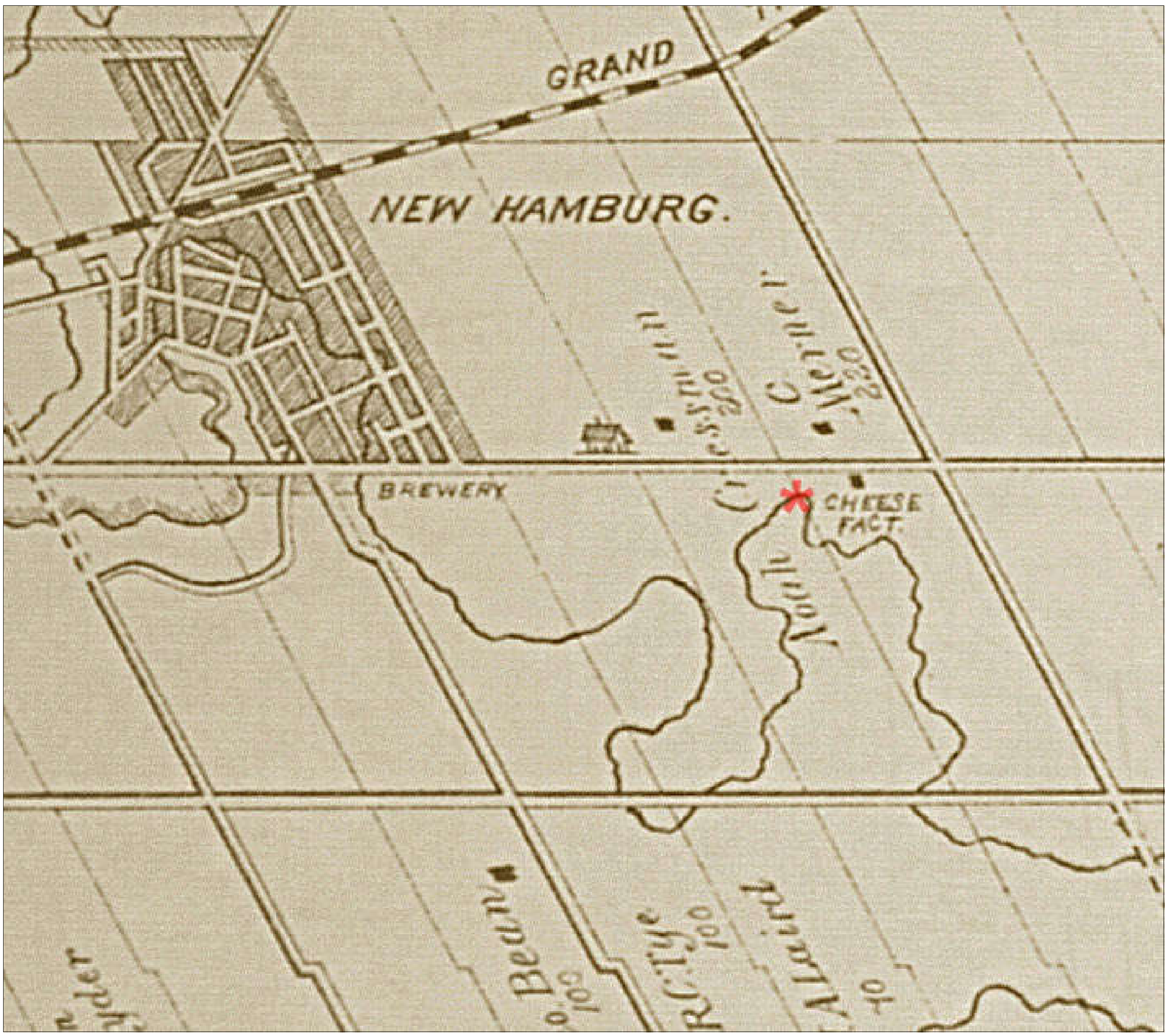

Figure 6   excerpt from Historical Atlas of Waterloo and Wellington Counties - 1881

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[7] *Waterloo Historical Society Annual Volume 6* p. 29

The bridge was built in 1910 by the Hamilton Bridge & Tool Company and was likely originally installed in Northern Ontario. It was moved to its current location *circa* 1925 - 1930 and was perhaps the second crossing of the river at this location, providing access to farms from Bleams Road via Holland Mills Road (Township Road 13) and the Holland Mills Road Bridge. The wooden piles and pieces of stonework from a previous bridge can be seen 40m northwest of the bridge (Figure 7).

Figure 7 wooden piles in the Nith River of previous bridge

In this 1946 airphoto (Figure 8), Township Road 13 makes no connection to the Huron Road in the south. The situation remained in 1955 (Figure 9). By 1966 (Figure 10), the road had been extended to the Huron Road to provide access from the south, the situation that exists today (Figure 11).

The unusual right-angle turn on the south side of the bridge immediately after crossing has been evident from the original placement of the bridge. The site of Holland Mills is a farm field in this 1946 airphoto; the bridge is indicated by the red asterisk (Figure 8).

Figure 8 1946 airphoto - *University of Waterloo Geospatial Centre*

Figure 9 1955 airphoto - *University of Waterloo Geospatial Centre*

Township Road 13 provides access only from the north (Bleams Road) across the bridge in this 1955 airphoto (Figure 9).

Figure 10 1966 airphoto - *University of Waterloo Geospatial Centre*

The old oxbow southwest of the bridge, formerly the location of mills and Holland Mills (Figure 4) contains the sewage treatment plant in this 1966 airphoto and Township Road 13 now connects Bleams Road with the Huron Road (Figure 10).

Figure 11 current airphoto - *GRCA mapping*

Access to the properties in the oxbow in which the bridge is situated is now limited to the Huron Road approach in the south on Township Road 13 because of the bridge closure (Figure 11).

The landscape in which the Holland Mills Road Bridge is located is a picturesque agricultural scene set among the many meanderings of the Nith River and punctuated with scattered woodlots and hedgerows, as illustrated in the Figures 12 through 19.

Figure 12 looking southeast across the Nith downstream of the bridge

Figure 13 looking northwest upstream of the bridge

Figure 14 Township Road 13 bridge approach from the south

Figure 15 Township Road 13 bridge approach from the north

Figure 16 downstream from the bridge

Figure 17 upstream from the bridge

Figure 18 the Nith and Township Road 13 from the bridge

Figure 19 the Nith from the bridge

A metal truss bridge whose main structure comes from a triangular framework of structural steel or iron, the Holland Mills Road bridge is a 6 panel, pin-connected, Pratt through truss. One of the two most common configurations, the Pratt truss tends to occupy the earlier half of the truss bridge era, but was used throughout. In the Pratt truss, originally developed by Thomas and Caleb Pratt in 1844, diagonal members angle toward the centre and bottom of bridge.[8]

The wood curbed, wood bridge deck is 29.7 metres long and 5.1 metres wide. The bridge is deficient in width and capacity and is closed and barricaded on both approaches (Figures 20 & 21).

Figure 20 barricaded south approach

Figure 21 barricaded north approach

All of the steel is rusty, with no evidence of paint (Figures 22 - 38). End posts and top chords are built-up steel consisting of a "wave" panel, rivet-connected to an I-beam (Figures 22 & 23).

Figure 22 end post

Figure 23 end post detail

8 An Introduction to Historic Bridges, HistoricBridges.org website http://www.historicbridges.org/info/intro/ithb2.pdf, pp. 78 & 79

Vertical members exhibit V-lacing and battens (Figures 24 & 25) and are pinned to the top and bottom chords, one of the unusual features of this bridge (Figures 25 - 27).

Figure 24 V-laced vertical member

Figure 25 top chord pinned connection and batten

Figure 26 top chord connection - *historicbridges.org*

Figure 27 bottom chord/beam connection

Figure 28 bottom chord connection - *historicbridges.org*

No maker's name or steel markings were found by the author; however, it has been documented that the bridge was built by the Hamilton Bridge & Tool Company (see Appendix 2 for the original drawings).

Diagonal members and sway bracing are steel rods with turnbuckles (Figure 29), including one unusual turnbuckle (Figure 30) and more typical turnbuckles (Figure 31). Loop-welded eye bars with teardrop-shaped holes are evident (Figure 27).

Figure 29   steel rod diagonal members & sway bracing

Figure 30   unusual turnbuckle

Figure 31   turnbuckle

Railings are pipe sections, passed through loops welded to the vertical members (Figures 32 & 33). The railings are a relatively new addition in the context of the history of this bridge, and quite crudely executed, unlike the remainder of the bridge which exhibits some fairly delicate and interesting metalwork.

Figure 32   pipe railing connection to end post

Figure 33 pipe railing with missing section

Figure 34 bridge deck - note ponding near southeast end

Figure 35 bridge deck, curb & expansion joint

The wood bridge deck was replaced in 2007. As can be seen in Figure 34, the deck has sagged near the southeast corner, allowing rainwater to pond. The deck is supported by steel I-beam stringers founded on concrete abutments (Figure 36).

The deck has a wood curb (Figure 35). Deck beams and stringers are severely rusted with much loss of material (Figure 37). Concrete abutments (Figure 38) were refaced in 2007.[9]

Figure 36 bridge deck, beams and abutments viewed from the north

[9] *2015 Township of Wilmot OSIM Inspections - Bridge 17B-T13*, p. 7

Figure 37 severely rusted deck beam and stringers

Figure 38 southerly concrete abutment - refaced 2007

Bridge No. 17/B-T13 is the subject of a bridge inspection report, dated April 30, 2015, conducted by K. Smart Associates Limited (Appendix 3). Repair and rehabilitation required from that report states:

- *rehabilitate approaches - priority 1 - 5 years*
- *rehabilitate railings - priority 1 - 5 years*
- *rehabilitate floor beams - priority urgent*
- *rehabilitate stringers - priority 6 - 10 years*
- *rehabilitate bracing - priority 6 - 10 years*
- *replace seals at ends of timber deck - priority 1 - 5 years*
- *rehabilitate connections - priority 1 - 5 years*
- *replace top chords - priority 6 - 10 years*[10]

The overall recommendation is to replace the structure with a new bridge at an estimated cost of $1,550,000.

2.2 Description of Property, Statement of Cultural Heritage Value or Interest, and Description of Heritage Attributes of the Bridge

Description of Property - Bridge No. 17/B-T13 is set in a picturesque, rural, agricultural landscape. It is located 0.3 km South of Bleams Road, Concession SBR, Lot 20 Block A, east of New Hamburg, Township of Wilmot. The bridge crosses the Nith River near the former hamlet of Holland Mills between New Hamburg and Haysville, where a woolen mill and a grist mill were located on a small stream or raceway joining two points on the river. It is a 29.7 metre long and 5.1 metre wide, wood decked, 6 panel, pin-connected, Pratt through truss. The bridge was built *circa* 1910 and moved to its current site *circa* 1925 - 1930. Its constructor was the Hamilton Bridge & Tool Company of Hamilton, Ontario. There is no visible identification of the builder on the bridge. The bridge has been modified over time with added pipe railings and various bits of steel reinforcing, rivet replacement, *etc.*

Statement of Cultural Heritage Value or Interest - The bridge is not listed on the Township's Heritage Register of Non-Designated Properties, nor designated under the *Ontario Heritage Act*, and is not listed on the *Ontario Bridge Inventory.* It is the oldest pin-jointed bridge in Wilmot Township. *Other through truss bridges in Wilmot Township are: Shade Street Bridge - 1953,Hartman Bridge - 1936, Haysville Bridge (demolished) - 1930, Oxford-Waterloo Road Bridge - 1912,and Bridge Street Bridge - 1913.*[11] There are other Pratt through truss bridges in the Region, including the spectacular Conestogo Bridge (Glasgow Street) over the Conestogo River, another pin-connected bridge.

The Holland Mills Bridge (Bridge No. 17/B-T13) is the subject of a 2016 inspection which recommended its replacement due to condition (currently closed and barricaded), its deficient loading capacity, and deficient width.

Description of Heritage Attributes - Consideration can be given to the bridge's:

- pin-connections and one unusual turnbuckle connection;
- proportions with a general massing that is appropriate to the landscape in which it is situated.

Key heritage attributes that embody the contextual heritage value of the bridge include:

- its association with an earlier river crossing near the vanished hamlet of Holland Mills;
- its contribution to the character of the Nith River valley.

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[10] *Ibid*

[11] *A Study of Old Bridges in Waterloo Region*, *Spanning the Generations: Phase 3 Heritage Assessment of Truss Bridges of Waterloo Region* October 2007, p. 32

2.3 MEA Checklist

This report is compliant with the MEA checklist materials (Appendix 1).

2.4 Cultural Heritage Evaluation

The structure was evaluated using the criteria of *Ontario Heritage Act Regulation 9/06*. The evaluation based on *Regulation 9/06* criteria is summarized below.

design value or physical value	
is a rare, unique, representative or early example of a style, type, expression, material or construction method	only pin-jointed Pratt through truss bridge in the Township, and although early, not in the Township until *c.* 1925-1930; unique in the Township, but not in the Region
displays a high degree of craftsmanship or artistic merit	combination of rivet- & bolt-connected steel, wood deck, concrete abutments, steel beams - does not exhibit a high degree of craftsmanship, has artistic merit
demonstrates a high degree of technical or scientific achievement	does not demonstrate a high degree of technical or scientific achievement
historical value or associative value	
direct associations with a theme, event, belief, person, activity, organization or institution that is significant to a community	no known association with historic theme, person or event; near the site of the historic, now vanished settlement of Holland Mills, but moved there after the hamlet disappeared
yields, or has the potential to yield, information that contributes to an understanding of a community or culture	does not meet this criterion
demonstrates or reflects the work or ideas of an architect, artist, builder, designer or theorist who is significant to a community	known, prolific Hamilton, Ontario builder of steel bridges in the late 19^{th} to early 20^{th} century- does not meet this criterion
contextual value	
is important in defining, maintaining or supporting the character of an area	does not meet this criterion
is physically, functionally, visually or historically linked to its surroundings	physically, functionally, visually and historically linked to its surroundings
is a landmark	a familiar structure in the context of the area - could be considered a landmark

The Holland Mills Bridge (Bridge No. 17/B-T13) meets the criteria of *Regulation 9/06*. It is considered significant and worthy of designation under the *Ontario Heritage Act*.

2.5 Images and Supporting Documentation

The following images are from photos taken by the author in November 2016.

Figure 39 wood deck - southeast corner of bridge

Figure 40 bridge approach from the south

Figure 41 north abutment - visible sag in bridge bottom chord

Figure 42 from the southwest

Figure 43 from the southeast

Figure 44 southeast corner of bridge- visible sag in bottom chord & deck

Figure 45 view from northwest - upstream of bridge

Figure 46 Holland Mills historic marker

Figure 47 "Bridge Closed" - intersection of Bleams Road and Holland Mills Road

Figure 48 view of bridge from just south of Bleams Road - Hydro tower in background

3.0 HERITAGE IMPACT ASSESSMENT

3.1 Description of the Proposed Undertaking

This heritage impact assessment is part of the planning and design process for a municipal roads project subject to a Class Environmental Assessment. Due to the existing bridge conditions, loading and width deficiency issues the Township of Wilmot is looking at improvements to the crossing. The existing steel truss bridge, *circa* 1910 not listed on the Township's Heritage Register of Non-Designated Properties, nor is it designated under the *Ontario Heritage Act*. Neither is it on Ontario's Heritage Bridge List. The bridge replacement cost is estimated at $1,550,000.[12] The options are:

- do nothing,
- repair the bridge,
- replace the bridge superstructure,
- replace the bridge in current location,
- replace the bridge in new location.

If the bridge were replaced in a new location, there is an option of repairing the bridge for pedestrian traffic and leaving it in place. If the bridge were replaced in the current location, thee is an option of repairing and relocating the Holland Mills Road bridge for another use.

3.2 Potential Impact of the Proposal on the Bridge and Environs

Doing nothing is not an option as the condition of the bridge requires it to be closed to traffic.

Repairing the bridge will not overcome the load and width deficiencies. Repairs would also be extensive, requiring much of the original structure to be replaced.

Replacing the bridge superstructure would remove the integrity of the original bridge.

Replacing the structure in the current location would have a negative impact on the heritage resource as it is the only pin-jointed Pratt through truss bridge in the Township. Replacing it in a new location and re-purposing the bridge for pedestrian use by repairing it, would have no negative impact on the resource..

The Holland Mills Road Bridge is in very poor and unsafe condition and would require extensive repair work to make it safe for vehicular travel. Width and load issues would remain. When retention of a span *in situ* is practically untenable from transportation, engineering or safety perspectives this is an appropriate conservation alternative that can satisfy the intent of retaining the span. Adoption of such an option is feasible if:

- the condition of the bridge is sufficiently good or can be made good at reasonable cost to warrant relocation;
- a site can be found where the bridge could be placed as a useful structure, or as a replacement for a bridge in poor condition; and
- this can be accomplished at a reasonable cost.

Should a replacement in a new location be feasible, and if a repaired Holland Mills Road bridge could serve a useful purpose as a pedestrian crossing in its current location, the heritage impact would be minimal. If retaining the bridge *in situ* is not practical, relocating the steel truss span of the structure would have a lesser negative impact on the heritage resource than demolition or scarp salvage. A relocation to a use that requires a weight limit that

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[12] Municipal Structure Inspection Form - K. Smart Associates Limited, April 30, 2015

does not exceed the repaired bridge's capacity and would not require a wider roadbed would be needed. A farm lane creek crossing, or a pedestrian park bridge, for example, might be ideal uses, should something be found within a reasonable proximity. Relocating the bridge to another place is feasible, although it would require dismantling, repair/replacement of the floor beams and railings, finding a site where the bridge could be placed as a useful structure, constructing new abutments, reassembly, and a new deck.

The preferred alternative at this juncture would appear to be replacement of the bridge in the current location. The impact on the heritage resource will depend on the potential for relocating the existing structure.

With respect to the environs, the CHER identifies the cultural heritage resources associated with the project. None needs to be impacted by the replacement of the bridge if the design of the replacement and especially its relationship to the immediate Nith River landscape is sensitive to the character of the adjacent landscape and the historic crossing.

3.3 Mitigating Measures

In the opinion of this author, the Holland Mills Road Bridge meets the criteria of *Regulation 9/06* for designation under the *Ontario Heritage Act*. Therefore, conservation / mitigation options need to be considered. The following options in order of preference are provided for context.

1. *retention of existing bridge with no major modifications undertaken;*
   not a reasonable alternative as the bridge is structurally unsound and closed to vehicular traffic.

2. *restoration of missing or deteriorated elements where physical or documentary evidence (e.g. photographs or drawings) exists for their design;*
   feasible, but requires extensive replacement of original fabric without resolving load and width issues.

3. *retention of existing bridge with sympathetic modification;*
   feasible, but requires extensive replacement of original fabric without resolving load and width issues.

4. *retention of existing bridge with sympathetically designed new structure in proximity;*
   considering the meandering nature of the Nith River and the associated extensive floodplain at this location, this may not be feasible.

5. *retention of existing bridge no longer in use for vehicular purposes but adapted for a new use, for example, prohibiting vehicle or restricting truck traffic or adapting for pedestrian walkways, cycle paths, scenic viewing, etc.;*
   Where retention of a span for vehicular use is practically untenable from engineering or safety perspectives this is an appropriate conservation alternative that would satisfy the intent of retaining the span. This option may not feasible considering the need for a vehicular crossing at this location.

GRCA Regulation - *GRCA mapping 2015*

6. *retention of bridge as heritage monument for viewing purposes only;*
   may not be feasible (see notes 4 & 5).

7. *relocation of smaller, lighter single span bridges to an appropriate new site for continued use or adaptive re-use;*
   Where retention of a span *in situ* is practically untenable from transportation, engineering or safety perspectives this is an appropriate conservation alternative that would satisfy the intent of retaining the span. Adoption of such an option is feasible if:
   - the condition of the bridge is sufficiently good or can be made good at reasonable cost to warrant relocation;
   - a site can be found where the bridge could be placed as a useful structure, or as a replacement for a bridge in poor condition; and
   - this can be accomplished at a reasonable cost.

8. *bridge removal and replacement with a sympathetically designed structure:*
   a. *where possible, salvage elements/members of bridge for incorporation into new structure or for future conservation work or displays; and*
   b. *undertake full recording and documentation of existing structure.*[13]
   Replacement is being considered by the Township. However, should a need be found, salvaged elements/members of the bridge could be retained for future conservation work and a recording and documentation of the existing structure undertaken. Photographs and descriptions gathered during the course of this CHER/HIA and previous documentation by the Region of Waterloo and *historicbridges.org* could be utilized for that purpose. As well, the existing structure could be commemorated with a plaque mounted on the replacement bridge.

4.0 RECOMMENDATION

The foregoing conservation options and mitigation measures should be taken into consideration during the selection of the preferred alternative in the EA process. Because the bridge is in such poor condition and requires many replacement elements, the preferred alternative is mitigating measure 8. above, documenting the bridge and a plaque on the new structure.

This is considered the minimal acceptable level of mitigation.

[13] *Ontario Heritage Bridge Guidelines (Interim) – Jan 11, 2008,* Ontario Ministry of Transportation

REFERENCES

Arch Truss and Beam, The Grand River Heritage Bridge Inventory (2013)

A Study of Old Bridges in Waterloo Region, *Spanning the Generations: Phase 3 Heritage Assessment of Truss Bridges of Waterloo Region* October 2007

Grand River Conservation Authority mapping, GRCA website https://www.grandriver.ca/en/Planning-Development/Map-Your-Property.aspx

History of Wilmot Township, Township webpage, http://www.wilmot.ca/en/living-here/History-of-Wilmot-Township.aspx

Heritage Resources Centre, University of Waterloo *Heritage Bridges: Identification and Assessment Guide, Ontario 1945-1965*

Holth, Nathan, An Introduction to Historic Bridges, http://www.historicbridges.org/info/intro/ithb2.pdf, HistoricBridges.org website

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Municipal Heritage Bridges Cultural, Heritage and Archaeological Resources Assessment Checklist Revised April 11, 2014

Ontario Ministry of Transportation, *Ontario Heritage Bridge Guidelines (Interim) – Jan 11, 2008.*

Province of Ontario, *Ontario Heritage Act* and *Ontario Regulation 9/06*.

Province of Ontario, *Environmental Assessment Act.*

K. Smart Associates Limited, *2015 Township of Wilmot OSIM Inspections - Bridge 17B-T13 Municipal Structure Inspection Form*, April 30, 2015

Tremaine's map of the County of Waterloo, Canada West, compiled and drawn by the publishers, Geo. R. & G. M. Tremaine. Toronto, 1861

University of Waterloo Geospatial Centre, aerial photographs

Waterloo Historical Society Annual Volume 6

Part A - Municipal Class EA Activity Selection

Description	Yes	No
Will the proposed project involve or result in construction of new water crossings? This includes ferry docks.	Schedule B or C	Next
Will the proposed project involve or result in construction of new grade separation?	Schedule B or C	Next
Will the proposed project involve or result in construction of new underpasses or overpasses for pedestrian recreational or agricultural use?	Schedule B or C	Next
Will the proposed project involve or result in construction of new interchanges between any two roadways, including a grade separation and ramps to connect the two roadways?	Schedule B or C	Next
Will the proposed project involve or result in reconstruction of a water crossing where the structure is less than 40 years old and the reconstructed facility will be for the same purpose, use, capacity and at the same location? (Capacity refers to either hydraulic or road capacity.) This includes ferry docks.	Schedule A+	Next
Will the proposed project involve or result in reconstruction of a water crossing, where the reconstructed facility will not be for the same purpose, use, capacity or at the same location? (Capacity refers to either hydraulic or road capacity). This includes ferry docks.	Schedule B or C	Next
Will the proposed project involve or result in reconstruction or alteration of a structure or the grading adjacent to it when the structure is over 40 years old where the proposed work will alter the basic structural system, overall configuration or appearance of the structure?	Next	Assess Archaeological Resources

Part B - Cultural Heritage Assessment

Description	Yes	No
Does the proposed project involve a bridge construction in or after 1956?	Next	Prepare CHER Undertake HIA
Does the project involve one of these four bridge types?	Rigid frame Next Precast with Concrete Deck Next Culvert or Simple Span Next Steel Beam/ Concrete Deck Next	Prepare CHER Undertake HIA
Does the bridge or study area contain a parcel of land that is subject of a covenant or agreement between the owner of the property and a conservation body or level of government?	Prepare CHER Undertake HIA	Next
Does the bridge or study area contain a parcel of land that is listed on a register or inventory of heritage properties maintained by the municipality?	Prepare CHER Undertake HIA	Next
Does the bridge or study area contain a parcel of land that is designated under Part IV of the *Ontario Heritage Act*?	Prepare CHER Undertake HIA	Next
Does the bridge or study area contain a parcel of land that is subject to a notice of intention to designate issued by a municipality?	Prepare CHER Undertake HIA	Next
Does the bridge or study area contain a parcel of land that is located within a designated Heritage Conservation District?	Prepare CHER Undertake HIA	Next
Does the bridge or study area contain a parcel of land that is subject to a Heritage Conservation District study area by-law?	Prepare CHER Undertake HIA	Next
Does the bridge or study area contain a parcel of land that is included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties?	Prepare CHER Undertake HIA	Next
Does the bridge or study area contain a parcel of land that is part of a National Historic Site?	Prepare CHER Undertake HIA	Next

APPENDIX 1 ***Municipal Heritage Bridges Cultural, Heritage and Archaeological Resources Assessment Checklist Revised April 11, 2014***

Description	Yes	No
Does the bridge or study area contain a parcel of land that is part of a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?	Prepare CHER Undertake HIA	Next
Does the bridge or study area contain a parcel of land that is designated under the Heritage Railway Station Protection Act?	Prepare CHER Undertake HIA	Next
Does the bridge or study area contain a parcel of land that is identified as a Federal Heritage Building by the Federal Heritage Building Review Office (FHBRO)	Prepare CHER Undertake HIA	Next
Does the bridge or study area contain a parcel of land that is the subject of a municipal, provincial or federal commemorative or interpretive plaque that speaks to the Historical significance of the bridge?	Prepare CHER Undertake HIA	Next
Does the bridge or study area contain a parcel of land that is in a Canadian Heritage River watershed?	Prepare CHER Undertake HIA	Next
Will the project impact any structures or sites (not bridges) that are over forty years old, or are important to defining the character of the area or that are considered a landmark in the local community?	Prepare CHER Undertake HIA	Next
Is the bridge or study area adjacent to a known burial site and/or cemetery?	Prepare CHER Undertake HIA	Next
Is the bridge considered a landmark or have a special association with a community, person or historical event in the local community?	Prepare CHER Undertake HIA	Next
Does the bridge or study area contain or is it part of a cultural heritage landscape?	Prepare Cher Undertake HIA	Assess Archaeological Resources

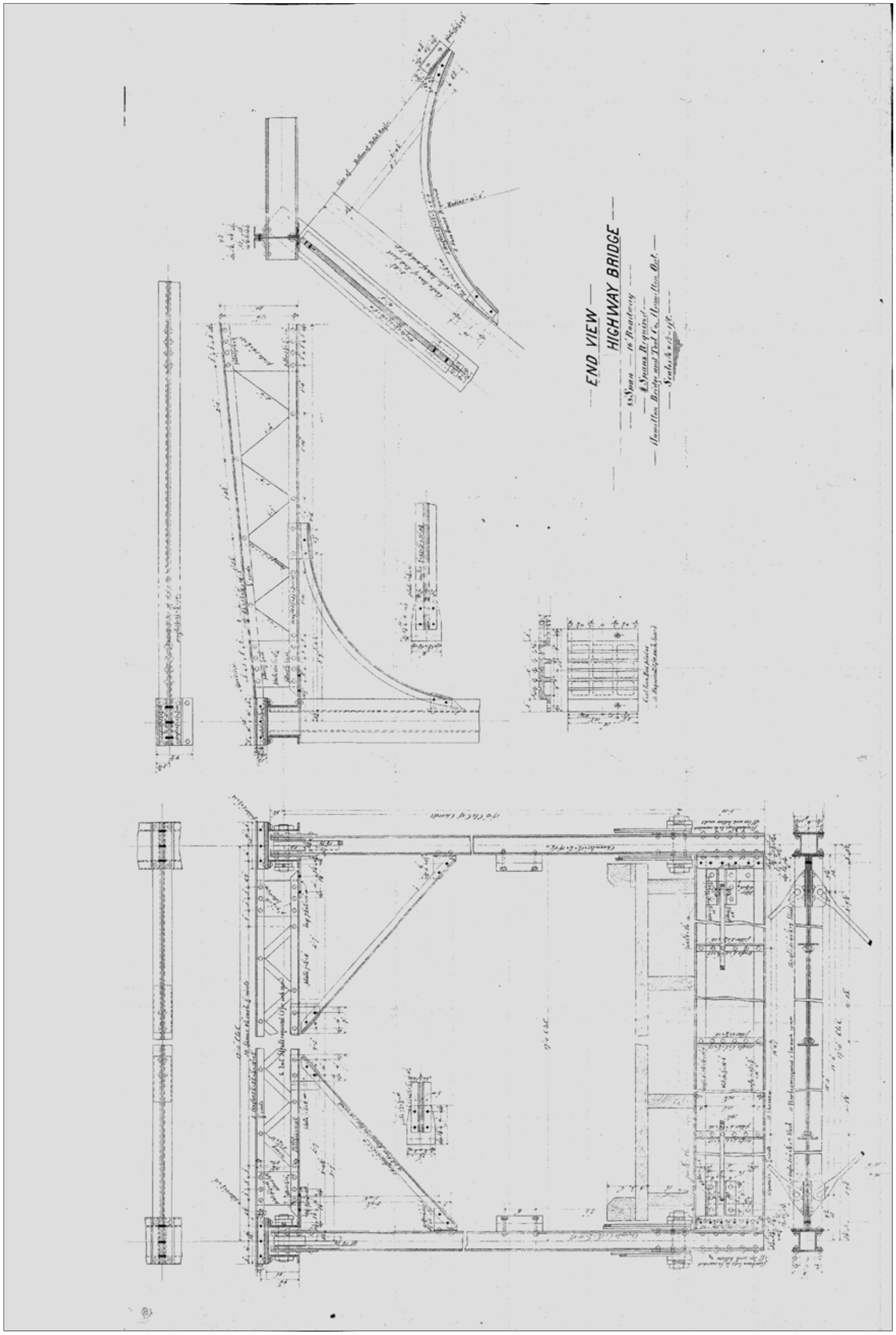
Part C - Heritage Assessment

Description	Yes	No
Does the Cultural Heritage Evaluation Report identify any Heritage Features on the project?	Undertake HIA	Part D - Archaeological Resources
Does the Heritage Impact Assessment determine that the proposed project will impact any of the Heritage Features that have been identified?	Schedule B or C	Part D - Archaeological Resources

from: *Municipal Heritage Bridges Cultural, Heritage and Archaeological Resources Assessment Checklist Revised April 11, 2014*

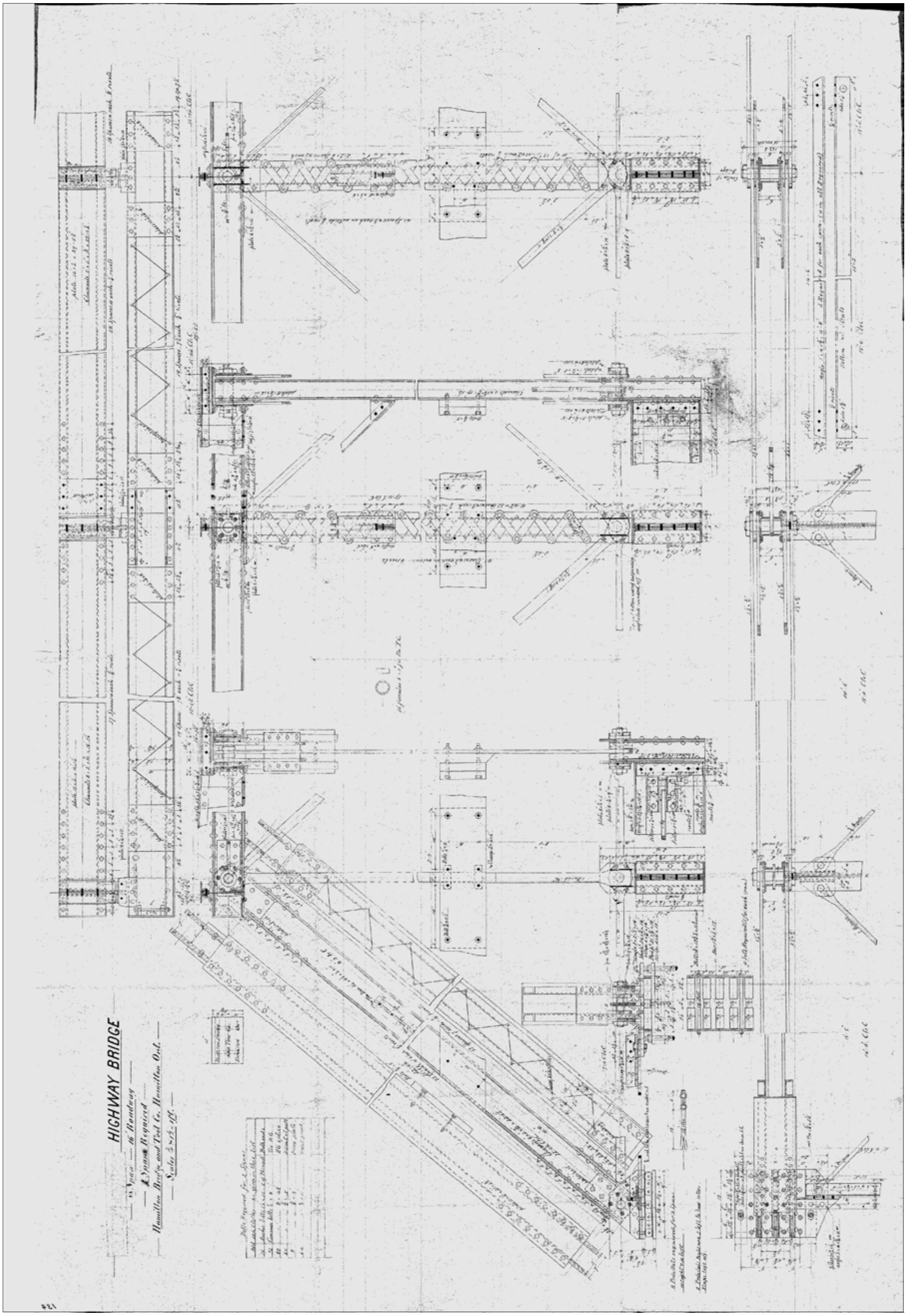
Highway Bridge

Hamilton Bridge and Tool Company, Hamilton, Ontario, undated



Highway Bridge

Hamilton Bridge and Tool Company, Hamilton, Ontario, undated



Inventory Data:

Structure Name	17/B-T13 – Holland Mills Road (Township Road 13)		
Main Hwy/Road #	On ☐ Under ☐	Crossing Type:	Navig. Water ☑ Non-Navig. Water ☐ Rail ☐ Road ☐ Ped. ☐ Other ☐
Road Name	Holland Mills Road (Township Road 13)		
Structure Location	0.26 km South of Bleams Road (Regional Road 4)		
Latitude		Longitude	
Owner(s)	Township of Wilmot	Heritage Designation:	Not Cons. ☑ Cons./not App. ☐ List/not Desig. ☐ Desig./not List ☐ Desig. & List ☐
MTO Region *	Southwestern	Road Class:	Freeway ☐ Arterial ☐ Collector ☐ Local ☑
MTO District *	London/Stratford	Posted Speed	No. of Lanes: 1
Old County *	Waterloo	AADT	% Trucks
Geographic Twp. *	Wilmot	Special Routes:	Transit ☐ Truck ☐ School ☐ Bicycle ☐
Structure Type *	Through Truss	Detour Length Around Bridge	(km)
Total Deck Length	30.50 (m)	Fill on Structure	(m)
Overall Str. Width	4.90 (m)	Skew Angle	(Degrees)
Total Deck Area	149.50 (sq.m)	Direction of Structure	N to S
Roadway Width	3.80 (m)	No. of Spans	1 (m)
Span Lengths	28.7m (m)		

Historical Data:

Year Built	1910	Year of Last Major Rehab.	2007
Last OSIM Inspection	2013	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	3 (tonnes)
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey		Min. Vertical Clearance	(m)

Rehab. History: (Date/description)

2007 Refacing of north abutment and wingwalls, refacing of corners of south abutment, repair of stringers, repair of floor beam connection, repair of bottom truss pin, replacement of timber deck, repair of railing system, placement of timber posts at approaches and repair of overhead crossing bracing.

Field Inspection Information:			
Date of Inspection:	April 30, 2015	Type of Inspection:	☑ OSIM ☐ Enhanced OSIM
Inspector:	Allan Garnham, P. Eng.		
Others in Party:	Darryl Schwartzentruber		
Access Equipment Used:	Tapes, Hammer, Chain, Camera, Safety Equipment, Binoculars		
Weather:	Sun & Cloud		
Temperature:	10°C		

Additional Investigations Required:	Priority: None	Priority: Normal	Priority: Urgent	Estimated Cost
Material Condition Survey				
Detailed Deck Condition Survey:	x			0
Non-destructive Delam. Survey of Asphalt-Covered Deck:	x			0
Concrete Substructure Condition Survey:	x			0
Detailed Coating Condition Survey:	x			0
Detailed Timber Investigation	x			0
Post-Tensioned Strand Investigation	x			0
Underwater Investigation:	x			0
Fatigue Investigation:	x			0
Seismic Investigation:	x			0
Structure Evaluation:	x			0
Monitoring (deformations, settlements, movements, crack widths)	x			0
Load Posting – Estimated Load			Total Cost	0
Investigation Notes:				

Overall Structure Notes:	
Overall Comments:	Monitor bridge for overall structural stability every 6 months.
Date of Next Inspection:	Every 6 months, October 2015.

Overall Bridge Condition:								
% Poor in Deck	0	% Poor in Beams	100	% Poor in Substructure	0	% Poor in Barrier	0	
							BCI_p=	65

Suspected Performance Deficiencies

01 Load carrying capacity
02 Excessive deformations (deflections & rotations)
03 Continuing settlement
04 Continuing movements
05 Seized bearings
06 Bearing not uniformly loaded/unstable
07 Jammed expansion joint
08 Pedestrian/vehicular hazard
09 Rough riding surface
10 Surface ponding
11 Deck drainage
12 Slippery surfaces
13 Flooding/channel blockage
14 Undermining of foundation
15 Unstable embankments
16 Other

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
05 Bridge Deck Joint Repair
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Data

Element Group:*	Abutments	Length:	
Element Name: *	Abutment Walls	Width:	7.20m
Location:	North and South	Height:	2.80m
Material: *	Cast-in-place concrete	Count:	2
Element Type: *	Conventional closed	Total Quantity:	40.30 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m² / m / each / % / all	0.00	0.00	40.30	0.00	

Comments:

North: Refaced in 2007. Numerous medium vertical cracks. Pattern cracking in isolated areas.

South: Delaminated and spalling corners refaced in 2007. Vertical cracks with efflorescence throughout.

Recommended Work: ☐ Rehab ☐ Replace
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Abutments	Length:	
Element Name: *	Bearings	Width:	
Location:	North and South	Height:	
Material: *		Count:	4
Element Type: *		Total Quantity:	4 each
Environment:	Benign / Moderate / Severe	Limited Inspection ☑	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m² / m / each / % / all	0	0	2	2	

Comments: Small roller bearing present at south abutment which are seized. Fixed bearings at north abutment.

Recommended Work: ☐ Rehab ☐ Replace
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Data

Element Group:*	Abutments		Length:			
Element Name: *	Wingwalls		Width:			
Location:	Corners of bridge		Height:			
Material: *	Cast-in-place concrete		Count:	4		
Element Type: *	Reinforced concrete		Total Quantity:	4 sq.m.		
Environment:	Benign / Moderate / Severe		Limited Inspection ☐			
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m²/ m / each / % / all	0.00	0.00	3.00	1.00	

Comments:
Northwest: Refaced in 2007. Numerous medium vertical cracks at bottom half.
Northeast: Refaced in 2007. 3 medium vertical cracks.
Southwest: Delaminated at top half, remainder in fair condition.
Southeast: Delaminated at top half, remainder in fair condition.

Recommended Work: ☐ Rehab ☐ Replace
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Accessories		Length:			
Element Name: *	Signs		Width:			
Location:	4 Quadrants		Height:			
Material: *	Aluminum		Count:	6		
Element Type: *			Total Quantity:	6		
Environment:	Benign / Moderate / Severe		Limited Inspection ☐			
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m²/ m / each / % / all		6			

Comments:
4 hazard markers in good condition
2 load postings in good condition

Recommended Work: ☐ Rehab ☐ Replace
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Approaches		Length:			
Element Name: *	Barriers		Width:			
Location:	Corners of structure		Height:			
Material: *			Count:	4		
Element Type: *	Timber Post		Total Quantity:	4 (All)		
Environment:	Benign / Moderate / Severe		Limited Inspection ☐			
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m²/ m / each / % / all	0	2	1	1	

Comments: Timber posts with reflectors installed at each corner of structure. There are some missing posts at the northeast quadrant. No significant defects noted. Railing at south has severe impact damage. Bottom rail at Southwest has completely detached and is laying in roadside ditch.

Recommended Work: ☐ Rehab ☐ Replace
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Data

Element Group:*	Approaches	Length:	
Element Name: *	Wearing Surface	Width:	
Location:	North and South	Height:	
Material: *		Count:	2
Element Type: *		Total Quantity:	2.00 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0.00	0.00	2.00	0.00	

Comments: Roadway approaches consist of gravel roadway except for a short length of asphalt adjacent to the structure. South approach has settled 25mm next to end dam. North approach has settled approximately 20mm.

Recommended Work: ☑ Rehab ☐ Replace ☐ Urgent ☑ 1-5 years ☐ 6-10 years ☐ None

Maintenance Needs: ☐ Urgent ☐ 1 year ☐ 2 year

Repair approach asphalt

Element Group:*	Barriers	Length:	29.60m
Element Name: *	Railing Systems	Width:	
Location:	East and West	Height:	
Material: *		Count:	2
Element Type: *	3 Rail Metal Railing - Steel	Total Quantity:	59.20m
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0.00	0.00	59.00	0.00	

Comments: Railing consists of 3 steel pipes fastened to the side of each truss. No end treatments present. Railing generally loose due to poor connections at floor beam locations. Railing bent and loose at southeast corner due to impact.

Recommended Work: ☑ Rehab ☐ Replace ☐ Urgent ☑ 1-5 years ☐ 6-10 years ☐ None

Maintenance Needs: ☐ Urgent ☐ 1 year ☐ 2 year

Repair railing as required.

Element Group:*	Beams / MLE's	Length:	4.90m
Element Name: *	Floor Beams	Width:	
Location:	All	Height:	
Material: *	Steel	Count:	5
Element Type: *	I type	Total Quantity:	1 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m^2 / m / each / % / all	0.00	0.00	0.00	1.00	

Comments: Severe rusting with some loss of section. Severe corrosion with perforations at first and second beams from south abutment.

Recommended Work: ☑ Rehab ☑ Replace ☑ Urgent ☐ 1-5 years ☑ 6-10 years ☐ None

Maintenance Needs: ☐ Urgent ☐ 1 year ☐ 2 year

Repair floor beams now.
Replace structure in 6-10 years.

Element Data

Element Group:*	Beams / MLE's	Length:	29.70m
Element Name: *	Stringers	Width:	
Location:	All	Height:	
Material: *	Steel	Count:	8
Element Type: *	I type	Total Quantity:	1 Each
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data: Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
m²/ m / each / % / all	0	0	0	1	

Comments: Severe rusting on longitudinal stringers supporting the timber deck. Several stringers were repaired or replaced as part of the most recent rehabilitation.

Recommended Work: ☐ Rehab ☑ Replace	Maintenance Needs:
☐ Urgent ☐ 1-5 years ☑ 6-10 years ☐ None	☐ Urgent ☐ 1 year ☐ 2 year
Replace structure in 6-10 years.	

Element Group:*	Bracing	Length:	
Element Name: *	Bracing	Width:	
Location:	All	Height:	
Material: *	Steel	Count:	
Element Type: *		Total Quantity:	1 each
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data: Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
m²/ m / each / % / all	0	0	0	1	

Comments: Severe rusting. Overhead bracing at south bay has been replaced. Some braces at north are sagging.

Recommended Work: ☐ Rehab ☑ Replace	Maintenance Needs:
☐ Urgent ☐ 1-5 years ☑ 6-10 years ☐ None	☐ Urgent ☐ 1 year ☐ 2 year
Replace structure in 6-10 years.	

Element Group:*	Coating	Length:	
Element Name: *	Railing Systems / Hand Railings	Width:	
Location:	East & West Railings	Height:	
Material: *	Hot Dip Galvanizing	Count:	
Element Type: *		Total Quantity:	1 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data: Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
m²/ m / each / % / all	0.00	0.00	0.00	1.00	

Comments: Coating on railing is generally in poor condition.

Recommended Work: ☐ Rehab ☐ Replace	Maintenance Needs:
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None	☐ Urgent ☐ 1 year ☐ 2 year

Element Data

Element Group:*	Coating			Length:		
Element Name: *	Structural Steel			Width:		
Location:	All steel members			Height:		
Material: *				Count:		
Element Type: *				Total Quantity:	1 sq.m.	
Environment:	Benign / Moderate / Severe			Limited Inspection ☐		
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m² / m / each / % / all	0.00	0.00	0.00	1.00	
Comments: No sign of any coatings. All members are covered with surface rust.						
Recommended Work: ☐ Rehab ☐ Replace				Maintenance Needs:		
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None				☐ Urgent ☐ 1 year ☐ 2 year		

Element Group:*	Decks			Length:	29.60m	
Element Name: *	Deck Top			Width:	4.30m	
Location:	All			Height:		
Material: *	Wood			Count:		
Element Type: *	Wood planks			Total Quantity:	127.30 sq.m.	
Environment:	Benign / Moderate / Severe			Limited Inspection ☐		
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m² / m / each / % / all	0.00	127.30	0.00	0.00	
Comments: Timber deck replaced in 2007. Timber deck also acts as the wearing surface. Some light to medium wearing of deck noted.						
Recommended Work: ☐ Rehab ☐ Replace				Maintenance Needs:		
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None				☐ Urgent ☐ 1 year ☐ 2 year		

Element Group:*	Decks			Length:	29.60m	
Element Name: *	Soffit – Thin Slab			Width:	4.30m	
Location:	All			Height:		
Material: *	Wood			Count:		
Element Type: *				Total Quantity:	127.30 sq.m.	
Environment:	Benign / Moderate / Severe			Limited Inspection ☐		
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m² / m / each / % / all	0.00	127.30	0.00	0.00	
Comments: New laminated wood deck in summer of 2007. No significant defects noted.						
Recommended Work: ☐ Rehab ☐ Replace				Maintenance Needs:		
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None				☐ Urgent ☐ 1 year ☐ 2 year		

Element Data

Element Group:*	Embankments & Streams			Length:		
Element Name: *	Embankments			Width:		
Location:				Height:		
Material: *				Count:		
Element Type: *				Total Quantity:	1 All	
Environment:	Benign / Moderate / Severe			Limited Inspection ☐		
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m²/ m / each / % / all	0	0	1	0	
Comments: No significant defects noted on north side. South embankments are typically steep although stable.						
Recommended Work: ☐ Rehab ☐ Replace				Maintenance Needs:		
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None				☐ Urgent ☐ 1 year ☐ 2 year		

Element Group:*	Embankments & Streams			Length:		
Element Name: *	Streams & Waterways			Width:		
Location:				Height:		
Material: *				Count:		
Element Type: *				Total Quantity:	1 All	
Environment:	Benign / Moderate / Severe			Limited Inspection ☐		
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m²/ m / each / % / all	0	0	0	1	
Comments: River is meandering at this location and flows from west to east. Severe erosion along southwest shoreline at water level. Rocks and concrete pieces in front of both abutments.						
Recommended Work: ☑ Rehab ☐ Replace				Maintenance Needs:		
☐ Urgent ☑ 1-5 years ☐ 6-10 years ☐ None				☐ Urgent ☐ 1 year ☐ 2 year		
Place rock protection in front of abutments and wingwalls.						

Element Group:*	Joints			Length:	4.90m	
Element Name: *	Armouring/retaining devices			Width:		
Location:	North and South			Height:		
Material: *	Steel			Count:	4	
Element Type: *				Total Quantity:	19.60m	
Environment:	Benign / Moderate / Severe			Limited Inspection ☐		
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m²/ m / each / % / all	0.00	0.00	19.60	0.00	
Comments: Light rusting especially at wheel paths						
Recommended Work: ☐ Rehab ☐ Replace				Maintenance Needs:		
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None				☐ Urgent ☐ 1 year ☐ 2 year		

Element Data

Element Group:*	Joints	Length:	
Element Name: *	Concrete end dams	Width:	
Location:	North and South	Height:	
Material: *	Cast-in-place concrete	Count:	
Element Type: *		Total Quantity:	1.00 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m² / m / each / % / all	0.00	1.00	0.00	0.00	

Comments: No significant defects noted.

Recommended Work: ☐ Rehab ☐ Replace
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☐ None

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Joints	Length:	
Element Name: *	Seals	Width:	
Location:	North and South	Height:	
Material: *		Count:	2
Element Type: *	Unsealed	Total Quantity:	2 (Each)
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m² / m / each / % / all	0	0	0	2	

Comments: No seal present at ends of timber deck

Recommended Work: ☐ Rehab ☑ Replace
☐ Urgent ☑ 1-5 years ☐ 6-10 years ☐ None

Install seals at end of timber deck.

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Group:*	Trusses/ Arches	Length:	
Element Name: *	Bottom chords	Width:	
Location:	East and West	Height:	
Material: *	Steel	Count:	
Element Type: *		Total Quantity:	1 sq.m.
Environment:	Benign / Moderate / Severe	Limited Inspection ☐	
Protection System: *			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies
	m² / m / each / % / all	0.00	0.00	0.00	1.00	

Comments: Bottom chords generally exhibit medium surface rusting with no loss of section. No cracks were observed.

Recommended Work: ☐ Rehab ☐ Replace
☐ Urgent ☐ 1-5 years ☐ 6-10 years ☑ None

Maintenance Needs:
☐ Urgent ☐ 1 year ☐ 2 year

Element Data

Element Group:*	Trusses / Arches			Length:		
Element Name: *	Connections			Width:		
Location:	All			Height:		
Material: *	Steel			Count:		
Element Type: *				Total Quantity:	1 each	
Environment:	Benign / Moderate / Severe			Limited Inspection ☐		
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m²/ m / each / % / all	0.00	0.00	0.00	1.00	

Comments: All connectors are generally in fair to poor condition. Broken bolt on gusset plate at northwest portal. Bottom pin at 2nd floor beam from northwest corner is tilted.

Recommended Work: ☑ Rehab ☐ Replace — ☐ Urgent ☑ 1-5 years ☐ 6-10 years ☐ None

Maintenance Needs: ☐ Urgent ☐ 1 year ☐ 2 year

Repair broken portal brace connection.

Element Group:*	Trusses / Arches			Length:		
Element Name: *	Top Chords			Width:		
Location:	East & West			Height:		
Material: *	Steel			Count:		
Element Type: *				Total Quantity:	1 sq.m.	
Environment:	Benign / Moderate / Severe			Limited Inspection ☐		
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m²/ m / each / % / all	0.00	0.00	0.00	1.00	

Comments: Top chord members are generally in fair to poor condition with severe rippling of top plates between rivets. Severe surface rusting on individual members. No cracks observed.

Recommended Work: ☐ Rehab ☑ Replace — ☐ Urgent ☐ 1-5 years ☑ 6-10 years ☐ None

Maintenance Needs: ☐ Urgent ☐ 1 year ☐ 2 year

Replace structure in 6-10 years.

Element Group:*	Trusses / Arches			Length:		
Element Name: *	Verticals/Diagonals			Width:		
Location:	All verticals and diagonals			Height:		
Material: *	Steel			Count:		
Element Type: *				Total Quantity:	1 sq.m.	
Environment:	Benign / Moderate / Severe			Limited Inspection ☐		
Protection System: *						Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	m²/ m / each / % / all	0.00	0.00	0.00	1.00	

Comments: Vertical and diagonal members are generally in fair to poor condition. Medium surface rusting on members.

Recommended Work: ☐ Rehab ☐ Replace — ☐ Urgent ☐ 1-5 years ☐ 6-10 years ☐ None

Maintenance Needs: ☐ Urgent ☐ 1 year ☐ 2 year

Municipal Structure Inspection Form

Repair and Rehabilitation Required:		Priority				Estimated Structural Cost
Element[1]	Repair and Rehabilitation Required[2]	6 to 10 years	1 to 5 years	Within 1 year	Urgent	
Structure	Demolition					
Structure	Replacement	x				$1,250,000
OR						
Deck	Rehab. =					
Sidewalk/Curb	Rehab. =					
Barrier	Rehab. =					
Joints	Rehab. =					
Beams	Rehab. = Repair floor beams			x		$50,000
Abutment	Rehab. =					
Pier	Rehab. =					
Other						
Estimated Rehabilitated or Replacement Structure Dimensions[3]		Total Structural Cost				$1,300,000
Total Deck Length (m) 30.0	Overall Str. Width (m) 10.5					

1 - Indicate specific costs for structure replacement OR for rehabilitation under the given headings.
2 - Give a very brief description of the rehabilitation work required.
3 - Estimated structure dimensions after completion of the proposed work – if it is expected to change.

Associated Work[4]:	Comments	Estimated Associated Work Cost
Approaches[5]		
Detours		
Traffic Control		
Utilities		
Other	Engineering and Contract Administration	$250,000
	Total Associated Work Cost	$250,000

Total Construction Cost	$1,550,000

4 - Includes other construction costs associated with the structure. Engineering fees for reports, environmental studies, designs, project management and contingencies are not included as associated work and should be specified on the Building Canada Fund – Communities Component (BCF-CC) Bridge Technical Schedule.
5 - Approach cost is for work (fill, pavement, guide rail, etc.) immediately adjacent to the structure to adjust for minor changes in horizontal or vertical alignment and for barrier end treatments at the structure. For BFC-CC applications, approaches longer than 30m (per end) require a separate Local Road Infrastructure Technical Schedule to be completed for that portion of road.

Justification:

2015 Township of Wilmot OSIM Inspections **Bridge 17B-T13**

1. North Approach (looking South)

2. South Approach (looking North)

K. Smart Associates Ltd.

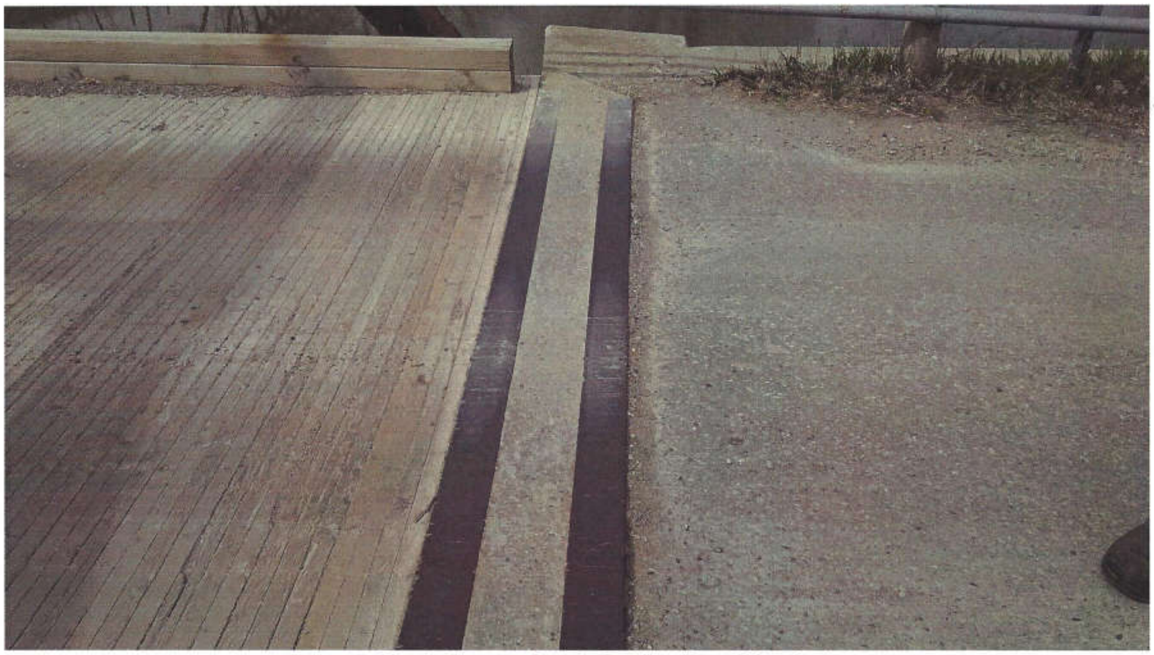
2015 Township of Wilmot OSIM Inspections **Bridge 17B-T13**

3. East Elevation (looking West) (downstream)

4. West Elevation (looking East) (upstream)

K. Smart Associates Ltd.

2015 Township of Wilmot OSIM Inspections Bridge 17B-T13



5. North Expansion Joint (looking West)

6. South Expansion Joint (looking West)

K. Smart Associates Ltd.

2015 Township of Wilmot OSIM Inspections **Bridge 17B-T13**

7. Approach Barrier at Southeast - Impact Damage

8. Approach Barrier at Southwest - Impact Damage

K. Smart Associates Ltd.

2015 Township of Wilmot OSIM Inspections **Bridge 17B-T13**

9. Deck (typical)

10. North Abutment

K. Smart Associates Ltd.

2015 Township of Wilmot OSIM Inspections **Bridge 17B-T13**

11. Soffit (typical)

12. South Abutment - Cracking with Efflorescence

K. Smart Associates Ltd.

2015 Township of Wilmot OSIM Inspections **Bridge 17B-T13**

13. Southwest Wingwall - Cracking with Efflorescence

14. Northeast Wingwall

K. Smart Associates Ltd.

15. Northwest Wingwall

16. Second Beam from South - Severe Corrosion with Perforations

R E S U M E

OWEN R. SCOTT, ***OALA, FCSLA, CAHP***

Education:
Master of Landscape Architecture (MLA) University of Michigan, 1967
Bachelor of Science in Agriculture (Landscape Horticulture), (BSA) University of Guelph, 1965

Professional Experience:

1965 - present	President, CHC Limited, Guelph, ON
1977 - present	President, The Landplan Collaborative Ltd., Guelph, ON
1977 - 1985	Director, The Pacific Landplan Collaborative Ltd., Vancouver and Nanaimo, BC
1975 - 1981	Editor and Publisher, *Landscape Architecture Canada*, Ariss, ON
1969 - 1981	Associate Professor, School of Landscape Architecture, University of Guelph
1975 - 1979	Director and Founding Principal, Ecological Services for Planning Limited, Guelph, ON
1964 - 1969	Landscape Architect, Project Planning Associates Limited, Toronto, ON

Historical Research, Heritage Landscape Planning and Restoration Experience and Expertise

Current Professional and Professional Heritage Associations Affiliations:
Member: Alliance for Historic Landscape Preservation (AHLP) - 1978 -
Member: Canadian Association of Heritage Professionals (CAHP) - 1987 -
Member: Ontario Association of Landscape Architects (OALA) - 1968 - (Emeritus 2016)
Member: Canadian Society of Landscape Architects (FCSLA) - 1969 - (Fellow 1977, Life Member 2016)

Community and Professional Society Service (Heritage):
Director: Canadian Association of Heritage Professionals (CAHP), 2002 - 2003
Member: Advisory Board, Architectural Conservancy of Ontario, 1980 - 2002
Member: City of Guelph Local Architectural Conservation Advisory Committee (LACAC), 1987 - 2000 (Chair 1988 - 1990)
Member: Advisory Council, Centre for Canadian Historical Horticultural Studies, 1985 - 1988

Professional Honours and Awards (Heritage):

Merit Award	2016	Canadian Association of Heritage Professionals Awards, City of Kitchener Cultural Heritage Landscapes
National Award	2016	Canadian Society of Landscape Architects (CSLA), City of Kitchener Cultural Heritage Landscapes
Mike Wagner Award	2013	Heritage Award - Breithaupt Block, Kitchener, ON
People's Choice Award	2012	Brampton Urban Design Awards, Peel Art Gallery, Museum and Archives, Brampton, ON
Award of Excellence	2012	Brampton Urban Design Awards, Peel Art Gallery, Museum and Archives, Brampton, ON
National Award	2009	Heritage Canada Foundation National Achievement, Alton Mill, Alton, ON
Award of Merit	2009	Canadian Association of Heritage Professionals Awards, Alton Mill, Alton, ON
Award	2007	Excellence in Urban Design Awards, Heritage, Old Quebec Street, City of Guelph, ON
Award	2001	Ontario Heritage Foundation Certificate of Achievement
Award	1998	Province of Ontario, Volunteer Award (10 year award)
Award	1994	Province of Ontario, Volunteer Award (5 year award)
Regional Merit	1990	CSLA Awards, Britannia School Farm Master Plan
National Honour	1990	CSLA Awards, Confederation Boulevard, Ottawa
Citation	1989	City of Mississauga Urban Design Awards, Britannia School Farm Master Plan
Honour Award	1987	*Canadian Architect*, Langdon Hall Landscape Restoration, Cambridge, ON
Citation	1986	*Progressive Architecture*, The Ceremonial Routes (Confederation Boulevard), Ottawa,
National Citation	1985	CSLA Awards, Tipperary Creek Heritage Conservation Area Master Plan, Saskatoon, SK
National Merit	1984	CSLA Awards, St. James Park Victorian Garden, Toronto, ON
Award	1982	Ontario Ministry of Municipal Affairs Ontario Renews Awards, Millside, Guelph, ON

Selected Heritage Publications:

Scott, Owen R., The Southern Ontario "Grid", *ACORN* Vol XXVI-3, Summer 2001. *The Journal of the Architectural Conservancy of Ontario*.

Scott, Owen R. *19th Century Gardens for the 20th and 21st Centuries*. Proceedings of "Conserving Ontario's Landscapes" conference of the ACO, (April 1997). Architectural Conservancy of Ontario Inc., Toronto, 1998.

Scott, Owen R. *Landscapes of Memories, A Guide for Conserving Historic Cemeteries.* (19 of 30 chapters) compiled and edited by Tamara Anson-Cartright, Ontario Ministry of Citizenship, Culture and Recreation, 1997.

Scott, Owen R. Cemeteries: A Historical Perspective, *Newsletter, The Memorial Society of Guelph*, September 1993.

Scott, Owen R. The Sound of the Double-bladed Axe, *Guelph and its Spring Festival*. edited by Gloria Dent and Leonard Conolly, The Edward Johnson Music Foundation, Guelph, 1992. 2 pp.

Scott, Owen R. Woolwich Street Corridor, Guelph, *ACORN* Vol XVI-2, Fall 1991. Newsletter of the Architectural Conservancy of Ontario Inc. (ACO)

Scott, Owen R. guest editor, *ACORN*, Vol. XIV-2, Summer 1989. Cultural Landscape Issue, Newsletter of the ACO.

Scott, Owen R. Heritage Conservation Education, Heritage Landscape Conservation, *Momentum 1989*, Icomos Canada, Ottawa, p.31.

Scott, Owen R. Cultivars, pavers and the historic landscape, *Historic Sites Supplies Handbook*. Ontario Museum Association, Toronto, 1989. 9 pp.

Scott, Owen R. Landscape preservation - What is it? *Newsletter,* American Society of Landscape Architects - Ontario Chapter, vol. 4 no.3, 1987.

Scott, Owen R. Tipperary Creek Conservation Area, Wanuskewin Heritage Park. *Landscape Architectural Review*, May 1986. pp. 5-9.

Scott, Owen R. Victorian Landscape Gardening. Ontario Bicentennial History Conference, McMaster University, 1984.

Scott, Owen R. Canada West Landscapes. *Fifth Annual Proceedings Niagara Peninsula History Conference (1983)*. 1983. 22 pp.

Scott, Owen R. Utilizing History to Establish Cultural and Physical Identity in the Rural Landscape. *Landscape Planning*, Elsevier Scientific Press, Amsterdam, 1979. Vol. 6, No. 2, pp. 179-203.

Scott, Owen R. Changing Rural Landscape in Southern Ontario. *Third Annual Proceedings Agricultural History of Ontario Seminar (1978)*. June 1979. 20 pp.

Scott, Owen R., P. Grimwood, M. Watson. George Laing - Landscape Gardener, Hamilton, Canada West 1808-187l. *Bulletin, The Association for Preservation Technology*, Vol. IX, No. 3, 1977, 13 pp. (also published in *Landscape Architecture Canada*, Vol. 4, No. 1, 1978).

Scott, Owen R. The Evaluation of the Upper Canadian Landscape. Department of Landscape Architecture, University of Manitoba. 1978. (Colour videotape).

Following is a **representative listing of some of the heritage consultations undertaken by Owen R. Scott** in his capacity as a principal of The Landplan Collaborative Ltd., and principal of CHC Limited.

Heritage Master Plans and Landscape Plans

- Alton Mill Landscape, Caledon, ON
- Black Creek Pioneer Village Master Plan, Toronto, ON
- Britannia School Farm Master Plan, Peel Board of Education/Mississauga, ON
- Confederation Boulevard (Sussex Drive) Urban Design, Site Plans, NCC/Ottawa, ON
- Doon Heritage Crossroads Master Plan and Site Plans, Region of Waterloo/Kitchener, ON
- Downtown Guelph Private Realm Improvements Manual, City of Guelph, ON
- Downtown Guelph Public Realm Plan, City of Guelph, ON
- Dundurn Castle Landscape Restoration Feasibility Study, City of Hamilton, ON
- Elam Martin Heritage Farmstead Master Plan, City of Waterloo, ON
- Exhibition Park Master Plan, City of Guelph, ON
- George Brown House Landscape Restoration, Toronto, ON
- *Grand River Corridor Conservation Plan*, GRCA/Regional Municipality of Waterloo, ON
- Greenwood Cemetery Master Plan, Owen Sound, ON
- Hamilton Unified Family Courthouse Landscape Restoration Plan, Hamilton, ON
- John Galt Park, City of Guelph, ON
- Judy LaMarsh Memorial Park Master Plan, NCC/Ottawa, ON
- Langdon Hall Gardens Restoration and Site Plans, Cambridge, ON

- London Psychiatric Hospital Cultural Heritage Stewardship Plan, London, ON
- McKay / Varley House Landscape Restoration Plan, Markham (Unionville), ON
- Museum of Natural Science/Magnet School 59/ Landscape Restoration and Site Plans, City of Buffalo, NY
- Muskoka Pioneer Village Master Plan, MNR/Huntsville, ON
- Peel Heritage Centre Adaptive Re-use, Landscape Design, Brampton, ON
- Phyllis Rawlinson Park Master Plan (winning design competition), Town of Richmond Hill, ON
- Prime Ministerial Precinct and Rideau Hall Master Plan, NCC/Ottawa, ON
- Queen/Picton Streets Streetscape Plans, Town of Niagara-on-the-Lake, ON
- Regional Heritage Centre Feasibility Study and Site Selection, Region of Waterloo, ON
- Rockway Gardens Master Plan, Kitchener Horticultural Society/City of Kitchener, ON
- St. George's Square, City of Guelph, ON
- St. James Cemetery Master Plan, Toronto, ON
- St. James Park Victorian Garden, City of Toronto, ON
- Tipperary Creek (Wanuskewin) Heritage Conservation Area Master Plan, Meewasin Valley Authority, Saskatoon, SK
- Whitehern Landscape Restoration Plan, Hamilton, ON
- Woodside National Historic Park Landscape Restoration, Parks Canada/Kitchener, ON

<u>Cultural Heritage Evaluation Reports (CHER)</u>, <u>Cultural Heritage Inventories</u> and <u>Cultural Heritage Landscape Evaluations</u>

- Adams Bridge (Structure S20) Cultural Heritage Evaluation Report
- Belfountain Area Heritage Inventory for Environmental Assessment, Peel Region, ON
- Bridge #20 Cultural Heritage Evaluation Report, Blandford-Blenheim Township, ON
- Bridge #25 Cultural Heritage Evaluation Report, Blandford-Blenheim Township, ON
- Chappell Estate / Riverside / Mississauga Public Garden Heritage Inventory, Mississauga, ON
- Cruickston Park Farm & Cruickston Hall - Cultural Heritage Resources Study, Cambridge, ON
- Doon Valley Golf Course - Cultural Heritage and Archaeological Resources Inventory, Kitchener/Cambridge, ON
- Government of Ontario Light Rail Transit (GO-ALRT) Route Selection, Cultural and Natural Resources Inventory for Environmental Assessment, Hamilton/Burlington, ON
- Hancock Woodlands Cultural Heritage Assessment, City of Mississauga, ON
- Hespeler West Secondary Plan - Heritage Resources Assessment, City of Cambridge, ON
- Highway 400 to 404 Link Cultural Heritage Inventory for Environmental Assessment, Bradford, ON
- Highway 401 to 407 Links Cultural Heritage Inventory for Environmental Assessment, Pickering/Ajax/Whitby/Bowmanville, ON
- Homer Watson House Cultural Heritage Evaluation Report, Kitchener, ON
- Irvine Street (Watt) Bridge Cultural Heritage Evaluation Report, Township of Centre Wellington, ON
- Lakewood Golf Course Cultural Landscape Assessment, Tecumseh, ON
- Landfill Site Selection, Cultural Heritage Inventory for Environmental Assessment, Region of Halton, ON
- Niska Road Cultural Heritage Landscape Addendum, City of Guelph, ON
- 154 Ontario Street, Historical - Associative Evaluation, Guelph, ON
- 35 Sheldon Avenue North, Cultural Heritage Evaluation Report, Kitchener, ON
- Silvercreek (LaFarge Lands) Cultural Landscape Assessment, Guelph, ON
- South Kitchener Transportation Study, Heritage Resources Assessment, Region of Waterloo, ON
- 53 Surrey Street East and 41, 43, 45 Wyndham Street South Cultural Heritage Evaluation Guelph, ON
- Swift Current CPR Station Gardens condition report and feasibility study for rehabilitation/reuse, Swift Current, SK
- University of Guelph, McNaughton Farm House, Cultural Heritage Resource Assessment, Puslinch Township, ON
- University of Guelph, Trent Institute Cultural Heritage Resource Assessment, Guelph, ON
- University of Guelph, 1 and 10 Trent Lane Cultural Heritage Resource Assessments, Guelph, ON
- Uno Park Road Bridge, Cultural Heritage Evaluation Report, Harley Township, ON
- 2007 Victoria Road South Heritage Evaluation, Guelph, ON
- Waterloo Valleylands Study, Heritage and Recreational Resources mapping and policies, Region of Waterloo

<u>Heritage Impact Assessments (HIA)</u>, <u>Heritage Impact Statements (HIS)</u>, <u>Cultural Heritage Resource Impact Assessments (CHRIA)</u> and <u>Cultural Landscape Heritage Impact Statements</u>

- Adams Bridge (Structure S20) Heritage Impact Assessment, Southgate Township, ON
- 33 Arkell Road Heritage Impact Assessment, Guelph, ON
- 86 Arthur Street, Heritage Impact Assessment, Guelph, ON

- William Barber House, 5155 Mississauga Road , Heritage Impact Assessment, Mississauga, ON
- Barra Castle Heritage Impact Assessment, Kitchener, ON
- Biltmore Hat Factory Heritage Impact Assessment, Guelph, ON
- 140 Blue Heron Ridge Heritage Impact Assessment, Cambridge, ON
- 25 Breithaupt Street Heritage Impact Assessment, Kitchener, ON
- 51 Breithaupt Street Heritage Impact Assessment, Kitchener, ON
- Bridge #20 Heritage Impact Assessment, Blandford-Blenheim Township, ON
- Bridge #25 Heritage Impact Assessment, Blandford-Blenheim Township, ON
- 215 Broadway Street Heritage Impact Statement, Mississauga, ON
- Cambridge Retirement Complex on the former Tiger Brand Lands, Heritage Impact Assessment, Cambridge, ON
- Cambridge Retirement Complex on the former Tiger Brand Lands, Heritage Impact Assessment Addendum, Cambridge, ON
- 27-31 Cambridge Street, Heritage Impact Assessment, Cambridge, ON
- 3075 Cawthra Road Heritage Impact Statement, Mississauga, ON
- 58 Church Street Heritage Impact Assessment, Churchville Heritage Conservation District, Brampton, ON
- City Centre Heritage Impact Assessment, Kitchener, ON
- 175 Cityview Drive Heritage Impact Assessment, Guelph, ON
- 12724 Coleraine Drive Cultural Heritage Impact Statement, Caledon (Bolton), ON
- 12880 Coleraine Drive Cultural Heritage Impact Statement, Caledon (Bolton), ON
- Cordingly House Heritage Impact Statement, Mississauga, ON
- 264 Crawley Road Heritage Impact Assessment (farmstead, house & barn), Guelph, ON
- 31-43 David Street (25 Joseph Street) Heritage Impact Assessment, Kitchener, ON
- 35 David Street (Phase II) Heritage Impact Assessment, Kitchener, ON
- 75 Dublin Street Heritage Impact Assessment, Guelph, ON
- 24, 26, 28 and 32 Dundas Street East Heritage Impact Statement, Mississauga, (Cooksville), ON
- 1261 Dundas Street South Heritage Impact Assessment, Cambridge, ON
- 172 - 178 Elizabeth Street Heritage Impact Assessment, Guelph, ON
- 19 Esandar Drive, Heritage Impact Assessment, Toronto, ON
- 14 Forbes Avenue Heritage Impact Assessment, Guelph, ON
- 42 Front Street South Heritage Impact Assessment, Mississauga, ON
- Grey Silo Golf Course/Elam Martin Farmstead Heritage Impact Assessment, City of Waterloo, ON
- GRCA Lands, 748 Zeller Drive Heritage Impact Assessment Addendum, Kitchener, ON
- Hancock Woodlands Heritage Impact Statement, City of Mississauga, ON
- 132 Hart's Lane, Hart Farm Heritage Impact Assessment, Guelph, ON
- 9675, 9687, 9697 Keele Street Heritage Impact Assessment, City of Vaughan (Maple) ON
- 13165 Keele Street Cultural Heritage Resource Impact Assessment, King Township (King City), ON
- 151 King Street North Heritage Impact Assessment, Waterloo, ON
- Kip Co. Lands Developments Ltd. Cultural Heritage Resource Impact Assessment - Woodbridge Heritage Conservation District, City of Vaughan (Woodbridge) ON
- 117 Liverpool Street Heritage Impact Assessment, Guelph, ON
- 30 - 40 Margaret Avenue Heritage Impact Assessment, Kitchener, ON
- 19 - 37 Mill Street Scoped Heritage Impact Assessment, Kitchener, ON
- 2610, 2620 and 2630 Mississauga Road, Cultural Landscape Heritage Impact Statement, Mississauga, ON
- 4067 Mississauga Road, Cultural Landscape Heritage Impact Statement, Mississauga, ON
- 1142 Mona Road, Heritage Impact Assessment, Mississauga, ON
- 1245 Mona Road, Heritage Impact Statement, Mississauga, ON
- 15 Mont Street, Heritage Impact Assessment, Guelph, ON
- Proposed Region of Waterloo Multimodal Hub at 16 Victoria Street North, 50 & 60 Victoria Street North, and 520 & 510 King Street West, Heritage Study and Heritage Impact Assessment, Kitchener, ON
- 6671 Ninth Line Heritage Impact Statement, Cordingley House Restoration & Renovation, Mississauga, ON
- 324 Old Huron Road Heritage Impact Assessment, Kitchener, ON
- 40 Queen Street South Heritage Impact Statement, Mississauga, (Streetsville), ON
- Rockway Holdings Limited Lands north of Fairway Road Extension Heritage Impact Assessment, Kitchener, ON
- 35 Sheldon Avenue, Heritage Impact Assessment, Kitchener, ON
- 259 St. Andrew Street East Cultural Heritage Assessment, Fergus, ON
- 10431 The Gore Road Heritage Impact Assessment, Brampton, ON

- Thorny-Brae Heritage Impact Statement, Mississauga, ON
- 7 Town Crier Lane, Heritage Impact Assessment, Markham, ON
- University of Guelph, 3 - 7 Gordon Street Houses, Heritage Impact Assessment, Guelph, ON
- University of Guelph, Harrison House, Heritage Impact Assessment, Guelph, ON
- Uno Park Road Bridge, Heritage Impact Assessment, Harley Township, ON
- Victoria Park Proposed Washroom Cultural Heritage Impact Assessment, Kitchener, ON
- 927 Victoria Road South (barn) Heritage Impact Assessment, Guelph, ON
- 26 - 32 Water Street North Heritage Impact Assessment, Cambridge (Galt), ON
- Winzen Developments Heritage Impact Assessment, Cambridge, ON
- 35 Wright Street Cultural Heritage Resource Impact Assessment, Richmond Hill, ON
- 1123 York Road Heritage Impact Assessment, Guelph, ON

Heritage Conservation Plans
- William Barber House, 5155 Mississauga Road , Heritage Conservation Plan, Mississauga, ON
- 51 Breithaupt Street Heritage Conservation Plan, Kitchener, ON
- Hamilton Psychiatric Hospital Conservation Plan, for Infrastructure Ontario, Hamilton, ON
- Harrop Barn Heritage Conservation Plan, Milton, ON
- 324 Old Huron Road Conservation Plan, Kitchener, ON
- 264 Woolwich Street Heritage Conservation Plan, Guelph, ON

Heritage Conservation District Studies and Plans
- Downtown Whitby Heritage Conservation District Study and Plan, Town of Whitby, ON
- MacGregor/Albert Heritage Conservation District Study and Plan, City of Waterloo, ON
- Queen Street East Heritage Conservation District Study, Toronto, ON
- University of Toronto & Queen's Park Heritage Conservation District Study, City of Toronto, ON

Cultural Heritage Landscape Inventories/Studies
- Cultural Heritage Landscape Study, City of Kitchener, ON
- Cultural Heritage Landscape Inventory, City of Mississauga, ON

Peer Reviews
- Acton Quarry Cultural Heritage Landscape & Built Heritage Study & Assessment Peer Review, Acton, ON
- Belvedere Terrace - Peer Review, Assessment of Proposals for Heritage Property, Parry Sound, ON
- Heritage Square Heritage Impact Assessment Peer Review for Township of Centre Wellington (Fergus), ON
- Little Folks Heritage Impact Assessment Peer Review for Township of Centre Wellington (Elora), ON

Expert Witness Experience
- 255 Geddes Street, Elora, ON, heritage opinion evidence - Ontario Superior Court of Justice, 2010
- Roselawn Centre Conservation Review Board Hearing, Port Colborne, ON, 1993
- Wilson Farmhouse Conservation Review Board Hearing, Guelph, ON, 2014
- Aurora South Landowners Ontario Municipal Board Hearing, Aurora, ON, 2000
- Ballycroy Golf Course Ontario Municipal Board Hearing, Palgrave, ON, 2002
- Diamond Property Ontario Municipal Board Hearing, Aurora, ON, 1998
- Doon Valley Golf Course Ontario Municipal Board Hearing, Cambridge, ON, 2002
- Downey Trail Ontario Municipal Board Hearing, Guelph, ON, 2010
- Harbour View Investments Ontario Municipal Board Hearing, Town of Caledon, ON, 1998
- Maple Grove Community Ontario Municipal Board Hearing, North York, ON, 2002
- Maryvale Crescent Ontario Municipal Board Hearing, Richmond Hill, ON, 2003
- Oelbaum Ontario Municipal Board Hearing, Eramosa Township, ON, 1988
- OPA 129 Ontario Municipal Board Hearing, Richmond Hill, ON, 1996
- LaFarge Lands Ontario Municipal Board Mediation, Guelph, ON, 2007
- Halton Landfill, Joint Environmental Assessment Act and Environmental Protection Act Board Hearing, 1994

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

File No. 16-298

MEMORANDUM

Subject: Bridge 17/B-T13 (Holland Mills Road Bridge)
Township of Wilmot
CHER and HIA Findings and Overall Recommendations

This memorandum is to summarize the major findings of the Cultural Heritage Evaluation Report and Heritage Impact Assessment (CHER/HIA Report) prepared by CHC Limited and provide overall recommendations to be incorporated into the proposed alternative.

The major finding of the CHER is that this structure is not listed on the Township's Heritage Register of Non-Designated Properties, nor is it designated under the Ontario Heritage Act, nor is it listed on the Ontario Bridge Inventory. Evaluation of the bridge using the criteria of Ontario Heritage Act Regulation 9/06 indicates that the bridge meets this criteria and is worthy of designation under the Ontario Heritage Act.

The HIA summarizes how each of the five chosen alternatives impacts the existing heritage. Obviously complete demolition of the existing structure and replacement results in the most impact to heritage whereas maintaining the bridge, albeit after major repairs, in its current location would have minimal impact to heritage.

Complete replacement of the bridge in its current location is the preferred alternative. Section 3.3 of the CHER/HIA Report provides mitigating measures which need to be considered. Of the 8 mitigating measures listed, Measure 8 is the most applicable to the preferred alternative. Measure 8 states "Bridge removal and replacement with a sympathetically designed structure: a) where possible, salvage elements/members of bridge for incorporation into new structure or for future conservation work or displays; and b) undertake full recording and documentation of existing structure."

To satisfy this mitigating measure, the following is recommended:

1) To provide sympathetic design elements in the replacement structure, the railing system should be an open type steel box beam railing. The openness of a box beam railing system will maintain views of the river and landscape from the bridge similar to the existing views. This railing style maintains the use of steel along the edges of the bridge. In lieu of hot dipped galvanizing to protect the steel, paint could be utilized. Weathering steel is not recommended as it will cause staining to the concrete surfaces.

   No other details of the proposed new structure, such as superstructure design or foundation type, can be reasonably modified to be sympathetic to the original structure.

2) As the main heritage attributes associated with the existing bridge are the pin connections and unusual turnbuckle. One (1) or two (2) floor beam connections and the unusual turnbuckle should be salvaged during the demolition and donated to a local museum for display and conservation.

3) A commemorative plaque, containing pictures of the existing bridge and the proposed bridge, be commissioned and placed in the Township office (or local museum) for public display.

4) The CHER/HIA Report prepared by CHC Limited as well as previous documentation by others be considered adequate documentation and recording of the existing structure.

Regards,

Allan Garnham, P. Eng.
Project Manager

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

File No. 16-298

MEMORANDUM

Subject: Bridge 17/B-T13 (Holland Mills Road Bridge)
Township of Wilmot
Possible Salvage of Existing Structure by Others

This memorandum is to confirm that the Township of Wilmot has no objections with proposals to salvage and repurpose the existing Holland Mills Road Bridge by other groups or agencies.

The Township of Wilmot is of the opinion that the existing bridge is too large to be used on a trail system and does not have the space to store the bridge until a repurpose can be found.

Should another group or agency wish to submit a proposal to salvage the bridge and repurpose it, the Township would be open to considering such a request. The Township themselves would have to determine the amount, if any, of financial assistance they would provide to such a group or agency.

The repurpose or salvage would definitely involve removal of the bridge, trucking to a location off the right-of-way and to an approved location and all in accordance with applicable laws and regulations. Another important consideration is that this salvage or repurposing must occur quickly and prior to the Township commencing work on the proposed new structure.

Regards,

Allan Garnham, P. Eng.
Project Manager

8.

ARCHAEOLOGIC ASSESSMENT CHECKLIST

- Completed Criteria for Evaluating Archaeological Potential Checklist
- Memorandum - Deep and Widespread Land Alteration

Ontario

Ministry of Tourism and Culture

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Archaeological Potential

A Checklist for the Non-Specialist

“Archaeological potential” is a term used to describe the likelihood that a property contains archaeological resources. This checklist is intended to assist non-specialists screening for the archaeological potential of a property where site alteration is proposed.

Note: for projects seeking a Renewable Energy Approval under Ontario Regulation 359/09, the Ministry of Tourism and Culture has developed a separate checklist to address the requirements of that regulation.

Project Name
Bridge 17/B-T13 (Holland Mills Road Bridge)

Project Location
Holland Mills Road at Nith River, Township of Wilmot, Region of Waterloo

Proponent Name
Township of Wilmot

Proponent Contact Information
Allan Garnham, Project Manager, K. Smart Associates Limited, Kitchener, ON

Known Archaeological Sites	**Yes**	**Unknown**	**No**
1. Known archaeological sites within 300 m of property	☐	☐	☒
Physical Features	**Yes**	**Unknown**	**No**
2. Body of water within 300 m of property If yes, what kind of water?	☐	☐	☐
a) Primary water source (lake, river, large creek, etc.)	☒	☐	☐
b) Secondary water source (stream, spring, marsh, swamp, etc.)	☐	☐	☐
c) Past water source (beach ridge, river bed, relic creek, ancient shoreline, etc.)	☐	☐	☐
3. Topographical features on property (knolls, drumlins, eskers, or plateaus)	☐	☐	☒
4. Pockets of sandy soil (50 m^2 or larger) in a clay or rocky area on property	☐	☐	☒
5. Distinctive land formations on property (mounds, caverns, waterfalls, peninsulas, etc.)	☐	☐	☒
Cultural Features	**Yes**	**Unknown**	**No**
6. Known burial site or cemetery on or adjacent to the property (cemetery is registered with the Cemeteries Regulation Unit)	☐	☐	☒
7. Food or scarce resource harvest areas on property (traditional fishing locations, agricultural/berry extraction areas, etc.)	☐	☐	☒
8. Indications of early Euro-Canadian settlement within 300 m of property (monuments, cemeteries, structures, etc.)	☐	☐	☒
9. Early historic transportation routes within 100 m of property (historic road, trail, portage, rail corridor, etc.)	☐	☐	☒
Property-specific Information	**Yes**	**Unknown**	**No**
10. Property is designated and/or listed under the *Ontario Heritage Act* (municipal register and lands described in Reg. 875 of the *Ontario Heritage Act*)	☐	☐	☒
11. Local knowledge of archaeological potential of property (from aboriginal communities, heritage organisations, municipal heritage committees, etc.)	☐	☐	☒
12. Recent deep ground disturbance† (post-1960, widespread and deep land alterations)	☒	☐	☐

† Archaeological potential can be determined not to be present for either the entire property or a part(s) of it when the area under consideration has been subject to widespread and deep land alterations that have severely damaged the integrity of any archaeological resources. Deep disturbance may include quarrying or major underground infrastructure development. Activities such as agricultural cultivation, gardening, minor grading and landscaping are not necessarily considered deep disturbance. Alterations can be considered to be extensive or widespread when they have affected a large area, usually defined as the majority of a property.

Scoring the results:	
If **Yes** to **any** of **1**, **2a, 2b, 2c, 6, 10, or 11**	→ high archaeological potential **–** assessment is required
If **Yes** to **two or more** of **3, 4, 5, 7, 8, or 9**	→ high archaeological potential **–** assessment is required
If **Yes** to **12 or No** to all of **1 - 10**	→ **low** archaeological potential **–** assessment is not required
If 3 or more **Unknown**	→ an archaeological assessment is required (see note below)

† **Note**: If information requested in this checklist is unknown, a consultant archaeologist licensed under the *Ontario Heritage Act* should be retained to carry out at least a Stage 1 archaeological assessment to further explore the archaeological potential of the property and to prepare a report on the results of that assessment. The Ministry of Tourism and Culture reviews all such reports prepared by consultant archaeologists against the ministry's Standards and Guidelines for Consultant Archaeologists. Once the ministry is satisfied that, based on the available information, the report has been prepared in accordance with those guidelines, the ministry issues an acceptance letter to the consultant archaeologist and places the report into its registry where it is available for public inspection.

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CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

File No. 16-298

MEMORANDUM

Subject: Bridge 17/B-T13 (Holland Mills Road Bridge)
Township of Wilmot
Deep and Widespread Land Alteration

This memorandum is to confirm our belief that a widespread area around the existing structure identified above has been subject to recent very deep land alterations in order to construct the bridge and roadway.

As evidenced by the current site conditions, concrete abutments and wingwalls are used to support the bridge. The very nature of these concrete abutments and wingwalls would require very large and deep excavations. These excavations would have destroyed all, if any, archaeological significant finds.

The proposed new structure and roadway approaches, for all intents and purposes, are coincident with the location of the existing structure and roadway.

In the unlikely event that archaeologic artifacts are discovered during the construction, we will stop the construction and contact the Ministry of Tourism, Culture and Sport, Programs and Services Branch for further instructions.

Regards,

Allan Garnham, P. Eng.
Project Manager

9.

SCOPED ENVIRONMENTAL SCREENING REPORT

- Scoped Environmental Screening Report prepared by Premier Environmental Services Inc. dated August 26, 2017
- Memorandum – Scoped Environmental Screening Report Recommendations

PREMIER
ENVIRONMENTAL SERVICES INC.

244 Montrose Street North
Unit 1 Upper
Cambridge, Ontario
N3H 2H7
Phone 519.6537140
Fax 519.653.8907
www.premiercorp.ca

MEMORANDUM

To:	Township of Wilmot
From:	Dean Fitzgerald, Premier Environmental Services
Premier Project:	617050.CE
Subject:	Holland Mills Road Bridge Replacement
Date:	September 8, 2017

1.0 INTRODUCTION

Premier Environmental Services (Premier) was retained to document the environmental features evident at a bridge that crosses the Nith River, east of New Hamburg, and approximately 250 m south of Bleams Road, Township of Wilmot, Regional Municipality of Waterloo (Figure 1). Such documentation of environmental features is required to allow for the preparation of an environmental management plan to support the Schedule B Municipal Class Environmental Assessment (MCEA) evaluating different options from repair to replacement. The bridge is referred to locally as the Holland Mills Road Bridge. This Memorandum will refer to the bridge as the Holland Mills Road Bridge or the Site.

Figure 1: View of the general study area for the Holland Mills Road Bridge MCEA, Wilmot Township (Ontario, 2017).

2.0 COMMUNITY AND REGULATORY CONSULTATIONS

Inspections during summer 2015 led to the closure of Holland Mills Road Bridge. These inspections were completed, as multiple vehicles, including large transport trucks, in excess of the posted load limit of 3 tonnes were observed crossing over the bridge during an emergency closure of nearby Bleams Road. Since 2016, studies in support of the MCEA have been on-going, including consultations with local residents and other interested parties to identify options for the bridge. During June 2017, the preferred option propose during a community meeting was to replace the bridge rather than complete repairs. The final design for the replacement bridge is currently under revision, in response to comments received during recent community consultations. Once the final design features of the preferred bridge are identified, the construction staging plan for the bridge will be prepared. In the future, this construction plan will be reviewed by regulatory agencies such as the Grand River Conservation Authority (GRCA) and the Ministry of Natural Resources and Forestry (MNRF).

For the Site, Premier reviewed the public records for SAR available from Ontario's Natural Heritage Information Centre (NHIC; MNRF 2017). This review of NHIC data focused on the identification of SAR occurrences during the last 20 or so years within 1 km^2 of Holland Mills Road Bridge, including the Nith River. This review identified a number of SAR evident in the general area, including: a fish (Silver Shiner (*Notropis photogenis*)), birds (Barn Swallow (*Hirundo rustica*), Chimney Swift (*Chaetura pelagica*), Eastern Wood-pewee (*Contopus virens*), and Bobolink (*Dolichonyx oryzivorus*)), a tree (Butternut (*Juglans cinerea*)), bats (Little Brown Myotis (*Myotis lucifugu*), Northern Myotis (*Myotis septentrionalis*)), and a turtle (Snapping Turtle (*Chelydra serpentine*)). In addition, online information from DFO reported the past distribution of Silver Shiner as likely evident in the Nith River downstream of the Site, within Ontario South West Map 15 (available at: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/onsw-soon-15-eng.htm). After this list was prepared, Premier submitted a request for additional guidance to MNRF Guelph District Office on July 12, 2017. The MNRF responded via brief electronic mail stating the list was comprehensive and that Barn Swallow and Silver Shiner were recently reported near the bridge. This note from MNRF identified that field inspections should be completed, to ascertain if suitable habitat was evident for any of these SAR on-Site. Premier considers the records review for SAR for the Site complete, as of August, 2017.

3.0 REVIEW OF INFORMATION REGARDING CANDIDATE SAR

A review of habitat preferences for candidate SAR possibly associated with the Holland Mills Road Bridge is presented for those species listed by NHIC as possibly within 1 km^2. This list includes Silver Shiner, Barn Swallow, Chimney Swift, Bobolink, Little Brown Myotis, Northern Myotis, Butternut, and Snapping Turtle, as follows:

- Silver Shiner prefers medium to large creeks and small rivers. This species prefers mostly deeper areas (> 1 m) with swift riffles and no submerged vegetation. Due to this preference for deeper water, it is rarely seen in small streams and is often found in small to large rivers (COSEWIC, 2011a);
- Barn Swallow prefers to nest in cavities of large trees or on human structures such as barns and bridges. Diet consists primarily of flying insects with foraging activities concentrated over water, natural areas, and agricultural fields (COSEWIC, 2011b);
- Chimney Swift nests predominantly in chimneys and cavities in large trees. Diet consists primarily of flying insects with foraging activities concentrated over water, natural areas, and agricultural fields (COSEWIC, 2007);
- Bobolink establishes nests on the ground and then defends the nest after egg deposition. Preferred habitats for nests are large, un-cut fields. Diet consists primarily of flying insects with foraging activities concentrated over natural areas and agricultural fields (COSEWIC, 2010);
- Eastern Wood-pewee prefers to forage and nest in mature deciduous forests. It forages on flying insects and nests in large mature trees (COSEWIC, 2012);
- Little Brown Myotis prefers to roost during the day within the cavities of large trees, caves, or abandoned mine shafts; these same habitats are also used as winter hibernacula (COSEWIC, 2013). Foraging at night usually involves a diet primarily of flying insects with foraging activities concentrated over natural areas, agricultural fields, water, and human settlements (EC, 2015);
- Northern Myotis prefers to roost during the day within the cavities of large trees, caves, or abandoned mine shafts; these same habitats are also used as winter hibernacula (COSEWIC, 2013). Foraging at night usually involves a diet primarily of flying insects with foraging activities concentrated over natural areas, agricultural fields, water, and human settlements (EC, 2015); and
- Butternut is a tree that is similar to Black Walnut (*Juglans nigra*). It often grows in sunny, well-drained areas or within deciduous forests. Generally, trees are evident as single specimens or small groups. Due to the similarity with Black Walnut, it is imperative to carefully inspect all Black Walnut to evaluate for presence of Butternut (EC, 2010).

4.0 METHODS

Inspections of the Holland Mills Road Bridge were completed by staff from Premier on July 11 and August 15, 2017. On these dates, the Site was inspected by Dean Fitzgerald, M.Sc., Ph.D., Senior Ecologist and Tiffany Waters, B.Sc., Junior Ecologist. Dr. Fitzgerald has 20+ years of experience with ecological survey methods as well as extensive experience with environmental management at water crossings.

Habitat Inventories

At Holland Mills Road Bridge, the habitat features upstream and downstream were inspected and documented. This inspection and documentation of habitat features focused on substrates, slope, evidence of erosion, vegetation composition, and evidence of wildlife use in the area. Photographs of habitat features from the water crossing are included within Appendix A.

Land Use in proximity to the Holland Mills Road Bridge was mapped using the MNRF's Ontario Flow Assessment Tool to represent key habitat features within 5 km^2 of the water crossing. This online tool is available at: https://www.ontario.ca/page/watershed-flow-assessment-tool.

As a complement to the habitat inventories, the land use in proximity to the bridge was described using the Ecological Land Classification (ELC) framework. Use of ELC has been described previously (e.g., Bakowsky et al. 1998; Jalava et al. 1997; Lee et al. 1998). For the Site, this ELC reflected the general location in southern Ontario and was integrated with observations on vegetation, drainage, slope, wildlife, and general land use including man-made features like roads, bridges, and buildings. An important caveat for the use of ELC concerns the degree of disturbance in the area. Specifically, the ELC approach is not well suited for extensively disturbed areas, such as those actively modified by human activities on a regular basis, like agriculture. The presence of roads, active farming, and this water crossing represent types of disturbance known to influence analyses within ELC.

Wildlife Inventories

The fish community in the Nith River near the Site was compiled, with literature from the GRCA, Region of Waterloo, MNRF and DFO. This survey period extends from the 1960s to 2010.

The bird community was assessed with observations from the Ontario Breeding Bird Atlas (OBBA) for 2001-2005, by Bird Studies Canada for survey grid 17NJ20 (Haysville; http://www.birdsontario.org/atlas/downloaddata.jsp).

5.0 RESULTS

Land use in proximity to the Holland Mills Road Bridge is dominated by the Nith River valley along with the flood plain, woodlands, bridge, roads, agriculture, and a few rural residences. Such features within 5 km^2 of the water crossing are presented within Figure 2.

Observations of the physical and biological features of the Nith River in close proximity to the Holland Mills Road Bridge are reviewed in Table 1. The shorelines upstream and downstream of the bridge were observed to be generally stable with little erosion on the slopes due to the presence of dense herbaceous and woody vegetation. We also observed large rocks and some waste concrete rock along the edge of the roadways, particularly along the north shoreline. At the bridge footings, woody vegetation was evident on the south shoreline while bare soil extended about 1.0 – 2.0 m on the north shoreline. Walking paths also exist on both shorelines to allow access to the river.

MINISTRY OF NATURAL RESOURCES AND FORESTRY

Ontario

Ontario Flow Assessment Tools

Holland Mills Road Bridge

Notes:

Legend

- Assessment Parcel
- Secondary Watershed
- Tertiary Watersheds
- Great Lakes - St. Lawrence Basin
- Hudson - James Bay Basin
- Nelson River Basin
- Diversions
- Waterbody Outlet
- Conservation Authority Dam
- Provincial Dam
- Federal Dam
- OPG Dam
- Other Dam
- HYDAT Gauge
- HYDAT Gauge (RHBN)

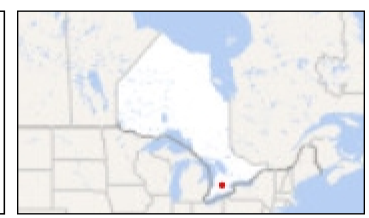
Land Cover Compilation

- Other
- Cloud/Shadow
- Clear Open Water
- Turbid Water
- Shoreline
- Mudflats
- Marsh
- Swamp
- Fen
- Bog
- Heath
- Sparse Treed
- Treed Upland
- Deciduous Treed
- Mixed Treed
- Coniferous Treed
- Plantations - Treed Cultivated
- Hedge Rows
- Disturbance
- Open Cliff and Talus
- Alvar
- Sand Barren and Dune
- Open Tallgrass Prairie
- Tallgrass Savannah
- Tallgrass Woodland
- Sand/Gravel/Mine Tailings/Extraction
- Bedrock
- Community/Infrastructure
- Agriculture and Undifferentiated Rural Land Use

0.7 0 km 0.33 0.7

Scale: 1 : 13,125

Projection: Web Mercator



The Ontario Ministry of Natural Resources and Forestry shall not be liable in any way for the use of, or reliance upon, this map or any information on this map. This map should not be used for: navigation, a plan of survey, routes, nor locations.

Inspections from the bridge deck and shorelines revealed the substrate of the river channel at the bridge footings was dominated by silt and sediment accumulations over clay with minor proportions of rock/cobble, and gravel also evident. Surface water during the July and August inspections demonstrated elevated turbidity with the substrate in the centre of the channel not visible. Shoreline features are represented in the photograph appendix as well (Appendix A).

Inspections of the Nith River valley upstream and downstream of Holland Mills Road Bridge on two dates confirmed this area includes five general habitats: 1) river; 2) flood plain along the river, 3) upland plant community along the edge of flood plain, 4) intense agriculture beyond flood plain, and 5) human settlements with roadways, residences, and other buildings.

Table 1: Physical and Biological features of the Nith River shoreline and channel upstream (US) and downstream (DS) of the Holland Mills Road Bridge. Representative photographs on-Site of all habitats included within Appendix A.

Feature	**Holland Mills Bridge**	
	US	DS
Steep shoreline	Yes	No
Woody vegetation along Shoreline	Yes	Yes
Herbaceous vegetation along Shoreline	No	No
Stable shoreline slope?	Yes	Yes
Evidence of erosion along Shoreline	Isolated	Isolated
Stable shoreline slope	Yes	Yes
Shading of water	~5%	~5%
Clay Shoreline	Yes	Yes
Gravel / Sand along Shoreline	Limited	Limited
Undercut shoreline	No	No
Evidence of erosion along Shoreline	No	No
Road drainage*	No	No

* - no drainage pipes observed that link the roadway to river in proximity to the bridge. Drainage appears to follow roadside ditches away from the river on both the south and north shorelines.

Vegetation Communities

Inspections of the Nith River shoreline upstream and downstream of Holland Mills Road Bridge revealed the flood plain contains three distinct plant communities, based on the distance from the river. Along the river shoreline, the vegetation community is dominated by sedges (grass-like plants from the family Cyperaceae) and Cattail (*Typha latifolia*). As the land transitions to the flood plain, wetland species are evident and dominated by Reed Canary Grass (*Phalaris arundinacea*) along with Joe-pye Weed (*Eutrochium purpureum*), Spotted Jewelweed (*Impatiens capenis*), with some patches of Field Horsetail (*Equisetum arvense*), Marsh Marigold (*Caltha palustris*), and Stinging Nettle (*Urtica dioica*). As the land slopes away from the flood plain, the plant community transitions to upland species that are dominated by goldenrod and asters such as Canada Goldenrod (*Solidago canadensis*), Panicled Aster (*Symphyotrichum lanceolatum*), and New England Aster (*Symphyotrichum novae-angliae*). Other species include Riverbank Grape (*Vitis riparia*), Ragweed (*Ambrosia artemisiifolia*), along with Red Raspberry (*Rubus idaeus*), Garlic Mustard (*Alliaria petiolata*), Virginia Creeper (*Parthenocissus quinquefolia*), Common Burdock (*Arctium minus*), and Wild Mullein (*Verbascum thapsus*). Woody stems are also evident within the flood plain including Black Willow (*Salix nigra*), Silver Maple (*Acer saccharinum*), and Staghorn Sumac (*Rhus typhina*). In contrast, the well-drained top-of-bank included numerous Manitoba Maple (*Acer negundo*) along with a few Black Walnut (*Juglans nigra*), American Elm (*Ulmus americana*), Bur Oak (*Quercus macrocarpa*), White Mulberry (*Morus alba*), Common Buckthorn (*Rhamnus cathartica*), Glossy Buckthorn (*Frangula alnus*), and Apple (*Malus spp.*). Also, the landowner in proximity to the south shoreline has planted Larch (*Larix spp.*) and Eastern White Pine (*Pinus strobus*) at the entrance to their laneway.

Ecological Land Classification

Integration of land use with the observed plant communities allows for the designation of ELC polygons for Holland Mills Road Bridge. These ELC polygons represent distinct vegetation communities, disturbance regimes, drainage, and slope (Bakowsky et al. 1998; Lee et al. 1998; OMNR, 2007). These polygons are presented in Figure 3 and include:

- MAMM1-16 – Reed Canary Grass Graminoid Mineral Meadow Marsh - representing the different plant communities within the floodplain as well as upslope woody stems;
- OAGM1 - Medium Mineral Annual Row Crop – representing row crops in the loam soil adjacent to the MAMM1-16 within the floodplain of the Nith River; and
- Roads and bridges in the area.

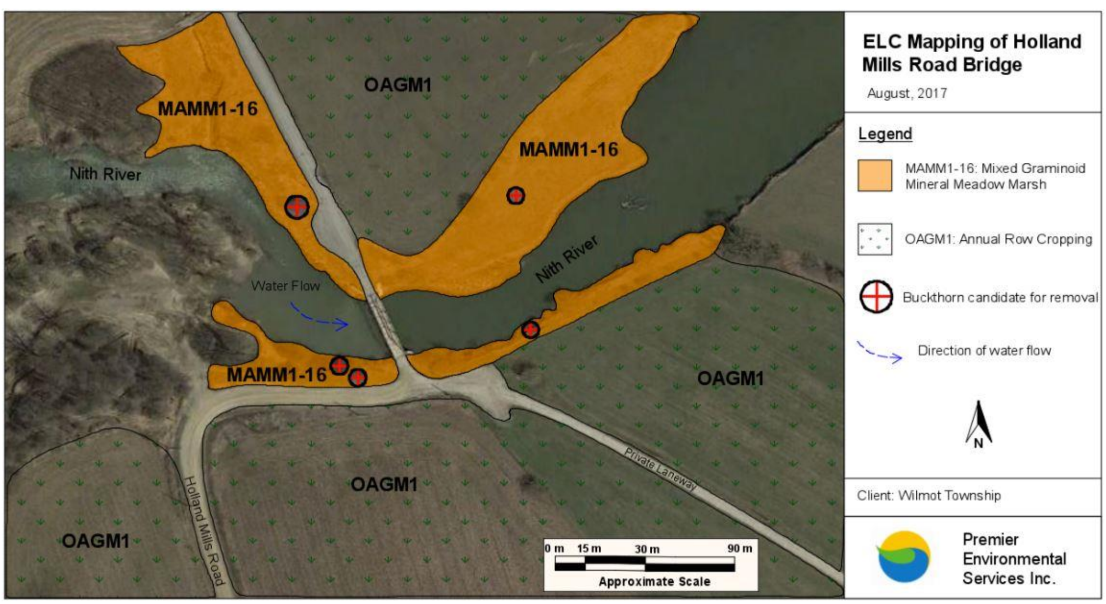


Figure 3: Identification of ELC polygons in proximity to the Holland Mills Road Bridge.

Wildlife

During the July and August Site visits, varied wildlife species were observed in proximity to the Holland Mills Road Bridge. On both dates, more than 20 Barn Swallow were observed. During July, these Barn Swallow were actively feeding young birds in nests located on the underside of the bridge deck as well as foraging over the river, flood plain, and agriculture fields. It is prudent to note the Barn Swallow nests were concentrated on the north side of the bridge. During August, the Barn Swallow were only observed foraging over the river, flood plain, and agricultural fields with no nesting activity evident.

Other birds observed on-Site include: Eastern Kingbird (*Tyrannus tyrannus*), American Goldfinch (*Spinus tristis*), Mourning Dove (*Zenaida macroura*), Field Sparrow (*Spizella pusilla*), Red winged Blackbird (*Agelaius phoeniceus*), Northern Flicker (*Colaptes auratus*), Cedar Waxwing (*Bombycilla cedrorum*), Turkey Vulture (*Cathartes aura*), Ruby-throated Hummingbird (*Archilochus colubris*), and Red-tailed Hawk (*Buteo jamaicensis*). Also, it is inferred that two Eastern Phoebe (*Sayornis phoebe*) nests were evident on beams at the north and south ends of the bridge. The Eastern Phoebe nests were on beams away from Barn Swallow nests.

The bird community within OBBA survey grid 17NJ20 for 2001 – 2005 surveys listed 74 species including SAR Barn Swallow and Bobolink with no reference to Chimney Swift (Table 3). During the July and August inspections, 11 birds from this list were observed near Holland Mills Road Bridge, including SAR Barn Swallow.

Amphibians were also observed on-Site, as juveniles ad/or adults; no tadpoles were evident. This list included: American Toad (*Anaxyrus americanus*), Leopard Frog (*Lithobates pipiens*), and Green Frog (*Lithobates clamitans*). No ponds or standing water was observed near the bridge that could be used for amphibian breeding. However, it is possible depression(s) exist in the flood plain that would create seasonal breeding habitat that was dry during the July and August inspections.

The fish community within the Nith River near the Site reported within a suite of studies for the period of 1950s to 2010 has included 30 species including SAR Silver Shiner (Table 2; Scott and Crossman, 1973; Grand River Conservation Authority (GRCA), 2001; MOE, 1966; XCG Consultants Ltd, 2015). Since fish are mobile, these species possibly exists upstream and/or downstream of Holland Mills Road Bridge. The MNRF also reported the Nith River is classified as warm water habitat and is consistent with the habitat designation from DFO (DFO, 2017).

Table 2: Fish species reported to exist in proximity to the Site since the 1960s.

Family	Common Name	Scientific Name
Catostomidae	Northern Hog Sucker	*Hypentelium nigricans*
Catostomidae	White Sucker	*Catostomus commersoni*
Catostomidae	Golden Redhorse	*Moxostoma erythrurum*
Catostomidae	Greater Redhorse	*Moxostoma valenciennesi*
Centrarchidae	Rockbass	*Ambloplites rupestris*
Centrarchidae	Pumpkinseed	*Lepomis gibbosus*
Centrarchidae	Smallmouth Bass	*Micropterus dolomieu*
Cyprinidae	Common Shiner	*Luxilus cornutus*
Cyprinidae	Blackchin Shiner	*Notropis heterodon*
Cyprinidae	Spottail Shiner	*Notropis hudsonius*
Cyprinidae	Rosyface Shiner	*Notropis rubellus*
Cyprinidae	Spotfin Shiner	*Cyprinella spiloptera*
Cyprinidae	Bluntnose Minnow	*Pimephales notatus*
Cyprinidae	Longnose Dace	*Rhinichthys cataractae*
Cyprinidae	Creek Chub	*Semotilus atromaculatus*
Cyprinidae	Central Stoneroller	*Campostoma anomalum*
Cyprinidae	Striped Shiner	*Luxilus chrysocephalus*
Cyprinidae	Silver Shiner	*Notropis photogenis*
Cyprinidae	Mimic Shiner	*Notropis volucellus*
Cyprinidae	Common Carp	*Cyprinus carpio*
Esocidae	Northern Pike	*Esox lucius*
Gasterosteidae	Brook Stickleback	*Culaea inconstans*
Ictaluridae	Stonecat	*Noturus flavus*
Ictaluridae	Brown bullhead	*Ameiurus nebulosus*
Percidae	Greenside Darter	*Etheostoma blennioides*
Percidae	Rainbow Darter	*Etheostoma caeruleum*
Percidae	Walleye	*Stizostedion vitreum*
Percidae	Johnny Darter	*Etheostoma nigrum*
Percidae	Blackside Darter	*Percina maculata*
Umbridae	Central Mudminnow	*Umbra limi*

Table 3: Birds observed in proximity to the Site, as reported by OBBA for 2001 – 2005 surveys.

Common Name	Scientific Name
Canada Goose	*Branta canadensis*
Mallard	*Anas platyrhynchos*
Ring-necked Pheasant	*Phasianus colchicus*
Wild Turkey	*Meleagris gallopavo*
Great Blue Heron	*Ardea herodias*
Turkey Vulture	*Cathartes aura*
Red-tailed Hawk	*Buteo jamaicensis*
Killdeer	*Charadrius vociferus*
Rock Pigeon	*Columba livia*
Spotted Sandpiper	*Actitis macularius*
Mourning Dove	*Zenaida macroura*
Black-billed Cuckoo	*Coccyzus erythropthalmus*
Eastern Screech-Owl	*Megascops asio*
Great Horned Owl	*Bubo virginianus*
Ruby-throated Hummingbird	*Archilochus colubris*
Belted Kingfisher	*Megaceryle alcyon*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Red-bellied Woodpecker	*Melanerpes carolinus*
Yellow-bellied Sapsucker	*Sphyrapicus varius*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Leuconotopicus villosus*
Northern Flicker	*Colaptes auratus*
Pileated Woodpecker	*Hylatomus pileatus*
Eastern Wood-Pewee	*Contopus virens*
Eastern Phoebe	*Sayornis phoebe*
Great Crested Flycatcher	*Myiarchus crinitus*
Eastern Kingbird	*Tyrannus tyrannus*
Yellow-throated Vireo	*Vireo flavifrons*
Warbling Vireo	*Vireo gilvus*
Red-eyed Vireo	*Vireo olivaceus*
Blue Jay	*Cyanocitta cristata*
American Crow	*Corvus brachyrhynchos*
Horned Lark	*Eremophila alpestris*
Tree Swallow	*Tachycineta bicolor*
Cliff Swallow	*Petrochelidon pyrrhonota*
Barn Swallow	*Hirundo rustica*
Black-capped Chickadee	*Poecile atricapillus*
White-breasted Nuthatch	*Sitta carolinensis*

Table 3: Birds observed in proximity to the Site, as reported by OBBA for 2001 – 2005 surveys.

Common Name	Scientific Name
Brown Creeper	*Certhia americana*
House Wren	*Troglodytes aedon*
Winter Wren	*Troglodytes hiemalis*
Eastern Bluebird	*Sialia sialis*
Wood Thrush	*Hyocichla mustelina*
American Robin	*Turdus migratorius*
Gray Catbird	*Dumetella carolinensis*
Brown Thrasher	*Toxostoma rufum*
European Starling	*Sturnus vulgaris*
Cedar Waxwing	*Bombycilla cedrorum*
Yellow Warbler	*Setophaga petechia*
Chestnut-sided Warbler	*Setophaga pensylvanica*
Black-throated Green Warbler	*Setophaga virens*
American Redstart	*Setophaga ruticilla*
Ovenbird	*Seiurus aurocapilla*
Mourning Warbler	*Geothlypis philadelphia*
Common Yellowthroat	*Geothlypis trichas*
Eastern Towhee	*Pipilo erythrophthalmus*
Chipping Sparrow	*Spizella passerina*
Field Sparrow	*Spizella pusilla*
Vesper Sparrow	*Pooecetes gramineus*
Savannah Sparrow	*Passerculus sandwichensis*
Song Sparrow	*Melospiza melodia*
Scarlet Tanager	*Piranga olivacea*
Northern Cardinal	*Cardinalis cardinalis*
Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Indigo Bunting	*Passerina cyanea*
Bobolink	*Dolichonyx oryzivorus*
Red-winged Blackbird	*Agelaius phoeniceus*
Eastern Meadowlark	*Sturnella magna*
Common Grackle	*Quiscalus quiscula*
Brown-headed Cowbird	*Molothrus ater*
Baltimore Oriole	*Icterus galbula*
House Finch	*Haemorhous mexicanus*
American Goldfinch	*Spinus tristis*
House Sparrow	*Passer domesticus*

Species At Risk

Inspections on-Site identified the presence of one SAR: Barn Swallow. During July and August, approximately 20 Barn Swallow were observed foraging over the Nith River as well as the flood plain (MAMM1-16) and agriculture fields (OAGM1). In addition, on July 11, Premier observed approximately 20 active Barn Swallow nests on the underside of Holland Mills Road Bridge. During August, Premier observed no active Barn Swallow nests, as all chicks were apparently fledged. However, the nests were still evident on the bridge.

The habitat inspections during the two dates allowed for the following inferences on SAR:

- Silver Shiner reported as present in Nith River downstream of the Site;
- Barn Swallow actively forage and nest on the underside of the north end of the bridge with approximately 20 nests;
- Snapping Turtle habitat may exist upstream and downstream of the Site whereas no suitable gravel or sand for nesting is evident at the bridge;
- Absence of nesting habitat for Chimney Swift and no recent observations via OBBA;
- Absence of deciduous forest indicates no habitat for Eastern Wood-pewee;
- Absence of Butternut from the Site based on direct evaluation of Black Walnut;
- Absence of large mature trees suitable for roosting by bats;
- Absence of other habitats such as caves for roosting by bats; and
- Absence of large un-cut fields available for use by Bobolink.

6.0 INTERPRETATION

Inspections of the bridge at Holland Mills Road provided an opportunity to inventory existing biological, physical, and environmental features. These inventories documented soil features, creek attributes, vegetation communities, aquatic species, wildlife occurrence, and SAR presence along with potential habitat for use by SAR. This information provides the basis to identify key features of the Holland Mills Road Bridge and prepare recommendations to enhance environmental management during the installation of replacement infrastructure.

Key findings regarding the Holland Mills Road Bridge included the following:

- Varied herbaceous plants exist within four general habitat areas on-Site, as follows: Nith River, flood plain of the river, the upland areas, and agricultural fields;
- Woody species exist within the flood plain of the Nith River and the upland areas;
- Indication of past planting of woody species within the flood plain;

- Nith River at the bridge demonstrates relatively stable slopes and limited sediment transport due to extensive herbaceous and woody vegetation;
- Nith River reported as warmwater fish habitat, and subject to the warmwater fisheries timing window for construction projects;
- Varied wildlife exist near the bridge including birds, amphibians, with other species likely also evident that were not observed but often exist along river valleys;
- No dens or burrows were observed around the bridge footings; and
- Extensive use by local citizens for recreation, including fishing and birding.

Species At Risk

Habitat inspections on-Site allowed for the documentation of possible presence of SAR and habitat available for SAR. When the Site was inspected, it documented presence of SAR Barn Swallow in numbers and they were also nesting on the bridge. The records review and communications with MNRF identified possible presence of other SAR wildlife and Butternut. These inspections indicated that habitat for most SAR was absent with the exception of Silver Shiner and Snapping Turtle in the Nith River. Thus, the SAR of concern on-Site includes Barn Swallow, Silver Shiner, and Snapping Turtle.

Inspections revealed that about 20 active Barn Swallow nests were evident only on the northern half of the bridge. Studies have reported this bird tends to establish nests in man-made structures such as barns, bridges, houses, and road culverts. In these settings, the typical mud nest is often placed on the underside of the bridge deck while nests can be placed anywhere along the length of a culvert. In both settings, these nests are very inaccessible to climbing predatory species like Raccoon (*Procyon lotor*). Also, Barn Swallow prefers to nest in structures located relatively close to surface waters, due to high densities of flying insects typically found over water. For this Site, it is inferred the nests exist only on the north half of the bridge due to the presence of relatively tall Silver Maple around the south footing of the bridge. That is, these Silver Maple likely acts as a route for predators like Raccoon to access the bridge structure. By extension, this also implies the potential predator would need to walk under the bridge over the river, to access the north area with Barn Swallow nests.

With these observations of habitat and possible SAR presence, Premier directly discussed possible SAR presence on-Site with MNRF via electronic mail on August 14. On this date, MNRF stated they agreed with the identification of these three SAR as top priorities for environmental management. In this discussion, MNRF recommended that the proposed project activity be registered due to possible disturbance to Barn Swallow and Silver Shiner under Ontario Regulation Reg. 242/08 of the ESA. Refer to Appendix B for a copy of this correspondence. In response, Premier registered Barn Swallow and Silver Shiner for potential disturbance from the forthcoming replacement of the Holland Mills Road Bridge, as prescribed under the ESA. This registration requires the completion of activities to reduce and/or prevent disturbance of SAR Barn Swallow and Silver Shiner during future activities. Standard methods are available to manage Barn Swallow and Silver Shiner to prevent harm to specimens and disturbance to nests, as described in Section 7.0 Recommendations. The registration details for each species are:

- Barn Swallow: M-102-4199845333, dated August 24, 2017; and
- Silver Shiner: M-102-7199885043, dated August 25, 2017.

In addition, due to the possible presence of Snapping Turtle, it is appropriate to use measures to exclude any specimens from the future work zone, to avoid disturbance.

Summary

Observations from the inspections confirm the ecological features upstream and downstream of Holland Mills Road Bridge are dominated by flood plain and intense agricultural activities. This flood plain provides habitat to varied vegetation and wildlife. This area is influence by the Nith River that represents important fish habitat. In addition, SAR Barn Swallow, Silver Shiner, and Snapping Turtle are in the area, so these species require dedicated management activities. For these reasons, environmental features and SAR need to be carefully managed with the application of varied measures on-Site. With this interpretation of the observations from inspections on-Site, recommendations for activities prior to and during future infrastructure replacement are now reviewed in light of the Nith River representing warm water fish habitat.

7.0 RECOMMENDATIONS

This study has identified existing environmental and biological features at the Holland Mills Road Bridge. With the identification of these features, it has resolved the possible effects of the proposed infrastructure replacement on these features. This resolution allows for the identification of Best Management Practices (BMPs) to enhance environmental management through effects avoidance as well as to mitigate unavoidable disturbance from the proposed activity. This process of effect avoidance is preferable to the implementation of mitigation measures after effects have already been created. Where possible, avoidance measures should be implemented before resorting to mitigation, and lastly, rehabilitation to minimize negative effects on natural features adjacent to the bridge. The following BMPs are recommended for implementation for this proposed activity. If the BMPs are implemented, they will likely avoid or reduce the possible negative effects from the proposed activity. After the recommended BMPs are reviewed, select follow-up activities are proposed, as rehabilitation measures at the Holland Mills Road Bridge that will benefit local vegetation, wildlife, and SAR. The direct requirements for SAR are identified and then followed by an overview of recommendations for the use of BMPs.

SPECIES AT RISK

This study identified approximately 20 active Barn Swallow nests on the north side of Holland Mills Road Bridge. In order to manage habitat and avoid disturbance, it is necessary to complete the following activities before the bridge is disturbed. This activity follows Ontario Regulation 242/08 for Barn Swallow along with guidance provided directly from MNRF, as follows:

- Prior to the arrival of Barn Swallow on-site during spring, 2018, install netting on the bridge deck to prevent nesting by the birds;
- Prior to the arrival of Barn Swallow on-site during spring 2018, install alternative nesting structure to house compensation nest cups. It is necessary to place this structure within 1000 m of the bridge and within 200 m of the Nith River shoreline. Due to the active nests on the north side of the river, an ideal location would also be on the north side;
- The alternative nesting structure should include metal cones on the posts to discourage climbing predators from accessing the nest structure; and
- Install a minimum of 20 nest cups, based on 1:1 compensation ratio of the total active nests observed during July, 2017. It may be necessary to install two nest structures, to fit the 20 nest cups.

This information describing Barn Swallow nest compensation is available at: https://www.ontario.ca/page/alter-structure-habitat-barn-swallow.

For Silver Shiner, Premier proposes the following activities around the bridge to prevent disturbance and enhance habitats:

- Install sediment and erosion control fences prior to disturbance of the shoreline areas, to prevent siltation of habitats. Detailed overview for this activity is included below;
- Install focal plantings of woody species that are well suited for sloped habitats directly around the bridge such as Eastern White Cedar, Bur Oak, and/or Willow. Placement of such woody plants on the slopes near the bridge will provide stability to the future slopes and reduce risk of future erosion;
- Future activities on-Site should consider addition of Eastern Red Cedar (*Junipersus virgiana*) along the slopes of the bridge even though they are currently absent. The reason is this tree generates a dense root system that is well suited for sloped habitats as well as will create a stable slope and provide habitat for wildlife;
- Install focal plantings of species such as Bur Oak, Silver Maple, and/or Eastern White Cedar within the upper section of the flood plain immediately upstream and downstream of the crossing (i.e., within 15 m of the bridge) to augment other plantings of woody stems in the general area; and

- Remove the accumulated silt and sediment evident in the Nith River around the existing bridge footings. Then after bridge installation is complete, place rock cobble substrate around the bridge footings to reduce channel erosion and provide habitat suitable for a variety of fishes, including Silver Shiner.

For Snapping Turtle, no specimens were observed and no suitable gravel or sand substrate was evident as candidate nesting habitat around the bridge footings. However, the future work could result in the exposure of sand or gravel in this area. As such, a prudent approach is to ensure the sediment and erosion control fences extend all around the work area, to prevent Snapping Turtle from accessing the area. In this regard, all sediment fences should be placed below grade, such that no gap exists between the fence material and soil. A properly installed sediment fence will prevent not just turtles but most other wildlife from walking in to the construction area and reduce overall risk to wildlife in general.

ACTIVITIES FOR USE BEFORE AND DURING INFRASTRUCTURE REPLACEMENT

Communications with MNRF confirmed that all in-water work needs to be completed between July 1 and March 31 during any given year, due to the designation of the Nith River as warmwater fish habitat. All recommendations are framed around this fisheries construction timing window (DFO, 2017).

Standard BMPs for construction activities should be used to mitigate other types of disturbance on the environment during the replacement of infrastructure at the bridge (Table 4). These BMPs will eliminate, reduce, and otherwise manage vegetation, soil, dust, vehicle exhaust, water runoff, and spills. The use of these mitigation measures is expected to reduce the extent and duration of negative effects of proposed activities. These BMPs and mitigation measures are framed relative to existing conditions and natural heritage features at the bridge relative to the timing of infrastructure replacement.

Sediment and Erosion Control

It is important to recognize the difference between erosion control and sediment control measures when preparing an effective erosion and sediment control plan. Specifically, erosion control is the process to reduce potential for erosion in the work area(s). In contrast, sedimentation control is the process that involves the management of eroded soil to be transported and/or deposited beyond the limits of the work area(s), to a desirable destination as opposed to the water course. It is prudent to complete erosion control and sediment control.

Measures to address both erosion control and sedimentation control are required at the bridge. Therefore, the design of erosion and sedimentation control measures is expected to be flexible and evolve throughout the construction process. This approach will limit effects on the surrounding area. Various BMPs can be applied to manage environmental features, as reviewed by Hamilton Conservation (Hamilton Conservation, 2006) and reviewed in Table 4.

All BMPs should be regularly inspected to ensure functionality as construction proceeds. For example, inspections should occur after rain events to ensure they are functioning as designed. It is also important that construction staff pay attention to weather forecasts. To prepare for upcoming rain events, operators should walk around the construction site to ensure that BMPs are functional and all facets of the work area are secure. Identification of these BMPs represents an opportunity to avoid the negative effects of the proposed development on the land and water environments.

Staff at the Holland Mills Road Bridge construction area should also visually inspect all BMPs when the site will be inactive for several days, such as over weekends and holidays. This will help to prepare for rain events that may occur when workers are away. These planned preparation procedures will help minimize the risk of on or off-site property damage.

Table 4: Examples of BMPs for activities near water crossings (HCA, 2006)

BMP	Advantage	Limitation
Silt Fence	• Effective way to prevent off-site transport of soil and debris • Relatively inexpensive • Reduces runoff and sediment transport to water course • Mitigates erosion on slopes adjacent to work area	• Must be installed properly to prove effective • Not suitable in areas with concentrated runoff volumes • Not suitable on rock or hard surfaces • Not suitable in areas exposed to high wind • Regular inspection required
Retain Vegetation	• Retain as much existing vegetation around water crossing as feasible • Will reduce erosion, especially during precipitation events • Filter air and reduce dust transport to water • Provides some habitat to wildlife • If vegetation is removed, do so before May 1, the start of bird nesting season	• Requires planning work area relative to vegetation • May require maintenance • Ensure protective measures are taken • Space consuming depending on size • Can be costly if buffer covers large area of land • Requires planning to remove vegetation early in season
Straw Bales	• Place bales in drainage ditches on both sides of water crossing • Mitigates erosion and reduces sediment transport • Relatively inexpensive • Reduces rate of runoff to water course	• Must be installed properly to prove effective • Not suitable in areas with concentrated runoff volumes • Require some maintenance
Dust Mitigation in Work Area	• Reduces the amount of airborne dust particles transported to adjacent vegetation and water course • Reduces the amount of sedimentation and by association water pollution to nearby water course. • Reduces stress on respiratory systems of wildlife and workers	• Can be costly • May increase muddy conditions on-Site • Transport may still occur to water course or roadway
Spill Prevention	• Reduces the risk of transport of chemicals to water course • Reduce total clean-up costs if spill response is fast	• Requires planning and preparation • Space consuming to store materials, depending on size • Time consuming to train staff for spill response methods

ACTIVITIES FOR AFTER INFRASTRUCTURE REPLACEMENT

Implementation of mitigation measures need to be completed after infrastructure replacement. These measures follow earlier recommendations and are reviewed for the Site, including:

- Ensure all garbage and construction debris is removed from the work area and adjacent creek areas;
- Create slopes from the bridge to the shoreline that are gradual to the water;
- Remove non-native buckthorn trees evident around the Site, as represented in Figure 3. The trees proposed for removal are the largest stems observed but others likely exits. Hence, all buckthorn in the area should be removed;
- Re-seed all disturbed soils as soon as feasible with an herbaceous seed mixture composed of only native plant species. Non-native species should not be included in the seed mixture. Such seed mixtures are commercially available from varied suppliers;
- Install focal plantings of woody species that are well suited for sloped habitats such as Bur Oak, Eastern White Cedar, and/or Willow along the edges of the upstream and downstream flood plains, to create additional stability to the soils on the slope of the crossing as well as within the adjacent areas;
- Consider the addition of Eastern Red Cedar along the slopes of the bridge even though they are currently absent. The reason is this tree generates a root system that will create a stable slope as well as provide habitat for wildlife;
- Install focal plantings of species such as Bur Oak, Silver Maple, and/or Eastern White Cedar immediately upstream and downstream of the crossing within the flood plain, to augment other plantings of woody stems in the general area; and
- Place rock cobble substrates below the bridge to reduce channel erosion and replace the accumulated silt directly below the existing bridge deck. At this time, remove any accumulated sediment-silt from this area.

In summary, the exact use of the BMPs will occur in conjunction with different phases of the proposed development. It is expected that the use of these BMPs will result in the avoidance or reduction of disturbance at the Site. However, it is essential for proper timing of the use of BMPs, to ensure they reflect typical seasonal constraints, such as high runoff during autumn rains. In addition, it is expected that the proposed BMPs may require modification due to site-specific requirements due to environmental features or unexpected wildlife considerations.

This study and the recommendations herein are subject to the Statement of Limitations included in Appendix D.

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APPENDIX A
SITE PHOTOGRAPH

PREMIER ENVIRONMENTAL SERVICES INC.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Wilmot Township	Holland Mills Rd Bridge – Crossing the Nith River	617050.CE

Photo No. 1 | **Date:** 11-July-17

Direction Photo Taken:

North

Description:

View of bridge looking north.

Photo No. 2 | **Date:** 11-July-17

Direction Photo Taken:

South

Description:

View of bridge looking south.

PREMIER ENVIRONMENTAL SERVICES INC.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Wilmot Township	Holland Mills Rd Bridge – Crossing the Nith River	617050.CE

Photo No.	Date:
3	11-July-17

Direction Photo Taken:

East

Description:

View looking downstream of bridge.

Photo No.	Date:
4	11-July-17

Direction Photo Taken:

West

Description:

View looking upstream of bridge.

PREMIER ENVIRONMENTAL SERVICES INC.	**PHOTOGRAPHIC LOG**

Client Name: Wilmot Township	**Site Location:** Holland Mills Rd Bridge – Crossing the Nith River	**Project No.** 617050.CE

Photo No. 5	**Date:** 11-July-17
Direction Photo Taken: West	
Description: Another view looking upstream of bridge.	

Photo No. 6	**Date:** 11-July-17
Direction Photo Taken: Northwest	
Description: Another view looking upstream of bridge. .	

PREMIER ENVIRONMENTAL SERVICES INC.		PHOTOGRAPHIC LOG
Client Name: Wilmot Township	**Site Location:** Holland Mills Rd Bridge – Crossing the Nith River	**Project No.** 617050.CE

Photo No. 7	**Date:** 11-July-17

Direction Photo Taken:

North

Description:

A view of the west (upstream) footing on north end of bridge.

Photo No. 8	**Date:** 11-July-17

Direction Photo Taken:

North

Description:

A view of the east (downstream) footing on north end of bridge.

PREMIER ENVIRONMENTAL SERVICES INC.

PHOTOGRAPHIC LOG

Client Name: Wilmot Township	**Site Location:** Holland Mills Rd Bridge – Crossing the Nith River	**Project No.** 617050.CE

Photo No. 9	**Date:** 11-July-17
Direction Photo Taken: South	
Description: View of the west (upstream) footing on south end of bridge.	

Photo No. 10	**Date:** 11-July-17
Direction Photo Taken: South	
Description: View of the east (downstream) footing on south end of bridge.	

PREMIER ENVIRONMENTAL SERVICES INC.		PHOTOGRAPHIC LOG
Client Name: Wilmot Township	**Site Location:** Holland Mills Rd Bridge – Crossing the Nith River	**Project No.** 617050.CE

Photo No. 11	**Date:** 11-July-17
Direction Photo Taken: Southeast	
Description: View of about 20 active Barn Swallow nests on underside of bridge at north end.	

Photo No. 12	**Date:** 11-July-17
Direction Photo Taken: South	
Description: View of Green Frog (*Lithobates clamitans*) at west footing on north end of bridge (specimen located to the right of white arrow).	

PREMIER ENVIRONMENTAL SERVICES INC.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Wilmot Township	Holland Mills Rd Bridge – Crossing the Nith River	617050.CE

Photo No.	Date:
13	11-July-17

Direction Photo Taken:

Southwest

Description:

View of shoreline substrate dominated by clay, upstream of south end of bridge (clay shore above white arrow).

Photo No.	Date:
14	15-Aug-17

Direction Photo Taken:

Description:

View of the bridge looking south, after it was closed to pedestrian traffic.

PREMIER ENVIRONMENTAL SERVICES INC.

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
Wilmot Township	Holland Mills Rd Bridge – Crossing the Nith River	617050.CE

Photo No.	**Date:**
15	15-Aug-17

Direction Photo Taken:

Description:

View of the bridge looking north, after it was closed to pedestrian traffic.

Photo No.	**Date:**
16	15-Aug-17

Direction Photo Taken:

Description:

Another view upstream of the bridge, from the south end.

PREMIER ENVIRONMENTAL SERVICES INC.	**PHOTOGRAPHIC LOG**

Client Name:	**Site Location:**	**Project No.**
Wilmot Township	Holland Mills Rd Bridge – Crossing the Nith River	617050.CE

Photo No.	**Date:**
17	15-Aug-17

Direction Photo Taken:

Description:

Another view of shoreline upstream of the bridge, at the north footing.

Photo No.	**Date:**
18	15-Aug-17

Direction Photo Taken:

Description:

Another view of shoreline upstream of the bridge, at the north footing.

PREMIER ENVIRONMENTAL SERVICES INC.		PHOTOGRAPHIC LOG
Client Name: Wilmot Township	**Site Location:** Holland Mills Rd Bridge – Crossing the Nith River	**Project No.** 617050.CE

Photo No. 19	**Date:** 15-Aug-17
Direction Photo Taken:	
Description: Another view of shoreline upstream of the bridge, at the north footing. Note the extensive silt that has accumulated in this area.	

Photo No. 20	**Date:** 15-Aug-17
Direction Photo Taken:	
Description: Another view of shoreline downstream of the bridge, at the north footing.	

PREMIER
ENVIRONMENTAL SERVICES INC.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Wilmot Township	Holland Mills Rd Bridge – Crossing the Nith River	617050.CE

Photo No. 21 **Date:** 15-Aug-17

Direction Photo Taken:

Description:

Another view looking south across the river, downstream side of bridge.

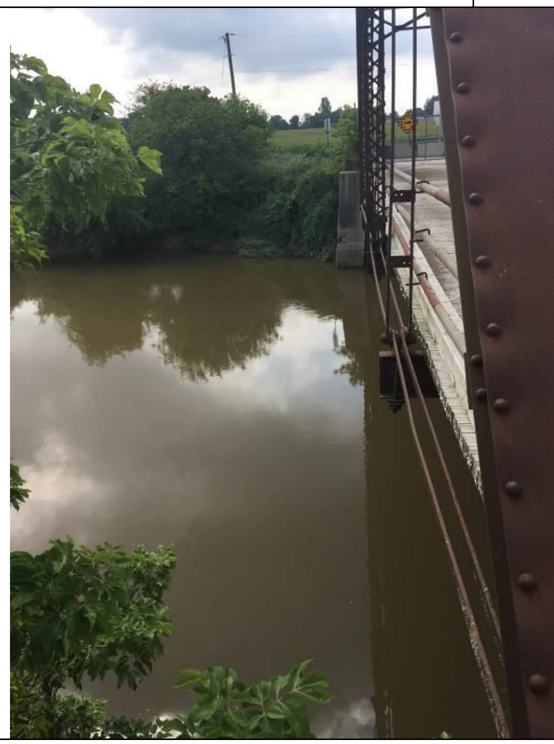


Photo No. 22 **Date:** 15-Aug-17

Direction Photo Taken:

East (downstream)

Description:

View of transition between farm field and flood plain along river, approximately 200 m downstream of the north bridge footing.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Wilmot Township	Holland Mills Rd Bridge – Crossing the Nith River	617050.CE

Photo No.	Date:
23	15-Aug-17

Direction Photo Taken:

West (upstream)

Description:

View of transition between farm field and flood plain along river, approximately 200 m downstream of the north bridge footing.

Photo No.	Date:
24	15-Aug-17

Direction Photo Taken:

North

Description:

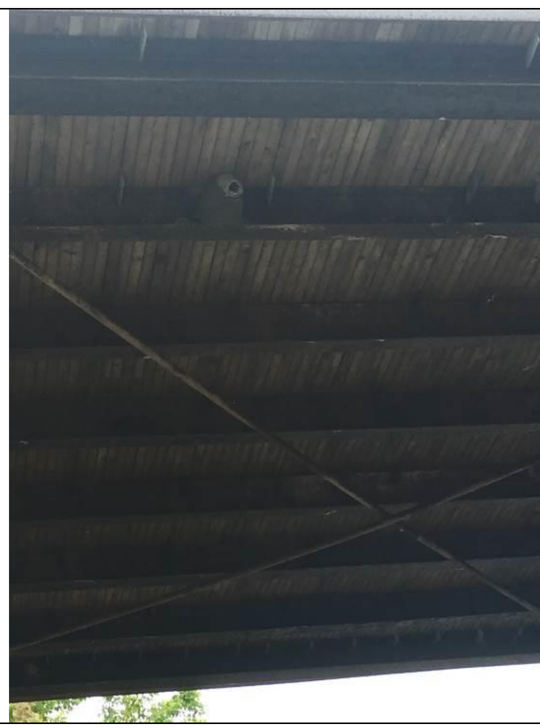
View of Common Buckthorn (marked with white arrow) and Black Walnut (marked with black arrow) along road, on north side of bridge.

PREMIER ENVIRONMENTAL SERVICES INC.	**PHOTOGRAPHIC LOG**

Client Name: Wilmot Township	**Site Location:** Holland Mills Rd Bridge – Crossing the Nith River	**Project No.** 617050.CE

Photo No. 25	**Date:** 15-Aug-17
Direction Photo Taken:	
Description: Another view of Barn Swallow nests under bridge deck, near north shoreline.	

Photo No. 26	**Date:** 15-Aug-17
Direction Photo Taken:	
Description: Another view of Barn Swallow nest under bridge deck, near north shoreline.	



PREMIER ENVIRONMENTAL SERVICES INC.		PHOTOGRAPHIC LOG
Client Name: Wilmot Township	**Site Location:** Holland Mills Rd Bridge – Crossing the Nith River	**Project No.** 617050.CE

Photo No.	**Date:**
27	15-Aug-17

Direction Photo Taken:

Description:

Another view of Barn Swallow nests near centre of bridge, near north shoreline.

Photo No.	**Date:**
28	15-Aug-17

Direction Photo Taken:

Description:

Another view downstream of bridge.

PHOTOGRAPHIC LOG		
Client Name: Wilmot Township	**Site Location:** Holland Mills Rd Bridge – Crossing the Nith River	**Project No.** 617050.CE

Photo No. 29	**Date:** 15-Aug-17
Direction Photo Taken:	
Description: View of shoreline downstream of the bridge, at the south footing.	

Photo No. 30	**Date:** 15-Aug-17
Direction Photo Taken:	
Description: View of shoreline upstream of the bridge, at the south footing.	

PREMIER ENVIRONMENTAL SERVICES INC.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Wilmot Township	Holland Mills Rd Bridge – Crossing the Nith River	617050.CE

Photo No.	Date:
31	15-Aug-17

Direction Photo Taken:

Description:

View across shoreline on upstream side of river, south end of bridge.

Photo No.	Date:
32	15-Aug-17

Direction Photo Taken:

Description:

Looking north across the river, upstream side of bridge.

PREMIER ENVIRONMENTAL SERVICES INC.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Wilmot Township	Holland Mills Rd Bridge – Crossing the Nith River	617050.CE

Photo No.	Date:
33	15-Aug-17

Direction Photo Taken:

Description:

Looking across the river, from downstream side of bridge.

Photo No.	Date:
34	15-Aug-17

Direction Photo Taken:

Description:

View of underside of bridge from south footing.

PREMIER ENVIRONMENTAL SERVICES INC.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Wilmot Township	Holland Mills Rd Bridge – Crossing the Nith River	617050.CE

Photo No.	Date:
35	15-Aug-17

Direction Photo Taken:

Description:

View of south footing, looking downstream.

Photo No.	Date:
36	15-Aug-17

Direction Photo Taken:

Description:

Posts along road at south end of bridge, upstream side of river. The purpose of these posts is not known.

PREMIER ENVIRONMENTAL SERVICES INC.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Wilmot Township	Holland Mills Rd Bridge – Crossing the Nith River	617050.CE

Photo No.	Date:
37	15-Aug-17

Direction Photo Taken:

Description:

View of test pit on north shoreline, downstream of bridge. This pit revealed presence of about 15 cm of loam followed by sand and gravel.

Photo No.	Date:
38	15-Aug-17

Direction Photo Taken:

Description:

View of test pit on north shore, upstream of bridge. This pit revealed presence about 15 cm of loam followed by sand and gravel.

PREMIER ENVIRONMENTAL SERVICES INC.

PHOTOGRAPHIC LOG

Client Name: Wilmot Township	**Site Location:** Holland Mills Rd Bridge – Crossing the Nith River	**Project No.** 617050.CE

Photo No.	**Date:**
39	15-Aug-17

Direction Photo Taken:

Description:

View of test pit on south shoreline, downstream of bridge. This pit revealed presence of about 10 cm of loam followed by sand and gravel.

Photo No.	**Date:**
40	15-Aug-17

Direction Photo Taken:

Description:

View of test pit on south shore, upstream of bridge. This pit revealed presence of about 10 cm of loam followed by sand and gravel.

APPENDIX B

CORRESPONDENCE WITH MNRF

From: Buck, Graham (MNRF) [mailto:Graham.Buck@ontario.ca]
Sent: August-14-17 9:51 AM
To: Dean Fitzgerald
Subject: RE: Request for Species At Risk screening

Hi Dean,

In addition to our last note about Barn Swallow, the Nith River at this location is habitat of Silver Shiner (threatened).

The Barn Swallow could be dealt with through the Barn Swallow exemption (23.5) of regulation 242/08 and Silver Shiner can he handled through the aquatic species exemption (23.4) of the same regulation.

For your convenience I am providing you a link to the regulation: https://www.ontario.ca/laws/regulation/080242 so that you may review the regulations and their applicability to this project.

If you have any questions please do not hesitate to contact me.

Graham

Graham Buck
Management Biologist
Ministry of Natural Resources and Forestry
Guelph District
1 Stone Road West Guelph ON
N1G 4Y2
519 826 4505
graham.buck@ontario.ca

APPENDIX C

BARN SWALLOW AND SILVER SHINER

CONFIRMATION OF REGISTRATION

Form Name:	Barn Swallow - Activities in built structures that are habitat (s.23.5)
Date Registration Filed:	08/24/2017
Confirmation ID:	M-102-4199845333
Version Number:	001
Update Date:	

Dear Sir/Madam,

DR DEAN FITZGERALD

244 Montrose ST N, UNIT, 1 Upper
CAMBRIDGE, ON N3H2H7

You have registered with the Ontario Regulation Reg. 242/08 of the *Endangered Species Act, 2007* and your Notice form has been received by the Ministry of Natural Resources and Forestry for activities eligible under the following regulatory provision:

Barn Swallow - Activities in built structures that are habitat (s.23.5)

located at:

Bridge that crosses Nith River at Holland Mills Road

For the species listed in Appendix A.

It is your responsibility to understand all the applicable requirements of registration and to be aware of which species are eligible or excluded in relation to your activity. **This includes monitoring changes to the SARO List (O. Reg. 230/08) as well as eligibility and requirements in the General Regulation O. Reg. 242/08.** Some requirements apply to all activities being initiated on the landscape, such as the minimization of adverse effects on the species. Other requirements vary by activity such as record keeping, monitoring, and creation of mitigation plans and reports. **Whenever documents are requested by the Ministry of Natural Resources and Forestry (MNRF) they are due within 14 days.**

Species observations must be reported directly to the Natural Heritage Information Centre, within three months, by completing a Rare Species Reporting Form available at http://www.ontario.ca/page/report-rare-species-animals-and-plants.

In addition to the General Regulation, information is available at http://www.ontario.ca/page/natural-resources-approvals.

You are required to show this Confirmation of Registration upon request of the Ministry. Please refer to Ontario Regulation 242/08 for requirements that apply to your activity.

Any questions related to this registration and/or the Natural Resources and Forestry Registry should be directed to:

Registry and Approval Services Centre
Ministry of Natural Resources and Forestry
300 Water Street
Peterborough, ON, K9J8M5
Toll-free: 1-855-613-4256
E-mail: mnr.rasc@ontario.ca

Appendix A:

Species impacted by the registered activity:

Barn Swallow (Hirundo rustica)

CONFIRMATION OF REGISTRATION

Form Name:	Aquatic Species - Activities in the habitat of certain fish or mussels (s.23.4)
Date Registration Filed:	08/25/2017
Confirmation ID:	M-102-7199885043
Version Number:	001
Update Date:	

Dear Sir/Madam,

DR DEAN FITZGERALD

244 Montrose ST N, UNIT, 1 Upper
CAMBRIDGE, ON N3H2H7

You have registered with the Ontario Regulation Reg. 242/08 of the *Endangered Species Act, 2007* and your Notice form has been received by the Ministry of Natural Resources and Forestry for activities eligible under the following regulatory provision:

Aquatic Species - Activities in the habitat of certain fish or mussels (s.23.4)
Bridge or Pier

located at:

Bridge that crosses Nith River at Holland Mills Road

For the species listed in Appendix A.

It is your responsibility to understand all the applicable requirements of registration and to be aware of which species are eligible or excluded in relation to your activity. **This includes monitoring changes to the SARO List (O. Reg. 230/08) as well as eligibility and requirements in the General Regulation O. Reg. 242/08.** Some requirements apply to all activities being initiated on the landscape, such as the minimization of adverse effects on the species. Other requirements vary by activity such as record keeping, monitoring, and creation of mitigation plans and reports. **Whenever documents are requested by the Ministry of Natural Resources and Forestry (MNRF) they are due within 14 days.**

Species observations must be reported directly to the Natural Heritage Information Centre, within three months, by completing a Rare Species Reporting Form available at http://www.ontario.ca/page/report-rare-species-animals-and-plants.

In addition to the General Regulation, information is available at http://www.ontario.ca/page/natural-resources-approvals.

You are required to show this Confirmation of Registration upon request of the Ministry. Please refer to Ontario Regulation 242/08 for requirements that apply to your activity.

Any questions related to this registration and/or the Natural Resources and Forestry Registry should be directed to:

Registry and Approval Services Centre
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300 Water Street
Peterborough, ON, K9J8M5
Toll-free: 1-855-613-4256
E-mail: mnr.rasc@ontario.ca

Appendix A:

Species impacted by the registered activity:

Silver Shiner (Notropis photogenis)

APPENDIX D

STATEMENT OF LIMITATIONS

STATMENT OF LIMITATIONS

The information, conclusions and recommendations given herein are specifically for WIlmot Township (the Client) only and for the scope of work described herein at Holland Mills Bridge, north of Haysville Ontario, in Wilmot Township, Ontario. It may not be sufficient for other uses. For this reason, Premier Environmental Services Inc. (Premier) does not accept responsibility for use by third parties.

The data, conclusions and recommendations which are present in this report, and the quality thereof, are based on a scope authorized by the Client. This information was garnered from a focal field study and literature review. Note however, that no scope of work, no matter how exhaustive, can identify all environmental constraints, contaminants or all conditions above and below ground that could pose technical challenges to the proposed infrastructure replacement across the Nith River. For example, conditions during the July and August inspections may differ from those encountered during other investigation and observed or measured conditions may change with time. This report therefore cannot warranty that all conditions on or off the Site are presented by those identified at specific locations.

Any recommendations and conclusions provided that are based on conditions or assumptions reported herein will inherently include any uncertainty associated with those conditions or assumptions. In fact many aspects involving professional judgment such as subsurface models and remediation criteria contain a degree of uncertainty which cannot be eliminated. This uncertainty should be managed by periodic review and refinement as additional information becomes available. Note also that standards, guidelines and practice related to environmental investigations may change with time. Those which are applied at the time of this study may be obsolete or unacceptable at a later date. Any topographic benchmarks and elevations referred to in this report are primarily to establish relative elevation differences around the bridge and should not be used for other purposes such as grading, excavation, planning, development, etc.

Any comments given in this report on potential remediation problems and possible methods are intended only for the guidance of the designer. The scope of work may not be sufficient to determine all of the factors that may affect construction or clean-up methods and costs. Contractors bidding on this project or undertaking clean-ups should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the conditions may affect their work. Any results from an analytical laboratory, title searcher or other subcontractor reported herein have been carried out by others, and Premier cannot warranty their accuracy. Similarly, Premier cannot warranty the accuracy of information supplied by the Client. Finally, only Wilmot Township is legally allowed to use the findings reported herein this environmental study.

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

85 McINTYRE DRIVE
KITCHENER, ONTARIO N2R 1H6

TELEPHONE (519) 748-1199
FAX (519) 748-6100

File No. 16-298

MEMORANDUM

Subject: Bridge 17/B-T13 (Holland Mills Road Bridge)
Township of Wilmot
Scoped Environmental Screening Report Recommendations

This memorandum is to confirm that the recommendations contained within the Scoped Environmental Screening Report will be implemented into the design and construction stages of the project.

Regards,

Allan Garnham, P. Eng.
Project Manager

10.

LEGAL SURVEY REPORT

- Legal Survey Report prepared by McKechnie Surveying Limited dated June 14, 2017

MCKECHNIE SURVEYING LTD.

10 John Street West
Waterloo, Ontario N2L 1A7
Tel: (519) 578-5570
Fax: (519) 578-9491
Email: plans@kwsurveys.ca

Association of Ontario Land Surveyors

June 14, 2017
File 17-014

The Corporation of the Township of Wilmot
c/o Trevor Hoard, C.E.T.
K. Smart Associates Ltd.
85 McIntyre Drive
Kitchener, ON.
N2R 1H6

Re: Holland Mills Road
Survey monuments found or set
No plan at this time
(Refer to the attached pdf scan showing the location of the monuments.)

Dear Trevor,

Further to our various discussions, the requested survey monuments have been set or found in the vicinity of the bridge over the Nith River – refer to the attached scan.

The section of road in question is identified by PIN 22188-0052 (south of the Nith River) and 22188-0114 (north of the Nith River.) The registered owner of both PIN's is The Corporation of the Township of Wilmot. We believe the Nith River itself to be self-evidently a navigable waterway, and if so the natural bed of the river remains unpatented Crown Land. (Our examination of the patents suggest no express grant of the bed was made, nor does it appear that a shoreline reservation was reserved.)

In the general area in question, it appears that in 1884 the Township acquired the land for valuable consideration by registered Instruments C6332, C6333 and C6339. Perhaps the road already existed within the bounds of these transfers, and perhaps the transfers formalized and made explicit an existing situation. (The road does not show on the 1861 Tremaine Map, but the mills in the vicinity of the road do show.) The 1946 aerial photograph clearly shows the road existing at that time. We were not able to locate a by-law establishing this particular section as highway – just the transfers and the fact of a travelled road.

The three transfers listed above (in total) appear to describe a strip of land 1 chain (66 feet or 20.117m) in width. This dimension generally holds true from Bleams Road southerly to and across the bridge and westerly until it reaches the long "southerly tangent" (having regard to the bed of the Nith River.)

10 John Street West
Waterloo, Ontario N2L 1A7
Tel: (519) 578-5570
Fax: (519) 578-9491
Email: plans@kwsurveys.ca

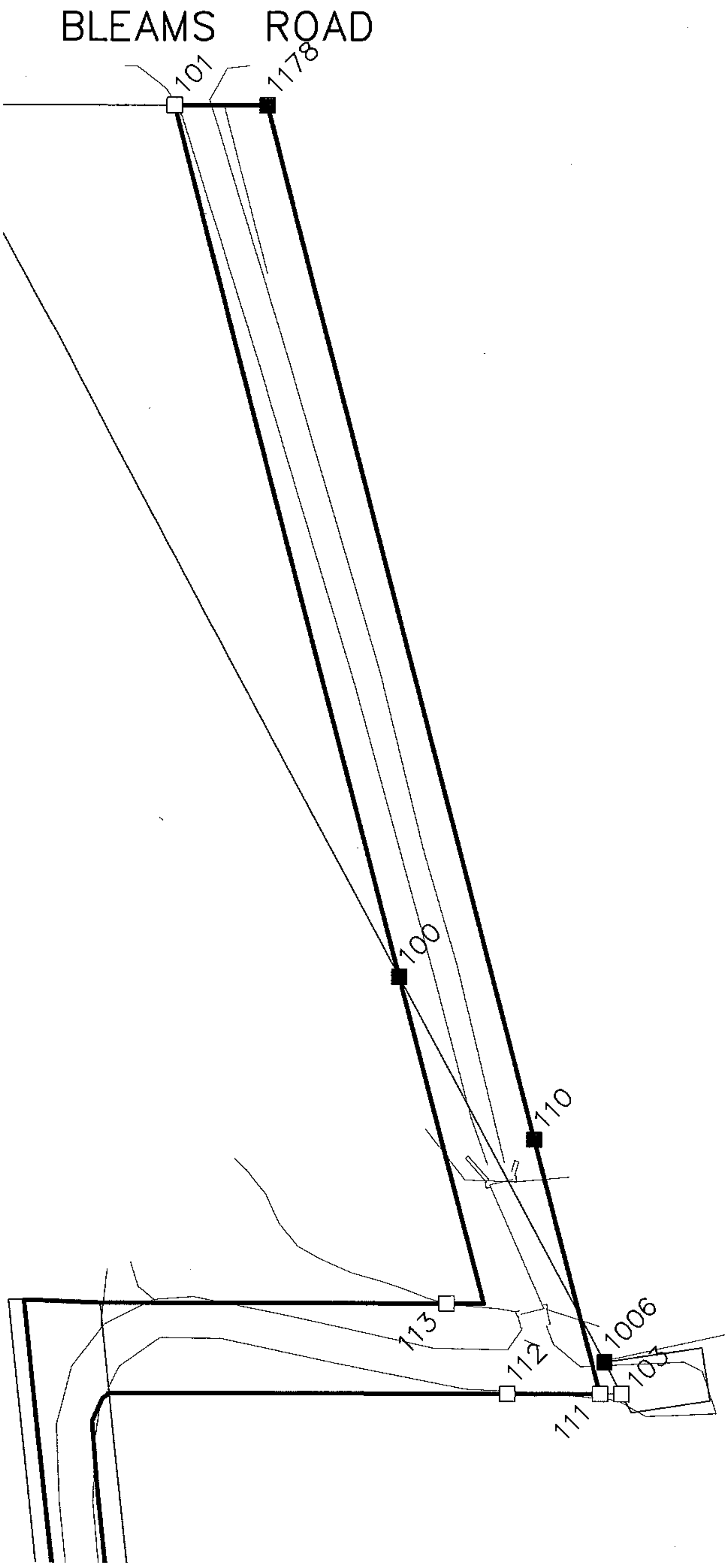
However, that southerly tangent does not appear to maintain that width and may only be approximately 38.7 feet (11.8m) in width. (Refer to reference plans 58R-421 and 58R-474 for those plan's interpretation of the original 1884 transfers C6332 and C6339.) My current level of research suggests that the Township did in fact and possibly after legal consultation adopt 58R-421 and 58R-474 as the proper interpretation of the facts, but that may be open to legal debate.

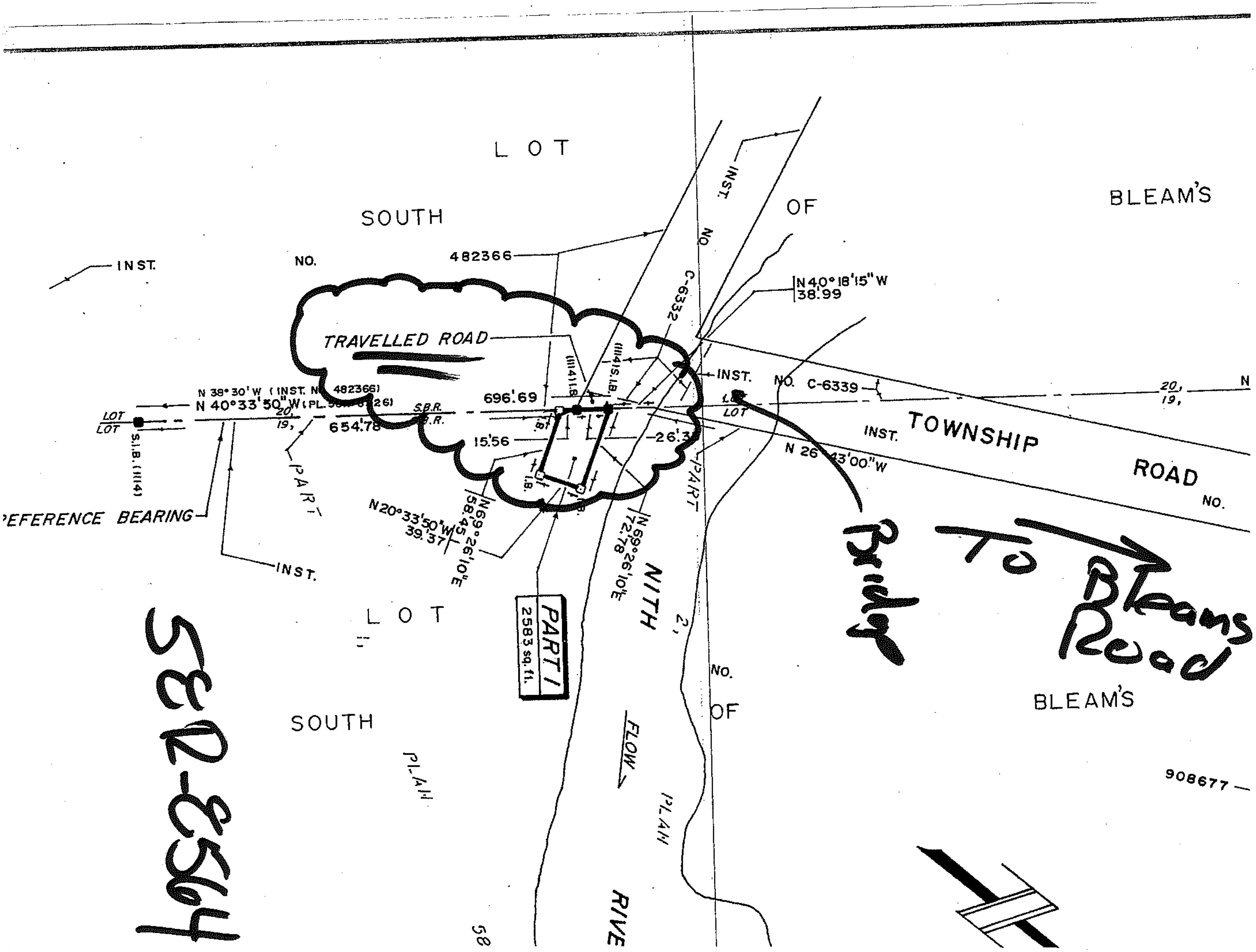
Also note the following situation just south of the bridge – refer to the partial copy of 58R-8564 attached. A series of reference plans (58R-8226, 58R-8564, 58R-11512) directly indicate a triangle of land beyond the bounds of the 1884 transfer C-6332 as a "Travelled Road" - I suppose meaning, "a road travelled by the public but in which neither a transfer to the municipality nor a by-law has been passed from which public highway can be completely inferred." [1] It seems to me that the trouble with this annotation is that one wonders what members of the general public would have actually used the triangle as a highway. I suppose the sole adjoining property would have used it to access their property from Holland Mills Road, and perhaps the snow plow as well once the bridge was no longer passable. Is this enough to establish a "travelled road?" Therefore: although we have monumented the triangle, as indicated on out attached sketch we have kept the heavy line to the 66 feet wide section and not included the triangle. If it is the intention to use the triangle as if it is a highway – and I personally see no better or legitimate current claimant, only a remnant of an ancient deed – then I suggest obtaining a legal opinion.

Sincerely yours,

Jeff Talbot, OLS
McKechnie Surveying Ltd.

1 It seems to me that it may be possible in these particular circumstances that the boundary clause of that limit in Instrument C6332 " ... thence along the same [east side of public road] ..." could perhaps be interpreted to include the triangle, but there is definitely doubt in that interpretation.


BLEAMS ROAD
101
1178
100
110
1006
113
112
103
111


LOT
SOUTH
NO.
INST.
482366
BLEAM'S
OF
INST.
NO.
C-6332
N 40° 18' 15" W
38.99
TRAVELLED ROAD
(1114) I.B.
(1114) S.I.B.
INST.
NO. C-6339
N 38° 30' W (INST. NO. 482366)
N 40° 33' 50" W (PL.
696.69
S.B.R.
654.78
15.56
26.3
20, 19,
LOT LOT
S.I.B. (1114)
PART
REFERENCE BEARING
N 20° 33' 50" W
39.37
N 69° 26' 10" E
58.45
N 69° 26' 10" E
72.78
TOWNSHIP
ROAD
INST.
N 26° 43' 00" W
NO.
PART
INST.
LOT
PART 1
2583 sq. ft.
NITH
2,
NO.
OF
SOUTH
PLAN
FLOW
PLAN
RIVE
58
908677
BLEAM'S
Bridge
To Bleams Road
5ER-E564

11.

HYDROLOGY REPORT

- Hydrology Report for Holland Mills Road Bridge (Bridge 17/B-T13) prepared by K. Smart Associates Limited dated September 2017

HYDROLOGY REPORT

HOLLAND MILLS ROAD BRIDGE
(BRIDGE 17/B-T13)
REPLACEMENT

TOWNSHIP OF WILMOT

LOTS 19 & 20, CONCESSION SOUTH OF BLEAMS ROAD (WILMOT)

SEPTEMBER 2017

K. SMART ASSOCIATES LIMITED
85 McIntyre Drive
Kitchener ON N2R 1H6

INDEX

HOLLAND MILLS ROAD BRIDGE
(BRIDGE 17/B-T13)
REPLACEMENT
TOWNSHIP OF WILMOT
HYDROLOGY REPORT

1.0 INTRODUCTION

The Township of Wilmot intends to replace the Holland Mills Road Bridge, otherwise known as Bridge 17/B-T13. The existing bridge is a single span steel through truss supported on concrete abutments. The structure was built in 1910. It is unknown if any previous hydrology studies have been completed for this structure.

The purpose of this study is to ensure that the new structure would have adequate hydraulic capacity and no significant changes to the level of the Regional Storm will occur upstream of the proposed new structure.

2.0 LOCATION

Holland Mills Road Bridge is located on Holland Mills Road over the Nith River, approximately 250m south of Bleams Road (R.R. 4) at Lots 19 and 20, Concession South of Bleams Road, in the Township of Wilmot in the Region of Waterloo.

3.0 BACKGROUND INFORMATION AND REFERENCES

3.1 Background Information

The following background information was compiled to prepare this report:

- 1:50,000 topographic maps for Cambridge, Conestogo, Guelph, Lucan, Seaforth, St Marys, Stratford and Woodstock
- Soil maps for Waterloo, Perth and Wellington Counties
- Record of flow from gauging station 02GA018 (Nith River at New Hamburg) for the period 1951-2012
- Nith River Flood Line Mapping Study prepared for GRCA in approximately April 1985
- Topographic engineering survey completed by KSAL in September 2016

3.2 References

The following references were consulted:

- MTO Drainage Management Manual
- Canadian Highway Bridge Design Code 2014
- MTO Highway Drainage Design Standards published January 2008

4.0 EXISTING CONDITIONS

4.1 Roadway Classification

Holland Mills Road is classified as a Rural Local Undivided with an assumed design speed of 40 km/hr, otherwise known as RLU 40.

4.2 Watershed Characteristics

Area of Watershed = 572.1 km^2
Length of River = 72.8 km
Average Slope of Watershed = 0.09%
CN (AMC II) = 76.6
Time to Peak = 26.96 hrs

4.3 Existing Structure

The existing structure is a single span steel through truss bridge with a span of 29.7m and an overall width of 4.9m. It is assumed the bridge was constructed in approximately 1910.

The existing stream bed elevation is approximately 321.73m and the soffit elevation is 327.76m.

4.4 Waterway Adequacy

The opening area is not adequate to pass the 10, 25, and 100 year design storms

4.5 Major Flood

It is known that major storms overtop Holland Mills Road at the north roadway approach.

4.6 Relief Flows

Relief flow is over the north and south roadway approaches.

4.7 Existing Roadside and Structure Drainage

Runoff from the roadway is directed to and collected in roadside swales. The swales drain directly to the river.

Runoff from the structure deck is directed to deck drains. These deck drains outlet directly into the river.

4.8 Upstream Structures

a) Approximately 3.2 km upstream, there is a 69.6m three span concrete bridge on Provincial Highway 7/8 which was constructed in 1989.
Total Opening area = 438 m^2

b) Approximately 5.2 km upstream, there is a 39.9m single span steel through truss bridge on Huron Street in New Hamburg which was constructed in 1936.
Total opening area = 232 m^2

4.9 Downstream Structures

a) Approximately 6.8 km downstream, there is a 61.2m two span concrete girder bridge on Huron Road which was constructed in 2000.
Total opening area = 234 m^2

b) Approximately 11.5km downstream, there is a single span steel through truss bridge on Bridge Street which was constructed in 1913.
Total opening area = 191 m^2

5.0 ESTIMATED FLOWS

5.1 Flow Estimate Methods

The following methods were used to estimate the flows at this structure:

- Modified Index Flood Method
- Single Station Frequency Analysis
- PCSWMM

5.2 Summary of Estimated Flows

Storm	Method	Flows (m^3/s)
10 Year	Modified Index Flood Method	176.5
	Single Station Frequency Analysis	327.5
	PCSWMM	--
25 Year	Modified Index Flood Method	215.3
	Single Station Frequency Analysis	412.7
	PCSWMM	--
100 Year	Modified Index Flood Method	273.4
	Single Station Frequency Analysis	514.6
	PCSWMM	--
Regional	Modified Index Flood Method	--
	Single Station Frequency Analysis	--
	PCSWMM	926.3

5.3 Design Flows

Reference is made to “Highway Drainage Design Standards” to determine the return period for the normal design flood for this structure. Based on Holland Mills Road being classified as a local road and the proposed span exceeding 6.0m, a 25 year return period shall be used. A 100 year return period shall be used for the check flood for scour.

As the Nith River is a regulated watercourse, the Regional Storm shall also be considered.

As the data used to compile the flows for the Single Station Frequency Analysis is the most recent and up-to-date, these flow rates will be used. The flow rate generated from

PCSWMM will be used for the Regional Storm. Therefore the design flows shall be:

Q_{10} = 327.5 m^3/s
Q_{25} = 412.7 m^3/s
Q_{100} = 514.6 m^3/s
Q_{REG} = 926.3 m^3/s

6.0 DESIGN CRITERIA

It is known and accepted that Holland Mills Road will overtop during the spring freshet and, of course, during extreme flow events. The existing Holland Mills Road Bridge is unusually small compared to other bridges over the Nith River because of the large amount of relief flow provided by the adjacent roadway. Normally, structures are designed to convey the estimated design flow for a given design storm without causing any flooding and no change is permitted to the level of the Regional Storm. However, for the case of the Holland Mills Road Bridge, this design criteria will result in an excessively large, unrealistic structure with significant raising of the adjacent roadway approaches. Such a structure and roadway will have negative environmental and economic impacts with minimal overall benefit. As such, the following modified design criteria shall be met:

a) The opening of the proposed structure combined with relief flow over the roadway shall be sufficient so that there is no increase in water level at any of the design storms considered in this report.

b) Consideration of scour adjacent to spread or strip footings.

c) There should not be an increase in the level of the Regional flood plain. An increase of more than 100mm would be considered a significant increase.

d) The roadway approaches may provide relief flow if the geometry of the roadway profile would permit.

e) Roadway approaches, if subject to relief flow below the 25 year design storm, shall be armoured to prevent scour.

f) A navigable clearance envelope of at least 10.0m wide by 2.5m tall.

g) 2% cross-fall across the deck to provide adequate bridge deck drainage.

7.0 PROPOSED STRUCTURE

The proposed structure shall be as follows:

Single span slab-on-girder bridge (prestressed concrete box girders)
Construction type to be semi-integral abutment style
Foundation to be spread footings
Span = 32.9m (centre of bearing to centre of bearing)
Skew = 0˚
Stream bed elevation = 321.73 (same as existing)
Low soffit elevation = 327.60
Effective total opening area = 157.88 m^2

8.0 ROADWAY IMPROVEMENTS

8.1 Horizontal Alignment

No changes to the horizontal alignment of Holland Mills Road are proposed.

8.2 Vertical Alignment

The vertical alignment of Holland Mills Road will be upgraded to a 40 km/hr design speed adjacent to the proposed structure. This will involve raising the roadway overtop the structure to provide a 0.3% longitudinal grade across the bridge. The north and south roadway approaches immediately adjacent to the bridge will be raised to 6%. Sag and crest vertical curves will be used to tie these grades to the existing approach and proposed structure grades respectfully. The roadway approach grades further away from the structure will be left intact.

The vertical alignment of Holland Mills Road where it intersects with Bleams Road will be upgraded to a 50 km/hr design speed and to provide a “landing zone” to improve sight distance and turning movements. This will involve extending the 2% (assumed) cross-fall grade from Bleams Road onto Holland Mills Road and providing a 4% transition grade between the existing approach grade and the cross-fall grade. Sag and crest vertical curves will be provided to tie all the grades together.

8.3 Cross-Section Elements

Holland Mills Road will be widened to provide 2 traffic lanes and shoulders over the structure and the roadway approaches adjacent to the structure. 2% cross-fall will be provided for positive roadway drainage, 1.5H to 1.0V sideslopes will be provided to support the roadway embankment and 1.5H to 1.0V backslopes will be used to tie-in to the existing ground where necessary. Roadway drainage will be provided by roadside swales on both sides of Holland Mills Road. Roadside swales will drain towards the river.

9. SUMMARY OF HYDRAULIC ANALYSIS

Hydraulic analysis using hand calculations has been completed for both the existing and proposed conditions. For flow under the bridge, the Open Channel Method of analysis has been used. For flow over the roadway approaches, the Weir Flow Method has been used.

The table below shows a comparison for the existing and proposed conditions.

Location	Storm Event	Flow m^3/s	High Water Elevation (m)	
			Existing	Proposed
Bridge	10 Year	327.5	326.70	326.62
	25 Year	412.7	326.90	326.89
	100 Year	514.6	327.10	327.09
	Regional	926.3	327.55	327.65

For further details, see Appendix A.

The above table indicates that there is a slight decrease between the existing and proposed conditions at the 10, 25 and 100 year design storms. This table also indicates that there is an increase of 100mm between the existing and proposed conditions at the Regional Storm. In general, the above table indicates that there would not be significant changes in the hydrology of the proposed conditions.

10. EROSION PROTECTION

To protect against erosion, rock protection will be placed on embankments underneath the structure and at the corners of the structure to above the 25 year water level. Rock protection will be laid on geotextile underlay.

11. SCOUR PROTECTION

To protect against possible undermining of the footings by scour, the footings will be surrounded with steel sheet piling and the grade will be protected with rock protection.

The roadway approaches, mainly the north, will be armoured with cable concrete to prevent scouring of the roadway platform.

12. BRIDGE DECK DRAINAGE

Bridge deck drainage will be accomplished by providing 2% cross-fall across the deck and providing a side mounted “open” railing system.

This system is ideal because of the relative size of the deck and it is maintenance free.

13. EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

A detailed erosion and sediment control drawing will be prepared to control erosion and sedimentation during the construction. This same drawing will also show the proposed dewatering scheme.

14. CONSTRUCTION

The roadway is currently closed at the bridge, and therefore traffic is detoured around the site using the existing road network. It is recommended that the proposed structure occur in single stage construction (ie. full road closure).

Removal of the existing structure could be accomplished by first removing the wood bridge deck, steel stringers and railing system. Using cranes to brace each truss, the bridge could be cut into halves where after the trusses could be lifted onto the existing roadway for disposal. The existing concrete abutments and foundations can be removed using a hydraulic excavator equipped with a hydraulic breaker.

Construction of the proposed structure will require in-water work. To minimize effects to the natural environment, all in-water work should be completed within the allowable in-water work timing windows. Sheet pile cofferdams would be constructed to isolate the watercourse from the construction and to permit work to proceed in the dry.

The new bridge would be constructed in stages starting with the footings, abutments and wingwalls to bearing seat level, placement of girders, construction of deck and remaining portions of wingwalls, and finally erection of the steel railing system.

The roadway would be constructed last so that it matches the bridge. Backfill adjacent to the new bridge would be placed in stages and only after the concrete deck was placed.

15. CONCLUSIONS

The hydraulic analysis has indicated that there would not be significant changes in the hydrology between the existing conditions and the proposed conditions. Overall, there is slight improvement in water level elevations at all design storms considered except at the Regional Storm. While there is an increase in water level at the Regional Storm, this increase is within the allowable limit.

The proposed structure also satisfies the stated design criteria.

Bridge deck drainage, erosion and sediment control during construction as well as construction details will be provided on the engineering drawings. These drawings are not included within this report.

It is our conclusion that the proposed structure would adequately serve the hydrology requirements.

All of which is respectfully submitted.

Allan Garnham, P. Eng.
Project Manager

Darryl Schwartzentruber, C. Tech

LICENSED PROFESSIONAL ENGINEER
A. L. GARNHAM
100123077
PROVINCE OF ONTARIO

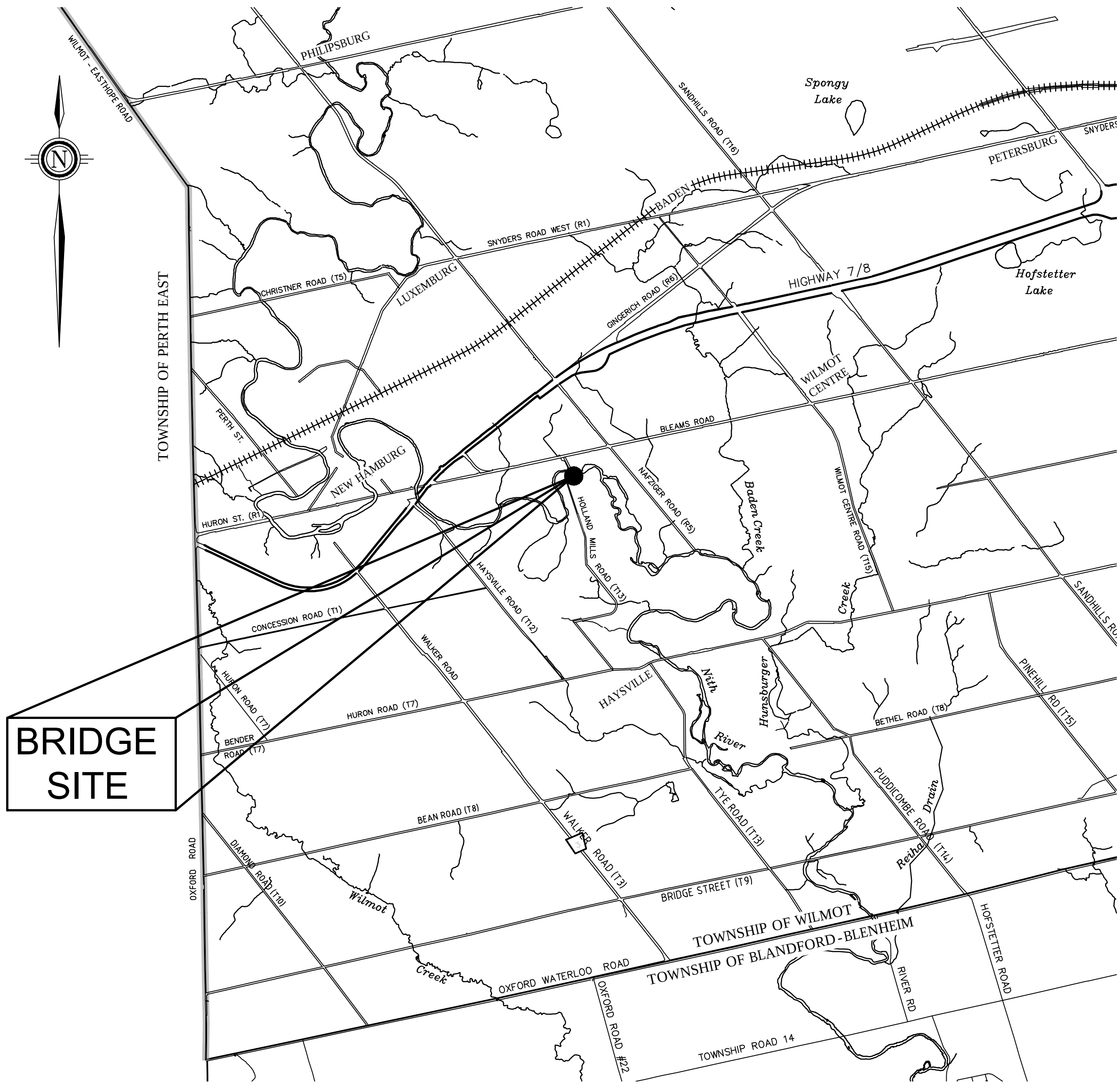
APPENDIX A

- Key Plan
- Watershed Plan
- Soils Map
- Hydraulic Computations

BRIDGE 17/B-T13
(HOLLAND MILLS ROAD BRIDGE)

TOWNSHIP OF WILMOT

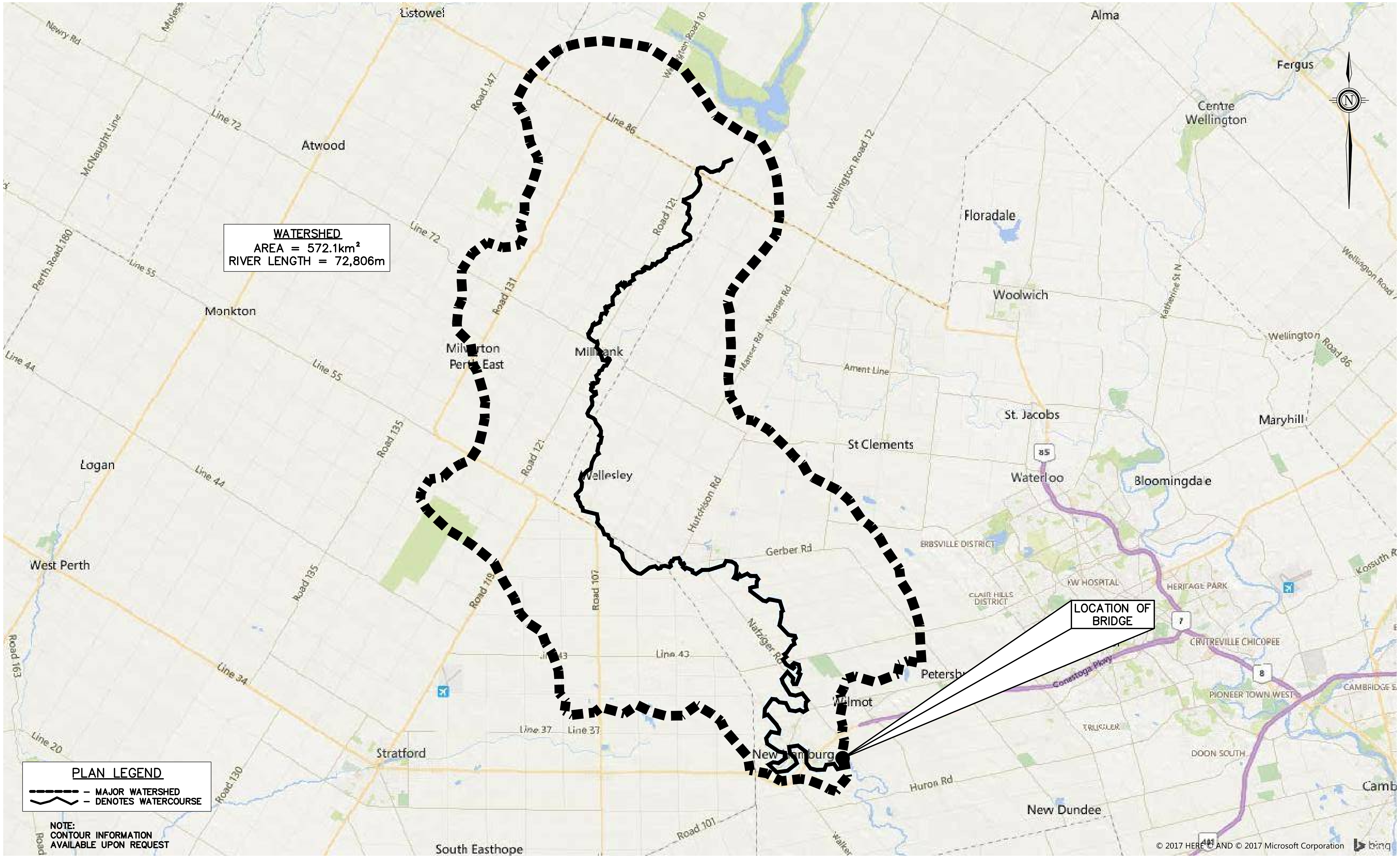
REGION OF WATERLOO



KEY PLAN

N.T.S.

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER SUDBURY



No.	REVISION	DATE

DESIGNED BY: --
CHECKED BY: --
DRAWN BY: P.M.
CHECKED BY: A.G.
FIELD BOOK:

SCALE
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1000m 0 2000m

HOLLAND MILLS RD. BRIDGE REPLACEMENT

TOWNSHIP OF WILMOT REGION OF WATERLOO

WATERSHED PLAN

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER SUDBURY

JOB NUMBER: 16-298
DATE: AUGUST 2017
DRAWING NUMBER: WATERSHD

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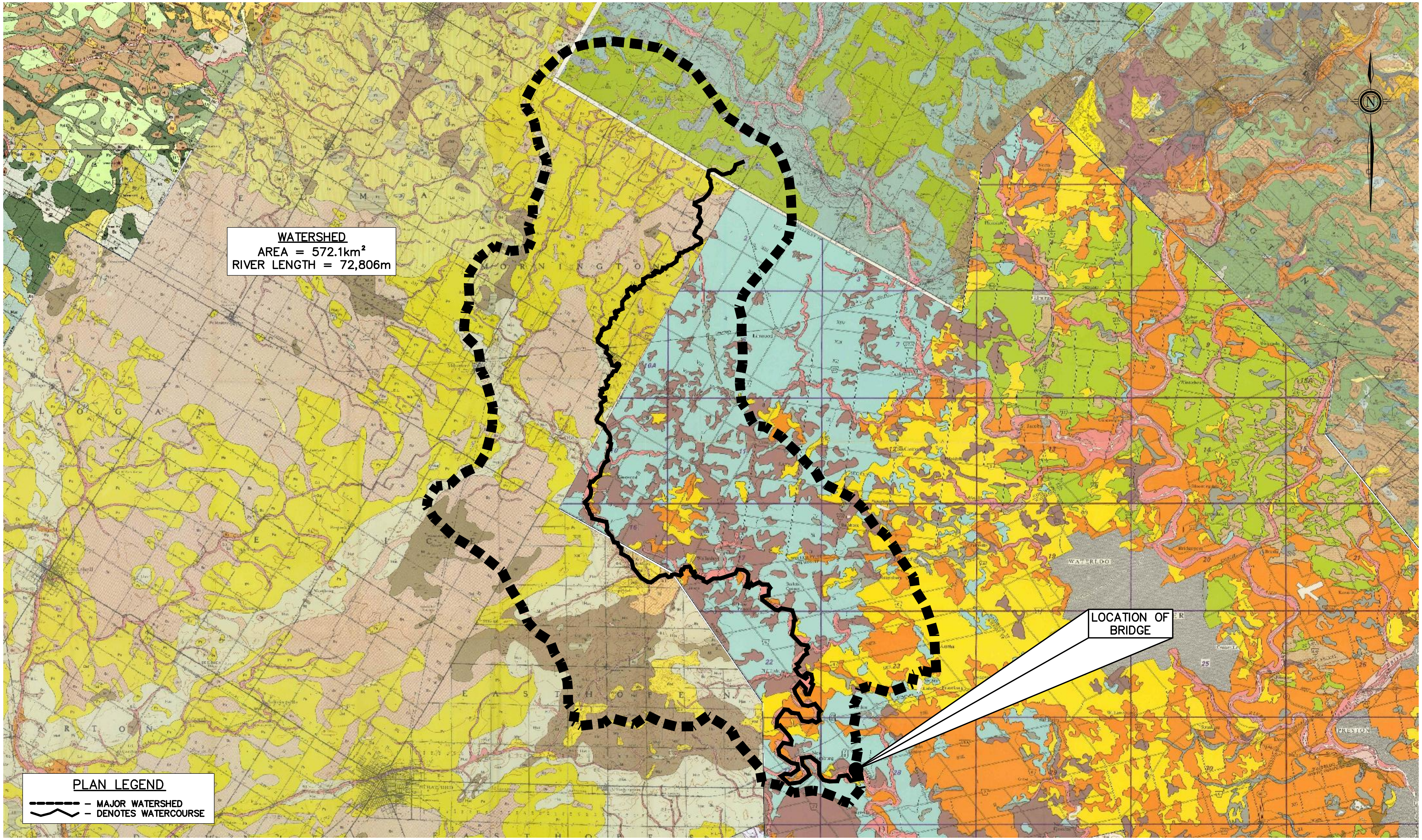

No.	REVISION	DATE

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CHECKED BY: A.G.
FIELD BOOK:

SCALE
1:100,000
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HOLLAND MILLS RD. BRIDGE REPLACEMENT

TOWNSHIP OF WILMOT — REGION OF WATERLOO

SOILS MAP

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER — SUDBURY

JOB NUMBER: 16-298
DATE: AUGUST 2017
DRAWING NUMBER: SOIL

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Holland Mills Road Bridge Replacement
(Wilmot Bridge 17/B-T13)
(KSAL 16-298)

Watershed Characteristics:

Watershed Area: 572.1 km²

Length of Creek: 72806 m

Slope of the Main Channel:

By the 85/10 Method

Length at 10% = 72806 x 0.10
Length at 10% = 7281 m

Actual distance = 5304 m
Elevation= 330 m

Length at 85% = 72806 x 0.85
Length at 10% = 61885 m

Actual distance = 59518 m
Elevation= 380 m

$$\text{Slope} = \frac{\text{rise}}{\text{run}}$$

$$\text{Slope} = \frac{380 - 330}{59518 - 5304}$$

$$\text{Slope} = \frac{50}{54214}$$

Slope = 0.0009 m/m

Land Use (From MTC Chart H2-7):

Waterloo		Wellington		Perth	
% of Watershed:	43	% of Watershed:	8	% of Watershed:	49
Crop:	71	Crop:	61	Crop:	68
Pasture:	20	Pasture:	30	Pasture:	26
Wood:	9	Wood:	9	Wood:	6

Watershed Land Use:

Crop:	69	%
Pasture:	24	%
Wood:	8	%

Soil Classification:

From Soil Maps of: Wellington County (North Sheet)
Waterloo County
Perth County

Soil Series	Map Symbol	Area	Hydraulic Soil Group
Bennington-Bookton	--	58.1 km²	B
Bottom Land	B.L.	25.1 km²	L/W
Brant-Waterloo	--	38.4 km²	A
Brookston Clay Loam	Bc	42.5 km²	C
Brookston Silt Loam	Bs	24.1 km²	C
Burford-Fox	--	18.0 km²	AB
Grand-Kirkland	--	15.7 km²	B
Guelph Loam	Gl	2.7 km²	BC
Harriston Silt Loam	His.	35.8 km²	BC
Huron Clay loam	Huc	157.3 km²	D
Huron Silt Loam	Hus	8.4 km²	BC
Listowel Silt Loam	Lsi	3.5 km²	BC
Muck	M	12.2 km²	B
Parkhill Loam	Pl	1.9 km²	BC
Perth Clay Loam	Pc	119.8 km²	CD
Waterloo Sandy Loam	Wsl	8.5 km²	A
	Area Sum =	572.1	see MTO Drainage Design Chart 1.09
	Watershed Area =	572.1 *check*	

Hydraulic Soil Group	Area	% of Watershed
A	46.9 km²	8.19%
AB	18.0 km²	3.15%
B	86.0 km²	15.03%
BC	52.4 km²	9.16%
C	66.6 km²	11.65%
CD	119.8 km²	20.94%
D	157.3 km²	27.49%
L/W	25.1 km²	4.38%
Area Sum =	572.1	
Watershed Area =	572.1 km²	*check*

CN Calculation:

		Crop		Pasture		Wood		
HSG	Area (km²)	Area	CN	Area	CN	Area	CN	Σ Areas x CNs
A	46.9	32.2	66	11.1	58	3.5	50	2948.3
AB	18.0	12.4	70	4.3	62	1.4	54	1206.7
B	86.0	59.1	74	20.4	65	6.5	58	6074.2
BC	52.4	36.0	78	12.4	71	3.9	65	3948.9
C	66.6	45.8	82	15.8	76	5.0	71	5314.1
CD	119.8	82.3	84	28.4	79	9.0	74	9830.8
D	157.3	108.1	86	37.3	81	11.8	77	13234.5
L/W	25.1	17.2	50	6.0	50	1.9	50	1253.8
							Total =	43811.2

$$CNavg = \frac{\text{Total}}{\text{WS Area}} = \frac{43811.2}{572.1}$$

$$= 76.6 \quad \text{(AMC II)}$$

Time to Peak:

Use three-parameter HYMO Equation

$t_p = 0.0086 * A^{0.422} * S^{-0.46} * (L/W)^{0.133}$

A = drainage area, hectares
A = 572.1 km^2 * 100
A = 57215 hectares

S = slope, m/m
S = 0.0009 m/m

L = Length of creek, m
L = 72806 m

$W_{avg} = \frac{W_1 + W_2 + W_3}{3}$ = Width of watershed, m

W_1= 13704 m (at creek length = 67300m)
W_2= 13371 m (at creek length = 52650m)
W_3= 17004 m (at creek length = 39100m)
W_{avg}= 14693 m
W_{avg}= 14700 m

t_p = time to peak, hours
$t_p = 0.0086 * A^{0.422} * S^{-0.46} * (L/W)^{0.133}$
$t_p = 0.0086 * (57215)^{0.422} * (0.0009)^{-0.46} * (72805/14700)^{0.133}$
t_p = 26.96 hours

Estimated Flows:

Modified Index Flood Method:

Watershed Type:	Southern		
Watershed Area:	572.1	km²	
Watershed Slope:	0.0009	m/m	
CN:	76.6		
Base Watershed Class:	8.95		(MTO Drainage Manual Design Chart 1.17)
	+		
Slope Adjustment:	-0.95		(Design Chart 1.18)
	=		
Net Watershed Class:	8.00		
Class Coefficient, C:	1.84		(Design Chart 1.15)

$Q_{25} = CA^{0.75}$

$Q_{25} = (1.84)(572.1)^{0.75}$

$Q_{25} =$ 215.3 m³/s

$Q_{10} = FCF_{10}Q_{25}$ $FCF_{10}=$ 0.82 Chart H5-9(a)

$Q_{10} = (0.82)(215.3)$

$Q_{10} =$ 176.5 m³/s

$Q_{100} = FCF_{100}Q_{25}$ $FCF_{10}=$ 1.27 Chart H5-9(a)

$Q_{100} = (1.27)(215.3)$

$Q_{100} =$ 273.4 m³/s

Single Station Frequency Analysis:

Use gauging station 02GA018 - Nith River at New Hamburg:

From line of best fit produced from Return Period Vs Flow:

$Q_{10} =$ 315 m³/s

$Q_{25} =$ 397 m³/s

$Q_{100} =$ 495 m³/s

Now transport discharge back to Holland Mills Road Bridge:

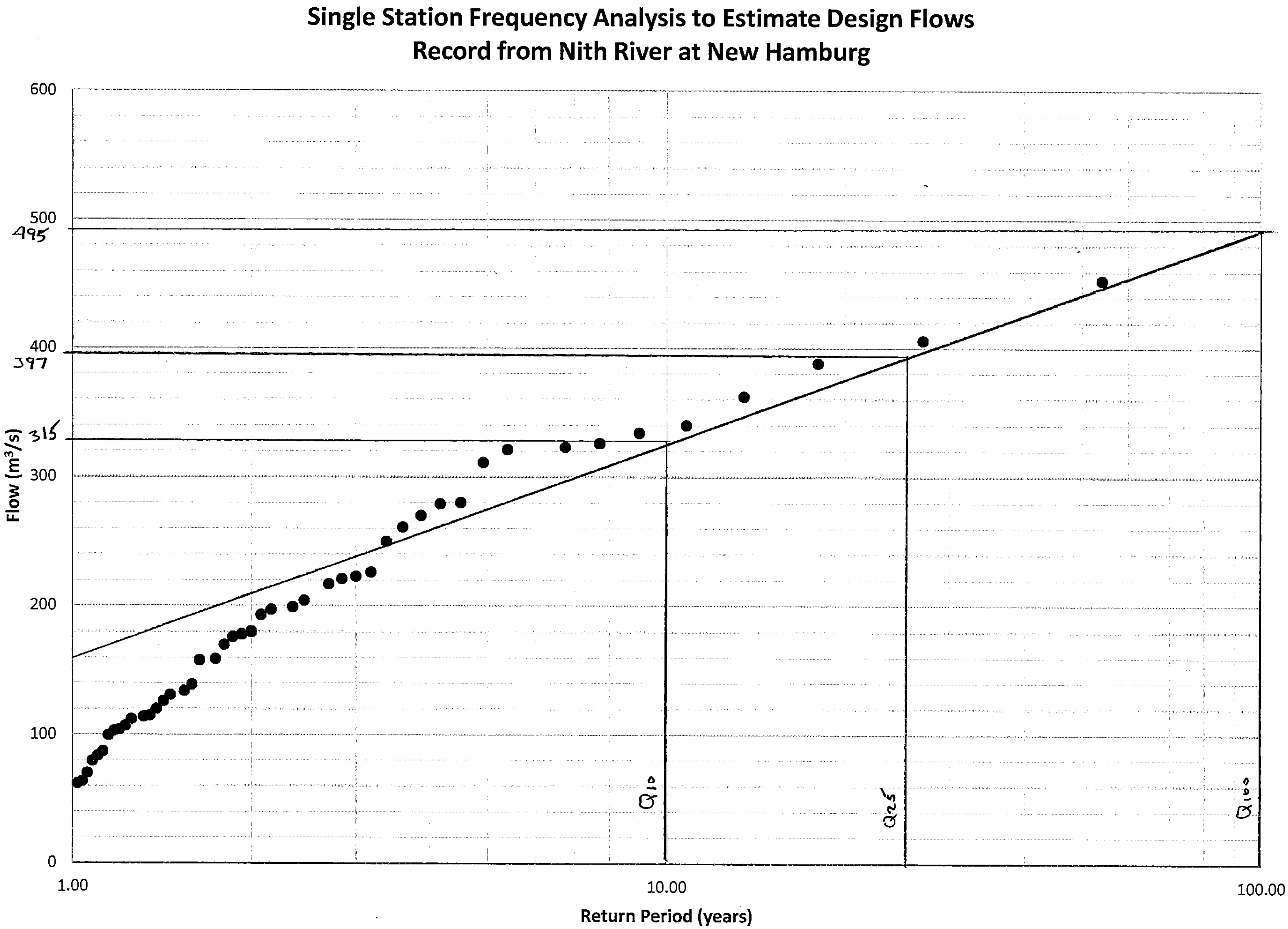
$A_1 =$ 572.15 km^2
$A_2 =$ 543.23 km^2

$A_1/A_2 = (572.15) / (543.23)$
$A_1/A_2 = 1.05$

$Q_{10} = Q_{10} (A_1/A_2)^{0.75}$
$Q_{10} = (315.0)(1.05)^{0.75}$
$Q_{10} =$ 327.5 m³/s

$Q_{25} = Q_{25} (A_1/A_2)^{0.75}$
$Q_{25} = (397.0)(1.05)^{0.75}$
$Q_{25} =$ 412.7 m³/s

$Q_{100} = Q_{100} (A_1/A_2)^{0.75}$
$Q_{100} = (495.0)(1.05)^{0.75}$
$Q_{100} =$ 514.6 m³/s


Single Station Frequency Analysis to Estimate Design Flows
Record from Nith River at New Hamburg
600
500
495
400
397
315
300
200
100
0
Flow (m3/s)
1.00
10.00
100.00
Return Period (years)
Q10
Q25
Q100

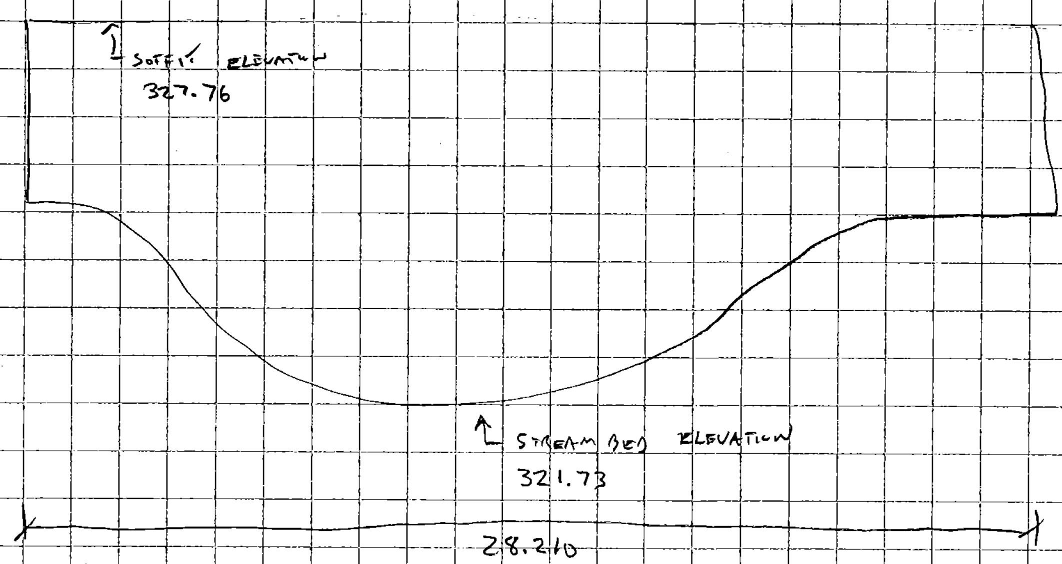
Summary of Estimated Flows:

Design Storm	Modified Index	Single Station Frequency Analysis	PCSWMM
10	176.5	327.5	--
25	215.3	412.7	--
100	273.4	514.6	--
Regional	--	--	926.3

Therefore, the design flows for this structure will be:

Q_{10}	327.5	m³/s
Q_{25}	412.7	m³/s
Q_{100}	514.6	m³/s
Q_{REG}	926.3	m³/s

EXISTING CONDITIONS



LOW POINT OF ROADWAY = 326.21 m

USE OPEN CHANNEL METHOD TO ELEVATION 326.21

THEN USE WEIR FLOW METHOD U/ TO REGIONAL WATER LEVEL

ASSUME $n = 0.03$

USE SLOPE OF CHANNEL = 0.0009 m/m

TRY WATER LEVEL AT ELEV. 325.00

$A = 66.865\ m^2$

$P = 30.417\ m$

$$R = \frac{A}{P} = \frac{66.865}{30.417} = 2.198$$

$$V = \frac{R^{2/3}\sqrt{S}}{n} = \frac{2.198^{2/3}\sqrt{0.0009}}{0.03} = 1.691\ m/s$$

$$Q = AV = 66.865\,(1.691) = 113.1\ m^3/s$$

TRY WATER LEVEL AT ELEV. 325.50

$A = 80.968\ m^2$

$P = 31.478\ m$

$$R = \frac{80.968}{31.478} = 2.572$$

$$V = \frac{2.572^{2/3}\sqrt{0.0009}}{0.03} = 1.877\ m/s$$

$$Q = 80.968\,(1.877) = 152.0\ m^3/s$$

TRY WATER LEVEL AT ELEV. 326.00

$A = 95.073\ m^2$

$P = 32.478\ m$

$R = \frac{95.073}{32.478} = 2.927$

$$V = \frac{2.927^{2/3}\sqrt{0.0009}}{0.03}$$

$= 2.046\ m/s$

$Q = 95.073\ (2.046)$
$= 194.5\ m^3/s$

TRY WATER LEVEL AT ELEV. 326.21 (JUST BELOW ROADWAY)

$A = 100.997\ m^2$

$P = 32.898\ m$

$R = \frac{100.997}{32.898} = 3.070$

$$V = \frac{3.070^{2/3}\sqrt{0.0009}}{0.03}$$

$= 2.112\ m/s$

$Q = 100.997\ (2.112)$
$= 213.3\ m^3/s$

TRY WATER LEVEL AT ELEV. 326.50

BRIDGE

$A = 109.178\ m^2$
$P = 33.478\ m$

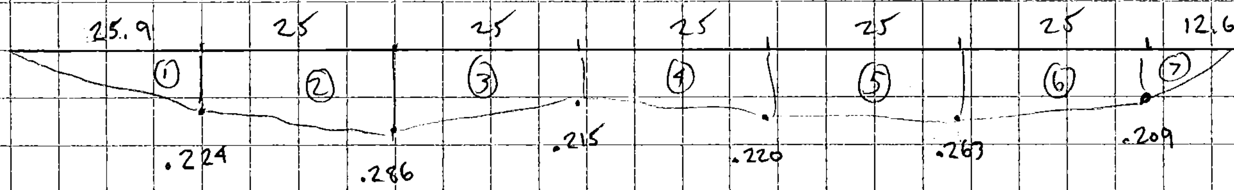
$R = \frac{109.178}{33.478} = 3.261$

$$V = \frac{3.261^{2/3}\sqrt{0.0009}}{0.03}$$

$= 2.199\ m/s$

$Q = 109.178\ (2.199)$
$= 240.1\ m^3/s$

WEIR FLOW



AREA 1

$$h_{avg} = \frac{.224}{2}$$
$$= 0.112$$

ASSUME "B" = 6.0

$$\frac{h}{B} = \frac{0.112}{6.0}$$
$$= 0.018$$

$\therefore$ $C = 2.62$

$\therefore$ $Q = 0.55\, C L H^{1.5}\, k_t$

Assume $k_t = 1.0$

Now $Q = 0.55\,(2.62)\,(25.9)\,(0.112)^{1.5}\,(1.0)$
$= 1.4\ m^3/s$

AREA 2

$$h_{avg} = \frac{.224 + .286}{2}$$
$$= 0.255$$

$$\frac{h}{B} = \frac{.255}{6.0}$$
$$= 0.04$$

$\therefore$ $C = 2.77$

$Q = 0.55\,(2.77)\,(25)\,(.255)^{1.5}\,(1.0)$
$= 4.9\ m^3/s$

AREA 3

$$h_{avg} = \frac{.286 + .215}{2}$$
$$= 0.251$$

$$C = 2.77$$

$$Q = 0.55\,(2.77)\,(25)\,(.251)^{1.5}\,(1.0)$$
$$= 4.8 \ m^3/s$$

AREA 4

$$h_{avg} = \frac{.215 + .220}{2}$$
$$= 0.218$$

$$C = 2.74$$

$$Q = 0.55\,(2.74)\,(25)\,(.218)^{1.5}\,(1.0)$$
$$= 3.8 \ m^3/s$$

AREA 5

$$h_{avg} = \frac{.220 + .263}{2}$$
$$= 0.242$$

$$C = 2.76$$

$$Q = 0.55\,(2.76)\,(25)\,(.242)^{1.5}\,(1.0)$$
$$= 4.5 \ m^3/s$$

AREA 6

$$h_{avg} = \frac{.263 + .209}{2}$$
$$= 0.236$$

$$C = 2.76$$

$$Q = 0.55\,(2.76)\,(25)\,(0.236)^{1.5}\,(1.0)$$
$$= 4.4 \ m^3/s$$

AREA 7

$$h_{avg} = \frac{.209}{2}$$
$$= 0.105$$

$C = 2.62$

$$Q = 0.55\,(2.62)\,(12.6)\,(.105)^{1.5}\,(1.0)$$
$$= 0.6 \ m^3/s$$

$$\therefore \ Q_{WEIR} = 1.4 + 4.9 + 4.8 + 3.8 + 4.5 + 4.4 + 0.6$$
$$= 24.4 \ m^3/s$$

$$Q_{TOTAL} = 240.1 + 24.4$$
$$= 264.5 \ m^3/s$$

TRY WATER LEVEL AT ELEV. 326.75

BRIDGE

$A = 116.230\ m^2$

$P = 33.978\ m$

$R = \frac{116.230}{33.978} = 3.421$

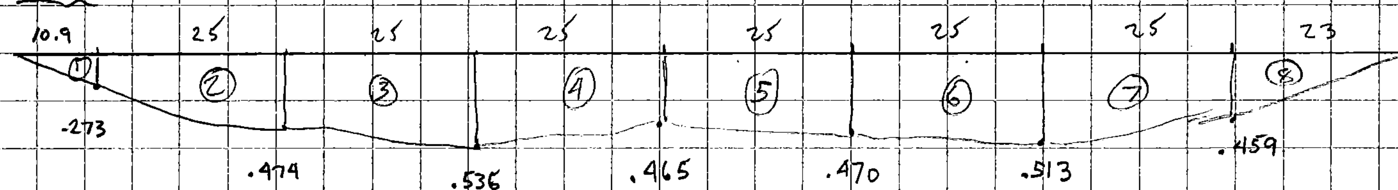
$V = \frac{3.421^{2/3}\sqrt{0.0009}}{0.03}$

$= 2.27\ m/s$

$Q = 116.230\ (2.27)$

$= 263.8\ m^3/s$

WEIR



AREA 1

$h_{avg} = \frac{.273}{2}$

$= 0.137$

$\frac{h}{B} = \frac{0.137}{6.0}$ WHERE "B" = 6.0

$= 0.023$

$\therefore\ C = 2.66$

$Q = 0.55\ (2.66)\ (10.9)\ (.137)^{1.5}\ (1.0)$

$= 0.8\ m^3/s$

AREA 2

$$h_{avg} = \frac{.273 + .474}{2} = 0.374$$

$$\frac{h}{B} = \frac{.374}{6} = 0.06$$

$\therefore \quad C = 2.86$

$$Q = 0.55(2.86)(25)(.374)^{1.5}(1.0) = 9.0 \ m^3/s$$

AREA 3

$$h_{avg} = \frac{.474 + .536}{2} = 0.505$$

$$\frac{h}{B} = \frac{.505}{6.0} = 0.08$$

$\therefore \quad C = 2.94$

$$Q = 0.55(2.94)(25)(.505)^{1.5}(1.0) = 14.5 \ m^3/s$$

AREA 4

$$h_{avg} = \frac{.536 + .465}{2} = 0.501$$

$\therefore \quad C = 2.94$

$$Q = 0.55(2.94)(25)(0.501)^{1.5}(1.0) = 14.3 \ m^3/s$$

AREA 5

$$h_{avg} = \frac{.465 + .470}{2}$$
$$= .468$$

$\therefore C = 2.91$

$$Q = 0.55\,(2.91)(25)(.468)^{1.5}$$
$$= 12.8 \ m^3/s$$

AREA 6

$$h_{avg} = \frac{.470 + .513}{2}$$
$$= 0.492$$

$\therefore C = 2.93$

$$Q = 0.55\,(2.93)(25)(.492)^{1.5}(1.0)$$
$$= 13.9 \ m^3/s$$

AREA 7

$$h_{avg} = \frac{.513 + .459}{2}$$
$$= 0.486$$

$\therefore C = 2.93$

$$Q = 0.55\,(2.93)(25)(.486)^{1.5}(1.0)$$
$$= 13.6 \ m^3/s$$

AREA 8

$$h_{avg} = \frac{.459}{2}$$
$$= 0.230$$

$C = 2.76$

$$Q = 0.55\,(2.76)(23)(.230)^{1.5}(1.0)$$
$$= 3.9 \ m^3/s$$

$$Q_{WEIR} = 0.8 + 9.0 + 14.5 + 14.3 + 12.8 + 13.9 + 13.6 + 3.9$$
$$= 82.8 \ m^3/s$$

$$Q_{TOTAL} = 82.8 + 263.8$$
$$= 346.6 \ m^3/s$$

TRY WATER LEVEL AT ELEV. 327.0

BRIDGE

$A = 123.283\ m^2$

$P = 34.478\ m$

$R = \frac{123.283}{34.478} = 3.576$

$V = \frac{3.576^{2/3}\sqrt{0.0009}}{0.03}$

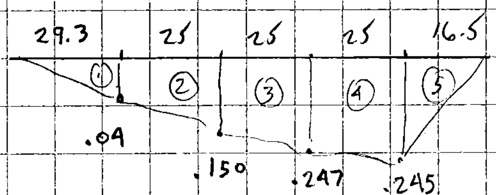
$= 2.338\ m/s$

$Q = 123.283\ (2.338)$

$= 288.2\ m^3/s$

WEIR FLOW

SOUTH SIDE OF BRIDGE



AREA 1

$h_{avg} = \frac{.04}{2}$

$= .02$

$\frac{h}{3} = \frac{.02}{6}$

$= 0.003$

$\therefore\ C = 2.53$

$Q = 0.55\ (2.53)\ (29.3)\ (.02)^{1.5}\ (1.0)$

$= 0.1\ m^3/s$

AREA 2

$$h_{avg} = \frac{.04 + .15}{2}$$
$$= 0.095$$

$$\frac{h}{B} = \frac{.095}{6}$$
$$= 0.016$$

$\therefore C = 2.62$

$$Q = 0.55 (2.62)(25)(.095)^{1.5}(1.0)$$
$$= 1.1 \ m^3/s$$

AREA 3

$$h_{avg} = \frac{.15 + .247}{2}$$
$$= 0.199$$

$$\frac{h}{B} = \frac{0.199}{6}$$
$$= 0.03$$

$\therefore C = 2.72$

$$Q = 0.55 (2.72)(25)(.199)^{1.5}(1.0)$$
$$= 3.3 \ m^3/s$$

AREA 4

$$h_{avg} = \frac{.247 + .245}{2}$$
$$= .246$$

$$\frac{h}{B} = \frac{.246}{6}$$
$$= 0.041$$

$\therefore C = 2.77$

$$Q = 0.55 (2.77)(25)(.246)^{1.5}(1.0)$$
$$= 4.6 \ m^3/s$$

AREA 5

$h_{avg} = \frac{.245}{2}$

$= 0.123$

$\therefore C = 2.65$

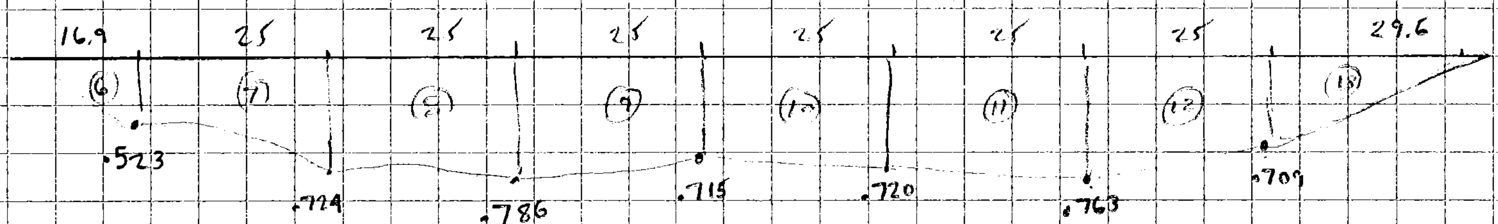
$Q = 0.55\,(2.65)\,(16.5)\,(.123)^{1.5}\,(1.0)$

$= 1.00 \ m^3/s$

Q_{WEIR} (SOUTH SIDE) $= 0.1 + 1.1 + 3.3 + 4.6 + 1.0$

$= 10.1$

NORTH SIDE OF BRIDGE



AREA 6

$h_{avg} = \frac{.523}{2}$

$= 0.262$

$\frac{h}{B} = \frac{.262}{6}$

$= 0.04$

$\therefore C = 2.78$

$Q = 0.55\,(2.78)\,(16.9)\,(.262)^{1.5}\,(1.0)$

$= 3.5 \ m^3/s$

AREA 7

$h_{avg} = \frac{.523 + .724}{2}$

$= 0.624$

$\frac{h}{B} = \frac{.624}{6}$

$= 0.104$

$\therefore C = 2.98$

$Q = 0.55\,(2.98)\,(25)\,(.624)^{1.5}\,(1.0)$
$= 20.2 \ m^3/s$

AREA 8

$h_{avg} = \dfrac{.724 + .786}{2}$
$= 0.755$

$\dfrac{h}{B} = \dfrac{.755}{6}$
$= 0.126$

$\therefore C = 3.01$

$Q = 0.55\,(3.01)\,(25)\,(.755)^{1.5}\,(1.0)$
$= 27.2 \ m^3/s$

AREA 9

$h_{avg} = \dfrac{.786 + .715}{2}$
$= 0.751$

$\therefore C = 3.01$

$Q = 0.55\,(3.01)\,(25)\,(.751)^{1.5}\,(1.0)$
$= 26.9 \ m^3/s$

AREA 10

$h_{avg} = \dfrac{.715 + .720}{2}$
$= 0.718$

$\therefore C = 3.0$

$Q = 0.55\,(3.0)\,(25)\,(.718)^{1.5}\,(1.0)$
$= 25.1 \ m^3/s$

AREA 11

$h_{avg} = \frac{.720 + .763}{2}$

$= 0.742$

$\therefore C = 3.01$

$Q = 0.55\,(3.01)\,(25)\,(.742)^{1.5}\,(1.0)$

$= 26.5\ m^3/s$

AREA 12

$h_{avg} = \frac{.763 + .709}{2}$

$= 0.736$

$\therefore C = 3.0$

$Q = 0.55\,(3.0)\,(25)\,(.736)^{1.5}\,(1.0)$

$= 26.0\ m^3/s$

AREA 13

$h_{avg} = \frac{.709}{2}$

$= 0.355$

$C = 2.85$

$Q = 0.55\,(2.85)\,(27.6)\,(.355)^{1.5}\,(1.0)$

$= 9.8\ m^3/s$

Q_{WEIR} (NORTH SIDE) $= 3.5 + 20.2 + 27.2 + 26.7 + 25.1 + 26.5 + 26 + 9.8$

$= 165.2$

$Q_{TOTAL} = 288.2 + 10.1 + 165.2$

$= 463.5$

TRY WATER LEVEL AT ELEV. 327.25

BRIDGE

$A = 130.335\ m^2$

$P = 34.978\ m$

$R = \frac{130.335}{34.978} = 3.726$

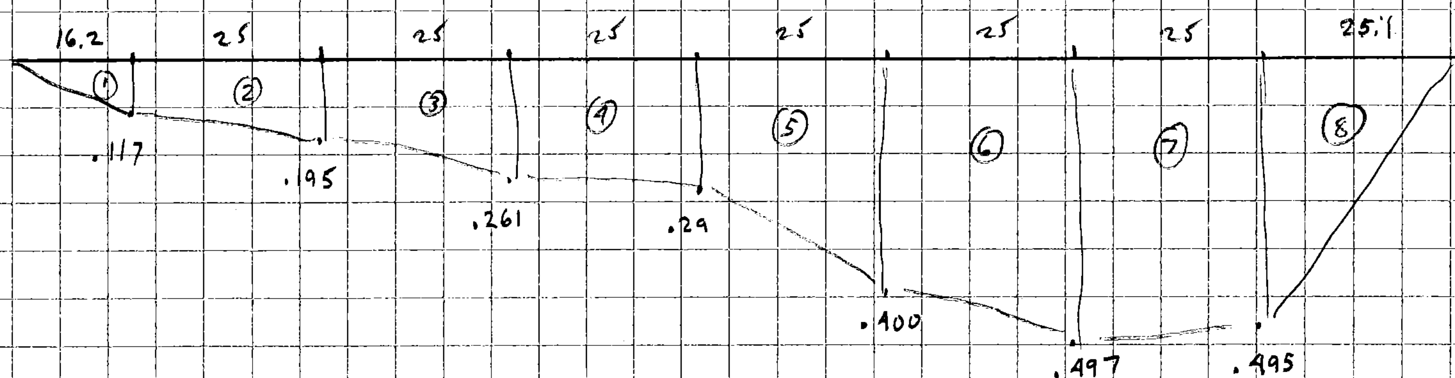
$V = \frac{3.726^{2/3}\sqrt{0.0009}}{0.03}$

$= 2.403\ m/s$

$Q = 130.335\,(2.403)$

$= 313.2\ m^3/s$

WEIR FLOW AT SOUTH SIDE OF BRIDGE



AREA 1

$h_{avg} = \frac{.117}{2}$

$= 0.059$

$c = 2.57$

$Q = 0.55\,(2.57)\,(16.2)\,(.059)^{1.5}\,(1.0)$

$= 0.3\ m^3/s$

AREA 2

$$h_{avg} = \frac{.117 + .195}{2}$$
$$= 0.156$$

$$C = 2.68$$

$$Q = 0.55(2.68)(25)(.156)^{1.5}(1.0)$$
$$= 2.3 \; m^3/s$$

AREA 3

$$h_{avg} = \frac{.195 + .261}{2}$$
$$= 0.228$$

$$C = 2.75$$

$$Q = 0.55(2.75)(25)(.228)^{1.5}(1.0)$$
$$= 4.1 \; m^3/s$$

AREA 4

$$h_{avg} = \frac{.261 + .290}{2}$$
$$= 0.276$$

$$\therefore C = 2.79$$

$$Q = 0.55(2.79)(25)(.276)^{1.5}(1.0)$$
$$= 5.6 \; m^3/s$$

AREA 5

$$h_{avg} = \frac{.29 + .40}{2}$$
$$= 0.345$$

$$\therefore C = 2.84$$

$$Q_1 = 0.55(2.84)(25)(.345)^{1.5}(1.0)$$
$$= 7.9 \; m^3/s$$

AREA 6

$h_{avg} = \frac{.4 + .497}{2}$

$= 0.449$

$\therefore C = 2.91$

$Q = 0.55\,(2.91)\,(25)\,(.449)^{1.5}\,(1.0)$

$= 12.0 \; m^3/s$

AREA 7

$h_{avg} = \frac{.497 + .495}{2}$

$= .496$

$\frac{h}{B} = \frac{.496}{6}$

$= 0.08$

$\therefore C = 2.93$

$Q = 0.55\,(2.93)\,(25)\,(.496)^{1.5}\,(1.0)$

$= 14.1 \; m^3/s$

AREA 8

$h_{avg} = \frac{.495}{2}$

$= 0.248$

$\therefore C = 2.77$

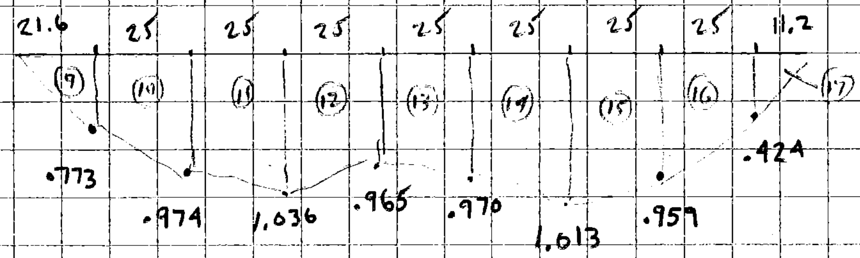
$Q = 0.55\,(2.77)\,(25.1)\,(.248)^{1.5}$

$= 4.7$

Q_{weir} (SOUTH SIDE) $= 0.3 + 2.3 + 4.1 + 5.6 + 7.9 + 12.0 + 14.1 + 4.7$

$= 51 \; m^3/s$

WEIR FLOW AT NORTH SIDE OF BRIDGE



AREA 9

$h_{avg} = \frac{.773}{2}$

$= 0.387$

$\therefore C = 2.87$

$Q = 0.55\,(2.87)\,(21.6)\,(.387)^{1.5}\,(1.0)$

$= 8.2\ m^3/s$

AREA 10

$h_{avg} = \frac{.773 + .974}{2}$

$= 0.874$

$\frac{h}{B} = \frac{0.874}{6}$

$= 0.146$

$\therefore C = 3.03$

$Q = 0.55\,(3.03)\,(25)\,(.874)^{1.5}\,(1.0)$

$= 34.0\ m^3/s$

AREA 11

$h_{avg} = \frac{.974 + 1.036}{2}$

$= 1.005$

$\frac{h}{B} = \frac{1.005}{6}$

$= 0.168$

$\therefore C = 2.97$

$$Q = 0.55\,(2.97)\,(25)\,(1.005)^{1.5}\,(1.0)$$
$$= 41.1\ m^3/s$$

$$V \approx \frac{41.1}{25\,(1.005)}$$
$$= 1.64$$

SINCE $V < 2.0$ $\therefore$ $Q = 41.1\ m^3/s$

AREA 12

$$h_{avg} = \frac{1.036 + .965}{2}$$
$$= 1.000$$

$$\frac{h}{B} = \frac{1.000}{6}$$
$$= 0.167$$

$\therefore$ $C = 2.965$

$$Q = 0.55\,(2.965)\,(25)\,(1.000)^{1.5}\,(1.0)$$
$$= 40.8\ m^3/s$$

AREA 13

$$h_{avg} = \frac{.965 + .970}{2}$$
$$= .968$$

$$\frac{h}{B} = \frac{.968}{6.0}$$
$$= 0.161$$

$\therefore$ $C = 2.96$

$$Q = 0.55\,(2.96)\,(25)\,(.968)^{1.5}\,(1.0)$$
$$= 38.8\ m^3/s$$

$$V \approx \frac{38.8}{25\,(.968)}$$
$$= 1.6\ m/s$$

AREA 14

$$h_{avg} = \frac{.970 + 1.013}{2}$$
$$= .992$$

$$\frac{h}{B} = \frac{.992}{6.0}$$
$$= 0.165$$

$$\therefore C = 2.965$$

$$Q = 0.55(2.965)(25)(.992)^{1.5}(1.0)$$
$$= 40.3 \ m^3/s$$

AREA 15

$$h_{avg} = \frac{1.013 + .959}{2}$$
$$= 0.986$$

$$\frac{h}{B} = \frac{.986}{6.0}$$
$$= 0.164$$

$$\therefore C = 2.965$$

$$Q = 0.55(2.965)(25)(.986)^{1.5}(1.0)$$
$$= 39.9 \ m^3/s$$

AREA 16

$$h_{avg} = \frac{.959 + .424}{2}$$
$$= 0.692$$

$$\frac{h}{B} = \frac{.692}{6.0}$$
$$= 0.115$$

$$\therefore C = 3.0$$

$$Q = 0.55(3.0)(25)(.692)^{1.5}(1.0)$$
$$= 23.7 \ m^3/s$$

AREA 17 $h_{avg} = \frac{.424}{2}$

$= .212$

$\therefore \quad C = 2.72$

$Q = 0.55 (2.72)(11.2)(.212)^{1.5}(1.0)$

$= 1.6 \ m^3/s$

Q_{WEIR} (NORTH SIDE) $= 8.2 + 34 + 41.1 + 40.8 + 38.8 + 40.3 + 39.9 + 23.7 + 1.6$

$= 268.4 \ m^3/s$

$Q_{TOTAL} = 313.2 + 51 + 268.4$

$= 632.6$

TRY WATER LEVEL AT ELEV 327.50

BRIDGE

$A = 137.388\ m^2$

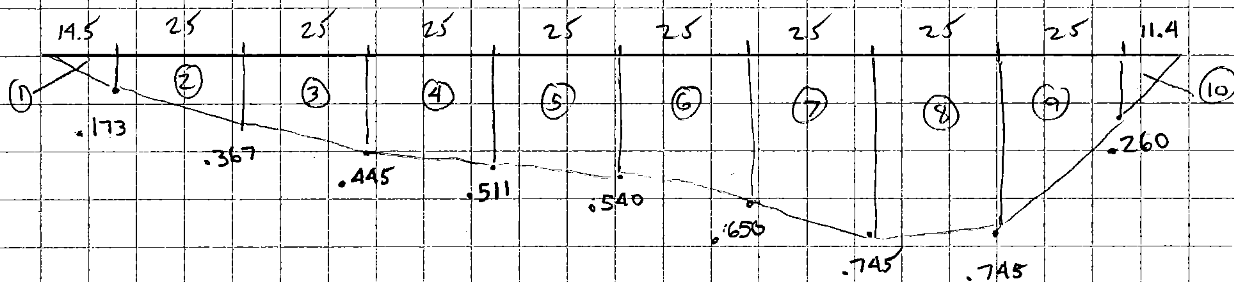
$P = 35.478\ m$

$R = \frac{137.388}{35.478} = 3.872$

$V = \frac{3.872^{2/3}\sqrt{0.0009}}{0.03} = 2.466\ m/s$

$Q = 137.388(2.466) = 338.8\ m^3/s$

WEIR FLOW ON SOUTH SIDE OF BRIDGE



AREA 1

$h_{avg} = \frac{.173}{2} = 0.087$

$\therefore C = 2.61$

$Q = 0.55(2.61)(14.5)(.087)^{1.5}(1.0) = 0.5\ m^3/s$

AREA 2

$h_{avg} = \frac{.173 + .367}{2} = 0.27$

$\therefore C = 2.79$

$Q = 0.55(2.79)(25)(.27)^{1.5}(1.0) = 5.4\ m^3/s$

AREA 3

$$h_{avg} = \frac{.367 + .445}{2} = 0.406$$

$$\therefore C = 2.88$$

$$Q = 0.55(2.88)(25)(.406)^{1.5}(1.0) = 10.2 \ m^3/s$$

AREA 4

$$h_{avg} = \frac{.445 + .511}{2} = 0.478$$

$$\therefore C = 2.92$$

$$Q = 0.55(2.92)(25)(.478)^{1.5}(1.0) = 13.3 \ m^3/s$$

AREA 5

$$h_{avg} = \frac{.511 + .540}{2} = 0.526$$

$$\frac{h}{B} = \frac{.526}{6} = 0.088$$

$$\therefore C = 2.95$$

$$Q = 0.55(2.95)(25)(0.526)^{1.5}(1.0) = 15.5 \ m^3/s$$

AREA 6

$$h_{avg} = \frac{.54 + .65}{2} = 0.595$$

$$\therefore C = 2.97$$

$$Q = 0.55(2.97)(25)(.595)^{1.5}(1.0) = 18.7 \ m^3/s$$

AREA 7

$$h_{avg} = \frac{.65 + .745}{2}$$
$$= 0.698$$

$$\therefore C = 3.0$$

$$Q = 0.55(3.0)(25)(.698)^{1.5}(1.0)$$
$$= 24.1 \ m^3/s$$

AREA 8

$$h_{avg} = \frac{.745 + .745}{2}$$
$$= .745$$

$$\frac{h}{B} = \frac{.745}{6.0}$$
$$= 0.124$$

$$\therefore C = 3.01$$

$$Q = 0.55(3.01)(25)(.745)^{1.5}(1.0)$$
$$= 26.6 \ m^3/s$$

AREA 9

$$h_{avg} = \frac{.745 + .260}{2}$$
$$= 0.503$$

$$\therefore C = 2.93$$

$$Q = 0.55(2.93)(25)(.503)^{1.5}(1.0)$$
$$= 14.4 \ m^3/s$$

AREA 10

$$h_{avg} = \frac{.260}{2}$$
$$= .13$$

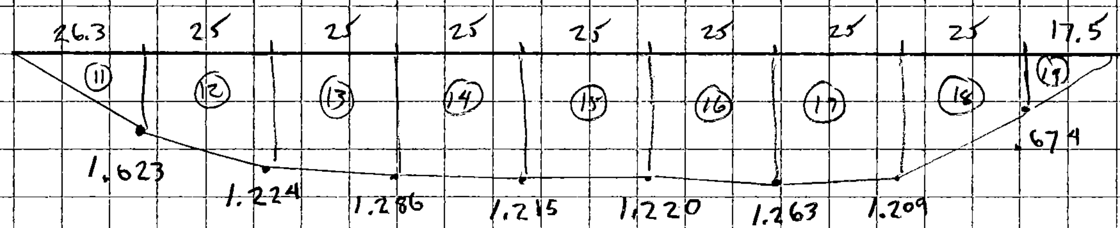
$$\therefore C = 2.65$$

$$Q = 0.55(2.65)(11.4)(.13)^{1.5}(1.0)$$
$$= 0.8 \ m^3/s$$

Q_{WEIR} (SOUTH SIDE) $= 0.5 + 5.4 + 10.2 + 13.3 + 15.5 + 18.7 + 24.1 + 26.6 + 14.4 + 0.8$

$= 129.5 \ m^3/s$

WEIR FLOW ON NORTH SIDE OF BRIDGE



AREA 11

$h_{avg} = \frac{1.623}{2}$

$= 0.512$

$\frac{h}{B} = \frac{.512}{6}$

$= 0.08$

$\therefore C = 2.94$

$Q = 0.55 (2.94)(26.3)(.512)^{1.5}(1.0)$

$= 15.6 \ m^3/s$

AREA 12

$h_{avg} = \frac{1.023 + 1.224}{2}$

$= 1.124$

$\frac{h}{B} = \frac{1.124}{6}$

$= 0.187$

$\therefore C = 2.99$

$Q = 0.55 (2.99)(25)(1.124)^{1.5}(1.0)$

$= 49.0 \ m^3/s$

$V = \frac{49.0}{25 (1.124)}$

$\simeq 1.7 \ m/s$

AREA 13

$$h_{avg} = \frac{1.224 + 1.286}{2}$$
$$= 1.255$$

$$\frac{h}{B} = \frac{1.255}{6}$$
$$= 0.209$$

$$\therefore C = 3.01$$

$$Q = 0.55(3.01)(25)(1.255)^{1.5}(1.0)$$
$$= 58.2 \ m^3/s$$

AREA 14

$$h_{avg} = \frac{1.286 + 1.215}{2}$$
$$= 1.251$$

$$\frac{h}{B} = \frac{1.251}{6.0}$$
$$= 0.21$$

$$\therefore C = 3.01$$

$$Q = 0.55(3.01)(25)(1.251)^{1.5}(1.0)$$
$$= 57.9 \ m^3/s$$

AREA 15

$$h_{avg} = \frac{1.215 + 1.220}{2}$$
$$= 1.218$$

$$\frac{h}{B} = \frac{1.218}{6}$$
$$= 0.203$$

$$\therefore C = 3.0$$

$$Q = 0.55(3.0)(25)(1.218)^{1.5}(1.0)$$
$$= 55.4 \ m^3/s$$

AREA 16

$$h_{avg} = \frac{1.220 + 1.263}{2}$$
$$= 1.242$$

$$\frac{h}{B} = \frac{1.242}{6}$$
$$= 0.21$$

$$\therefore C = 3.01$$

$$Q = 0.55(3.01)(25)(1.242)^{1.5}(1.0)$$
$$= 57.3 \ m^3/s$$

AREA 17

$$h_{avg} = \frac{1.263 + 1.209}{2}$$
$$= 1.236$$

$$\frac{h}{B} = \frac{1.236}{6}$$
$$= 0.206$$

$$\therefore C = 3.01$$

$$Q = 0.55(3.01)(25)(1.236)^{1.5}(1.0)$$
$$= 56.9 \ m^3/s$$

AREA 18

$$h_{avg} = \frac{1.209 + .674}{2}$$
$$= 0.942$$

$$\frac{h}{B} = \frac{.942}{6}$$
$$= 0.157$$

$$\therefore C = 2.955$$

$$Q = 0.55(2.955)(25)(.942)^{1.5}(1.0)$$
$$= 37.1 \ m^3/s$$

AREA 19

$$h_{avg} = \frac{.674}{2} = 0.337$$

$$\frac{h}{B} = \frac{.337}{6} = 0.06$$

$$\therefore \quad C = 2.83$$

$$Q = 0.55(2.83)(17.5)(.337)^{1.5}(1.0)$$
$$= 5.3 \ m^3/s$$

$$Q_{WEIR} \text{ (NORTH SIDE)} = 15.6 + 49.0 + 58.2 + 57.9 + 55.4 + 57.3 + 56.9 + 37.1 + 5.3$$
$$= 392.7$$

$$Q_{TOTAL} = 338.8 + 129.5 + 392.7$$
$$= 861.0 \ m^3/s$$

TRY WATER LEVEL AT ELEV 327.65

BRIDGE

$A = 141.619 \ m^2$

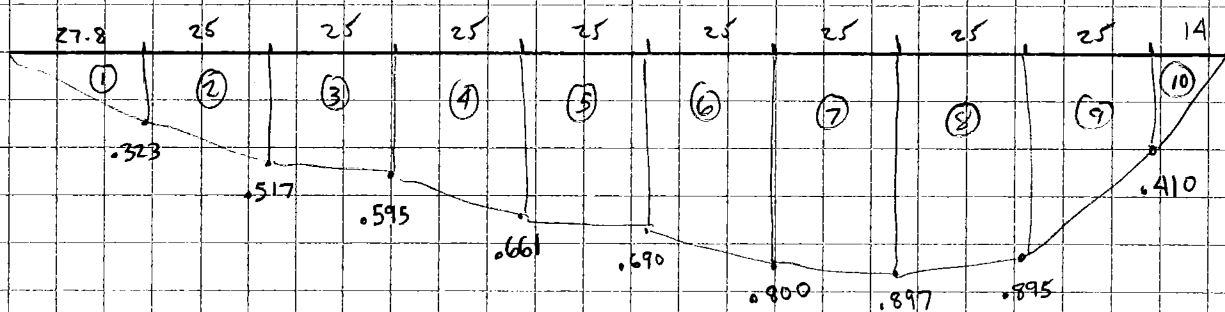
$R = \dfrac{141.619}{35.778} = 3.958$

$P = 35.778 \ m$

$$V = \frac{3.958^{2/3} \sqrt{0.0009}}{0.03} = 2.502 \ m/s$$

$$Q = 141.619(2.502) = 354.3 \ m^3/s$$

WEIR FLOW ON SOUTH SIDE OF BRIDGE



AREA 1

$$h_{avg} = \frac{.323}{2} = 0.162$$

$$\frac{h}{B} = \frac{.162}{6} = 0.027$$

$\therefore C = 2.68$

$$Q = 0.55(2.68)(27.8)(.162)^{1.5}(1.0) = 2.7 \ m^3/s$$

AREA 2 $h_{avg} = \frac{.323 + .517}{2}$

$= 0.42$

$\therefore C = 2.89$

$Q = 0.55\,(2.89)(25)(.42)^{1.5}(1.0)$

$= 10.8 \ m^3/s$

AREA 3 $h_{avg} = \frac{.517 + .595}{2}$

$= 0.556$

$\therefore C = 2.96$

$Q = 0.55\,(2.96)(25)(.556)^{1.5}(1.0)$

$= 16.9 \ m^3/s$

AREA 4 $h_{avg} = \frac{.595 + .661}{2}$

$= 0.628$

$\therefore C = 2.98$

$Q = 0.55\,(2.98)(25)(.628)^{1.5}(1.0)$

$= 20.4 \ m^3/s$

AREA 5 $h_{avg} = \frac{.661 + .690}{2}$

$= 0.676$

$\frac{h}{B} = \frac{.676}{6.0}$

$= 0.113$

$\therefore C = 2.99$

$Q = 0.55\,(2.99)(25)(.676)^{1.5}(1.0)$

$= 22.9 \ m^3/s$

AREA 6

$$h_{avg} = \frac{.690 + .800}{2} = 0.745$$

$$\frac{h}{B} = \frac{0.745}{6} = 0.124$$

$\therefore\ C = 3.01$

$$Q = 0.55(3.01)(25)(.745)^{1.5} = 26.6\ m^3/s$$

AREA 7

$$h_{avg} = \frac{.800 + .897}{2} = 0.848$$

$$\frac{h}{B} = \frac{.848}{6} = 0.141$$

$\therefore\ C = 3.02$

$$Q = 0.55(3.02)(25)(.848)^{1.5}(1.0) = 32.4\ m^3/s$$

AREA 8

$$h_{avg} = \frac{.897 + .895}{2} = .896$$

$$\frac{h}{B} = \frac{.896}{6} = 0.15$$

$\therefore\ C = 3.03$

$$Q = 0.55(3.03)(25)(.896)^{1.5}(1.0) = 35.3\ m^3/s$$

AREA 9

$h_{avg} = \frac{.895 + .410}{2}$

$= 0.653$

$\therefore C = 2.99$

$Q = 0.55 (2.99)(25)(.653)^{1.5}(1.0)$

$= 21.7 \ m^3/s$

AREA 10

$h_{avg} = \frac{.410}{2}$

$= .205$

$\therefore C = 2.72$

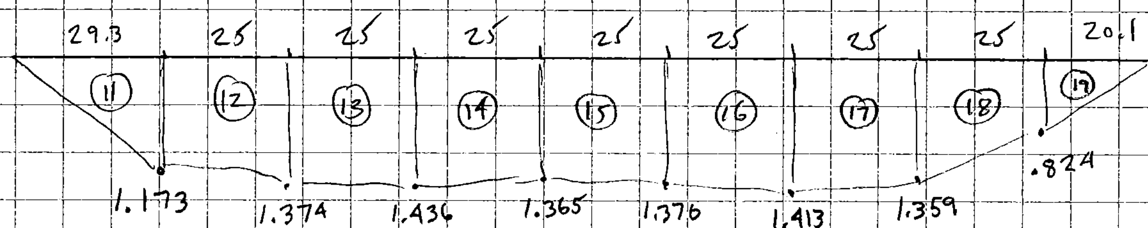
$Q = 0.55 (2.72)(14)(.205)^{1.5}(1.0)$

$= 1.9 \ m^3/s$

Q_{WEIR} (SOUTH SIDE) $= 2.7 + 10.8 + 16.9 + 20.4 + 22.9 + 26.6 + 32.4 + 35.3 + 21.7 + 1.9$

$= 191.6 \ m^3/s$

WEIR FLOW ON NORTH SIDE OF BRIDGE



AREA 11

$h_{avg} = \frac{1.173}{2}$

$= 0.587$

$\frac{h}{B} = \frac{0.587}{6}$

$= 0.1$

$\therefore C = 2.97$

$Q = 0.55 (2.97)(29.3)(.587)^{1.5}(1.0)$

$= 21.5 \ m^3/s$

AREA 12

$$h_{avg} = \frac{1.173 + 1.374}{2}$$
$$= 1.274$$

$$\frac{h}{B} = \frac{1.274}{6.0}$$
$$= 0.21$$

$$\therefore\ C = 3.01$$

$$Q = 0.55\,(3.01)\,(25)\,(1.274)^{1.5}\,(1.0)$$
$$= 59.5\ m^3/s$$

$$v = \frac{59.5}{25\,(1.274)}$$
$$= 1.87 \qquad \therefore\ ok$$

AREA 13

$$h_{avg} = \frac{1.374 + 1.436}{2}$$
$$= 1.405$$

$$\frac{h}{B} = \frac{1.405}{6.0}$$
$$= 0.234$$

$$\therefore\ C = 3.03$$

$$Q = 0.55\,(3.03)\,(25)\,(1.405)^{1.5}\,(1.0)$$
$$= 69.4$$

$$v = \frac{69.4}{25\,(1.405)}$$
$$= 1.98\ m/s \qquad \therefore\ ok$$

AREA 14

$$h_{avg} = \frac{1.436 + 1.365}{2}$$
$$= 1.401$$

$$\frac{h}{B} = \frac{1.401}{6}$$
$$= 0.233$$

$\therefore \; C = 3.03$

$$Q = 0.55\,(3.03)\,(25)\,(1.401)^{1.5}\,(1.0)$$
$$= 69.1 \;\; m^3/s$$

$$v = \frac{69.1}{25(1.401)}$$
$$= 1.97 \;\; m/s$$

AREA 15

$$h_{avg} = \frac{1.365 + 1.376}{2}$$
$$= 1.371$$

$$\frac{h}{B} = \frac{1.371}{6}$$
$$= 0.229$$

$\therefore \; C = 3.03$

$$Q = 0.55\,(3.03)\,(25)\,(1.371)^{1.5}\,(1.0)$$
$$= 66.9 \;\; m^3/s$$

AREA 16

$$h_{avg} = \frac{1.376 + 1.413}{2}$$
$$= 1.395$$

$$\frac{h}{B} = \frac{1.395}{6}$$
$$= 0.232$$

$\therefore \; C = 3.03$

$$Q = 0.55\,(3.03)\,(25)\,(1.395)^{1.5}\,(1.0) \quad = 68.6 \;\; m^3/s$$

AREA 17

$$h_{avg} = \frac{1.413 + 1.359}{2}$$
$$= 1.386$$

$$\frac{h}{B} = \frac{1.386}{6.0}$$
$$= 0.231$$

$\therefore C = 3.03$

$$Q = 0.55\,(3.03)\,(25)\,(1.386)^{1.5}\,(1.0)$$
$$= 68.0 \quad m^3/s$$

AREA 18

$$h_{avg} = \frac{1.359 + .824}{2}$$
$$= 1.092$$

$$\frac{h}{B} = \frac{1.092}{6}$$
$$= 0.182$$

$\therefore C = 2.98$

$$Q = 0.55\,(2.98)\,(25)\,(1.092)^{1.5}\,(1.0)$$
$$= 46.8 \quad m^3/s$$

AREA 19

$$h_{avg} = \frac{.824}{2}$$
$$= .412$$

$$\frac{h}{B} = \frac{.412}{6}$$
$$= 0.07$$

$\therefore C = 2.88$

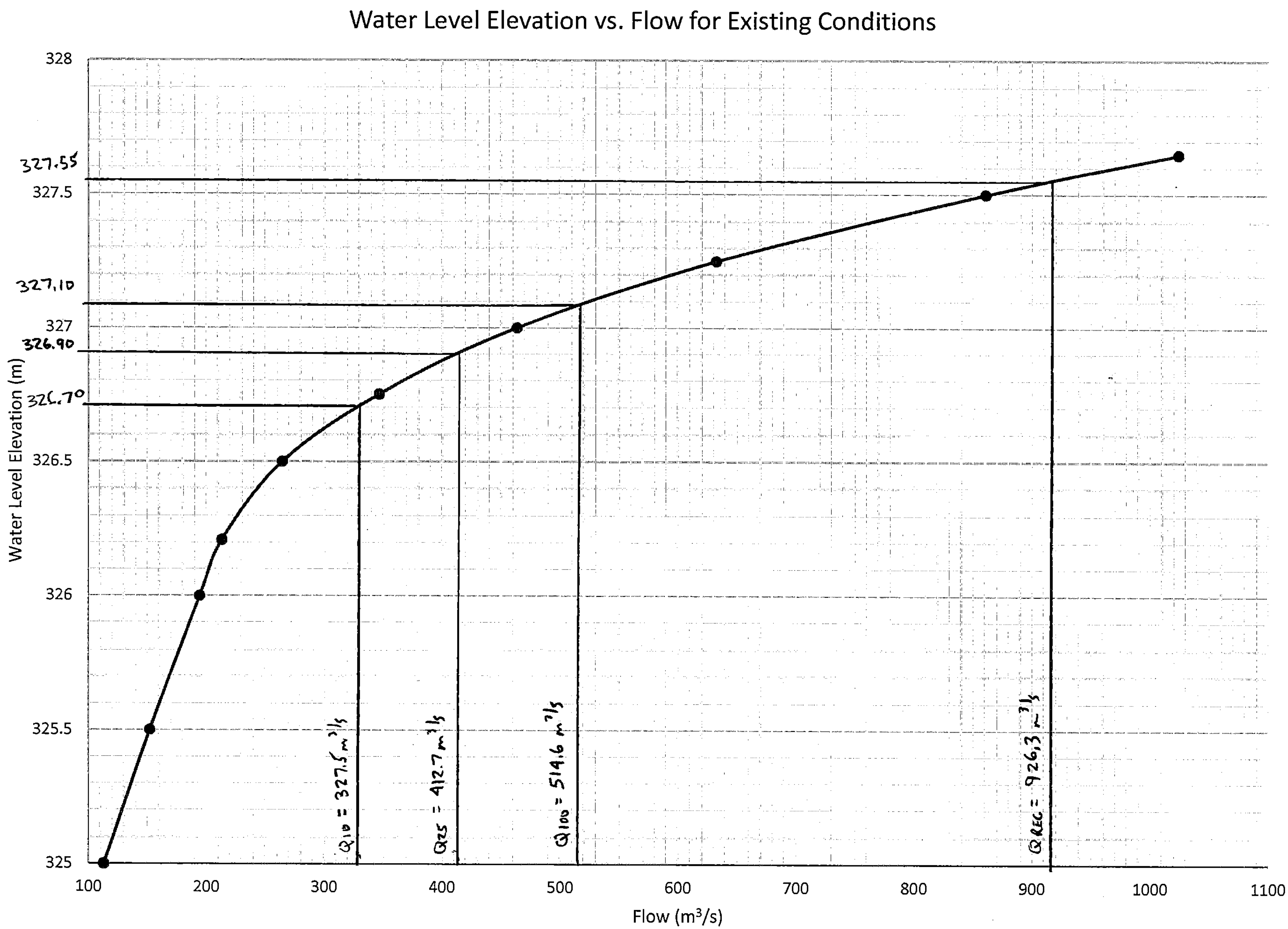
$$Q = 0.55\,(2.88)\,(20.1)\,(.412)^{1.5}\,(1.0)$$
$$= 8.4 \quad m^3/s$$

Q_{WEIR} (NORTH SIDE) $= 21.5 + 59.5 + 69.4 + 69.1 + 66.9 + 68.6 + 68.0 + 46.8 + 8.4$

$= 478.2$

$Q_{TOTAL} = 354.3 + 191.6 + 478.2$

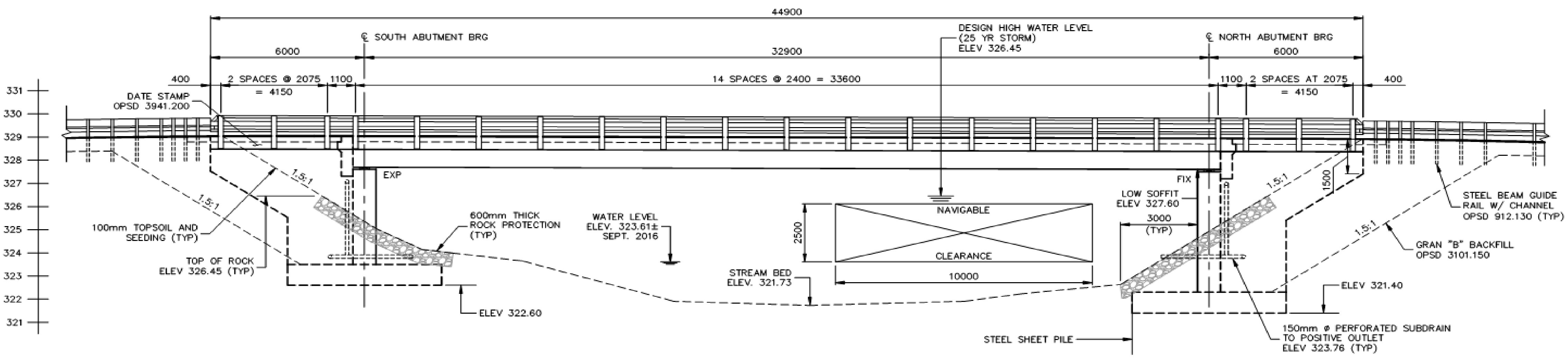
$= 1024.1 \ m^3/s$

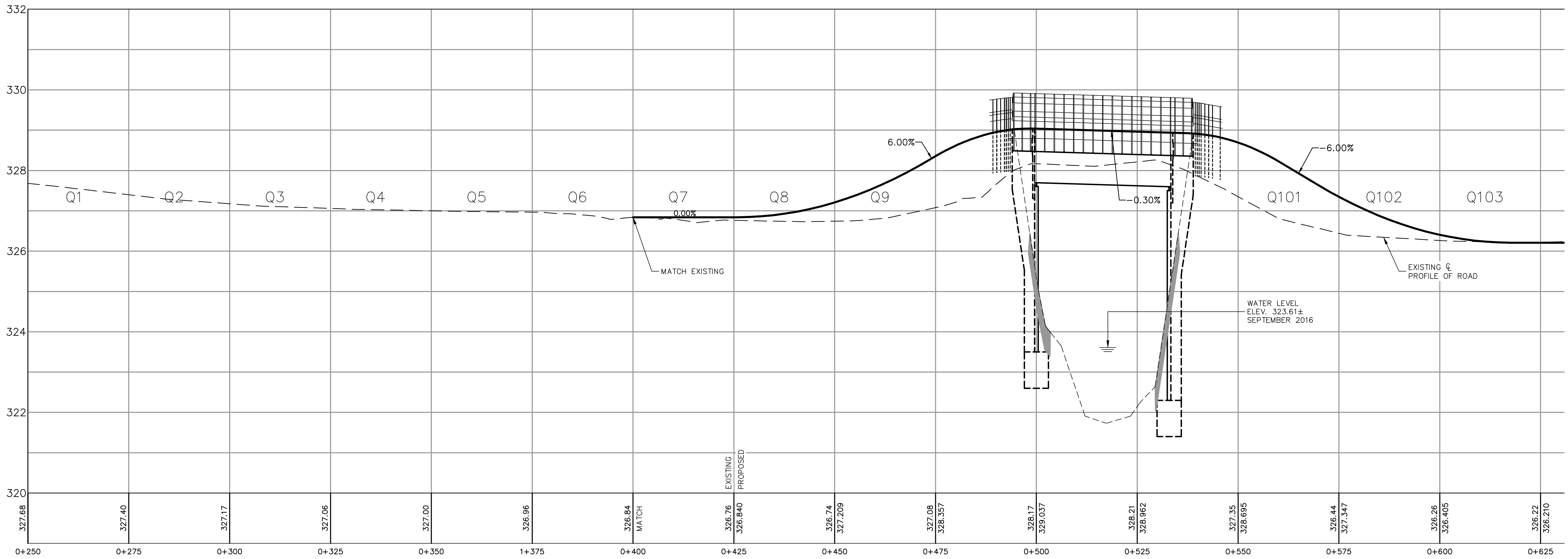


Water Level Elevation vs. Flow for Existing Conditions
Water Level Elevation (m)
Flow (m³/s)
328
327.5
327
326.5
326
325.5
325
100
200
300
400
500
600
700
800
900
1000
1100
327.55
327.10
326.90
326.70
Q10 = 327.5 m³/s
Q25 = 412.7 m³/s
Q100 = 514.6 m³/s
QREC = 926.3 m³/s

Existing Conditions		
Design Storm	Flow m^3/s	Existing High Water Elevation (m)
10 Year	327.5	326.70
25 Year	412.7	326.90
100 Year	514.6	327.10
Regional	926.3	327.55

Proposed Conditions - Open Channel Flow (Bridge Only)							
Water Elevation (m)	Area (A) (m^2)	Perimeter (P) (m)	Hydraulic Radius (R) = A / P (m)	Slope (s) (m/m)	Roughness Coefficeint (n)	Velocity (v) = $[(R^{2/3}*s^{1/2})/n]$ (m/s)	Flow (Q) = (A x V) (m^3/s)
327.65	157.883	38.669	4.083	0.0009	0.03	2.555	403.3
327.60	157.883	38.669	4.083	0.0009	0.03	2.555	403.3
327.55	156.233	38.569	4.051	0.0009	0.03	2.541	397.0
327.50	154.633	38.469	4.020	0.0009	0.03	2.528	390.9
327.00	138.633	37.469	3.700	0.0009	0.03	2.392	331.6
326.50	122.633	36.469	3.363	0.0009	0.03	2.245	275.3
326.00	106.633	35.469	3.006	0.0009	0.03	2.083	222.1
325.50	90.633	34.469	2.629	0.0009	0.03	1.905	172.7
325.00	74.636	33.408	2.234	0.0009	0.03	1.709	127.5
324.50	58.946	31.69	1.860	0.0009	0.03	1.512	89.2
324.00	44.086	28.87	1.527	0.0009	0.03	1.326	58.5
323.50	31.149	24.634	1.264	0.0009	0.03	1.169	36.4
323.00	19.714	21.967	0.897	0.0009	0.03	0.930	18.3





No.	REVISION	DATE

DESIGNED BY: A.G.
CHECKED BY: --
DRAWN BY: D.S.
CHECKED BY: A.G.
FIELD BOOK:

SCALE
HORIZ. 1:500
VERT. 1:50
5.0m 0 10.0m
(ON 24 x 36 PAPER)

HOLLAND MILLS BRIDGE REPLACEMENT

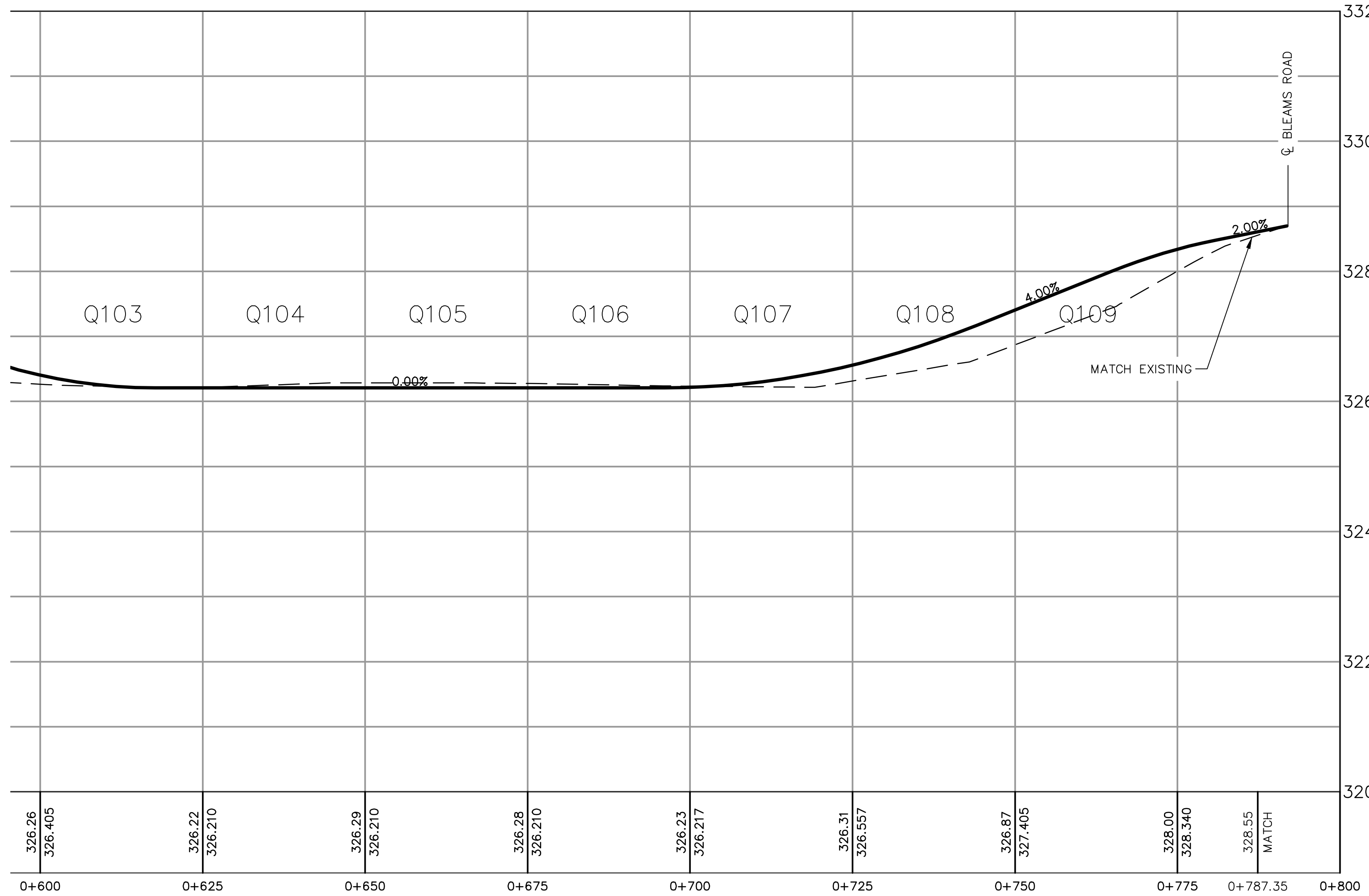
TOWNSHIP OF WILMOT — REGION OF WATERLOO

WEIR FLOW 1

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER — SUDBURY

JOB NUMBER: 16-298
DATE: SEPTEMBER 2017
DRAWING NUMBER: WEIRFLO-1

\\server\ksdata\Data\2016\16-298\Drafting\16-298 Holland Mills Bridge Replacement.dwg HYDROLOGY 12-Sep-17 8:51:58 AM



No.	REVISION	DATE

DESIGNED BY: A.G.
CHECKED BY: --
DRAWN BY: D.S.
CHECKED BY: A.G.
FIELD BOOK:

SCALE
HORIZ. 1:500
VERT. 1:50
5.0m 0 10.0m
(ON 24 x 36 PAPER)

HOLLAND MILLS BRIDGE REPLACEMENT

TOWNSHIP OF WILMOT REGION OF WATERLOO

WEIR FLOW 2

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER SUDBURY

JOB NUMBER
16-298
DATE
SEPTEMBER 2017
DRAWING NUMBER
WEIRFLO-2

\\server\ksdata\Data\2016\16-298\Drafting\16-298 Holland Mills Bridge Replacement.dwg HYDROLOGY (2) 12-Sep-17 8:53:08 AM

PROPOSED CONDITIONS - WEIR FLOW

Water Level Elevation = 326.50

$Q_{REGIONAL}$ = 926.3 m^3/s

Q_{BRIDGE} = 275.3 m^3/s

Area 102

L = 3.870

b = 8.00

h_{avg} = 0.095/2

h_{avg} = 0.048

h/b = 0.048/8.00

h/b = 0.006

C = 2.86 (D.C. 2.09)

Assume k_t = 1.0

$Q_{102} = 0.55CLH^{1.5}k_t$

Q_{102} = 0.55(2.86)(3.870)(0.048^1.5)*(1.0)

Q_{102} = 0.1 m^3/s

Height (h)

0.095

Area 103

L = 25.000

b = 8.00

h_{avg} = (0.095 + 0.290)/2

h_{avg} = 0.193

h/b = 0.193/8.00

h/b = 0.024

C = 2.92 (D.C. 2.09)

Assume k_t = 1.0

$Q_{103} = 0.55CLH^{1.5}k_t$

Q_{103} = 0.55(2.92)(25.000)(0.193^1.5)*(1.0)

Q_{103} = 3.4 m^3/s

Height (h)

0.290

Area 104

L = 25.000

b = 8.00

h_{avg} = (0.290 + 0.290)/2

h_{avg} = 0.290

h/b = 0.290/8.00

h/b = 0.036

C = 2.94 (D.C. 2.09)

Assume k_t = 1.0

$Q_{104} = 0.55CLH^{1.5}k_t$

Q_{104} = 0.55(2.94)(25.000)(0.290^1.5)*(1.0)

Q_{104} = 6.3 m^3/s

Q_{WEIR} = Q102 + Q103 + Q104 + Q105 + Q106 + Q107

Q_{WEIR} = (0.1) + (3.4) + (6.3) + (6.3) + (6.2)+ (1.9)

Q_{WEIR} = 24.2 m^3/s

$Q_{TOTAL} = Q_{BRIDGE} + Q_{WEIR}$

Q_{TOTAL} = (275.3) + (24.2)

Q_{TOTAL} = 299.4 m^3/s

PROPOSED CONDITIONS - WEIR FLOW

Water Level Elevation = 326.50

Height (h): 0.290

Area 105

L = 25.000
b = 8.00

h_{avg} = (0.290 + 0.290)/2
h_{avg} = 0.290

h/b = 0.290/8.00
h/b = 0.036

C = 2.94 (D.C. 2.09)

Assume k_t = 1.0

Q_{105} = $0.55CLH^{1.5}k_t$
Q_{105} = 0.55(2.94)(25.000)(0.290^1.5)*(1.0)
Q_{105} = 6.3 m^3/s

Height (h): 0.290

Area 106

L = 25.000
b = 8.00

h_{avg} = (0.290 + 0.283)/2
h_{avg} = 0.287

h/b = 0.287/8.00
h/b = 0.036

C = 2.94 (D.C. 2.09)

Assume k_t = 1.0

Q_{106} = $0.55CLH^{1.5}k_t$
Q_{106} = 0.55(2.94)(25.000)(0.287^1.5)*(1.0)
Q_{106} = 6.2 m^3/s

Height (h): 0.283

Area 107

L = 22.549
b = 8.00

h_{avg} = 0.283/2
h_{avg} = 0.142

h/b = 0.142/8.00
h/b = 0.018

C = 2.9 (D.C. 2.09)

Assume k_t = 1.0

Q_{107} = $0.55CLH^{1.5}k_t$
Q_{107} = 0.55(2.90)(22.549)(0.142^1.5)*(1.0)
Q_{107} = 1.9 m^3/s

PROPOSED CONDITIONS - WEIR FLOW
Water Level Elevation = 327.00

$Q_{REGIONAL}$ = 926.3 m^3/s
Q_{BRIDGE} = 331.6 m^3/s

Area 5	Height (h)	Area 6	Height (h)	Area 7	Height (h)
L = 25.000	0.033	L = 25.000	0.160	L = 25.000	0.160
b = 8.00		b = 8.00		b = 8.00	
h_{avg} = 0.033/2		h_{avg} = (0.033 + 0.160)/2		h_{avg} = (0.160 + 0.160)/2	
h_{avg} = 0.017		h_{avg} = 0.097		h_{avg} = 0.160	
h/b = 0.017/8.00		h/b = 0.097/8.00		h/b = 0.160/8.00	
h/b = 0.002		h/b = 0.012		h/b = 0.020	
C = 2.86 (D.C. 2.09)		C = 2.86 (D.C. 2.09)		C = 2.9 (D.C. 2.09)	
Assume k_t = 1.0		Assume k_t = 1.0		Assume k_t = 1.0	
$Q_5 = 0.55CLH^{1.5}k_t$		$Q_6 = 0.55CLH^{1.5}k_t$		$Q_7 = 0.55CLH^{1.5}k_t$	
Q_5 = 0.55(2.86)(25.000)(0.017^1.5)*(1.0)		Q_6 = 0.55(2.86)(25.000)(0.097^1.5)*(1.0)		Q_7 = 0.55(2.90)(25.000)(0.160^1.5)*(1.0)	
Q_5 = 0.1 m^3/s		Q_6 = 1.2 m^3/s		Q_7 = 2.6 m^3/s	

Q_{WEIR} = Q5 + Q6 + Q7 + Q8 + Q102 + Q103 + Q104 + Q105 + Q106 + Q107 + Q108
Q_{WEIR} = (0.1) + (1.2) + (2.6) + (0.6) + (0.9) + (23.7) + (28.9) + (28.9) + (28.8) + (19.7) + (2.5)
Q_{WEIR} = 137.7 m^3/s

$Q_{TOTAL} = Q_{BRIDGE} + Q_{WEIR}$
Q_{TOTAL} = (331.6) + (137.7)
Q_{TOTAL} = 469.3 m^3/s

PROPOSED CONDITIONS - WEIR FLOW

Water Level Elevation = 327.00

Area 8

L = 16.692
b = 8.00

h_{avg} = 0.160/2
h_{avg} = 0.080

h/b = 0.080/8.00
h/b = 0.010

C = 2.86 (D.C. 2.09)

Assume k_t = 1.0

$Q_8 = 0.55CLH^{1.5}k_t$
Q_8 = 0.55(2.86)(16.692)(0.080^1.5)*(1.0)
Q_8 = 0.6 m^3/s

Bridge

Area 102

Height (h): 0.595

L = 3.599
b = 8.00

h_{avg} = (0.000 + 0.595)/2
h_{avg} = 0.298

h/b = 0.298/8.00
h/b = 0.037

C = 2.94 (D.C. 2.09)

Assume k_t = 1.0

$Q_{102} = 0.55CLH^{1.5}k_t$
Q_{102} = 0.55(2.94)(3.599)(0.298^1.5)*(1.0)
Q_{102} = 0.9 m^3/s

Area 103

Height (h): 0.790

L = 25.000
b = 8.00

h_{avg} = (0.595 + 0.790)/2
h_{avg} = 0.693

h/b = 0.693/8.00
h/b = 0.087

C = 2.99 (D.C. 2.09)

Assume k_t = 1.0

$Q_{103} = 0.55CLH^{1.5}k_t$
Q_{103} = 0.55(2.99)(25.000)(0.693^1.5)*(1.0)
Q_{103} = 23.7 m^3/s

PROPOSED CONDITIONS - WEIR FLOW

Water Level Elevation = 327.00

Area 104	Height (h)	Area 105	Height (h)	Area 106	Height (h)
L = 25.000	0.790	L = 25.000	0.790	L = 25.000	0.783
b = 8.00		b = 8.00		b = 8.00	
h_{avg} = (0.790 + 0.790)/2		h_{avg} = (0.790 + 0.790)/2		h_{avg} = (0.790 + 0.783)/2	
h_{avg} = 0.790		h_{avg} = 0.790		h_{avg} = 0.787	
h/b = 0.790/8.00		h/b = 0.790/8.00		h/b = 0.787/8.00	
h/b = 0.099		h/b = 0.099		h/b = 0.098	
C = 2.99 (D.C. 2.09)		C = 2.99 (D.C. 2.09)		C = 3.00 (D.C. 2.09)	
Assume k_t = 1.0		Assume k_t = 1.0		Assume k_t = 1.0	
$Q_{104} = 0.55CLH^{1.5}k_t$		$Q_{105} = 0.55CLH^{1.5}k_t$		$Q_{106} = 0.55CLH^{1.5}k_t$	
Q_{104} = 0.55(2.99)(25.000)(0.790^1.5)*(1.0)		Q_{105} = 0.55(2.99)(25.000)(0.790^1.5)*(1.0)		Q_{106} = 0.55(3.00)(25.000)(0.787^1.5)*(1.0)	
Q_{104} = 28.9 m^3/s		Q_{105} = 28.9 m^3/s		Q_{106} = 28.8 m^3/s	

PROPOSED CONDITIONS - WEIR FLOW

Water Level Elevation = 327.00

Height (h) = 0.443

Area 107

$L =$ 25.000

$b =$ 8.00

$h_{avg} = (0.783 + 0.443)/2$

$h_{avg} = 0.613$

$h/b = 0.613/8.00$

$h/b = 0.077$

$C =$ 2.98 (D.C. 2.09)

Assume $k_t =$ 1.0

$Q_{107} = 0.55CLH^{1.5}k_t$

$Q_{107} = 0.55(2.98)(25.000)(0.613\text{^}1.5)*(1.0)$

$Q_{107} =$ 19.7 m^3/s

Area 108

$L =$ 14.654

$b =$ 8.00

$h_{avg} = (0.443)/2$

$h_{avg} = 0.222$

$h/b = 0.222/8.00$

$h/b = 0.028$

$C =$ 2.92 (D.C. 2.09)

Assume $k_t =$ 1.0

$Q_{108} = 0.55CLH^{1.5}k_t$

$Q_{108} = 0.55(2.92)(14.654)(0.222\text{^}1.5)*(1.0)$

$Q_{108} =$ 2.5 m^3/s

PROPOSED CONDITIONS - WEIR FLOW

Water Level Elevation = 327.55

$Q_{REGIONAL}$ = 926.3 m^3/s

Q_{BRIDGE} = 397.0 m^3/s

Area 1	Height (h)	Area 2	Height (h)	Area 3
	0.151		0.375	
L = 12.958		L = 25.000		L = 25.000
b = 8.00		b = 8.00		b = 8.00
h_{avg} = 0.151/2		h_{avg} = (0.151 + 0.375)/2		h_{avg} = (0.375 + 0.489)/2
h_{avg} = 0.076		h_{avg} = 0.263		h_{avg} = 0.432
h/b = 0.076/8.00		h/b = 0.263/8.00		h/b = 0.432/8.00
h/b = 0.009		h/b = 0.033		h/b = 0.054
C = 2.5 (D.C. 2.09)		C = 2.53 (D.C. 2.09)		C = 2.56 (D.C. 2.09)
Assume k_t = 1.0		Assume k_t = 1.0		Assume k_t = 1.0
$Q_1 = 0.55CLH^{1.5}k_t$		$Q_2 = 0.55CLH^{1.5}k_t$		$Q_3 = 0.55CLH^{1.5}k_t$
Q_1 = 0.55(2.50)(12.958)(0.076^1.5)*(1.0)		Q_2 = 0.55(2.53)(25.000)(0.263^1.5)*(1.0)		Q_3 = 0.55(2.56)(25.000)(0.432^1.5)*(1.0)
Q_1 = 0.4 m^3/s		Q_2 = 4.7 m^3/s		Q_3 = 10.0 m^3/s

Q_{WEIR} = Q1 + Q2 + Q3 + Q4 + Q5 + Q6 + Q7 + Q8 + Q9 + Q101 + Q102 + Q103 + Q104 + Q105 + Q106 + Q107 + Q108 + Q109

Q_{WEIR} = (0.4) + (4.7) + (10.0) + (13.2) + (15.1) + (18.5) + (24.5) + (15.5) + (3.4) + (0.2) + (22.7) + (58.2) + (65.3) + (65.3) + (65.0) + (51.9) + (17.6) + (0.1)

Q_{WEIR} = 434.0 m^3/s

$Q_{TOTAL} = Q_{BRIDGE} + Q_{WEIR}$

Q_{TOTAL} = (397.0) + (434.0)

Q_{TOTAL} = 831.0 m^3/s

PROPOSED CONDITIONS - WEIR FLOW

Water Level Elevation = 327.55

	Area 4	Area 5	Area 6
Height (h)	0.489	0.55	0.583
L =	25.000	25.000	25.000
b =	8.00	8.00	8.00
h_{avg} =	(0.489 + 0.550)/2	(0.550 + 0.583)/2	(0.583 + 0.709)/2
h_{avg} =	0.520	0.567	0.646
h/b =	0.520/8.00	0.567/8.00	0.646/8.00
h/b =	0.065	0.071	0.081
C =	2.57 (D.C. 2.09)	2.58 (D.C. 2.09)	2.59 (D.C. 2.09)
Assume k_t =	1.0	1.0	1.0
Q =	$Q_4 = 0.55CLH^{1.5}k_t$	$Q_5 = 0.55CLH^{1.5}k_t$	$Q_6 = 0.55CLH^{1.5}k_t$
Q =	Q_4 = 0.55(2.57)(25.000)(0.520^1.5)*(1.0)	Q_5 = 0.55(2.58)(25.000)(0.567^1.5)*(1.0)	Q_6 = 0.55(2.59)(25.000)(0.646^1.5)*(1.0)
Q =	Q_4 = 13.2 m^3/s	Q_5 = 15.1 m^3/s	Q_6 = 18.5 m^3/s

PROPOSED CONDITIONS - WEIR FLOW
Water Level Elevation = 327.55

Height (h)	Area 7	Height (h)	Area 8	Height (h)	Area 9	
0.709		0.709		0.341		
	$L =$ 25.000		$L =$ 25.000		$L =$ 9.875	
	$b =$ 8.00		$b =$ 8.00		$b =$ 8.00	
	$h_{avg} =$ (0.709 + 0.709)/2		$h_{avg} =$ (0.709 + 0.341)/2		$h_{avg} =$ 0.709/2	
	$h_{avg} =$ 0.709		$h_{avg} =$ 0.525		$h_{avg} =$ 0.355	
	h/b = 0.709/8.00		h/b = 0.525/8.00		h/b = 0.355/8.00	Bridge
	h/b = 0.089		h/b = 0.066		h/b = 0.044	
	C = 2.99 (D.C. 2.09)		C = 2.97 (D.C. 2.09)		C = 2.95 (D.C. 2.09)	
	Assume $k_t =$ 1.0		Assume $k_t =$ 1.0		Assume $k_t =$ 1.0	
	$Q_7 = 0.55CLH^{1.5}k_t$		$Q_8 = 0.55CLH^{1.5}k_t$		$Q_9 = 0.55CLH^{1.5}k_t$	
	$Q_7 =$ 0.55(2.99)(25.000)(0.709^1.5)*(1.0)		$Q_8 =$ 0.55(2.97)(25.000)(0.525^1.5)*(1.0)		$Q_9 =$ 0.55(2.95)(9.875)(0.355^1.5)*(1.0)	
	$Q_7 =$ 24.5 m^3/s		$Q_8 =$ 15.5 m^3/s		$Q_9 =$ 3.4 m^3/s	

PROPOSED CONDITIONS - WEIR FLOW

Water Level Elevation = 327.55

Area 101	Height (h)	Area 102	Height (h)	Area 103
L = 3.643	0.203	L = 25.000	1.145	L = 25.000
b = 8.00		b = 8.00		b = 8.00
h_{avg} = (0.000 + 0.203)/2		h_{avg} = (0.203 + 1.145)/2		h_{avg} = (1.145 + 1.340)/2
h_{avg} = 0.102		h_{avg} = 0.674		h_{avg} = 1.243
h/b = 0.102/8.00		h/b = 0.674/8.00		h/b = 1.243/8.00
h/b = 0.013		h/b = 0.084		h/b = 0.155
C = 2.88 (D.C. 2.09)		C = 2.98 (D.C. 2.09)		C = 3.055 (D.C. 2.09)
Assume k_t = 1.0		Assume k_t = 1.0		Assume k_t = 1.0
$Q_{101} = 0.55CLH^{1.5}k_t$		$Q_{102} = 0.55CLH^{1.5}k_t$		$Q_{103} = 0.55CLH^{1.5}k_t$
Q_{101} = 0.55(2.88)(3.643)(0.102^1.5)*(1.0)		Q_{102} = 0.55(2.98)(25.000)(0.674^1.5)*(1.0)		Q_{103} = 0.55(3.06)(25.000)(1.243^1.5)*(1.0)
Q_{101} = 0.2 m^3/s		Q_{102} = 22.7 m^3/s		Q_{103} = 58.2 m^3/s

PROPOSED CONDITIONS - WEIR FLOW

Water Level Elevation = 327.55

Height (h)	Area 104	
1.340	L =	25.000
	b =	8.00
	h_{avg} =	(1.340 + 1.340)/2
	h_{avg} =	1.340
	h/b =	1.340/8.00
	h/b =	0.168
	C =	3.060 (D.C. 2.09)
	Assume k_t =	1.0
	Q_{104} =	$0.55CLH^{1.5}k_t$
	Q_{104} =	0.55(3.06)(25.000)(1.340^1.5)*(1.0)
	Q_{104} =	65.3 m^3/s

Height (h)	Area 105	
1.340	L =	25.000
	b =	8.00
	h_{avg} =	(1.340 + 1.340)/2
	h_{avg} =	1.340
	h/b =	1.340/8.00
	h/b =	0.168
	C =	3.060 (D.C. 2.09)
	Assume k_t =	1.0
	Q_{105} =	$0.55CLH^{1.5}k_t$
	Q_{105} =	0.55(3.06)(25.000)(1.340^1.5)*(1.0)
	Q_{105} =	65.3 m^3/s

Height (h)	Area 106	
1.340	L =	25.000
	b =	8.00
	h_{avg} =	(1.340 + 1.333)/2
	h_{avg} =	1.337
	h/b =	1.337/8.00
	h/b =	0.167
	C =	3.060 (D.C. 2.09)
	Assume k_t =	1.0
	Q_{106} =	$0.55CLH^{1.5}k_t$
	Q_{106} =	0.55(3.06)(25.000)(1.337^1.5)*(1.0)
	Q_{106} =	65.0 m^3/s

PROPOSED CONDITIONS - WEIR FLOW

Water Level Elevation = 327.55

Area 107

Height (h): 1.333

L = 25.000
b = 8.00

h_{avg} = (1.333 + 0.993)/2
h_{avg} = 1.163

h/b = 1.163/8.00
h/b = 0.145

C = 3.01 (D.C. 2.09)

Assume k_t = 1.0

$Q_{107} = 0.55CLH^{1.5}k_t$
Q_{107} = 0.55(3.01)(25.000)(1.163^1.5)*(1.0)
Q_{107} = 51.9 m^3/s

Area 108

Height (h): 0.993

L = 25.000
b = 8.00

h_{avg} = (0.993 + 0.145)/2
h_{avg} = 0.569

h/b = 0.569/8.00
h/b = 0.071

C = 2.98 (D.C. 2.09)

Assume k_t = 1.0

$Q_{108} = 0.55CLH^{1.5}k_t$
Q_{108} = 0.55(2.98)(25.000)(0.569^1.5)*(1.0)
Q_{108} = 17.6 m^3/s

Area 109

Height (h): 0.145

L = 3.631
b = 8.00

h_{avg} = 0.145/2
h_{avg} = 0.073

h/b = 0.073/8.00
h/b = 0.009

C = 2.86 (D.C. 2.09)

Assume k_t = 1.0

$Q_{109} = 0.55CLH^{1.5}k_t$
Q_{109} = 0.55(2.86)(3.631)(0.073^1.5)*(1.0)
Q_{109} = 0.1 m^3/s

PROPOSED CONDITIONS - WEIR FLOW

Water Level Elevation = 327.65

$Q_{REGIONAL}$ = 926.3 m^3/s

Q_{BRIDGE} = 403.3 m^3/s

Area 1	Height (h)	Area 2	Height (h)	Area 3
	0.251		0.475	
L = 21.962		L = 25.000		L = 25.000
b = 8.00		b = 8.00		b = 8.00
h_{avg} = 0.251/2		h_{avg} = (0.251 + 0.475)/2		h_{avg} = (0.475 + 0.589)/2
h_{avg} = 0.126		h_{avg} = 0.363		h_{avg} = 0.532
h/b = 0.126/8.00		h/b = 0.363/8.00		h/b = 0.532/8.00
h/b = 0.016		h/b = 0.045		h/b = 0.067
C = 2.50 (D.C. 2.09)		C = 2.55 (D.C. 2.09)		C = 2.57 (D.C. 2.09)
Assume k_t = 1.0		Assume k_t = 1.0		Assume k_t = 1.0
$Q_1 = 0.55CLH^{1.5}k_t$		$Q_2 = 0.55CLH^{1.5}k_t$		$Q_3 = 0.55CLH^{1.5}k_t$
Q_1 = 0.55(2.50)(21.962)(0.126^1.5)*(1.0)		Q_2 = 0.55(2.55)(25.000)(0.363^1.5)*(1.0)		Q_3 = 0.55(2.57)(25.000)(0.532^1.5)*(1.0)
Q_1 = 1.3 m^3/s		Q_2 = 7.7 m^3/s		Q_3 = 13.7 m^3/s

Q_{WEIR} = Q1 + Q2 + Q3 + Q4 + Q5 + Q6 + Q7 + Q8 + Q9 + Q101 + Q102 + Q103 + Q104 + Q105 + Q106 + Q107 + Q108 + Q109

Q_{WEIR} = (1.3) + (7.7) + (13.7) + (17.3) + (19.5) + (23.1) + (29.9) + (20.2) + (1.9) + (0.5) + (28.0) + (65.4) + (72.8) + (72.8) + (72.6) + (59.7) + (22.5) + (0.4)

Q_{WEIR} = 529.4 m^3/s

$Q_{TOTAL} = Q_{BRIDGE} + Q_{WEIR}$

Q_{TOTAL} = (403.3) + (529.4)

Q_{TOTAL} = 932.8 m^3/s

PROPOSED CONDITIONS - WEIR FLOW
Water Level Elevation = 327.65

Height (h)	Area 4	Height (h)	Area 5	Height (h)	Area 6
0.589	L = 25.000	0.650	L = 25.000	0.683	L = 25.000
	b = 8.00		b = 8.00		b = 8.00
	h_{avg} = (0.589 + 0.650)/2		h_{avg} = (0.650 + 0.683)/2		h_{avg} = (0.683 + 0.809)/2
	h_{avg} = 0.620		h_{avg} = 0.667		h_{avg} = 0.746
	h/b = 0.620/8.00		h/b = 0.667/8.00		h/b = 0.746/8.00
	h/b = 0.077		h/b = 0.083		h/b = 0.093
	C = 2.58 (D.C. 2.09)		C = 2.60 (D.C. 2.09)		C = 2.61 (D.C. 2.09)
	Assume k_t = 1.0		Assume k_t = 1.0		Assume k_t = 1.0
	$Q_4 = 0.55CLH^{1.5}k_t$		$Q_5 = 0.55CLH^{1.5}k_t$		$Q_6 = 0.55CLH^{1.5}k_t$
	Q_4 = 0.55(2.58)(25.000)(0.620^1.5)*(1.0)		Q_5 = 0.55(2.60)(25.000)(0.667^1.5)*(1.0)		Q_6 = 0.55(2.61)(25.000)(0.746^1.5)*(1.0)
	Q_4 = 17.3 m^3/s		Q_5 = 19.5 m^3/s		Q_6 = 23.1 m^3/s

PROPOSED CONDITIONS - WEIR FLOW

Water Level Elevation = 327.65

Height (h)	Area 7	Height (h)	Area 8	Height (h)	Area 9	
0.809	L = 25.000 b = 8.00 h_{avg} = (0.809 + 0.809)/2 h_{avg} = 0.809 h/b = 0.809/8.00 h/b = 0.101 C = 2.99 (D.C. 2.09) Assume k_t = 1.0 $Q_7 = 0.55CLH^{1.5}k_t$ Q_7 = 0.55(2.99)(25.000)(0.809^1.5)*(1.0) Q_7 = 29.9 m^3/s	0.809	L = 25.000 b = 8.00 h_{avg} = (0.809 + 0.441)/2 h_{avg} = 0.625 h/b = 0.625/8.00 h/b = 0.078 C = 2.98 (D.C. 2.09) Assume k_t = 1.0 $Q_8 = 0.55CLH^{1.5}k_t$ Q_8 = 0.55(2.98)(25.000)(0.625^1.5)*(1.0) Q_8 = 20.2 m^3/s	0.441	L = 11.710 b = 8.00 h_{avg} = 0.441/2 h_{avg} = 0.221 h/b = 0.221/8.00 h/b = 0.028 C = 2.92 (D.C. 2.09) Assume k_t = 1.0 $Q_9 = 0.55CLH^{1.5}k_t$ Q_9 = 0.55(2.92)(11.710)(0.221^1.5)*(1.0) Q_9 = 1.9 m^3/s	Bridge

PROPOSED CONDITIONS - WEIR FLOW
Water Level Elevation = 327.65

Area 101	Height (h)	Area 102	Height (h)	Area 103
L = 5.345	0.303	L = 25.000	1.245	L = 25.000
b = 8.00		b = 8.00		b = 8.00
h_{avg} = (0.303)/2		h_{avg} = (0.303 + 1.245)/2		h_{avg} = (1.245 + 1.439)/2
h_{avg} = 0.152		h_{avg} = 0.774		h_{avg} = 1.342
h/b = 0.152/8.00		h/b = 0.774/8.00		h/b = 1.342/8.00
h/b = 0.019		h/b = 0.097		h/b = 0.168
C = 2.90 (D.C. 2.09)		C = 2.99 (D.C. 2.09)		C = 3.06 (D.C. 2.09)
Assume k_t = 1.0		Assume k_t = 1.0		Assume k_t = 1.0
$Q_{101} = 0.55CLH^{1.5}k_t$		$Q_{102} = 0.55CLH^{1.5}k_t$		$Q_{103} = 0.55CLH^{1.5}k_t$
Q_{101} = 0.55(2.90)(5.345)(0.152^1.5)*(1.0)		Q_{102} = 0.55(2.99)(25.000)(0.774^1.5)*(1.0)		Q_{103} = 0.55(3.06)(25.000)(1.342^1.5)*(1.0)
Q_{101} = 0.5 m^3/s		Q_{102} = 28.0 m^3/s		Q_{103} = 65.4 m^3/s

PROPOSED CONDITIONS - WEIR FLOW

Water Level Elevation = 327.65

Height (h): 1.439

Area 104

L = 25.000
b = 8.00

h_{avg} = (1.439 + 1.439)/2
h_{avg} = 1.439

h/b = 1.439/8.00
h/b = 0.180

C = 3.068 (D.C. 2.09)

Assume k_t = 1.0

$Q_{104} = 0.55CLH^{1.5}k_t$
Q_{104} = 0.55(3.07)(25.000)(1.439^1.5)*(1.0)
Q_{104} = 72.8 m^3/s

Height (h): 1.439

Area 105

L = 25.000
b = 8.00

h_{avg} = (1.439 + 1.439)/2
h_{avg} = 1.439

h/b = 1.439/8.00
h/b = 0.180

C = 3.068 (D.C. 2.09)

Assume k_t = 1.0

$Q_{105} = 0.55CLH^{1.5}k_t$
Q_{105} = 0.55(3.07)(25.000)(1.439^1.5)*(1.0)
Q_{105} = 72.8 m^3/s

Height (h): 1.439

Area 106

L = 25.000
b = 8.00

h_{avg} = (1.439 + 1.433)/2
h_{avg} = 1.436

h/b = 1.436/8.00
h/b = 0.180

C = 3.068 (D.C. 2.09)

Assume k_t = 1.0

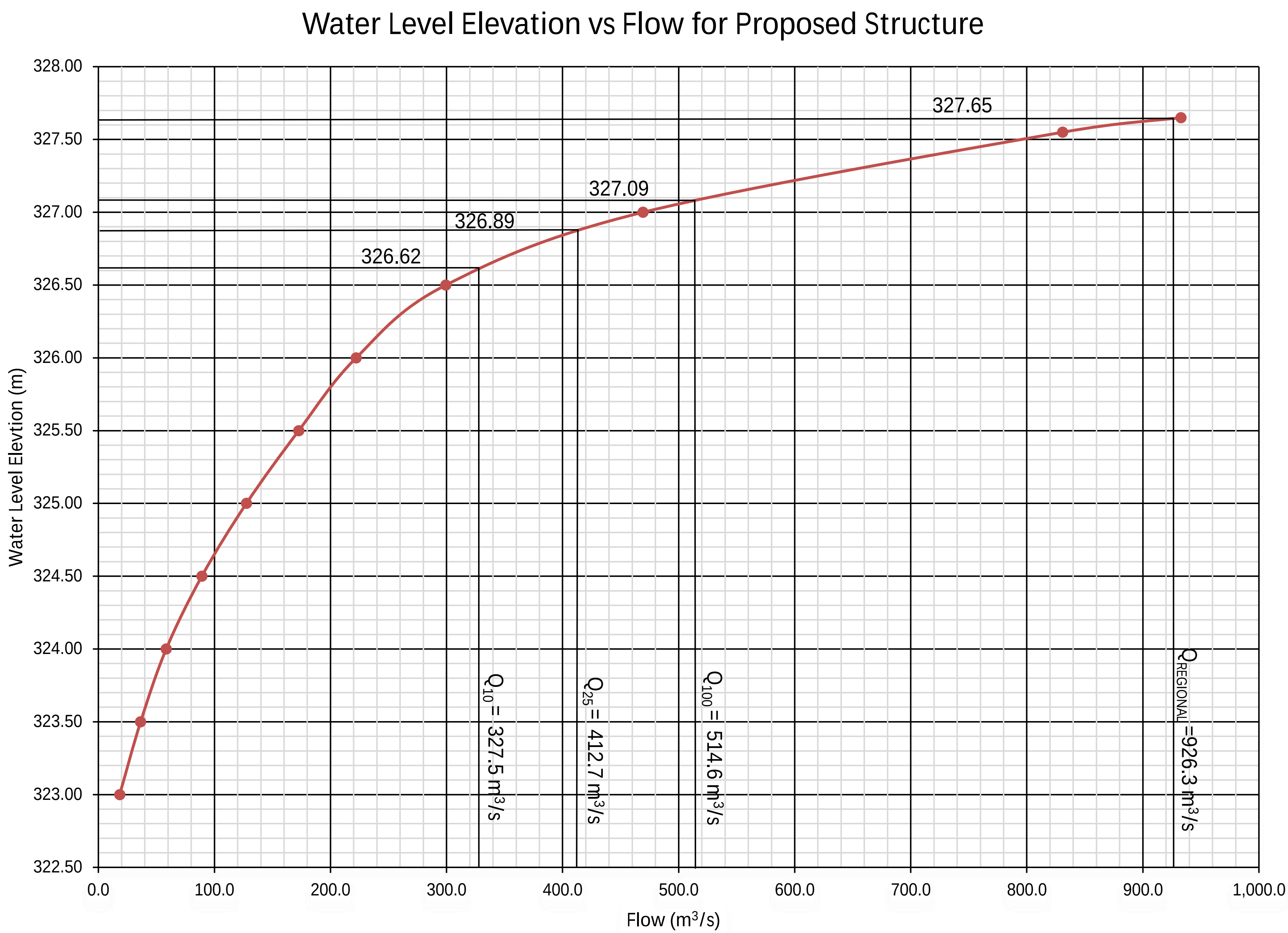
$Q_{106} = 0.55CLH^{1.5}k_t$
Q_{106} = 0.55(3.07)(25.000)(1.436^1.5)*(1.0)
Q_{106} = 72.6 m^3/s

PROPOSED CONDITIONS - WEIR FLOW

Water Level Elevation = 327.65

	Area 107	Area 108	Area 109
Height (h)	1.433	1.093	0.245
L =	25.000	25.000	6.131
b =	8.00	8.00	8.00
h_{avg} =	(1.433 + 1.093)/2	(1.093 + 0.245)/2	0.245/2
h_{avg} =	1.263	0.669	0.123
h/b =	1.263/8.00	0.669/8.00	0.123/8.00
h/b =	0.158	0.084	0.015
C =	3.06 (D.C. 2.09)	2.99 (D.C. 2.09)	2.87 (D.C. 2.09)
Assume k_t =	1.0	1.0	1.0
Q =	$Q_{107} = 0.55CLH^{1.5}k_t$	$Q_{108} = 0.55CLH^{1.5}k_t$	$Q_{109} = 0.55CLH^{1.5}k_t$
Q =	Q_{107} = 0.55(3.06)(25.000)(1.263^1.5)*(1.0)	Q_{108} = 0.55(2.99)(25.000)(0.669^1.5)*(1.0)	Q_{109} = 0.55(2.87)(6.131)(0.123^1.5)*(1.0)
Q =	Q_{107} = 59.7 m^3/s	Q_{108} = 22.5 m^3/s	Q_{109} = 0.4 m^3/s

PROPOSED CONDITIONS			
Water Elevation (m)	Bridge Flow (m3/s)	Weir Flow (m3/s)	Q_{Total} (m^3/s)
327.65	403.3	529.4	932.8
327.55	397.0	434.0	831.0
327.00	331.6	137.7	469.3
326.50	275.3	24.2	299.4
326.00	222.1	0.0	222.1
325.50	172.7	0.0	172.7
325.00	127.5	0.0	127.5
324.50	89.2	0.0	89.2
324.00	58.5	0.0	58.5
323.50	36.4	0.0	36.4
323.00	18.3	0.0	18.3



Water Level Elevation vs Flow for Proposed Structure
Water Level Elevtion (m)
Flow (m3/s)
328.00
327.50
327.00
326.50
326.00
325.50
325.00
324.50
324.00
323.50
323.00
322.50
0.0
100.0
200.0
300.0
400.0
500.0
600.0
700.0
800.0
900.0
1,000.0
327.65
327.09
326.89
326.62
Q10 = 327.5 m3/s
Q25 = 412.7 m3/s
Q100 = 514.6 m3/s
QREGIONAL =926.3 m3/s

PROPOSED CONDITIONS		
Design Storm	Flow m^3/s	Proposed High Water Elevation (m)
10 Year	327.5	326.62
25 Year	412.7	326.89
100 Year	514.6	327.09
Regional	926.3	327.65

12.

GEOTECHNICAL REPORT

- Geotechnical Investigation – Proposed Bridge 17/B-T13 Replacement prepared by Chung and VanderDoelen Engineering dated June 27, 2017

CHUNG & VANDER DOELEN
ENGINEERING LTD.

GEOTECHNICAL INVESTIGATION
PROPOSED BRIDGE 17/B-T13 REPLACEMENT

Holland Mills Road

Township of Wilmot, Ontario

SUBMITTED TO:
Township of Wilmot
c/o K. Smart Associates Ltd.
85 McIntyre Drive
Kitchener, Ontario
N2R 1H6

ATTENTION:
Mr. Trevor Hoard, C.E.T.

FILE NO / G17439 / June 27, 2017

CHUNG & VANDER DOELEN
ENGINEERING LTD.

311 VICTORIA STREET NORTH
KITCHENER / ONTARIO / N2H 5E1
519-742-8979

June 27, 2017
File No.: G17439

Township of Wilmot
c/o K. Smart Associates Ltd.
85 McIntyre Drive
Kitchener, Ontario
N2R 1H6

Attention: Mr. Trevor Hoard, C.E.T.

RE: Geotechnical Investigation
Proposed Bridge 17/B-T13 Replacement
Holland Mills Road, Township of Wilmot, Ontario

We take pleasure in enclosing two (2) copies of our Geotechnical Investigation Report carried out at the above-referenced Site. Soil samples will be retained for a period of three (3) months and will thereafter be disposed of unless we are otherwise instructed.

If you have any questions or clarifications are required, please contact the undersigned at your convenience.

We thank you for giving us this opportunity to be of service to you.

Yours truly,
CHUNG & VANDER DOELEN ENGINEERING LTD.

Eric Y. Chung, M. Eng., P.Eng.
Principal Engineer

TABLE OF CONTENTS

LIST OF ENCLOSURES

1.0 INTRODUCTION

CHUNG & VANDER DOELEN ENGINEERING LTD. (CVD) has been retained by Township of Wilmot to carry out a subsurface investigation for the proposed reconstruction of Bridge 17/B-T13 which is located on Holland Mills Road, over Nith River, just south of Bleams Road in the Township of Wilmot, Ontario.

The existing single-lane, single span, steel truss bridge structure is approximately 29 m long and 5 m wide. It is standing approximately 6 m above the river bed. It is our understanding that the replacement bridge will be lengthened slightly and widened to accommodate two-lane traffic. The proposed finished grade of the replacement bridge deck will be close to that of the existing grade.

The purpose of the investigation was to determine the subsurface conditions at the site and, based on the findings, make geotechnical recommendations for the design and construction of the foundation elements of the proposed replacement bridge, and widening of the approach embankments.

2.0 FIELD WORK

In order to investigate the subsurface conditions at the site, two (2) boreholes were advanced to depths between 15.24 and 16.87 m below ground surface on May 18, 2017. The borehole locations are indicated on the Borehole Location Plan, Drawing No. 1.

The field work was carried out under the supervision of a member of our engineering team, who logged the boreholes in the field, effected the subsurface sampling, and monitored the groundwater conditions.

The boreholes were advanced using a truck-mounted drilling rig, supplied and operated by a specialized drilling contractor. The drill rig was equipped with 82 mm I.D. continuous hollow stem augers and standard soil sampling equipment. Standard penetration tests (SPTs) in accordance with ASTM Specification D1586, were carried out at frequent intervals of depth, and the results are shown on the Borehole Logs as Penetration Resistance or "N"-values. The undrained shear strength of the cohesive soil deposit was determined on the slightly disturbed SPT samples using a field pocket penetrometer. Dynamic Cone Penetration tests were performed to collect further information and confirm the density of the fine granular deposit where disturbance to the STP "N"-values was suspected. The compactness condition or consistency of the soil strata has been inferred from these test results.

The location and ground surface elevation of the boreholes were surveyed by CVD for the purpose of this report. The ground surface elevations were referenced to a temporary benchmark (TBM) which is shown on Drawing No. 1 and described below:

TBM: Cut cross in northwest corner of northwest wingwall (CP#1), as shown on Drawing No. 1

Elevation: 327.64 m (geodetic)

3.0 LABORATORY TESTING

Soil samples obtained from the in situ tests were examined in the field and subsequently brought to our laboratory for visual and tactile examination to confirm field classification. Moisture content determination of all retrieved samples occurred.

In addition, two (2) grain size distribution analyses were performed on the major soil deposits to confirm field identification.

4.0 EXISTING SITE CONDITIONS

Bridge 17/B-T13 is located on Holland Mills Road, over Nith River, just west of Bleams Road in the Township of Wilmot. The exiting structure is a single span, steel truss bridge with a wood deck about 29 m long, and concrete abutments at each end.

The ground surface on both sides of the bridge is relatively flat laying. The elevation of the bridge deck is about 1.5 m higher than that of the surrounding terrain. The ground surface elevations at the borehole locations ranged between 327.72 and 327.88 m.

5.0 SUBSURFACE CONDITIONS

The detailed subsurface conditions encountered in the two (2) boreholes advanced as part of this investigation are shown on the Borehole Log Sheets, Enclosures 1 to 2, inclusive. The following sections provide descriptions of the major soil deposits encountered in the boreholes.

In general, the pavement and fill materials were underlain by a layer of compact sand and gravel followed by a very stiff to hard silty clay till, underlain by deposits of very dense silty sand and gravel and very dense sand.

5.1 Pavement

Asphalt pavement, consisting of approximately 60 mm asphalt and 500 mm granular base materials, was penetrated at Boreholes 1 and 2 which were in the roadway (near the existing abutments).

5.2 Fill

A layer of fill was encountered underlying the pavement in Boreholes 1 and 2. The fill layer extended to depths between 2.3 m and 3.1 m below ground surface. The fill materials generally comprised of silty sand and gravel to sandy silt, and trace clay.

The SPT "N"-values measured within fill materials ranged from 2 blows to 24 blows per 300 mm of penetration, indicating a very loose to compact compactness condition. The measured water content of the samples collected from this deposit ranged between 4 and 26%, thus indicating a damp to saturated moisture condition.

5.3 Silt

A layer of silt was encountered below the fill materials in Borehole 1. The silt layer had a thickness of 0.6 m and extended to a depth of 3.7 m. The silt contained some sand, trace clay and occasional shells, rootlets and organics.

The one SPT "N"-value measured within the silt was 3 blows per 300 mm of penetration, indicating a very loose compactness condition. The measured water content of the sample collected from this deposit 23%, thus indicating a saturated moisture condition.

5.4 Sand and Gravel

A layer of sand and gravel containing some silt was encountered below the silt in Borehole 1 and fill materials in Borehole 2. This layer ranged in thickness from 0.8 to 1.1 m and extended to depths between 3.4 and 4.4 m below the existing ground surface.

The SPT "N"-values measured within the sand and gravel layer ranged from 13 blows to 23 blows per 300 mm of penetration, indicating a compact compactness condition. The measured water content of the samples collected from this deposit ranged between 13 and 21%, thus indicating a saturated moisture condition

5.5 Silty Clay Till

A deposit of silty clay till was encountered below the sand and gravel l at both Boreholes 1 and 2. This deposit ranged in thickness from 5.6 to 6.7 m and extended to a depth of 10.1 m. The silty clay till contained some sand and trace gravel. Although, not encountered at the borehole locations, till deposits are known to contain sporadic cobbles and boulders.

The SPT "N"-values measured within the silty clay till deposit ranged from 15 blows to 25 blows per 300 mm of penetration. The undrained shear strength obtained on the retrieved samples ranged from 168 kPa to over 250 kPa. Based on the above test results and tactile examination, the silty clay till deposit is considered to have a very stiff to hard consistency. The measured water content of the samples collected from this deposit ranged between 14 and 27%, thus indicating a moist moisture condition.

5.6 Silty Sand and Gravel

A silty sand and gravel deposit was encountered below the silty clay till in Boreholes 1 and 2. Where fully penetrated in Borehole 2, the deposit measured 1.5 m in thickness and extended to a depth of 11.6 m. Borehole 1 was terminated within the deposit at a depth of 12.65 m.

The SPT "N"-values measured within the silty sand and gravel ranged from 7 blows per 300 mm of penetration to 50 blows per 50 mm of penetration. The lower SPT "N"-value of 7 is associated with hydrostatic disturbance of the soil during borehole advancement. Therefore, the layer is considered to be in very dense compactness condition. The measured water content of the samples collected from this deposit ranged between 10 and 14%, thus indicating a saturated moisture condition.

5.7 Sand

A sand deposit was encountered below the silty sand and gravel in Borehole 2 and extended to a depth of 15.32m, the maximum depth of exploration. The sand deposit contained some silt and trace gravel.

The SPT "N"-values measured within the sand deposit ranged from 55 blows per 300 mm of penetration to 50 blows per 75 mm of penetration, indicating a very dense compactness condition. The measured water content of the samples collected from this deposit ranged between 19 and 21%, thus indicating a saturated moisture condition.

5.8 Groundwater

Groundwater conditions were monitored during and following completion of borehole sampling. Water levels were observed at depths of 2.44 and 2.74 m respectively in Boreholes 2 and 1 upon completion of drilling. The river level was measured to be at elevation 323.61 m in September 2016 by K. Smart Associates Limited. The ground water level at Boreholes 1 and 2 will stabilize to near the river level.

It is noted that the observed groundwater table will fluctuate seasonally and in response to major weather events.

6.0 DISCUSSION AND RECOMMENDATIONS

6.1 General

The existing single-lane, single span, steel truss bridge structure is approximately 29 m long and 5 m wide. It is standing approximately 6 m above the river bed. It is our understanding that the replacement bridge will be lengthened slightly and widened to accommodate two-lane traffic. The proposed finished grade of the replacement bridge deck will be close to that of the existing grade.

In general, the pavement and fill materials were underlain by a layer of compact sand and gravel followed by a very stiff to hard silty clay till, underlain by deposits of very dense silty sand and gravel and very dense sand.

The soils encountered at the subject site are considered suitable for the support of bridge foundations on spread footings. We understand that an integral abutment type structure is contemplated which will necessitate the use of steel H-plies. Preliminary borehole information suggested that the very dense sand to sand and gravel deposit encountered 15 to 16 m below existing ground surface can support steel H-piles.

6.2 Footing Foundations

Conventional strip and spread footing foundations can be used to support the proposed bridge. Footings cast on competent native very stiff to hard silty clay till can be designed using a Geotechnical Reaction at SLS of 350 kPa. The SLS value given above is based on a maximum settlement of 25 mm under the footing foundations. The Factored Geotechnical Resistance at ULS is 600 kPa.

The following table summarizes the highest founding level and elevation for the footing at each borehole location:

Borehole No.	Existing Ground Elevation (m)	Highest Founding Depth (m)	Highest Founding Elevation (m)
1	327.72	4.72	323.00
2	327.88	4.68	323.20

These soil bearing pressures can be achieved provided that the founding subgrade is undisturbed during construction. The majority of the settlements will take place during construction and the first loading cycle of the building.

Under inclined loading conditions, the bearing resistance at ULS should be reduced in accordance with Clause 6.10.4 of CAN/CSA-S6-14.

It is recommended that a lean concrete mat be placed over approved footing subgrade in wet or saturated areas to prevent further disturbance to the bearing soils resulting from construction activities.

It is recommended that the footing excavations be inspected by the geotechnical engineer to ensure adequate soil bearing and proper subgrade preparation.

6.3 Pile Foundation Considerations

Pile foundations would be required for an integral abutment bridge design. Typically, H-Plies are driven to practical refusal to achieve full axial capacity. The soils encountered at the site to a depth between 15 to 16 m below existing grades would not provide practical refusal required to achieve full axial capacity.

However, if required, a lower axial capacity for H-Piles driven into the very dense sand and gravel and very dense sand can be provided. Further investigation will need to be carried out to determine design pile tip elevations if full axial pile capacity is desirable.

6.4 Lateral Earth Pressure

The lateral earth pressures acting on the bridge abutments will depend on the type and method of placement of the backfill materials and on the subsequent lateral movement of the structure. The lateral earth pressures to be used in the design should be computed in accordance with Section 6.12 of CAN/CSA-S6-14.

The granular backfill should conform to OPSS Form 1010 for either Granular “A” or “B” Type II. To maintain free-draining characteristics in granular fill materials, the maximum percentage passing the No. 200 sieve (75 mm) should be limited to 5%. The excavated material is not considered suitable as granular backfill. Free-draining granular material specified above should be imported.

The backfill should be placed in accordance with OPSS 501. Any slopes should be benched as per OPSD 208.010 prior to backfill placement. A perforated sub-drain must be installed behind the walls with a positive outlet to maintain the granular fill in a drained condition. Alternatively, weep holes can be used to effect drainage.

The lateral earth pressure, P_h, may be computed using the equivalent fluid pressures presented in Clause 6.12.2.3 of CAN/CSA-S6-14.

Alternatively, the following equation based on unfactored earth pressure distributions can be used:

$$P_h = K\ (\gamma\, h + q)$$

Where:

K = earth pressure coefficient, use value from table below

γ = unit weight of soil = 21.2 kN/m^3 for Granular "B" Type II
= 22.8 kN/m^3 for Granular "A"
h =depth below top of wall, m
q = surcharge pressure, of 0.8 m of fill as per Clause 6.12.5, CAN/CSA-S6-14

Wall Type	**Earth Pressure Coefficient (K)**	
	Granular "A" (ϕ = 35°)	**Granular "B" Type II (ϕ = 34°)**
Restrained Wall (K_o)	0.43	0.44
Unrestrained Wall (K_a)	0.27	0.28

The submerged unit weight of the backfill should be used for any submerged portion of the granular backfill when calculating the lateral earth pressure.

The above parameters are based on a horizontal back slope (not exceeding 5°) behind the retaining walls.

A compaction surcharge equal to 12 kPa should be included in the lateral earth pressures for the structural design of the abutment and retaining walls in accordance with Clause 6.12.3 of CAN/CSA-S6-14.

Vibratory equipment for use behind retaining walls should be restricted in size as per current MTO practices.

6.5 Construction and Groundwater Control

Excavation for this project will involve the removal of the existing bridge structure and excavation for the abutment footings. The excavation is expected to be 4 to 5 m deep below the existing road surface. Excavations to depths of 5 m should not present any special difficulties using heavy excavation equipment. Groundwater control can be achieved with temporary stream diversion and pumping from filtered sumps. Perimeter intercept ditching is recommended to collect seepage water from the cut slope face.

All excavations must be carried out in compliance with the requirements of the current Occupational Health and Safety Act (OHSA). For this purpose, the upper fill materials and the compact to dense granular deposits are classified as Type 3 soils. Within the Type 3 soils, the excavation should be cut to no steeper than 1H:1V throughout. Proper ground water control must be maintained throughout the construction of the foundation and abutment walls and during backfilling. Where saturated granular deposits are exposed, the cut slopes may have to be temporarily flattened to 2H:1V during excavation until the groundwater bleeds out.

6.6 Embankment Widening

The existing approach embankments are 1 to 3 m high adjacent to the existing bridge. For the widening of the approach embankments, the surficial topsoil, loose silt and any deleterious materials should be stripped or excavated prior to placing fill materials. The fill to be used for embankment construction should be imported granular materials. Embankments constructed using these materials and/or approved imported suitable soils can be safely constructed with side slopes of not steeper than 2.5 H:1V.

Backfill adjacent to the abutments should be carried out in conformance with OPSD 3501.00, and the fill should be placed in accordance with OPSS 501. Local steepening of the embankment slope adjacent to the abutment to 1.5H:1V is feasible, provided that the slope surface is protected with rip-raps.

The fill placement should begin at the toe of the embankment, in leveled lifts and each lift compacted to at least 98% SPMDD. The new embankment fill should be benched into the existing embankment as per OPSD 208.010.

After stripping, the exposed subgrade should be inspected and approved by the geotechnical engineer. The approved subgrade should then be proof-rolled using a heavy compactor, as directed by the engineer. Unless the excavation is carried out in wet weather conditions, no unusual dewatering is anticipated during stripping and preparation of the subgrade to receive the embankment fills. Where necessary, gravity drainage and pumping from open filtered sumps should suffice.

Measures should be incorporated into the design and staging to ensure that the slope surfaces are protected from surface erosion. Proper erosion control measures should be implemented both during construction of the embankment fills and permanently. Erosion control during construction should be carried out by installing silt fences. Properly designed erosion control blankets could also be placed on any new embankments after completion of fill placement. A vegetative cover should be established as soon as practical upon completion of fill placement to minimize the chances of surface erosion.

Revetments such as a rip-rap blanket should be provided at the toe of the slope to prevent erosion/scour by surface water. The design of the rip-rap blanket should be carried out cognizant of the stream hydraulics.

7.0 CLOSURE

The Limitations of Report, as quoted in Appendix A, is an integral part of this report.

We trust that the information presented in this report is complete within our terms of reference. If there are any further questions concerning this report, please do not hesitate to contact our office.

Yours truly,
CHUNG & VANDER DOELEN ENGINEERING LTD.

for

LICENSED PROFESSIONAL ENGINEER
E.Y. CHUNG
8345506
June 27, 2017
PROVINCE OF ONTARIO

Chris Sternik, P.Eng.
Geotechnical Engineer

Eric Y. Chung, M. Eng., P.Eng.
Principal Engineer

APPENDIX A

LIMITATIONS OF REPORT

APPENDIX "A"

LIMITATIONS OF REPORT

The conclusions and recommendations given in this report are based on information determined at the testhole locations. Subsurface and groundwater conditions between and beyond the testholes may differ from those encountered at the testhole locations, and conditions may become apparent during construction which could not be detected or anticipated at the time of the site investigation. It is recommended practice that the Soils Engineer be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered in the testholes.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of testholes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusion as to how the subsurface conditions may affect their work.

The benchmark and elevations mentioned in this report were obtained strictly for use in the geotechnical design of the project and by this office only, and should not be used by any other parties for any other purposes.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. CHUNG & VANDER DOELEN ENGINEERING LIMITED accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report does not reflect the environmental issues or concerns unless otherwise stated in the report. The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final design stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid.

ENCLOSURES

Enclosure No.: 1
Sheet 1 of 1

FILE No: G17439

BOREHOLE No. 1

Client: **Township of Wilmot c/o K. Smart Associates Limited**
Project: **Holland Mills Road Bridge Replacement (Structure 17/B-T13)**
Location: **Township of Wilmot, Ontario**

EQUIPMENT DATA

Machine: **CME 75**
Method: **Hollow Stem Auger**
Size: **82 I.D.**
Date: **May 18 / 17** TO **May 18 / 17**

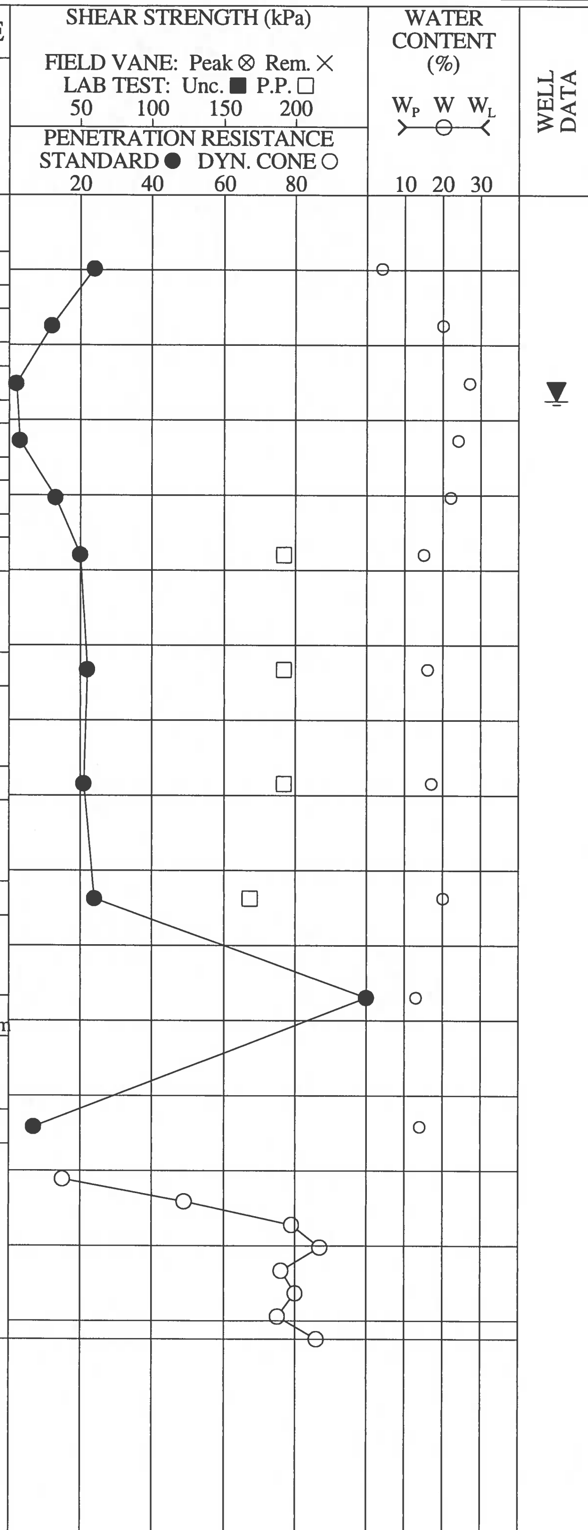
SOIL LITHOLOGY

Ground Elevation: **327.72 m**

ELEV./DEPTH (m)	DESCRIPTION
	60 mm Asphalt 500 mm Granular Base
	compact to very loose dark brown to brown FILL, silty sand and gravel to sandy silt, trace clay damp to saturated
324.67 3.05	very loose, brown and grey SILT, some sand, trace clay occ. shells, rootles, organics saturated
324.06 3.66	compact, brown SAND and GRAVEL some silt, saturated
323.30 4.42	very stiff to hard grey SILTY CLAY TILL some sand, trace gravel moist
317.66 10.06	very dense grey SILTY SAND and GRAVEL saturated
315.07 12.65	End of Borehole Start of DCPT
312.48 15.24	End of DCPT

SAMPLE

SAMPLE ID	TYPE	N-VALUE
1	SS	24
2	SS	12
3	SS	2
4	SS	3
5	SS	13
6	SS	20
7	SS	22
8	SS	21
9	SS	24
10	SS	50/50mm
11	SS	7



REMARKS

DEPTH (m)	REMARKS
2.74	water level at a depth of 2.74 m upon completion of drilling
9.75	cave-in at a depth of 9.75 m upon completion of drilling
12.0	soil disturbed by hydrostatic pressure (decreased N-value)

PROJECT MANAGER: **Eric Chung**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

CVD BOREHOLE (2015) G17439 BRIDGE 17 K SMART.GPJ CVD_ENG.GDT 27/6/17

FILE No: G17439

BOREHOLE No. 2

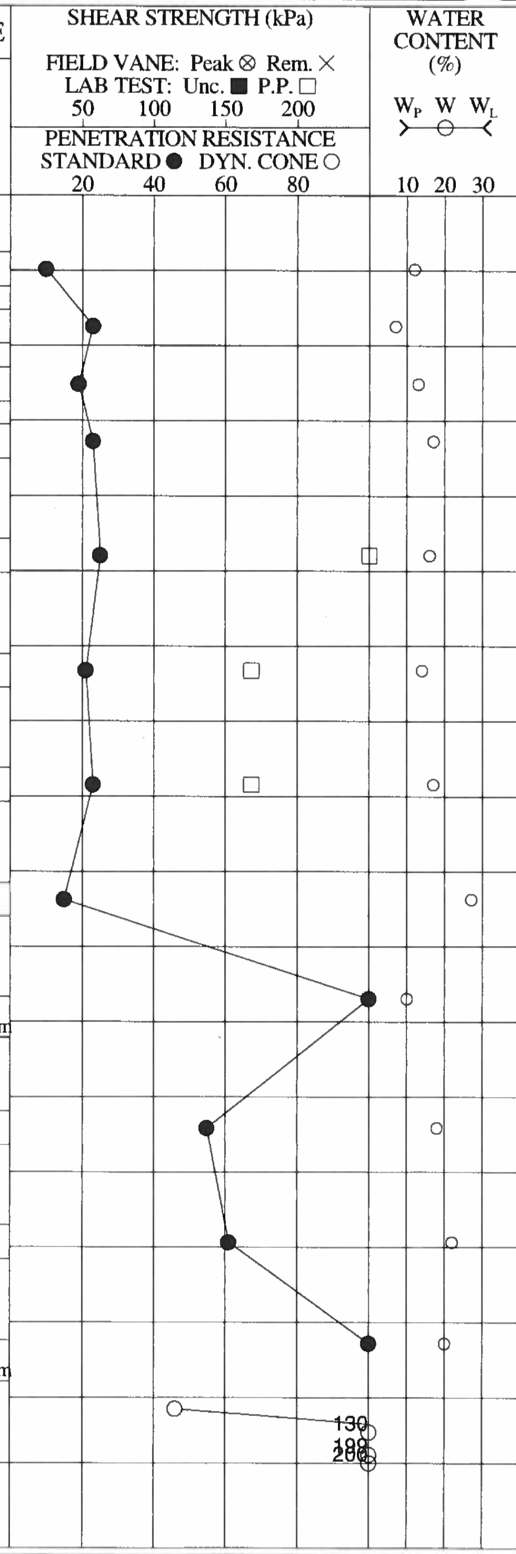
Client: **Township of Wilmot c/o K. Smart Associates Limited**
Project: **Holland Mills Road Bridge Replacement (Structure 17/B-T13)**
Location: **Township of Wilmot, Ontario**

EQUIPMENT DATA
Machine: **CME 75**
Method: **Hollow Stem Auger**
Size: **82 I.D.**
Date: **May 18 / 17** TO **May 18 / 17**

SOIL LITHOLOGY

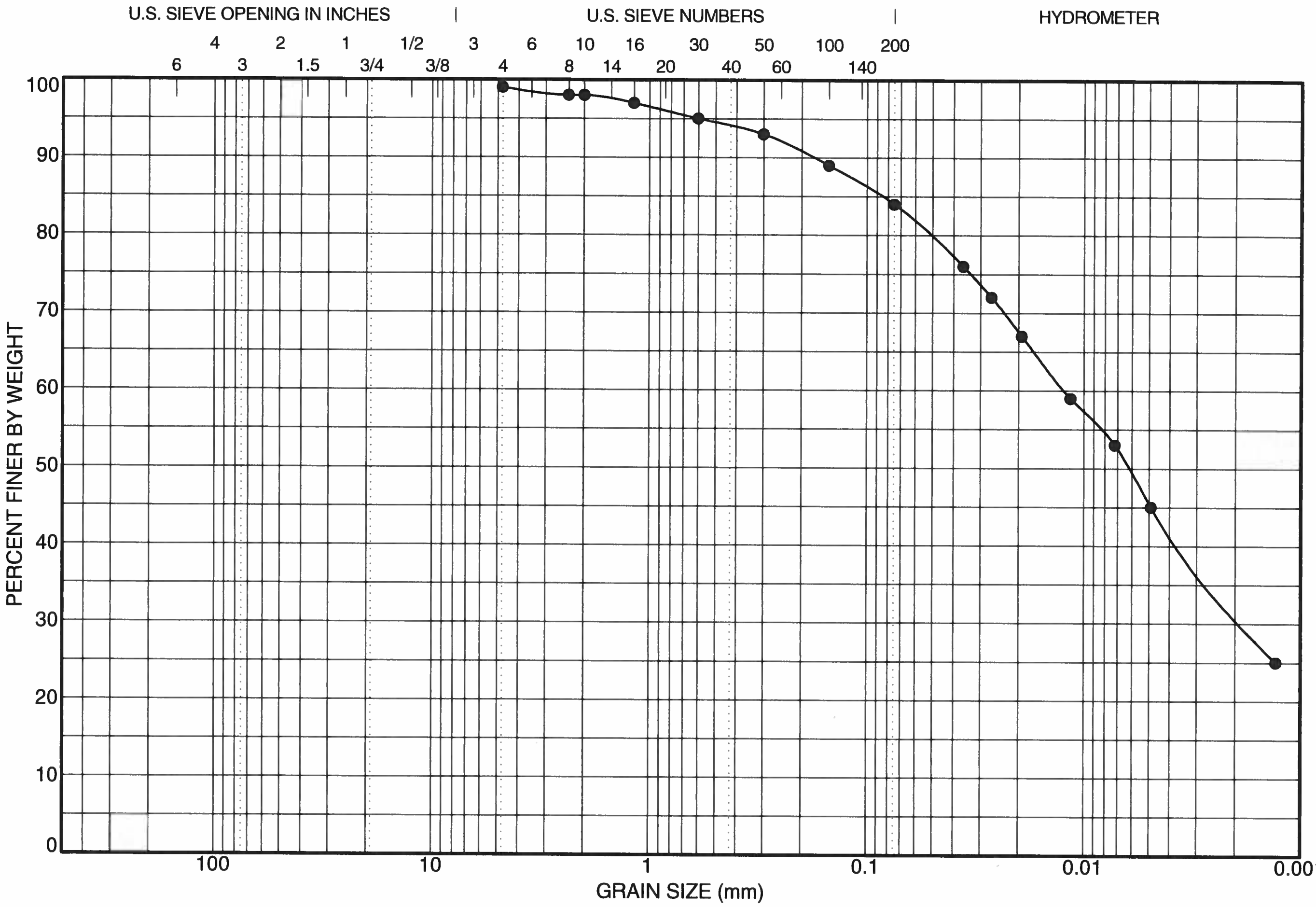
Ground Elevation: **327.88 m**

ELEV./DEPTH (m)	DESCRIPTION	SAMPLE ID	TYPE	N-VALUE	REMARKS
	500 mm Granular Base				
	compact dark brown to brown FILL, silty sand and gravel moist to wet	1	SS	10	
		2	SS	23	
325.59 / 2.29	compact, brown SAND and GRAVEL trace to some silt, saturated	3	SS	19	water level at a depth of 2.44 m upon completion of drilling
324.53 / 3.35	very stiff to hard grey SILTY CLAY TILL some sand, trace gravel moist	4	SS	23	
		5	SS	25	
		6	SS	21	
		7	SS	23	
		8	SS	15	
317.82 / 10.06	very dense grey SILTY SAND and GRAVEL saturated	9	SS	50/ 50mm	cave-in at a depth of 10.36 m upon completion of drilling
316.30 / 11.58	very dense grey SAND some silt trace gravel saturated	10	SS	55	
		11	SS	61	
312.56 / 15.32	End of Borehole Start of DCPT	12	SS	50/ 75mm	
311.01 / 16.87	End of DCPT				



PROJECT MANAGER: **Eric Chung**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

LL	PL	PI	Cc	Cu	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
					4.75	0.012	0.002		0.0	15.0	84.0	

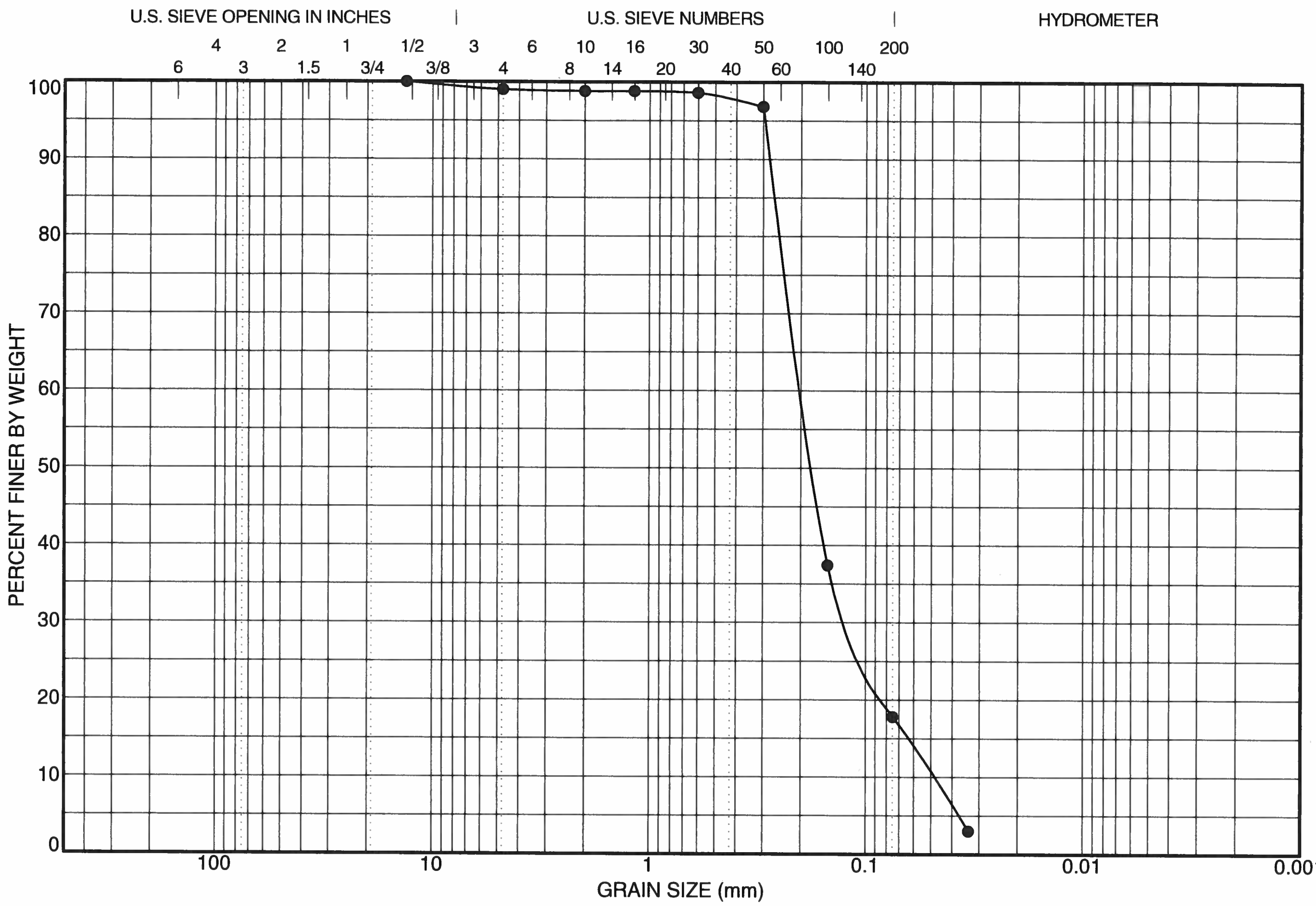
Date: Jun. 05 / 2017
Client: K. Smart Associates Limited
Contractor:
Source:
Sampled From: BH-1 SA-7, 6.10-6.55 m depth
Sample No.: 1-7
Date Sampled: May. 18 / 2017
Sampled By: AB
Lab No.: 1678
Date Tested: May. 25 / 2017
Type of Material: Silty Clay Till, some sand

Sieve Size (mm)	Percent Passing	No Specifications

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
Telephone: 519-742-8979
Fax: 519-742-7739
e-mail: info@cvdengineering.com

GRAIN SIZE DISTRIBUTION

Project: Holland Mills Road Bridge Replacement (Structure 17/B-T13)
Location: Township of Wilmot, Ontario
File No.: G17439
Enclosure No.: 3



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

LL	PL	PI	Cc	Cu	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
			1.39	3.98	13.2	0.195	0.115	0.049	1.0	81.2	17.8	

Date: Jun. 05 / 2017
Client: K. Smart Associates Limited
Contractor:
Source:
Sampled From: BH-2 SA-11, 13.72-14.17 m depth
Sample No.: 2-11
Date Sampled: May. 18 / 2017
Sampled By: AB
Lab No.: 1679
Date Tested: May. 25 / 2017
Type of Material: Sand, some silt, trace gravel

Sieve Size (mm)	Percent Passing	No Specifications

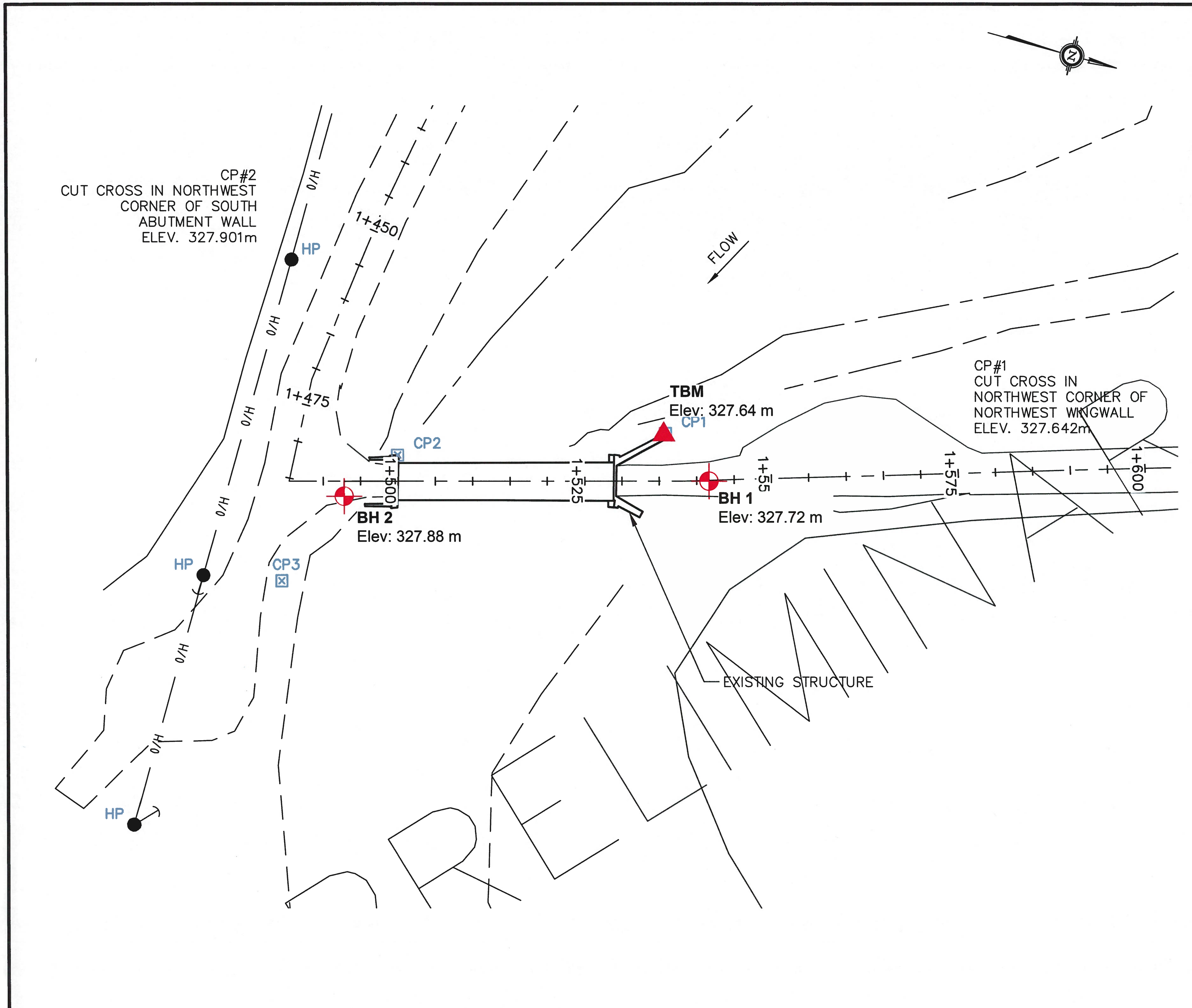
CHUNG & VANDER DOELEN
ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
Telephone: 519-742-8979
Fax: 519-742-7739
e-mail: info@cvdengineering.com

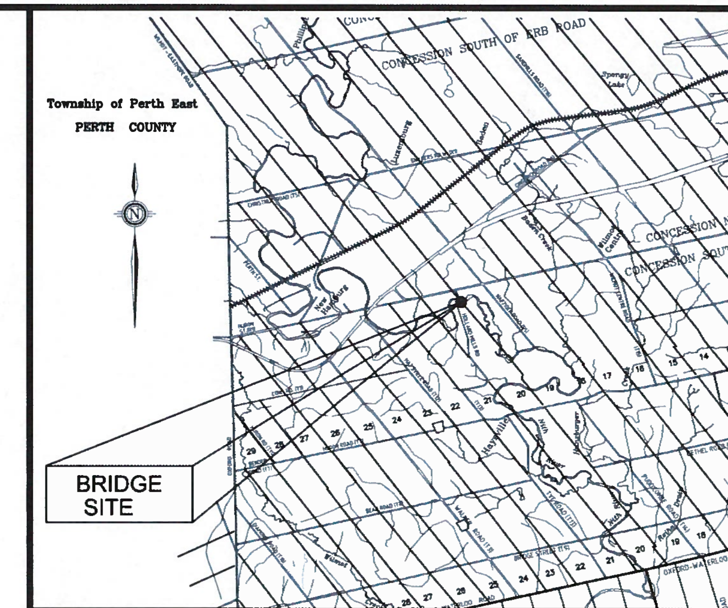
GRAIN SIZE DISTRIBUTION

Project: Holland Mills Road Bridge Replacement (Structure 17/B-T13)
Location: Township of Wilmot, Ontario

File No.: G17439
Enclosure No.: 4

DM - NO SPECIFICATIONS G17439 BRIDGE 17 K SMART.GPJ LAW_LNDN.GDT 19/6/17





KEY PLAN **SOURCE:** K.Smart Associates

LEGEND

TBM: Cut cross in northwest corner of northwest wingwall (CP#1)
Elevation: 327.64 m

Borehole Location

BOREHOLE LOCATION PLAN

Proposed Holland Mills Road Bridge Replacement
Structure 17/B-T13

Holland Mills Road
Township of Wilmont
Ontario

CHUNG & VANDER DOELEN
ENGINEERING LTD.
311 VICTORIA STREET NORTH
KITCHENER / ONTARIO / N2H 5E1 / 519-742-8979

Drawn By: AB	Date: June, 2017	File No.: G17439
Checked By: EYC	Scale: 1:500	Drawing No.: 1

13.

SITE PHOTOS

- Site Photos taken September 21-23, 2016 by K. Smart Associates Limited

1. Far North Approach (looking south)

2. Holland Mills Road (looking south)

3. North Approach (looking south)

4. North Approach (looking south)

5. Bridge Deck

6. Holland Mills Road (looking southwest)

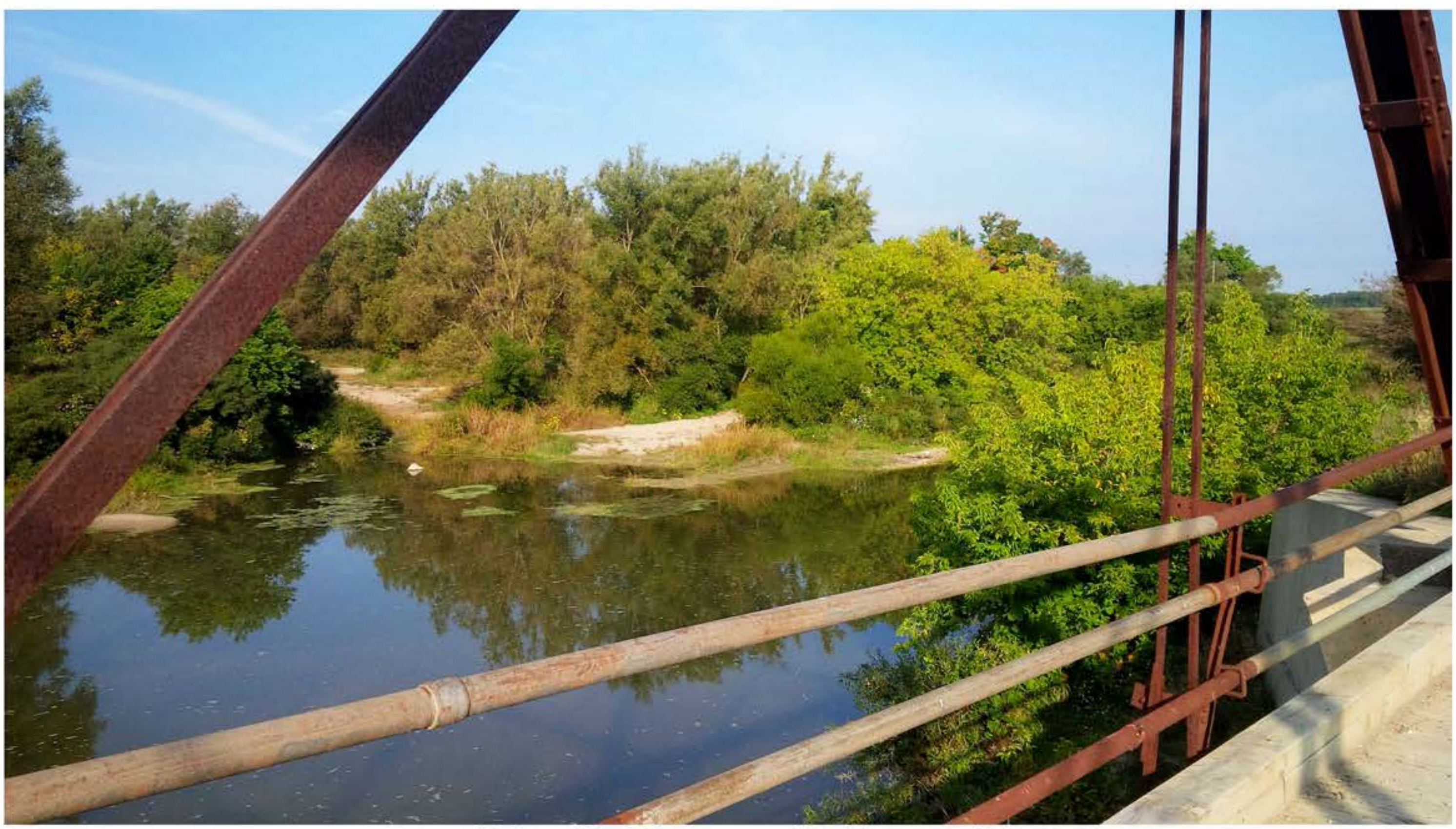
7. Holland Mills Road (looking west)

8. South Approach (looking north)

9. Private Entrance at Southeast (looking east)

10. West Elevation (looking northeast)

11. West Elevation (looking southeast)



12. Looking Upstream (looking west)

13. Looking Downstream (looking east)

14. Holland Mills Road (looking north)

15. Bridge Soffit

14.

POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATING MEASURES ASSOCIATED WITH IMPLEMENTATION OF THE PREFERRED ALTERNATIVE

- Construction Process - In-Water Aspect
- Construction Process - Terrestrial Aspect

CONSTRUCTION PROCESS - IN-WATER ASPECT

Removal and Demolition of Existing Structure and Demolition of Substructure and Foundations
The proposed design calls for the demolition of the existing truss structure and removal of the existing substructure and foundations.

The steps involved in accomplishing this task are as follows:

- A barn swallow habitat will be established outside the construction zone;
- Bird netting will be installed on the existing structure prior to nesting season and remain in place until demolition commencement;
- Silt fence will be installed at the perimeter of the construction zone to prevent turtles and other small animals from entering the construction zone;
- Removal of wood deck, steel stringers and railing system
- Lifting the steel truss in one piece off the substructure
- Installing sheet pile cofferdams around the substructure to isolate them from the river.
- Dewatering the area inside the cofferdams
- Demolition of the concrete abutments
- Demolition of the foundation

Removal of the wood deck, steel stringer, and railing system will produce small debris. Temporary floating platforms covered with tarps will be placed underneath the structure to catch debris from entering the river. These platforms will be installed prior to any bridge demolition commencement. After the deck is completely removed, the platforms will be cleaned to remove the debris.

The steel truss structure will be lifted off its supports and onto the adjacent roadway approach in one single operation by a large crane. This crane would be positioned on the existing roadway in order to complete the lift. Once lifted off its supports and onto the roadway, the truss will then be torch cut into small pieces. A designated piece of significance will be saved for presentation while the remaining pieces will be distributed to a recycling facility. Again, temporary floating platforms underneath will prevent debris from entering the watercourse.

Steel sheeting will then be installed to form a cofferdam around the existing abutments and foundations in the water. These cofferdams would be strategically placed to allow for the construction of the new footings and abutments without having to remove and re-install steel sheeting. Prior to driving the sheets, a floating silt curtain will be installed to contain any disturbance and prevent its spread throughout the remainder of the water. Once the cofferdam is complete, the area inside will be dewatered. Conventional submersible pumps will be used. All trapped aquatic life will be gathered (with nets) and relocated alive to the adjacent river as required by a qualified technician under a 'License to Collect Fish' obtained from the Ministry of Natural Resources and Forestry.

The concrete abutments and foundations will be demolished using a hydraulic breaker. As this work will be contained within the cofferdams, all debris will be contained inside. After demolition, the debris will be removed via hydraulic excavator and used as roadway fill. Reinforcing steel (if any) will be recycled.

The sheet pile cofferdams will remain intact until the foundation and abutments of the new structure are constructed and backfilled.

Construction of New Footings and Abutments

The new bridge footings and abutments would be constructed within the cofferdam set in place to remove the existing structure foundations. The abutments are designed to provide an opening width and height similar to that of the existing bridge.

Some excavation will be required to provide sufficient frost and scour cover and to provide room for rock protection. The rock protection would be placed to prevent erosion/scouring of the streambed in front of the abutments. This work is all contained within the cofferdams.

The new foundation would be conventional reinforced concrete spread footings. The footings would be designed for loads of the bridge as well as vehicular loads. Vehicular loads would be current loads as per the Canadian Highway Bridge Design Code. Again, all this work is contained within the cofferdams.

Wood formwork would then be erected to contain the wet concrete. Steel reinforcing bars would be tied within the formwork to reinforce the concrete. This work is isolated from the water by the cofferdams.

After the concrete has cured, all wood formwork would be removed and disposed of outside the limits of the project. Backfilling would then take place. Backfill materials would be Granular "B" obtained from a licensed pit and trucked to the site. Backfill would be compacted to eliminate air pockets and to eliminate the potential for excessive settlements after the construction is complete. The rock protection would be placed in front of the abutments as dictated by the design. This work is again all contained within the cofferdams.

Once backfilling is complete, the area between the cofferdams would then be flooded. After flooding, the cofferdams would be completely removed. The floating silt curtains would be removed thereafter.

Construction of Superstructure
Placement of the prestressed concrete box girders, concrete deck and railings will occur above the river.

The girders will be placed with a crane from the roadway approaches. Before lifting the girders into place, a worker will brush the girders with a broom to remove any mud or loose particles. This procedure will eliminate any debris from entering the river. The very nature of this type of structure (side-by-side concrete box girders) negates the need to construct falsework between the girders to support the deck. This falsework can not only generate dust and debris during its installation, but also during its removal. Falsework is required along the sides, but this can be installed from the top.

Once the girders are erected and side falsework installed, the bridge deck can be formed and poured. The girders themselves as well as the side falsework will prevent debris and wet concrete from entering the river. All gaps between adjacent girders and formwork will be sealed to prevent concrete spillage into the watercourse below. After the deck is cured, the side falsework will be removed. Again, this will occur from the bridge deck. To prevent dust and debris from entering the river, a floating barge covered with tarps will be employed.

The railings would then be installed. The proposed railing system would be manufactured off site and delivered via truck. The railing would be installed from the bridge deck with no disturbance to the river below.

Water Quality and Quantity
There are no anticipated impacts to water quality or quantity in the river. The various mitigation measures outlined for the construction components are deemed sufficient to address the potential for

aquatic impacts including sedimentation, fuel spillage and other deleterious substances. Proper spill response planning combined with appropriate fuel and chemical best management practices will ensure that precautions are exercised to prevent any spills from entering the river.

Fuel and Chemical Storage
Proper prevention and spill response procedures are to be put in place to deal with the potential for spills to occur during refuelling and maintenance of equipment. Refuelling, fuel storage and maintenance of equipment is not to occur in or adjacent to watercourses. Any fuel or chemical storage area will not be allowed within 30 metres of the river. In addition, the Contractor will:

- Conduct proper spill response training for all personnel associated with chemical and fuel handling and storage;
- Be responsible for ensuring that all material required for the containment and cleanup of a spill is present, on site, in close proximity to fuelling and maintenance areas; and
- Immediately report any fuel or chemical spills to the Ontario Spills Action Centre (1-800-268-6060).

Discharge of Excavation Water
All water which is pumped from the cofferdam during the construction will be piped to a dewatering trap. The dewatering trap will prevent sediment from entering the watercourse. The dewatering trap will be designed by the Contractor and would be located well away from the river and the edge of the excavations.

Aquatic Species-at-Risk
Silver Shiner and Snapping Turtle have been identified as possibly being present at the project location.

To mitigate against impacts to Silver Shiner, erosion and sediment control measures will be installed prior to construction and maintained throughout the construction. At the completion of construction, plantings will be installed to provide shade to the river as well as to provide slope stability.

To mitigate against impacts to Snapping Turtle, silt fence will be installed around the project site. Properly installed silt fence (i.e. embedded into the ground) will prevent Snapping Turtles from entering the construction site altogether.

Further details will be determined during the detailed design stage.

CONSTRUCTION PROCESS – TERRESTRIAL ASPECT

Roadway Approach Construction
In order to match the new bridge, the existing roadway approaches will need to be elevated. This work will be contained within the existing 20m right-of-way owned by the Township. This reconstruction will require the removal of ground vegetation on the sideslopes of the roadway.

The grade change is necessary to achieve a safe, effective approach to the bridge. Not addressing the vertical alignment of the roadway and structure is not an option because the Township is required to adhere to current design criterion for roadways set in place by Regulatory Agencies.

Minimizing the removal of vegetation is a goal and will be achieved by;

- Minimizing the extent of the work during the design phase of the project
- Identifying the extent of clearing required prior to the commencement of work and demarking the area,
- Restoring disturbed areas as the work progresses.
- Avoiding equipment & material use or storage within restored areas.

The implementation of these measures will minimize the amount of vegetation clearing and maximize the amount of existing vegetation to be retained.

As the roadway construction will create the potential for materials to migrate towards the river, sufficient erosion and sediment control measures must be incorporated into the work. As such, conventional silt fence is proposed. The details of this fence are depicted on the engineering drawings. In addition to this silt fencing, erosion control blankets will be placed on disturbed areas adjacent to the river and seeded.

Adjacent Landowners
There are 4 adjacent landowners in the vicinity of this project. No substantial impacts are expected to 3 of these landowners as these properties are agricultural lands. The 4th landowner will be directly affected by the work as the driveway to this property will require complete reconstruction to meet the new roadway. A temporary access route will be provided for this landowner. Communication with all landowners will be essential to ensure project goals are achieved.

Disruption of Traffic
No disruption to traffic is expected as Holland Mills Road adjacent to the bridge is currently closed. Local residents, as well as Emergency Services, have already become accustomed to the bridge being closed.

Noise Impacts
Noise is anticipated to arise from concrete removal, pumps, generators, construction equipment and trucks. The noise is expected to extend throughout the length of the project. No construction is anticipated to occur after dark (unless there are extenuating circumstances) therefore impacts will be limited to the daylight hours. Steps will be taken during the construction to minimize the level of noise such as requesting that stationary noise generating equipment be enclosed and that construction equipment be fitted with mufflers and maintained in good working order.

Impacts to wildlife are anticipated to be minimal for the same reasons given in the previous paragraph. Another reason for impacts to wildlife to be minimal as the construction of the new bridge is only expected to take one (1) season to complete.

Dust Impacts
Normal construction activities have the potential to generate dust which has the potential to impact nearby vegetation, aquatic habitats and residents. Dust can arise from a range of activities, including vehicular traffic, excavations and removal of the existing structure foundations. Appropriate dust control measures must be implemented to control dust. Assuming these measurements are used, no significant dust impacts are anticipated.

Terrestrial Rehabilitation
All scarred and bare soils including roadway sideslopes and backslopes will be rehabilitated by placing topsoil, hydroseed, and the placement of erosion control blanket.

Terrestrial Species-at-Risk
Barn Swallows have been identified as being present underneath the existing structure.

To mitigate against loss of habitat, a temporary nesting structure will be constructed adjacent to the bridge. The new bridge abutments will be habitable for nesting after construction is complete.

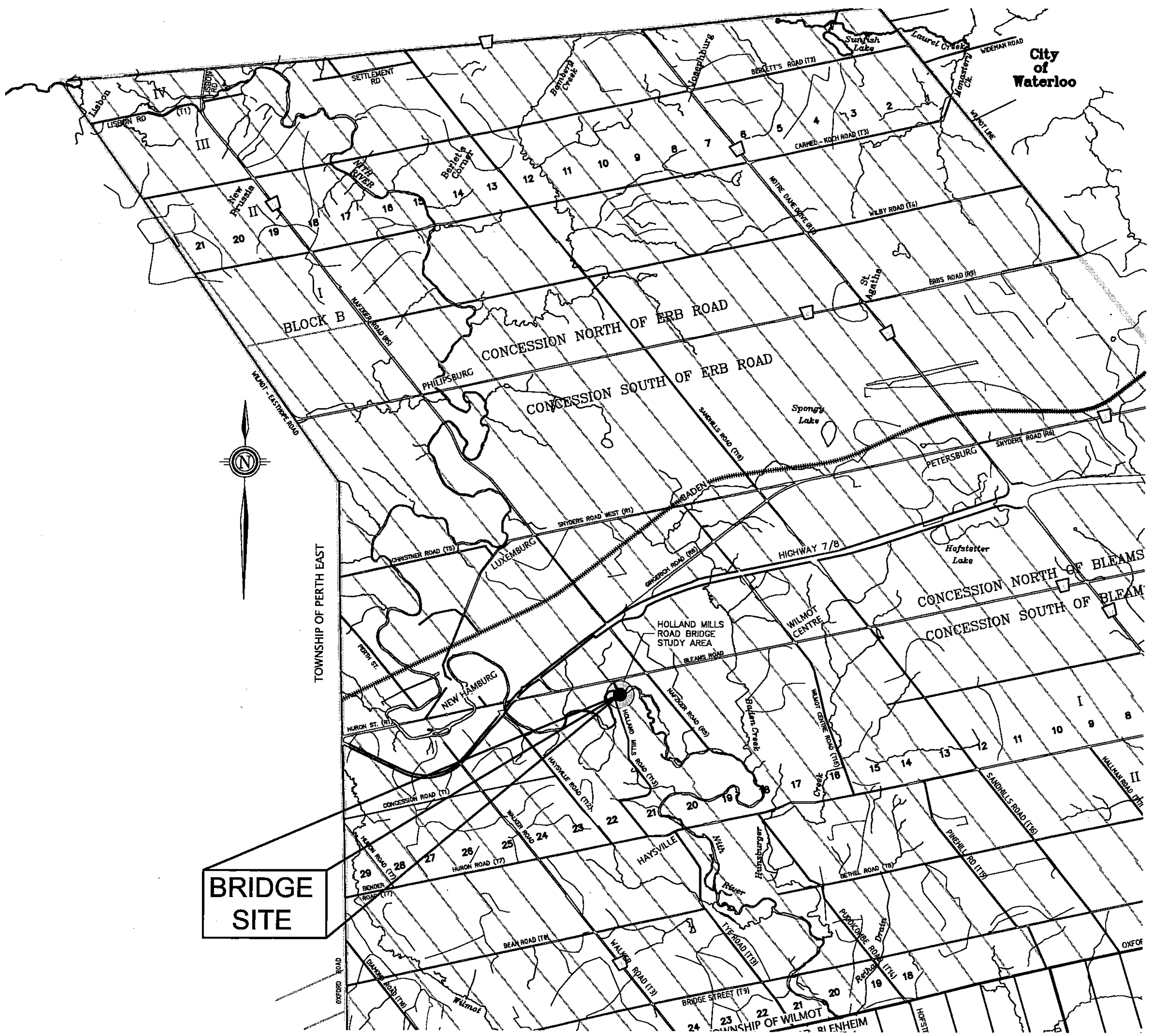
15.

DRAWINGS OF PROPOSED STRUCTURE

- Drawings 1-5 inclusive showing the proposed structure prepared by K. Smart Associates Limited dated September 2017.

BRIDGE 17/B-T13
(HOLLAND MILLS ROAD BRIDGE)

TOWNSHIP OF WILMOT
REGION OF WATERLOO



KEY PLAN
N.T.S.

LIST OF DRAWINGS

1. PLAN
2. PROFILE
3. PROFILE – CONTINUED
4. GENERAL ARRANGEMENT
5. EROSION AND SEDIMENT CONTROL

CONTRACT DRAWINGS

CONTRACT No. 16–298

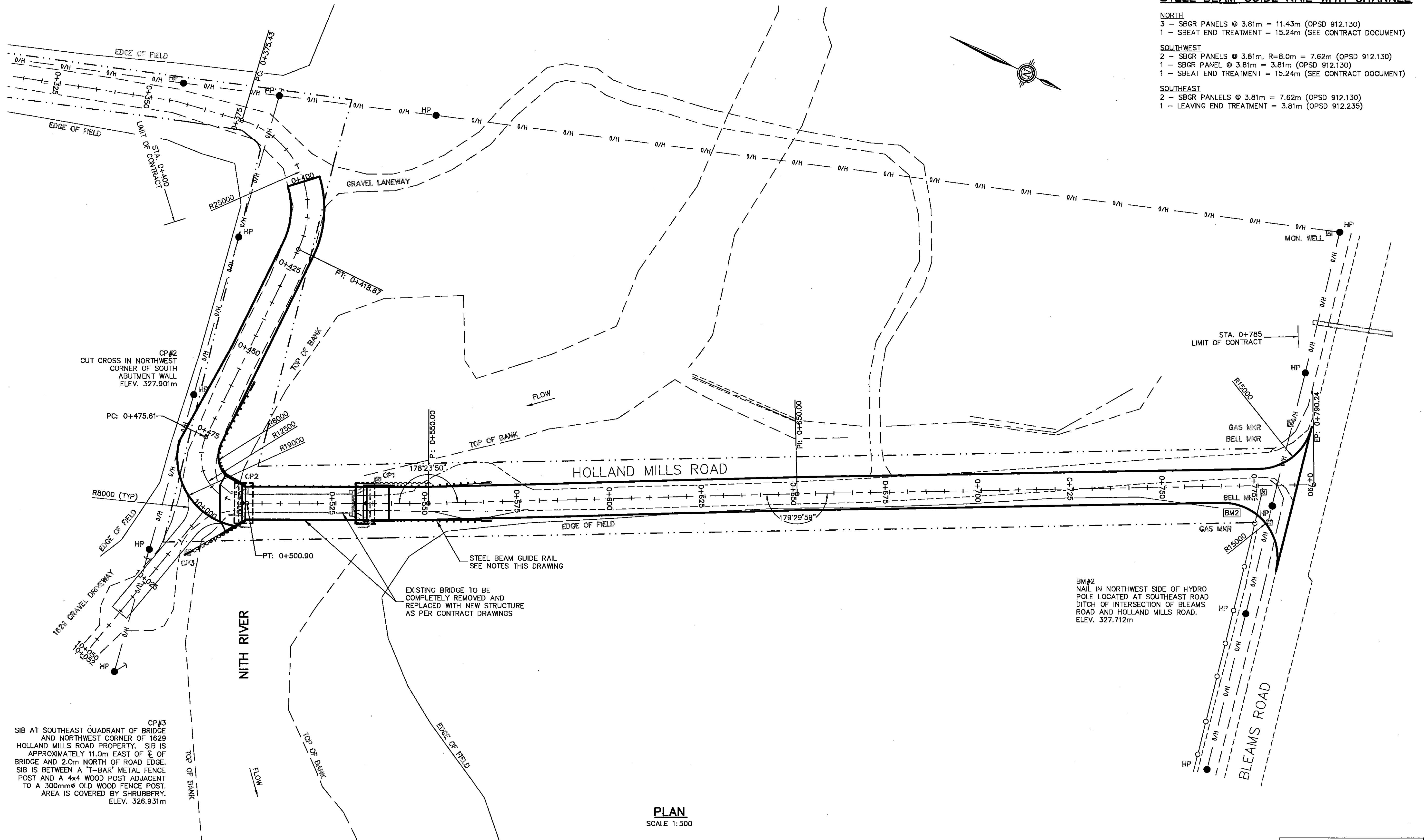
K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER SUDBURY

STEEL BEAM GUIDE RAIL WITH CHANNEL

NORTH
3 – SBGR PANELS @ 3.81m = 11.43m (OPSD 912.130)
1 – SBEAT END TREATMENT = 15.24m (SEE CONTRACT DOCUMENT)

SOUTHWEST
2 – SBGR PANELS @ 3.81m, R=8.0m = 7.62m (OPSD 912.130)
1 – SBGR PANEL @ 3.81m = 3.81m (OPSD 912.130)
1 – SBEAT END TREATMENT = 15.24m (SEE CONTRACT DOCUMENT)

SOUTHEAST
2 – SBGR PANLELS @ 3.81m = 7.62m (OPSD 912.130)
1 – LEAVING END TREATMENT = 3.81m (OPSD 912.235)



PLAN
SCALE 1:500

NOTE:
THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING 2 AND 3

No.	REVISION	DATE
1.	ISSUED FOR PIC	MAY 05/17
2.	ISSUED FOR PROJECT FILE	SEPT. 13/17

DESIGNED BY: A.G.
CHECKED BY: —
DRAWN BY: D.S.
CHECKED BY: A.G.
FIELD BOOK:

SCALE 1:500
5.0m 0 10.0m
(ON 24 x 36 PAPER)

BRIDGE 17/B–T13 REPLACEMENT

TOWNSHIP OF WILMOT — REGION OF WATERLOO

PLAN

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER — SUDBURY

JOB NUMBER: 16–298
DATE: SEPTEMBER 2017
DRAWING NUMBER: 1

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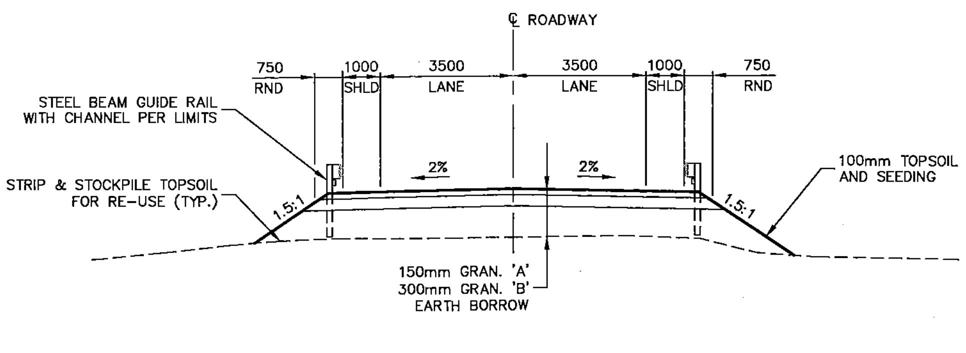
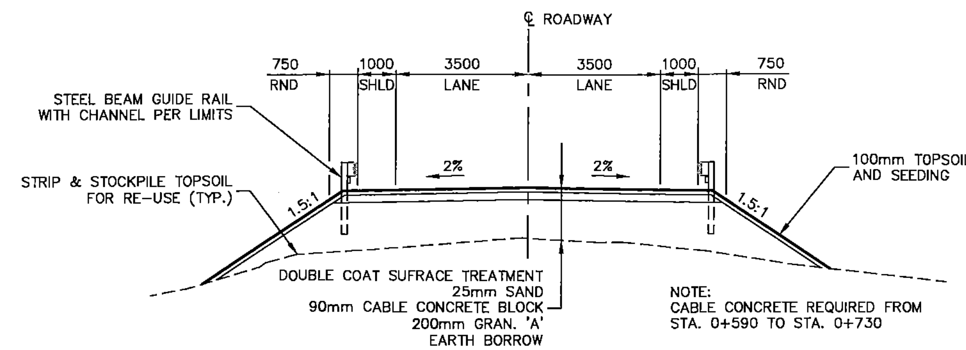
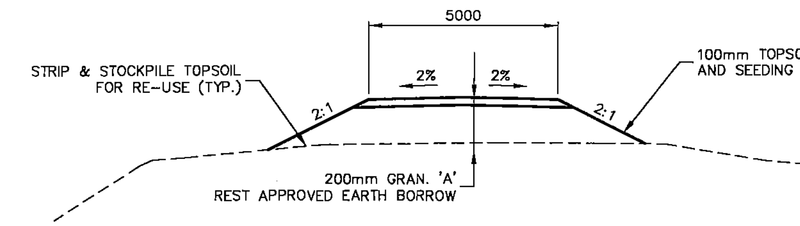


TYPICAL ROADWAY SECTION
STA. 0+400 TO BRIDGE
SCALE 1:100



TYPICAL ROADWAY SECTION
BRIDGE TO BLEAMS ROAD
SCALE 1:100



TYPICAL DRIVEWAY SECTION
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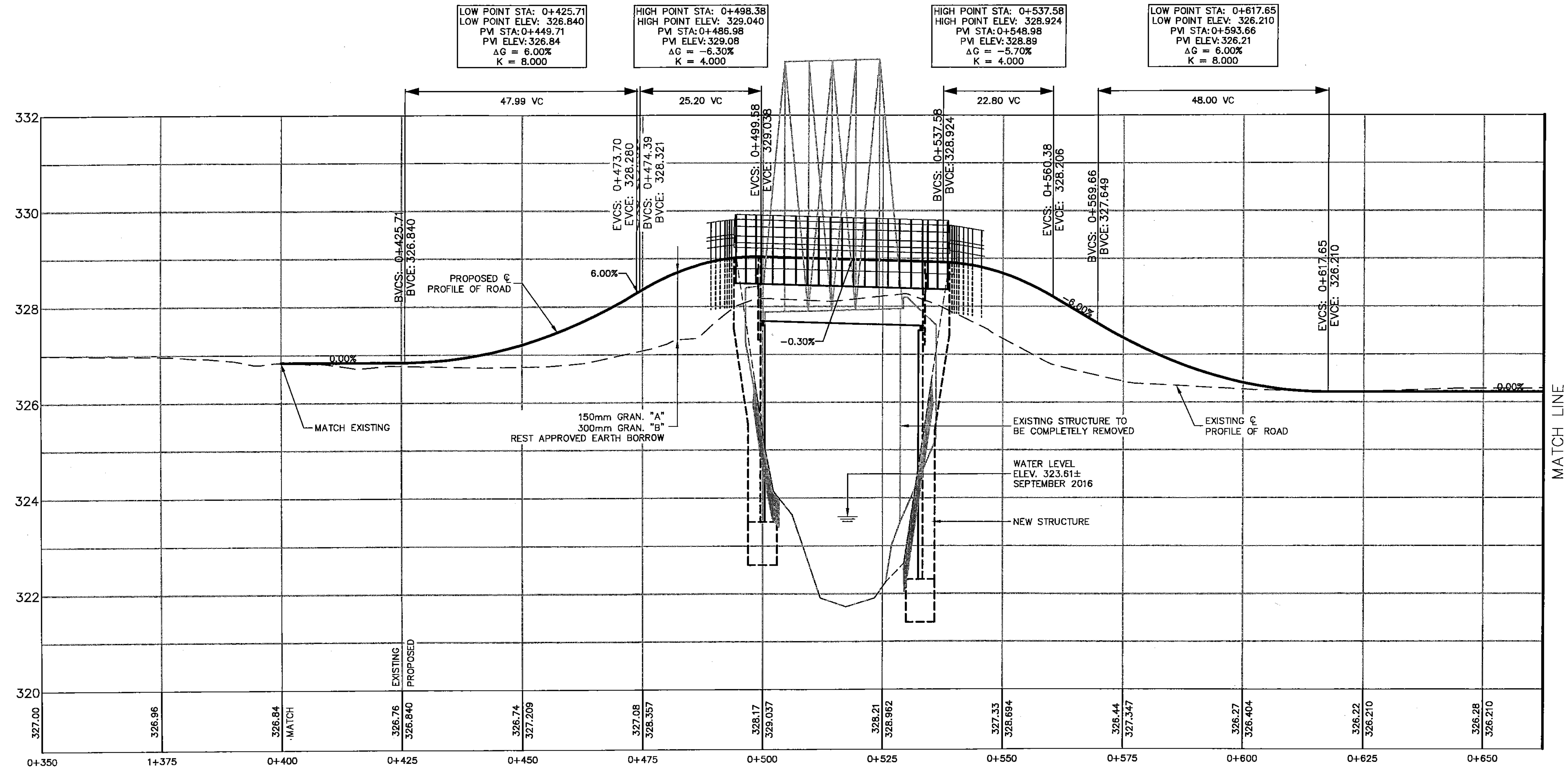

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FIELD BOOK:

SCALE
HORIZ. 1:500
VERT. 1:50
5.0m 0 10.0m
(ON 24 x 36 PAPER)

BRIDGE 17/B-T13 REPLACEMENT

TOWNSHIP OF WILMOT — REGION OF WATERLOO

PROFILE

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER SUDBURY

JOB NUMBER 16-298
DATE SEPTEMBER 2017
DRAWING NUMBER 2

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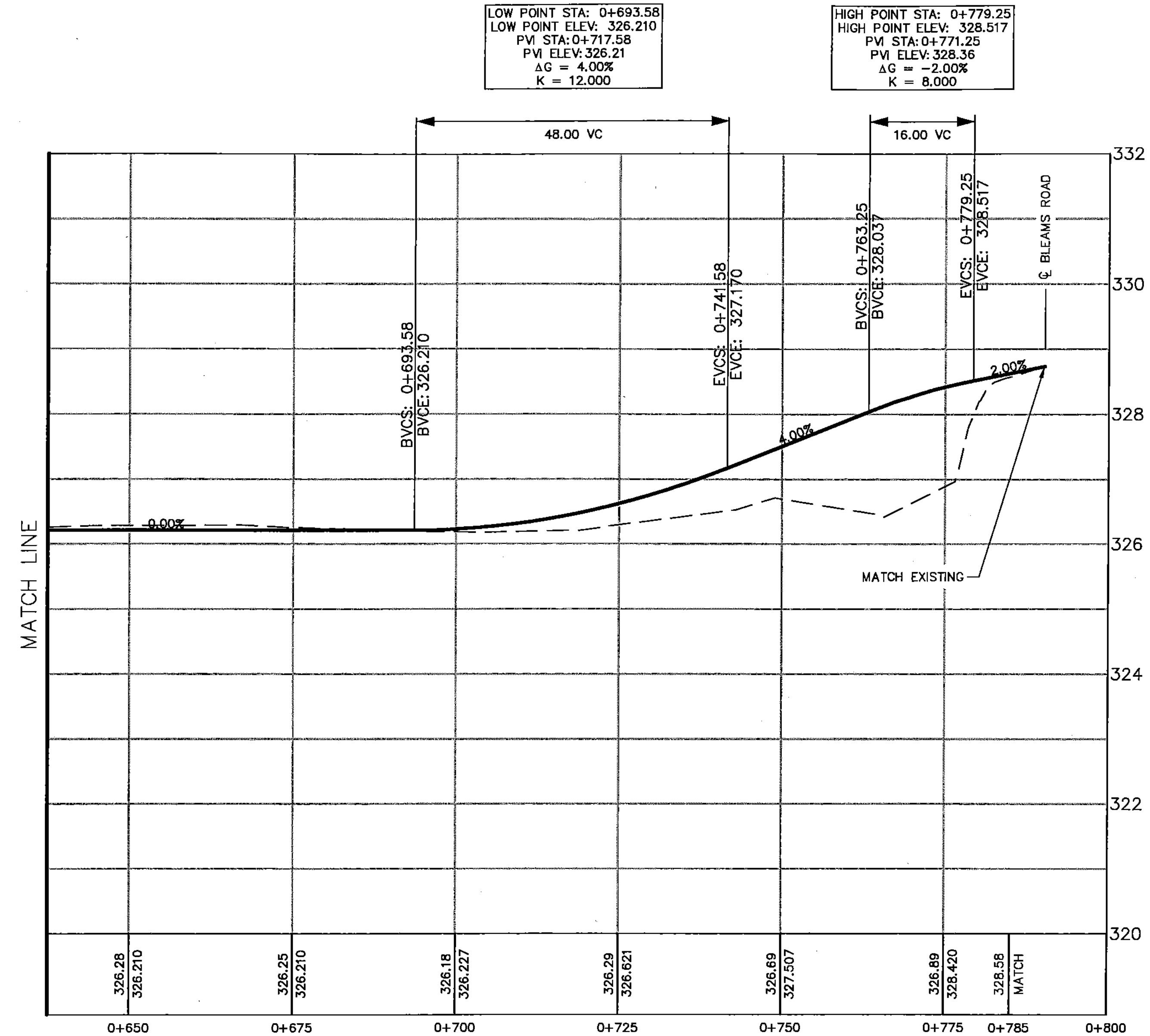

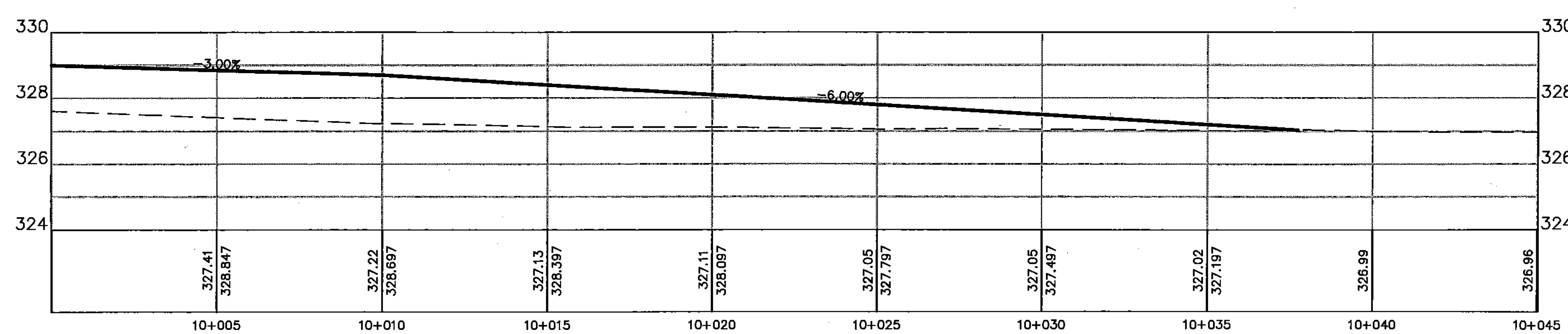

DRIVEWAY PROFILE – STA. 0+492.50

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FIELD BOOK:

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5.0m 0 10.0m
(ON 24 x 36 PAPER)

BRIDGE 17/B-T13 REPLACEMENT

TOWNSHIP OF WILMOT — REGION OF WATERLOO

PROFILE - CONTINUED

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER — SUDBURY

JOB NUMBER: 16-298
DATE: SEPTEMBER 2017
DRAWING NUMBER: 3

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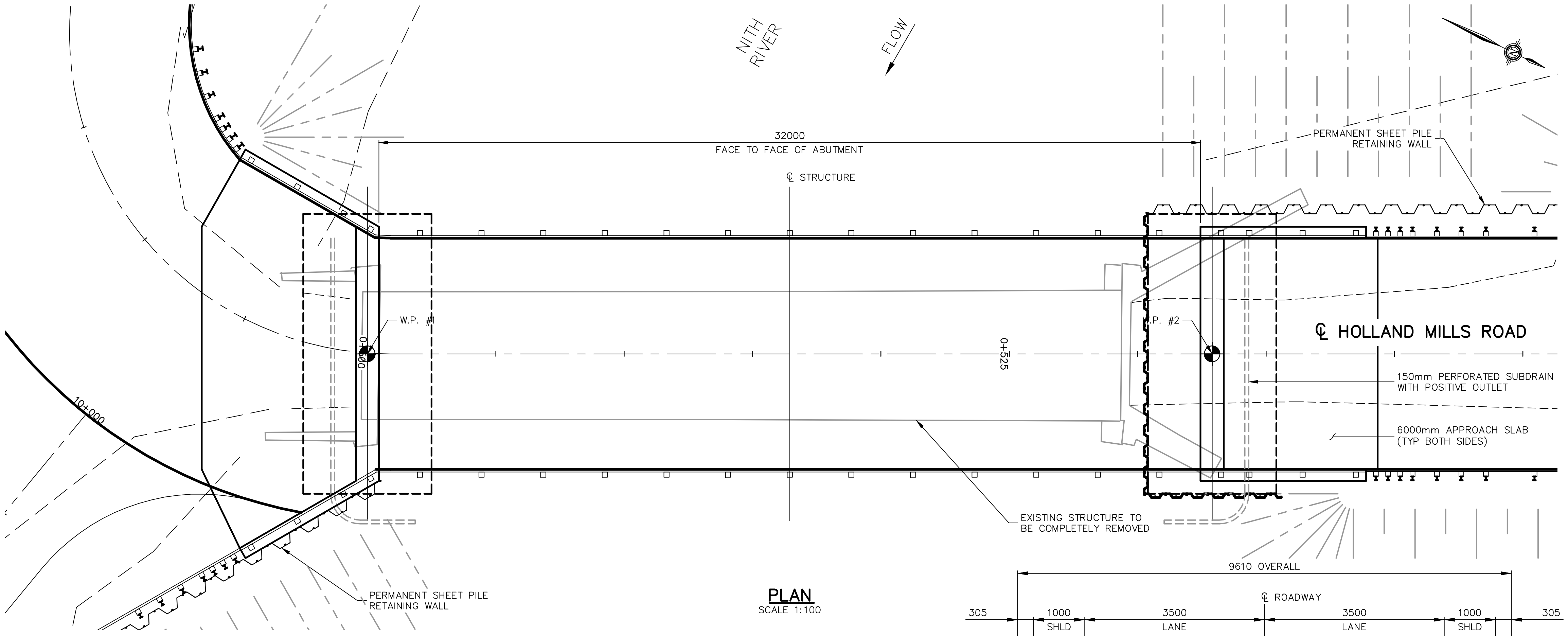
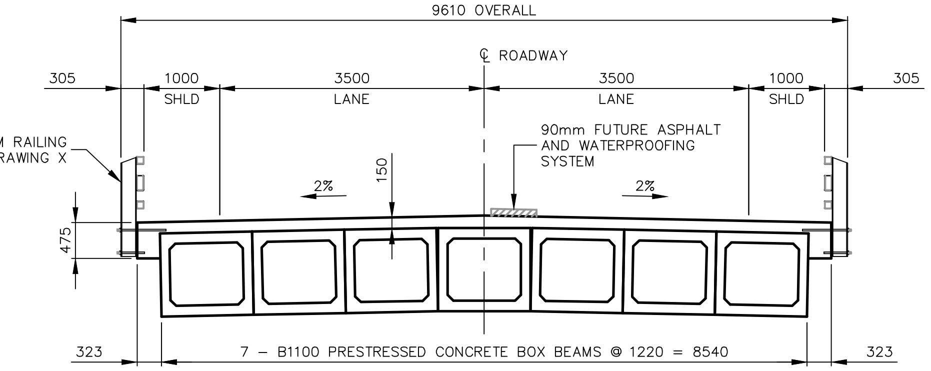


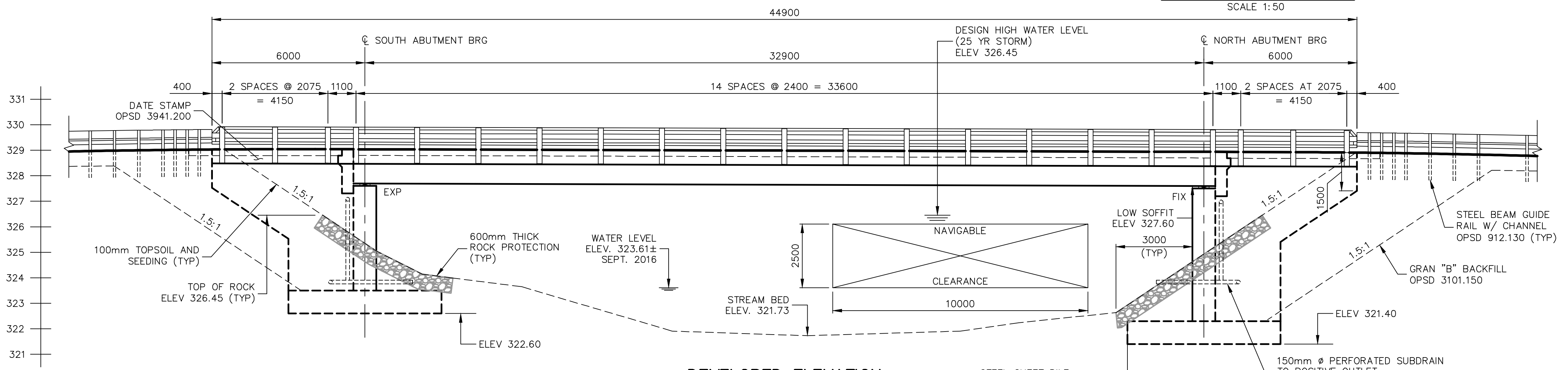
PLAN
SCALE 1:100

℄	W.P. #1	W.P. #2
ELEVATION	329.043	328.945
STATION	1 + 499.550	0 + 532.350

WORKING POINT (W.P.) ELEVATIONS GIVEN TO TOP OF CONCRETE DECK



DECK CROSS–SECTION
SCALE 1:50



DEVELOPED ELEVATION
SCALE 1:100

CONSTRUCTION NOTES

1. STRUCTURE DESIGNED FOR CL–625 (ONT) LOADING PLUS 90mm OF ASPHALT IN ACCORDANCE WITH THE CANADIAN HIGHWAY BRIDGE DESIGN CODE (CHBDC) 2014.
2. WORK ON THE STRUCTURE MUST NOT BE COMMENCED UNTIL MONUMENTS TO FIX CONTROL POINTS HAVE BEEN ERECTED AND CHECKED BY THE CONTRACT ADMINISTRATOR.
3. STRUCTURE TO BE BUILT IN ACCORDANCE WITH THE MOST CURRENT OPS SPECIFICATIONS AND DRAWINGS AS WELL AS THE CONTRACT ADMINISTRATOR'S SPECIFICATIONS.
4. THE COMPLETE SOIL INVESTIGATION BY ____________ FORM PART OF THE CONTRACT DOCUMENTS. THE CONTRACT ADMINISTRATOR DOES NOT GUARANTEE THE ACCURACY OF THIS REPORT. THE CONTRACTOR SHALL REVIEW THE REPORT AND DETERMINE HIS OWN METHOD TO CONTROL GROUND WATER DURING THE EXCAVATION.
5. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS ON THE JOB AND REPORT ANY DISCREPANCIES TO THE CONTRACT ADMINISTRATOR BEFORE PROCEEDING WITH THE WORK.
6. CLASS OF CONCRETE
   CAST–IN–PLACE CONCRETE — 35 MPa C–1 MIX
   PRESTRESSED CONCRETE — REFER TO RELEVANT DRAWINGS

   ALL CONCRETE SHALL INCLUDE AN APPROVED AIR ENTRAINING ADMIXTURE
7. CLEAR COVER TO REINFORCING STEEL TO BE:
   FOOTINGS — 100 ± 25mm
   REMAINDER (UNLESS NOTED OTHERWISE) — 70 ± 20mm
   PRESTRESSED CONCRETE — SEE PRESTRESSED DWGS
8. REINFORCING STEEL SHALL BE GRADE 400. BARS MARKED WITH POSTFIX "S" DENOTE STAINLESS STEEL BARS. UNLESS OTHERWISE SHOWN, TENSION LAP LENGTHS NOT INDICATED ON THE CONTRACT DRAWINGS SHALL BE CLASS "B". BAR HOOKS SHALL BE MINIMUM LENGTH AND STIRRUPS SHALL HAVE MINIMUM HOOKS, UNLESS INDICATED OTHERWISE.
9. MINIMUM LAP OF REINFORCING STEEL SHALL BE IN ACCORDANCE WITH CHBDC (2014)
10. ALL CONCRETE SHALL BE PLACED IN THE DRY.
11. NO CONCRETE SHALL BE PLACED BEFORE MATERIALS, FORMWORK AND REINFORCING HAVE BEEN CHECKED AND APPROVED BY THE CONTRACT ADMINISTRATOR.
12. A.LL EXPOSED EDGES SHALL BE CHAMFERED 19mm UNLESS OTHERWISE NOTED. ALL ACUTE ANGLES TO BE FILLED AS INDICATED.
13. CONSTRUCTION JOINTS NOT SHOWN ON THE PLANS MUST BE APPROVED BY THE CONTRACT ADMINISTRATOR.
14. FOOTING DEPTHS ARE SUBJECT TO REVISION BY THE CONTRACT ADMINISTRATOR. FOOTINGS DESIGNED FOR A BEARING CAPACITY OF XXX kPa (ULS) AND XXX kPa (SLS).
15. BEARING SEATS TO BE FINISHED DEAD LEVEL TO THE SPECIFIED ELEVATIONS TO A TOLERANCE OF ±3mm.
16. THE BRIDGE DECK SHALL BE FINISHED USING AN APPROVED FINISHING MACHINE IN ACCORDANCE WITH OPS.MUNI 904.
17. ANY EXCAVATED OR IMPORTED MATERIAL SHALL BE STOCKPILED WELL AWAY FROM THE EDGE OF THE EXCAVATION AND AT APPROVED LOCATIONS.
18. NO BACKFILL SHALL BE PLACED UNLESS APPROVED BEFOREHAND BY THE CONTRACT ADMINISTRATOR. NATIVE MATERIAL SHALL NOT BE REMOVED FROM THE CONSTRUCTION SITE WITHOUT WRITTEN APPROVAL FROM THE CONTRACT ADMINISTRATOR.
19. ROCK PROTECTION SHALL BE 300mm NOMINAL SIZE WITH 50% LARGER THAN 300mm AND 50% SMALLER THAN 300mm. ROCK PROTECTION SHALL BE PLACED ON GEOTEXTILE UNDERLAY.

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FIELD BOOK:

SCALE
AS NOTED

BRIDGE 17/B–T13 REPLACEMENT

TOWNSHIP OF WILMOT — REGION OF WATERLOO

GENERAL ARRANGEMENT

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER — SUDBURY

JOB NUMBER
16–298
DATE
SEPTEMBER 2017
DRAWING NUMBER
4

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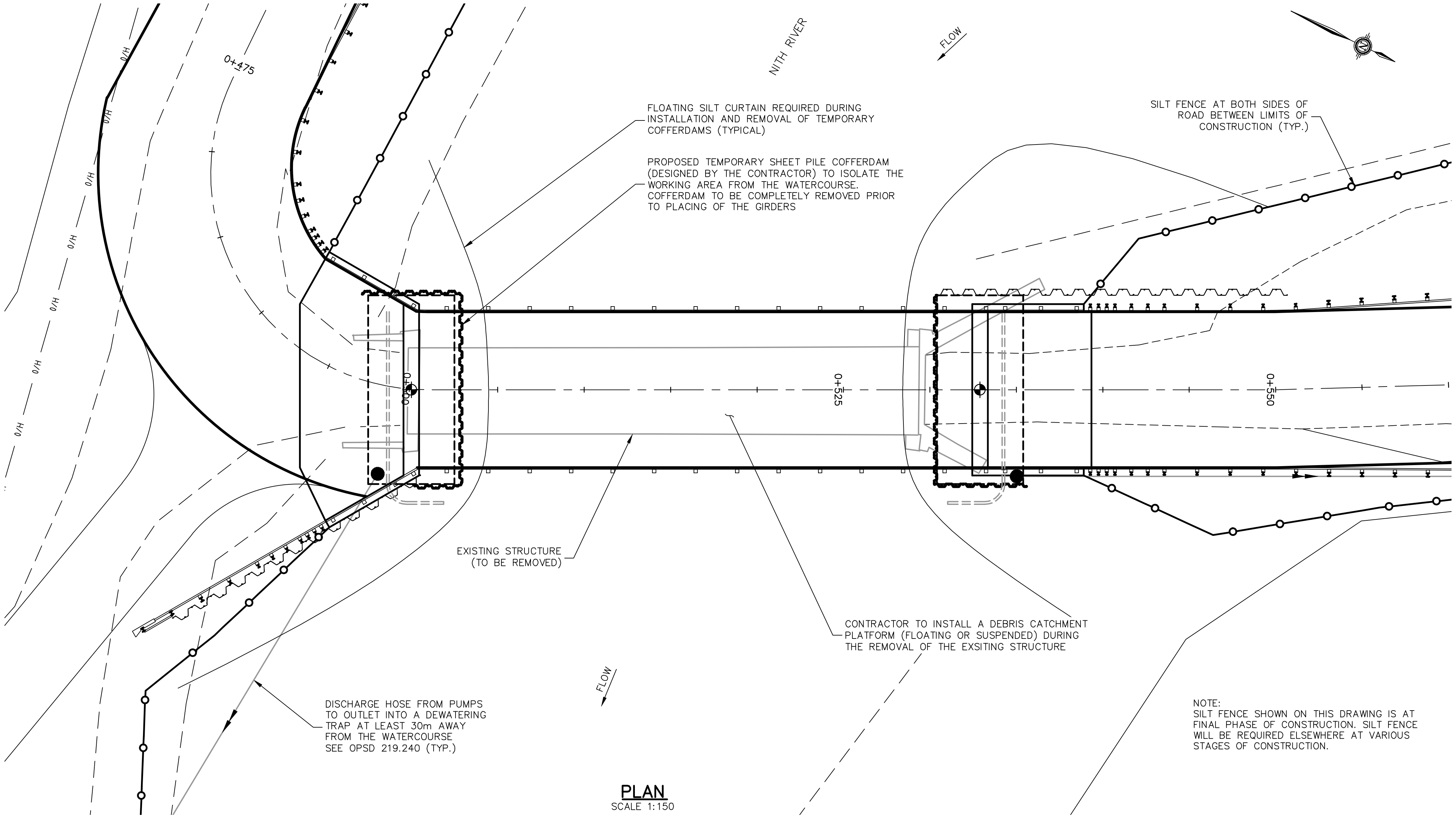
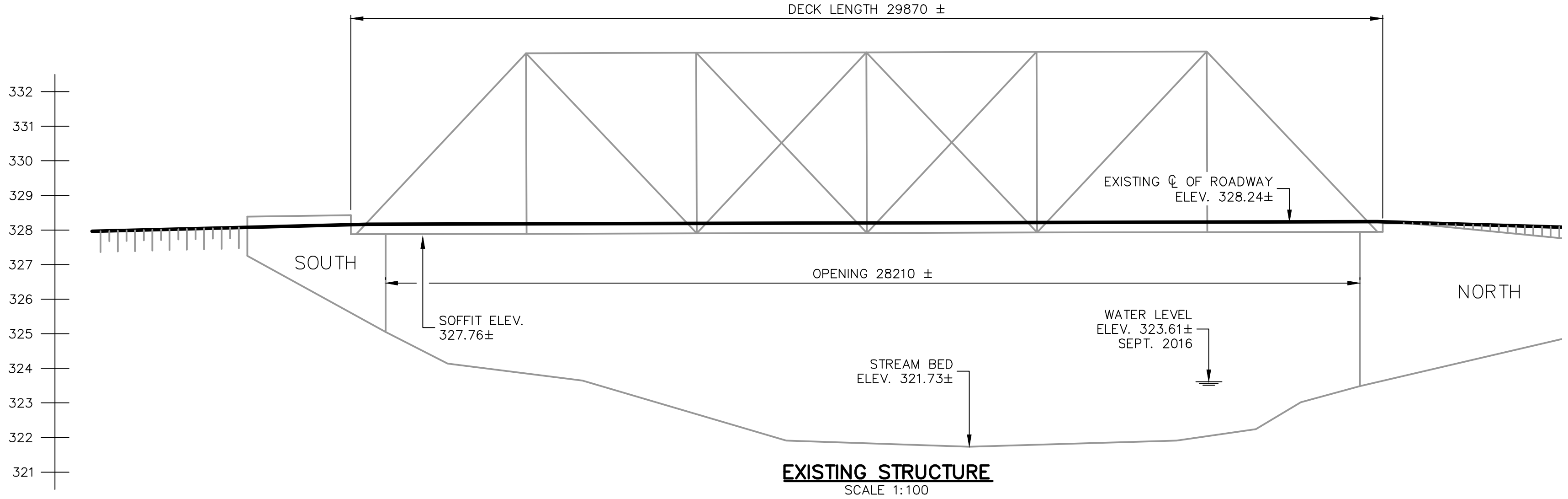


PLAN
SCALE 1:150



EXISTING STRUCTURE
SCALE 1:100

DEWATERING SEQUENCE

1. INSTALL SILT FENCE, STRAW BALE CHECK DAMS AND ANY OTHER EROSION CONTROL MEASURES WHICH MAY BE REQUIRED.
2. CONSTRUCT DEMOLITION PLATFORM UNDERNEATH EXISTING BRIDGE AND REMOVE EXISTING SUPERSTRUCTURE.
3. CLEAN DEBRIS, DUST AND SLURRY FROM DEMOLITION PLATFORM AND REMOVE PLATFORM.
4. PLACE FLOATING SILT CURTAINS UPSTREAM AND DOWNSTREAM OF WORKING AREA.
5. INSTALL SHEET PILE COFFERDAMS OR OTHER CONTAINMENT SYSTEM AS REQUIRED.
6. COMPLETE DEMOLITION OF THE EXISTING BRIDGE.
7. EXCAVATE AS REQUIRED IN ORDER TO CONSTRUCT NEW FOUNDATION AND ABUTMENTS.
8. PLACE BACKFILL AS REQUIRED ON BOTH SIDES OF ABUTMENT TO FACILITATE REMOVAL OF COFFERDAMS. PLACE ROCK PROTECTION.
9. REMOVE COFFERDAMS.
10. REMOVE FLOATING SILT CURTAINS.
11. COMPLETE REMAINING CONSTRUCTION OF THE BRIDGE.
12. COMPLETE ROADWORK.
13. INSTALL PERMANENT SILT FENCE AND STRAW BALE CHECK DAMS.

EROSION CONTROL – BRIDGE RECONSTRUCTION

1. ALL WORK SHALL BE DONE IN THE DRY.
2. NO IN-WATER WORK SHALL TAKE PLACE BETWEEN APRIL 1 AND JUNE 30.
3. DEWATERING OF THE SITE SHALL BE ACHIEVED BY THE INSTALLATION OF COFFERDAMS TO ISOLATE THE WORKING AREA, AND THE PLACEMENT OF CONVENTIONAL SUMP PUMPS WHERE REQUIRED. THE CONTRACTOR'S SPECIFIC METHOD SHALL BE APPROVED BEFOREHAND BY THE CONTRACT ADMINISTRATOR. ALTERNATIVE METHODS OF DEWATERING MAY BE POSSIBLE PENDING THE WRITTEN APPROVAL OF THE CONTRACT ADMINISTRATOR.
4. THE CONTRACTOR SHALL APPLY AND OBTAIN A PERMIT TO TAKE WATER (PTTW) SHOULD PUMPING EXCEEED 50,000 LITRES PER DAY.
5. DISCHARGE FROM PUMPING OPERATIONS SHALL FIRST OUTLET INTO A SILTING POND OR SEDIMENT TRAP BEFORE THE WATER IS ALLOWED TO RE-ENTER THE RIVER OR ANOTHER WATERCOURSE.
6. COFFERDAMS SHALL BE DESIGNED BY THE CONTRACTOR AND SUBMITTED TO THE CONTRACT ADMINISTRATOR FOR APPROVAL.
7. ALL DISTURBED AREAS INCLUDING BANKS ABOVE WATER LEVEL SHALL BE REGRADED, TOPSOILED AND SEEDED TO THE SATISFACTION OF THE CONTRACT ADMINISTRATOR AS SOON AS POSSIBLE.
8. ALL EROSION CONTROL MEASURES (SILT FENCE, ROCK DAMS, SILTATION POND/DEWATERING TRAP, ETC.) SHALL BE CHECKED DAILY DURING ON-SITE WORK AND BE MAINTAINED IN GOOD STATE SO THAT THEY ARE FUNCTIONING PROPERLY. SILT FENCE AND STRAW BALE CHECK DAMS TO BE LEFT IN PLACE FOR 12 MONTHS OR UNTIL SUCH TIME AS THE SITE STABILIZES (THESE ARE LOCATED ABOVE HIGH WATER LEVEL).
9. NO MACHINERY SHALL CROSS THE RIVER AT ANY TIME. ANY MACHINERY THAT IS REQUIRED ON THE OTHER SIDE OF THE RIVER WHILE THE BRIDGE IS DISMANTLED OR UNDER CONSTRUCTION SHALL BE HAULED BY FLOAT OR DRIVEN AROUND ON ROADS. MACHINERY, VEHICLES, EQUIPMENT PUMPS, ETC., WILL NOT BE REFUELED WITHIN 30 METRES OF THE WATERCOURSE. MACHINERY SHALL NOT BE CLEANED WITHIN 30 METRES OF THE RIVER.
10. ALL WASTE MATERIAL FROM CONSTRUCTION SHALL BE STORED AWAY AND ABOVE THE HIGH WATERMARK AND AT NO TIME SHALL SUCH MATERIAL ENTER IN THE WATER.
11. FOR TYPICAL CHECK DAMS REFER TO OPSD 219.210
12. FOR SILT FENCE REFER TO OPSD 219.110.

ADDITIONAL ENVIRONMENTAL MEASURES TO BE ADHERED TO:

1. SEDIMENT AND EROSION CONTROL MEASURES SHOULD BE IMPLEMENTED PRIOR TO WORK, AND MAINTAINED DURING THE WORK PHASE, TO PREVENT THE ENTRY OF SEDIMENT INTO THE WATER OR THE MOVEMENT OF RE-SUSPENDED SEDIMENT.
2. A FLOATING TURBIDITY CURTAIN OR SILT FENCE SHOULD BE PLACED IMMEDIATELY AROUND THE WORK SITE PRIOR TO THE INSTALLATION OF COFFERDAMS.
3. ALL DISTURBED WORK AREAS SHOULD BE STABILIZED AND RE-VEGETATED AS REQUIRED UPON THE COMPLETION OF WORK AND RESTORED TO A PRE-DISTURBED STATE OR BETTER.
4. SEDIMENT AND EROSION CONTROL MEASURES SHOULD BE LEFT IN PLACE UNTIL ALL DISTURBED AREAS HAVE BEEN STABILIZED.
5. EXISTING STREAM FLOWS SHOULD BE MAINTAINED DOWNSTREAM OF THE DE-WATERED WORK AREA WITHOUT INTERRUPTION, DURING ALL STAGES OF WORK. THERE SHOULD BE NO INCREASE IN WATER LEVELS UPSTREAM OF THE DE-WATERED WORK AREA.
6. FISH SHOULD BE REMOVED FROM THE WORK AREA PRIOR TO DE-WATERING AND RELEASED ALIVE IMMEDIATELY DOWNSTREAM.
7. SILT OR DEBRIS THAT HAS ACCUMULATED AROUND THE TEMPORARY COFFERDAMS SHOULD BE REMOVED PRIOR TO THE WITHDRAWAL.
8. NATURAL STRUCTURES SUCH AS LOGJAMS AND IN-STREAM WOODY COVER SHOULD NOT BE REMOVED UNLESS THEY REPRESENT A BARRIER TO FLOWS OR FISH MOVEMENT.
9. OPERATE HEAVY MACHINERY ON LAND AND IN A MANNER THAT MINIMIZES DISTURBANCE TO THE BANKS OR BED OF THE RIVER.
10. ENSURE THAT MACHINERY ARRIVES ON SITE IN A CLEAN, WASHED CONDITION AND IS MAINTAINED FREE OF FLUID LEAKS.
11. WASH, REFUEL AND SERVICE MACHINERY AND STORE FUEL AND OTHER MATERIALS FOR THE MACHINERY AWAY FROM THE WATER TO PREVENT ANY DELETERIOUS SUBSTANCE FROM ENTERING THE WATER OR SPREADING ONTO THE ICE SURFACE.
12. KEEP AN EMERGENCY SPILL KIT ON SITE IN CASE OF FLUID LEAKS OR SPILLS FROM MACHINERY.
13. STABILIZE ANY WASTE MATERIALS REMOVED FROM THE WORK SITE TO PREVENT IT FROM ENTERING THE WATERBODY. THIS COULD INCLUDE COVERING STOCKPILES WITH BIODEGRADABLE MATS OR TARPS, OR PLANTING STOCKPILES WITH GRASS OR SHRUBS.
14. ALL UNSTABLE BANKS OF THE WATERCOURSE SHOULD BE STABILIZED AND SIDE RUN-OFF DITCHES SHOULD BE CONSTRUCTED TO DIVERT ROAD RUN-OFF THROUGH THE GREENBELT BEFORE ENTERING THE STREAM.
15. VEGETATE AND STABILIZE ANY DISTURBED AREAS BY SEEDING AND PLANTING TREES, SHRUBS, OR GRASSES.
16. STREAM CROSSINGS SHOULD ALLOW FOR UNIMPEDED UPSTREAM AND DOWNSTREAM MOVEMENT OF FISH.
17. CONCRETE LEACHATE IS ALKALINE AND HIGHLY TOXIC TO FISH AND AQUATIC LIFE AND MEASURES MUST BE TAKEN TO PREVENT ANY INCIDENCE OF CONCRETE OR CONCRETE LEACHATE FROM ENTERING THE WATERCOURSE. ALL CAST-IN-PLACE CONCRETE, GROUT, MORTARS, ETC. SHOULD BE TOTALLY ISOLATED FROM PRECIPITATION AND THE WATERS OF THE CANAL FOR A MINIMUM 48 HOUR PERIOD OR UNTIL SIGNIFICANTLY CURED TO ALLOW THE pH TO REACH NEUTRAL LEVELS. CONTAINMENT FACILITIES SHOULD BE PROVIDED AT THE SITE FOR THE WASH-DOWN FROM CONCRETE DELIVERY TRUCKS, CONCRETE PUMPING EQUIPMENT, AND OTHER TOOLS AND EQUIPMENT AS REQUIRED.

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FIELD BOOK:

SCALE
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BRIDGE 17/B-T13 REPLACEMENT

TOWNSHIP OF WILMOT — REGION OF WATERLOO

EROSION AND SEDIMENT CONTROL

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER — SUDBURY

JOB NUMBER
16-298
DATE
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5

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Township of Wilmot
REPORT

REPORT NO.	**DS 2017-18**
TO:	**Council**
PREPARED BY:	**Andrew Martin, Manager of Planning/EDO**
DATE:	**September 25, 2017**
SUBJECT:	**Agreement with respect to time of payment of Development Charges 300 Snyder's Road East, Baden Westcap Development Inc.**

Recommendation:

That the Township enter into an agreement between the Township of Wilmot and Westcap Development Inc. pursuant to Section 3.14 of the Township Development Charge By-law 2014-34 to extend the time for which a redevelopment allowance is calculated as follows:

1. **Prior to October 26, 2019 a redevelopment allowance shall be available calculated based on the development charge rates in place at the time of issuance of a building permit, and in consideration of the demolition of 16,374sq.ft of commercial floor area and 3 single detached dwellings.**
2. **Between October 27, 2019 and June 24, 2020 a redevelopment allowance shall be available if any allowance from Clause 1 remains, but not exceeding 1 single detached dwelling and calculated based on the development charge rates in place at the time of issuance of a building permit.**
3. **No extensions to the time frames set out in this agreement will be available.**

Background:

The Township Development Charge By-law 2014-34 includes provisions for a redevelopment allowance when calculating development charges. Presently, the by-law sets out that if permits are issued for new construction to replace structures demolished within the 60 months prior to issuance, the development charges are reduced based on the value of development charges for the demolished buildings.

The Region of Waterloo's Development Charge By-law contains the same provision, but the time frame is 84 months.

Discussion:

Westcap Development Inc. purchased three properties on Snyder’s Road around 2011 and subsequently demolished the existing structures including three single detached dwellings and the commercial buildings of the former Herner Wood Products operation. Westcap subsequently pursued development approval for a townhome development on these properties in 2013. The official plan amendment and zone change were approved in 2015. Westcap has moved towards finalizing the development plans through the site plan approval process, but is not immediately ready to commence construction.

Two of the homes and all of the commercial buildings on the properties were demolished in 2012 and the third home in 2013. The applicant will not be ready to obtain building permits by October 26, 2017 when the majority of the Township’s redevelopment allowance will expire. The Region of Waterloo’s by-law provides for an additional 2 years. The applicant has requested that the Township extend the time frame for which the redevelopment allowance is calculated to line up with the 84 month period set out in the Region of Waterloo’s by-law.

Section 3.14 of the Township Development Charge By-law sets out that Council from time to time, may enter into agreements providing for all or any part of a development charge to be paid before or after it would otherwise be payable. Staff suggest that it is reasonable that the Township calculate the redevelopment allowance consistently with the time frame of the Region of Waterloo. This agreement allows for this to occur.

Strategic Plan Conformity:

Facilitating consistent implementation and time frames with respect to development charge fees promotes an engaged community through strengthening customer service.

Financial Considerations:

Adjusting the time frame for which the redevelopment allowance is calculated does not require Township funding to offset the reduction in the fees otherwise payable.

Conclusion:

Staff suggest that it is reasonable to have consistency between the Township and Regional Development Charge by-laws. Staff recommend that Council agree to the Township entering into an agreement with the applicant to extend the time for which a redevelopment allowance is calculated in line with the provisions of the Region of Waterloo’s Development Charge by-law.

Andrew Martin, MCIP RPP
Manager of Planning/EDO

Grant Whittington
Reviewed by CAO

Township of Wilmot
REPORT

REPORT NO.	**PRD-2017-11**
TO:	**Council**
PREPARED BY:	**Scott Nancekivell, Director of Facilities & Recreation Services**
DATE:	**September 25, 2017**
SUBJECT:	**RFP 2017-23** **Consultant Services for the Engineered Design of the Kirkpatrick Park Parking Lot and Wilmot Street Parking Enhancements, New Hamburg**

Recommendation:

That GM Blueplan Engineering Limited be hired to complete an Engineered Design of the Kirkpatrick Park Parking Lot and Wilmot Street Parking Enhancements, as per their proposal received on August 31, 2017 for the bid price of $42,590.00 plus applicable taxes.

Background:

Consulting services for a scoped review and engineered redesign of the Kirkpatrick Park and Wilmot Street parking facilities was approved as part of the 2017 budget process.

Discussion:

On August 17, 2017 the Township issued a formal request for proposal for Consultant Services for the Engineered Design of the Kirkpatrick Park Parking Lot and Wilmot Street Parking Enhancements, New Hamburg (RFP 2017-23), with the objective of having a preliminary design completed by late October, and a final design with construction cost estimates completed by December 1, 2017.

Bidders were requested to submit proposals utilizing a two-phased approach:
Phase 1 - review, preliminary design, final design and construction cost estimates (2017),
Phase 2 - tender preparation, construction contract administration and inspection (2018).

The Township received proposals from the following nine (9) engineering consulting firms:

- GM Blueplan Engineering Limited (Kitchener)
- R.J. Burnside & Associates Limited (Stratford)
- Mooney Metaxas Engineering (Waterloo)
- Meritech Engineering (Cambridge)
- MTE Consultants (Kitchener)

- IBI Group (Waterloo)
- WalterFedy (Kitchener)
- Cole Engineering Group Ltd. (Kitchener)
- NA Engineering Associates Inc. (Stratford)

An internal selection committee consisting of staff from Facilities & Recreation Services and Public Works, reviewed and evaluated the nine (9) proposals based on the flowing criteria:

- Project Understanding
- Experience & References
- Project Manager/Team
- Cost Proposal

A detailed review of the submissions based on the first three criteria was initially completed, followed by an evaluation of the cost proposal, to arrive at a final score for all submissions.

Strategic Plan Conformity:

Ensuring people's safety,
Enhancing our mobility,
Maintaining our infrastructure,
Investing in our downtowns and commercial areas.

Financial Considerations:

The proposal from GM Blueplan Engineering Limited, which includes all items requested in the scope of work (Phase 1 & 2), is $42,590.00 plus applicable taxes. Consulting fees, net of the HST rebate, will be $43,339.58.

The Council approved budget contains a total of $58,000.00 for consulting and construction administration services.

Conclusion:

The selection committee recommends that the contract for consulting services be awarded to GM Blueplan Engineering Limited, for the bid price of $42,590.00 plus applicable taxes.

Scott Nancekivell, B.Sc.
Director of Facilities & Recreation Services

Grant Whittington
Reviewed by CAO

WILMOT AGRICULTURAL SOCIETY

PO Box 6008
New Hamburg, ON N3A 2K6
www.newhamburgfallfair.ca
info@newhamburgfallfair.ca
519-501-7242

Dear The Corporation of the Township of Wilmot,

The Executive and Board of Directors of the Wilmot Agricultural Society wish to thank you for your generous sponsorship. Your donation has helped make the 2017 New Hamburg Fall Fair a great success – and it hasn't even happened yet!! Your support of the fair is a vital factor in the continuing success of our non-profit, volunteer based organization.

Please find attached the tax receipt for your charitable donation.

The theme of the 2017 Fair is "Celebrating Canada's 150th". We will continue to have our Heavy Horse and Pony Show; 4-H Competitions, Draft Horse Pull, Hunter and Jumper show and our Home Craft Displays. As always, we have our Ambassador Competition, Citizen of the Year Awards and many other shows and displays. We are excited to see our partnership with the New Hamburg Neighbourhood Association continue to grow each year in our Play Zone named 'The Barnyard' for younger families. We are planning on having the Western Horse event back on Friday night and of course, we'll still have our Demolition Derby that always draws a big and exciting crowd!

The financial support you provide to the Wilmot Agricultural Society will be used to ensure the continuing quality and success of the New Hamburg Fall Fair which will be held this year on September 14th, 15th, 16th and 17th and for years to come. Your contribution not only allows us to offer our regular shows and displays, but also helps us bring in new events to keep the New Hamburg Fall Fair fun and exciting. With your support, we are able to provide a Fall Fair program that will appeal to everyone in Wilmot Township and Waterloo Region. Given that we are the last true Agricultural Fair left in this region, your financial support will help to ensure that our organization is able to continue to provide a New Hamburg Fall Fair for many years to come.

We really do hope that you choose to join us at some point throughout the weekend to take in the fair and the many talents of our community. What a great way to spend a fall weekend, at the fair with family and friends!!

Also, please note that our Annual General Meeting is scheduled for Monday January 22nd, 2018 at 7pm at the New Hamburg Legion. Please join us as our guest to enjoy a nice meal and to be recognized for your contribution to the fair.

If you have any questions about the Wilmot Agricultural Society or the New Hamburg Fall Fair, please contact Stephanie Szusz at 519-569-9859. We are always looking for feedback, ideas and volunteers!

Sincerely,
The Executive & Board of Directors
Wilmot Agricultural Society

TOWNSHIP OF WILMOT

BY-LAW NO. 2017-45

BY-LAW RESPECTING THE APPOINTMENT OF
A CHIEF BUILDING OFFICIAL AND INSPECTORS.

WHEREAS Section 3 of The Building Code Act provides for the appointment of a Chief Building Official and such Inspectors as necessary to carry out the enforcement of The Building Code Act;

AND WHEREAS it is considered necessary and expedient to provide for the appointment of a Chief Building Official and Inspectors in the Township of Wilmot;

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE TOWNSHIP OF WILMOT ENACTS AS FOLLOWS:

1. That the following appointments be made:

Name of Officer	Title or Office
Terry Gerber	Chief Building Official Inspector
Amy May	Deputy Chief Building Official Inspector
Sheri Gutzeit	Inspector
Barbara Mocny	Inspector
Thomas Bromberg	Inspector
Gerald Moore	Inspector
Mandy Harris	Inspector

2. That By-law 2014-30 is repealed upon this by-law coming into force and effect.

3. That this by-law shall come into force and effect September 25th, 2017.

READ a first and second time on the 25th day of September, 2017.

READ a third time and finally passed in Open Council on the 25th day of September, 2017.

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MAYOR

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CLERK