REQUEST FOR TENDER

TENDER NO. ENG-50-2019
DENNIS BRIDGE REHABILITATION

Issued Date: February 26, 2019

Last Date to Submit Questions:	**Monday, March 8, 2019**
Last Date for Addenda to be Posted:	**Tuesday, March 12, 2019**
Closing Date and Time:	**Tuesday, March 19, 2019 before 2:00:00 p.m., local time**
Contact for Questions:	**Mr. Michael J. Rapai, P.Eng.** **G. Douglas Vallee Limited Consulting Engineers** **michaelrapai@gdvallee.ca**

CONTENT LIST

FOR

TENDER NO. ENG-50-2019

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1. **DEFINITIONS**

"Bidder" means one who submits a response to an invitation to bid as issued by the County.

"Closing Date" shall mean the date and time specified in the bid document or addressed in an issued addendum.

"Contractor" shall mean the awarded Bidder with whom an agreement has been signed to furnish goods, services or construction for a said price.

"Haldimand County" as defined by Bill 125. Haldimand County may also be referred to in this document as "County", "Municipality", "Corporation" or "Owner".

"Successful Bidder" shall mean the Bidder who has met or exceeded the minimum requirements of the bid document in its entirety as determined by Haldimand County in its absolute discretion and award is recommended.

2. **INQUIRIES DURING TENDERING**

The Bidder is advised that inquiries regarding the interpretation of the tender documents shall be directed to:

Mr. Michael J. Rapai, P. Eng.
G. Douglas Vallee Limited Consulting Engineers
Questions must be submitted in writing by email to:
michaelrapai@gdvallee.ca

Questions must be received by the end of the business day of Friday March 8th, 2019 or the questions may not be responded to. Addenda will be posted no later than 7 calendar days before the bid closing date.

Addenda will be posted to the Haldimand County website, Bid Opportunities web page and available for viewing and download by Bidders. It is the **Bidders responsibility** to check the website to obtain issued Addenda.

Questions regarding the procurement process can be directed to Support Services at 905-318-5932.

3. **SUBMISSION OF TENDERS**

A Request for Prequalification No. ES-01-2019 was completed in January, 2019. As a result, the following General Contractors have been prequalified. Bids will only be accepted from the following General Contractors:

- Clearwater Structures Inc.
- Dufferin Construction Company a Division of CRH Canada Group Inc.
- Rankin Construction Inc.

Submissions to be sealed in an envelope and submitted as required within this document clearly identified including your company name, the bid name, number, closing date and addressed to:

Manager Support Services/designate
Haldimand County
45 Munsee Street, Cayuga, ON N0A 1E0
before 2:00:00 p.m. on Tuesday, March, 19, 2019.

A sample submission label is enclosed at the end of this document.

Submissions received by facsimile or electronic delivery, secured or otherwise, will not be accepted. Bids will be opened at approximately 2:15 p.m. unless otherwise stated at time of closing or as determined by the Manager Support Services/designate.

Lowest or any tender not necessarily accepted.

4. **EXTENT AND LOCATION OF WORK**

The extent of work included within these documents is located at the Dennis Bridge (Structure No. 980305).

The Dennis Bridge (Structure 980305) is located approximately 1.5km west of Cheapside Road on Rainham Road (Haldimand Road 3) in Walpole Township, Haldimand County.

In general, the rehabilitation of the Dennis Bridge includes:

- Full depth removal and replacement of asphalt wearing surface;
- Full depth concrete removal and replacement of bridge barriers and curbs;
- Removal and replacement of existing pier expansion joints;
- Jacking of steel beams and concrete girders and replacement of bearings;
- Scarification of existing concrete deck;
- Localized partial depth removal and replacement of deteriorated concrete on bridge deck, soffit, abutment walls, wingwalls, and piers;
- Construction of a concrete deck overlay, concrete patchwork, waterproofing, and asphalt wearing surface;
- Semi-integral conversion of bridge abutments;
- Rehabilitation of precast concrete girders.
- Reinforcing of steel beams with prefabricated plates via welding;
- Sandblasting, cleaning, and coating of structural steel girders, bearings, diaphragms, stiffeners and associated steel elements;
- Removal of existing guiderail and installation of new guide rail;
- Associated roadwork and site restorations;
- Installation of rip rap slope protection.

5. DOCUMENTATION

All documentation as attached to this Request for Tender must be completed in full or included as instructed. Failure to do so will result in automatic rejection.

- Bid Deposit
- Agreement to Bond
- Bidder Covenant
- Schedule of Items and Prices

6. GENERAL FORMS

The following documents should be completed in full and included with the tender submission:

- Corporate Disclosure Form
- Bid Deposit Return Form
- List of Proposed Sub-Contractors

- Bidders & Sub-Contractors Experience in Similar Work
- List of Bidders Senior Staff to be Employed on this Contract

7. **BID DEPOSIT**

Tender submissions shall be accompanied by one of the following forms of security: certified cheque, bank draft, money order, or bid bond. The bid security in the amount of **seventy-five thousand dollars ($75,000)** made payable to the Corporation of Haldimand County, shall act as a guarantee for the execution of the contract.

The bid deposits of all Bidders, except the lowest and second low Bidder, will be returned within ten (10) days after the tender opening unless the bid is not awarded; in which case all bid deposits will be returned.

If the bid is awarded, the bid deposit of the second low Bidder will be returned when the successful Bidder has returned the executed Agreement and other applicable documents to the Owner.

The bid deposit received from the successful Bidder will be returned after the return of the executed Agreement and other applicable documents.

If the successful Bidder fails to return to the Owner, within the ten (10) days of receipt of acceptance of the tender or alternative timeline as specified by the Owner and agreed to by the successful Bidder, the executed Agreement and other related documents, the bid deposit from the successful Bidder shall be forfeited.

The Owner may at its discretion return a bid deposit at an earlier time than provided herein; or on receipt of an alternative security acceptable to the Owner, and no such action shall prejudice the validity of the tender to which such bid deposit relates.

8. **AGREEMENT TO BOND**

Each tender submission must be accompanied by the completed "AGREEMENT TO BOND", provided in the Form of Tender or on an Agreement to Bond Form from a bonding company, as a surety that the Bidder can obtain the required Bonds if deemed the successful Bidder. If the Bidder chooses to submit an Agreement to Bond on the

bonding company's form, the bonding form must comply with the terms and conditions as outlined in this tender.

9. **BONDS**

At the time of Execution of the Contract, the successful Bidder shall be required to provide Haldimand County with the following:

- a Performance Bond in the amount of one hundred (100%) percent of the Total Contract Price.
- a Labour and Material Payment Bond in the amount of fifty (50%) of the Total Contract Price.

A Surety company authorized to do business in the Province of Ontario shall provide the specified Bonds.

10. **GUARANTEED MAINTENANCE/WARRANTY**

The finished product shall be warranted, covering all Contractor supplied materials and workmanship for a period of two (2) years from the date of final acceptance of the Work unless otherwise specified.

The Contractor will be required to make permanent repairs, satisfactory to the County, for any area identified as being deficient due to materials or workmanship used in the Works at the sole discretion of the Owner.

Should the Contractor fail to comply with the required repairs, the Owner may, after providing the Contractor fourteen (14) calendar day's written notice, take such measures, as the Owner deems necessary to have the repairs completed. The Owner reserves the right to contact the Surety issuing the applicable bonds at any time during requests for warranty repair work if the Contractor has not taken appropriate measures to address the issues, without penalty.

Any repair work shall be completed prior to the end of the warranty period.

11. **EXECUTE CONTRACT**

Tenders shall be open for acceptance for a period of sixty (60) days after the closing date. After this time the tender can only be accepted

with the consent of the successful Bidder.

The successful Bidder shall execute the contract documents and furnish the required documentation within ten (10) calendar days of notification of Acceptance of Tender or within the timeline specified by the Owner and accepted by the successful Bidder.

Failure by the successful Bidder to meet the above requirements will entitle the Owner to cancel the award of the Contract and retain the bid deposit as compensation due to the Bidders default. The Owner may then elect to award the Contract to another Bidder or take such actions as required.

12. COMMENCEMENT OF WORK

The successful Bidder shall commence work on the site no later than May 6th, 2019.

Contract working days will be applied to the project starting from this date. A change in a commencement date, and the start of working days, after this date shall be submitted in writing by the Contractor and approved by the Contract Administrator.

13. ACCESSIBILITY FOR ONTARIANS WITH DISABILITIES ACT, 2005

In accordance with Ontario Regulation 429/07, "Accessibility Standards for Customer Service" (the Standard), every Contractor who interacts with the public or other third parties on the County's behalf, must have Accessible Customer Service training.

Contractors are fully responsible for providing Accessible Customer Service training to all of their staff who provides these services. Training shall include but not be limited to:

- How to interact and communicate with persons with various types of disabilities.
- How to interact with persons with disabilities who use assistive devices or require assistance of a guide animal, or a support person.
- How to use equipment that is available on the premises that may help in the provision of goods or services.
- What to do if a person with a particular type of disability is having difficult accessing the provider's good or services.

- Information on the policies, practices and procedures governing the provision of goods and services to people with disabilities.

Contractors are also responsible to ensure that their subcontractors who may interact with the public or other third parties on the County's behalf have been trained to the same standards as outlined above.

14. REQUIREMENTS AT TIME OF EXECUTION AND PRIOR TO COMMENCEMENT OF WORK

The successful Bidder will be required to submit the following documentation, in a form satisfactory to Haldimand County, at the time of the execution of the Contract:

a. 100% Performance Bond
b. 50% Labour and Material Payment Bond
c. Executed Agreement
d. Insurance Documents in compliance with the Tender Document
e. Workplace Safety and Insurance Board Clearance Certificate
f. Copy of the Notice of Project Form (0175) as transmitted to the Ministry of Labour and a copy of the submitted and approved Registration of Construction and Employers Engaged in Construction Form (Form 1000) in accordance to Section 6 of the Regulation for Construction Projects (O. Reg. 213/91) of the Occupational Health and Safety Act
g. A copy of the Contractors Health and Safety Policy
h. Compliance Form for Contractors (Accessibility Standards for Customer Service)

15. CONDITIONS

Award of this contract is subject to Council approval, budget approval and satisfactory reference checks on previous projects.

Reference checks may be conducted. The decision to award will be in consideration of the factors noted above and will be based on the County's assessment of the overall references including applicable relevant project experience (i.e. project scope and value) to the work outlined within this bid document. If the County is unable to obtain satisfactory references; or if a reference(s) chooses not to comment; or the project scope or value is not relevant to the work outlined within this project as deemed by the County, the reference will be deemed

unsatisfactory. An unsatisfactory reference may be justification not to award to a Bidder.

The Owner may enter into negotiations with the lowest compliant Bidder if the price bid is over the budgeted amount for the project. Should the Owner be unable to reach an agreement with the lowest compliant Bidder, the Owner reserves the right to cancel the bid opportunity, present a report to Council, initiate negotiations with the next lowest compliant Bidder, cancel the bid document and/or reissue in its original or revised format; or take such action that is deemed to be in the best interest of the Owner.

16. ABILITY AND EXPERIENCE OF BIDDER AND SUB-CONTRACTORS

The Owner reserves the right to reject the tender of any Bidder who does not furnish satisfactory evidence of sufficient capital, or plant or experience to successfully execute and complete the work.

The Contractor agrees to submit a list of any sub-contractor who will be carrying out any part of this Contract. The list shall show the names of the proposed sub-contractors and for what work each sub-contractor will be responsible. The Owner has the right to reject any of the sub-contractors so named. In this event, the Contractor shall arrange to have the work done by such other sub-contractor as may be approved by the Owner at no additional cost.

Sub-contractors shall be supervised on the job site at all times by a qualified representative of the Contractor. The Contractor shall notify the Owner in writing of the names and positions of the person or persons so representing the Contractor.

As part of this tender package, standard forms for listing any sub-contractors have been included. The Bidder should include the completed forms with their submission of the tender.

17. BIDDERS TO INVESTIGATE

Bidders shall inspect and examine the site(s) and before submitting their bid satisfy themselves as to the nature of the work and materials necessary for the completion of the Works.

The Bidder shall be deemed to have satisfied themselves before

tendering as to the correctness and sufficiency of their bid for the completion of the Works.

Bidders shall obtain their own information as to the availability of electric power and light, water, fuel and all other local materials required for the Work; satisfying themselves as to the quality of the materials and the sufficiency of quantities available.

In addition, Bidders shall obtain their own information on all matters and things that may in any way influence them in making their tender and fixing the rates entered by them on the pricing pages. Bidders shall also satisfy themselves in all respects as to the risks and obligations to be undertaken under the terms of the Contract.

18. **LATE SUBMISSIONS**

Bids received later than the closing time specified in the bid document will not be accepted, regardless of the reason. Such bids will result in an automatic rejection and will be returned unopened to the Bidder, or not received at all.

The County is in no way responsible for any documentation that is misdirected to another County location.

19. **SUBMISSION WITHDRAWAL**

Submissions may be withdrawn prior to the specified bid closing time. The representative shall provide to the County a request in writing and photo identification. A courier is not deemed a representative of the Bidder.

20. **MULTIPLE SUBMISSIONS**

A Bidder who has already submitted a sealed bid may submit a further sealed bid at any time up to the official closing time. The last sealed bid received shall supersede and invalidate all other sealed bids previously submitted by that Bidder as it applies to this request.

21. **PUBLIC OPENING**

At the public opening, a basic review of each submission will be conducted to ensure full compliance to the requirements at time of

closing. (i.e. review of bid deposits, bid bonds, etc.) If the submission does not comply with the specified document requirements, Support Services will retain the submission and provide written notification to the Bidder of the submissions non-compliance. No official disqualification will be announced at the public opening.

If the submission meets the minimum requirements, the bid will be provided to the user division for analysis of specifications, pricing, etc.

22. LAWS AND REGULATIONS

Bidders are assumed to have made themselves familiar with and will abide by all Municipal, Provincial and Federal laws, rules and regulations which in any way affect the Works. No plea of misunderstanding will be considered on account of ignorance.

This document and any contract arising shall be governed by the laws of the Province of Ontario, Canada and the parties shall agree to be governed by the Courts of the Province of Ontario.

The Successful Bidder or Contractor shall comply with all applicable statutes, laws, by-laws, regulations, ordinances, notices and orders whether Federal, Provincial, Municipal or otherwise, at any time in effect during the currency of this contract, and all rules and requirements of the Police and Fire departments, or other governmental authorities, and procure all C.S.A. approvals, if required. The Successful Bidder or Contractor shall not do or suffer to be done anything in violation of any such laws, ordinances, rules or requirements. If the attention of the Successful Bidder or Contractor is called to any such violation on the part of the Successful Bidder or Contractor or of any person employed or engaged by them, they shall immediately desist from and correct such violation.

23. COLLUSION

Submission from an individual firm, partnership, corporation or association under the same or different names will not be considered. Collusion between Bidders will be sufficient cause for rejection of all bids affected.

24. IRREGULARITIES CONTAINED IN BIDS

If bid irregularity occurs, the bid submission shall be rejected as outlined below. Bid rejection shall only occur based upon the requirements of this request. Example: If this request for tender does not require a mandatory site visit, then item 8 would not apply.

IRREGULARITY	RESPONSE
1. Late Bids	Automatic rejection, returned unopened to the Bidder, or not received at all.
2. Unsealed Envelopes	Automatic rejection
3. Insufficient Financial Security (No Bid Deposit or insufficient Bid Deposit) as specified in bid document.	Automatic Rejection
4. Failure to insert the name of the bonding company in the space noted in the provided forms.	Rejected as incomplete
5. Failure to provide a letter of Agreement to Bond where required.	Rejected as incomplete
6. Illegible or obscure Bids or Bids which contain additions not called for, erasures, alterations, errors or irregularities of any kind.	Will be rejected as informal
7. Documents, in which all necessary Addenda having financial implication or scope of work amendments have not been acknowledged as deemed by the County.	Rejected as incomplete
8. Failure to attend mandatory site visit(s).	Automatic rejection
9. Bids received on documents other than those provided by Haldimand County, when specified to do so.	Rejected as informal.
10. Failure to insert the Bidder's business name in the space(s) provided on the Bidders Covenant.	Rejected as incomplete
11. Failure to include signature of	Rejected as incomplete

IRREGULARITY	RESPONSE
the person authorized to bind the Bidder in the space provided in the provided forms.	
12. Conditions placed by the Bidder on the Total Contract Price.	Rejected as informal
13. Bids Containing Mathematical Errors	a) If the amount submitted for a unit price item does not agree with the extension of the estimated quantity and the submitted unit price, or if the extension has not been made, the unit price shall govern and the total price shall be corrected accordingly. If both the unit price and the total price are left blank, the Bid will be rejected as incomplete. b) If the unit price is left blank but a total price is shown for the item, the Bid will be rejected as incomplete. c) If the total price is left blank for a lump sum item, the Bid will be rejected as incomplete. d) If the Bid contains an error in addition and/or subtraction in the approved documentation format requested when unit prices are totalled (i.e. not the additional supporting documentation supplied), the error shall be corrected and the corrected total Contract price shall govern. Submissions containing prices which appear to be so unbalanced as to likely affect the interests of the County adversely will be clarified and may be rejected.

All blanks must be legibly and properly filled in on the forms supplied for that purpose. **If a bid for an item is no cost, enter nil or 0 or other such marking.**

25. **TAXES**

Harmonized Sales Tax (HST) shall be excluded from the unit prices. HST

as applicable to the Contract shall be entered in the space provided on the pricing page.

26. RESERVED RIGHTS OF HALDIMAND COUNTY

This document is in full compliance with the Procurement Policy which is available for viewing at www.haldimandcounty.ca.

The County shall not be responsible for any costs incurred by any Bidder to prepare and submit a bid or any subsequent documentation related to this request or submission.
All submissions become the property of the County and will not be returned. The exception is the return of bid deposits, which will be returned in accordance with this tender.

In addition, Haldimand County reserves the right in its sole discretion to:

a. Inspect any or all Bidders equipment, certificates, references, financial capabilities, etc. prior to or after contract execution as applicable to the product/services included as part of this request.
b. Not necessarily award to the lowest or any Bidder;
c. Accept a Bid which is not the lowest submitted Bid, or reject a Bid that is the lowest Bid even if it is the only Bid Received.
d. Cancel this Bid at any time, either before or after the Closing Time and Date;
e. Accept or reject any and all Bids, whether in whole or in part, and award any part of any Bid.
f. Award the Contract in its entirety or in part, to one or more Bidders, in accordance with the Bid Document, where more than one primary Contractor is provided for;
g. Subject to "Irregularities Contained in Bids", accept any unbalanced, irregular, or informal Bids, or waive any informalities, requirements, discrepancies, errors, omissions, or any other defects or deficiencies or any other forms of non-compliance with the Bid Documents in relation to any Bid Form or Bid Submission;
h. Seek clarification from any Bidder with respect to a Bid Submission after the Closing Time and Date without becoming obligated to seek clarification of any other bid.
i. Reject any Bidder who was a Consulting firm involved in preparing or assisting in developing the Scope of Work and/ or specifications for the project which is the subject of the Contract.

27. INTERPRETATION OF TENDER DOCUMENTS

If a prospective Bidder is in doubt as to the true meaning of any part of the Specifications or other documents, or finds omissions or discrepancies therein, the Bidder shall submit a request for interpretation or correction thereof and, if deemed necessary by the Owner, an Addendum will be posted on the website for downloading. Should the Owner, of his own accord wish to expand or delete any portion of the said Specifications, Drawings or other documents, an Addendum will be posted.

28. LITIGATION

It is the policy of Haldimand County that contracts for the supply of labour and materials, or work or services, may ***not*** be awarded to any Bidder who:

a) Is a party to litigation with the County, or
b) Directly or indirectly, including by common ownership or control or otherwise, is related to a party to litigation with the County, or
c) Intends to use a sub-contractor in respect of this contract who is a party to litigation with the County, or, who, directly or indirectly, including by common ownership or control or otherwise, is related to a party to litigation with the County.

For the purposes of this section, the phrase "party to litigation with the County" includes cases in which the Bidder or prospective Bidder or any of the parties named above, have advised the County in writing of their intention to commence litigation, or have commenced or have advised the County of their intention to commence an arbitral proceeding, against the County.
Bids from any Bidder in any of the above circumstances shall be rejected as informal, irregular and non-compliant.

29. CONTINGENCY AND PROVISIONAL ITEMS

Bidders are advised that Haldimand County may have entered a contingency value in the pricing table. Bidders shall carry these prices forward for inclusion in the Total Tendered Price as applicable.

If provisional pricing is requested, this pricing should be carried forward in the Total Tendered Price unless directed otherwise.

30. **DISPUTES**

Disputes shall be handled in accordance with process as outlined in the Procurement Policy 2013-02.

31. **LOBBYING**

The County will be entitled to reject a bid submission if any representative of a bidder including any other parties that may be involved in a joint venture, consortium, subcontractor or Supplier relationship, makes any representation or solicitation to any elected official, employee or agent of Haldimand County during the blackout period.

32. **INDEMNIFICATION**

The successful Bidder will indemnify, defend and hold harmless the County, its officers, employees and agents from all claims, demands, actions or other proceedings initiated by others arising out of, or attributable to anything and against all liability resulting from any and all operations and activities associated with responding to this Request.

33. **TREATMENT OF INFORMATION**

The information submitted in response to this RFP will be managed in accordance with all applicable legislation governing municipal activity, including but not limited to the Municipal Freedom of Information and Protection of Privacy Act (MFIPPA). The Bidder does, by the submission of a bid, accept that the information contained in it will be treated in accordance with the process set out in this Request. Bidders should clearly indicate in their submission which parts, if any, are exempt from disclosure under the relevant freedom of information and protection of privacy legislation.

Any submitted bid shall immediately become the property of Haldimand County. In the course of the project or of the bid process, Haldimand County may provide information to Bidders to allow the preparation of a response to the Request or of the project deliverables. Haldimand County retains the ownership of and reserves all rights (including copyright and other intellectual property rights) in any document, materials or other information that they provide to the

Bidders. Bidders may not use any materials provided for other purposes without the written permission of Haldimand County.

34. CODE OF CONDUCT AND BEHAVIOUR

Haldimand County is committed to maintaining a healthy, safe and supportive workplace for all employees that is free from discrimination and harassment. It is anticipated that County staff and their authorized representatives; the Contractor and their employees, subcontractors and suppliers, shall be treated and treat others with respect and dignity in keeping with the County's values of accountability, dedication, honesty, innovation, respect and teamwork.

If either party receives notification of behaviour that does not comply with the requirements outlined above, the notified party shall take appropriate action which may include removal of the authorized representative, employee, subcontractor or supplier from continuing in any future work arising out of the contracted works.

Submitted by: _____
Name of Bidder

To: The Corporation of Haldimand County
45 Munsee Street North, P.O. Box 400, Cayuga, Ontario, N0A 1E0
(905) 318-5932

BIDDER COVENANT

The undersigned authorized signing officer of the Bidder, hereby declares that no person, firm, or corporation other than the one represented by the signature below, has any interest in this submission.

The undersigned further declares that all statements, schedules and other information provided in this submission are true, complete and accurate in all respects to the best knowledge and belief of the Bidder.

The undersigned further declares that this submission is made without collusion, connection, knowledge or comparison of figures or arrangement with any other company, firm or persons making a submission and is in all respects fair.

I/we understand that this may result in the rejection of our submission if this declaration is found to be untrue.

I/we acknowledge as per Procurement Policy 2013-02, bids from bidders that are a party to litigation with the County may not be accepted.
(check one)

□ I/we are a party to litigation with the County.
□ I/we are not a party to litigation with the County.

OFFER

The undersigned Bidder, hereinafter called the "Contractor" hereby offers to The Corporation of Haldimand County, hereinafter called "Haldimand County", to furnish all necessary tools, plant services, materials and labour to execute and complete in a careful and workmanlike manner the Work set out in the Contract Documents.

Pursuant to and in compliance with the Request for Tender and the proposed Contract Documents relating to **Dennis Bridge Rehabilitation (Structure No. 980305) ENG-50-2019**, the undersigned, having become thoroughly familiar with the terms and conditions of the enclosed sample

Contract Documents, the terms and conditions and with the local conditions affecting the performance and cost of the Work at the place where the Work is to be completed, and having fully inspected the site in all particulars, and having examined Addenda _____ to _____, hereby offers to fully perform the Work including furnishing of any and all labour and materials **within one hundred (100) working days from commencement of the Contract.**

The Contractor also undertakes to do all the Work required to construct and complete said Work in accordance with the Contract Documents at the prices tendered as follows: ($ _____) **including HST**, or such other sum as may be ascertained in accordance with the Contract Documents.

The pricing pages shall form part of this tender. If there is any conflict between the tender sum entered above and the correct summation of the lump sum prices, provisional sums and correct extensions of the unit prices and quantities entered in the aforesaid Schedule, unit prices will prevail.

This tender is irrevocable for sixty (60) calendar days after the closing time, whether or not any other tender has previously been accepted and whether notice of acceptance of another tender has been given or not.

Notice of acceptance, or request for additional information, or the request to enter into negotiation may be addressed to the undersigned at the address set forth below.

COMPANY NAME: _____

STREET ADDRESS: _____

CITY: _____ PROV: _____ POSTAL CODE: _____

TELEPHONE NO. _____ FAX NO. _____

E-MAIL ADDRESS: _____

AUTHORIZED INDIVIDUAL: _____
Print Name

SIGNATURE OF PERSON NAMED ABOVE: _____

NAME OF REPRESENTATIVE SUBMITTING BID: _____
Print Name

DATE: _____

WSIB ACCOUNT NUMBER: _____

Corporate Disclosure Form

Name of Business: _____

Doing Business As: _____

Form of Business: □Sole Proprietorship □Partnership □Corporation
□Other _____
Explain if other

Address: _____

_____

Telephone: _____ Website Address: _____

HST#: _____

Principals and Company Owner Information

Principal/Company Owner Name	Title

If the company has operated previously or is currently operating under a different name, this information must be included below.

Company Name	Principal and Company Owner Name

Form Completed by:

Name and Position: _____
Please print

Email address: _____

Signature: _____

I confirm that all information provided above is true and correct. I understand that any falsification of statements, misrepresentation, deliberate omission, or concealment of information may be considered just cause for not awarding a contract, termination of an awarded contract, bidder suspension or any other action by the Haldimand County.

Dated this ___ day of _____, _____

Name: _____ Signature: _____
Printed Name of Authorized Individual

Bid Deposit Return

For the purpose of returning bid deposits to the correct contact person and address, complete the form as outlined below. Bid deposits may be returned by registered mail or by regular mail.

Contact Name: _____

Company Name: _____

Address if returning by registered mail (street address)

_____
Street Number and Name

_____
City Province Postal Code

Address if returning by regular mail (may include P.O. Box #)

_____
Street Number and Name or P.O. Box Number

_____
City Province Postal Code

SCHEDULE OF ITEMS AND PRICES

DENNIS BRIDGE REHABILITATION (Structure No. 980305)
HALDIMAND COUNTY CONTRACT ENG 19-050

Item	SP #	OPSD / MTO SS	Description	Unit	Estimated Quantity	Unit Price	Total Price
1	SP1, SP37		Mobilization, bonds, insurance, contract administration, etc.	LS	**1**		
2	SP2		Traffic control and detour.	LS	**1**		
3	SP3		***Utilities*** :				
			General coordination and protection.	LS	**1**		
4	SP4	219.100 - 219.261, 220.010	***Environmental Protection:***				
a			General Environmental Protection	LS	**1**		
b			Species-at-Risk Mitigation	LS	**1**		
5	SP5		Clear and grub work area as required.	LS	**1**		
6	SP6		Remove and dispose of existing steel beam guiderail complete, including hazard signs.	LS	**1**		
7	SP6, SP9		Remove & dispose of existing asphalt pavement at limit of construction to bridge ends.	m^2	**870**		
8	SP6		***Excavation:***				
a	SP9		Sub-excavate to depth of 600mm below finished road grades for **road reconstruction**.	LS	**1**		
b	SP9		Sub-excavate to depth of 150mm below finished road grades for **road restoration**.	LS	**1**		
c	SP10		Excavate behind abutments for new deck end, subdrain, and approach slab installation.	LS	**1**		
d	SP10		Excavate adjacent to wingwalls to suit abutment subdrain outlet.	LS	**1**		
9	SP6, SP7		Debris, access, and working platform(s), for demolition and construction, incl. design, maintenance, etc. and removal complete (excluding work for items 21a and b, and 22a and b).	LS	**1**		
10	SP8		***Dewatering:***				
a			Design cofferdams and water control systems to complete pier rehabilitation work.	LS	**1**		
b			Supply, install, and maintain cofferdams and water control systems to complete pier rehabilitation work (incl. dewatering and removal).	LS	**1**		
11	SP16		Full depth asphalt, waterproofing and debris removal on the bridge.	m^2	**370**		

Note: Notwithstanding all SP #, OPSD, and MTO SS listed in the Schedule of Items and Prices, all relevant SP #, OPSD, and MTO SS shall apply to all associated items.

Item	SP #	OPSD / MTO SS	Description	Unit	Estimated Quantity	Unit Price	Total Price
12	SP16, SP19		Deck scarification removal, blast clean, and prepare concrete for delamination survey.	m^2	**370**		
13	SP25		***Deck Drains:***				
a	SP19		Remove existing deck drains and core holes as required to install new deck drains.	each	**14**		
b		3340.100	Supply and install new deck drains.	each	**14**		
14	SP6, SP15, SP19		***Reinforced Concrete Removals*** *:* Remove and dispose of existing reinforced concrete and abrasive blast clean concrete surfaces and exposed steel reinforcement to a white metal finish:				
			Full Depth:				
a			Bridge barrier and curb.	each	**2**		
b			Area of ballast walls, wingwalls, cleats, and deck ends as required for semi-integral conversion (incl. removal and disposal of existing expansion joints complete).	each	**2**		
			Partial Depth Type A:				
c	SP16		Bridge deck after delamination survey.	m^2	**60**		
d			Bridge deck concrete removals required to facilitate new curb reinforcement installation.	each	**2**		
e			Concrete removals required to install new expansion joints at piers (incl. removal and disposal of existing expansion joints and armouring complete).	each	**2**		
			Partial Depth Type B:				
f			Soffit.	m^2	**20**		
g			Girders.	m^2	**6**		
			Partial Depth Type C:				
h			Abutment walls, wingwalls, and ballast walls.	m^2	**2**		
i			Piers, pier caps.	m^2	**10**		

Item	SP #	OPSD / MTO SS	Description	Unit	Estimated Quantity	Unit Price	Total Price
15	SP14, SP18		***Formed Concrete:*** Supply all labour, equipment, & materials to install all cast-in-place concrete and reinforcing steel including all bonding agents, securement of reinforcement, formwork, falsework, curing, formwork removal, and finishing:				
a			Cleat, ballast and wingwall caps (35MPa C1).	each	**2**		
b	SP16		Semi-integral deck end & overlay (35MPa C1 13mm).	m^3	**72**		
c	SP26		Concrete for cast-in-place expansion joints (35MPa C1 13mm).	each	**2**		
d			Curbs on deck (35MPa C1).	each	**2**		
e			Curbs on wingwalls (35MPa C1).	each	**2**		
f			Approach slabs (35MPa C1).	each	**2**		
g		3940.151, 3941.200	Structure number installation.	each	**2**		
h			Barrier endposts (35MPa C1).	each	**4**		
i	SP24	604.010 MOD.	Spillways on approaches (32MPa C2).	each	**4**		
j	SP24	600.110	Curbs off structure (32MPa C2).	m	**14**		
16	SP14, SP15, SP19		***Concrete Patchwork:*** Supply all labour, equipment, & materials to install all concrete including all bonding, securement of reinforcement, formwork, falsework, curing, formwork removal, and finishing:				
a			Formed patches (35MPa C1 13mm).	m^3	**5**		
b			Southwest pier cap repair including WWM, reinforcement, drilling and grouting. (35MPa C1 13mm).	m^3	**1**		
c			Unformed patches (proprietary compound).	m^2	**36**		
17	SP18		***Provisional:*** Replace existing deteriorated rebar with new rebar or dowels to match, including all ties, stirrups, drilling, & epoxying as required.	kg	**300**		
18	SP26	SS113-12, SS113-18	***Expansion Joints:***				
a			Design and supply of expansion joint assemblies and cover plates at piers.	LS	**1**		
b			Installation of expansion joint assemblies and cover plates at piers complete (excluding all concrete work - Item 15c).	each	**2**		
c		SS113-14	Supply and install galvanized expansion joint catchbasins and downpipes.	each	**4**		

Note: Notwithstanding all SP #, OPSD, and MTO SS listed in the Schedule of Items and Prices, all relevant SP #, OPSD, and MTO SS shall apply to all associated items.

Item	SP #	OPSD / MTO SS	Description	Unit	Estimated Quantity	Unit Price	Total Price
19	SP14		Preparation and installation of WABO seals, foam, and components at deck end and pier expansion joints through concrete curbs.	each	**8**		
20	SP17		***Crack Injection:*** Seal existing concrete cracks in bridge soffit, abutment walls, and wingwalls including cleaning, flushing, preparation of cracks, curing & finishing.	m	**40**		
21			***Structural Steel Girder Rehabilitation:***				
a	SP7		Access platforms.	LS	**1**		
b	SP19, SP20		Debris containment, full enclosures, abatement, disposal and mitigation.	LS	**1**		
c	SP23		Design and installation of jacking and temporary support structure (per bearing).	each	**28**		
d	SP21		Supply and install steel plate reinforcement sheets on steel girders (per beam end).	each	**28**		
e	SP6		Remove and dispose of existing steel bearings and anchor rods.	LS	**1**		
f	SP21, SP22		Supply and install new shoe plates, bearing pads, and anchor rods.	each	**28**		
g	SP19, SP20		Abrasive blast clean steel girders, diaphragms, stiffeners, connectors, and clean and prepare for inspection and coating.	LS	**1**		
h	SP20		Coat steel girders, bearings, bearing plates, diaphragms, stiffeners and connectors.	LS	**1**		
22			***Concrete Girder Rehabilitation:***				
a	SP7		Access platforms.	LS	**1**		
b	SP8		Debris containment and mitigation.	LS	**1**		
c	SP23		Design and installation of jacking and temporary support structure (per concrete bearing).	each	**12**		
d	SP6, SP22		Removal of existing, and supply and installation of new bearing pads.	each	**12**		
23	SP27	3370.100, 3370.101	Supply and install hot applied membrane waterproofing and protection boards including membrane reinforcement.	LS	**1**		
24	SP11, SP12	3101.150	Supply and install 150mm perforated subdrain with filter sock behind abutments and wingwalls including clearstone, geotextile, sleeves and rodent grates complete.	m	**48**		
25	SP10, SP11, SP13		**Granular Materials:** Supply, install, and compact granular material:				
a			Granular "A".	tonne	**275**		
b			Granular "B" Type II.	tonne	**590**		

Note: Notwithstanding all SP #, OPSD, and MTO SS listed in the Schedule of Items and Prices, all relevant SP #, OPSD, and MTO SS shall apply to all associated items.

Item	SP #	OPSD / MTO SS	Description	Unit	Estimated Quantity	Unit Price	Total Price
26	SP28, SP29		**Asphalt pavement**: Supply, install and compact asphalt pavement:				
a			HL3.	tonne	**180**		
b			HL4.	tonne	**180**		
c			HL8.	tonne	**130**		
d			Mill joint at existing asphalt.	each	**2**		
e			Handwork and patching at curb ends, private entrances, structure edges, spillways, bridge deck drains, and transitions into existing asphalt.	LS	**1**		
f			Rout and seal.	m	**40**		
27	SP9, SP11, SP13		Earthwork, grading, slope widening, benching, swales, alignment of ditches, including the placement, and compaction of all required suitable material for slope construction adjacent to wingwalls, adjacent to guiderails, and ditching/swales as directed by the Engineer.	LS	**1**		
28	SP33		**Rip rap and River Stone:** Supply and install rip rap and river rock on geotextile slope protection:				
a			Rip Rap rock.	tonne	**120**		
b			River rock.	tonne	**140**		
29	SP30	SS110-48 MOD	Supply and install galvanized steel box beam & post bridge barrier system incl. anchors, epoxy grout, & seal.	LS	**1**		
30	SP31	912.430, 912.101, 912.102, 912.103	***Standard Barrier Guide Railings:*** Supply and install new standard barrier guide railing and components:				
a		912.130	Steel beam, steel post, offset block assembly.	m	**128**		
b	SP32	922.181	SBGR energy attenuator system assemblies (15.24m).	each	**4**		
c		912.430, 3419.100	SBGR structure assemblies & bottom channel (1.4m).	each	**4**		
d			***Provisional:*** Supply and utilize Hydro Vac during construction.	hour	**20**		

Note: Notwithstanding all SP #, OPSD, and MTO SS listed in the Schedule of Items and Prices, all relevant SP #, OPSD, and MTO SS shall apply to all associated items.

Item	SP #	OPSD / MTO SS	Description	Unit	Estimated Quantity	Unit Price	Total Price
31	SP34, SP35		***Restorations:***				
a			Restore grassed areas with topsoil, hydro seed, and mulch.	m^2	**400**		
b			Restore all other areas disturbed as result of the work to original condition or better.	LS	**1**		
32	SP36		**Pavement Markings:**				
a			Permanent solid yellow centerline.	m	**150**		
b			Permanent white edge line.	m	**300**		
33	SP39		Contingency	LS	**1**		$20,000.00

SUBTOTAL _____

HST _____

GRAND TOTAL _____

Lowest or any submission not necessarily accepted.

Note: Notwithstanding all SP #, OPSD, and MTO SS listed in the Schedule of Items and Prices, all relevant SP #, OPSD, and MTO SS shall apply to all associated items.

AGREEMENT TO BOND

We, the undersigned, hereby agree to become bound as Surety for

_____

_____

in a bond totalling One Hundred Percent (100%) of the total Contract Price, and a Labour and Material Payment Bond in the amount of Fifty Percent (50%) of the total Contract Price, conforming to the instruments of Contract attached hereto, for the full and due performance of the Works shown as described herein, if the tender for

Contract **Dennis Bridge Rehabilitation**
(Structure No. 980305)
ENG-50-2019

as accepted by Haldimand County.

It is a condition of this Agreement that if this tender is accepted, application for a Performance Bond and Labour and Material Payment Bond must be completed with the undersigned within ten (10) days of acceptance of the Tender related thereto, otherwise this Agreement may be null and void.

DATED this _____day of _____, 2019.

_____
Name of Bonding Company

_____
Duly Authorized Signing Officer(s)

LIST OF PROPOSED SUB-CONTRACTORS

I/We _____

of_____
being Bidders on this Work, propose to sublet the following portions of the Works to the sub-contractors as listed hereunder, subject to the written approval of Haldimand County.

1. Sub-contractor's name and address:

   _____

   _____

   Sub-contractor's representative:

   _____

   Type of work sublet:

   _____

2. Sub-contractor's name and address:

   _____

   _____

   Sub-contractor's representative:

   _____

   Type of work sublet:

   _____

3. Sub-contractor's name and address:

   _____

   _____

   Sub-contractor's representative:

   _____

   Type of work sublet:

   _____

BIDDERS AND SUB-CONTRACTORS EXPERIENCE IN SIMILAR WORK
(To be completed and returned with tender)

1. For whom work performed _____

   Year completed _____

   Value of work _____

   Description of work _____

2. For whom work performed _____

   Year completed _____

   Value of work _____

   Description of work _____

3. For whom work performed _____

   Year completed _____

   Value of work _____

   Description of work _____

4. For whom work performed _____

   Year completed _____

   Value of work _____

   Description of work _____

LIST OF BIDDERS SENIOR STAFF TO BE EMPLOYED ON THIS CONTRACT

(To be completed and returned with tender)

The Contractor shall provide a Project Manager and a Site Superintendent with a minimum of 10 years of relevant bridge construction experience for the duration of the work.

Name_____

Position Project Manager

Qualifications/ Experience_____

_____

_____

_____

Name Site Superintendent

Position_____

Qualifications/ Experience_____

_____

_____

_____

Name_____

Position Project Lead Hand/Foreman

Qualifications/ Experience_____

_____

_____

_____

THIS AGREEMENT MADE IN DUPLICATE ON THIS _____ DAY OF _____, 2019.

BETWEEN:

THE CORPORATION OF HALDIMAND COUNTY

(Hereinafter referred to as "the County")

OF THE FIRST PART

And -

(Hereinafter referred to as the "Contractor")

OF THE SECOND PART

WHEREAS the Corporation of Haldimand County is desirous that certain Works should be constructed, namely, **Dennis Bridge Rehabilitation (Structure 980305)** and has accepted the tender by the Contractor for the construction, completion and maintenance of such Works,

SAMPLE

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement, words and expressions shall have the same meaning as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents shall be deemed to form and be read and construed as part of this Agreement, via:
   a) Form of Agreement
   b) Addenda
   c) Tender and Drawings
   d) Ontario Provincial Standard Drawings
   e) Ontario Provincial Standard Specifications
   f) Form of Tender (pricing)
   g) Performance Bond
   h) Labour & Material Payment Bond

3. In consideration of the payments to be made by Haldimand County to the Contractor, as hereinafter mentioned, the Contractor hereby

covenants with the County to construct, complete and maintain the Works in conformity in all respects with the provisions of the Contract.

4. The County hereby covenants to pay the Contractor in consideration of the construction, completion and maintenance of the Works at the Contract Price in the manner prescribed by the Contract.

5. The issuance of the final estimate for payment by the Engineer, and the acceptance by the Contractor of the amount or amounts certified for payment, shall constitute a waiver and release by the Contractor of all claims by the Contractor under this Contract, against the County.

6. **IN WITNESS WHEREOF** the parties hereto have caused their respective Common Seals to be hereunto affixed (or have hereunto set their respective hands and seals) the day and year first written above.

SAMPLE

_____
General Manager
I have the authority to bind the corporation.

Signed and delivered
by the Contractor in the presence
Of:

_____
Contractor's Representative

_____
Contractor's Representative

I/We have the authority to bind the corporation.

SECTION D

GENERAL CONDITIONS OF CONTRACT

It is the Contractor's responsibility to secure and be familiar with the general conditions of the contract document. Refer to OPS Volume 7 – OPS General Conditions of Contract and General & Construction Specifications.

https://www.raqsb.mto.gov.on.ca/techpubs/ops.nsf/OPSHomepage

SECTION E

STANDARD SPECIFICATIONS

Unless otherwise noted, the Ontario Provincial Standards and Specifications (OPSS) and the Ontario Provincial Standard Drawings (OPSD) shall prevail.

The text of all OPSS is contained in the manual "Ontario Provincial Standard Specifications":

Volume 1	**General & Construction Specifications**
Volume 2	**Material Specifications**

OPSD are contained in:

Volume 3	**Drawings for Roads, Barriers, Drainage, Sanitary Sewers, Watermains and Structures Standards for Roads and Municipal Services**

Contract Drawings and Specifications

a) **The latest OPSS General Conditions of Contract shall apply to this Contract.**

b) **Ontario Provincial Standard Specifications (most recent) shall apply**

c) **Ontario Provincial Standard Drawings (most recent) shall apply**

SPECIAL PROVISIONS – GENERAL

1. DEFINITIONS

Wherever the word "Engineer" appears it shall be taken to mean the General Manager of Public Works for The Corporation of Haldimand County/designate.

In the OPSS General Conditions of Contract Form, wherever the words "Ministry of Transportation" appear, they shall be taken to mean "The Corporation of Haldimand County".

2. ORDER OF PRECEDENCE

In case of any inconsistency of conflict between the provisions of this Agreement and the Plans or Specifications or General Conditions or Tender or any other document or writing the provisions of such documents shall take precedence and govern in the following order.

a) Form of Agreement
b) Addenda
c) Special Provisions – General
d) Special Provisions – Specifications
e) Contract Drawings
f) Standard Specifications
g) Information to Bidders
h) Form of Tender
i) Supplemental General Conditions
j) General Conditions of Contract
k) Working Drawings

3. NO INCREASE IN RATES

No claim for increase in rates in the Schedule of Items and Prices, or other prices included in the Contract will be entertained, nor shall the Contractor be entitled to make any claim on the grounds of misrepresentation, nor on the grounds that he was given any promise or guarantee by the County or his agents or employees or any other person.

The single exception to the requests for increases or decreases will apply to the per tonne price of Hot Mix Asphalt materials and shall be

based on the following formula:

HOT MIX ASPHALT PRICING BASED ON THE LIQUID ASPHALT CEMENT PRICE INDEX (APPLIES TO ITEMS PAID ON A TONNAGE BASIS ONLY)

Bidders are advised that Haldimand County has set the asphalt cement price index for this tender at $800/tonne.

Haldimand County will adjust the payment for hot mix asphalt to the Bidder based on changes to the Ministry of Transportation's (MTO) Performance Graded Asphalt Price (PGAC) price index. The price index is published monthly in the MTO Contract Bulletin and will be displayed on the OHMPA (www.ohmpa.org) and MTO websites (www.raqsa.mto.gov.on.ca). The price index will be used to calculate the amount of the payment adjustment per tonne of new asphalt cement.

The price index will be based on the price, excluding taxes, FOB the depots in the Toronto area, of asphalt cement grade PG 58-28 or equivalent. One index will be used to establish and calculate the payment adjustment for all grades. The price index for each month will reflect the previous month's prices.

A payment adjustment per tonne of new asphalt cement will be established for each month in which paving occurs when the price index for the month differs by more than $15.00/tonne from the price index for the month prior to the month in which the tender closed. When the price index differential is less than $15.00/tonne, there will be no payment adjustment for that month.

The payment adjustment per tonne will apply to the quantity of asphalt cement purchased during the month. The payment adjustment for the month will be calculated by the following means:

1. **When AC Prices are Rising** by more than a $15.00/tonne difference: the payment adjustment to be paid to the Bidder is the result of subtracting the price index in effect the month prior to when the tender closed from the price index in effect when paving took place, minus the $15.00 float, multiplied by the number of tonnes of PGAC incorporated in the mix as determined by the job mix formula. If the answer is negative, no adjustment is made.

2. **When AC Prices are Falling** by more than $15.00/tonne difference: the payment adjustment made in favour of the County is the result of subtracting the price index in effect when paving took place from the price index the month prior to when the tender closed, minus the $15.00 float, multiplied by the number of tonnes of PGAC incorporated in the mix as determined by the job mix formula. If the answer is negative, no adjustment is made.

The quantity of new asphalt cement includes all grades of asphalt cement supplied by the Bidder with and without polymer modifiers. For each month in which a payment adjustment has been established, the quantity will be calculated using the hot mix quantity purchased that month and its corresponding total asphalt cement content as required by the job mix formula.

Example 1 – AC prices rising by more than $ 15.00 / tonne

- PGAC 64-28 specified, 3,000 tonnes of HL3 @ 5.2% AC (156.0 tonnes AC)
- Price Index in March 2005, one month prior to tender closing, $330/tonne (PG 58-28)
- Price Index on August 17th - 24th, 2005 actual paving dates – $365/tonne (PG 58-28)
- Payment adjustment to be paid to the Contractor:
  ($365 - $330) - $15 (float) = $20 x 156 tonnes AC = $3,120.00

Example 2 – AC prices falling by more than $ 15.00 / tonne

- PGAC 58-28 specified, 4,500 tonnes of HL4 @ 4.6% AC (207.0 tonnes AC)
- Price Index in March 2005, one month prior to tender closing, $330/tonne (PG 58-28)
- Price Index on October 11th - 18th, 2005 actual paving dates - $285/tonne (PG 58-28)
- Payment for hot mix items reduced by:
  ($330 - $285) - $15 (float) = $30 x 207 tonnes AC = $6,210.00

Notes

- Bidders should bid the hot mix asphalt item using the cost of the PGAC specified. The AC Price Index is only a tool for qualifying hot

mix prices and is not intended as a standard AC price to be incorporated into the bid.
- The payment adjustment calculated using this formula is full compensation for any and all PGAC grades specified.
- This AC price adjustment applies only to items that are measured on a tonnage basis; there will be no AC price adjustment for asphalt measured for payment on a square meter basis or for asphalt not measured but included in payment under other items.

If the AC Index has not changed more than $15.00 per tonne up or down, no adjustment is required. Only the amount of the change that is greater than $15.00 is used to calculate payment adjustments.

4. **PAYMENTS**

Progress payments will be made as per OPS General Conditions Section GC 8.02.03.01 "Progress Payment Certificate". The cut off date will be at the end of each calendar month. **A 10% holdback will be applied to all payment certificates.** Final payment will be made subject to Section GC 8.02.03.05 "Substantial Performance Payment and Substantial Performance Statutory Holdback Release Payment Certificates" of the OPS General Provisions of Contract, and the following conditions if applicable.

a) Two copies of a form of release signed by each property owner, upon whose land the Contractor has entered for any purpose in conjunction with the contract, shall be provided by the Contractor. (Release form available from Haldimand County should it be required).
b) For tax rebate claims by the Owner, copies of all invoices for materials supplied by the Contractor and permanently incorporated into the Work, to include material costs and tax amounts paid.
c) A statement defining the status of all damage or other claims received by the Contractor, resulting from the Work.
d) Submission of material testing results indicating conformity with the applicable specifications.
e) Submission of appropriate completed OPSS 1800 series forms in compliance with OPSS 180.
f) Submission of valid WSIB clearance certificate or WSIB account number that verifies Contractor remains in good standing.

5. **SUPPLY OF MATERIALS**

The Contractor shall be responsible for the supply of all temporary and permanent materials required to complete the project in every detail as shown on the Contract Drawings and Specifications. All materials, unless specified, must conform to OPSS.

Haldimand County reserves the right to reject any supplier and or materials at the sole discretion of Haldimand County.

6. **NOTICES, PERMITS AND LICENSES**

The Contractor shall obtain all necessary notices, shall apply for all permits, licenses and inspections, and shall pay all fees for such notices, permits, licenses and inspections required to complete the Work. The Contractor shall notify the Engineer before any application for a license or permit is made in order that the Engineer may be represented if and when such application is made.

7. **CONTRACTOR'S SUPERVISION ON SITE**

The Contractor shall provide a competent representative to be constantly on site during all working hours and ongoing throughout the execution of the Works. The Contractor's representative shall, at all times, be in full control and be responsible for all activities and all phases of Work including those portions of the Works performed by sub-contractors.

8. **CONTRACTOR'S SCHEDULE AND HOURS OF WORK**

The Contractor shall be required to submit a detailed schedule within a period of seven (7) calendar days after receiving notice that their tender has been accepted, to submit to the Engineer for approval with sufficient information to demonstrate completion of all aspects of the Works within the completion date requirements.

One hundred (100) working days are allocated for the work described within this contract document.
Working days for provisional items, should they be included, will be in addition to those working days noted in the preceding paragraph.

Under this Contract, the Contractor shall not work on Saturdays,

Sundays or Statutory Holidays (except as instructed by the Engineer in the case of an emergency).

The Contractor may commence operations starting no earlier than 7:00 am. All operations must be off of the road and secured for the evening no later than one half hour before sunset.

9. **LAYOUT OF WORK**

The Contractor shall be responsible for the true and proper setting out of the work and for the correctness of the position, elevation and alignment of all parts of the work in accordance with accepted survey procedures. Using qualified personnel and following accepted engineering practice, the Contractor shall calculate, layout, establish and maintain all lines and grades necessary for the construction and verification of the work. The Contractor shall provide such information verbally or in writing on the calculations, layout, lines and grades as the Engineer may at any time require.

The Engineer will provide basic horizontal and vertical control from which the location of the work may be determined. Horizontal control will consist of either survey reference points sufficient to locate the centreline, or co-ordinated control points and their values, sufficient to lay out the work. Vertical control will consist of one or more benchmarks on or near the site. During the progress of the work the Contractor shall notify the Engineer forthwith of any errors, omissions or inconsistencies in the geometric information and the controls provided by the Engineer.

All reference points and benchmarks provided by the Engineer will be located and identified to the Contractor on the site at the start of the Work. These reference points and benchmarks shall be preserved by the Contractor; in the event of their movement, destruction or removal by him or his sub-contractor(s), such reference points and benchmarks shall be replaced at his expense.

The Contractor shall provide all stakes required for layout purposes. There will be no separate payment made for this requirement, cost of same being deemed to be included in the unit prices for the Contract.

10. **RISK MANAGEMENT**

a) Insurance Coverage Requirements

Prior to the execution of the contract and prior to any work being commenced, the Contractor shall make the necessary arrangements to have their insurance agent/broker furnish to the County, at his/her expense, a valid Certificate of Insurance for coverage in respect of any one accident to:

1. *Commercial General Liability Insurance*, on an occurrence basis, including but not limited to bodily and personal injury liability, extended bodily injury, property damage, products liability, completed operations liability, owners & contractors protective liability, blanket contractual liability, premises liability, and contingent employer's liability coverage, having an inclusive limit of not less than **$5,000,000** per occurrence. The insurance policy will contain Cross Liability and Severability of Interest clauses **naming Haldimand County and G. Douglas Vallee Limited as Additional Insured;**

2. Automobile Liability Insurance that complies with all requirements of the current legislation of the Province of Ontario, having an inclusive limit of not less than $2,000,000 per occurrence for Third Party Liability, in respect of the use or operation of vehicles owned, operated or leased by the Contractor for the provision of services;

3. Non-Owned Automobile Liability Insurance in standard form having an inclusive limit of not less than **$2,000,000** per occurrence in respect of vehicles not owned by the Contractor, that are used or operated on its behalf for the provision of services under the Contract;

The Certificate will provide 30 days' written notice of cancellation, alteration or material change.

The Certificate of Insurance shall identify the activity to which the Certificate applies.
All policies shall apply as primary and not as excess of any insurance available to the County.

Insurance companies providing coverage must be licenced to do business in the Province of Ontario.

b) Claims Management

Should the Contractor in the performance of the Works, damage County property or receive notification of damage and/or injury from a third party due to actions and/or inactions of the Contractor, the Contractor shall be responsible for making good such damage inclusive of claim investigation by the Contractor's adjuster and/or insurance company within ten (10) days of receiving notification of the claim. Claims may be received directly from the third party or received by the County.

If said damage may result in imminent or actual danger to the life, health or safety of the public; or damage or destruction of real property, the County may take any action necessary to rectify the issue and provide notification to the Contractor prior to, during or after the rectification process. Any costs that the County may incur as a result of the rectification process may be allocated against the Contractor.

The Contractor shall provide the County with documentation/notification of claim status within the ten (10) days and continue to provide updates to the County regarding claim status. Claims management shall continue until rectified, which may exceed the life of the contract period.

Contractors who do not provide documentation/notification of claim status within ten (10) days to the County may result in the County including this non-action on the Contractors performance evaluation.

c) Workplace Safety and Insurance Board

The successful Bidder shall furnish a valid Certificate of Clearance from the Workplace Safety and Insurance Board. This Certificate or the WSIB account number can also be provided in lieu of a Certificate which shall be furnished prior to commencement of work. The successful Bidder shall further agree to maintain good standing with WSIB throughout the contract period. The County will

not be liable to WSIB for payments in connection with the successful Bidders fulfilment of the award requirements.

The successful Bidder may be required to produce a Certificate of Clearance from the Workplace Safety and Insurance Board from time to time during the contract and/or prior to final payment.

11. OCCUPATIONAL HEALTH AND SAFETY ACT

a) LEGISLATIVE REQUIREMENTS

The Contractor shall conform to and enforce strict compliance with the **Occupational Health and Safety Act** (OHSA) including the Contractors obligations as an "Employer" under section 25 and 26 thereof and with all regulations under the OHSA including:

i) Regulation 860 RSO 1990 (Workplace Hazardous Material Information System (WHMIS)
ii) Regulation 851/91 Industrial Establishments
iii) Highway Traffic Act

b) WORK HAZARDS

The Contractor is responsible for addressing all work hazards that could be reasonably expected on the job site and to develop both training and written policy and procedures, where necessary, for the protection of workers and the general public.

It is the responsibility of the Contractor to monitor compliance and where necessary correct and/or discipline workers.

Without restricting the generality of the foregoing, Haldimand County expects training and written procedures pertaining to the following:

- Tag and lockout
- Pinch points and guarding
- Equipment use, maintenance and operation, including no climbing policy, working at heights, confined space (if applicable)
- Reporting and documentation of accidents, incidents and unsafe circumstances

- ► Handling and disposal of sharp objects
- ► Use, wearing and care of personal protective equipment and its limitations
- ► Operation of equipment near live power lines
- ► Hygiene
- ► Material handling
- ► Emergency procedures

Workplace safety meetings and initial, ongoing operator training shall include discussion and demonstration of:

- ► The importance of preventative maintenance
- ► Safe operation of motorized and hydraulic equipment
- ► Basic mechanical workings related to the vehicles
- ► Importance of vehicle checks (such as circle checks) and other documentation which ensures safe functioning of vehicles
- ► Manufacturer's operation manuals and safety guidelines, which includes any updates

c) **COMPLIANCE**

The Contractor is cautioned that lack of compliance to the OHSA, County policy, the Environmental Protection Act and the accepted industrial standards, may cause **the performance of the work to be suspended or the Contract to be cancelled.**

12. **UTILITIES**

The Contractor is responsible for arranging for utility locates. It is the Contractors duty to ensure the correctness of all locates before performing work in a sensitive area. Any costs that the County may face in regards to the Contractor disrupting utility services will be directed to the Contractor and/or their insurance company for resolution as a 3rd party claim.

13. **WORKING AROUND RAILWAYS**

The Contractor shall be responsible for contacting the appropriate railway agency to arrange for flagmen, protection, clearance, etc. before working on or in the immediate vicinity of the railway tracks or right of way. The Contractor should give enough warning to the

agency (usually 48 hours) prior to the commencement of work, on or near the railway. No work shall be done in these areas without clearance from the railway authority.

14. SITE STORAGE

The Contractor shall be governed by the direction of the Owner or authority having jurisdiction as it pertains to the on-site storage of equipment and materials. The Contractor shall immediately move or remove any equipment or materials at the Contractor's sole expense, as directed by the Owner or authority having jurisdiction. The Contractor shall be solely responsible for site security and all materials on site, in use, in storage, or otherwise.

15. QUANTITIES

Quantities shown are estimated based on field measurements of the existing conditions and proposed work to be completed. The Engineer reserves the right to alter the quantities or portion of the Work at any time.

16. LIQUIDATED DAMAGES

Working days noted elsewhere in this contract are for those items that are not provisional.

Appropriate working days shall be added for provisional items that may be added to the contract, including amendments to the Contract and Change Orders, at the discretion of the Contract Administrator.

A working day is defined under Subsection GC1.04 of the General Conditions of Contract.

If this time limit above is not sufficient to permit completion of the work by the Contractor working a normal number of hours each day or week on a single daylight shift basis, it is expected that additional and/or augmented daylight shifts will be required throughout the life of the Contract to ensure that the work will be completed within the time limit specified. Any additional costs incurred by compliance with these provisions will be considered to be included in the prices bid for the various items and no additional compensation will be allowed

thereafter.

The Contract Administrator shall charge working time until the date of acceptance of the Work.

The Contract Administrator will furnish the Contractor with a monthly statement showing the number of working days charged to the Contract for the preceding weeks, the number or working days specified for the completion of the Contract and the number of working days remaining to complete the Contract. Any discrepancies shall be brought to the Contract Administrators attention within seven (7) days of receiving the notice, through a written notification.

It is agreed by the parties to the Contract that if the Work is not completed within the number of Working Days or the date specified, then damages shall be sustained by the County and that it is and shall be impracticable and extremely difficult to ascertain and determine the actual damage which the County shall sustain in the event of and by any reason of such delay, and the parties hereto agree that the Contractor shall pay to the County the sum of **one thousand dollars** (**$1,000**) for liquidated damages for each working day delay in finishing the Work in excess of the number of Working Days or completion date prescribed. It is agreed that this amount is an estimate of the actual damages to the County which shall accrue during the period in excess of the prescribed completion date or the number of Working Days.

The County may deduct any amount due under this paragraph from any monies that may be due or payable to the Contractor on any account whatsoever. The liquidated damages payable under this paragraph are in addition to and without prejudice of any other right, claim, action or any other remedy that may be available to Haldimand County.

17. **FORCE MAJEURE**

Neither party shall be liable for damages caused by delay or failure to perform its obligations under the Contract where such delay or failure is caused by an event beyond its reasonable control. The parties agree that an event shall not be considered beyond one's reasonable control if a reasonable business person applying due diligence in the same or similar circumstances under the same or similar obligations as those contained in the Contract would have put in place contingency

plans to either materially mitigate or negate the effects of such event. Without limiting the generality of the foregoing, the parties agree that force majeure events shall include natural disasters and acts of war, insurrection and terrorism but shall not include shortages or delays relating to supplies or services. If a party seeks to excuse itself from its obligations under this Contract due to a force majeure event, that party shall immediately notify the other party of the delay or non-performance, the reason for such delay or non-performance and the anticipated period of delay or non-performance. If the anticipated or actual delay or non-performance exceeds fifteen (15) business days, the other party may immediately terminate the Contract by giving notice of termination and such termination shall be in addition to the other rights and remedies of the terminating party under the Contract, at law or in equity.

18. **DISPOSAL**

Disposal shall be such as not to be unsightly or potentially unsightly when viewed from the right-of-way, shall be carried out in an environmentally acceptable manner, and shall avoid any environmentally sensitive areas identified in the Contract.

The Contractor shall remove and dispose of all surplus excavated material, which shall be disposed in areas provided by the Contractor outside the limits of the contract, at his own expense, in accordance with OPSS 180 or as instructed by the County.

19. **PRIVATE PROPERTY**

The Contractor shall assume full responsibility for crossing or making use of private property and shall obtain all necessary permission in connection therewith.

The Contractor is responsible for keeping the property owners, who may be inconvenienced in any way by construction, informed prior to commencing the operation.

This requirement applies to, but is not limited to, cutting off of driveways, disrupting services, removing mail boxes or in any way disrupting mail service, temporary drainage problems and encroachment on private property.

Any damage to private property is to be brought to the attention of

the property owner and the County within twenty (24) hours. The notification shall include an outline as to when and how the damage will be repaired.

20. HAULAGE ROUTES

The requirements of Section GC7.06 in the General Conditions of Contract shall apply with the following Special Provisions:

a) The Contractor shall at all times keep their haulage routes free from materials spilled on the street surfaces by his equipment, and shall maintain the streets in clean condition to the satisfaction of the street authorities. The Engineer may inspect haulage routes, the site and adjacent premises daily and may halt operations or may carry out such additional cleaning operations as he considers necessary, deducting the cost from monies due or to become due to the Contractor.

b) No separate measurement or payment will be made for any additional expense to the Contractor as a result of the requirements under this subsection.

21. PROTECTION OF PUBLIC AND TRAFFIC

GENERAL

All traffic control, procedures and devices shall be provided by the Contractor and conform to the requirements of the following references:

a) The Ministry of Transportation "Ontario Traffic Manual (OTM) Book 7, latest revisions.
b) The Ministry of Transportation "Manual of Uniform Traffic Control Devices" (MUTCD).
c) Canadian General Standards Board.
d) C.G.S.B. Standard 62-GP-11M, May 1978 - Reflective Materials and Surfaces and/or latest updates/revisions.)

22. TRAFFIC CONTROL

The Contractor will be responsible for closing Rainham Road (Haldimand Road 3) at the Dennis Bridge (Structure No. 980305) and

providing a detour around the site for traffic as detailed on the Contract Drawings. The Contractor shall avoid the blocking of vehicular or pedestrian traffic for a longer period than is necessary for the proper construction of the Work.

Construction signs, barricades, warning signs, lanterns, lights and all necessary detour signs within the limits of the Contract shall be maintained throughout the course of the Work, all at the expense of the Contractor and to the satisfaction of the Engineer.

Detour signing, in the event detours are required and/or permitted, outside of the Contract limits shall also be carried out by, and at the expense of the Contractor.

23. SIGNALLING

The Contractor shall provide, at his own expense, flag persons where additionally required for the direction of traffic. The flag persons shall be on duty continuously when construction is being carried out adjacent to traffic, unless directed otherwise by the Engineer.

24. NOTIFICATIONS

The Contractor is responsible for notification to the Police Department, the Fire Department and Ambulance Services before closing any roadway to traffic. In the case where the roadway is utilized as a school bus route, the Contractor shall notify the appropriate educational authority. The notifications shall be made in writing, with copies provided to the Manager of Roads, Haldimand County.

25. QUALITY ASSURANCE TESTING - GEOTECHNICAL FIRM

The Owner shall engage the services of Geotechnical/Construction Materials Consultant whose personnel and facilities shall have appropriate Canadian Council of Independent Laboratories (CCIL) certification to provide QA testing results on material used in the execution of this Contract.

All testing will be paid for directly to the Geotechnical/Construction Materials Consultant by the Owner and shall include, but is not necessarily limited to, inspection with regard to backfill compaction, concrete placing, reinforcing steel placing, steel sandblasting, steel

welding, steel coating, waterproofing, and asphalt placement.

The Contractor in consultation with the Consultant, by coordination of all testing during construction, must ensure that the Geotechnical/ Construction Materials Consultant carries out all sampling in accordance with accepted sampling methods in the presence of the Owner and/or the Consultant. The sampling method is to be described in the report provided to the Owner and/or Consultant.

Concrete testing cylinders for compressive strength shall be taken by the Construction Materials Contract Administrator for all concrete pours. Five cylinders will be taken per concrete pour for testing at 4 days, 7 days, 28 days, 56 days and one additional. One early break cylinder may be field cured at the request of the Contractor. If the Contractor wishes to have additional early break cylinders field cured, storage and transportation to the laboratory of the Construction Materials Contract Administrator will be the responsibility of the Contractor. The Contractor shall deliver cylinders to the laboratory for early strength determination prior to the time of testing.

26. ACCEPTANCE OF MATERIALS

Testing of all materials shall conform to the specifications. Tests are required for every different **source of aggregate** materials (pit, quarry, etc). The cost for all material testing shall be borne by the Contractor. The County reserves the right to perform correlation testing at any time. Should any test not conform to the Specifications, the Engineer may disqualify that particular lot of material. **THE COUNTY WILL ONLY ACCEPT STOCKPILES TESTED AND APPROVED.**

27. TESTING OF MIX DESIGNS

The Contractor shall provide a Mix Design for all asphalt, recycled asphalt products, and concrete materials as specified in this contract. Mix Designs shall be prepared by a Geotechnical Engineering Firm certified by the CCIL in accordance with the Ontario Provincial Standards and Specifications. Mix Designs shall be submitted to the County for approval at least ten (10) days prior to commencement of the delivery of asphalt.

28. INSPECTIONS

Haldimand County shall have an Inspector on site as required during the entire construction period. The Contractor shall co-operate with the Inspector and provide any data or information requested by the Inspector. The Contractor shall also provide reasonable assistance to the Inspector for taking required measurements.

The Contractor must arrange for the Inspector's presence prior to undertaking work as stipulated by the County. A minimum of forty-eight (48) hours notice shall be provided so that provisions for inspection and/or layout may be accomplished.

29. CONTRACTOR APPRAISAL FORMS

The Contractor is advised that Haldimand County conducts performance appraisals on all contracted work as part of the Vendor Management Program. The Contractor Appraisal will be retained on record by the County and may be used in determining future awards. Copies of the completed evaluation form will be forwarded to the Contractor. Blank copies for the Contractor's information are available upon request from the County.

30. WATERCOURSE / FISHERIES PROTECTION – GENERAL

At all times, the Contractor's operations shall be controlled so as to prevent the entry of deleterious materials to watercourses. Controls shall include, but not be restricted to the following:

a) Erosion and sedimentation control, and protection of environmentally sensitive areas shall be in compliance with requirements that may be specified elsewhere in the Contract.
b) Watercourses shall not be diverted or blocked, and temporary watercourse crossings shall not be constructed or utilized, unless otherwise specified in the Contract.
c) Where the Contract does not require work in watercourses or on watercourse banks, equipment shall not be operated within such areas.
d) Where the Contract requires work in watercourses or on watercourse banks, such work shall comply with operation constraints specified elsewhere in the Contract.
e) Construction materials, excess material, construction debris and empty containers shall be stored away from watercourses and

watercourse banks.

f) All equipment maintenance and refuelling shall be controlled so as to prevent any discharge of petroleum products. Vehicular maintenance and refuelling shall be conducted away from watercourse banks.

In the event that the Contract Administrator determines that controls are unacceptable, the Contractor shall cease those operations, as identified by the Contract Administrator. Such operations shall remain suspended until otherwise directed by the Contract Administrator in writing.

31. DUST CONTROL

The Contractor shall maintain all construction zones in a manner so as not to cause undue dust to neighbouring properties. The Contractor shall be responsible for the costs of maintaining dust control on site.

32. MEDICAL & SANITARY

The Contractor shall provide all necessary sanitary installations and medical supplies and facilities for his employees to the satisfaction of the Owner. Should the Contractor fail to do so, then the Owner may provide what is necessary and deduct the amount of any expenditure incurred from any monies due to the Contractor.

33. ALCOHOL

The Contractor shall not permit the use of alcoholic beverages upon or about the work described in this contract.

34. RIGHTS OF OTHERS

During the progress of the work, if it is necessary for other contractors or persons to do work in or about the site of the work, the Contractor shall afford such facilities as they may be required.

END SECTION F: SPECIAL PROVISIONS – GENERAL

SECTION "G" SPECIAL PROVISIONS – CONTRACT

SP 1. Construction Sequence, Coordination & Administration

Prior to commencing construction, the Contractor shall submit a construction schedule clearly outlining the specific tasks required to complete the works, the duration of each task as well as key milestones required for the timely completion of the project. The construction scheduled shall include, but not be limited to:

- Construction phasing;
- Itemized list of tasks;
- Start date, end date, and duration for each task;
- Construction staging;
- Traffic control phasing;
- Critical path.

The Contractor shall provide a Project Manager and a Site Superintendent with a minimum of 10 years of relevant bridge construction experience for the duration of the work. Prior to commencing construction the Contractor shall submit the Curricula Vitae (or similar) describing the qualifications and relevant experience of the proposed Project Manager and Site Superintendent to the Contract Administrator. Personnel that do not possess adequate qualification and experience, at the discretion of the Contract Administrator, shall not be accepted for this project. The Project Manager and the Site Superintendent shall not be substituted for any period of time during the work, without the written consent of the Contract Administrator.

The Dennis Bridge (Structure No. 980305) shall be closed to traffic during construction.

The Contractor shall notify the Fire, Ambulance, and Police Departments and all other services affected by the closures of portions of the road at least 48 hours prior to closing any road. Notifications shall be in writing with a copy forwarded to Haldimand County and to the Engineer.

The work shall also include any and all mobilization and demobilization, as well as construction administrative work as required to complete the project such as coordination of bonds, insurance, certificates, permits, etc. It shall also include the coordination and supply of all required sealed

and reviewed designs/shop drawings not covered under other items (e.g.: falsework, working/debris platforms, temporary support assemblies, structural methods/procedures, cofferdams, etc.).

Pending appropriate approvals, it is anticipated that Union Gas will have their existing gas line, currently attached to the south fascia of the bridge, relocated. Construction may begin upon completion of the line relocation (by others). Refer to special provision for Existing Utilities for additional information.

The Contractor shall maintain full and clear access to farm entrances at all times during construction. Temporary blockages may be permitted with approval from the land owner only.

Payment for this work shall be at the prices shown for the appropriate items as stated in the Form of Tender and shall be made as follows:

- 50% after mobilization;
- 50% after the project is complete and all traffic control measures are removed.

SP 2. Traffic Control & Signage

All traffic control required to complete the works shall be performed in accordance with the M.T.O. "Manual of Uniform Traffic Control Devices", the "Ontario Traffic Manual", and OPSS 740, 723, 710, 706, 620, and 106.

General

At the site the Contractor shall close the road for the duration of the construction period. A detour route shall be established to OTM Book 7 standards and shall detour traffic to travel around the bridge as per the detour routes for traffic included in the Contract Drawings. An MTO Encroachment Permit has been arranged by the Owner. The Contractor shall follow all requirement as stipulated in the permit.

Materials, Equipment, & Staging

The Contractor shall supply and install, all traffic control equipment and systems required to close the road at the site, detour traffic, and for the protection of the public during the entire course of construction. Equipment and materials may include, but not be limited to:

- Advance warning & detour signs;
- Tunnels, lights, or signals;
- Temporary pavement markings;
- Barrels, barriers, end treatments;
- Flag, flagmen, etc.

The Contractor shall include the cost for the fabrication, placement, maintenance and removal of a minimum of three TC-64 advanced notification signs and seven Project Notification Signs advising motorists of the road closure. Signs shall be prepared and placed along approaching roadways as directed by the Contract Administrator and the County.

As part of this item the Contractor shall fabricate and install two project ID signs. Signs shall be installed, erected on bases, secured, maintained, and protected for the duration of the project. Upon contract completion, the Contractor shall return the signs in-tact to the Haldimand County Walpole Public Works yard located at 1433 Haldimand Rd 55, Jarvis.

Submissions & Notifications

Any permits required to complete the work shall be obtained from any authority having jurisdiction. The County will apply for the Encroachment Permit from the MTO.

The Contractor shall notify all agencies such as fire, ambulance, police, school boards, mail delivery, etc., at least 48 hours in advance of any road closure, lane closure or traffic modification. Haldimand County shall be included in the list of agencies to be notified.

Construction shall not commence until all traffic control is reviewed and approved by the County and the Consultant, and is confirmed to be working properly.

Maintenance & Troubleshooting

The Contractor shall be responsible for the maintenance of all traffic control systems for the duration of the works. Troubleshooting or tweaking of the traffic system shall be done at the request of the County.

During "off work" hours, including weekends and holidays, the Contractor shall lock down each construction site and maintain a responsible person readily available to check and maintain the signage and barricades.

If, for any reason, the traffic control system fails outside of normal working hours, the Contractor shall have an emergency contact (on-call) to repair the system immediately and the Contractor shall employ flag persons to direct traffic and maintain flow as required until the system is restored.

In the event of an emergency, and the Contractor has not taken control of the traffic, the OPP may be contacted to perform traffic control at the expense of the Contractor.

Completion

At the completion of the work, remove temporary traffic control systems and restore to original conditions or better. The road shall be re-opened to traffic only upon the direction of the Owner. Such opening shall not necessarily constitute final acceptance of the work.

Any signage removed prior to construction shall be reinstated or surrendered to the County as directed.

Payment

Payment for the traffic control works of this section shall be at the lump sum prices shown in the Form of Tender for all labour, materials, and equipment required to perform the works, and will be made as follows:

- 50% after approved traffic control has been installed;
- 50% after all traffic control measures are removed upon completion of the project.

SP 3. Utilities

The provision of OPSS 491 shall apply except that:

General

The locations of existing utilities as shown on the drawings have been shown schematically for bidding purposes and are for general information only. G. Douglas Vallee Limited or Haldimand County cannot accept responsibility for damage to any existing utility which may or may not be indicated on the drawings.

It is the Contractor's responsibility to verify the completeness of this information. The Contractor shall contact the various utility companies to determine the exact location, size, and number of such services prior to the start of construction. The Contractor shall coordinate with all utilities to complete the works.

The Contractor is cautioned that all of the existing utilities may not be indicated on the drawings. The Contractor must arrange for locates from each area utility company prior to any construction or excavation. The Contractor shall be solely responsible for the protection and temporary support of all utilities including those not indicated on the drawings. Any utility lines and ducts removed in order for the work to be completed shall be reinstalled as directed by the appropriate utility company.

Union Gas

Pending appropriate approvals, it is anticipated that Union Gas will have their existing line, currently attached to the south fascia of the bridge, permanently relocated. Union Gas has scheduled for the relocation to be complete by April 26th 2019. The Contractor shall coordinate scheduling mobilization on site with Union Gas; construction may begin upon completion of the line relocation (by others).

Payment

Payment for the work of this section shall be at the contract price as stated in the Form of Tender for all labour, materials, and equipment required to perform the Work and will be made as follows:

- 50% after project mobilization;
- 50% after project completion.

SP 4. Environmental Protection, Erosion Controls and Fisheries Protection

Environmental protection shall be completed in accordance with associated Ontario Provincial Standard Specifications such as OPSS.MUNI 182, OPSS 801, and 805.

Prior to construction, the Contractor shall prepare and submit detailed plans with regards to all environmental protections and controls, including construction sequencing, maintenance, and mitigation plans, debris platforms, debris containment, etc.; for the review of the County and Consultant, as well as for the approval of any permitting authorities having jurisdiction for the purpose of obtaining any necessary permits.

The design, installation, and maintenance of the erosion and sediment control measures shall be the responsibility of the Contractor. The Contractor shall ensure that the measures perform to the satisfaction of the Engineer, the Conservation Authority, and the Owner.

The materials required for these controls may comprise of a minimum of:

- siltation control barriers (OPSD 219.100 to 219.130)
- straw bale flow checks (OPSD 219.180)
- sandbag barriers (OPSD 219.150)
- sediment traps (OPSD 219.220)
- dewatering traps (OPSD 219.240)
- turbidity curtains (OPSD 219.260)
- tree protection (OPSD 220.010)

This list shall not be considered to be exhaustive for the purposes of environmental protections controls for the duration of the project.

Mitigation Measures

At all times, the Contractor's operations shall be controlled so as to prevent the entry of deleterious materials to watercourses. Controls shall include, but not be restricted to the following:

- Erosion and sedimentation control, and protection of environmentally sensitive areas shall be in compliance with requirements that may be specified elsewhere in the Contract.
- Watercourses shall not be diverted or blocked, and temporary

watercourse crossings shall not be constructed or utilized, unless otherwise specified in the Contract.

- Where the Contract does not require work in watercourses or on watercourse banks, equipment shall not be operated within such areas.
- Where the Contract requires work in watercourses or on watercourse banks, such work shall comply with operation constraints specified elsewhere in the Contract.
- Construction materials, excess material, construction debris and empty containers shall be stored away from watercourses and watercourse banks.
- All equipment maintenance and refuelling shall be controlled so as to prevent any discharge of petroleum products. Vehicular maintenance and refuelling shall be conducted away from watercourse banks.

The Contractor shall do all demolition and rehabilitation work from a temporary platform(s) suspended from the structure, or from other similar approved systems, in a manner that all debris is contained and will allow the work to be completed while preventing material from entering the waterway. Only at the discretion of the Consultant, the Conservation Authority, Department of Fisheries and Oceans, or any other agency having jurisdiction, work may be allowed to be done in the waterway.

In the event that the Contract Administrator and/or Owner, and/or Consultant, and/or any authority having jurisdiction determines that controls are unacceptable, the Contractor shall cease those operations, as identified. Such operations shall remain suspended until otherwise directed by the Consultant in writing. Costs incurred by any such stoppage shall be borne solely by the Contractor.

Minimum maintenance requirements shall include daily inspections and during or immediately following rainfall events. All silt and sediment deposits accumulated by environmental protection controls shall be removed and legally disposed and shall not be permitted to enter the watercourse.

Any damage caused by the failure of the Contractor's measures shall be the sole responsibility of the Contractor. All costs and expenses to correct and repair any such damage shall be borne by the Contractor.

The Contractor shall hold harmless the Owner and the Engineer from any and all claims relating to damage from environmental pollution, erosion and sediment regardless of the source or cause of the damage.

Species at Risk

The Contractor is advised that the areas proposed for construction may contain certain identified species-at-risk and endangered species and may require additional environmental mitigation measures as required by any authority having jurisdiction. The Contractor is to adhere to the mitigation requirements as outlined in the ecological consultant's report attached to this contract.

The Contractor is advised that should any species at risk or endangered species be present at the site, it is the responsibility of the Contractor to employ appropriate mitigation requirements as required.

The Contractor shall record any encounters and mitigation controls used regarding any species at risk. A formal letter, signed by the Bidder, shall be submitted to the Contract Administrator upon project completion summarizing all encounters and mitigation methods used.

Payment

Payment for General Environmental Protection shall be at the price shown in the Form of Tender for all labour, materials, and equipment required to perform the work. Payments will be made as follows:

- 50% after installation;
- 50% upon project completion.

Payment for the Species-at-Risk Mitigation shall be at the price shown in the Form of Tender for all labour, materials, and equipment required to perform the work. Payments will be made as follows:

- 30% after mobilization;
- 70% upon project completion and submission of required documentation.

SP 5. Clearing & Grubbing

Clearing and grubbing shall conform to the provisions of OPSS 180 and 201 and shall include the disposal of all excess materials as a result of completing the work.

Work of this item shall also include any tree removals required so that the work may proceed.

The Contractor shall adhere to the 'Species at Risk Mitigation Plan' recommendations regarding clearing and grubbing, refer to Appendix C.

Payment for the work of this section shall be included with the appropriate items at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the Work.

SP 6. Demolitions, Removals, & Disposal

The scope of this section shall refer to all bridge elements as may be described in the Ontario Structure Inspection Manual in accordance with OPSS 490, and OPSS.MUNI 180, 510 and 539.

The geometry of the existing portions of the Dennis Bridge can be obtained from original C.C. Parker and Associates Limited Consulting Engineers design drawings issued with this document, see Appendix B.

General

Demolition and removals shall be carried out in such a manner and with such equipment to avoid any damage to the environment and any portions of the existing structure that are to remain in place, and to the existing utilities in the vicinity of the work.

All materials gained from the demolition operation shall become the property of the Contractor and shall be removed from the site and lawfully disposed of by the Contractor outside the limits of the contract notwithstanding explicit written instruction from the County and/or Contract Administrator. See OPSS 180 for special requirements regarding Disposal Sites.

Structure Removals

The Contractor shall remove and dispose of existing portions of barrier walls, endposts, curbs, wingwalls, ballast walls, deck, backfill, roadway wearing surface and subbase, etc, as indicated on the contract drawings and as may be required to complete the work.

The concrete bridge barriers, select deteriorated portions of the soffit, bridge deck, abutment walls, wingwalls, cleats, and piers shall be removed as directed and prepared for rehabilitation. The existing steel curb cover plates, asphaltic plug expansion joint assemblies, existing asphalt wearing surface, and existing deck drains shall be removed. The top of existing wingwalls and reinforcing shall be removed to suit new curb. Portions of the ballast walls, wingwalls, and cleats shall be removed to install new semi-integral deck ends. This work shall include the protection and restoration of any existing steel reinforcing bars as required.

The Contractor shall be responsible for the removal of all other obstructions to the work including, but not necessarily limited to:

- Existing asphalt pavement or surface treatment;
- Existing curb, gutter, barriers, guiderails, etc.;
- All other items that require demolition or removal in order that the work may proceed.

Any failure of notation as such on the drawings does not relieve the Bidder from responsibility for removing these obstructions. See Section "A" for additional information.

Payment

Payment for the work of this section shall be included with the appropriate items at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the Work.

SP 7. Temporary Protection Systems

The scope of this section shall refer to the design, construction, maintenance, monitoring, and removal of temporary protection systems to complete the work in accordance OPSS.MUNI 539.

The geometry of the existing portions of the Dennis Bridge can be obtained from original C.C. Parker and Associates Limited Consulting Engineers design drawings issued with this document, see Appendix B.

General

Demolition and support shall be carried out in such a manner and with such equipment to avoid any damage to the existing portions of the structure that are to remain in place, and to the existing utilities in the vicinity of the work.

Debris Containment & Temporary Support

The Contractor shall design, supply, install, and operate any demolition and debris mitigation platforms and support systems (including any cofferdams and dewatering) required to perform the work. All in-water work shall be performed **after July 15th 2019 and before March 15th 2020** in accordance with the requirements of Fisheries and Oceans Canada, the MNRF, the Conservation Authority having jurisdiction, and the Species at Risk Mitigation Plan attached with this Contract. Any permits that may be required that are dependent upon the method of demolition chosen by the Contractor, shall be the responsibility of the Contractor.

Such methods and plans shall be designed, signed, and sealed by a Professional Engineer in the Province of Ontario and submitted to the Contract Administrator, the County, and any other authority having jurisdiction (eg.: CA) for review prior to commencement of the work.

Payment

Payment for the work of this section shall be included with the appropriate items at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the Work.

SP 8. Waterway Control & Dewatering

Work under this item shall include all labour, materials, and equipment required to control the waterway as permitted by the authorities having jurisdiction and the dewatering of the piers as required to perform the work in the dry. This work shall include the design, construction and maintenance of temporary waterway controls, the full time maintenance of any systems (i.e. pumping, diversions, cofferdams etc.) employed, and any required permits, in accordance with OPSS.MUNI 182, and OPSS 805, 902, and 518 and the requirements of any authority having jurisdiction.

Cofferdams

Cofferdam systems shall be designed by the Contractor (and/or designate). Proposed design (i.e. shop or erection) drawings bearing the seal and signature of a Professional Engineer licensed in the province of Ontario shall be provided by the Contractor to the Engineer and the County prior to the commencement of construction, and in support of documentation submitted for the LPRCA Permit Application, as well as to the Ministry of Labour with respect to the requirements of the Ontario Health and Safety Act.

Dewatering

The Contractor (and/or designate) shall prepare and submit detailed plans regarding the waterway controls and de-watering of the required site areas to the local Conservation Authority for approval and the Contract Administrator for review, notwithstanding the requirements of OPSS.MUNI 182. The Contractor shall be responsible for obtaining a permit to take water from the Ministry of the Environment when required, and any dewatering plans required to be prepared by a professional engineer. The Contractor shall be solely responsible for the design, construction, and implementation of any dewatering plans so that work may be completed in the dry. Any delays or additional costs as a result of inadequate dewatering shall not be borne by the Owner or its agents.

The Contractor shall perform any "in-water" works **after July 15th 2019 and before March 15th 2020** in accordance with the requirements of Fisheries and Oceans Canada, the Ministry of Natural Resources & Forestry, the Ministry of Environment, the Conservation Authority having

jurisdiction (LPRCA), and the Species at Risk Mitigation Plan attached with this Contract.

Payment

Payment for the work of this section shall be at the contract price as stated in the Form of Tender for all labour, materials, and equipment required to perform the Work.

SP 9. Excavation Grading and Sub-excavation

The provisions of OPSS 180 & OPSS.MUNI 206 shall apply, except for the following:

This work shall consist of the grading (cutting and filling) and the removal of whatever nature, including concrete pavement, asphalt pavement, curbs, earth, etc., to the bottom of the new granular base in conformance with the contract drawings. It shall also include any excavation and/or grading works required for road construction and guide railing installation.

The work shall also include any general grading and installations for ditches, drainage, roadworks, drainage tiles, and restorations as required.

All excavated material shall become the property of the Contractor and shall be legally disposed of off-site.

Payment for the work of this section shall be included with the appropriate items at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the Work.

SP 10. Excavation and Backfill for Structures

The scope of this section shall refer to all excavation, backfill, and earthworks required for the rehabilitation of portions of the existing structure in accordance with OPSS 180, 539, and 902.

Excavations shall be done such that structures, utilities, and embankments that are to remain are not damaged or become unstable. Temporary support and/or protection systems shall be installed and approved by the professional engineer responsible for their design prior to excavation.

The Contractor shall backfill the structure in accordance with details shown on the drawings. Backfill materials shall be Granular A, B Type II, Clear Stone, or Select Subgrade Material conforming as noted on the contract drawings.

Material placed in and around the structure, from the extent of the wingwalls towards the midspan of the structure shall be considered 'backfill' for the purpose of this specification (i.e.: material placed within and adjacent to the structure). Materials placed from the end of the wingwalls and away from the midpsan of the structure (i.e. road approaches) shall be considered under the road works specifications.

Payment for the work of this section shall be at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the work.

SP 11. Aggregates – Granular A, B, M, Select Subgrade Material and Clear Stone

The provisions of OPSS.MUNI 1010 and 314 apply except for the following:

- Granular "A" shall be 100% crushed limestone obtained from quarried rock sources.
- Granular "B Type II" shall be 100% crushed limestone obtained from quarried rock sources, and shall be clean hard, durable uncoated particles.
- Select Subgrade material shall be well-graded non-plastic aggregate as specified in OPSS.MUNI 1010.
- Granular "A" and Granular "B" shall not be placed until the base has been inspected and approved by the Engineer.
- Clear stone shall be 100% crushed limestone.

OPSS.MUNI 1010.05.01 Table 1 references to Granular "A" are deleted and replaced by the following:

Laboratory Test	**MTO Test Number**	**Granular "A"**
Minimum Crushed	LS 607	100 % minimum
Micro Deval - coarse	LS 618	25% maximum
Micro Deval - fine	LS 619	30 % maximum
Asphalt Coated Particles	LS 621	30 % maximum
Plasticity Index	LS 704	0

Payment for the work of this section shall be included with the appropriate items at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the Work.

SP 12. Plastic Pipe Sub-drains

The provisions of OPSS 405 shall apply except for the following:

All sub-drains shall be polyethylene pipe products in accordance with OPSS 405.05.02 and supplied with a filter sock. Bedding and backfill material shall be clear stone wrapped in geotextile. Rodent grates shall be supplied and installed at the outlet end of each subdrain.

Payment for the work shall be at the unit rates indicated in the Form of Tender for all labour, materials, and equipment to perform the Work.

SP 13. Compaction

The provisions of OPSS 501 shall apply. Compaction shall conform to 501.08.02.

Payment for the work of this section shall be included with the appropriate items at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the Work.

SP 14. Cast-in-place Concrete General

All concrete work shall conform to the requirements of CAN/CSA A23.1, ACI 308, OPSS.MUNI 904, OPSS 919, OPSS.MUNI 920, and OPSS.MUNI 1350. All concrete shall be supplied by an approved ready-mix supplier conforming to OPSS.MUNI 1350.

General

All concrete shall conform to the required CSA exposure class (i.e.: C-1, C-2, F-1, etc.) and shall have a minimum compressive strength as required at 28 or 56 days unless otherwise noted. Refer to CSA A23.1 Table 2 for further details. Submit mix designs to the Contract Administrator for review.

The Contractor may substitute alternative proprietary concrete mixes and proprietary patching compounds **only upon receipt of written**

acceptance of the material by the Owner and Contract Administrator. Refer to concrete removal and patching specifications for additional details.

Concrete spillways shall be C-2 exposure class and have a minimum compressive strength of 32MPa at 28 days. Concrete spillways to be installed as per the details on the drawings at all bridge quadrants. Spillways to be installed on a suitably compact granular base and to **be installed after guiderail installation is complete**.

Formwork & Falsework

All formwork and falsework, including installation and removal, shall comply with OPSS 919, notwithstanding the requirements of this section.

The Contractor shall design, supply, install, and operate any formwork and falsework and support systems (including any cofferdams and dewatering if necessary) required to perform the work, and any permits that may be required. Such methods and plans shall be designed, signed, and sealed by a Professional Engineer in the Province of Ontario and submitted to the Contract Administrator, the County, and any other authority having jurisdiction (eg.: CA) for review and approval prior to commencement of the work.

Site numbers and the date shall be cast into the concrete via figure forms from **cast acrylic sheet or high impact styrene** that shall not stain the concrete and that are secured neatly to the formwork as to not move during concrete placement and consolidation. **Figure forms of any other material will <u>not</u> be accepted**. Finished figures cast into concrete that are not to the satisfaction of the County shall be replaced complete at no additional expense.

Installation

Existing concrete surfaces to which new concrete is to be placed against shall be kept continuously moist at a saturated surface-dry condition beginning one hour prior to placing bonding agent. No ponding of water shall be present. The bonding agent shall be a cement-sand-grout slurry and shall only be applied immediately prior to concreting. A latex modified or epoxy grout may be used in lieu of

the above procedure in accordance with the manufacturer's recommendations.
Working of the concrete surface shall take place while it is sufficiently plastic to achieve the desired grades, elevations, and texture. Concrete shall not be prematurely worked or overworked to cause excessive fines and water to be forced to the surface.

The application of water, cement, cement paste or similar mixtures to the concrete surface to aid in the finishing of the concrete is prohibited.

In accordance with material testing requirements, and in consideration of coordination of resources and scheduling, all concrete pours shall be a minimum of $3m^3$. Contractors shall not be permitted to pour quantities less than $3m^3$ unless explicitly approved in writing by the Contract Administrator a minimum of 5 working days prior to the scheduled pour.

Curing

Curing shall be done with clean burlap (to prevent staining) and water and white opaque polyethylene film in accordance with OPSS.MUNI 904. The burlap required for curing shall be pre-soaked in water in accordance with OPSS.MUNI.904 **on-site** for a period of not less than 24 hours prior to the scheduled concrete pour. Concrete pours will not be permitted in the event that properly pre-soaked burlap is not on-site.

The burlap shall be maintained in place and kept thoroughly wet for a minimum of **four (4)** days unless otherwise explicitly instructed in writing by the Contract Administrator to do otherwise. During hot weather, formed surfaces shall be cured by leaving formwork in place and keeping formwork continuously wet.

The period of curing shall be modified as defined by the following tables:

Concrete Strength at 4 Days (MPa)	Curing Protocol after 4 Days
< 59.99% *	Cure 3 Additional Days & Re-Evaluate at 7 days
60.00% – 70.00% *	Curing Complete
> 70.01% *	Cure 3 Additional Days & Re-Evaluate at 7 days

*Percentages are based off the specified design strength of concrete.

Concrete Strength at 7 Days (MPa)	Curing Protocol after 7 Days
< 69.99% *	Cure 3 Additional Days
70.00% – 85.00% *	Curing Complete
> 85.01% *	Cure 3 Additional Days

*Percentages are based off the specified design strength of concrete.

Concrete that requires additional curing in accordance with the above table may require review by the material testing Consultant prior to removal of curing materials. **In any event, the Contractor shall not be permitted to remove curing materials or formwork/falsework without the explicit written direction of the Contract Administrator.**

Concrete that is not cured in accordance with this specification shall be removed and replaced at the sole cost and expense of the Contractor.

Finishing

Class "B" Finish

This type of finish involves the removal of all corrodible metal within 20 mm of the surface and repairing the cavities so formed. Fins and other projections shall be removed leaving a smooth surface. The appearance of the concrete when viewed from a distance of 15 m shall be uniform in appearance as to colour, pattern, and texture. Rubbing with a carborundum stone may be necessary to produce the required surface appearance. **Class "B" finishes shall be used on all exposed concrete surfaces below the level of the bridge deck soffit.**

Class "A" Finish

This treatment involves removing the formwork, filling all holes with mortar and rubbing the entire surface with a medium carborundum stone using a small amount of mortar. The mortar shall be carefully brushed over the entire surface and allowed to set. The mortared surface shall then be cured with wet burlap for the balance of the curing period or for a minimum of 48 hours, whichever is greater. During the curing period the final finish shall be obtained using a fine carborundum stone and water. After final rubbing and completion of the curing, the surface shall be rubbed with dry burlap. The finished surface shall be uniform in colour, texture and pattern when closely viewed. ***Class "A" finish work must be completed prior to the full***

removal of curing materials. Class "A" finishes shall be used on all exposed concrete surfaces above the level of the bridge deck soffit.

All exposed concrete corners and edges and construction joints between structure elements shall be chamfered (19mm) unless shown or noted otherwise on the contract drawings.

The finished surface of concrete placed for such items as bridge decks, approach slabs, sidewalks, curbs and gutters, shall conform accurately to grades and elevations shown on the contract documents.

Except across the crown of drainage gutters, the surface is to be such that when tested with a 3 metre long straight edge (provided by the Contractor) placed anywhere in any direction on the surface, there shall not be a gap greater than 6mm between the bottom of the straight edge and the surface of the concrete anywhere below the straight edge. The surface shall be free from open texturing, plucked aggregates and local projections.

Miscellaneous

The work of this section also includes the supply and placement of Dow Corning or Sika Canada sealants (or approved equal), Wabo seals (or approved equal), EVA Foam, Ceramar, asphalt impregnated fibreboard, and other materials required for bond break, to seal concrete deck ends, control joints, or base plates, etc.

All other work of this section shall be done explicitly in accordance with OPSS Division 9.

Payment

Payment for cast-in-place concrete work shall be at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the Work and shall be made as follows:

- 80% after completion of concrete pour;
- 20% at inspection and approval of concrete finishes.

Payment for "Wabo Inverseals" and EVA Foam at curb joints shall be at the contract price as stated in the Form of Tender for all labour, materials, and equipment required to perform the Work.

SP 15. Concrete Removals & Patching

This specification covers the requirements for the supply of all labour materials and equipment to remove reinforced concrete from the portions of the structure as indicated on the contract drawings and as directed by the Contract Administrator. This specification also covers the preparation of concrete surfaces, and the supply, placement, finishing, curing and protection of new concrete for patches.

The Contractors work shall conform to the following standard specifications:

CAN/CSA A23.1	Concrete Materials and Methods of Concrete Construction
OPSS.MUNI 904	Construction Specifications for Concrete Structures
OPSS.MUNI 928	Construction Specifications for Structure Rehabilitation – Concrete Removal
OPSS 930	Construction Specifications for Structure Rehabilitation – Concrete Patches and Overlays
OPSS.MUNI 1350	Concrete (Materials & Production)

General

All concrete for patchwork shall be supplied by an approved ready-mix concrete supplier. Maximum aggregate size shall be 13 mm, and shall be C-1 exposure class with a minimum compressive strength of 35 MPa at 56 days. Refer to CSA A23.1 Table 2 for further details.

Where the depth of any patch is to exceed 50mm, the patch shall be filled with pumpable C1–35MPa concrete. The Contractor may substitute alternative proprietary concrete mixes and proprietary patching compounds **only upon receipt of written acceptance of the material by the Owner and Contract Administrator.**

Where the depth of patch is less than 50mm, the patch shall be filled with a Proprietary Patching Compound. The Proprietary Patching Compound shall be SikaTop 123 Plus, or approved equal. The Contract Administrator shall review the type of material and the methods prior to use. Install proprietary concrete ready-mix as per manufacturer's recommendations.

The existing geometry of concrete bridge elements that are to be rehabilitated shall be field measured by the Contractor prior to undertaking any of the work of this section.

Removals

The Contractor shall remove deteriorated concrete as directed by the Contract Administrator to the depths as specified or directed.

Neatly saw-cut demarcated areas for removal. Do not cut any existing reinforcement unless otherwise noted on the contract drawings or as directed. Do not allow any deleterious material to enter the watercourse. Do not damage any portions of the structure that are to remain in place. Use power and hand tools as directed.

Preparation

Following removal of reinforced concrete, abrasive blast the area clean to remove all loose particles and blast all exposed reinforcing steel to a white metal finish. The Contract Administrator shall inspect all removal and sandblasted areas prior to any concrete placement. If deemed necessary, reposition, secure, and support reinforcing steel and replace deteriorated reinforcing steel as directed by the Contract Administrator.

The surface areas which concrete is to be placed shall be kept continuously moist to a saturated surface-dry condition beginning one hour prior to placing bonding agent. No ponding of water shall be present. The bonding agent shall be a cement-sand-grout slurry and shall only be applied immediately prior to placing concrete. A latex modified epoxy grout may be used in lieu of the above procedure in accordance with the manufacturer's recommendations.

The area to be patched with proprietary patching compound shall be dampened with water prior to placing product. The Proprietary Patching Compound shall be mixed and applied in strict accordance with the manufacturer's recommendations.

Curing

Cure patched areas in accordance with OPSS.MUNI 904 and the recommendations of the compound manufacturer.

Payment

Payment for cast-in-place concrete work shall be at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the work and shall be made as follows:

- 80% at after completion of concrete pour
- 20% at inspection and approval of concrete finishes

SP 16. Concrete Deck Repair and Overlay

Conform to the requirements of OPSS 930 - Construction Specification for Concrete Overlay - Structures, OPSS.MUNI 904 Construction Specification for Concrete Structures and OPSS.MUNI 1350.

General

Concrete materials shall conform to OPSS.MUNI 1350 and shall be C-1 exposure class having a minimum compressive strength of 35 MPa. Refer to CSA A23.1 Table 2 for further details.

Prior to placement of concrete, the Contractor shall provide the Contract Administrator with a Bridge Deck Placement plan in accordance with OPSS MUNI 904. 04.01.02.

Removals

Remove the existing asphalt wearing surface and existing waterproofing from the entire deck. The existing concrete deck shall be scarified to the depths noted on the drawings. Do not damage existing reinforcing steel.

Remove additional deteriorated concrete on the deck surface as directed by the Contract Administrator. Remove additional concrete at bridge barrier post and curb locations as required to facilitate new barrier anchorages.

Preparation

Following scarification of concrete and prior to patching, abrasive blast clean the area to remove all loose particles and abrasive blast

clean exposed reinforcing steel to a white metal finish. Prepare the deck surface for delamination survey. The Contract Administrator shall inspect all removal and sandblasted areas prior to placing concrete.
If necessary reposition, secure, and support reinforcing steel. Replace deteriorated reinforcing steel as directed by the Contract Administrator.

The deck area shall be maintained wet to a saturated surface-dry condition for 1 hour as per CSA A23 prior to placing bonding agent. No ponding of water shall be present. The bonding agent shall only be applied immediately prior to concreting.

Installation

Deck patches shall be poured monolithically with deck overlay. New wingwall top and curbs, shall be formed, poured, and cured prior to installing the deck overlay.

Deck ends shall be poured monolithically with deck overlay.

A bonding agent shall be used and identified. Place concrete over a bonding grout conforming to the requirements of OPSS 930 Construction Specification for Structure Rehabilitation - Concrete patches and Overlay.

Overlay concrete shall not be placed when the air or deck temperature is below 10 deg. C or likely to rise above 30 deg. C during the duration of the placing operations. Placement of the concrete overlay shall not commence if precipitation is expected.

Finishing

A **self-propelled mechanical** bridge deck finisher (Bidwell, Gomaco, or approved equivalent) shall be used to strike off and finish concrete decks to the accuracy required by the Contract. In addition, the Contractor shall make any and all necessary adjustments to provide the required camber, crown, thickness and concrete cover, etc.

Curing

Two layers of wet burlap shall be placed on the surface of the concrete overlay as soon as the surface will support it without

deformation. Strips of burlap shall overlap by at least 150mm. Burlap shall be thoroughly soaked for 24 hours prior to placing. A layer of white opaque polyethylene film shall be placed immediately on the wet burlap. The polyethylene shall be lapped a minimum of 150mm and securely held in place against displacement.

Traffic (construction or highway) will not be permitted on the finished surface of the overlay concrete until 14 days following placement or until the deck concrete has achieved design strength.

Payment

Payment for the work of this section shall be included with the appropriate items at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the Work and shall be made as follows:

- 80% after completion of concrete pour;
- 20% at inspection and approval of concrete finishes.

SP 17. Concrete Crack Repair & Injection

Conform to the requirements of OPSS 932 - Construction Specification for Crack Repair – Concrete.

Repair, by means of injection using a positive displacement pump, select cracks in the concrete structure surfaces as designated by the Contract Administrator. Remove, flush, and clean cracks prior to injection.

Crack injection material shall conform to OPSS 932. Polyurethane resin shall be used for injection of active cracks and epoxy resin shall be used for injection of passive cracks. Cracks shall be identified as active or passive as determined by the Contract Administrator.

In addition to being moisture insensitive, epoxy resin shall conform to ASTM C-881, Type I and IV, Grade 1, Class B and C.

Payment for the work of this section shall be at the contract price as stated in the Form of Tender for all labour, materials, and equipment required to perform the Works.

SP 18. Reinforcing Steel

Reinforcing steel shall be in accordance with OPSS 905, 1440 and 1442 and shall include the supply, placement, drilling and grouting, and tying of all reinforcing steel for the project.

Reinforcing steel shall be epoxy coated, or uncoated, as specified on the contract drawings. Reinforcing steel within the substructure concrete (i.e.: footings, lower abutment wall, etc.) need not be epoxy coated unless specifically stated otherwise on the contract drawings.

Shop drawings for reinforcing steel shall be provided by the supplier and shall be marked as reviewed and approved by the Contractor **prior** to submitting to the Contract Administrator for review. Reinforcing steel shop drawings shall be the original work of the supplier, facsimile's of the tendered or working drawings will not be accepted.

Payment for the work of this section shall be included with the appropriate items for placement of cast-in-place concrete as stated in the Form of Tender for all labour, materials, and equipment required to perform the Works.

SP 19. Abrasive Blast Cleaning

The requirements for abrasive blast cleaning concrete, steel reinforcement, and structural steel, shall conform to the requirements of OPSS.MUNI 911 – Construction Specification for Coating Structural Steel Systems, and OPSS 929 – Abrasive Blast Cleaning for Concrete Construction.

General

All structural steel to be repaired and coated and all exposed steel reinforcement and concrete to remain must be blast cleaned with silica sand media to the requirements of OPSS 929. Areas and components of the structure not designated for abrasive blast cleaning, including adjacent vegetation and waterways, shall be protected from the sand blast media.

The Contractor is to supply, install, and maintain all enclosures, partial or full, hoarding, etc., that may be required and are necessary to

contain and prevent blasting and paint materials from contaminating the waterway.

Reinforced Concrete

All exposed steel reinforcement shall be sandblasted to a white metal finish to the satisfaction of the Contract Administrator. All concrete removal areas shall be thoroughly sandblasted to the satisfaction of the Contract Administrator.

Structural and Miscellaneous Steel

Existing structural and miscellaneous steel specified to be cleaned and coated in the Contract Documents shall be abrasive blast cleaned to the requirements of SSPC-SP 10/NACE No. 2 Near White Metal Standard having a surface profile within a range of 25 – 75 microns. Abrasive blast surfaces shall be washed and prepared for inspection and subsequent coatings.

The Contractor shall be aware of the results of the test samples taken from the existing coating on the steel girders, and the hazardous material (i.e. lead paint) analysis. Refer to Appendix A - Bridge Check Canada Detailed Condition Survey Report. The Contractor shall complete all lead paint mitigation as required by the OHSA and all other safety and environmental regulations and standards.

The Contractor is to supply, install, and maintain all hoarding, full enclosures with negative pressure, etc., necessary to contain and prevent blasting and paint materials from contaminating the environment and waterway.

The Contractor shall consider and treat the existing paint material to be "lead containing" or "lead based" paint based on the result of the chemical analysis detailed in the appended report. Existing paint shall be removed following the appropriate lead abatement procedures outlined in the Ministry of Labour Guideline "Lead on Construction Projects" Sept. 2004. All waste materials shall be contained, removed, and properly disposed. During lead abatement procedures, monitoring shall be conducted including pre-abatement and post-abatement inspections by the materials consultant.

The surfaces of the existing structural steel shall be cleaned and coated according to the contract drawings and specifications. The Contractor is advised that there may be isolated areas of structural steel surfaces where there is high chloride penetration. In order to obtain the specified surface preparation standard, the Contractor will be permitted to utilize low pressure hot water after abrasive blast cleaning. The cleaned steel surfaces and all overlapping joints, crevices, and adjacent structural steel shall be blown dry with clean, dry, compressed air after water cleaning. Clean air shall be in accordance with ASTM D 4285. The cost of any cleaning to meet the required standard shall be included in the price for abrasive blast cleaning in the Form of Tender.

Partial Enclosures: A partial enclosure is not an appropriate containment system for this project.

Full Enclosure: Full Enclosures shall be impervious to dust and wind and prevent the escape of all materials, including dust. A full enclosure on its own is not an appropriate containment system for high dust generating surface preparation operations such as abrasive blast cleaning. Full enclosures shall be free of any openings and shall have joints, seams, and overlaps fully sealed.

Full Enclosure with Negative Pressure: A full enclosure with negative pressure shall consist of the full enclosure, as described in the Full Enclosures clause, equipped with a mechanical ventilation system capable of effecting complete air change for the enclosure in less than one minute. The mechanical ventilation system shall be in operation during abrasive blast cleaning, clean-up activities, and surface blow down or other high dust generating surface preparation operations to ensure effective removal of dust and other materials from the air inside the enclosure. The effect of this system shall also be to ensure that all deleterious substances and materials are properly collected and disposed of in accordance with lead abatement procedure requirements.

Payment

Payment for the abrasive blast cleaning of concrete removal areas and steel reinforcement shall be included in the contract prices for concrete removal items as stated in the Form of Tender and shall

include all labour, materials, and equipment required to perform the Work.

Payment for the abrasive blast cleaning, and preparing of structural steel and miscellaneous metals shall be at the prices shown in the Form of Tender for all labour, materials, and equipment required to perform the works.

Payment for lead abatement procedures, enclosures, debris containment, disposal, and mitigation shall be at the prices shown in the Form of Tender for all labour, materials, and equipment required to perform the work.

SP 20. Structural Steel Coating

The work and materials of this section shall conform to the requirements of OPSS 906, OPSS.MUNI 911 and OPSS 1704 and shall consist of the cleaning and coating of all the structural steel including beams, bracing, diaphragms, plates, connections, and all other existing steel components of the structure.

General

The Contractor is to supply, install, and maintain all hoarding, full enclosures, etc., necessary to prevent contaminating the environment and waterway and prevent over-spray on the existing structure.

Structural steel coating is to be applied **after** structural steel rehabilitation and bearing replacements are complete.

The Contractor shall be aware of the results related to the lead paint test sample results of the existing coating on the steel girders, refer to Appendix H of Bridge Check Canada's Detailed Condition Survey report included in this contract (Appendix A). The Contractor is notified that the results indicate the lead paint content is below the Regulatory Limit. The Contractor shall complete all lead paint mitigation if required.

Coatings

OPSS.MUNI 911 is amended by the following:

The following low VOC coating system shall be employed for all steel coatings:

- Inorganic Zinc / Epoxy / Polyurethane System conforming to OPSS.MUNI 911.
    - Prime coat 75 um total minimum dry film thickness
    - Second coat 75 um total minimum dry film thickness
    - Third coat 75 um total minimum dry film thickness

911.07.04.02.01 Application of Coating - General: Bearing shoe plates shall be coated using the specified coating system. Stripe coat of the prime coat shall be done by brush after spray application of the prime coat. Stripe coat of the finish coat shall be done prior to the spray application of the finish coat.

All coatings shall be low VOC 3-coat systems meeting OPSS 1704, and shall be selected from the pre-approved list of products in the Ministry of Transportation designated sources materials list (DSM of Low VOC Paint Systems www.roadauthority.com). The Contractor shall provide the Owner and the Contract Administrator product data sheets and colour swatches of all proposed coating materials clearly identifying conformance with the specifications for this project for approval prior to installation. The colour shall be standard MTO grey.

Repairs

Where excessive coating thickness produces "mud cracking" in zinc rich coating materials, such coating shall be scraped back and sanded to soundly bond coating and the area re-coated to the required thickness. If the work is incomplete in any section the application of each coat shall be terminated so that a 100mm minimum width of prepared surface and/or each coat of the new system is exposed until the adjacent sections of the surface preparation and/or coating are completed.

Damaged areas of coated surfaces shall be cleaned of all rust and other contaminants and re-coated with the same materials.

Quality Control & Inspection

In accordance with OPSS.MUNI 911 QUALITY CONTROL:

The Contractor shall execute ongoing quality control of the cleaning and coating application operations, including measurements of temperature, humidity, dew point, surface profile, and coating thickness. The surface preparation and all other measurements taken shall be taken within the requirements specified in the Contract Documents. Written documentation of measurements taken, including dry film thickness (DFT) measurements taken using Type 2 constant pressure probe magnetic gauges, shall be provided to the Contract Administrator on a weekly basis, minimally.

In accordance with this requirement, the Contractor shall take and record measurements of temperature, humidity, dew point, surface profile and coating thickness on a daily basis during coating operations, or more frequently as required. The humidity, temperature, and dew point measurements shall be taken and recorded by means of an instrument(s) that is capable of temperature readings accurate to within +/- 0.50C, a relative humidity range of 0% to 100% RH with an accuracy +/-3% RH.

The Contractor shall supply magnetic gauges to measure the dry film thickness and shall satisfy themselves of conformance with the specifications at the request of the Contract Administrator.

Each phase of the work will require inspection by the Contract Administrator before proceeding to the next phase. Acceptance of the surface preparation will be based on the applicable SSPC surface preparation specifications and pictorial standards given in SSPC-Vis 1.

The Contract Administrator may arrange Quality Assurance testing by a third party in accordance with OPSS.MUNI 911.08 QUALITY ASSURANCE. This testing will be paid for directly to the Geotechnical/Construction Materials Consultant by the County. Refer to the tender documents Section "F" – General Provisions.

Payment

Payment for the work of this section shall be at the lump sum price as noted in the Form of Tender for all labour, materials, and equipment required to perform the works.

SP 21. Miscellaneous Structural Steel

This work consists of the supply of all labour, materials, and equipment to replace or rehabilitate the deteriorated structural steel components as indicated on the drawings or as directed by the Contract Administrator.

Steel bearing and shoe plates shall be in accordance with:

OPSS 922	Construction Specification for Installation of Bearings;
OPSS 1203	Material Specification for Bearings – Rotational and Sliding Surface.

The work in this section also covers the supply, fabrication, and installation of new steel plates to reinforce the existing steel girder webs as detailed on the contract drawings.

General

Field measure and confirm all dimensions prior to undertaking any of the work of this section. Conform to the requirements of OPSS 906 - Construction Specification for Structural Steel for Bridges. Submit shop drawings and erection drawings to the Contract Administrator for review prior to fabrication of structural steel components.

Steel shoe plates and web reinforcement plates shall be CSA G40.21 Grade 300W or equivalent.

All structural steel components removed from the existing structure shall become the property of the Contractor and shall be removed from the site and disposed of by the Contractor.

Deteriorated or damaged structural steel components shall be replaced in-kind or at the direction of the Contract Administrator.

Do not remove any structural steel components until the jacking temporary support systems are installed and the replacement member is on site and in position to be quickly installed.

Welding

For attachment of shoe plates and web reinforcement plates to existing structural steel, all welds shall be executed in accordance with CSA W59 by a company certified by the Canadian Welding Bureau to CSA W47.1. Controlled Hydrogen filler metals such as E4918-1 or equivalent are to be used. The fabricator shall have CWB approved WPDSs to cover the materials, positions and thicknesses used in the joints. Preheat shall conform to CSA W59 Table 5.3 for the materials and thicknesses involved.

Payment

Payment for the steel rehabilitation work of this Section shall be at the unit price for each of the removal and replacement or rehabilitation of structural steel components as indicated on the Form of Tender.

SP 22. Bearing Pads

Neoprene and/or elastomeric bearing pads shall be in accordance with:

OPSS.MUNI 922	Construction Specification for Installation of Bearings;
OPSS.MUNI 1202	Material Specification for Bearings – Elastomeric Plain and Steel Laminated.

Payment for the work shall be at the contract price as stated in the form of tender for all labour, materials (including adhesive connection), and equipment required to perform the Work.

SP 23: Jacking of Bridge Superstructure

This specification covers the requirements for raising and lowering a bridge superstructure by the use of jacks. This Special Provision refers to the following standards, specifications or publications:

- OPSS 906 Structural Steel for Bridges
- OPSS 919 Formwork and Falsework;
- OPSS 922 Installation of Bearings;
- Ontario Ministry of Transportation Structural Manual;
- Ontario Ministry of Transportation Designated Sources for Materials (DSM) Manual;

- CSA G40.20-013/G40.21-13 General Requirements for rolled or welded structural quality steel / Structural quality steel;
- A 563M-15 Standard Specification for Carbon and Alloy Steel Nuts F 436M-16 Standard Specification for Hardened Steel Washers;
- F 3125M-15a Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 830MPa and 1040MPa Minimum Tensile Strength [Metric].

For the purpose of this Special Provision the following definitions apply:

Certificate of Conformance means a stamped document issued by the Jacking Design Engineer confirming that the specified components of the Work are in general conformance with the requirements of the Contract Documents.

Jacking Design Engineer means an Engineer retained by the Contractor qualified to provide the services specified in the Contract Documents to both design and certify the provided jacking equipment and jacking methodologies will facilitate the jacking and lowering of the bridge in conformance with the Contract Documents.

Jacking System means all components required to perform the lifting and temporary support of the bridge superstructure. This includes but is not limited to; jacks, hydraulic hoses and fluid, valves, sensors, jacking systems, shims, temporary support systems, and all related appurtenances.

Survey means precise and detailed measurements and elevations taken, recorded, documented and certified by an Ontario Land Surveyor or an Engineer.

1.0 Design and Submission Requirements

1.01 Design Requirements

1.01.01 General

The Contractor shall be responsible for the design of the jacking system. When certain aspects of a jacking system are provided in the Contract Documents, the Contractor shall incorporate these aspects into the design of the jacking system.

Where the replacement of bearings is called for in the Contract Documents, the design shall take into account the possible difference in bearings size between the new and the original and ensure that the placement of the temporary supports does not interfere with the proper placing of bearings.

The design shall account for the structural work and condition of the structure at the time of jacking, and the stages that may interfere with temporary supports or jacking locations. It shall take into account any deterioration and/or removals prior to and during the duration of the jacking and remedial work. The design of temporary supports shall account for articulation of the superstructure including thermal movements, as well as any potential slip in supports. Jack and support locations shall account for conflicts between structural work and temporary works designed by the contractor.

The Contractor shall be responsible for determining an appropriate amount of pre-loading to be applied to the jacks prior to the start of displacement controlled jacking. The pre-loading amount shall be no less than 15% of the specified jacking load and shall be sufficient to account for decompression of bearings, gaps between shims (if used) and any other geometric imperfections in the proposed jacking system.

Shims and blocking used to support the jacks shall also be designed for no less than 150% of the jacking loads specified on the Contract Drawings.

The Jacking Design Engineer shall determine the locations for jacking points and temporary supports. Additional structure reinforcement, (eg. Beam stiffeners, bracing, bearings) if required by the designer, shall be proposed to the Contract Administrator and shown on the jacking shop drawings.

1.02 Submission Requirements

1.02.01 Jacking Drawings and Calculations

The Contractor shall submit the jacking shop drawings and calculations 7 Working Days prior to the commencement of the jacking operations, for information purposes only. Submissions shall bear the seals and signatures of the jacking design Engineer and a design checking Engineer.

The jacking drawings and calculations shall include the following:

a) Jacking methodology and sequence.
b) Location, number, type and capacity of the jacks to be used.
c) Description of the control system, complete with all design, schematics and equipment to be used.
d) Location and material to be used for temporary blocking and shimming.
e) Proposed pre-loading to be applied to jacks.
f) Schematic showing the configuration of all jacks, stop valves, gauges, manifolds and hydraulic pumps.
g) Current calibration certificates for all jacks, gauges, and lifting/lowering controller and tolerances.
h) Full details of the temporary support system including forces to be transmitted and method of transferring the loads to the substructure or founding strata, including considerations for thermal expansion and contraction.
i) Strengthening of the existing structure where necessary.
j) Restrictions on traffic and construction traffic.

Any required modifications to accommodate the proposed jacking system that may affect the final configuration of the bridge shall be submitted as a written proposal to the Contract Administrator prior to commencing jacking operations.

The Contractor shall have a copy of the signed and sealed jacking drawings at the site during jacking setup and operations.

1.02.02 Revised Submissions

When jacking design considerations or field conditions necessitate amendments to the jacking drawings, revised jacking drawings shall be submitted according to the Jacking Drawings and Calculations subsection.

2.0 Materials

2.01 Structural Steel

All structural steel shall be according to CSA G40.20/G40.21.

2.02 High Strength Bolts, Nuts and Washers

High strength bolts shall be according to ASTM F 3125M.

High strength nuts, and hardened washers shall be suitable for use with the types of bolts being specified and shall be according to ASTM A 563M, and ASTM F 436M.

The nuts, bolts, and washers shall be shipped together as an assembly from the manufacturer. The requirements outlined in the Test Reports for Fasteners clause found in OPSS 906 shall apply.

2.03 Mechanical and/or Adhesive Anchors

Mechanical and/or adhesive anchors shall be suitable for dynamic loads and shall be installed according to the manufacturer's recommendations.

2.04 Grout

Cement based non-shrink grout shall be supplied from sources named in the DSM manual.

3.0 Equipment

3.01 Synchronized Jacking System

A synchronized jacking system shall consist of either a Programmable Logic Controller (PLC) controlled system or a volumetric controlled system. The system shall be capable of adjusting pressures and hydraulic volumes in order to achieve a uniform lift and/or lowering to a tolerance of not more than 1.0 mm from the leading to lagging cylinders.

3.01.01 Programmable Logic Controlled Jacking System

A PLC controlled system shall include a central unit which continuously monitors the relative and absolute position of each individual jacking point.

3.01.02 Volumetric Controlled Jacking System

A volumetric controlled jacking system shall be fully calibrated and designed to precisely deliver the same volume of hydraulic oil to each individual jack at the same time when the same make and model of jacks are used at all locations.

When different makes and models of jacks are used, the system shall be capable of adjusting for differing amounts of fluid required at different jacks in order to comply with the specified lifting and lowering tolerances.

3.02 Displacement Sensors

The synchronized jacking system shall display real-time data for each jack location showing vertical displacement, hydraulic pressure, and applied force for monitoring purposes during the jacking operation. The data shall be automatically recorded at 1 second intervals in a data log file for the entire duration of the jacking/lowering operation(s) and stop only after the bridge is firmly on the temporary supports or permanent bearings.

Each jacking location shall have either a digital displacement sensor or linear transducer accurate to 0.1mm to monitor displacements. The displacement sensors can be either integrated into the jacking system or independently monitored such that displacement sensors, stroke sensors or calibrated volumetric control system is capable of achieving the relative lift/lowering tolerances specified by the Jacking Design Engineer. For jacks supported on temporary fixtures (such as jacking corbels), independent displacement sensors shall be used, and measurements shall be made relative to a fixed location on the adjacent bearing seat.

A data log file shall be reviewed by the Jacking Design Engineer during jacking operations for monitoring or modification purposes. The Jacking Design Engineer shall be responsible for identifying if any modifications to the methods, process, or jacking system is required. Data log file format is to be in a table with individual columns representing each displacement sensor reading in millimetres, hydraulic pressure, and applied force at each jacking location. Individual rows shall represent the time in Hr:Min:Sec format.

4.0 Construction

4.01 Pre-Construction Surveys

Prior to the start of any work related to the jacking operation, the Contractor shall carry out field measurements of all components of the existing structure that might impact the installation of the jacking system and ensure that any necessary adjustments to the jacking drawings and calculations based on these field measurements are made accordingly.

The jacking design Engineer and the design checking Engineer shall then determine whether any adjustments to the jacking system based on the field measurements will be required. If adjustments to the jacking drawings and calculations are required, the jacking drawings and calculations shall be resubmitted to the Contract Administrator along with a request for approval.

The Contractor shall take measurements of the underside of deck or girders at bearing locations prior to jacking the structure as part of this detailed survey and shall be relative to an adjacent fixed point on the substructure which will not move during construction. This shall include a minimum of one local fixed marking on the abutment or pier immediately adjacent to each lift point and bearing location. This marking must be located such that it will not be moved or compromised by the construction operations. Measurements to the underside of each girder and lifting point shall be made relative to the corresponding fixed marking, which shall be recorded accurate to 1mm.

The Contractor shall submit these measurements to the Contract Administrator prior to jacking.

4.01.01 Detailed Survey

Prior to the start of any work related to the jacking operation, the Contractor shall perform a detailed survey to establish geodetic elevations of the existing bridge deck, curb, and crown along deck joints to remain. The survey shall be in addition to the pre-construction survey, and the Contractor shall submit the results to the Contract Administrator prior to jacking.

4.02 Structural Steel

All structural steel fabrication, delivery and erection shall be according to OPSS 906.

4.03 Formwork and Falsework

All formwork and falsework shall be according to OPSS 919.

4.04 Installation of Bearings

When jacking is required for the installation, replacement or adjustment of bearings, the requirements of OPSS 922 shall apply.

4.05 Jacking

4.05.01 General

The Contractor shall ensure that all existing expansion joints and deck ends are free to move vertically prior to jacking. Bolts securing the handrail posts to the parapet walls, if present, shall be loosened to permit jacking without damaging the handrails.

Upon completion of the fabrication and installation of the components of the temporary works and prior to jacking, the jacking design Engineer shall conduct an inspection to verify that the fabrication and installation of the temporary works has been carried out according to the jacking drawings.

Traffic shall be allowed on or below each bridge during jacking as follows:

4.05.02 Jacking Points and Loads

Jacks shall only be placed at the jacking points specified in the jacking shop drawings by the Jacking Design Engineer. Jacks with a rated capacity of no less than 150% of the jacking loads specified on the Contract Drawings shall be used.

At no point shall the applied jacking loads exceed 200% of the jacking loads specified on the Contract Drawings.

4.05.03 Inspection Prior to the Commencement of the Jacking Operation

A Certificate of Conformance shall be submitted to the Contract Administrator prior to commencing each jacking operation.

4.05.04 Jacking Operations

The Contractor shall inform the Contract Administrator in writing at least 3 Days prior to the commencement of the jacking operations.

The lifting or lowering of the entire width of the structure shall be carried out in one uniform and synchronized operation using a synchronized

jacking system. At no time during the lifting or lowering of the structure shall the elevation difference between any jacking points exceed 1.0 mm as measured at the centre line of the bearings.

Jacking operations shall be carried out under the direct supervision of the jacking design Engineer. Prior to the commencement of jacking operations, the accuracy of all transducer read-outs, relative to manual measurements shall be demonstrated to the Contract Administrator.

The lift and/or lowering at each jacking point shall be monitored continuously during the jacking operation from a centralized location by remote sensors or calibrated jacking system. The maximum lift for all jacking points shall be sufficient to decompress the bearings and stop 3 mm above the final jacking elevation, unless otherwise specified in the Contract Documents.

4.05.05 Temporary Supports

The bridge superstructure shall not be supported on hydraulic jacks for a period longer than permitted on the jacking drawings and in no case longer than 12 hours.

When the required lift for all jacking points has been achieved and the bearings have been released, temporary supports (such as blocking and shimming) shall be placed to support the bridge. The jacks shall then be lowered in one synchronized operation while maintaining the maximum allowable difference between any two jacking points of 1.0 mm.

The jacking loads shall be transferred to the temporary supports and then the jacks released prior to the commencement of bearing removal and bearing seat reconstruction or bearing replacement work.

Unless otherwise specified in the Contract Drawings, temporary supports shall be located at the jacking points.

Temporary supports shall consider any and all construction and rehabilitation loading and work required for the bridge project. No conflict in the jacking and temporary support shall be made with the rehabilitation work.

The superstructure shall not be left on temporary supports for more than 15 Days or as specified in the Contract Documents.

4.05.05.01 Post-Jacking Survey

Immediately after the structure has been placed on temporary supports and prior to the bearing seats being reconstructed (if applicable), the underside of the superstructure that will be in contact with the new bearings shall be surveyed. The survey shall include the four corners in contact with the bearings and at least one point in the middle of the bearing area. Data from the survey shall be forwarded to the Contract Administrator to determine if adjustments to the design are required.

4.05.06 Lowering of the Superstructure

Where jacking of the superstructure is accompanied by rehabilitation of bearing seats, the superstructure may be jacked again for the removal of the temporary supports only after the concrete in the bearing seats has reached 75% of its design strength. The jacks shall then be lowered in one synchronized operation, while maintaining the maximum allowable difference between any two jacking points of 1.0 mm, and the superstructure shall be placed onto the bearings.

4.05.06.01 Bearing Contact

The bearings shall have uniform and full contact at top and bottom. The requirements for bearing full contact as specified in OPSS 922 shall be met. The jacking system shall remain in place until full contact of bearings is achieved.

4.05.07 Reinstatement of Structure and Components

The bridge deck and girders shall be reinstated to the original elevations unless new elevations are specified in the Contract Documents or as otherwise directed by the Contract Administrator.

A final continuous and smooth riding surface not exceeding 3 mm in difference across all joints, approaches and adjacent spans where bearings are replaced shall be provided. The pre-jacking elevations, proposed new elevations, new bearing thickness, elastic compression of new bearings from the manufacturer, and any other new components installed shall be assessed as part of the Work in meeting this requirement.

The Contractor shall notify the Contract Administrator when any existing conditions or components will affect the ability to meet the above requirement.

Anchor holes shall be filled with non-shrink grout finished flush with the surrounding concrete with matching color; no metal components of the jacking system shall be embedded permanently in concrete with less than 40 mm of cover.

All expansion joint and handrail components removed or loosened to facilitate jacking shall be reinstated.

4.06 Inspection after Completion of the Jacking Operation

A Certificate of Conformance shall be submitted to the Contract Administrator upon completion of each jacking operation.

5.0 Basis of Payment

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment and Materials to do the work.

SP 24. Concrete Curb and Spillways

The provisions of OPSS 353 shall apply except for the following:

Except for the curb located on the bridge structure and approach slab, concrete for curb spillways shall be 32 MPa C2 exposure class. Refer to CSA A23.1 Table 2 for further details.

Joint fillers shall conform to OPSS 1308 Type A - non-extruding and resilient bituminous.

Payment for the work shall be at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the work.

SP 25. Deck Drains

The Contractor shall supply and install deck drains in accordance with the OPSD's as noted on the design drawings and in this document. The drains shall be monolithically cast into the deck with the deck overlay.

Existing deck drains shall be removed and disposed. Holes in the existing deck shall be cored to suit new steel deck drains. Existing concrete and steel reinforcement shall be removed or adjusted to suit new deck drains.

Shop drawings shall be submitted for review to the Contract Administrator prior to fabrication of the deck drains. The OPSD shall be modified to suit the existing conditions of the structure after removals, field measurements by the Contractor, and the new curb, deck, and asphalt geometry as shown on the design drawings. Shop drawings shall be provided by the supplier and/or fabricator and shall be marked as reviewed and approved by the Contractor prior to submitting to the Contract Administrator.

Payment for the work shall be at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the Works.

SP 26. Expansion Joint Assemblies

This specification covers the design, supply, and installation of expansion joint assemblies and cover plates. Conform to the following standard specifications:

OPSS.MUNI 920	Construction Specification for Deck Joint Assemblies, Preformed Seals, Joint Fillers, Joint Seals, Joint Sealing Compounds, and Waterstops - Structures
OPSS.MUNI 1210	Material Specification for Deck Joint Assemblies

General

Expansion joint assemblies shall be BASF Wabo FabroSpan FR-100D Type "A" expansion joint system and shall be in accordance with SS113-12, and SS113-16 Modified.

Expansion joint catchbasins and downpipes shall be per SS113-14 Modified. All components of catchbasins and down pipes including fasteners shall be hot dip galvanized in accordance with All components shall be galvanized in accordance with CSA G164M.

The Contractor shall provide expansion joint assembly product and working drawings in accordance with OPSS.MUNI 920 for review by the Contract Administrator. Working drawings shall bear the seal and signature of an Engineer with 5 years' experience in either, or both, fabrication or installation of expansion joints certifying conformance with the contract drawings and product drawings.

Product drawings and working drawings shall be submitted for review to the Contract Administrator 3 weeks prior to fabrication of the expansion joint assemblies.

Payment

Payment for the work shall be at the lump sum prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the work.

SP 27. Concrete Bridge Deck Waterproofing

Waterproofing shall be in accordance with OPSS 914, OPSD 3370.100 and 3370.101 and shall include the supply, labour, materials and equipment to perform the work.

Membrane reinforcement shall be supplied to the site and installed at the direction of the Contract Administrator.
Payment for the work shall be at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the work.

SP 28. Hot Mix Asphalt

This specification covers the supply, placing, and compaction of hot mixed, hot laid asphalt pavement on the granular base and bridge deck. The provisions of OPSS 310, OPSS.MUNI 1003, 1101, and OPSS 1150 shall apply.

General

Submit asphalt mix designs for review at least two weeks prior to asphalt placement. The mix design shall be confirmed one day prior to asphalt placement.

No asphalt shall be placed until the road base has been inspected and approved by the Contract Administrator. Proof-roll road sub-base and granular road base in the presence of the Geotechnical Consultant.

This specification also covers the work of routing, cleaning, and sealing asphalt joints in accordance with OPSS.MUNI 341 and OPSS 1212.

Asphalt Physical Requirements

OPSS 1003.05.03.02 Table 3 is revised to read:

Laboratory Test	**MTO Test Number**	**HL3**	**HL8**	**HL3HS**	**HL8HS**
Loss by Washing, Pass 75µm Sieve, % maximum					2.0
Absorption by Mass, % maximum					2.0
Percent Crushed Particles, % minimum	LS-607	80	100	100	100
Flat and Elongated Particles, % maximum					20
Petrographic Examination, % non-carbonate of retained 4.75mm					-
Particles with 2 Faces Crushed, % minimum					-
Micro-Deval Abrasion, % maximum loss					21
Alternative Requirements to Magnesium Sulphate Soundness (LS-606)					
Unconfined Freeze-Thaw Loss, %	LS-614				15

The addition of Engine Oil Residue (EOR) to any asphalt cement is prohibited. As part of the Quality Control (QC) and Quality Assurance (QA) procedures samples of the asphalt cement will be obtained from the asphalt plant from asphalt tank(s) during asphalt production. One sample will be taken for the Contractor, one for the County and one for referee testing. The samples shall be 1 litre each and stored in glass containers. If there is any concern about the quality of the asphalt cement in the mix, the samples of the asphalt cement will be tested using a Gas Chromatography Mass Spectrometer (GCMS) for the presence of deleterious components not anticipated in good quality asphalt cement.

Installation

In intersections, turn-outs, driveways, and other irregular sections where it is impractical to spread and finish the binder, levelling, or surface mixtures by machine methods, the Contractor shall use other spreading equipment or shall spread the mixture by hand. When it is necessary to hand-spread the mixture in sections adjacent to machine-laid areas, such hand-spreading shall be carried out concurrent with machine laying. Care shall be taken when laying asphalt by hand to achieve a smooth, well-graded surface free of voids or isolated stones.

Any joints in asphalt placement phases shall be made to ensure a thorough and continuous bond, and to provide a smooth riding surface. All dirt or other foreign material and all loose material shall be removed from all faces at which joints are made.

Longitudinal joints shall be properly "set up" with the back of a rake or lute, or both, at proper height and grade prior to rolling. The width of succeeding courses shall be adjusted by an offset of 150-300mm so that longitudinal joints do not coincide. The longitudinal joints in the surface course shall correspond to the demarcation between driving lanes or the finished roadway crown.

On surface courses the method of making joints shall be such that the excess material is not scattered on the surface of the freshly laid mat. Such excess material shall be removed.

Where a butt joint is to be constructed, the existing pavement edge shall be trimmed to a straight, clean, vertical face. Where a stepped

joint is to be constructed, the existing pavement edge shall be trimmed to a straight, clean, vertical face and the asphalt pavement shall be removed to the depth and width indicated to form the stepped joint.

Asphalt ramps, only if required and only where necessary, shall be constructed with surface course pavement and shall be milled off prior to placement of surface course asphalt.

Payment

Payment for the work(s) of this section shall be at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the Work.

Payment for routing, cleaning, and sealing shall be at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the Work.

SP 29. Tack Coat

The provisions set in OPSS.MUNI 310 shall apply, except for the following:

Tack coat shall be SS-1 emulsified asphalt according to OPSS.MUNI 1103. No alternates will be permitted. The tack coat shall be diluted with an equal volume of water.

Tack coat shall be applied to all surfaces prior to the placement of new asphalt. Application rate shall be 0.35 kg/sq. metre.

No separate payment will be made for this item. Payment for all labour, materials, and equipment required to perform the work shall be included in the contract prices as stated in the Form of Tender for hot mix asphalt.

SP 30. Galvanized Box Beam Bridge Railing

The work of this section consists of the supply and installation of Galvanized Steel Railing. The Contractor shall conform to the requirements of OPSS.MUNI 908 - "Construction Specification for Metal Traffic Barriers and Metal Railings for Structures", standard drawing SS110-48 and the details shown on the drawings.

General

Railing elements shall consist of posts from rolled wide flange structural sections conforming to CSA G40.21-M92 grade 350WT. Steel plate shall conform to the requirements of CSA G40.21-M92 Grade 350WT. HSS rails shall conform to CSA standard CAN3-G40.21-M92 Grade 350WT Class C and shall meet the Longitudinal Charpy V-Notch Impact Test requirements of 27 Joules at test temperature of -20° C. The notch toughness requirements for posts and plates shall be the same as HSS rails. Anchor studs, washers and nuts shall conform to ASTM specification A449. Full thread studs, washers and nuts for fastening guide rails to posts shall conform to ASTM A108.

All components shall be galvanized in accordance with CSA G164-92M (excluding locknuts). Locknuts shall be zinc-plated according to ASTM-B695. All galvanizing shall be done after fabrication. Store, handle and erect railing so as to minimize damage to the spelter coating.

Rail posts shall be set perpendicular to grade. Post anchoring nuts shall be tightened to a snug fit condition and given an additional 1/3 of a turn.

Bolts in rail splices shall be tightened to a condition that will allow rail movement.

Galvanized components shall be uniform and consistent in appearance, texture, finish, and colour, to the satisfaction of the Owner. Components that are unsatisfactory will not be accepted by the Owner.

For the purpose of measurement all scratches shall be considered to be a minimum of 10mm in width. Notwithstanding the area determination, any component that exhibits corrosion or the finish is damaged to base metal, shall be removed and recoated at the discretion of the Contract Administrator.

If spelter coating has been damaged, recoating of the damaged portion shall be at the discretion of the Contract Administrator.

All welding shall conform to CSA Standard W59-M89 and shall be done by a welder qualified under CSA Standard W47-M83.

Shop drawings for all bridge railing systems shall be provided by the supplier and/or fabricator and **shall be marked as reviewed and approved by the General Contractor prior to submitting to the Contract Administrator for review**. Shop drawings shall be the original work of the supplier, copies of the tendered or working drawings will not be accepted. The Contractor shall notify the Contract Administrator of any deviations from the contract drawings. Any shop drawings that deviate from the contract drawings shall bear the stamp and signature of a Professional Engineer Licensed in the Province of Ontario.

The Owner may require a shop inspection of the components prior to shipment.

Erection

Anchor systems set into concrete shall be field measured and adjustments shall be made to the shop drawings prior to fabrication. All bridge railing components including anchorage assemblies shall be fabricated and erected using field measurements completed by the Contractor.

Erect railing with posts set perpendicular to the road grade. Provide railing splices as required and in accordance with the details provided. The face of the barrier railing shall be aligned flush with the face of the concrete bridge endposts.

Damaged components shall be replaced.

Payment

Payment for the work of this section including the supply and erection of galvanized steel railing shall be at the lump sum price as noted in the Form of Tender.

SP 31. Steel Beam Guide Railing (SBGR)

This work shall consist of the supply of all labour, materials and equipment to construct the steel beam guide rail in accordance with the details shown on the drawing and as indicated herein. Conform to the requirements of OPSS.MUNI 721, OPSS.MUNI 1504 and OPSS.MUNI 1505.

General

Base metal of steel beam guide rail and terminal elements shall have a minimum yield strength of 345 MPa. All rail elements shall be galvanized after fabrication to CSA G164M. All bolts, nuts and washers shall conform to ASTM A307, and shall be hot dip galvanized to CSA G164M.

Structure assemblies including bottom channel and termination shall be per OPSD 912.430, and shall include embedded anchorage plates per OPSD 3419.100.
Galvanized components shall be uniform and consistent in appearance, texture, finish, and colour, to the satisfaction of the Owner. Components that are unsatisfactory will not be accepted by the Owner.

If spelter coating has been damaged, recoating of the damaged portion shall be at the sole discretion of the Owner.

Erection

Erect railing elements in accordance with OPSD 912.130 and attach SBGR to structure as per OPSD 912.430 complete. **SBGR beams shall fit flush to the structure surface at the structure connection assemblies.**

Attach railing elements to posts with all new hardware including all new bolts, nuts and washers including new post bolt, nut and washer.

Damaged components shall be replaced.

Payment

Payment for supply and erection of steel beam guide rail shall be at the unit price per metre as stated on the Form of Tender.

Payment for supply and erection of steel beam guide rail structure assemblies shall be at the unit price per structure connection as stated on the Form of Tender.

SP 32. Steel Beam Guide Rail End Treatments

End treatments and energy attenuators shall be supplied and installed in accordance with OPSS 721 and 732, and OPSD 922.181, 912.235 and

912.531.

All components shall be galvanized in accordance with CSA G164-92M (excluding locknuts). Locknuts shall be zinc-plated according to ASTM-B695. All galvanizing shall be done after fabrication. Store, handle and erect railing so as to minimize damage to the spelter coating.

Galvanized components shall be uniform and consistent in appearance, texture, finish, and colour, to the satisfaction of the Owner. Components that are unsatisfactory will not be accepted by the Owner.

For the purpose of measurement all scratches shall be considered to be a minimum of 10mm in width. Notwithstanding the area determination, any component that exhibits corrosion or the finish is damaged to base metal, shall be removed and recoated at the discretion of the Contract Administrator.

If spelter coating has been damaged, recoating of the damaged portion shall be at the discretion of the Contract Administrator.

Payment for the work shall be at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the work.

SP 33. Rip Rap, River Stone, and Geotextile

This work shall consist of the supply of all labour, materials and equipment necessary for the installation of rip rap and river rock for slope and bank protection as shown on the drawings. This work shall conform to OPSS.MUNI 182, OPSS 511, OPSS 512 and OPSS.MUNI 1004.

General

Rip rap and river rock shall be well graded in sizes ranging from 150mm to 450mm. Rip rap rock shall be crushed and angular in shape.

Geotextile shall conform to OPSS 1860 and shall be free of tears. Only Class 2, non-woven geotextile shall be used. Granular materials shall conform to OPSS 1001, and OPSS.MUNI 1010.

Grading and excavation for rip rap shall be carried out to such lines and grades as specified in the contract or as directed by the Contract Administrator.

Excess material gained from the works shall become the property of the Contractor and the Contractor shall remove and dispose of this material at no additional cost to the County.

Installation

Place rip rap on a stable slope. River rock is to be placed as slope protection below the waterline as required. Place rip rap commencing at the bottom of the slope and progress toward the top of the slope. Place larger pieces of rip rap in the bottom courses. Smaller pieces shall be used to fill voids. Place in a random but stable pattern. Where rip rap is placed on a geotextile, the placing operation shall be done in such a manner that there is no tearing or damage to the geotextile.

Geotextile shall be placed in a manner so that it is free of folds, tears and wrinkles and as shown in the contract. All seams shall be overlapped a minimum of 500mm and pinned to prevent sliding during installation. On slopes, the upper portion of the geotextile shall be fixed to prevent sliding during installation. The placement operation shall be such that the geotextile shall not be exposed to daylight for more than 30 days.

Payment

Payment for the work shall be at the contract price as stated in the Form of Tender for all labour, materials, and equipment required to perform the work.

SP 34. Topsoil, Seed and Mulch

This work shall consist of the supply of all labour, materials and equipment necessary for imported topsoil, seed, and mulch of areas shown on drawings and disturbed by construction as directed by the Contract Administrator and if required for restoration.

Work shall conform to OPSS 802 and OPSS 804. Special notice and reference is made to the sections of the OPSS 804.08 Quality Assurance.

Areas where the seed fails to grow shall be re-seeded at no additional cost.

The grass shall have a warranty maintenance period of one (1) year after installation.

Materials

Imported topsoil shall be fertile loamy material free from roots, vegetation or other debris. Topsoil shall not contain any clods over 50mm in greatest diameter and shall be free of the seeds of noxious weeds.

Grass seed shall be Ontario Native Roadside Mix for Seed Zone 37 or equivalent as approved by the local conservation authority. Refer to Appendix D.

Fertilizer shall be standard 8-32-16 analyses in granular form. Emulsified asphalt shall conform to the requirements for straw mulch adhesive in accordance with OPSS 1103.

Hydraulic mulch shall be Type "C" in conformance with OPSS 804.05.03.04

Installation

Supply and place imported topsoil to cover area to be seeded and mulched. Spread imported topsoil evenly over area to be seeded. Place topsoil to a minimum depth of 100mm. Fine grade surface by hand raking. Remove all stones and lumps.

Rates of application per 10,000 m2 of area to be seeded and mulched shall be as follows:

- Primary Seed 50 kg
- Fertilizer (8-32-16) 350 kg
- Hydraulic Mulch Type "C" 2000 kg
- Water 42,700 litres

Materials shall be mixed thoroughly into a homogeneous water slurry and shall be uniformly distributed over the area via a hydraulic seeder/mulcher.

Payment

Payment for topsoiling, seeding, and mulching shall be at the unit price as shown on the Form of Tender. Re-application of material on areas that fail the performance measures listed in OPSS 804 shall be at the Contractor's expense. **Payment shall not be made on this item until the material has passed the 60 days inspection.**

SP 35. Restoration

All materials and workmanship used in the work of this Section shall conform to the applicable Sections of these Documents and the applicable Sections of the Ontario Provincial Standard Specifications.

Unless otherwise indicated elsewhere in these documents all surfaces disturbed as a result of the construction of the works shall be restored to conditions equal to or better than existed prior to the work. The provisions of OPSS.MUNI 492, OPSS 802, and OPSS.MUNI 804 shall apply except:

Asphalt Surfaces

Where the new work abuts existing pavement the asphalt surface shall be restored by neatly cutting back the edges of the existing pavement to a straight line at least 300mm back from the edge of the excavation, removing and disposing of all pavement cut, coating the edges with tack coat and restoring the pavement to the thickness to match existing.

Gravel Surfaced Areas

Unless otherwise indicated, restore gravel surfaced areas with 300mm Granular "B" and 150mm thickness of Granular "A".

Grassed Areas

Unless otherwise indicated grassed areas shall be restored with 100 mm of topsoil and seed and mulch.

Payment

Payment for the supply and placing of Granular for restorations shall be at the contract price as stated in the Form of Tender for all labour,

materials, and equipment required to perform the work.

Payment for the supply and placing of asphalt pavement for roadway restoration shall be at the contract price as stated in the Form of Tender for all labour, materials, and equipment required to perform the work.

Payment for the supply and placing of topsoil seed and mulch for restoration of grassed areas shall be at the contract price as stated in the Form of Tender for all labour, materials, and equipment required to perform the work. The grass shall have a warranty maintenance period of one (1) year after installation.

Restorations for areas damaged by the Contractor that are, in the opinion of the Owner, due to negligence, poor workmanship, or are excessive beyond what is considered reasonable for this project will be done at the sole expense of the Contractor.

SP 36. Pavement Markings

This work shall consist of the supply of all labour, materials and equipment necessary for installing pavement markings for restoration. Construction, equipment, application, and materials shall conform to OPSS 710.

General

The Contractor shall install pavement markings conforming to the MUTCD and the manufacturer's recommendations. The work of pavement marking shall include:

- providing samples of materials for testing for conformity to the appropriate material specification;
- surface preparation;
- pavement marking obliterating (if applicable);
- premarking;
- application of permanent pavement markings.

At tie-in to existing pavement markings, lines shall be obliterated and surfaces prepared to the extents required to install a uniform and transparent transition to the new pavement markings.

Installation

Pavement markings shall not be installed until pre-marking/layout has been approved by the Contract Administrator.

Quality Assurance

Special notice and reference is made to the sections of the OPSS 710.08 Quality Assurance. Any line markings deemed unacceptable shall be removed and reinstalled at no cost to the County.

Payment

Payment for the work shall be at the contract prices as stated in the Form of Tender for all labour, materials, and equipment required to perform the work.

SP 37. Meetings

The Project Manager, Project Superintendent, and Site Foreman of the Contractor shall attend all meetings as requested.

A pre-construction meeting shall be held at the office of the County prior to the commencement of the work.

Site meetings shall be held every two weeks unless otherwise arranged during the progress of the work. Meetings shall be held on-site, or any other suitable location as agreed upon by the Owner, the Contract Administrator, and the Contractor.

The Contract Administrator will record and distribute typed meeting minutes based on discussions during each site meeting. Once distributed, the Contractor and the County shall respond with any revisions, additions, deletions, or clarifications requested. Any modifications done to the meeting minutes will be clearly identified and recorded on a revised document and distributed to all parties.

SP 38. Weighing Devices – Limits of Error

Section 102.03 of OPSS 102 is amended by the addition of the following:

i. Limits of Error: The In-Service Limits of Error contained in the Government of Canada Weights and Measures Act.

Section 102.08.01 of OPSS 102 is deleted and replaced with the following:

i. Haldimand County reserves the right to check the accuracy of devices used to measure material for payment by mass.

ii. Where a device is found to be in error in excess of the Limits of Error but less than three times the Limits of Error, Haldimand County will accept material measures for payment by the device for a period of 48 hours from the time the Contractor is notified in writing that the error exceeds the Limits of Error.

iii. Where a device is found to be in error in excess of three times the Limits of Error, the County would immediately cease to accept material measured for payment by the device.

SP 39. General Contingencies and Allowances

All bidders are to include in their tender submission, the lump sum amounts indicated for contingencies and allowances as shown in the Schedule of Items and Prices. It is understood and agreed by the Contractor that such contingencies and allowances are merely for the convenience of accounting by the Owner, and the Contractor is not entitled to payment thereof except for additional work carried out as explicitly directed by the Owner and/or the Consultant in writing in accordance with the contract documents.

END SECTION G: SPECIAL PROVISIONS – CONTRACT

APPENDIX A

Detailed Condition Survey Report



BRIDGE CHECK CANADA

Your Bridge & Concrete Inspection Specialists

DETAILED CONDITION SURVEY REPORT (DRAFT)

Site No. 980305, Dennis Bridge
Haldimand County, ON

Prepared for:
G. Douglas Vallee Limited /
Haldimand County

BCC Project No.: BCC17018
Report Date: September 26, 2017



Bridge Check Canada Ltd.
200 Viceroy Road, Unit 4, Vaughan, ON L4K 3N8
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Appendix B Survey Equipment and Calibration Procedures
Appendix C Core Photographs and Sketches
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No. 5 Surface Deterioration of Abutments, Wingwalls, Piers and Girders

Structure Identification Sheet

200 Viceroy Road, Unit 4, Vaughan, ON L4K 3N8
www.bridgecheckcanada.com
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info@bridgecheckcanada.com

STRUCTURE IDENTIFICATION SHEET

GENERAL INFORMATION

STRUCTURE NAME	***Dennis Bridge***		
SITE NUMBER	980305	**DISTRICT NUMBER**	N/A
HIGHWAY	**above** Rainham Road	**Below**	
TYPE OF STRUCTURE	Reinforced cast-in-place concrete slab over steel and concrete "I" girders		
NUMBER OF SPANS	3	**SPAN LENGTHS**	9.65, 21.50 & 9.65m
ROADWAY WIDTH	8.92m	**YEAR BUILT**	1965
DIRECTION OF STRUCTURE	East to West		
SEQUENCE NUMBER	N/A	**TOWNSHIP NUMBER**	N/A
LHRS NUMBER	N/A	**MUNICIPAL BRIDGE NUMBER**	N/A
LOCATION	1.4km west of Cheapside Road	**JURISDICTION**	Haldimand County
INSPECTOR'S NAME	Alireza Keramati, P.Eng.		
PARTY MEMBERS	Mohammad Abdollahi, Faraz Masoumi, Jonathan Caceres		
DATE OF INSPECTION	July 10 (deck) & July 16 (sub), 2017		
TEMPERATURE	22 & 23 °C	**WEATHER**	sunny
MTO REGION	southwestern	**AADT**	1900
DECK RIDING SURFACE	Asphalt with waterproofing		
YEAR LAST REHABILITATED	1997		

ENGINEER'S STAMP

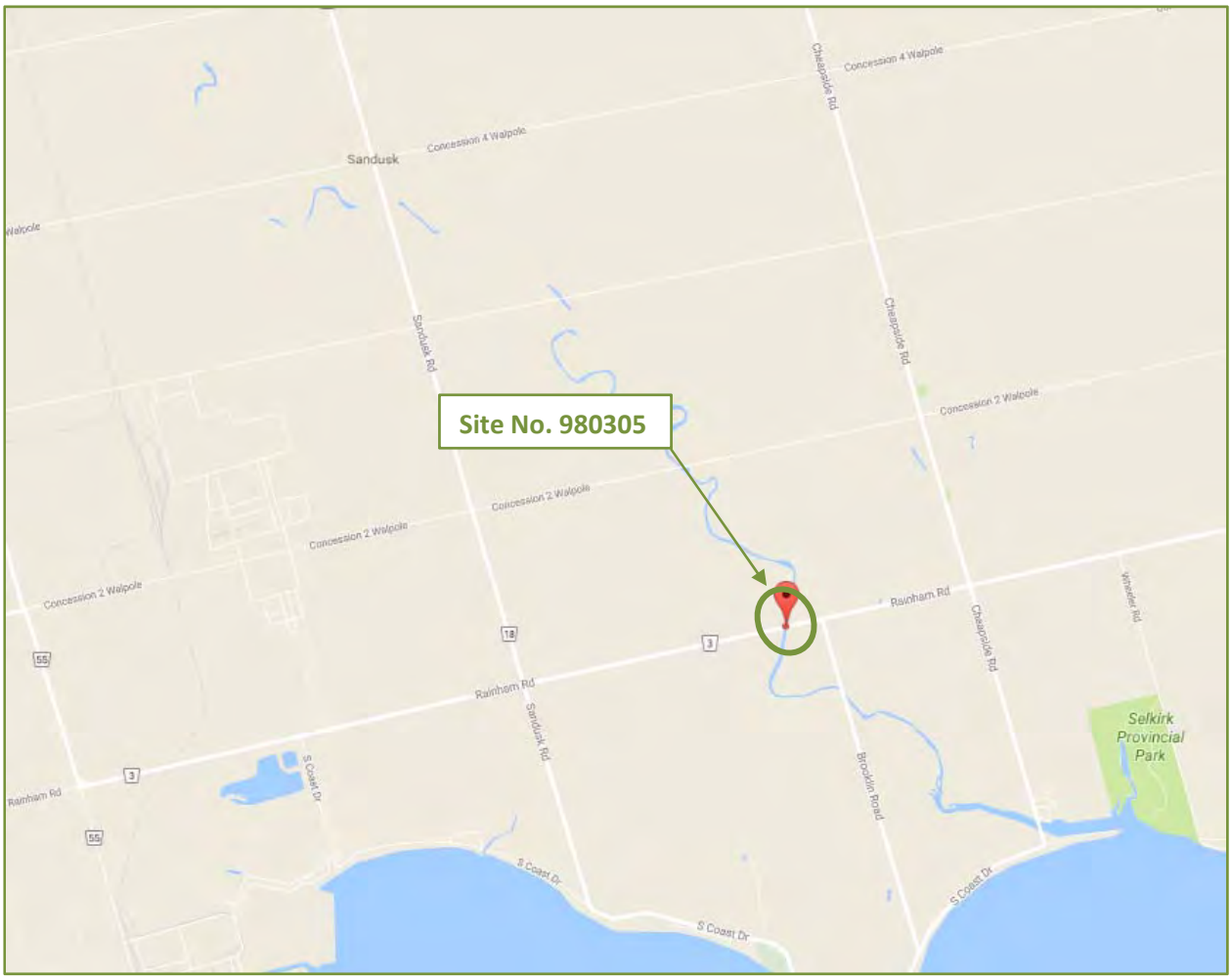


Key Plan

200 Viceroy Road, Unit 4, Vaughan, ON L4K 3N8
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KEY PLAN

Site No. 980305, Dennis Bridge
Haldimand County, ON





Summary of Significant Findings

SUMMARY OF SIGNIFICANT FINDINGS

Site No. 980305, Dennis Bridge, Rainham, Haldimand County, Ontario

1.0 INTRODUCTION

Bridge Check Canada Ltd. was retained by G. Douglas Vallee Ltd. to carry out a detailed bridge condition survey for a total of six structures in Haldimand County under assignment PW ES 17-060. This report presents Bridge Check Canada's findings, through the field investigations and laboratory testing, for Dennis Bridge (Site No. 980305). The site is located on Rainham Road, 0.3 km west of Booklin Road in Rainham, Haldimand County, ON. First time field investigations were carried out on July 10, 2017 (deck inspection) and July 16, 2017 (substructure inspection).

The site, constructed in 1965, is a three-span cast-in-place concrete slab over steel and concrete I girders, overlain with asphalt and carries one traffic lane per direction of Rainham Road.

The total span length of the bridge is 40.80 m and the roadway width is 8.92 m. The structure has an east-west orientation. Outer limits of the structure have concrete curbs and concrete handrail system. Photo P1 shows a view of the north elevation of the site.



North Elevation of Site No. 980305, Dennis Bridge, Rainham

The bridge was rehabilitated in 1997 details of which are not available. The rehabilitation work was likely to include a concrete overlay as review of the concrete cores revealed presence of a concrete overlay.

2.0 METHODOLOGY

In general, the procedures followed to conduct the condition survey and delamination survey were those defined in Part 1 of the MTO Structure Rehabilitation Manual (2007). This assignment involved the observation and recording of surface defects, delamination detection, grid layouts (1.5 m x 1.5 m), concrete cores (100 mm ø), sawn asphalt samples, corrosion potential survey, and physical testing of the concrete cores.

The delaminations in the concrete were detected by striking the surface with a heavy hammer and noting the type of sound being emitted. It should be mentioned that, while this method is quite reliable, it may not detect delaminations at a depth greater than 100 mm. The hammer sounding method was used for all accessible vertical and overhead surfaces. The areas and locations of patches, spalls, delaminations, exposed reinforcement, honey-combing, wet areas, scaling and other observed defects were recorded.

A corrosion potential survey was conducted for the asphalt covered bridge deck, curbs, and handrail system. The survey was performed in accordance with the requirements of ASTM C876 and the MTO Structure Rehabilitation Manual. A positive ground connection was made directly to the reinforcing steel, at the locations shown on the accompanying drawings.

Fifteen (15) cores (14 cores in deck and one core in the east approach) and 12 sawn asphalt samples were extracted from this structure, in compliance with the requirements for selecting cores and sawn asphalt samples from deteriorated and sound areas. The inside of the coreholes were examined carefully for cracks and the condition of the concrete. The exposed surface of the concrete at the sawn asphalt samples was carefully examined for evidence of deterioration. All the test holes were reinstated to their original condition using MTO-approved products.

Enclosed with this report are detailed condition survey summary sheets, survey equipment and calibration procedures, core photos/sketches, core logs, sawn asphalt sample photos, sawn asphalt sample logs, site photos, laboratory test results, and drawings.

3.0 BRIDGE STRUCTURE

3.1 Asphalt Covered Deck

The width of the asphalt covered bridge deck at abutments is 8.92 m, with a total surveyed area of 363.94 m^2. The condition of the asphalt wearing surface on the bridge deck was identified through visual field observations and review of cores and sawn asphalt samples. Drawing 1 shows the deterioration as well as the location of cores and sawn asphalt samples. The general pavement surface condition is shown in Photos P2 to P6. The asphalt wearing surface on the concrete deck was generally in fair condition with unsealed transverse cracks (52.0 m), longitudinal cracks (113.0 m), and random cracks (54.0 m). The total asphalt thickness, measured in the drilled holes, coreholes, and sawn asphalt samples, varied from 70 mm to 100 mm with an average thickness of 81 mm (refer to Drawing 2).

Asphalt samples were tested for asbestos content. The testing was conducted according to US EPA 600/R-93/116 test method using Polarized Light Microscopy. Results indicated that the asphalt samples are not contaminated with asbestos.

3.2 Waterproofing

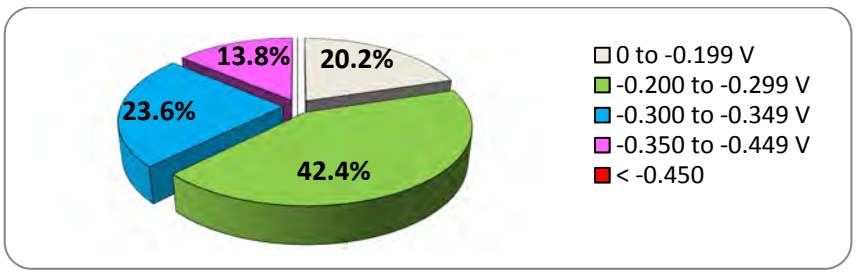
A hot rubberized asphalt waterproofing system with protection board was encountered underneath the asphalt on deck. The thickness of the waterproofing membrane varied from 6 mm to 8 mm with an average thickness of 7 mm. The condition of the waterproofing membrane was found to be good. The bond of waterproofing to concrete was found to be fair to good.

3.3 Concrete Deck

The concrete deck consists of a three-span cast-in-place concrete slab over steel and concrete I girders, supported by abutments and piers. The condition of the concrete deck was observed at 14 core locations and 12 sawn asphalt sample locations. The inside of the coreholes and the exposed concrete surface at the sawn asphalt sample locations were examined carefully for cracks and other defects. Photos P121 to P126 show the inside of the coreholes. A review of the concrete cores revealed spalling in core C3 and debonding of the overlay in core C15. Visual review of the exposed concrete surface at the sawn asphalt samples revealed cracking in SS3 and SS6. Refer to the core and sawn asphalt sample logs and photos.

Full depth core C15 identified a 235 mm thickness for deck slab at this corehole location. The concrete overlay range in thickness from 65 mm to 100 mm. The concrete cover to the upper rebar layer measured in the cores and sawn asphalt samples ranged from 86 to 138 mm with an average cover of 109 mm. Light rusting of the reinforcement was found in cores C2, C8, C9, C10, and C14. Refer to the core logs and photos.

Corrosion potential values obtained from the half-cell test carried out on the asphalt covered deck ranged from –0.129 V to –0.430 V with an average value of –0.272 V. The half-cell survey indicated that 20.2% of the deck area likely had no corrosion activity, with corrosion potential values between 0.000 V and -0.199 V. The half-cell survey indicated uncertain low corrosion activity for 67.0% (42.4%+23.6%) of the deck area, with values ranging from -0.200 V to -0.349 V. Probable active corrosion was detected for 13.8% (13.8%+0.0%) of the deck area with corrosion potential values more negative than -0.350 V. Drawing 3 shows the corrosion potential readings in deck. Active corrosion was observed near abutment joints.



Corrosion potential distribution in deck

Cores C6 and C9 were tested for compressive strength of the hardened concrete in accordance with CSA A23.2-14-14C. The compressive strength of the hardened concrete for these cores was found to be 39.3 MPa and 56.9 MPa, respectively.

The chloride ion content was determined for four cores using MTO LS-417 "Method of Test for Determination of Total Chloride Ion in Concrete – Acid Soluble". These core samples were located at areas prone to salt exposure (e.g. high corrosion potential areas, along construction joints, low points of the deck, asphalt cracks). In addition, samples from other moderately exposed areas were also taken. The chloride ion content values, at the average concrete cover or at rebar level are summarized below.

Core No.	C4 (Parent)	C8 (Parent)	C11 (Parent)	C14 (Parent)
Corrected Chloride Content (%)*	0.002	0.062	0.009	0.002
Corrosion Potential (V)	-0.167	-0.426	-0.278	-0.398

* Background chloride ion content was estimated to be 0.021 for both the parent concrete and the overlay.

The chloride threshold value necessary to depassivate embedded steel and to allow the onset of corrosion (in the presence of oxygen and moisture) is generally taken as 0.025% by mass of concrete. The background chloride content is the lowest chloride content value for all of the cores tested for chloride content. The "background" chlorides do not contribute to corrosion, and thus the results are corrected for the background chloride content. The corrected chloride content, at the rebar level, was above the chloride threshold level of 0.025% in core C8. Overall, the results indicate that chloride contamination has extended to the upper rebar level in limited areas of deck.

Based on the concrete removal policy outlined in the Structure Rehabilitation Manual, the following comments can be made:

- Since greater than 10% of the deck area is more negative than -0.350 V, the average chloride content at the reinforcing level is calculated using only the cores with corrosion potential more negative than -0.350 V. Therefore, the average adjusted chloride content at the reinforcing steel level is 0.032%.
- Based on the above, since the average adjusted chloride content at the top reinforcement level is less than 0.05% by mass of concrete, concrete deck removal is recommended to include delaminated areas only.

Cores C5 and C7 were tested to determine the air void system of the hardened concrete in accordance with ASTM C457 using the Modified Point Count Method. Test results are summarized below:

Core No.	Air Content (%)	Specific Surface (mm^{-1})	Spacing Factor (mm)
C5	7.9	42.90	0.090
C4	7.3	36.20	0.092

Concrete is normally considered to be properly air entrained if the air content exceeds 3.0%, the specific surface exceeds 24 mm^{-1}, and the average spacing factor is less than 0.200 mm. Therefore, the air void system for both tested cores is considered air entrained.

3.4 Deck Soffit and Girders

Inspection of the deck soffit and girders was carried out visually. The deterioration is shown on Drawings 4 and 5, and in Photos P7 to P37.

The bridge deck soffit, with a total surveyed area of 478.85 m^2, was in fair-to-poor condition with clean/stained medium width cracks (143.0 m), delaminations (10.10 m^2), spalls (7.10 m^2), patches (2.61 m^2), light scaling (2.83 m^2), and wet areas (20.70 m^2). Medium to severe corrosion was observed on deck drain pipes. Severe spalling and exposed reinforcement were observed on soffit fascia.

The concrete I girders are located between east and west piers. The deterioration on concrete girders is shown on Drawing 5. The concrete girders, with a total surveyed area of 285.09 m^2 were in good condition with clean medium width cracks (1.0 m).

The steel I girders are located between abutments and piers. The steel girders and diaphragms were generally in fair condition with light to medium corrosion.

Three paint samples, on the bottom flange of steel I girders at east abutment, were tested for Lead content. The testing was analysis by ASTM D3335-85a by AAS. Results (% by Weight) for three samples tested are reported as 0.26, 0.053 and 0.32.

3.5 Bridge Approaches

Photos P38 and P39 show the general condition of the bridge approaches. The asphalt on the approaches was in fair-to-good condition with unsealed cracks. Core C1 was taken from the east approach. Photo P120 shows the inside of corehole C1. Granular materials were encountered beneath the asphalt in core C1. Asphalt thickness was 190 mm in core C1.

3.6 Deck Drainage

A total of 14 drain pipes were located on the bridge, each having a 210 mm diametre and 1,150 mm length (Photos P40 to P53). No catch basins were observed in the vicinity of the bridge structure.

3.7 Deck Joints

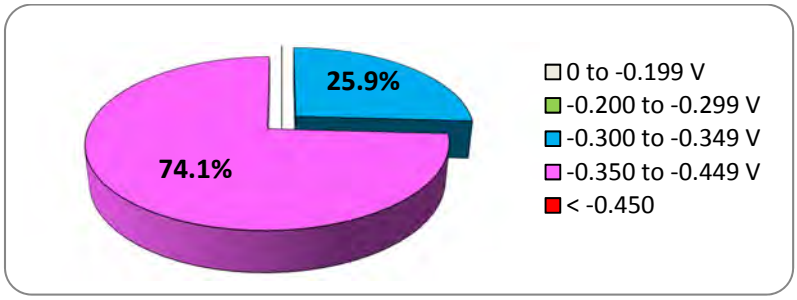
The deck joints are paved over as shown in Photos P54 to P57.

3.8 Concrete Curbs

The concrete curbs, with a total surveyed area of 92.50 m^2, were in poor condition with clean medium width cracks (17.0 m), delaminations (9.98 m^2), spalls (3.20 m^2), patches (0.30 m^2), and light scaling (8.30 m^2). Exposed corroded rebar was observed in the spalled areas. The surface deterioration is shown on

Drawing 1 and in Photos P58 to P70. Concrete cover ranged from 40 mm to 75 mm with an average cover of 56 mm, as shown on Drawing 2.

Corrosion potential values obtained from the half-cell test carried out on the concrete curbs ranged from –0.302 V to –0.436 V with an average value of –0.374 V. The half-cell survey indicated uncertain low corrosion activity for 25.9% (0.0%+25.9%) of the curb area, with values ranging from -0.200 V to -0.349 V. Probable active corrosion was detected for 74.1% (74.1%+0.0%) of the curb area with corrosion potential values more negative than -0.350 V. Drawing 3 shows the corrosion potential readings in the curbs.

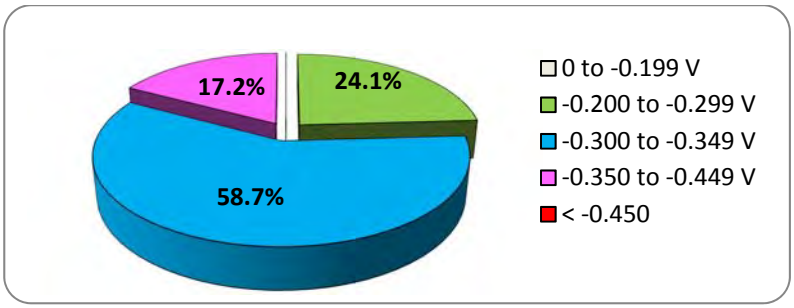


Corrosion potential distribution in the concrete curbs

3.9 Concrete Handrails

The concrete handrail system, with a total surveyed area of 54.40 m^2, was in fair-to-poor condition with clean medium width cracks (20.0 m), delaminations (3.72 m^2), spalls (0.65 m^2), light scaling (13.60 m^2), and medium scaling (1.41 m^2). The surface deterioration is shown on Drawing 1 and in Photos P58 to P68. Spalls and delaminations were mainly observed on the north handrail. Medium scaling was observed on the south handrail. Concrete cover ranged from 36 mm to 79 mm with an average cover of 63 mm, as shown on Drawing 2.

Corrosion potential values obtained from the half-cell test carried out on the concrete handrail system ranged from –0.241 V to –0.413 V with an average value of –0.320 V. The half-cell survey indicated uncertain low corrosion activity for 82.8% (24.1%+58.7%) of the handrail area, with values ranging from -0.200 V to -0.349 V. Probable active corrosion was detected for 17.2% (17.2%+0.0%) of the handrail area with corrosion potential values more negative than -0.350 V. Drawing 3 shows the corrosion potential readings in the concrete handrails.



Corrosion potential distribution in the concrete handrails

3.10 Concrete End Posts and Steel Guiderails

The concrete end posts were generally in fair-to-good condition with light-to-medium scaling, cracks, and delaminations (Photos P71 to P74). The steel beam guiderails were in good condition with light corrosion (Photos P75 to P78).

4.0 SUBSTRUCTURE COMPONENTS

The abutments, wingwalls, and piers were inspected and hammer sounded, where accessible, to check for delaminations. Field measurements are presented in the field summary sheets.

4.1 Abutment Walls

The exposed surfaces of the abutment walls were inspected and sounded to check for delaminations, where accessible. The total surveyed area for the east and west abutments were 27.80 m^2 and 28.70 m^2, respectively. The deterioration is shown on Drawing 5. General views of the abutments and bearings are shown in Photos P79 to P100. The abutment walls were found to be in good condition. The field investigation of the east abutment wall revealed clean medium width cracks (16.0 m), light scaling (2.10 m^2), and wet areas (2.50 m^2). The field investigation of the west abutment wall revealed clean medium width cracks (22.0 m), light scaling (1.66 m^2), and wet areas (0.47 m^2).

The steel bearings were in fair condition with medium corrosion (Photos P83 to P89 and P94 to P100).

4.2 Ballast Walls

The total surveyed area for the east and west ballast walls were 9.27 m^2 each. The deterioration is shown on Drawing 5. The ballast walls were generally in good condition. The field investigation of the east ballast did not reveal any visible defects. The field investigation of the west ballast wall revealed clean medium width cracks (1.0 m), delaminations (0.10 m^2), and wet areas (0.55 m^2).

4.3 Bearing Seats

The total surveyed area for the east and west bearing seats were 5.27 m^2 each. The deterioration is shown on Drawing 5. The bearing seats were generally in fair-to-good condition. The field investigation of the east bearing seat revealed clean medium width cracks (3.0 m) and wet areas (0.30 m^2). The field investigation of the west bearing seat revealed clean medium width cracks (3.0 m).

4.4 Wingwalls

The exposed areas of the bridge wingwalls were inspected visually and hammer sounded, where accessible. The total surveyed area for the wingwalls was 20.95 m^2. The wingwalls were generally in fair-to-good condition with clean/stained medium width cracks (7.0 m), delaminations (0.45 m^2), spalls (0.31 m^2), and wet areas (2.42 m^2). The deterioration is shown on Drawing 5 and in Photos P101 to P105.

4.5 Piers

The total surveyed area for the bridge piers was 178.00 m^2. The piers were generally in fair-to-good condition with clean/stained medium width cracks (14.0 m), delaminations (3.20 m^2), spalls (0.25 m^2), light scaling (5.71 m^2), and wet areas (17.70 m^2). The deterioration is shown on Drawing 5 and in Photos P106 to P114.

4.6 Slopes

The rip rap slope protection is in good condition as shown in Photos P115 and P116. The embankment slopes are in good condition (Photos P117 to P119).

5.0 Recommendations

The bridge was rehabilitated in 1997 details of which are not available. The rehabilitation work was likely to include a concrete overlay as review of the concrete cores revealed presence of a concrete overlay.

The structure was found to be in fair condition. The concrete deck had low to high corrosion potential. The corrected chloride content, at the rebar level, was above the chloride threshold level of 0.025% in core C8. Concrete deck removal is recommended to include delaminated areas only. Deteriorations were mostly found at the following locations: cores C3 and C15 and asphalt sawn sample SS3 and SS6.

The asphalt wearing surface on the concrete deck was generally in fair condition. The asphalt riding surface requires maintenance to repair the deficiencies; to minimize ingress of chloride ions into the deck concrete.

The bridge deck soffit was in fair-to-poor condition. Severe spalling and exposed reinforcement were observed on soffit fascia. The deteriorated, delaminated and spalled areas of the soffit of the deck should be repaired within 1-2 years.

Medium to severe corrosion was observed on deck drain pipes. Repair and/or replacement should be considered.

The steel girders and diaphragms were generally in fair condition with light to medium corrosion. New paint should be considered.

The concrete curbs and handrail system, were in fair-to-poor condition. Replacement should be considered.

The deteriorated, delaminated and spalled areas of the abutments, piers and wingwalls should be repaired in 3 to 5 years as part of the routine maintenance.

Consideration should be given to the utility duct supports at south fascia.

Routine maintenance should be considered for the structure.

Appendix A:

Detailed Condition Survey Summary Sheets

Asphalt Covered Deck, Exposed Concrete Components, Expansion Joint, Drainage

ASPHALT COVERED DECK

DECK RIDING SURFACE

Site No. 980305

1. Dimensions and Area of Survey

Width between E abutment curbs	8.92 m	Width between W abutment curbs	8.92 m
Length between abutment joints	40.80 m	Area of deck riding surface	363.94 m²

Remarks

Deck dimensions were taken from the structural drawings

2. Asphalt Surface Cracks

Orientation	Unsealed	Sealed	
Transverse	52.0	0.0	**m**
Longitudinal	113.0	0.0	**m**
Random	54.0	0.0	**m**

* Asphalt potholes/patches = 0.00 m²
* Asphalt Alligator Cracks = 0.00 m²
* Asphalt Ravelling = 0.00 m²

3. Asphalt Depth

Remarks

Condition *	Depth			
	Min	Max	Avg	
F	70	100	81	**mm**

* G – Good, F – Fair, P – Poor, V - Variable Good to Poor

Remarks

4. Waterproofing

Type	Condition *	Conc. Bond *	Thickness (mm) **			
			Min	Max	Avg	
Hot rubberized asphalt with protection board	G	F to G	6	8	7	**mm**

* G – Good, F – Fair, P – Poor, V - Variable Good to Poor

** Report only thickness of waterproofing membrane but note presence of protection board

Site No. 980305

5. Concrete Cover – Cores and Sawn Samples

Remarks

Minimum	Maximum	Average	
86	138	109	mm

Note: Only include covers for upper layer of rebars.

6. Corrosion Activity

Remarks

Minimum	Maximum	Average	
-0.129	-0.430	-0.272	V

0 to -0.20	-0.20 to -0.30	-0.30 to -0.35	-0.35 to -0.45	< -0.45	
73.5	154.3	85.9	50.2	0.0	m^2
20.2	42.4	23.6	13.8	0.0	%

Remarks

7. Defective Cores and Sawn Samples

Corrosion Activity (Volts)	Cores and Sawn Samples						
	Total in Each Area	Delaminated, Spalled, Severe Scaling and Disintegration *			Medium Scaling *		
		No.	m^2	%	No.	m^2	%
0 to -0.20	5	0	0.0	0.0	0	0.0	0.0
-0.20 to -0.30	11	1	14.0	3.9	0	0.0	0.0
-0.30 to -0.35	2	0	0.0	0.0	0	0.0	0.0
-0.35 to -0.45	8	1	6.3	1.7	0	0.0	0.0
<-0.45	0	0	0.0	0.0	0	0.0	0.0

* The percent calculation should be of the entire deck area investigated. The values obtained should be used with caution as large errors may occur when a small number of samples are used for the calculation or when the samples are not randomly distributed over the entire deck area.

Site No. 980305

8. Adjusted Chloride Content Profile

*Background (original concrete) chloride content = 0.021
*Background (overlay concrete) chloride content = 0.021

Corrosion Activity at Core Location		0 to -0.20	-0.20 to -0.35	≤-0.35
Chloride Content*	0-10 mm	0.013	0.012	0.009
	20-30 mm	0.011	0.007	0.007
	40-50 mm	0.010	0.002	0.004
	60-70 mm	0.008	0.000	0.006
	80-90 mm	0.005	0.004	0.041
	100-110 mm	0.002	0.009	0.032
	120-130 mm	-	0.005	0.019
	140-150 mm	-	0.003	0.000

Remarks

* Average chloride content as % chloride by weight of concrete after deducting background chlorides for all cores taken in each range of corrosion potential.

9. Chloride Content at Rebar Level

Core No.	C4	C8	C11	C14			
Chloride Content*	0.002	0.062	0.009	0.002			
Corrosion Potential	-0.167	-0.426	-0.278	-0.398			
Core No.							
Chloride Content*							
Corrosion Potential							
Core No.							
Chloride Content*							
Corrosion Potential							

* Chloride content as % chloride by weight of concrete after deducting background chlorides.

10. AC Resistance Test Data of Epoxy Coated Rebar

Measured AC Resistance between Connection #1 and #2						Calculated AC Resistance *
Connection #1	Connection #2					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

Remarks
Table # 10 is Not Applicable.

* See Appendix 1E for calculating AC resistance contributed by individual rebar.

Site No. 980305

Remarks
Table # 11 is Not Applicable.

11. IR Drop and Truce Half Cell Potential Measurements of Epoxy Coated Rebar

IR Drop Between Connection #1 and #2						True Half Cell Potential *
Connection #1 (positive)	Connection #2 (negative)					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* Half cell reading taken on the same rebar with the ground connection.

12. Concrete Air Entrainment

		Yes	No	Marginal
Concrete Air Entrained?				
	C5	X		
	C7	X		

13. Compressive Strength

Average Compressive Strength **48.1 MPa**

EXPOSED CONCRETE COMPONENTS (Exposed Deck, Deck Soffit, Curbs, Medians, Sidewalks, Barrier/Parapet Walls, etc.): Use separate form for each component

Site No: **980305**

Component Type & Location: Soffit and Fascia **OSIM Identifier: Decks**

1. Dimensions and Area

Width	11.00 m	Length	41.28 m	Height	0.30 m x 2
Diameter	-	Total Area Surveyed		478.85 m²	

Remarks
Dimensions were taken from the structural drawings & site measurements

2. Cracks (medium and wide)

Type		Transverse	Longitudinal	Other	Total	
Medium Width	Clean	21.0	2.0	59.0	143.0	m
	Stained	34.0	0.0	27.0		
Wide Width	Clean	0.0	0.0	0.0	0.0	m
	Stained	0.0	0.0	0.0		

3. Alkali Aggregate Reaction

Area of component with severe to very severe aggregate reaction 0.0 m²

4. Concrete Cover

Minimum	Maximum	Average	
-	-	-	mm

0 – 20 mm	-	40 – 60 mm	-	m^2
	-		-	%
20 – 40 mm	-	over 60 mm	-	m^2
	-		-	%

Remarks
Table # 4 is Not Applicable.

Site No: **980305**

Component Type & Location: Soffit and Fascia **OSIM Identifier: Decks**

5. Corrosion Activity

Remarks
Table # 5 is Not Applicable.

Minimum	Maximum	Average	
-	-	-	V

0 to -0.20	-0.20 to -0.30	-0.30 to -0.35	-0.35 to -0.45	< -0.45	
-	-	-	-	-	m^2
-	-	-	-	-	%

6. Delaminations and Spalls

Remarks

Defect Type	Delaminations	Spalls	Patches
Area (m^2)	10.10	7.10	2.61
Total Delaminations and Spalls		Total Delaminations and Spalls in Areas ≤-0.35 V	
17.20 m²	3.6 %	N/A	N/A

*Wet areas = 20.70 m²

7. Scaling

Remarks

Light	Medium	Severe to Very Severe	
2.83	0.00	0.00	m^2
0.6	0.0	0.0	%

8. Honeycombing

Total Area 0.00 m²

Site No: **980305**

Component Type & Location: Soffit and Fascia **OSIM Identifier: Decks**

Remarks
Table # 9 and 10 are Not Applicable.

9. Adjusted Chloride Content Profile

Corrosion Activity at Core Location (volts)		0 to -0.20	-0.20 to -0.35	≤ -0.35
Chloride Content*	0-10 mm	-	-	-
	20-30 mm	-	-	-
	40-50 mm	-	-	-
	60-70 mm	-	-	-
	80-90 mm	-	-	-
	100-110 mm	-	-	-

* Average chloride content as % chloride by weight of concrete after deducting background chlorides for all cores taken in each range of corrosion potential.

10. Chloride Content at Rebar Level

Core No.	-	-	-	-	-	-
Chloride Content*	-	-	-	-	-	-

* Chloride content as % chloride by weight of concrete after deducting background chlorides.

Remarks
Table # 11 is Not Applicable.

11. AC Resistance Test Data of Epoxy Coated Rebar

Measured AC Resistance between Connection #1 and #2						Calculated AC Resistance *
	Connection #2					
Connection #1	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* See Appendix 1E for calculating AC resistance contributed by individual rebar.

Site No: **980305**

Component Type & Location: Soffit and Fascia **OSIM Identifier: Decks**

Remarks
Table # 12 is Not Applicable.

12. IR Drop and Truce Half Cell Potential Measurements of Epoxy Coated Rebar

IR Drop Between Connection #1 and #2						True Half Cell Potential *
Connection #1 (positive)	Connection #2 (negative)					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* Half cell reading taken on the same rebar with the ground connection.

13. Concrete Air Entrainment

Concrete Air Entrained: not tested

14. Compressive Strength

Average Compressive Strength: not tested

EXPOSED CONCRETE COMPONENTS (Exposed Deck, Deck Soffit, Curbs, Medians, Sidewalks, Barrier/Parapet Walls, etc.): Use separate form for each component

Site No: **980305**

Component Type & Location: Beams **OSIM Identifier: Retaining Walls**

1. Dimensions and Area

Width	0.45 m	Length	21.50 m x 6	Height	0.88 m x 2
Diameter	-	Total Area Surveyed		285.09 m²	

Remarks

Dimensions were taken from the structural drawings & site measurements

2. Cracks (medium and wide)

Type		Vertical	Horizontal	Diagonal	Total	
Medium Width	Clean	0.0	0.0	1.0	1.0	m
	Stained	0.0	0.0	0.0		
Wide Width	Clean	0.0	0.0	0.0	0.0	m
	Stained	0.0	0.0	0.0		

3. Alkali Aggregate Reaction

Area of component with severe to very severe aggregate reaction 0.0 m²

4. Concrete Cover

Remarks

Table # 4 is Not Applicable.

Minimum	Maximum	Average	
-	-	-	mm

0 – 20 mm	-	40 – 60 mm	-	m^2
	-		-	%
20 – 40 mm	-	over 60 mm	-	m^2
	-		-	%

Site No: **980305**

Component Type & Location: Beams **OSIM Identifier: Retaining Walls**

5. Corrosion Activity

Remarks

Table # 5 is Not Applicable.

Minimum	Maximum	Average	
-	-	-	V

0 to -0.20	-0.20 to -0.30	-0.30 to -0.35	-0.35 to -0.45	< -0.45	
-	-	-	-	-	V
-	-	-	-	-	m^2
-	-	-	-	-	%

6. Delaminations and Spalls

Remarks

Defect Type	Delaminations	Spalls	Patches
Area (m^2)	0.00	0.00	0.00
Total Delaminations and Spalls		Total Delaminations and Spalls in Areas ≤-0.35 V	
0.00 m²	0.0 %	N/A	N/A

*Wet areas = 0.00 m²

7. Scaling

Remarks

Light	Medium	Severe to Very Severe	
0.00	0.00	0.00	m^2
0.0	0.0	0.0	%

8. Honeycombing

Total Area 0.00 m²

Site No: **980305**

Component Type & Location: Beams

OSIM Identifier: Retaining Walls

Remarks
Table # 9 and 10 are Not Applicable.

9. Adjusted Chloride Content Profile

Corrosion Activity at Core Location (volts)		0 to -0.20	-0.20 to -0.35	≤ -0.35
Chloride Content*	0-10 mm	-	-	-
	20-30 mm	-	-	-
	40-50 mm	-	-	-
	60-70 mm	-	-	-
	80-90 mm	-	-	-
	100-110 mm	-	-	-

* Average chloride content as % chloride by weight of concrete after deducting background chlorides for all cores taken in each range of corrosion potential.

10. Chloride Content at Rebar Level

Core No.	-	-	-	-	-	-
Chloride Content*	-	-	-	-	-	-

* Chloride content as % chloride by weight of concrete after deducting background chlorides.

Remarks
Table # 11 is Not Applicable.

11. AC Resistance Test Data of Epoxy Coated Rebar

Measured AC Resistance between Connection #1 and #2						Calculated AC Resistance *
	Connection #2					
Connection #1	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* See Appendix 1E for calculating AC resistance contributed by individual rebar.

Site No: **980305**

Component Type & Location: Beams

OSIM Identifier: Retaining Walls

Remarks
Table # 12 is Not Applicable.

12. IR Drop and Truce Half Cell Potential Measurements of Epoxy Coated Rebar

IR Drop Between Connection #1 and #2						True Half Cell Potential *
Connection #1 (positive)	Connection #2 (negative)					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* Half cell reading taken on the same rebar with the ground connection.

13. Concrete Air Entrainment

Concrete Air Entrained: not tested

14. Compressive Strength

Average Compressive Strength: not tested

DETAILED CONDITION SURVEY SUMMARY SHEET

EXPOSED CONCRETE COMPONENTS (Exposed Deck, Deck Soffit, Curbs, Medians, Sidewalks, Barrier/Parapet Walls, etc.): Use separate form for each component

Site No: **980305**

Component Type & Location: North & south Curbs **OSIM Identifier: Sidewalks/curbs**

1. Dimensions and Area

Width	0.88 m	Length	46.25 m x 2	Height	0.12 m
Diameter	-	Total Area Surveyed		92.50 m²	

Remarks

Dimensions were taken from the structural drawings & site measurements

2. Cracks (medium and wide)

Type		Transverse	Longitudinal	Other	Total	
Medium Width	**Clean**	5.0	6.0	6.0	17.0	**m**
	Stained	0.0	0.0	0.0		
Wide Width	**Clean**	0.0	0.0	0.0	0.0	**m**
	Stained	0.0	0.0	0.0		

3. Alkali Aggregate Reaction

Area of component with severe to very severe aggregate reaction 0.0 m²

4. Concrete Cover

Remarks

Minimum	Maximum	Average	
40	75	56	**mm**

0 – 20 mm	0.0	**40 – 60 mm**	67.8	m^2
	0.0		73.3	%
20 – 40 mm	0.0	**over 60 mm**	24.7	m^2
	0.0		26.7	%

Site No: 980305

Component Type & Location: North & south Curbs **OSIM Identifier: Sidewalks/curbs**

Remarks

5. Corrosion Activity

Minimum	Maximum	Average	
-0.302	-0.436	-0.374	V

0 to -0.20	-0.20 to -0.30	-0.30 to -0.35	-0.35 to -0.45	< -0.45	V
0.0	0.0	24.0	68.5	0.0	m^2
0.0	0.0	25.9	74.1	0.0	%

Remarks

6. Delaminations and Spalls

Defect Type	Delaminations	Spalls	Patches
Area (m^2)	9.98	3.20	0.30
Total Delaminations and Spalls		Total Delaminations and Spalls in Areas ≤-0.35 V	
13.18 m^2	14.2 %	12.2 m^2	13.2 %

*Wet areas = 0.00 m^2

7. Scaling

Remarks

Light	Medium	Severe to Very Severe	
8.30	0.00	0.00	m^2
9.0	0.0	0.0	%

8. Honeycombing

Total Area 0.00 m^2

Site No: **980305**

Component Type & Location: North & south Curbs **OSIM Identifier: Sidewalks/curbs**

Remarks
Table # 9 and 10 are Not Applicable.

9. Adjusted Chloride Content Profile

Corrosion Activity at Core Location (volts)		0 to -0.20	-0.20 to -0.35	≤ -0.35
Chloride Content*	0-10 mm	-	-	-
	20-30 mm	-	-	-
	40-50 mm	-	-	-
	60-70 mm	-	-	-
	80-90 mm	-	-	-
	100-110 mm	-	-	-

* Average chloride content as % chloride by weight of concrete after deducting background chlorides for all cores taken in each range of corrosion potential.

10. Chloride Content at Rebar Level

Core No.	-	-	-	-	-	-
Chloride Content*	-	-	-	-	-	-

* Chloride content as % chloride by weight of concrete after deducting background chlorides.

Remarks
Table # 11 is Not Applicable.

11. AC Resistance Test Data of Epoxy Coated Rebar

Measured AC Resistance between Connection #1 and #2						Calculated AC Resistance *
Connection #1	Connection #2					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* See Appendix 1E for calculating AC resistance contributed by individual rebar.

Site No: **980305**

Component Type & Location: North & south Curbs

OSIM Identifier: Sidewalks/curbs

Remarks
Table # 12 is Not Applicable.

12. IR Drop and Truce Half Cell Potential Measurements of Epoxy Coated Rebar

IR Drop Between Connection #1 and #2						True Half Cell Potential *
Connection #1 (positive)	Connection #2 (negative)					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* Half cell reading taken on the same rebar with the ground connection.

13. Concrete Air Entrainment

Concrete Air Entrained: not tested

14. Compressive Strength

Average Compressive Strength: not tested

DETAILED CONDITION SURVEY SUMMARY SHEET

EXPOSED CONCRETE COMPONENTS (Exposed Deck, Deck Soffit, Curbs, Medians, Sidewalks, Barrier/Parapet Walls, etc.): Use separate form for each component

Site No: **980305**

Component Type & Location: North & South Hndrails **OSIM Identifier: Barriers**

1. Dimensions and Area

Width	0.30 m	Length	46.25 m x 2	Height	-
Diameter	-	Total Area Surveyed		54.40 m²	

Remarks

Dimensions were taken from the structural drawings & site measurements

2. Cracks (medium and wide)

Type		Vertical	Horizontal	Diagonal	Total	
Medium Width	**Clean**	2.0	10.0	8.0	20.0	**m**
	Stained	0.0	0.0	0.0		
Wide Width	**Clean**	0.0	0.0	0.0	0.0	**m**
	Stained	0.0	0.0	0.0		

3. Alkali Aggregate Reaction

Area of component with severe to very severe aggregate reaction 0.0 m²

4. Concrete Cover

Remarks

Minimum	Maximum	Average	
36	79	63	**mm**

0 – 20 mm	0.0	**40 – 60 mm**	10.9	m^2
	0.0		20.0	%
20 – 40 mm	3.6	**over 60 mm**	39.9	m^2
	6.7		73.3	%

Site No: **980305**

Component Type & Location: North & South Hndrails **OSIM Identifier: Barriers**

Remarks

5. Corrosion Activity

Minimum	Maximum	Average	
-0.241	-0.413	-0.320	V

0 to -0.20	-0.20 to -0.30	-0.30 to -0.35	-0.35 to -0.45	< -0.45	V
0.0	13.1	31.9	9.4	0.0	m^2
0.0	24.1	58.7	17.2	0.0	%

6. Delaminations and Spalls

Remarks

Defect Type	Delaminations	Spalls	Patches
Area (m^2)	3.72	0.65	0.00
Total Delaminations and Spalls		Total Delaminations and Spalls in Areas ≤-0.35 V	
4.37 m²	8.0 %	0.6 m²	1.0 %

*Wet areas = 0.00 m²

7. Scaling

Remarks

Light	Medium	Severe to Very Severe	
13.60	1.41	0.00	m^2
25.0	2.6	0.0	%

8. Honeycombing

Total Area 0.00 m²

Site No: **980305**

Component Type & Location: North & South Hndrails **OSIM Identifier: Barriers**

Remarks
Table # 9 and 10 are Not Applicable.

9. Adjusted Chloride Content Profile

Corrosion Activity at Core Location (volts)		0 to -0.20	-0.20 to -0.35	≤ -0.35
Chloride Content*	0-10 mm	-	-	-
	20-30 mm	-	-	-
	40-50 mm	-	-	-
	60-70 mm	-	-	-
	80-90 mm	-	-	-
	100-110 mm	-	-	-

* Average chloride content as % chloride by weight of concrete after deducting background chlorides for all cores taken in each range of corrosion potential.

10. Chloride Content at Rebar Level

Core No.	-	-	-	-	-	-
Chloride Content*	-	-	-	-	-	-

* Chloride content as % chloride by weight of concrete after deducting background chlorides.

Remarks
Table # 11 is Not Applicable.

11. AC Resistance Test Data of Epoxy Coated Rebar

Measured AC Resistance between Connection #1 and #2						Calculated AC Resistance *
Connection #1	Connection #2					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* See Appendix 1E for calculating AC resistance contributed by individual rebar.

Site No: **980305**

Component Type & Location: North & South Hndrails **OSIM Identifier: Barriers**

Remarks
Table # 12 is Not Applicable.

12. IR Drop and Truce Half Cell Potential Measurements of Epoxy Coated Rebar

IR Drop Between Connection #1 and #2						True Half Cell Potential *
Connection #1 (positive)	Connection #2 (negative)					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* Half cell reading taken on the same rebar with the ground connection.

13. Concrete Air Entrainment

Concrete Air Entrained: not tested

14. Compressive Strength

Average Compressive Strength: not tested

EXPOSED CONCRETE COMPONENTS (Exposed Deck, Deck Soffit, Curbs, Medians, Sidewalks, Barrier/Parapet Walls, etc.): Use separate form for each component

Site No: **980305**

Component Type & Location: West Abutment Wall **OSIM Identifier: Abutments**

1. Dimensions and Area

Width	11.71 m	Length	-	Height	2.45 m
Diameter	-	Total Area Surveyed		28.70 m²	

Remarks
Dimensions were taken from the structural drawings & site measurements

2. Cracks (medium and wide)

Type		Vertical	Horizontal	Diagonal	Total	
Medium Width	Clean	14.0	0.0	8.0	22.0	m
	Stained	0.0	0.0	0.0		
Wide Width	Clean	0.0	0.0	0.0	0.0	m
	Stained	0.0	0.0	0.0		

3. Alkali Aggregate Reaction

Area of component with severe to very severe aggregate reaction 0.0 m²

4. Concrete Cover

Minimum	Maximum	Average	
-	-	-	mm

0 – 20 mm	-	40 – 60 mm	-	m^2
	-		-	%
20 – 40 mm	-	over 60 mm	-	m^2
	-		-	%

Remarks
Table # 4 is Not Applicable.

Site No: **980305**

Component Type & Location: West Abutment Wall **OSIM Identifier: Abutments**

Remarks
Table # 5 is Not Applicable.

5. Corrosion Activity

Minimum	Maximum	Average	
-	-	-	V

0 to -0.20	-0.20 to -0.30	-0.30 to -0.35	-0.35 to -0.45	< -0.45	
					V
-	-	-	-	-	m^2
-	-	-	-	-	%

6. Delaminations and Spalls

Remarks

Defect Type	Delaminations	Spalls	Patches
Area (m^2)	0.00	0.00	0.00
Total Delaminations and Spalls		Total Delaminations and Spalls in Areas ≤-0.35 V	
0.00 m²	0.0 %	N/A	N/A

*Wet areas = 0.47 m²

7. Scaling

Remarks

Light	Medium	Severe to Very Severe	
1.66	0.00	0.00	m^2
5.8	0.0	0.0	%

8. Honeycombing

Total Area 0.00 m²

Site No: **980305**

Component Type & Location: West Abutment Wall **OSIM Identifier: Abutments**

Remarks
Table # 9 and 10 are Not Applicable.

9. Adjusted Chloride Content Profile

Corrosion Activity at Core Location (volts)		0 to -0.20	-0.20 to -0.35	≤ -0.35
Chloride Content*	0-10 mm	-	-	-
	20-30 mm	-	-	-
	40-50 mm	-	-	-
	60-70 mm	-	-	-
	80-90 mm	-	-	-
	100-110 mm	-	-	-

* Average chloride content as % chloride by weight of concrete after deducting background chlorides for all cores taken in each range of corrosion potential.

10. Chloride Content at Rebar Level

Core No.	-	-	-	-	-	-
Chloride Content*	-	-	-	-	-	-

* Chloride content as % chloride by weight of concrete after deducting background chlorides.

Remarks
Table # 11 is Not Applicable.

11. AC Resistance Test Data of Epoxy Coated Rebar

Measured AC Resistance between Connection #1 and #2						Calculated AC Resistance *
	Connection #2					
Connection #1	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* See Appendix 1E for calculating AC resistance contributed by individual rebar.

Site No: **980305**

Component Type & Location: West Abutment Wall **OSIM Identifier: Abutments**

Remarks
Table # 12 is Not Applicable.

12. IR Drop and Truce Half Cell Potential Measurements of Epoxy Coated Rebar

IR Drop Between Connection #1 and #2						True Half Cell Potential *
Connection #1 (positive)	Connection #2 (negative)					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* Half cell reading taken on the same rebar with the ground connection.

13. Concrete Air Entrainment

Concrete Air Entrained: not tested

14. Compressive Strength

Average Compressive Strength: not tested

EXPOSED CONCRETE COMPONENTS (Exposed Deck, Deck Soffit, Curbs, Medians, Sidewalks, Barrier/Parapet Walls, etc.): Use separate form for each component

Site No: **980305**

Component Type & Location: West Ballast Wall **OSIM Identifier: Abutments**

1. Dimensions and Area

Width	11.71 m	Length	-	Height	-
Diameter	-	Total Area Surveyed		9.27 m²	

Remarks
Dimensions were taken from the structural drawings & site measurements

2. Cracks (medium and wide)

Type		Vertical	Horizontal	Diagonal	Total	
Medium Width	Clean	0.0	0.0	1.0	1.0	m
	Stained	0.0	0.0	0.0		
Wide Width	Clean	0.0	0.0	0.0	0.0	m
	Stained	0.0	0.0	0.0		

3. Alkali Aggregate Reaction

Area of component with severe to very severe aggregate reaction 0.0 m²

4. Concrete Cover

Remarks
Table # 4 is Not Applicable.

Minimum	Maximum	Average	
-	-	-	mm

0 – 20 mm	-	40 – 60 mm	-	m^2
	-		-	%
20 – 40 mm	-	over 60 mm	-	m^2
	-		-	%

Site No: **980305**

Component Type & Location: West Ballast Wall **OSIM Identifier: Abutments**

Remarks
Table # 5 is Not Applicable.

5. Corrosion Activity

Minimum	Maximum	Average	
-	-	-	V

0 to -0.20	-0.20 to -0.30	-0.30 to -0.35	-0.35 to -0.45	< -0.45	
-	-	-	-	-	V
-	-	-	-	-	m^2
-	-	-	-	-	%

6. Delaminations and Spalls

Remarks

Defect Type	Delaminations	Spalls	Patches
Area (m^2)	0.10	0.00	0.00
Total Delaminations and Spalls		Total Delaminations and Spalls in Areas ≤-0.35 V	
0.10 m²	1.1 %	N/A	N/A

*Wet areas = 0.55 m²

Remarks

7. Scaling

Light	Medium	Severe to Very Severe	
0.00	0.00	0.00	m^2
0.0	0.0	0.0	%

8. Honeycombing

Total Area 0.00 m²

Site No: **980305**

Component Type & Location: West Ballast Wall **OSIM Identifier: Abutments**

Remarks
Table # 9 and 10 are Not Applicable.

9. Adjusted Chloride Content Profile

Corrosion Activity at Core Location (volts)		0 to -0.20	-0.20 to -0.35	≤ -0.35
Chloride Content*	0-10 mm	-	-	-
	20-30 mm	-	-	-
	40-50 mm	-	-	-
	60-70 mm	-	-	-
	80-90 mm	-	-	-
	100-110 mm	-	-	-

* Average chloride content as % chloride by weight of concrete after deducting background chlorides for all cores taken in each range of corrosion potential.

10. Chloride Content at Rebar Level

Core No.	-	-	-	-	-	-
Chloride Content*	-	-	-	-	-	-

* Chloride content as % chloride by weight of concrete after deducting background chlorides.

Remarks
Table # 11 is Not Applicable.

11. AC Resistance Test Data of Epoxy Coated Rebar

Measured AC Resistance between Connection #1 and #2						Calculated AC Resistance *
	Connection #2					
Connection #1	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* See Appendix 1E for calculating AC resistance contributed by individual rebar.

Site No: **980305**

Component Type & Location: West Ballast Wall **OSIM Identifier: Abutments**

Remarks
Table # 12 is Not Applicable.

12. IR Drop and Truce Half Cell Potential Measurements of Epoxy Coated Rebar

IR Drop Between Connection #1 and #2						True Half Cell Potential *
Connection #1 (positive)	Connection #2 (negative)					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* Half cell reading taken on the same rebar with the ground connection.

13. Concrete Air Entrainment

Concrete Air Entrained: not tested

14. Compressive Strength

Average Compressive Strength: not tested

EXPOSED CONCRETE COMPONENTS (Exposed Deck, Deck Soffit, Curbs, Medians, Sidewalks, Barrier/Parapet Walls, etc.): Use separate form for each component

Site No: 980305

Component Type & Location: West Abutment Bearing Seat **OSIM Identifier: Abutments**

1. Dimensions and Area

Width	0.45 m	Length	11.71 m	Height	-
Diameter	-	Total Area Surveyed		5.27 m²	

Remarks

Dimensions were taken from the structural drawings & site measurements

2. Cracks (medium and wide)

Type		Transverse	Longitudinal	Other	Total	
Medium Width	Clean	2.0	0.0	1.0	3.0	m
	Stained	0.0	0.0	0.0		
Wide Width	Clean	0.0	0.0	0.0	0.0	m
	Stained	0.0	0.0	0.0		

3. Alkali Aggregate Reaction

Area of component with severe to very severe aggregate reaction 0.0 m²

4. Concrete Cover

Remarks

Table # 4 is Not Applicable.

Minimum	Maximum	Average	
-	-	-	mm

0 – 20 mm	-	40 – 60 mm	-	m^2
	-		-	%
20 – 40 mm	-	over 60 mm	-	m^2
	-		-	%

Site No: 980305

Component Type & Location: West Abutment Bearing Seat

OSIM Identifier: Abutments

5. Corrosion Activity

Remarks

Table # 5 is Not Applicable.

Minimum	Maximum	Average	
-	-	-	V

0 to -0.20	-0.20 to -0.30	-0.30 to -0.35	-0.35 to -0.45	< -0.45	
-	-	-	-	-	V
-	-	-	-	-	m^2
-	-	-	-	-	%

6. Delaminations and Spalls

Remarks

Defect Type	Delaminations	Spalls	Patches
Area (m^2)	0.00	0.00	0.00
Total Delaminations and Spalls		Total Delaminations and Spalls in Areas ≤-0.35 V	
0.00 m²	0.0 %	N/A	N/A

*Wet areas = 0.00 m²

7. Scaling

Remarks

Light	Medium	Severe to Very Severe	
0.00	0.00	0.00	m^2
0.0	0.0	0.0	%

8. Honeycombing

Total Area 0.00 m²

Site No: **980305**

Component Type & Location: West Abutment Bearing Seat

OSIM Identifier: Abutments

Remarks
Table # 9 and 10 are Not Applicable.

9. Adjusted Chloride Content Profile

Corrosion Activity at Core Location (volts)		0 to -0.20	-0.20 to -0.35	≤ -0.35
Chloride Content*	0-10 mm	-	-	-
	20-30 mm	-	-	-
	40-50 mm	-	-	-
	60-70 mm	-	-	-
	80-90 mm	-	-	-
	100-110 mm	-	-	-

* Average chloride content as % chloride by weight of concrete after deducting background chlorides for all cores taken in each range of corrosion potential.

10. Chloride Content at Rebar Level

Core No.	-	-	-	-	-	-
Chloride Content*	-	-	-	-	-	-

* Chloride content as % chloride by weight of concrete after deducting background chlorides.

Remarks
Table # 11 is Not Applicable.

11. AC Resistance Test Data of Epoxy Coated Rebar

Measured AC Resistance between Connection #1 and #2						Calculated AC Resistance *
	Connection #2					
Connection #1	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* See Appendix 1E for calculating AC resistance contributed by individual rebar.

Site No: 980305

Component Type & Location: West Abutment Bearing Seat

OSIM Identifier: Abutments

Remarks
Table # 12 is Not Applicable.

12. IR Drop and Truce Half Cell Potential Measurements of Epoxy Coated Rebar

IR Drop Between Connection #1 and #2						True Half Cell Potential *
Connection #1 (positive)	Connection #2 (negative)					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* Half cell reading taken on the same rebar with the ground connection.

13. Concrete Air Entrainment

Concrete Air Entrained: not tested

14. Compressive Strength

Average Compressive Strength: not tested

EXPOSED CONCRETE COMPONENTS (Exposed Deck, Deck Soffit, Curbs, Medians, Sidewalks, Barrier/Parapet Walls, etc.): Use separate form for each component

Site No: **980305**

Component Type & Location: East Abutment Wall **OSIM Identifier: Abutments**

1. Dimensions and Area

Width	11.71 m	Length	-	Height	2.37 m
Diameter	-	Total Area Surveyed		27.80 m²	

Remarks
Dimensions were taken from the structural drawings & site measurements

2. Cracks (medium and wide)

Type		Vertical	Horizontal	Diagonal	Total	
Medium Width	Clean	10.0	0.0	6.0	16.0	m
	Stained	0.0	0.0	0.0		
Wide Width	Clean	0.0	0.0	0.0	0.0	m
	Stained	0.0	0.0	0.0		

3. Alkali Aggregate Reaction

Area of component with severe to very severe aggregate reaction 0.0 m²

4. Concrete Cover

Minimum	Maximum	Average	
-	-	-	mm

0 – 20 mm	-	40 – 60 mm	-	m^2
	-		-	%
20 – 40 mm	-	over 60 mm	-	m^2
	-		-	%

Remarks
Table # 4 is Not Applicable.

Site No: **980305**

Component Type & Location: East Abutment Wall **OSIM Identifier: Abutments**

Remarks
Table # 5 is Not Applicable.

5. Corrosion Activity

Minimum	Maximum	Average	
-	-	-	V

0 to -0.20	-0.20 to -0.30	-0.30 to -0.35	-0.35 to -0.45	< -0.45	
-	-	-	-	-	V
-	-	-	-	-	m^2
-	-	-	-	-	%

Remarks

6. Delaminations and Spalls

Defect Type	Delaminations	Spalls	Patches
Area (m^2)	0.00	0.00	0.00
Total Delaminations and Spalls		Total Delaminations and Spalls in Areas ≤-0.35 V	
0.00 m²	0.0 %	N/A	N/A

*Wet areas = 2.50 m²

Remarks

7. Scaling

Light	Medium	Severe to Very Severe	
2.10	0.00	0.00	m^2
7.6	0.0	0.0	%

8. Honeycombing

Total Area 0.00 m²

Site No: 980305

Component Type & Location: East Abutment Wall **OSIM Identifier: Abutments**

Remarks
Table # 9 and 10 are Not Applicable.

9. Adjusted Chloride Content Profile

Corrosion Activity at Core Location (volts)		0 to -0.20	-0.20 to -0.35	≤ -0.35
Chloride Content*	0-10 mm	-	-	-
	20-30 mm	-	-	-
	40-50 mm	-	-	-
	60-70 mm	-	-	-
	80-90 mm	-	-	-
	100-110 mm	-	-	-

* Average chloride content as % chloride by weight of concrete after deducting background chlorides for all cores taken in each range of corrosion potential.

10. Chloride Content at Rebar Level

Core No.	-	-	-	-	-	-
Chloride Content*	-	-	-	-	-	-

* Chloride content as % chloride by weight of concrete after deducting background chlorides.

Remarks
Table # 11 is Not Applicable.

11. AC Resistance Test Data of Epoxy Coated Rebar

Measured AC Resistance between Connection #1 and #2						Calculated AC Resistance *
	Connection #2					
Connection #1	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* See Appendix 1E for calculating AC resistance contributed by individual rebar.

Site No: **980305**

Component Type & Location: East Abutment Wall **OSIM Identifier: Abutments**

Remarks
Table # 12 is Not Applicable.

12. IR Drop and Truce Half Cell Potential Measurements of Epoxy Coated Rebar

IR Drop Between Connection #1 and #2						True Half Cell Potential *
Connection #1 (positive)	Connection #2 (negative)					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* Half cell reading taken on the same rebar with the ground connection.

13. Concrete Air Entrainment

Concrete Air Entrained: not tested

14. Compressive Strength

Average Compressive Strength: not tested

EXPOSED CONCRETE COMPONENTS (Exposed Deck, Deck Soffit, Curbs, Medians, Sidewalks, Barrier/Parapet Walls, etc.): Use separate form for each component

Site No: **980305**

Component Type & Location: East Ballast Wall **OSIM Identifier: Abutments**

1. Dimensions and Area

Width	11.71 m	Length	-	Height	-
Diameter	-	Total Area Surveyed		9.27 m²	

Remarks
Dimensions were taken from the structural drawings & site measurements

2. Cracks (medium and wide)

Type		Vertical	Horizontal	Diagonal	Total	
Medium Width	Clean	0.0	0.0	0.0	0.0	m
	Stained	0.0	0.0	0.0		
Wide Width	Clean	0.0	0.0	0.0	0.0	m
	Stained	0.0	0.0	0.0		

3. Alkali Aggregate Reaction

Area of component with severe to very severe aggregate reaction 0.0 m²

4. Concrete Cover

Remarks
Table # 4 is Not Applicable.

Minimum	Maximum	Average	
-	-	-	mm

0 – 20 mm	-	40 – 60 mm	-	m^2
	-		-	%
20 – 40 mm	-	over 60 mm	-	m^2
	-		-	%

Site No: **980305**

Component Type & Location: East Ballast Wall **OSIM Identifier: Abutments**

Remarks
Table # 5 is Not Applicable.

5. Corrosion Activity

Minimum	Maximum	Average	
-	-	-	V

0 to -0.20	-0.20 to -0.30	-0.30 to -0.35	-0.35 to -0.45	< -0.45	
-	-	-	-	-	V
-	-	-	-	-	m^2
-	-	-	-	-	%

6. Delaminations and Spalls

Remarks

Defect Type	Delaminations	Spalls	Patches
Area (m^2)	0.00	0.00	0.00
Total Delaminations and Spalls		Total Delaminations and Spalls in Areas ≤-0.35 V	
0.00 m²	0.0 %	N/A	N/A

*Wet areas = 0.00 m²

7. Scaling

Remarks

Light	Medium	Severe to Very Severe	
0.00	0.00	0.00	m^2
0.0	0.0	0.0	%

8. Honeycombing

Total Area 0.00 m²

Site No: **980305**

Component Type & Location: East Ballast Wall **OSIM Identifier: Abutments**

Remarks
Table # 9 and 10 are Not Applicable.

9. Adjusted Chloride Content Profile

Corrosion Activity at Core Location (volts)		0 to -0.20	-0.20 to -0.35	≤ -0.35
Chloride Content*	0-10 mm	-	-	-
	20-30 mm	-	-	-
	40-50 mm	-	-	-
	60-70 mm	-	-	-
	80-90 mm	-	-	-
	100-110 mm	-	-	-

* Average chloride content as % chloride by weight of concrete after deducting background chlorides for all cores taken in each range of corrosion potential.

10. Chloride Content at Rebar Level

Core No.	-	-	-	-	-	-
Chloride Content*	-	-	-	-	-	-

* Chloride content as % chloride by weight of concrete after deducting background chlorides.

Remarks
Table # 11 is Not Applicable.

11. AC Resistance Test Data of Epoxy Coated Rebar

Measured AC Resistance between Connection #1 and #2						Calculated AC Resistance *
	Connection #2					
Connection #1	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* See Appendix 1E for calculating AC resistance contributed by individual rebar.

Site No: **980305**

Component Type & Location: East Ballast Wall **OSIM Identifier: Abutments**

Remarks
Table # 12 is Not Applicable.

12. IR Drop and Truce Half Cell Potential Measurements of Epoxy Coated Rebar

IR Drop Between Connection #1 and #2						True Half Cell Potential *
Connection #1 (positive)	Connection #2 (negative)					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* Half cell reading taken on the same rebar with the ground connection.

13. Concrete Air Entrainment

Concrete Air Entrained: not tested

14. Compressive Strength

Average Compressive Strength: not tested

EXPOSED CONCRETE COMPONENTS (Exposed Deck, Deck Soffit, Curbs, Medians, Sidewalks, Barrier/Parapet Walls, etc.): Use separate form for each component

Site No: **980305**

Component Type & Location: East Abutment Bearing Seat **OSIM Identifier: Abutments**

1. Dimensions and Area

Width	0.45 m	Length	11.71 m	Height	-
Diameter	-	Total Area Surveyed		5.27 m²	

Remarks
Dimensions were taken from the structural drawings & site measurements

2. Cracks (medium and wide)

Type		Transverse	Longitudinal	Other	Total	
Medium Width	Clean	2.0	0.0	1.0	3.0	m
	Stained	0.0	0.0	0.0		
Wide Width	Clean	0.0	0.0	0.0	0.0	m
	Stained	0.0	0.0	0.0		

3. Alkali Aggregate Reaction

Area of component with severe to very severe aggregate reaction 0.0 m²

4. Concrete Cover

Minimum	Maximum	Average	
-	-	-	mm

0 – 20 mm	-	40 – 60 mm	-	m^2
	-		-	%
20 – 40 mm	-	over 60 mm	-	m^2
	-		-	%

Remarks
Table # 4 is Not Applicable.

Site No: 980305

Component Type & Location: East Abutment Bearing Seat

OSIM Identifier: Abutments

Remarks

Table # 5 is Not Applicable.

5. Corrosion Activity

Minimum	Maximum	Average	
-	-	-	V

0 to -0.20	-0.20 to -0.30	-0.30 to -0.35	-0.35 to -0.45	< -0.45	
-	-	-	-	-	V
-	-	-	-	-	m^2
-	-	-	-	-	%

Remarks

6. Delaminations and Spalls

Defect Type	Delaminations	Spalls	Patches
Area (m^2)	0.00	0.00	0.00
Total Delaminations and Spalls		Total Delaminations and Spalls in Areas ≤-0.35 V	
0.00 m²	0.0 %	N/A	N/A

*Wet areas = 0.30 m²

Remarks

7. Scaling

Light	Medium	Severe to Very Severe	
0.00	0.00	0.00	m^2
0.0	0.0	0.0	%

8. Honeycombing

Total Area 0.00 m²

Site No: **980305**

Component Type & Location: East Abutment Bearing Seat

OSIM Identifier: Abutments

Remarks
Table # 9 and 10 are Not Applicable.

9. Adjusted Chloride Content Profile

Corrosion Activity at Core Location (volts)		0 to -0.20	-0.20 to -0.35	≤ -0.35
Chloride Content*	0-10 mm	-	-	-
	20-30 mm	-	-	-
	40-50 mm	-	-	-
	60-70 mm	-	-	-
	80-90 mm	-	-	-
	100-110 mm	-	-	-

* Average chloride content as % chloride by weight of concrete after deducting background chlorides for all cores taken in each range of corrosion potential.

10. Chloride Content at Rebar Level

Core No.	-	-	-	-	-	-
Chloride Content*	-	-	-	-	-	-

* Chloride content as % chloride by weight of concrete after deducting background chlorides.

Remarks
Table # 11 is Not Applicable.

11. AC Resistance Test Data of Epoxy Coated Rebar

Measured AC Resistance between Connection #1 and #2						Calculated AC Resistance *
	Connection #2					
Connection #1	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* See Appendix 1E for calculating AC resistance contributed by individual rebar.

Site No: **980305**

Component Type & Location: East Abutment Bearing Seat

OSIM Identifier: Abutments

Remarks
Table # 12 is Not Applicable.

12. IR Drop and Truce Half Cell Potential Measurements of Epoxy Coated Rebar

IR Drop Between Connection #1 and #2						True Half Cell Potential *
Connection #1 (positive)	Connection #2 (negative)					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* Half cell reading taken on the same rebar with the ground connection.

13. Concrete Air Entrainment

Concrete Air Entrained: not tested

14. Compressive Strength

Average Compressive Strength: not tested

EXPOSED CONCRETE COMPONENTS (Exposed Deck, Deck Soffit, Curbs, Medians, Sidewalks, Barrier/Parapet Walls, etc.): Use separate form for each component

Site No: **980305**

Component Type & Location: East and West Piers **OSIM Identifier: Piers**

1. Dimensions and Area

Width	11.71 m	Length	-	Height	-
Diameter	-	Total Area Surveyed		178.00 m²	

Remarks

Dimensions were taken from the structural drawings & site measurements

2. Cracks (medium and wide)

Type		Vertical	Horizontal	Diagonal	Total	
Medium Width	Clean	9.0	0.0	3.0	14.0	m
	Stained	1.0	0.0	1.0		
Wide Width	Clean	0.0	0.0	0.0	0.0	m
	Stained	0.0	0.0	0.0		

3. Alkali Aggregate Reaction

Area of component with severe to very severe aggregate reaction 0.0 m²

4. Concrete Cover

Minimum	Maximum	Average	
-	-	-	mm

0 – 20 mm	-	40 – 60 mm	-	m^2
	-		-	%
20 – 40 mm	-	over 60 mm	-	m^2
	-		-	%

Remarks

Table # 4 is Not Applicable.

Site No: **980305**

Component Type & Location: East and West Piers **OSIM Identifier: Piers**

5. Corrosion Activity

Remarks
Table # 5 is Not Applicable.

Minimum	Maximum	Average	
-	-	-	V

0 to -0.20	-0.20 to -0.30	-0.30 to -0.35	-0.35 to -0.45	< -0.45	
-	-	-	-	-	m^2
-	-	-	-	-	%

6. Delaminations and Spalls

Remarks

Defect Type	Delaminations	Spalls	Patches
Area (m^2)	3.20	0.25	0.00
Total Delaminations and Spalls		Total Delaminations and Spalls in Areas ≤-0.35 V	
3.45 m²	1.9 %	N/A	N/A

*Wet areas = 17.70 m²

Remarks

7. Scaling

Light	Medium	Severe to Very Severe	
5.71	0.00	0.00	m^2
3.2	0.0	0.0	%

8. Honeycombing

Total Area 0.00 m²

Site No: **980305**

Component Type & Location: East and West Piers **OSIM Identifier: Piers**

Remarks
Table # 9 and 10 are Not Applicable.

9. Adjusted Chloride Content Profile

Corrosion Activity at Core Location (volts)		0 to -0.20	-0.20 to -0.35	≤ -0.35
Chloride Content*	0-10 mm	-	-	-
	20-30 mm	-	-	-
	40-50 mm	-	-	-
	60-70 mm	-	-	-
	80-90 mm	-	-	-
	100-110 mm	-	-	-

* Average chloride content as % chloride by weight of concrete after deducting background chlorides for all cores taken in each range of corrosion potential.

10. Chloride Content at Rebar Level

Core No.	-	-	-	-	-	-
Chloride Content*	-	-	-	-	-	-

* Chloride content as % chloride by weight of concrete after deducting background chlorides.

Remarks
Table # 11 is Not Applicable.

11. AC Resistance Test Data of Epoxy Coated Rebar

Measured AC Resistance between Connection #1 and #2						Calculated AC Resistance *
	Connection #2					
Connection #1	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* See Appendix 1E for calculating AC resistance contributed by individual rebar.

Site No: **980305**

Component Type & Location: East and West Piers **OSIM Identifier: Piers**

Remarks
Table # 12 is Not Applicable.

12. IR Drop and Truce Half Cell Potential Measurements of Epoxy Coated Rebar

IR Drop Between Connection #1 and #2						True Half Cell Potential *
Connection #1 (positive)	Connection #2 (negative)					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* Half cell reading taken on the same rebar with the ground connection.

13. Concrete Air Entrainment

Concrete Air Entrained: not tested

14. Compressive Strength

Average Compressive Strength: not tested

EXPOSED CONCRETE COMPONENTS (Exposed Deck, Deck Soffit, Curbs, Medians, Sidewalks, Barrier/Parapet Walls, etc.): Use separate form for each component

Site No: **980305**

Component Type & Location: Wingwalls **OSIM Identifier: Abutments**

1. Dimensions and Area

Width	-	Length	2.96 m x 4	Height	Avg. 1.77 m
Diameter	-	Total Area Surveyed		20.95 m²	

Remarks
Dimensions were taken from the structural drawings & site measurements

2. Cracks (medium and wide)

Type		Vertical	Horizontal	Diagonal	Total	
Medium Width	Clean	0.0	0.0	6.0	7.0	m
	Stained	0.0	0.0	1.0		
Wide Width	Clean	0.0	0.0	0.0	0.0	m
	Stained	0.0	0.0	0.0		

3. Alkali Aggregate Reaction

Area of component with severe to very severe aggregate reaction 0.0 m²

4. Concrete Cover

Minimum	Maximum	Average	
-	-	-	mm

0 – 20 mm	-	40 – 60 mm	-	m^2
	-		-	%
20 – 40 mm	-	over 60 mm	-	m^2
	-		-	%

Remarks
Table # 4 is Not Applicable.

Site No: **980305**

Component Type & Location: Wingwalls **OSIM Identifier: Abutments**

5. Corrosion Activity

Remarks
Table # 5 is Not Applicable.

Minimum	Maximum	Average	
-	-	-	V

0 to -0.20	-0.20 to -0.30	-0.30 to -0.35	-0.35 to -0.45	< -0.45	
-	-	-	-	-	m^2
-	-	-	-	-	%

6. Delaminations and Spalls

Remarks

Defect Type	Delaminations	Spalls	Patches
Area (m^2)	0.45	0.31	0.00
Total Delaminations and Spalls		Total Delaminations and Spalls in Areas ≤-0.35 V	
0.76 m²	3.6 %	N/A	N/A

*Wet areas = 2.42 m²

7. Scaling

Remarks

Light	Medium	Severe to Very Severe	
0.00	0.00	0.00	m^2
0.0	0.0	0.0	%

8. Honeycombing

Total Area 0.00 m²

Site No: **980305**

Component Type & Location: Wingwalls **OSIM Identifier: Abutments**

Remarks
Table # 9 and 10 are Not Applicable.

9. Adjusted Chloride Content Profile

Corrosion Activity at Core Location (volts)		0 to -0.20	-0.20 to -0.35	≤ -0.35
Chloride Content*	0-10 mm	-	-	-
	20-30 mm	-	-	-
	40-50 mm	-	-	-
	60-70 mm	-	-	-
	80-90 mm	-	-	-
	100-110 mm	-	-	-

* Average chloride content as % chloride by weight of concrete after deducting background chlorides for all cores taken in each range of corrosion potential.

10. Chloride Content at Rebar Level

Core No.	-	-	-	-	-	-
Chloride Content*	-	-	-	-	-	-

* Chloride content as % chloride by weight of concrete after deducting background chlorides.

Remarks
Table # 11 is Not Applicable.

11. AC Resistance Test Data of Epoxy Coated Rebar

Measured AC Resistance between Connection #1 and #2						Calculated AC Resistance *
	Connection #2					
Connection #1	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* See Appendix 1E for calculating AC resistance contributed by individual rebar.

Site No: **980305**

Component Type & Location: Wingwalls **OSIM Identifier: Abutments**

Remarks
Table # 12 is Not Applicable.

12. IR Drop and Truce Half Cell Potential Measurements of Epoxy Coated Rebar

IR Drop Between Connection #1 and #2						True Half Cell Potential *
Connection #1 (positive)	Connection #2 (negative)					
	G1	G2	G3	G4	G5	
G1	N/A	-	-	-	-	-
G2	-	N/A	-	-	-	-
G3	-	-	N/A	-	-	-
G4	-	-	-	N/A	-	-
G5	-	-	-	-	N/A	-

* Half cell reading taken on the same rebar with the ground connection.

13. Concrete Air Entrainment

Concrete Air Entrained: not tested

14. Compressive Strength

Average Compressive Strength: not tested

CONDITION SURVEY SUMMARY SHEET - EXPANSION JOINTS

Site No. 908305

Dimension	Abutments		Intermediate			
	Joint 1	Joint 2	Joint 3		Joint 4	
	E	W				
a (mm)	880	880	-		-	
b (mm)	120	110	-		-	
b' (mm)	130	120	-		-	
c (mm)	8920	8920	-		-	
d (mm)	110	110	-		-	
d' (mm)	120	120	-		-	
e (mm)	880	880	-		-	
Depth of Asphalt @ Deck Side			N/E	S/E	N/E	S/W
1 (mm)	80	80	-	-	-	-
2 (mm)	80	85	-	-	-	-
3 (mm)	80	80	-	-	-	-
Width: Top of Ballast Wall and End Dams						
	Ballast Wall	End Dam	Ballast Wall	End Dam	N/E	S/W	N/E	S/W
1 (mm)	-	-	-	-	-	-	-	-
2 (mm)	-	-	-	-	-	-	-	-
3 (mm)	-	-	-	-	-	-	-	-
Gap Dimensions								
1 (mm)	-		-		-		-	
2 (mm)	-		-		-		-	
3 (mm)	-		-		-		-	
Misc. Joint Details			Skew Angle		00° 00' 00"			
Exp	-		-		-		-	
Fixed	-		-		-		-	
Type	-						-	
Leaking	-		-		-		-	
Angle size	-		-		-		-	
Temp °C	Deck		22˚C		Ambient		22˚C	

Remarks

a & e = width of curb

b & d = depth of curb

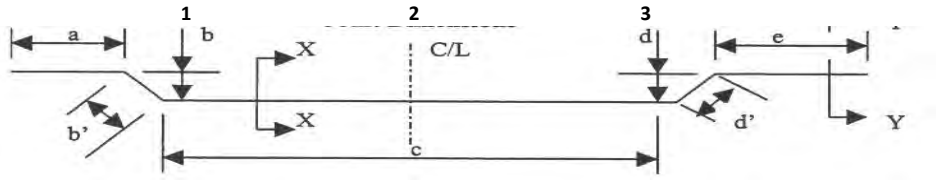
c = roadway width

No expansion joints present in structure.

N

JOINT DIMENSIONS

S



Typical Sections at Joints: E - W

DRAINAGE

Site No. 908305

	Number	Type	Length	Angle	Depth *
Deck Drains	14	210mm steel pipe	1150-1159	N/A	10-80

* For asphalt covered decks, recess depth in mm between top of asphalt and top of drain.

Catch Basins	NO	

* Identify location of catch basins as N/E, N/W, S/E etc. using the same direction of north as shown on the drawings.

Drainage Tubes	YES	**Void Drains**	NO



North Deck Drainage – 1st from west



South Deck Drainage – 1st from west

Appendix B:

Survey Equipment and Calibration Procedures

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SURVEY EQUIPMENT AND CALIBRATION PROCEDURES

Component Type: Asphalt Covered Bridge Deck **Site Number:** 980305

1. Delaminations:

Weight of Chain: 2.2 **kg/m**
Other Equipment: Hammer

2. Concrete Cover:

Covermeter Make and Model: ELCOMETER Protovale 331

Battery Check:	**Reading at Start of Test:**	OK
	Reading at End of Test:	OK
Concrete Cover Check:	**Location of Check:**	@ 'SS2'
	Actual Depth and Rebar Diameter:	-
	Reading Before Test:	112 mm
	Readings Each 30 minutes During Test:	112 mm
	Reading at End of Test:	112 mm

3. Corrosion Activity:

Half Cell Make and Model: MC MILLER Electrode RE-#a (3" ø)
Multimeter Make and Model: Mastercraft Digital Multimeter 3R93
Length and Gauge of Lead Wires: 150 m of 18 gauge

Deck Temperature:	**Start of Test:**	22	°C	**End of Test:**	22	°C
Ambient Temperature:	**Start of Test:**	22	°C	**End of Test:**	22	°C

Battery Check: O.K.

Ground Check: **Method of Connection:**	self-tapping screw		
Ground Location:	@ Core C2, C5, C8	**Check Location:**	@ Core C14, C12, C10
Lead Resistance:	1.8 - 1.9 Ω	**Voltage Drop (mV's):**	0.9 – 1.0
Resistance [c]:	1.8 - 1.9 Ω	**Resistance Reversed:**	1.8 - 1.9 Ω

Grid Point Potential Readings Check – See Table Below

Location	Initial Reading	Check Reading [a]	Check Reading – Latex Concrete Overlay [b]
A23/G23/A8/G8/A1/G1	-0.332/-0.381/-0.313/-0.258/-0.426/-0.414	-0.333/-0.380/-0.315/-0.257/-0.425/-0.415	-
A24/G25/A9/G9/A2/G2	-0.244/-0.343/-0.268/-0.243/-0.374/-0.335	-0.245/-0.343/-0.267/-0.243/-0.374/-0.336	-
A25/G25/A10/G10/A3/G3	-0.190/-0.315/-0.226/-0.278/-0.328/-0.256	-0.191/-0.316/-0.227/-0.277/-0.328/-0.258	-
A26/G26/A11/G11/A4/G4	-0.165/-0.351/-0.232/-0.217/-0.271/-0.272	-0.166/-0.351/-0.232/-0.217/-0.271/-0.273	-
A27/G27/A12/G12/A5/G5	-0.289/-0.374/-0.280/-0.253/-0.312/-0.230	-0.288/-0.374/-0.281/-0.253/-0.312/-0.232	-

[a] Check at least five readings at beginning of test and each change in ground.

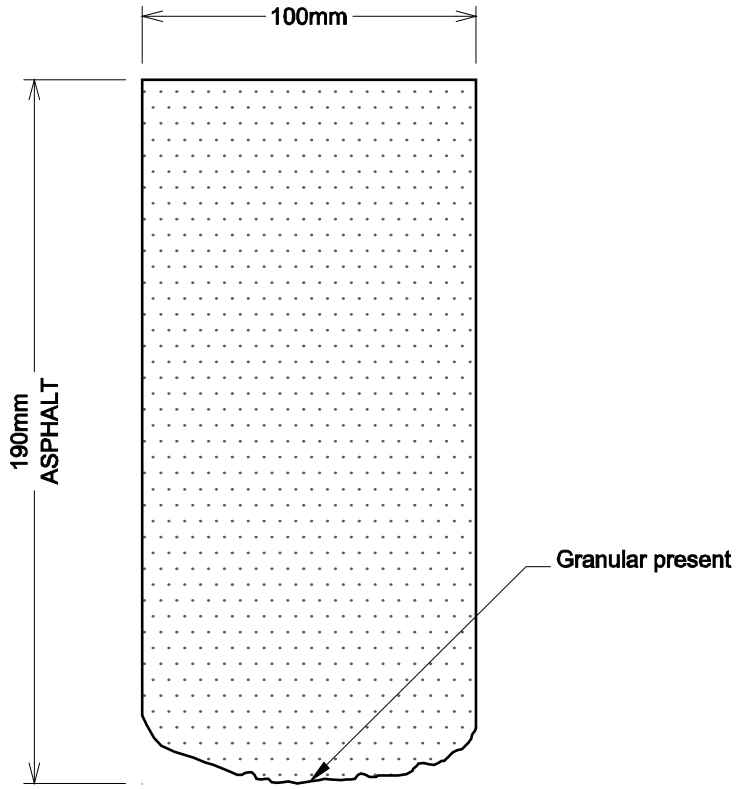
Appendix C:

Core Photographs and Sketches

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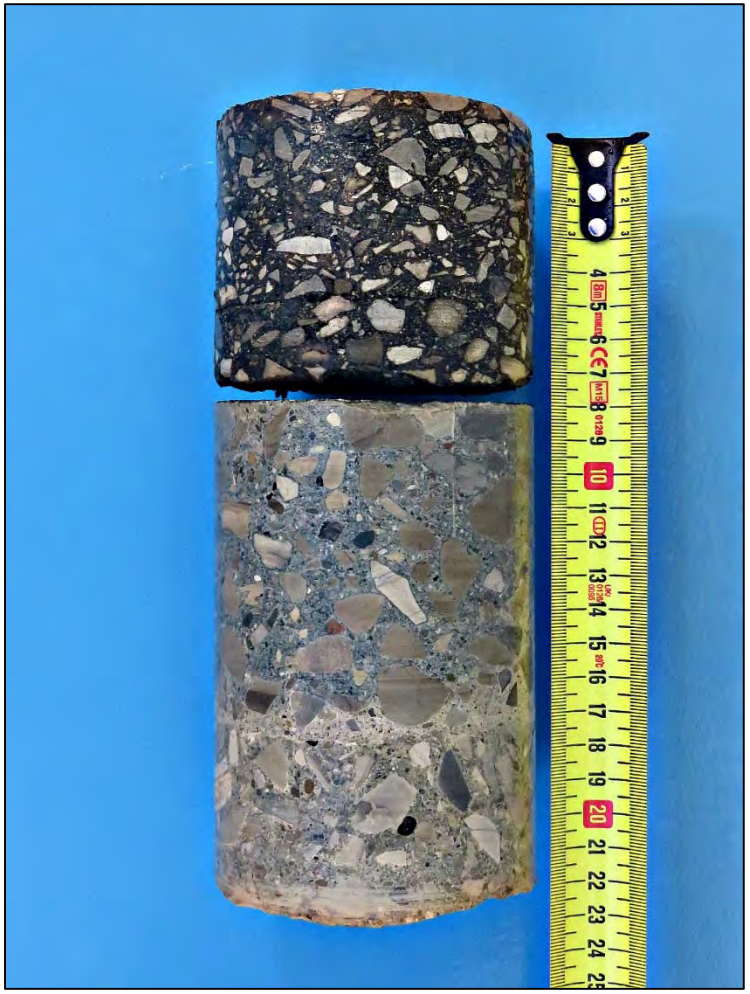
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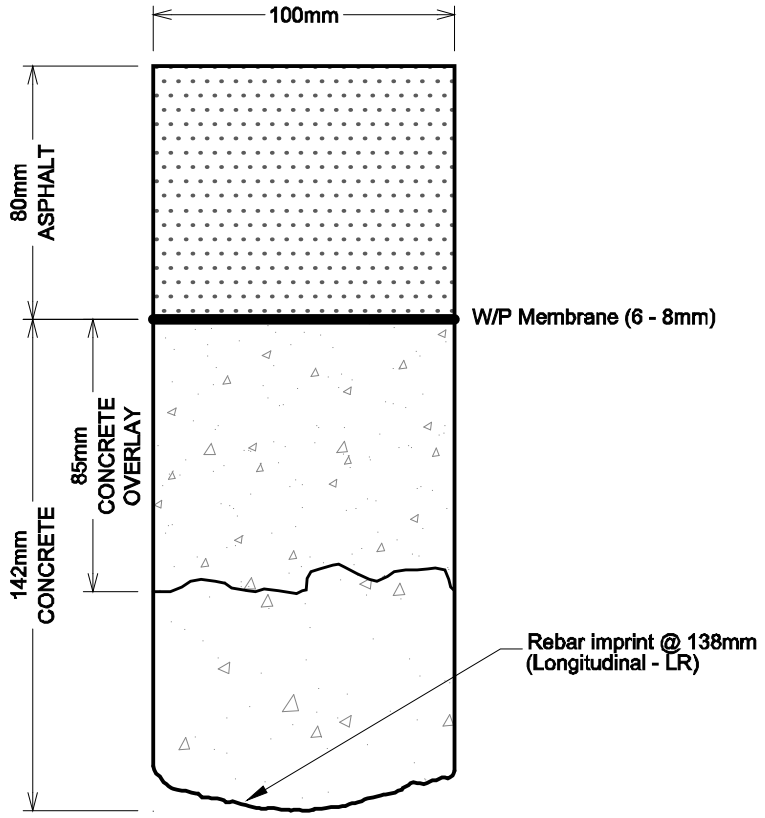




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Core C2

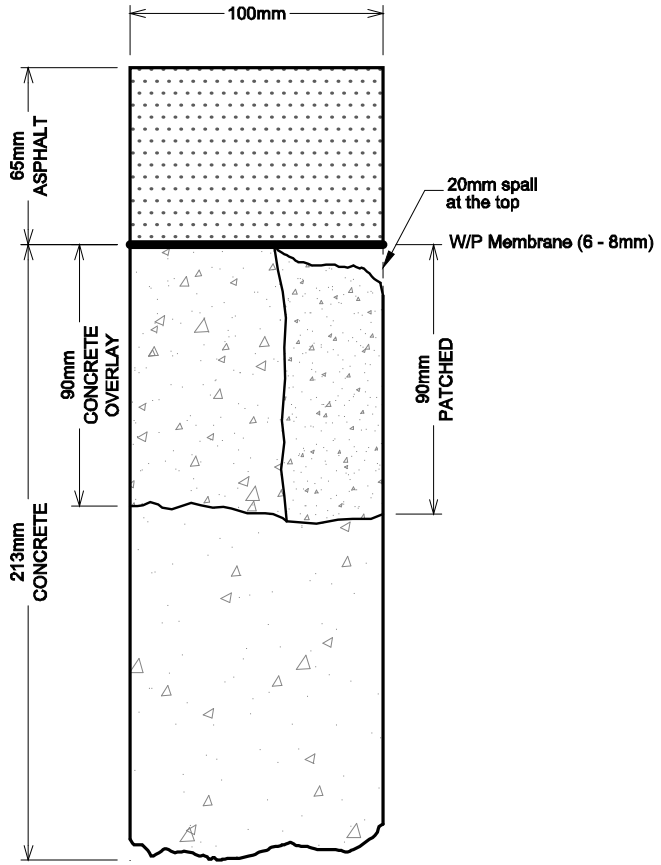




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Core C3

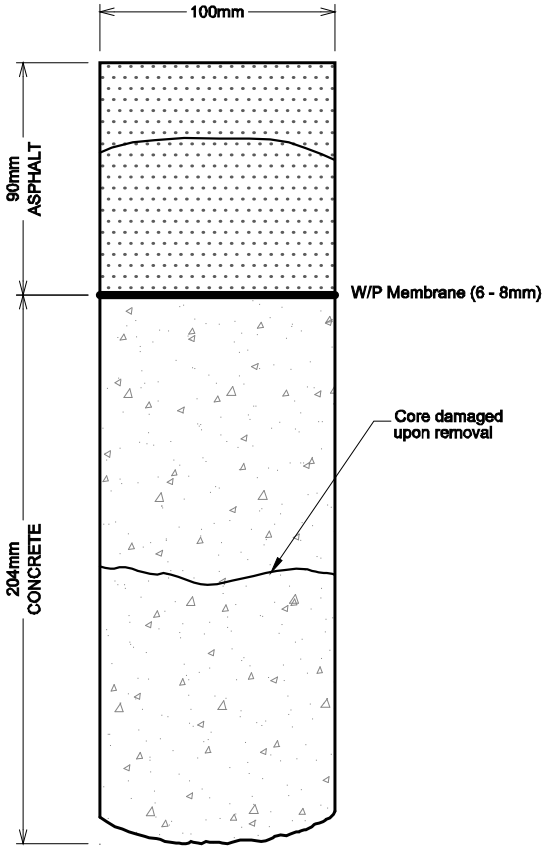




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Core C4

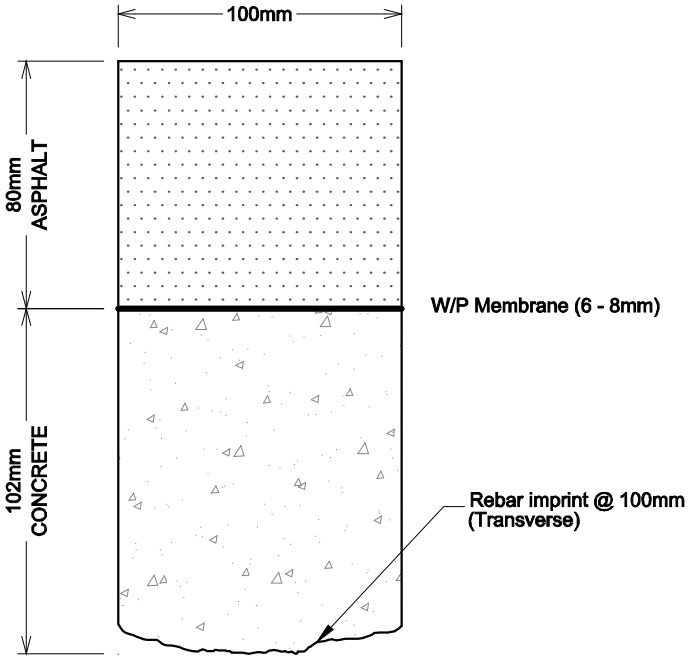




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Core C5

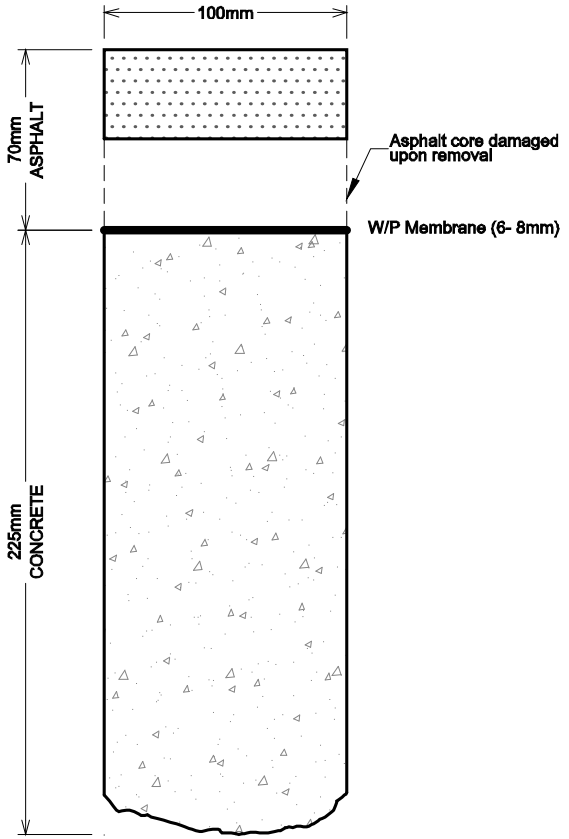




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Core C6

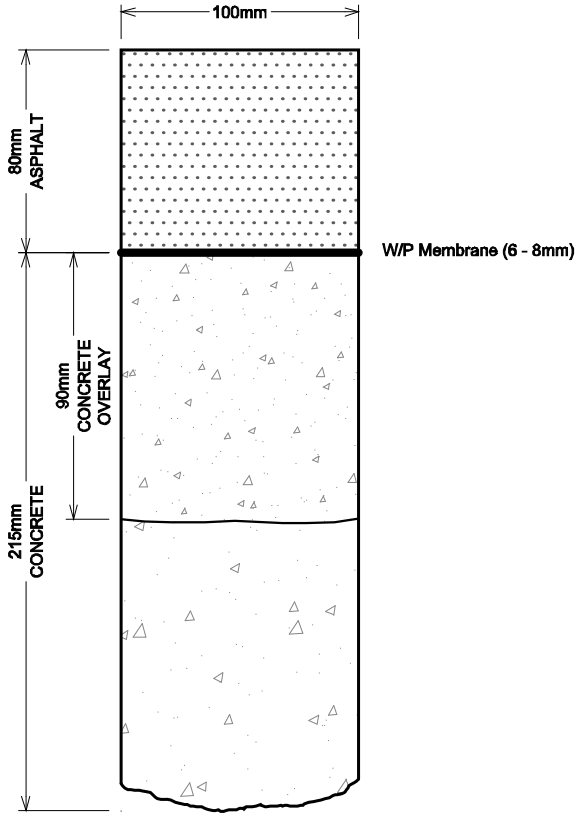




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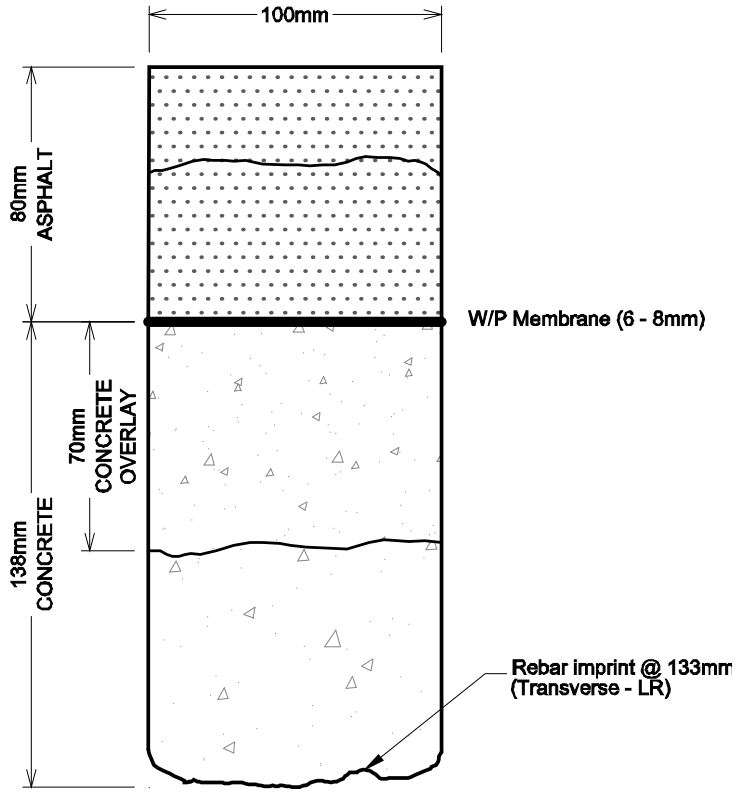




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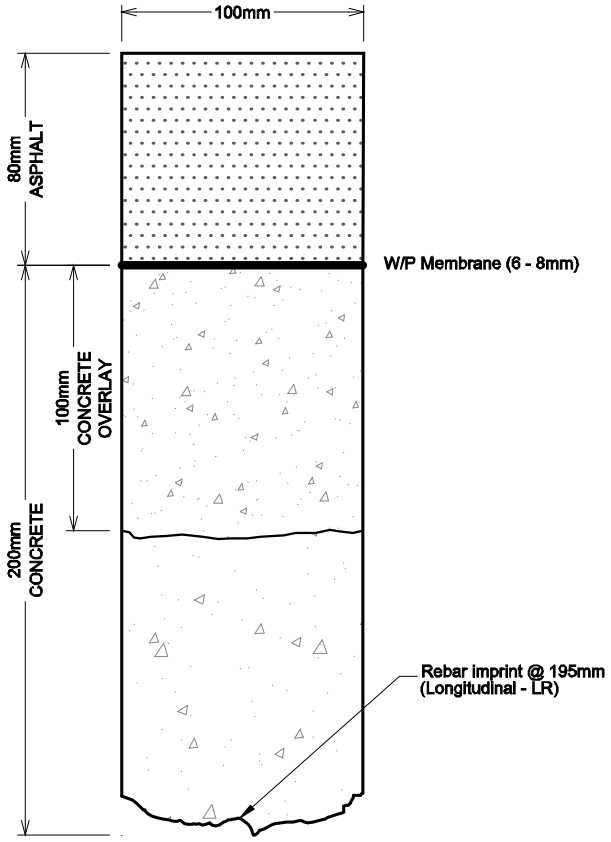




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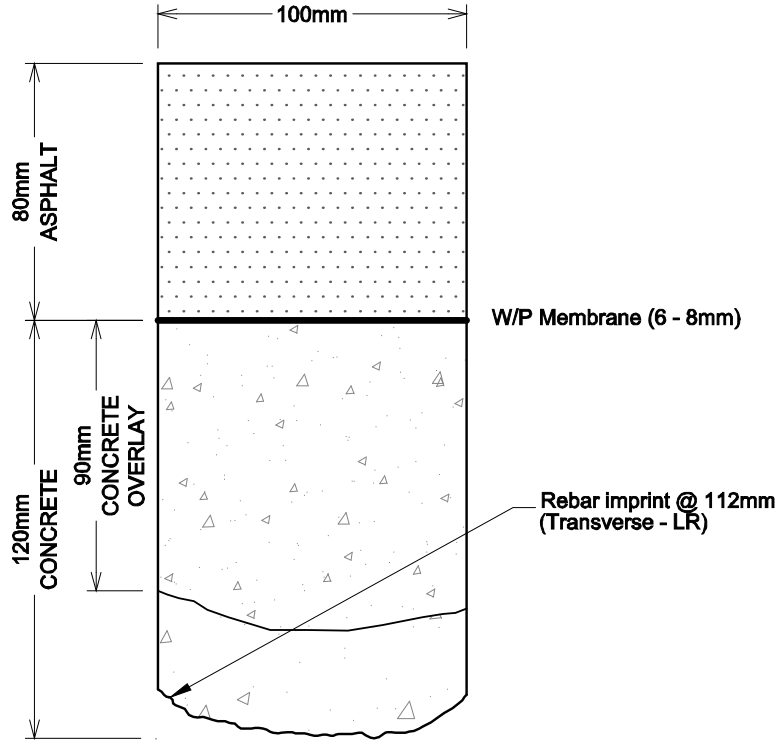




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Core C10

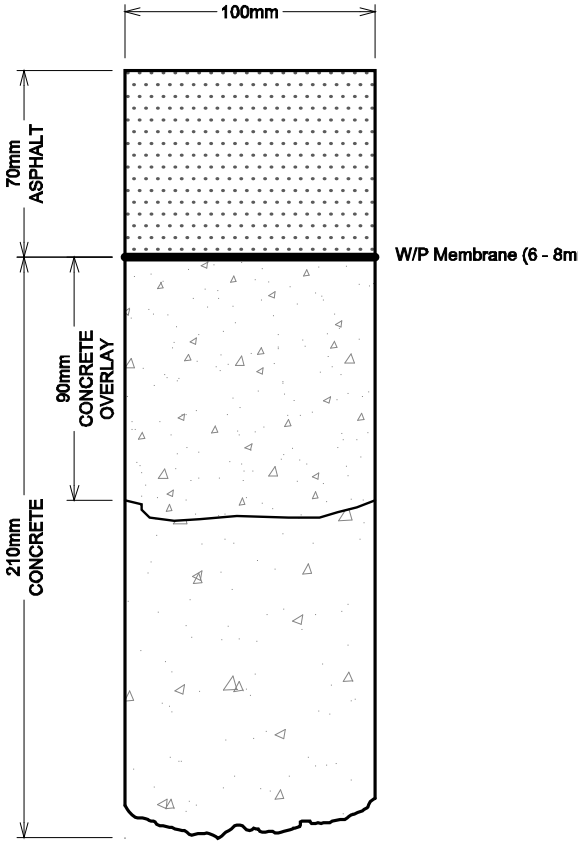




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Core C11

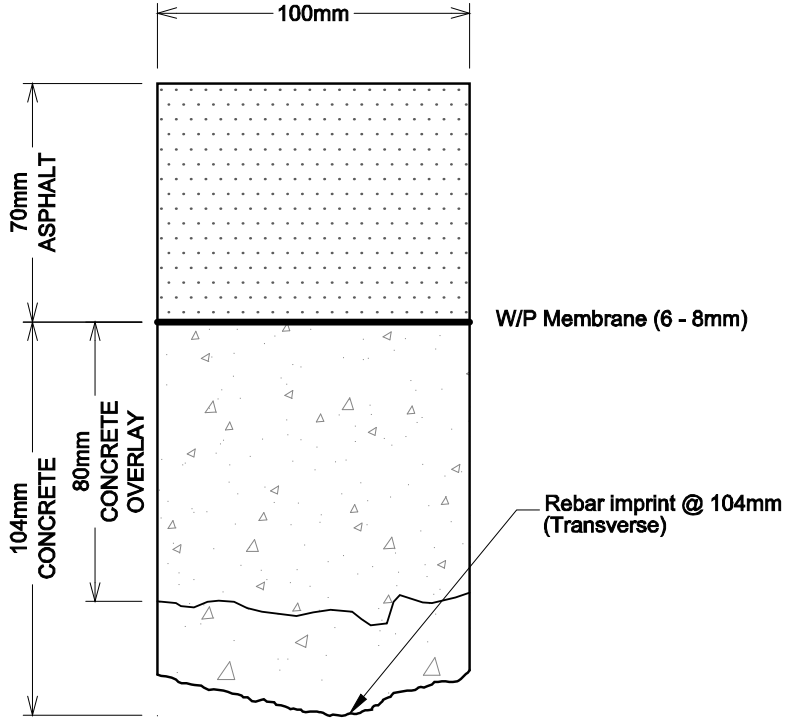




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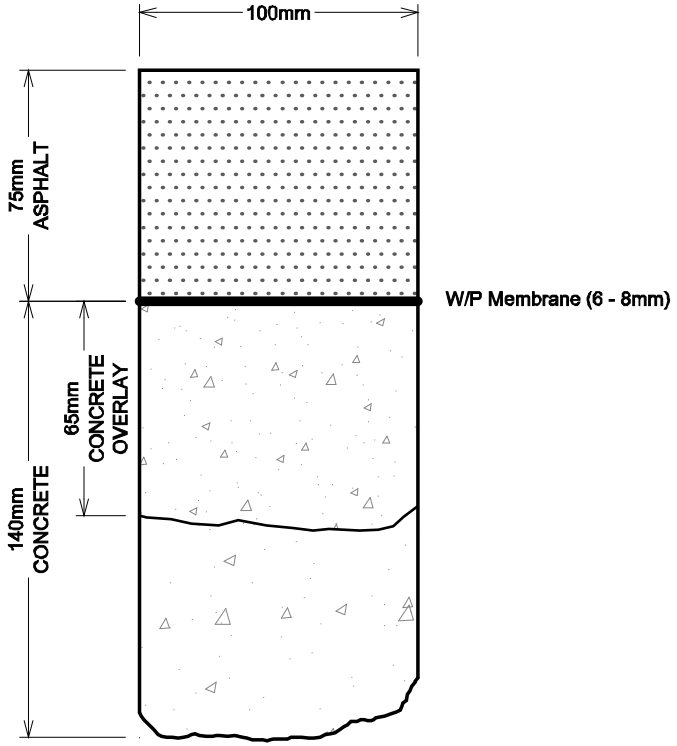




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Core C13

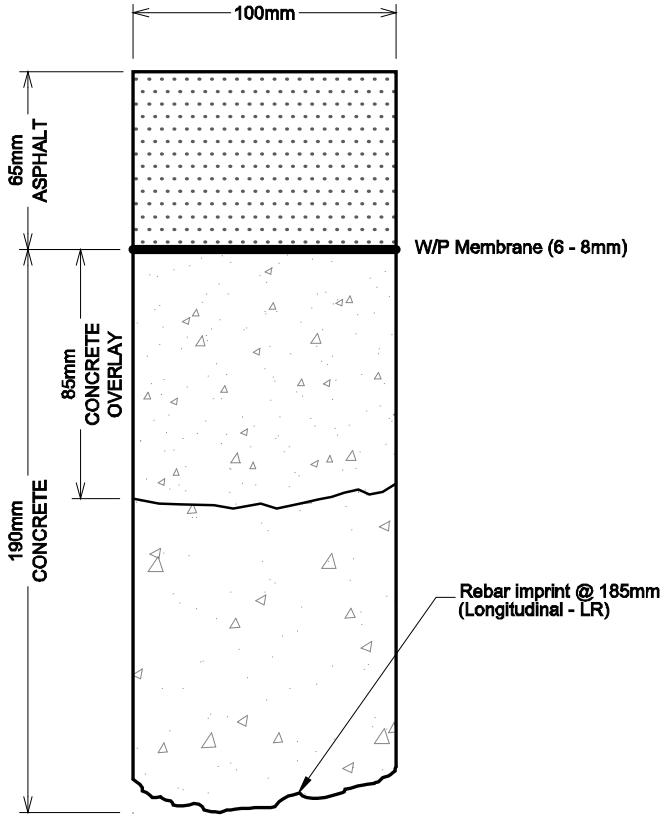




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Core C14

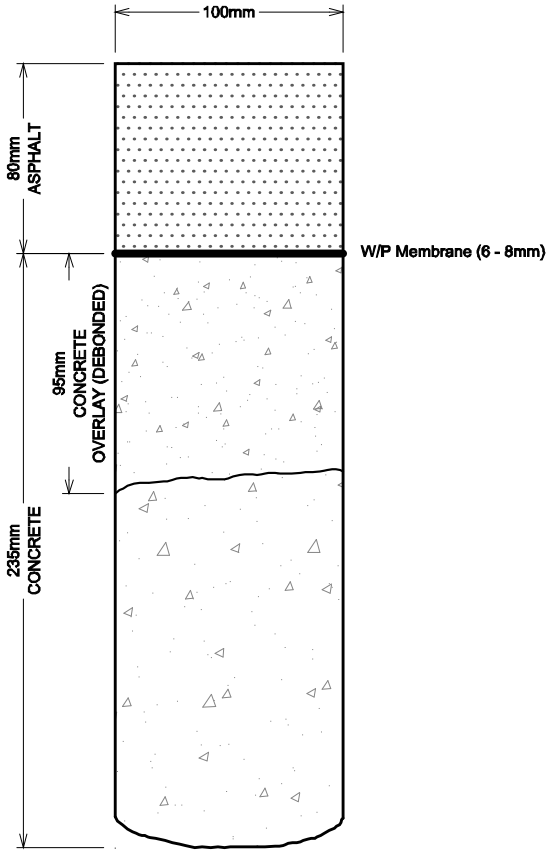




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Core C15





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Appendix D:

Core Logs

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CORE LOG ASPHALT COVERED BRIDGE DECKS

 Site: 980305

Core No.		**C1**		**C2**		**C3**	
Location (between gridlines)		East Approach		'B' and '28'		'C' and '25'	
Diameter, mm		100.0		100.0		100.0	
Thickness of Asphalt, mm		190.0		80.0		65.0	
Thickness of Asphalt @ Nearest Grid Point		N/A		80.0		65.0	
Thickness of Concrete, mm		N/A		142.0		213.0	
Full Depth (yes/no)				No		No	
Condition of Asphalt [1]		G		G		F	
Waterproofing (W/P) Type		N/A		Hot rubberized asphalt with protection board		Hot rubberized asphalt with protection board	
Condition of W/P [1]		N/A		G		G	
W/P Thickness, mm		N/A		6 to 8 mm		6 to 8 mm	
Bond of Asphalt or W/P to Concrete		N/A		F		F	
Defects in Concrete [2]		-		-		S	
Condition of Rebar [3]		N/A		LR		N/A	
Corrosion Potential				-0.362		-0.260	
Compressive Strength, MPa							
Chloride Content % Chloride by Weight of Concrete	**0-10 mm**	Total	Corrected	Total	Corrected	Total	Corrected
	20-30 mm						
	40-50 mm						
	60-70 mm						
	80-90 mm						
AIR VOIDS	**Air Content,%**						
	Spec. Surf.,mm^2/mm^3						
	Spacing Factor, mm						
TEST LABORATORY							
REMARKS **- orientation of rebars and cover** **- presence of overlay, patch and thickness** **- other observed defects**		Granular present.		Rebar imprint @138mm (Longitudinal - LR). 85mm concrete overlay.		20mm spall at the top. 90mm concrete patched. 90mm concrete overlay.	

1. Condition-G=Good, F=Fair, P=Poor.
2. Defects-C= Cracked, D= Delamination, R= Rough, Sc= Scaling, S= Spalling
3. Condition Rebar- G= Good, LR= Light Rust, SR= Severe Rust, N/A= No rebar exposed

Condition of Epoxy Coating – ECG=Good, ECF=Fair, ECP=Poor-rusted & debonded areas

CORE LOG ASPHALT COVERED BRIDGE DECKS

 Site: **980305**

Core No.		**C4**		**C5**		**C6**	
Location (between gridlines)		'B' and '19'		'C' and '15'		'B' and '12'	
Diameter, mm		100.0		100.0		100.0	
Thickness of Asphalt, mm		90.0		80.0		70.0	
Thickness of Asphalt @ Nearest Grid Point		90.0		80.0		70.0	
Thickness of Concrete, mm		204.0		102.0		225.0	
Full Depth (yes/no)		No		No		No	
Condition of Asphalt (1)		F		F		F	
Waterproofing (W/P) Type		Hot rubberized asphalt with protection board		Hot rubberized asphalt with protection board		Hot rubberized asphalt with protection board	
Condition of W/P (1)		G		G		G	
W/P Thickness, mm		6 to 8 mm		6 to 8 mm		6 to 8 mm	
Bond of Asphalt or W/P to Concrete		F		F		F	
Defects in Concrete (2)		-		-		-	
Condition of Rebar (3)		N/A		G		N/A	
Corrosion Potential		-0.167		-0.180		-0.221	
Compressive Strength, MPa							
		Total	Corrected	Total	Corrected	Total	Corrected
Chloride Content % Chloride by Weight of Concrete	**0-10 mm**	0.034	0.013				
	20-30 mm	0.032	0.011				
	40-50 mm	0.031	0.010				
	60-70 mm	0.029	0.008				
	80-90 mm	0.026	0.005				
	100-110 mm	0.023	0.002				
AIR VOIDS	**Air Content,%**			7.9			
	Spec. Surf.,mm^2/mm^3			42.90			
	Spacing Factor, mm			0.090			
TEST LABORATORY				BCC			
REMARKS **- orientation of rebars and cover** **- presence of overlay, patch and thickness** **- other observed defects**		Core damaged upon removal.		Rebnar imprint @100mm (Transverse).		Asphalt core damaged upon removal.	

1. Condition-G=Good, F=Fair, P=Poor.
2. Defects-C= Cracked, D= Delamination, R= Rough, Sc= Scaling, S= Spalling
3. Condition Rebar- G= Good, LR= Light Rust, SR= Severe Rust, N/A= No rebar exposed

Condition of Epoxy Coating – ECG=Good, ECF=Fair, ECP=Poor-rusted & debonded areas

CORE LOG ASPHALT COVERED BRIDGE DECKS

 Site: **980305**

Core No.		**C7**		**C8**		**C9**	
Location (between gridlines)		'C' and '6'		'A' and '1'		'G' and '1'	
Diameter, mm		100.0		100.0		100.0	
Thickness of Asphalt, mm		80.0		80.0		80.0	
Thickness of Asphalt @ Nearest Grid Point		80.0		80.0		80.0	
Thickness of Concrete, mm		215.0		138.0		200.0	
Full Depth (yes/no)		No		No		No	
Condition of Asphalt [1]		G		G		G	
Waterproofing (W/P) Type		Hot rubberized asphalt with protection board		Hot rubberized asphalt with protection board		Hot rubberized asphalt with protection board	
Condition of W/P [1]		G		G		G	
W/P Thickness, mm		6 to 8 mm		6 to 8 mm		6 to 8 mm	
Bond of Asphalt or W/P to Concrete		F		F		F	
Defects in Concrete [2]		-		-		-	
Condition of Rebar [3]		N/A		LR		LR	
Corrosion Potential		-0.329		-0.426		-0.414	
Compressive Strength, MPa							
		Total	Corrected	Total	Corrected	Total	Corrected
Chloride Content % Chloride by Weight of Concrete	**0-10 mm**			0.032	0.011		
	20-30 mm			0.029	0.008		
	40-50 mm			0.025	0.004		
	60-70 mm			0.033	0.012		
	80-90 mm			0.098	0.077		
	100-110 mm			0.083	0.062		
	120-130 mm			0.058	0.037		
AIR VOIDS	**Air Content,%**	7.3					
	Spec. Surf.,mm^2/mm^3	36.2					
	Spacing Factor, mm	0.092					
TEST LABORATORY		BCC		BCC			
REMARKS **- orientation of rebars and cover** **- presence of overlay, patch and thickness** **- other observed defects**		90mm concrete overlay.		Rebar imprint @133mm (Transverse - LR). 70mm concrete overlay.		Rebar imprint @195mm (Longitudinal - LR). 100mm concrete overlay.	

1. Condition-G=Good, F=Fair, P=Poor.
2. Defects-C= Cracked, D= Delamination, R= Rough, Sc= Scaling, S= Spalling
3. Condition Rebar- G= Good, LR= Light Rust, SR= Severe Rust, N/A= No rebar exposed

Condition of Epoxy Coating – ECG=Good, ECF=Fair, ECP=Poor-rusted & debonded areas

CORE LOG ASPHALT COVERED BRIDGE DECKS

 Site: 980305

Core No.		C10		C11		C12	
Location (between gridlines)		'E' and '5'		'G' and '10'		'D' and '13'	
Diameter, mm		100.0		100.0		100.0	
Thickness of Asphalt, mm		80.0		70.0		70.0	
Thickness of Asphalt @ Nearest Grid Point		80.0		70.0		70.0	
Thickness of Concrete, mm		120.0		210.0		104.0	
Full Depth (yes/no)		No		No		No	
Condition of Asphalt [1]		F		F		G	
Waterproofing (W/P) Type		Hot rubberized asphalt with protection board		Hot rubberized asphalt with protection board		Hot rubberized asphalt with protection board	
Condition of W/P [1]		G		G		G	
W/P Thickness, mm		6 to 8 mm		6 to 8 mm		6 to 8 mm	
Bond of Asphalt or W/P to Concrete		F		F		F	
Defects in Concrete [2]		-		-		-	
Condition of Rebar [3]		LR		N/A		G	
Corrosion Potential		-0.397		-0.278		-0.260	
Compressive Strength, MPa							
		Total	Corrected	Total	Corrected	Total	Corrected
Chloride Content % Chloride by Weight of Concrete	0-10 mm			0.033	0.012		
	20-30 mm			0.028	0.007		
	40-50 mm			0.023	0.002		
	60-70 mm			0.021	0.000		
	80-90 mm			0.025	0.004		
	100-110 mm			0.030	0.009		
	120-130 mm			0.026	0.005		
	140-150 mm			0.024	0.003		
AIR VOIDS	Air Content,%						
	Spec. Surf.,mm^2/mm^3						
	Spacing Factor, mm						
TEST LABORATORY				BCC			
REMARKS - orientation of rebars and cover - presence of overlay, patch and thickness - other observed defects		Rebar imprint @112mm (Transverse - LR). 90mm concrete overlay.		90mm concrete overlay.		Rebar imprint @104mm (Transverse). 80mm concrete overlay.	

1. Condition-G=Good, F=Fair, P=Poor.
2. Defects-C= Cracked, D= Delamination, R= Rough, Sc= Scaling, S= Spalling
3. Condition Rebar- G= Good, LR= Light Rust, SR= Severe Rust, N/A= No rebar exposed

Condition of Epoxy Coating – ECG=Good, ECF=Fair, ECP=Poor-rusted & debonded areas

CORE LOG ASPHALT COVERED BRIDGE DECKS

Site: **980305**

Core No.		**C13**		**C14**		**C15**	
Location (between gridlines)		'E' and '19'		'F' and '23'		'G' and '28'	
Diameter, mm		100.0		100.0		100.0	
Thickness of Asphalt, mm		75.0		65.0		80.0	
Thickness of Asphalt @ Nearest Grid Point		75.0		65.0		80.0	
Thickness of Concrete, mm		140.0		190.0		235.0	
Full Depth (yes/no)		No		No		Yes	
Condition of Asphalt [1]		F		G		G	
Waterproofing (W/P) Type		Hot rubberized asphalt with protection board		Hot rubberized asphalt with protection board		Hot rubberized asphalt with protection board	
Condition of W/P [1]		G		G		G	
W/P Thickness, mm		6 to 8 mm		6 to 8 mm		6 to 8 mm	
Bond of Asphalt or W/P to Concrete		F		F		G	
Defects in Concrete [2]		-		-		D	
Condition of Rebar [3]		N/A		LR		N/A	
Corrosion Potential		-0.157		-0.398		-0.383	
Compressive Strength, MPa							
		Total	Corrected	Total	Corrected	Total	Corrected
Chloride Content % Chloride by Weight of Concrete	**0-10 mm**			0.028	0.007		
	20-30 mm			0.026	0.005		
	40-50 mm			0.024	0.003		
	60-70 mm			0.021	0.000		
	80-90 mm			0.026	0.005		
	100-110 mm			0.023	0.002		
	120-130 mm			0.023	0.002		
	140-150 mm			0.021	0.000		
AIR VOIDS	**Air Content,%**						
	Spec. Surf.,mm^2/mm^3						
	Spacing Factor, mm						
TEST LABORATORY				BCC			
REMARKS **- orientation of rebars and cover** **- presence of overlay, patch and thickness** **- other observed defects**		65mm concrete overlay.		Rebar imprint @185mm (Longitudinal - LR). 85mm concrete overlay.		95mm concrete overlay (debonded).	

1. Condition-G=Good, F=Fair, P=Poor.
2. Defects-C= Cracked, D= Delamination, R= Rough, Sc= Scaling, S= Spalling
3. Condition Rebar- G= Good, LR= Light Rust, SR= Severe Rust, N/A= No rebar exposed

Condition of Epoxy Coating – ECG=Good, ECF=Fair, ECP=Poor-rusted & debonded areas

Appendix E:

Sawn Asphalt Sample Photographs

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Photo S1 – Sawn Sample SS1



Photo S2 – Sawn Sample SS2



Photo S3 – Sawn Sample SS3 - crack



Photo S4 – Sawn Sample SS4



Photo S5 – Sawn Sample SS5



Photo S6 – Sawn Sample SS6- crack

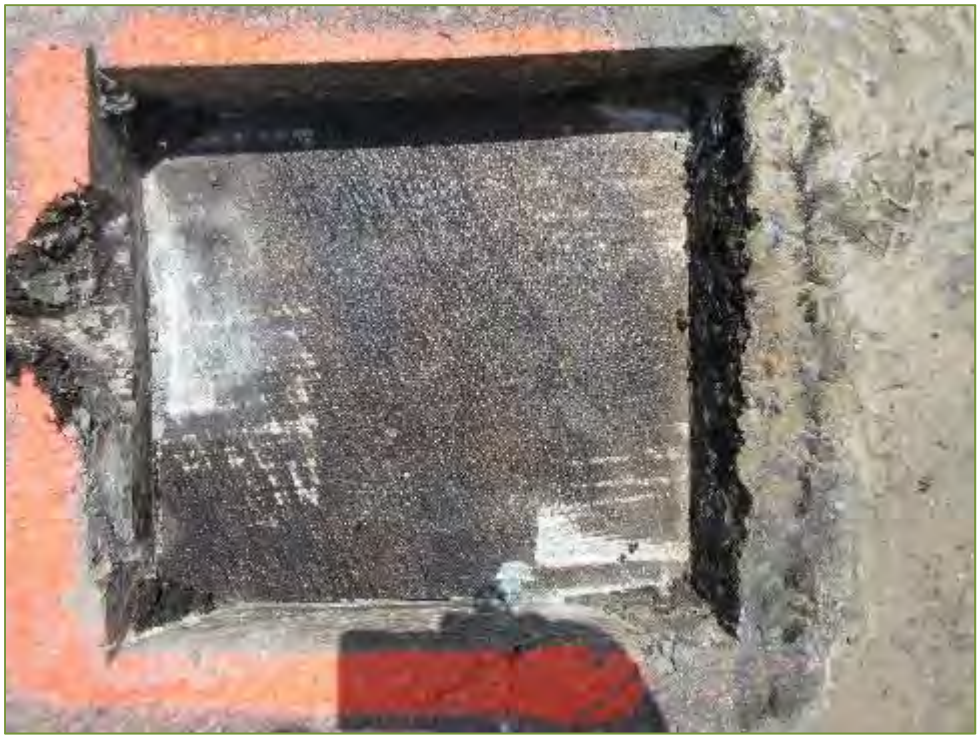


Photo S7 – Sawn Sample SS7



Photo S8 – Sawn Sample SS8



Photo S9 – Sawn Sample SS9



Photo S10 – Sawn Sample SS10



Photo S11 – Sawn Sample SS11



Photo S12 – Sawn Sample SS12

Appendix F:

Sawn Asphalt Sample Logs

SAWN ASPHALT SAMPLE LOG

Site No: **980305**

Sample No.	SS1	SS2	SS3
Location (between gridlines)	'B' and '29'	'B' and '25'	'C' and '20'
Size, mm X mm	370x340	310x310	300x260
Thickness of Asphalt, mm	80	80	90
Thickness of Asphalt @ Nearest Grid Point	80	80	90
Condition of Asphalt (1)	G	F	F
Waterproofing (W/P) Type	Hot rubberized asphalt with protection board	Hot rubberized asphalt with protection board	Hot rubberized asphalt with protection board
W/P Thickness, mm	6 to 8 mm	6 to 8 mm	6 to 8 mm
Condition of W/P (1)	G	G	G
Bond of W/P to Asphalt	G	G	G
Bond of Asphalt or W/P to Concrete	F	F	F
Concrete Cover to Reinf., mm	110L	112T	104T
Defects in Concrete Surface (2)	-	-	C
Corrosion Potential on Concrete Surface	-0.428	-0.178	-0.204
Remarks			Cracks.

1. Condition - G = Good, F = Fair, P = Poor.
2. Defects - C = Cracked, D = Delamination, R = Rough, Sc = Scaling, S = Spalling

SAWN ASPHALT SAMPLE LOG

Site No: **980305**

Sample No.	SS4	SS5	SS6
Location (between gridlines)	'A' and '17'	'C' and '10'	'C' and '4'
Size, mm X mm	330x330	310x290	320x300
Thickness of Asphalt, mm	100	80	80
Thickness of Asphalt @ Nearest Grid Point	100	80	80
Condition of Asphalt (1)	G	F	F
Waterproofing (W/P) Type	Hot rubberized asphalt with protection board	Hot rubberized asphalt with protection board	Hot rubberized asphalt with protection board
W/P Thickness, mm	6 to 8 mm	6 to 8 mm	6 to 8 mm
Condition of W/P (1)	G	G	G
Bond of W/P to Asphalt	G	G	G
Bond of Asphalt or W/P to Concrete	F	F	F
Concrete Cover to Reinf., mm	96L	96L	<125
Defects in Concrete Surface (2)	-	-	C
Corrosion Potential on Concrete Surface	-0.243	-0.254	-0.319
Remarks			Cracks.

1. Condition - G = Good, F = Fair, P = Poor.
2. Defects - C = Cracked, D = Delamination, R = Rough, Sc = Scaling, S = Spalling

SAWN ASPHALT SAMPLE LOG

Site No: **980305**

Sample No.	SS7	SS8	SS9
Location (between gridlines)	'E' and '1'	'F' and '7'	'D' and '11'
Size, mm X mm	350x350	290x290	330x330
Thickness of Asphalt, mm	85	85	85
Thickness of Asphalt @ Nearest Grid Point	85	85	85
Condition of Asphalt [(1)]	G	F to G	F to G
Waterproofing (W/P) Type	Hot rubberized asphalt with protection board	Hot rubberized asphalt with protection board	Hot rubberized asphalt with protection board
W/P Thickness, mm	6 to 8 mm	6 to 8 mm	6 to 8 mm
Condition of W/P [(1)]	G	G	G
Bond of W/P to Asphalt	G	G	G
Bond of Asphalt or W/P to Concrete	F to G	F	F to G
Concrete Cover to Reinf., mm	125L	107T	106T
Defects in Concrete Surface [(2)]	-	-	-
Corrosion Potential on Concrete Surface	-0.418	-0.275	-0.231
Remarks			

1. Condition - G = Good, F = Fair, P = Poor.
2. Defects - C = Cracked, D = Delamination, R = Rough, Sc = Scaling, S = Spalling

SAWN ASPHALT SAMPLE LOG

Site No: **980305**

Sample No.	SS10	SS11	SS12
Location (between gridlines)	'G' and '14'	'E' and '18'	'E' and '26'
Size, mm X mm	330x330	330x280	320x270
Thickness of Asphalt, mm	75	80	75
Thickness of Asphalt @ Nearest Grid Point	75	80	75
Condition of Asphalt (1)	G	F to G	F to G
Waterproofing (W/P) Type	Hot rubberized asphalt with protection board	Hot rubberized asphalt with protection board	Hot rubberized asphalt with protection board
W/P Thickness, mm	6 to 8 mm	6 to 8 mm	6 to 8 mm
Condition of W/P (1)	G	G	G
Bond of W/P to Asphalt	G	G	F to G
Bond of Asphalt or W/P to Concrete	F	F	F
Concrete Cover to Reinf., mm	86L	100L	97L
Defects in Concrete Surface (2)	-	-	-
Corrosion Potential on Concrete Surface	-0.165	-0.231	-0.261
Remarks			

1. Condition - G = Good, F = Fair, P = Poor.
2. Defects - C = Cracked, D = Delamination, R = Rough, Sc = Scaling, S = Spalling

Appendix G:

Site Photographs

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Photo P1 – North Elevation



Photo P2 – Deck General View, looking east



Photo P3 – Deck General View, looking west



Photo P4 – Deck Wearing Surface (fair condition – unsealed cracks)



Photo P5 – Deck Wearing Surface (unsealed cracks)



Photo P6 – Deck Wearing Surface (unsealed cracks)



Photo P7 – Soffit between West Abutment and West Pier (fair to poor condition – cracks, spall, delamination, light scaling and wet area) **and Girders** (fair condition – light to medium corrosion)



Photo P8 – Soffit at West Abutment, south edge (cracks, spall and delamination) **and Girders** (light corrosion)



Photo P9 – Soffit at West Abutment (cracks and spall) **and Girders** (light corrosion) note exposed rebar



Photo P10 – Soffit between West Abutment and West Pier (cracks, delamination and wet area) **and Girders** (light corrosion) note light to medium corrosion on deck drain



Photo P11 – Soffit between West Abutment and West Pier, north edge (cracks and spall) **and Girders** (light corrosion)



Photo P12 – Soffit at West Pier, south edge (cracks, spall and delamination) **and Girders** (light corrosion)



Photo P13 – Soffit at West Pier (cracks, spall and delamination) **and Girders** (light corrosion)



Photo P14 – Soffit at West Pier (cracks, delamination and spall) **and Girders** (light corrosion) note exposed rebar



Photo P15 – Soffit at West Pier, north edge (cracks, delamination and spall) **and Girders** (light to medium corrosion)



Photo P16 – Soffit between East Pier and West Pier (fair condition – cracks, spall, light scaling, patched and wet area) **and Girders**



Photo P17 – Soffit at West Pier, south edge (cracks) **and Girders** note light to medium corrosion on deck drain



Photo P18 – Soffit at West Pier (patched area) **and Girders**



Photo P19 – Soffit at West Pier, north edge (crack) **and Girders** note light to severe corrosion on deck



Photo P20 – Soffit between East Pier and West Pier, south edge (cracks, and spall) **and Girders** note light to medium corrosion on deck drain



Photo P21 – Soffit between East Pier and West Pier (cracks and light scaling) **and Girders**



Photo P22 – Soffit between East Abutment and East Pier (fair to poor condition – cracks, spall, delamination and wet area) **and Girders** (fair condition – light to medium corrosion)



Photo P23 – Soffit at East Pier, south edge (cracks, spall and wet area) **and Girders** (light to medium corrosion) note severe corrosion on deck drain

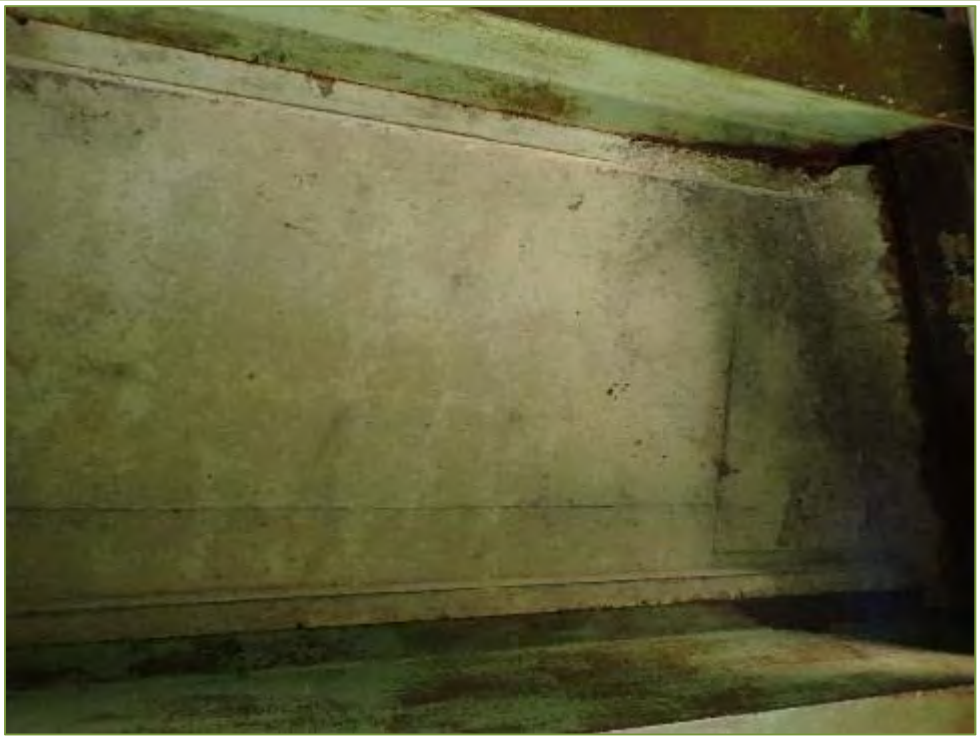


Photo P24 – Soffit at East Pier (spall and wet area) **and Girders** (light corrosion)



Photo P25 – Soffit at East Pier, north edge (cracks and spall) **and Girders** (light corrosion)



Photo P26 – Soffit between East Abutment and East Pier (cracks and spall) **and Girders** (light corrosion)



Photo P27 – Soffit between East Abutment and East Pier, north edge (cracks, spall and delamination) **and Girders** (light corrosion)



Photo P28 – Soffit at East Abutment, south edge (cracks and delamination) **and Girders** (light corrosion) note light to medium corrosion on deck drain



Photo P29 – Soffit at East Abutment, north edge (cracks and spall) **and Girders** (light corrosion) note light to medium corrosion on deck drain



Photo P30 – Diaphragm at West Abutment (light to medium corrosion)



Photo P31 – Diaphragm at East Abutment (light to medium corrosion)



Photo P32 – South Elevation – Fascia (cracks and spall)



Photo P33 – South Elevation – Fascia (cracks, spall and delamination) note exposed rebar



Photo P34 – South Elevation – Fascia (cracks, spall and delamination)



Photo P35 – South Elevation – Fascia (spall) note exposed rebar



Photo P36 – North Elevation – Fascia (cracks, spall and delamination)



Photo P37 – North Elevation – Fascia (cracks, spall and delamination)



Photo P38 – East Approach Wearing Surface (fair condition – unsealed cracks)



Photo P39 – West Approach Wearing Surface (fair to good condition – unsealed cracks)



Photo P40 – North Deck Drainage – 1st from west



Photo P41 – North Deck Drainage – 2nd from west



Photo P42 – North Deck Drainage – 3rd from west



Photo P43 – North Deck Drainage – 4th from west



Photo P44 – North Deck Drainage – 5th from west



Photo P45 – North Deck Drainage – 6th from west



Photo P46 – North Deck Drainage – 7th from west



Photo P47 – South Deck Drainage – 1st from west



Photo P48 – South Deck Drainage – 2nd from west



Photo P49 – South Deck Drainage – 3rd from west



Photo P50 – South Deck Drainage – 4th from west



Photo P51 – South Deck Drainage – 5th from west



Photo P52 – South Deck Drainage – 6th from west



Photo P53 – South Deck Drainage – 7th from west



Photo P54 – Wearing Surface at East Joint



Photo P55 – Wearing Surface at East Pier Joint



Photo P56 – Wearing Surface at West Pier Joint



Photo P57 – Wearing Surface at West Joint



Photo P58 – North Curb (poor condition – cracks, spall and delamination) **and Concrete Handrails** (fair condition – cracks, spall, delamination and light scaling)



Photo P59 – North Curb (cracks, spall and delamination) **and Concrete Handrails** (cracks, spall and delamination) note exposed and corroded rebar



Photo P60 – North Curb (cracks, spall and delamination) **and Concrete Handrails** (delamination and light scaling) note exposed and corroded rebar



Photo P61 – North Curb (cracks and delamination) **and Concrete Handrails** (cracks, spall and



Photo P62 – North Concrete Handrails (cracks, spall and delamination)



Photo P63 – North Curb (cracks, spall and delamination) **and Concrete Handrails** (cracks, spall, delamination and light scaling) note exposed and corroded rebar



Photo P64 – South Curb (poor condition – cracks, spall and delamination) **and Concrete Handrails** (fair to poor condition – cracks, spall, light to medium scaling and delamination)



Photo P65 – South Curb (cracks, spall and delamination) **and Concrete Handrails** (cracks, spall, delamination and light scaling)



Photo P66 – South Curb (cracks, spall and delamination) **and Concrete Handrails** (spall and delamination)



Photo P67 – South Curb (cracks, spall and delamination) **and Concrete Handrails** (cracks and spall)



Photo P68 – South Curb (cracks, spall and delamination) **and Concrete Handrails** (cracks, spall and delamination)



Photo P69 – South Curb – Exterior Face (spall) note exposed and corroded rebar



Photo P70 – South Curb – Exterior Face (spall) note exposed and corroded rebar



Photo P71 – North East End Post (good condition – light scaling)



Photo P72 – North West End Post (fair to good condition – crack and delamination)



Photo P73 – South East End Post (fair to good condition – medium scaling)



Photo P74 – South West End Post (good condition – light scaling)



Photo P75 – North East Guiderail (good condition)



Photo P76 – North West Guiderail (good condition – light corrosion)



Photo P77 – South East Guiderail (good condition)



Photo P78 – South West Guiderail (good condition)



Photo P79 – West Abutment (good condition – cracks, light scaling and wet area) **and Ballast Wall** (good condition)



Photo P80 – West Abutment (crack, light scaling and wet area)



Photo P81 – West Abutment (cracks)



Photo P82 – West Abutment (cracks and light scaling)



Photo P83 – West Abutment Steel Bearing - 1st bearing from south (fair condition – medium corrosion)



Photo P84 – West Abutment Steel Bearing – 2nd bearing from south (fair condition – medium corrosion)



Photo P85 – West Abutment Steel Bearing – 3rd bearing from south (fair condition – medium corrosion)



Photo P86 – West Abutment Steel Bearing – 4th bearing from south (fair condition – medium corrosion)



Photo P87 – West Abutment Steel Bearing – 5th bearing from south (fair condition – medium corrosion)



Photo P88 – West Abutment Steel Bearing – 6th bearing from south (fair condition – medium corrosion)



Photo P89 – West Abutment Steel Bearing – 7th bearing from south (fair condition – medium corrosion)



Photo P90 – East Abutment (good condition – cracks, light scaling and wet area) **and Ballast Wall** (good condition – cracks and wet area)



Photo P91 – East Abutment (cracks, light scaling and wet area)



Photo P92 – East Abutment (cracks and wet area)



Photo P93 – East Abutment (cracks and wet area)



Photo P94 – East Abutment Steel Bearing - 1st bearing from south (fair condition – medium corrosion)



Photo P95 – East Abutment Steel Bearing – 2nd bearing from south (fair condition – medium corrosion)



Photo P96 – East Abutment Steel Bearing – 3rd bearing from south (fair condition – medium corrosion)



Photo P97 – East Abutment Steel Bearing – 4th bearing from south (fair condition – medium corrosion)



Photo P98 – East Abutment Steel Bearing – 5th bearing from south (fair condition – medium corrosion)



Photo P99 – East Abutment Steel Bearing – 6th bearing from south (fair condition – medium corrosion)



Photo P100 – East Abutment Steel Bearing – 7th bearing from south (fair condition – medium corrosion) note cracks and wet area on ballast wall



Photo P101 – South West Wingwall (fair to good condition – cracks, delamination and wet area)



Photo P102 – South West Wingwall (cracks and delamination)



Photo P103 – South East Wingwall (fair to good condition – cracks, spall and wet area)



Photo P104 – North West Wingwall (fair condition – cracks, spall, delamination and wet area)



Photo P105 – North East Wingwall (fair to good condition – cracks and wet area)



Photo P106 – West Pier – West Face (fair condition – cracks, delamination, light scaling and wet area)



Photo P107 – West Pier – West Face (delamination and light scaling)



Photo P108 – West Pier – West Face



Photo P109 – West Pier - East Face (fair to good condition – cracks, spall, delamination, light scaling and



Photo P110 – West Pier - East Face (cracks, spall, delamination, light scaling and wet area)



Photo P111 – West Pier - East Face (cracks, spall and wet area) note exposed rebar



Photo P112 – East Pier - West Face (good condition – cracks, light scaling and wet area)



Photo P113 – East Pier - East Face (fair condition – cracks, delamination, light scaling and wet area)



Photo P114 – East Pier - East Face (cracks, delamination and wet area)



Photo P115 – West Rip Rap Slope (good condition)



Photo P116 – East Rip Rap Slope (good condition)



Photo P117 – South West Embankment (good condition)



Photo P118 – North West Embankment (good condition)



Photo P119 – North East Embankment (good condition)



Photo P120 – Typical Condition of Inside Core – C1 (east approach, granular)



Photo P121 – Typical Condition of Inside Core – C6



Photo P122 – Typical Condition of Inside Core – C8 (light rust)



Photo P123 – Typical Condition of Inside Core – C11



Photo P124 – Typical Condition of Inside Core – C13 (crack)



Photo P125 – Typical Condition of Inside Core – C14 (light rust)



Photo P126 – Typical Condition of Inside Core – C15 (full depth)



Photo P127 – Duct at South Fascia note unstable anchorage due to spall

Appendix H:

Laboratory Test Results

200 Viceroy Road, Unit 4, Vaughan, ON L4K 3N8
www.bridgecheckcanada.com
Tel: 905-660-6608 Fax: 905-660-6609
info@bridgecheckcanada.com

COMPRESSIVE STRENGTH OF CONCRETE CORES

(CSA A23.2-14C)

Project No.:	**BCC17018**
Site No.:	**980305**
Location:	**Site No. 980305 Dennis Bridge Haldimand County, Ontario**

Core ID	C6	C9	
Location	*Deck*	*Deck*	
Lab No.	-	-	
Date Cast	-	-	
Date Cored	July 10, 2017	July 10, 2017	
Date Tested	July 19 2017	July19 2017	
Capped Height (mm)	171	126	
Average Diameter (mm)	100.0	100.0	
Density (kg/m^3)	2273	2301	
Corrected Compressive Strength (MPa)	39.3	56.9	
*** Direction of Loading**	Longitudinal	Longitudinal	
Moisture Contact at Time of Test	Dry	Dry	
Remarks			

*Relative to the direction of original placement.

Savio DeSouza, M.A.Sc., P.Eng.
Senior Principal Engineer

TOTAL CHLORIDE ION CONTENT

(Testing Method: MTO LS – 417)

Project No.:	**BCC17018**
Site No.:	**980305**
Location:	**Dennis Bridge Haldimand county, ON**

Core ID	Lab No.	Horizon from the Top of the Core (mm)	Chloride Ion Content (%)	Chloride Ion Content Corrected for Background* (%)
C4	L17-0493	0-10	0.034	0.013
		20-30	0.032	0.011
		40-50	0.031	0.010
		60-70	0.029	0.008
		80-90	0.026	0.005
		100-110	0.023	0.002
C8	L17-0497	**0-10(overlay)**	0.032	0.011
		20-30(overlay)	0.029	0.008
		40-50(overlay)	0.025	0.004
		60-70(overlay)	0.033	0.012
		80-90	0.098	0.077
		100-110	0.083	0.062
		120-130	0.058	0.037
C11	L17-0499	**0-10(overlay)**	0.033	0.012
		20-30(overlay)	0.028	0.007
		40-50(overlay)	0.023	0.002
		60-70(overlay)	0.021	0.000
		80-90(overlay)	0.025	0.004
		100-110	0.030	0.009
		120-130	0.026	0.005
		140-150	0.024	0.003
C14	L17-0500	**0-10(overlay)**	0.028	0.007
		20-30(overlay)	0.026	0.005
		40-50(overlay)	0.024	0.003
		60-70(overlay)	0.021	0.000
		80-90(overlay)	0.026	0.005
		100-110	0.023	0.002
		120-130	0.023	0.002
		140-150	0.021	0.000

Background chloride **(original concrete) = 0.021%*
Background chloride **(overlay) =0.021%*
***The threshold of chloride ion generally regarded to be able to initiate reinforcing bar corrosion is 0.025%.*

Tested By: Sukhjinder Singh
Date Tested: July21, 2017

Savio DeSouza, M.A.Sc., P.Eng.
Senior Principal Engineer

AIR VOID TEST RESULTS

(Modified Point Count – ASTM C457, Procedure B)

Project No.:	**BCC17018**
Site No.:	980305
Location:	Dennis Bridge Haldimand County, Ontario

Core ID	C5	**C7**	**-**
Lab No.	L17-0494	L17-0496	-
Air Content (%)	7.9	7.3	-
Specific Surface (mm^{-1})	42.90	36.20	-
Spacing Factor (mm)	0.090	0.092	-
Dimension of Specimen Tested			-
Length of Traverse (mm)	3283.2	3283.2	-
Area Traversed (mm^2)	7879.68	7879.68	-
Average Chord Length	0.093	0.110	-
Number of Stops	1368	1368	-
No. of Voids per mm	0.854	0.668	--
Paste-Air Ratio	3.87	3.33	-
Paste Content (%)	30.84	24.63	-
Aggregate Content (%)	61.20	67.99	-

Tested By: Brad Wiersma
Date Tested: JULY, 2017

Savio DeSouza, M.A.Sc., P.Eng.
Senior Principal Engineer

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Mt. Laurel, New Jersey 08054
Telephone: 856-231-9449
Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: Bridge Check Canada Ltd.
200 Viceroy Rd Unit 4
Vaughan ON L4K3N8

Client: BRI780

Report Date: 9/6/2017
Report No.: 545323 - PLM
Project:
Project No.: BCC17018

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 6328768	**Description:** Black Asphalt	**Location:** Site #985301/On Deck
Client No.: 1	**Facility:**	
Percent Asbestos:	Percent Non-Asbestos Fibrous Material:	Percent Non-Fibrous Material:
None Detected	None Detected	100
Lab No.: 6328769	**Description:** Black Asphalt	**Location:** Site #985301/On Deck
Client No.: 2	**Facility:**	
Percent Asbestos:	Percent Non-Asbestos Fibrous Material:	Percent Non-Fibrous Material:
None Detected	None Detected	100
Lab No.: 6328770	**Description:** Black Asphalt	**Location:** Site #985301/On Deck
Client No.: 3	**Facility:**	
Percent Asbestos:	Percent Non-Asbestos Fibrous Material:	Percent Non-Fibrous Material:
None Detected	None Detected	100
Lab No.: 6328771	**Description:** Black Asphalt	**Location:** Site #980305/On Deck
Client No.: 1	**Facility:**	
Percent Asbestos:	Percent Non-Asbestos Fibrous Material:	Percent Non-Fibrous Material:
None Detected	None Detected	100
Lab No.: 6328772	**Description:** Black Asphalt	**Location:** Site #980305/On Deck
Client No.: 2	**Facility:**	
Percent Asbestos:	Percent Non-Asbestos Fibrous Material:	Percent Non-Fibrous Material:
None Detected	None Detected	100
Lab No.: 6328773	**Description:** Black Asphalt	**Location:** Site #980305/On Deck
Client No.: 3	**Facility:**	
Percent Asbestos:	Percent Non-Asbestos Fibrous Material:	Percent Non-Fibrous Material:
None Detected	None Detected	100
Lab No.: 6328774	**Description:** Black Asphalt	**Location:** Site #010016/On Deck
Client No.: 1	**Facility:**	
Percent Asbestos:	Percent Non-Asbestos Fibrous Material:	Percent Non-Fibrous Material:
None Detected	None Detected	100

Analytical Method -**US EPA 600, R93-116**. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 8/29/2017
Date Analyzed: 09/06/2017
Signature:
Analyst: Randy Caran

Approved By:
Frank E. Ehrenfeld, III
Laboratory Director

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CERTIFICATE OF ANALYSIS

Client: Bridge Check Canada Ltd.
200 Viceroy Rd Unit 4
Vaughan ON L4K3N8

Client: BRI780

Report Date: 9/6/2017
Report No.: 545323 - PLM
Project:
Project No.: BCC17018

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 6328775 **Client No.:** 2	**Description:** Black Asphalt **Facility:**	**Location:** Site #010016/On Approach
Percent Asbestos: *None Detected*	Percent Non-Asbestos Fibrous Material: None Detected	Percent Non-Fibrous Material: 100
Lab No.: 6328776 **Client No.:** 3	**Description:** Black Asphalt **Facility:**	**Location:** Site #010016/On Approach
Percent Asbestos: *None Detected*	Percent Non-Asbestos Fibrous Material: None Detected	Percent Non-Fibrous Material: 100
Lab No.: 6328777 **Client No.:** 1	**Description:** Black Asphalt **Facility:**	**Location:** Site #000019/On Approach
Percent Asbestos: *None Detected*	Percent Non-Asbestos Fibrous Material: None Detected	Percent Non-Fibrous Material: 100
Lab No.: 6328778 **Client No.:** 2	**Description:** Black Asphalt **Facility:**	**Location:** Site #000019/On Deck
Percent Asbestos: *None Detected*	Percent Non-Asbestos Fibrous Material: None Detected	Percent Non-Fibrous Material: 100
Lab No.: 6328779 **Client No.:** 3	**Description:** Black Asphalt **Facility:**	**Location:** Site #000019/On Deck
Percent Asbestos: *None Detected*	Percent Non-Asbestos Fibrous Material: None Detected	Percent Non-Fibrous Material: 100

Analytical Method -**US EPA 600, R93-116**. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 8/29/2017
Date Analyzed: 09/06/2017
Signature:
Analyst: Randy Caran

Approved By:
Frank E. Ehrenfeld, III
Laboratory Director

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CERTIFICATE OF ANALYSIS

Client: Bridge Check Canada Ltd.
200 Viceroy Rd Unit 4
Vaughan ON L4K3N8

Client: BRI780

Report Date: 9/6/2017
Report No.: 545323 - PLM
Project:
Project No.: BCC17018

Appendix to Analytical Report

Customer Contact: Moe Abdollahi
Analysis: US EPA 600, R93-116

This appendix seeks to promote greater understanding of any observations, exceptions, special instructions, or circumstances that the laboratory needs to communicate to the client concerning the above samples. The information below is used to help promote your ability to make the most informed decisions for you and your customers. Please note the following points of contact for any questions you may have.

iATL Customer Service: customerservice@iatl.com
iATL Office Manager: cdavis@iatl.com
iATL Account Representative: Shirley Clark
Sample Login Notes: See Batch Sheet Attached
Sample Matrix: Bulk Building Materials
Exceptions Noted: See Following Pages

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Information Pertinent to this Report:

Analysis by US EPA 600 93-116: Determination of Asbestos in Bulk Building Materials by Polarized Light Microscopy (PLM).

Certifications:

- NIST-NVLAP No. 101165-0
- NY-DOH No. 11021
- AIHA-LAP, LLC No. 100188

Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analytical Methodology Alternatives: Your initial request for analysis may not have accounted for recent advances in regulatory requirements or advances in technology that are routinely used in similar situations for other qualified projects. You may have the option to explore additional analysis for further information. Below are a few options, listed as the matrix followed by the appropriate methodology. Also included are links to more information on our website.

Bulk Building Materials that are Non-Friable Organically Bound (NOB) by Gravimetric Reduction techniques employing PLM and TEM: ELAP 198.6 (PLM-NOB), ELAP 198.4 (TEM-NOB)

Loose Fill Vermiculite Insulation, Attic Insulation, Zonolite (copyright), etc.: US EPA 600 R-4/004 (multi-tiered analytical process)
Sprayed On Insulation/Fireproofing with Vermiculite (SOF-V): ELAP 198.8 (PLM-SOF-V)>

Soil, sludge, sediment, aggregate, and like materials analyzed for asbestos or other elongated mineral particles (ex. erionite, etc.): ASTM D7521, CARB 435, and other options available

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CERTIFICATE OF ANALYSIS

Client: Bridge Check Canada Ltd.
200 Viceroy Rd Unit 4
Vaughan ON L4K3N8

Client: BRI780

Report Date: 9/6/2017
Report No.: 545323 - PLM
Project:
Project No.: BCC17018

Asbestos in Surface Dust according to one of ASTM's Methods (very dependent on sampling collection technique – by TEM): ASTM D 5755, D5756, or D6480

Various other asbestos matrices (air, water, etc.) and analytical methods are available.

Disclaimers / Qualifiers:

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1) Note: No mastic provided for analysis.
2) Note: Insufficient mastic provided for analysis.
3) Note: Insufficient material provided for analysis.
4) Note: Insufficient sample provided for QC reanalysis.
5) Note: Different material than indicated on Sample Log / Description.
6) Note: Sample not submitted.
7) Note: Attached to asbestos containing material.
8) Note: Received wet.
9) Note: Possible surface contamination.
10) Note: Not building material. 1% threshold may not apply.
11) Note: Recommend TEM-NOB analysis as per EPA recommendations.
12) Note: Asbestos detected but not quantifiable.
13) Note: Multiple identical samples submitted, only one analyzed.
14) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.080%.
15) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.125%.

Recommendations for Vermiculite Analysis:

Several analytical protocols exist for the analysis of asbestos in vermiculite. These analytical approaches vary depending upon the nature of the vermiculite mineral being tested (e.g. un-processed gange, homogeneous exfoliated books of mica, or mixed mineral composites).Please contact your client representative for pricing and turnaround time options available.

iATL recommends initial testing using the EPA 600/R-93/116 method. This method is specifically designed for the analysis of asbestos in bulk building materials. It provides an acceptable starting point for primary screening of vermiculite for possible asbestos.

Results from this testing may be inconclusive. EPA suggests proceeding to a multi-tiered analysis involving wet separation techniques in conjunction with PLM and TEM gravimetric analysis (EPA 600/R-04/004).

Further information on this method and other vermiculite and asbestos issues can be found at the following: Agency for Toxic Substances and Disease Registry (ATSDR) www.atsdr.cdc.gov, United States Geological Survey (USGS) www.minerals.usgs.gov/minerals/, US EPA www.epa.gov/asbestos. The USEPA also has an informative brochure "Current Best Practices for Vermiculite Attic Insulation" EPA 747F03001 May 2003, that may assist the health and remediation professional.

The following is a summary of the analytical process outlines in the EPA 600/R-04/004 Method:

1)**Analytical Step/Method:** Initial Screening by PLM, EPA 600R-93/116
Requirements/Comments: Minimum of 0.1 g of sample. ~0.25% LOQ for most samples.

2)**Analytical Step/Method:** Wet Separation by PLM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Sinks" only.

3)**Analytical Step/Method:** Wet Separation by PLM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Floats" only.

4)**Analytical Step/Method:** Wet Separation by TEM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Sinks" only.

5)**Analytical Step/Method:** Wet Separation by TEM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Suspension" only.

LOQ, Limit of Quantitation estimates for mass and volume analyses.
*With advance notice and confirmation by the laboratory.
**Approximately 1 Liter of sample in double-bagged container (~9x6 inch bag of sample).

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CERTIFICATE OF ANALYSIS

Client: Bridge Check Canada Ltd.
200 Viceroy Rd Unit 4
Vaughan ON L4K3N8

Client: BRI780

Report Date: 9/25/2017
Report No.: 547179 - Lead Paint
Project:
Project No.: BCC17018

Appendix to Analytical Report:

Customer Contact: Moe Abdollahi
Analysis: ASTM D3335-85a

This appendix seeks to promote greater understanding of any observations, exceptions, special instructions, or circumstances that the laboratory needs to communicate to the client concerning the above samples. The information below is used to help promote your ability to make the most informed decisions for you and your customers. Please note the following points of contact for any questions you may have.

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iATL Account Representative: Shirley Clark
Sample Login Notes: See Batch Sheet Attached
Sample Matrix: Paint
Exceptions Noted: See Following Pages

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Information Pertinent to this Report:

Analysis by ASTM D3335-85a by AAS

Certification:
- National Lead Laboratory Program (NLLAP): AIHA-LAP, LLC No. 100188
- NYSDOH-ELAP No. 11021

Regulatory limit is 0.5% lead by weight (EPA/HUD guidelines). Recommend multiple sampling for all samples less than regulatory limit for confirmation.
All results are based on the samples as received at the lab. iATL assumes that appropriate sampling methods have been used and that the data upon which these results are based have been accurately supplied by the client.
Method Detection Limit (MDL) per EPA Method 40CFR Part 136 Apendix B.
Reporting Limit (RL) based upon Lowest Standard Determined (LSD) in accordance with AIHA-ELLAP policies.
LSD=0.2 ppm MDL=0.005% by weight. RL= 0.010% by weight (based upon 100 mg sampled).

Disclaimers / Qualifiers:

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* Insufficient sample provided to perform QC reanalysis (<200 mg)

** Not enough sample provided to analyze (<50 mg)

*** Matrix / substrate interference possible.

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Telephone: 856-231-9449
Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: Bridge Check Canada Ltd.
200 Viceroy Rd Unit 4
Vaughan ON L4K3N8

Client: BRI780

Report Date: 9/25/2017
Report No.: 547179 - Lead Paint
Project:
Project No.: BCC17018

Appendix to Analytical Report:

Customer Contact: Moe Abdollahi
Analysis: ASTM D3335-85a

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- NYSDOH-ELAP No. 11021

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All results are based on the samples as received at the lab. iATL assumes that appropriate sampling methods have been used and that the data upon which these results are based have been accurately supplied by the client.
Method Detection Limit (MDL) per EPA Method 40CFR Part 136 Apendix B.
Reporting Limit (RL) based upon Lowest Standard Determined (LSD) in accordance with AIHA-ELLAP policies.
LSD=0.2 ppm MDL=0.005% by weight. RL= 0.010% by weight (based upon 100 mg sampled).

Disclaimers / Qualifiers:

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* Insufficient sample provided to perform QC reanalysis (<200 mg)

** Not enough sample provided to analyze (<50 mg)

*** Matrix / substrate interference possible.

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CERTIFICATE OF ANALYSIS

Client: Bridge Check Canada Ltd.
200 Viceroy Rd Unit 4
Vaughan ON L4K3N8

Client: BRI780

Report Date: 9/25/2017
Report No.: 547179 - Lead Paint
Project:
Project No.: BCC17018

LEAD PAINT SAMPLE ANALYSIS SUMMARY

Lab No.: 6350251 **Description:**
Client No.: 1 **Location:** Site No. 980305
Result (% by Weight): 0.26
Result (ppm): 2600
Comments:

Lab No.: 6350252 **Description:**
Client No.: 2 **Location:** Site No. 980305
Result (% by Weight): 0.053
Result (ppm): 530
Comments: ***

Lab No.: 6350253 **Description:**
Client No.: 3 **Location:** Site No. 980305
Result (% by Weight): 0.32
Result (ppm): 3200
Comments:

Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 9/25/2017
Date Analyzed: 09/25/2017
Signature:
Analyst: Chad Shaffer

Approved By:
Frank E. Ehrenfeld, III
Laboratory Director

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Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: Bridge Check Canada Ltd.
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Client: BRI780

Report Date: 9/25/2017
Report No.: 547179 - Lead Paint
Project:
Project No.: BCC17018

Appendix to Analytical Report:

Customer Contact: Moe Abdollahi
Analysis: ASTM D3335-85a

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Exceptions Noted: See Following Pages

General Terms, Warrants, Limits, Qualifiers:

General information about iATL capabilities and client/laboratory relationships and responsibilities are spelled out in iATL policies that are listed at www.iATL.com and ir our Quality Assurance Manual per ISO 17025 standard requirements. The information therein is a representation of iATL definitions and policies for turnaround times, sample submittal, collection media, blank definitions, quantification issues and limit of detection, analytical methods and procedures, sub-contracting policies, results reporting options, fees, terms, and discounts, confidentiality, sample archival and disposal, and data interpretation.

iATL warrants the test results to be of a precision normal for the type and methodology employed for each sample submitted. iATL disclaims any other warrants, expressed or implied, including warranty of fitness for a particular purpose and warranty of merchantability. iATL accepts no legal responsibility for the purpose for which the client uses test results. Any analytical work performed must be governed by our Standard Terms and Conditions. Prices, methods and detection limits may be changed without notification. Please contact your Customer Service Representative for the most current information.

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA LAP LLC, or any agency of local, state or province governments nor of any agency of the U.S. government.

This report shall not be reproduced except in full, without written approval of the laboratory.

Information Pertinent to this Report:

Analysis by ASTM D3335-85a by AAS

Certification:
- National Lead Laboratory Program (NLLAP): AIHA-LAP, LLC No. 100188
- NYSDOH-ELAP No. 11021

Regulatory limit is 0.5% lead by weight (EPA/HUD guidelines). Recommend multiple sampling for all samples less than regulatory limit for confirmation.
All results are based on the samples as received at the lab. iATL assumes that appropriate sampling methods have been used and that the data upon which these results are based have been accurately supplied by the client.
Method Detection Limit (MDL) per EPA Method 40CFR Part 136 Apendix B.
Reporting Limit (RL) based upon Lowest Standard Determined (LSD) in accordance with AIHA-ELLAP policies.
LSD=0.2 ppm MDL=0.005% by weight. RL= 0.010% by weight (based upon 100 mg sampled).

Disclaimers / Qualifiers:

There may be some samples in this project that have a "NOTE:" associated with a sample result. We use added disclaimers or qualifiers to inform the client about something that requires further explanation. Here is a complete list with highlighted disclaimers pertinent to this project. For a full explanation of these and other disclaimers, please inquire at **customerservice@iatl.com.**

* Insufficient sample provided to perform QC reanalysis (<200 mg)

** Not enough sample provided to analyze (<50 mg)

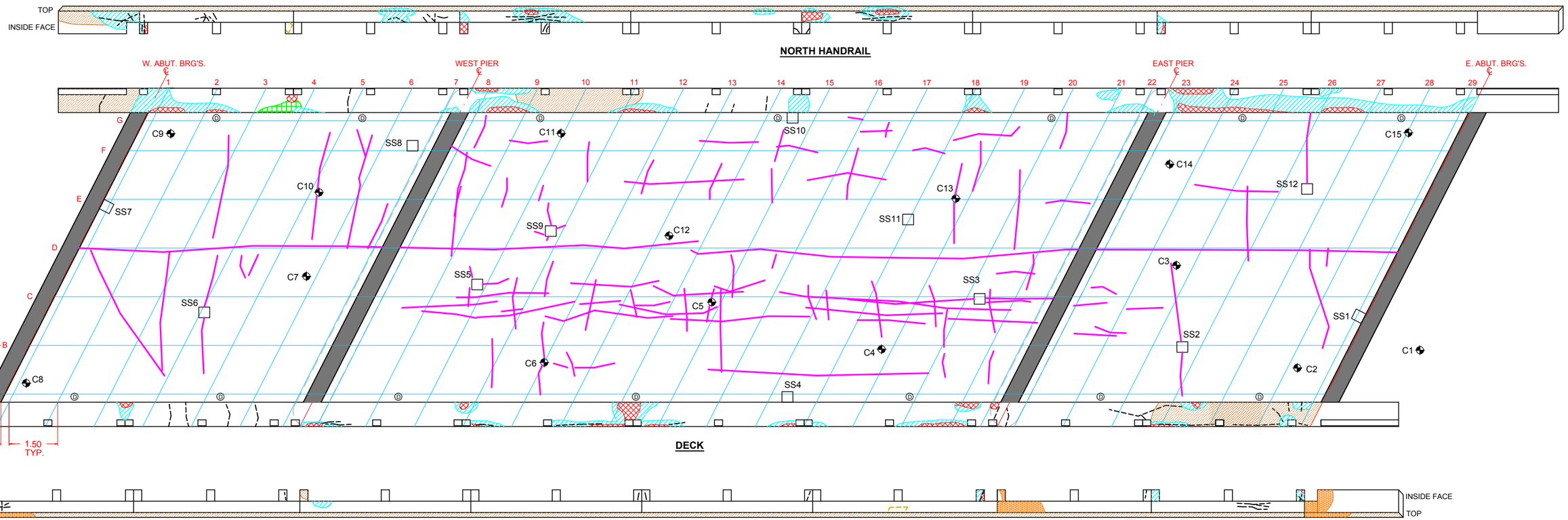
*** Matrix / substrate interference possible.

Appendix I:

ACAD Drawings

200 Viceroy Road, Unit 4, Vaughan, ON L4K 3N8
www.bridgecheckcanada.com
Tel: 905-660-6608 Fax: 905-660-6609
info@bridgecheckcanada.com

CONSTRUCTION NORTH



KEY PLAN



LEGEND:

Ⓓ Drain	Medium Scaling	Medium Concrete Cracks
C1 Core Sample Location	Severe Scaling	W Wide Concrete Cracks
SS1 Sawn Sample Location	Honeycombed Areas	Medium Stained/ Efflorescence Cracks
Patched Spalls	Wet Areas	Unsealed Asphalt Cracks
Delaminations	Concrete Pattern cracks	SC Sealed Asphalt Cracks
Spalls	Raveling	Rutting
Light Scaling	Pot Hole/ Asphalt Patch	

BRIDGE CHECK CANADA

200 Viceroy Road, Unit 4
Vaughan, ON L4K 3N8
T: 905-660-6608 F: 905-660-6609

PROJECT:

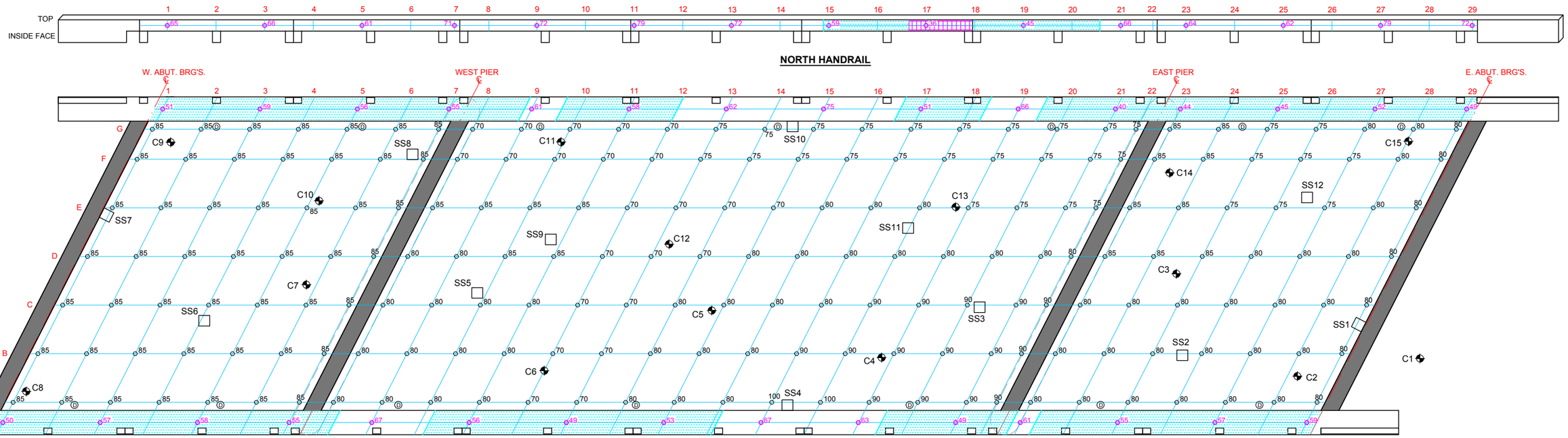
Dennis Bridge
Site No: 980305
Haldimand County, ON

TITLE:

SURFACE DETERIORATION OF ASPHALT ON DECK, CONCRETE CURBS AND HANDRAILS

Drawing No.:	1
Project No.:	BCC17018
Date:	August 2017
Scale:	1:125
Drawn by:	SZ
Checked by:	MA

CONSTRUCTION NORTH



KEY PLAN



LEGEND:

- Drain
- C1 Core Sample Location
- SS1 Sawn Sample Location
- 80 Asphalt Thickness-mm
- 80 Concrete cover-mm
- Cover over 60mm
- Cover from 40mm to 60mm
- Cover from 20mm to 39mm
- Cover less than 20mm
- G1 AC Resistance test Location
- Ground Location
- Ground Check Location
- 0.000 to -0.199 volts
- -0.200 to -0.299 volts
- -0.300 to -0.349 volts
- -0.350 to -0.449 volts
- more negative than -0.450 volts
- 460 Copper-Copper Sulphate Half-Cell Potential (negative volts x10^{-3})

BRIDGE CHECK CANADA

200 Viceroy Road, Unit 4
Vaughan, ON L4K 3N8
T: 905-660-6608 F: 905-660-6609

PROJECT:

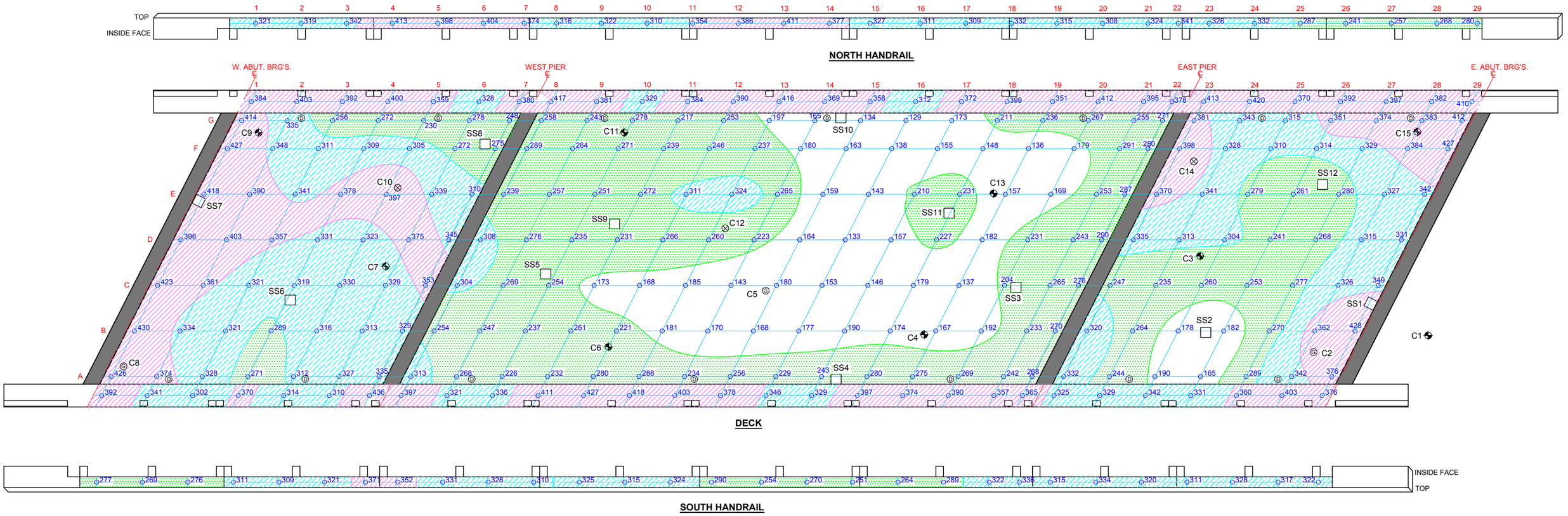
Dennis Bridge
Site No: 980305
Haldimand County, ON

TITLE:

ASPHALT THICKNESS OF DECK, CONCRETE COVER OF CURBS AND HANDRAILS

Drawing No.:	2
Project No.:	BCC17018
Date:	August 2017
Scale:	1:125
Drawn by:	SZ
Checked by:	MA

CONSTRUCTION NORTH



KEY PLAN



LEGEND:

- Drain
- C1 Core Sample Location
- SS1 Sawn Sample Location
- 80 Asphalt Thickness-mm
- 80 Concrete cover-mm
- Cover over 60mm
- Cover from 40mm to 60mm
- Cover from 20mm to 39mm
- Cover less than 20mm
- G1 AC Resistance test Location
- Ground Location
- Ground Check Location
- 0.000 to -0.199 volts
- -0.200 to -0.299 volts
- -0.300 to -0.349 volts
- -0.350 to -0.449 volts
- more negative than -0.450 volts
- 460 Copper-Copper Sulphate Half-Cell Potential (negative volts x10^{-3})

BRIDGE CHECK CANADA

200 Viceroy Road, Unit 4
Vaughan, ON L4K 3N8
T: 905-660-6608 F: 905-660-6609

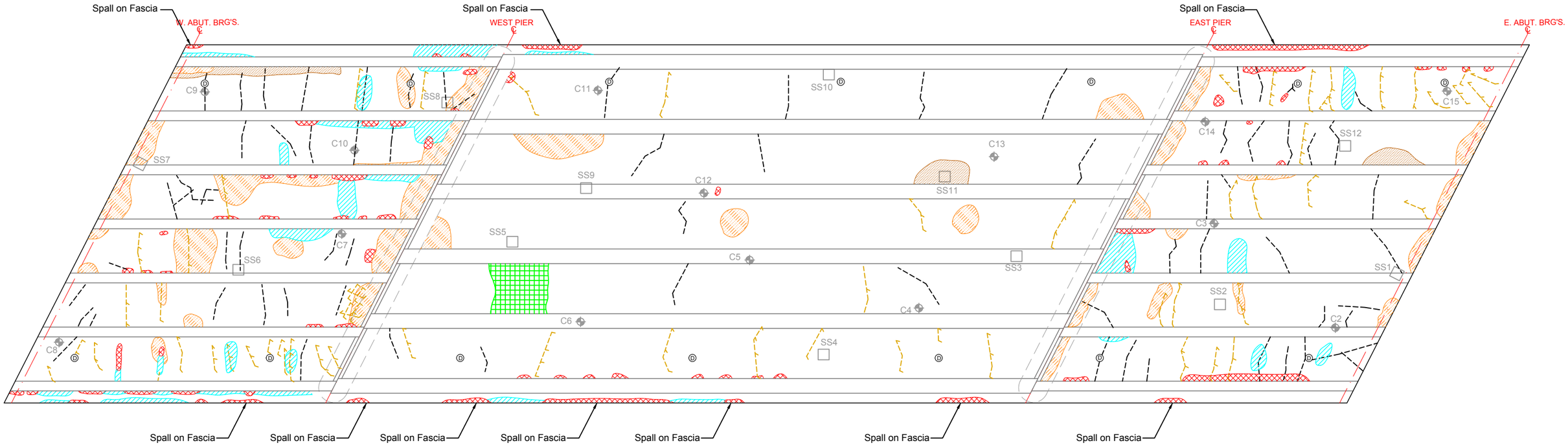
PROJECT:

Dennis Bridge
Site No: 980305
Haldimand County, ON

TITLE:

CORROSION POTENTIAL OF DECK, CONCRETE CURBS AND HANDRAILS

Drawing No.:	3
Project No.:	BCC17018
Date:	August 2017
Scale:	1:125
Drawn by:	SZ
Checked by:	MA



KEY PLAN



LEGEND:

- Drain
- C1 Core Sample Location
- SS1 Sawn Sample Location
- Patched Spalls
- Delaminations
- Spalls
- Light Scaling
- Medium Scaling
- Severe Scaling
- Honeycombed Areas
- Wet Areas
- Concrete Pattern cracks
- Medium Concrete Cracks
- W Wide Concrete Cracks
- Medium Stained/ Efflorescence Cracks

BRIDGE CHECK CANADA

200 Viceroy Road, Unit 4
Vaughan, ON L4K 3N8
T: 905-660-6608 F: 905-660-6609

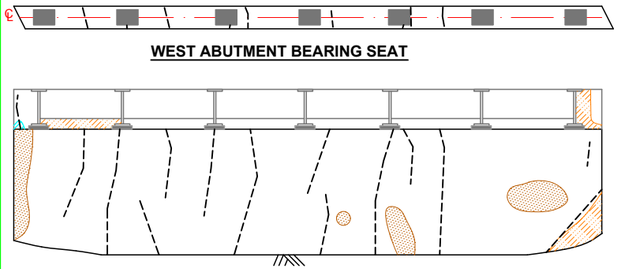
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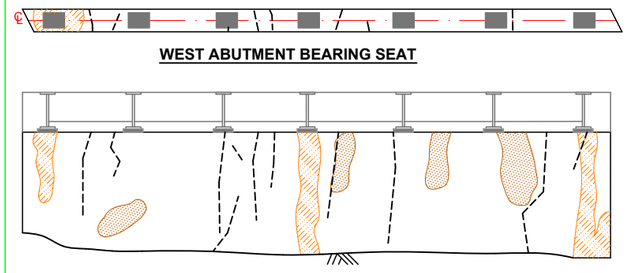
Dennis Bridge
Site No: 980305
Haldimand County, ON

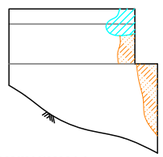
TITLE:

SURFACE DETERIORATION OF SOFFIT

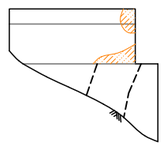
Drawing No.:	4
Project No.:	BCC17018
Date:	August 2017
Scale:	1:125
Drawn by:	SZ
Checked by:	MA

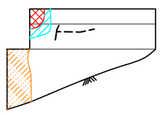




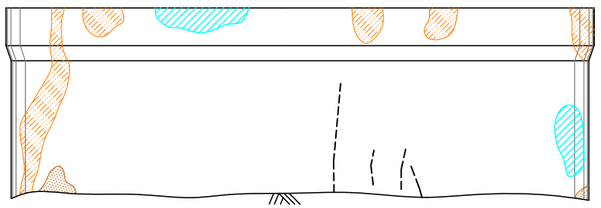

SW WINGWALL

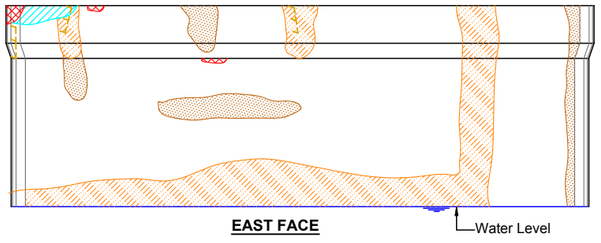

SE WINGWALL


NE WINGWALL


NW WINGWALL

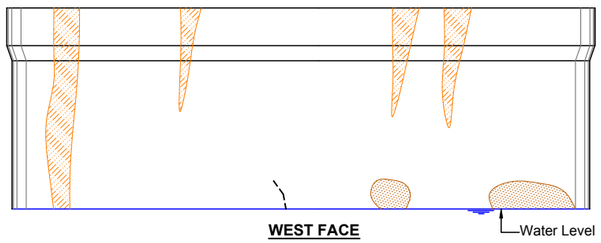
WEST PIER


WEST FACE

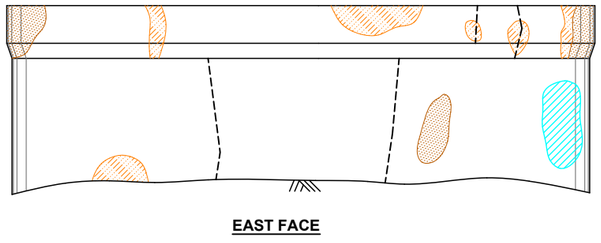


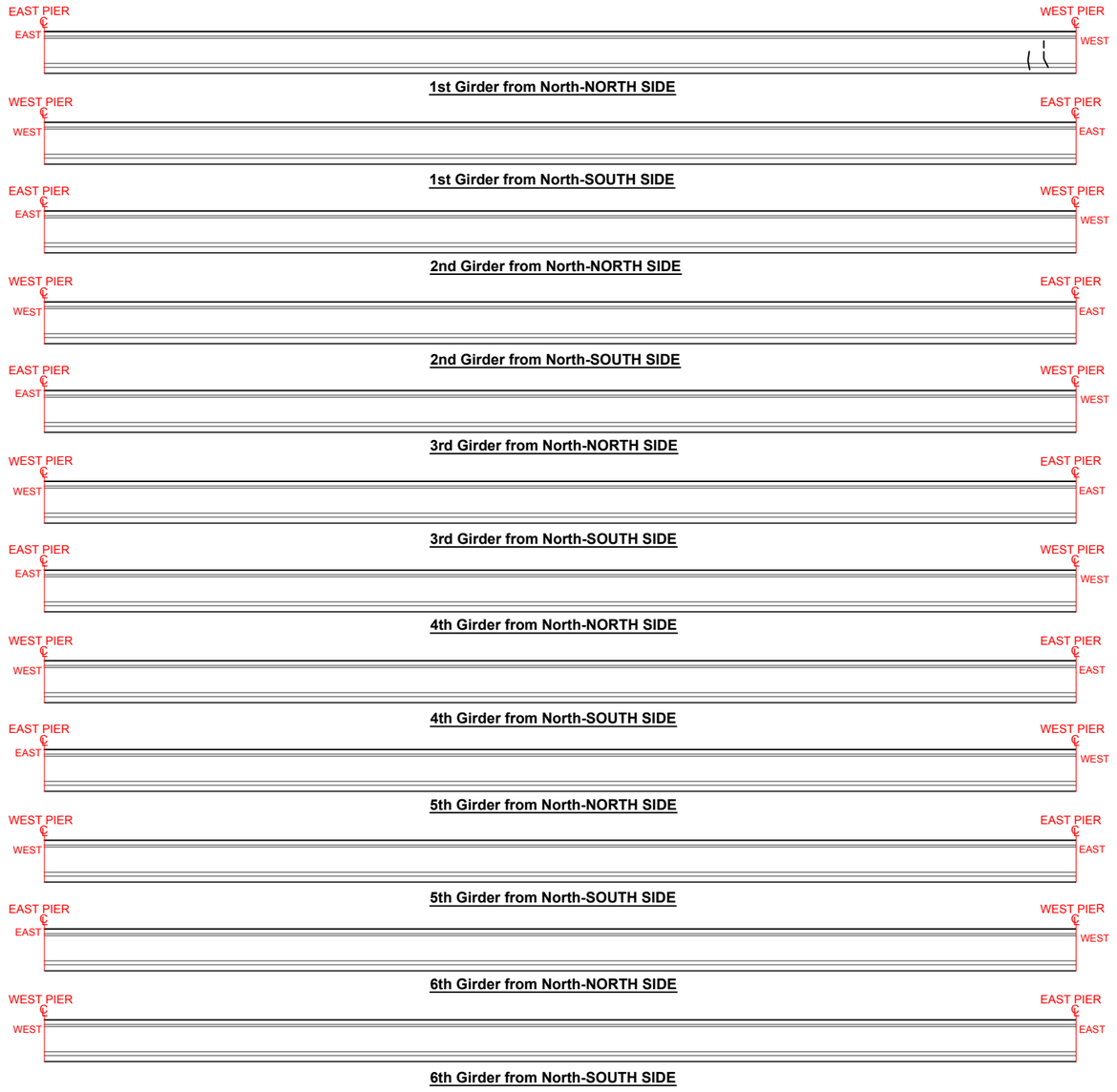
EAST FACE

EAST PIER



WEST FACE


EAST FACE



KEY PLAN



LEGEND:

- Drain
- C1 Core Sample Location
- SS1 Sawn Sample Location
- Patched Spalls
- Delaminations
- Spalls
- Light Scaling
- Medium Scaling
- Severe Scaling
- Honeycombed Areas
- Wet Areas
- Concrete Pattern cracks
- Medium Concrete Cracks
- W Wide Concrete Cracks
- Medium Stained/ Efflorescence Cracks

BRIDGE CHECK CANADA
200 Viceroy Road, Unit 4
Vaughan, ON L4K 3N8
T: 905-660-6608 F: 905-660-6609

PROJECT:

Dennis Bridge
Site No: 980305
Haldimand County, ON

TITLE:

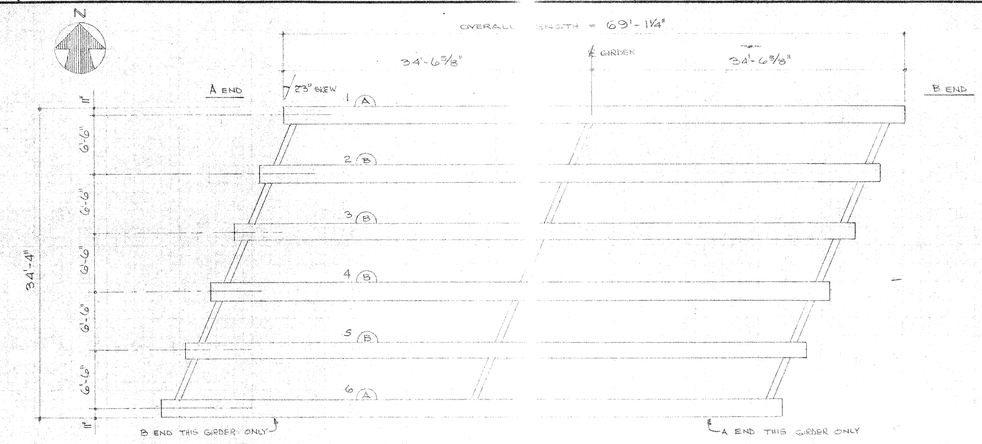
SURFACE DETERIORATION OF ABUTMENTS, WINGWALLS, PIERS AND GIRDERS

Drawing No.:	5
Project No.:	BCC17018
Date:	August 2017
Scale:	1:125
Drawn by:	SZ
Checked by:	MA

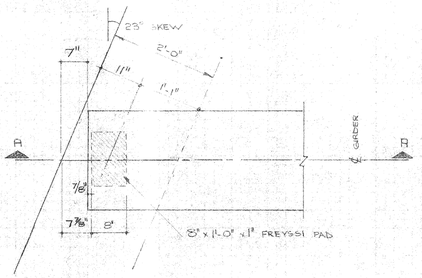
APPENDIX B

Existing Bridge Drawings

Dennis Bridge over Sandusk Creek
Feb. 1966 – D. C. Cramm

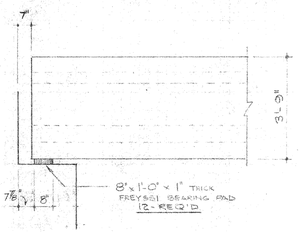


GIRDER LAYOUT PLAN
⅛" TO 1'-0"

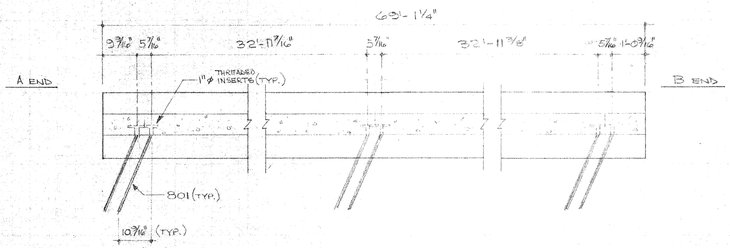


BEARING PLAN
¾" TO 1'-0"

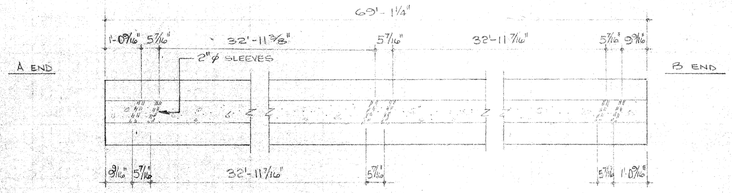
7" x 7" x 1" NEOPRENE PADS BETWEEN GIRDERS 3 & 4 (4 REQ'D)
AT GUIDE BLOCKS



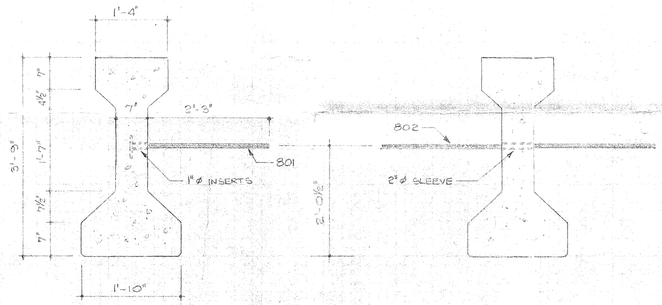
SECTION A-A
⅜" TO 1'-0"



GIRDER TYPE A 2-REQ'D
½" TO 1'-0"

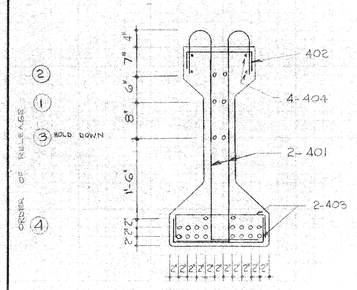


GIRDER TYPE B 4-REQ'D
½" TO 1'-0"

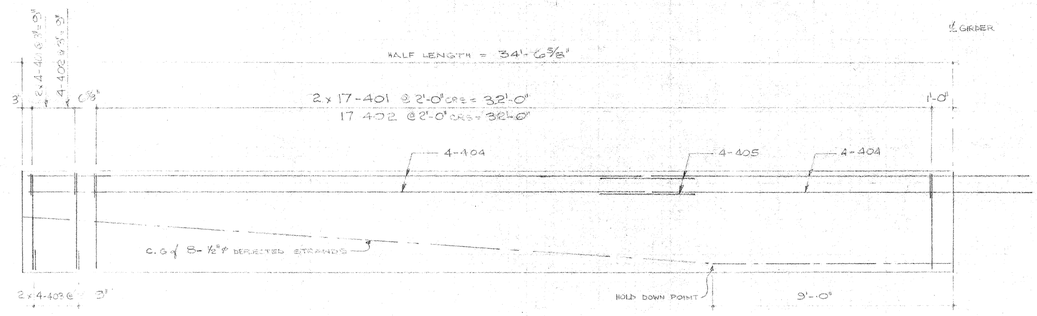


INSERT & SLEEVE LOCATIONS
¾" TO 1'-0"

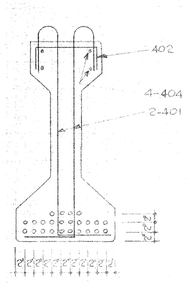
ASSHO III



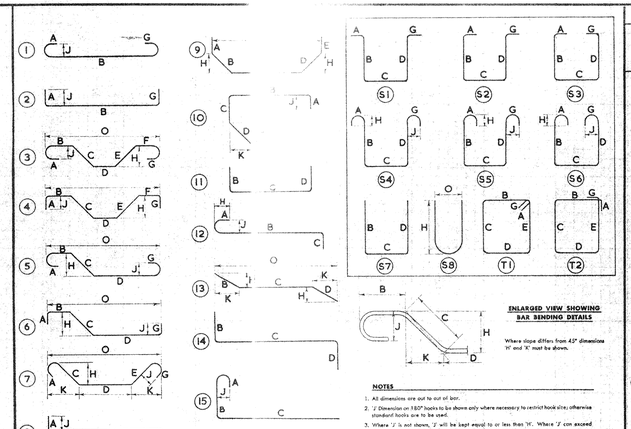
SECTION AT ENDS
¾" TO 1'-0"



HALF REINFORCING ELEVATION
⅛" TO 1'-0"



SECTION AT CENTRE
¾" TO 1'-0"



ENLARGED VIEW SHOWING BAR BENDING DETAILS

Where slope differs from 45° dimensions 'H' and 'K' must be shown.

NOTES

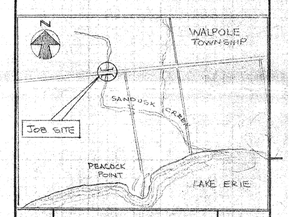
1. All dimensions are out to out of bar.
2. 'J' Dimension on 180° hooks to be shown only where necessary to restrict hook size; otherwise standard hooks are to be used.
3. Where 'J' is not shown, 'J' will be kept equal to or less than 'H'. Where 'J' can exceed 'H', it should be shown.
4. 'H' Dimension on stirrups to be shown where necessary to restrict hooks.
5. Where bars are to be bent more accurately than standard bending tolerances, bending dimensions which require closer working should have limits indicated.
6. Figures in circles show types.
7. No allowance for bend curvature is to be made except for standard hook and radii in excess of same.
8. First figure of mark number indicates bar size.

MARK	No. BARS	LENGTH	TYPE	A	B	C	D	E	F	G	H	J	K	O	REMARKS
401	504	3'-8"	12	1'-0"	3'-11½"	10½"						10"	4⅜"		
402	252	1'-8"	11		5"	1'-6½"	5"								TOP OF GIRDER
403	96	2'-3"	11		4½"	1'-9½"	4½"								ENDS ONLY
404	72	22'-11"	STR.												
405	48	4'-0"	STR.												LAP BARS
801	12	2'-6"			1" ϕ DOWELS WITH 3" THREAD ONE END FOR DIAPHRAGMS										
802	24	5'-1"	STR		1" ϕ DOWELS FOR DIAPHRAGMS										

DRAWINGS PREPARED FROM

GENERAL NOTES

1. CONCRETE STRENGTH @ 28 DAYS = 5000 P.S.I.
   CONCRETE STRENGTH @ TRANSFER = 4000 P.S.I.
2. STRAND FORCES:
   INITIAL FORCE = 28.20 K/strand
   FINAL FORCE = 22.85 K/strand
3. REINFORCING SHALL BE OF INTERMEDIATE GRADE DEFORMED STEEL BARS
4. MINIMUM COVER TO REINFORCING STEEL SHALL BE 1½" UNLESS OTHERWISE NOTED
5. ALL EXPOSED ARRISES TO BE PENCIL ROUND
6. LIFTING HOOKS SHALL BE 7 WIRE STRAND, CUT OFF FLUSH TO FACE AFTER ERECTION NO BURN MARKS TO APPEAR ON EXPOSED FACES
7. ~~DOVE TAIL ANCHOR SLOTS TO BE GALVANIZED~~
8. ~~PAINT ALL EXPOSED METAL SURFACES (EXCEPT BASE PLATES) IN THE SHOP~~
9. THE CONCRETE SURFACE OF THE OUT-SIDE OF THE EXTERIOR GIRDERS SHALL BE GIVEN A CLASS 'A' FINISH. ALL OTHER SURFACES SHALL BE GIVEN A CLASS 'B' FINISH TOP SURFACE TO BE ROUGHENED BY BROOMING.
10. TOLERANCES
    LENGTH ±⅜"
    CROSS SECTION ⅛" FROM EACH DIM. NOT CUMULATIVE
    ALIGNMENT ⅛" MAX. IN ANY 10'-0" LENGTH WITH MAX ½" IN O/ALL LENGTH
11. DIAPHRAGM BOWELS, TO BE INSERTED PRIOR TO SHIPPING OF GIRDER
12. STRANDS AT ENDS TO BE BURNED OFF FLUSH WITH FACE THEN PAINTED WITH ONE COAT OF BITUMASTIC OR SIMULAR
13. BEARING PADS TO BE SET IN A GROUT MIXTURE: ONE PART PORTLAND CEMENT & ONE PART SAND THEN REMOVE EXCESS MORTAR.



BY	ITEM	DATE
R.T.H.	C. REVISED STRAND PATTERN	MAY 30/66
R.T.H.	B. NEW STRAND PATTERN	MAY 19/66
R.T.H.	A. ARCH. AMENDS	MAY 19/66

REVISIONS:

Note: Beams constructed before approval

NO.	ITEM	DATE

ORDERING

APPROVED FOR PRODUCTION PER DATE

APPROVED FOR ERECTION PER DATE

Revisions in green on superseded plans. (No elongation sheets received for last revision (B))

STRAND PATTERN

24 - ½" ϕ STRANDS 270 K/ULT
INITIAL FORCE 28.20 K/STRAND
FINAL FORCE 22.85 K/STRAND
CONC. STR. @ TRANSFER 4000 P.S.I.
CONC. STR. @ 28 DAYS 5000 P.S.I.

Revised

DEPARTMENT OF HIGHWAYS ONTARIO
APPROVED JUN 29 1966 (DATE) PURSUANT TO THE HIGHWAY IMPROVEMENT ACT AND THE MUNICIPAL ACT.
APPROVAL NO. 13737
Municipal Bridge Liaison Engineer

STRUCTURE SITE No. 9-68

SCHELL INDUSTRIES LTD.
PRECAST CONCRETE DIVISION
WOODSTOCK ONTARIO

JOB
DENNIS BRIDGE
WALPOLE TOWNSHIP

ARCH.
ENG.
CONTR.

DETAIL
GIRDER LAYOUT & DETAILS
ASSHO III

DRAWN BY	DATE	DRAWING NO
R.T.H.	MAY 5/66	5 OF 10
CHECKED BY	SCALE	REVISION NO.
C.M.C.K.	AS NOTED	C

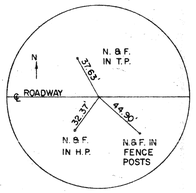
MAY 30/1966

MISSISSAUGA OFFICE

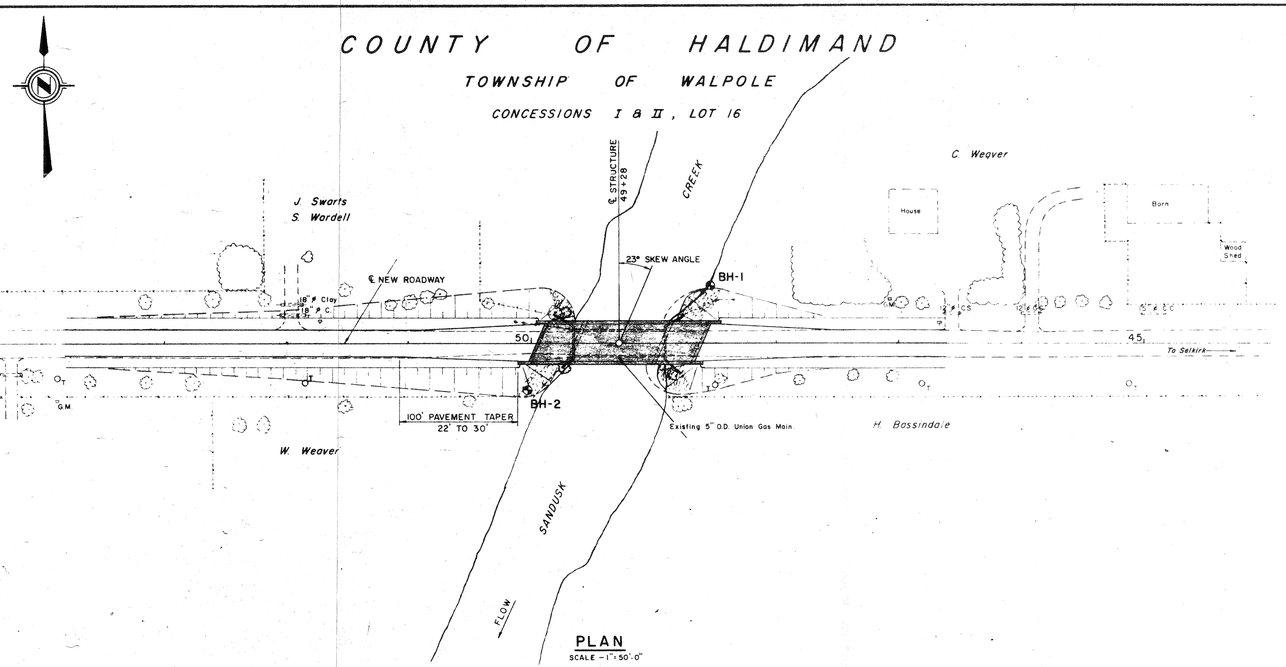
COUNTY OF HALDIMAND

TOWNSHIP OF WALPOLE

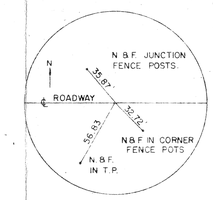
CONCESSIONS I & II, LOT 16



STA. 57+56·80



PLAN
SCALE – 1"=50'-0"



STA. 39+61 ±

BOREHOLE 1

GROUND EL. 89·7

- 8 / 16 — FILL & ALLUVIUM – Organic stained clayey silt to approx. 4 ft. changing to relatively clean brown silty clay with some topsoil pockets and tiny rootlets, stiff
- 32 — SILTY SAND – dense, very fine, grey, wet limestone slabs or gravel 11' to 13.5'
- LIMESTONE – sand, 6 ins. gravel in first 2·5 ft
- End of bore

B. CONT./FT.

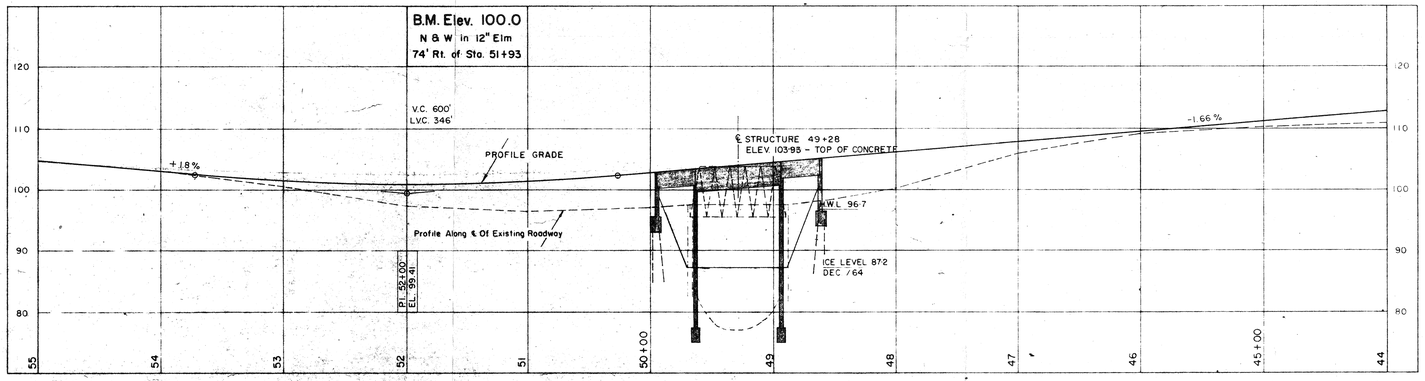
BOREHOLE 2

GROUND EL. 89·4

- 14 / 4 — 9 ins. topsoil ALLUVIUM – organic stained clayey silt becomes brown silty clay with less staining below about 4 ft., some rootlets
- 12 — SILTY SAND – dense, very fine, grey, wet
- LIMESTONE, sound
- End of bore

TEST BORING RESULTS

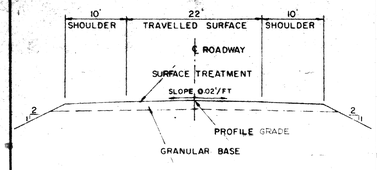
Test Borings are by William A. Trow and Associates Limited, Weston, Ontario. Test Borings are for General Information only and are not guaranteed by the County.



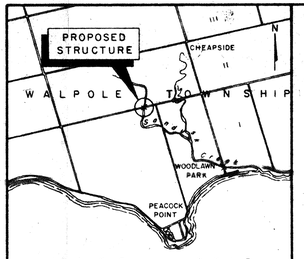
PROFILE
SCALES – HORIZ 1"=50'-0" VERT. 1"=10'-0"

DEPARTMENT OF HIGHWAYS ONTARIO
APPROVED MAR 17 1966 (DATE) PURSUANT TO THE HIGHWAY IMPROVEMENT ACT AND THE MUNICIPAL ACT.
APPROVAL NO. 13737-1
Municipal Bridge Liaison Engineer

2243



TYPICAL SECTION THRU APPROACHES
SCALE 1"=10'



KEY PLAN

FOLLOW SEPARATE INSTRUCTIONS FOR PREPARATION OF BRIDGE SITE PLAN WHEN MAKING BRIDGE SURVEY

DATA

1 SPECIAL FEATURES WATERFALLS, DAMS, EXCEPTIONAL FLOODS, ICE, DRIFTWOOD, SLIDING BANKS ETC
NONE

2 (A) UPSTREAM & DOWNSTREAM BRIDGES (GIVE LOCATION, LENGTH, HEIGHT ABOVE N.H.W.L., NET CROSS-SECTIONAL AREA AT HIGH WATER & ESTIMATED AGE) UPSTREAM – LOT 15, CON II & III, TWP. WALPOLE, 70' SPAN, CONC. RIGID FRAME, AREA 1,105 SQ. FT., BUILT IN 1964-65.
DOWNSTREAM – LOT 16-17, CON I, TWP. WALPOLE, TWO 30' SPANS, CONC. BEAM, AREA 480 SQ. FT., BUILT IN 1916.

(B) REASONS WHY THESE BRIDGES ARE, OR ARE NOT, FAIR INDICATIONS OF SIZE OF PROPOSED BRIDGE
FLOODING OCCURS AT DOWNSTREAM BRIDGE.

3 REASONS FOR CHANGES IN HEIGHT OR LENGTH FROM THAT OF OLD BRIDGE
ROAD PROFILE RAISED.

DATA (CONTD)

4	IS DITCH, STREAM, OR RIVER GRADIENT LIABLE TO BE LOWERED	NO
5	NAVIGATION CLEARANCES REQUIRED, IF ANY	NOT APPLICABLE
6	RAILWAY CLEARANCE REQUIRED, IF ANY	
7	IF STRUCTURE IS OVER OR UNDER A RAILWAY, HAS APPROVAL BEEN OBTAINED	
	(A) FROM RAILWAY CO	N.A.
	(B) FROM BOARD OF TRANSPORT COMMISSIONERS	N.A.
8	HAS APPROVAL BEEN OBTAINED UNDER NAVIGABLE WATERS PROTECTION ACT?	N.A.
9	IS A TEMPORARY DETOUR REQUIRED?	YES
	WHO WILL BUILD IT?	COUNTY
	WHO WILL MAINTAIN IT?	COUNTY
10	INFORMATION AND EVIDENCE OF EXTREME FLOODING WAS OBTAINED FROM LOCAL RESIDENTS AND REFLECTS HIGHEST WATER ELEVATION IN THE AREA OF THIS CONSTRUCTION TO BE 96.7 AND THE LOWEST WATER ELEVATION TO BE 86.0	
11	ROAD DESIGN INFORMATION	
	ESTIMATED ADT	CLASS 400-1000 (DESIGN YEAR 1984)
	DESIGN SPEED	50 M.P.H.
	STOPPING SIGHT DISTANCE	350 FEET

STRUCTURE DATA

1	NET SPAN LENGTH AND TYPE OF BRIDGE 30'+70'+30' +130' SIMPLE SPAN STEEL GIRDERS & PRESTRESSED CONC. GIRDERS		
2	ROADWAY WIDTH ON BRIDGE	30 FEET	
3	NUMBER & WIDTH OF SIDEWALKS TWO 2 FOOT ESCAPE CURBS		
4	SKEW ANGLE	23°	
5	TOTAL LENGTH & TYPE OF PILING STEEL H PILES		
		350	LIN. FT.
6	APPROX. VOLUME OF CONCRETE	522	CU. YDS.
7	APPROX. WEIGHT OF STR. STEEL	25	TONS
8	APPROX. WEIGHT OF REINFORCEMENT	32	TONS
9	APPROX. VOLUME OF APPROACH FILL 100' EACH SIDE OF STRUCTURE		CU. YDS
10	DRAINAGE AREA	45	SQ. MILES

FIELD INVESTIGATION MADE DEC. 1964

BY L. LANZA
SURVEY ENGINEER

C·C PARKER & ASSOCIATES LTD
CONSULTING ENGINEERS
HAMILTON ONTARIO

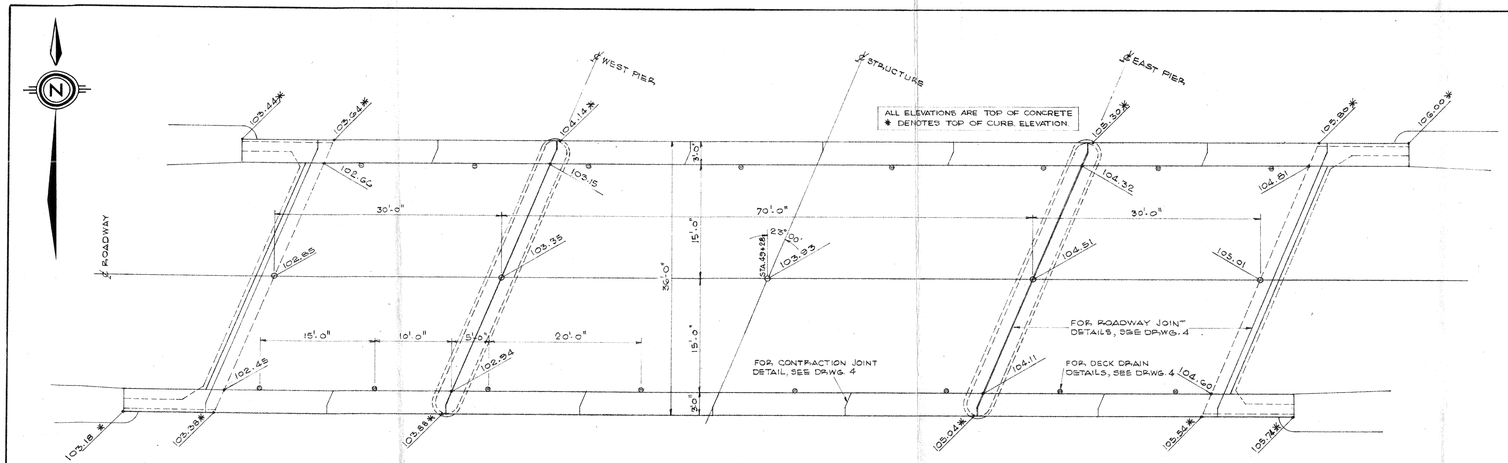
BRIDGE OVER SANDUSK CREEK

OWNER CTY. OF HALDIMAND	MUNICIPAL DIST. NO. 4
CO. HALDIMAND	ROAD NO. 11
TWP. WALPOLE	LOT 16 CON. I & II

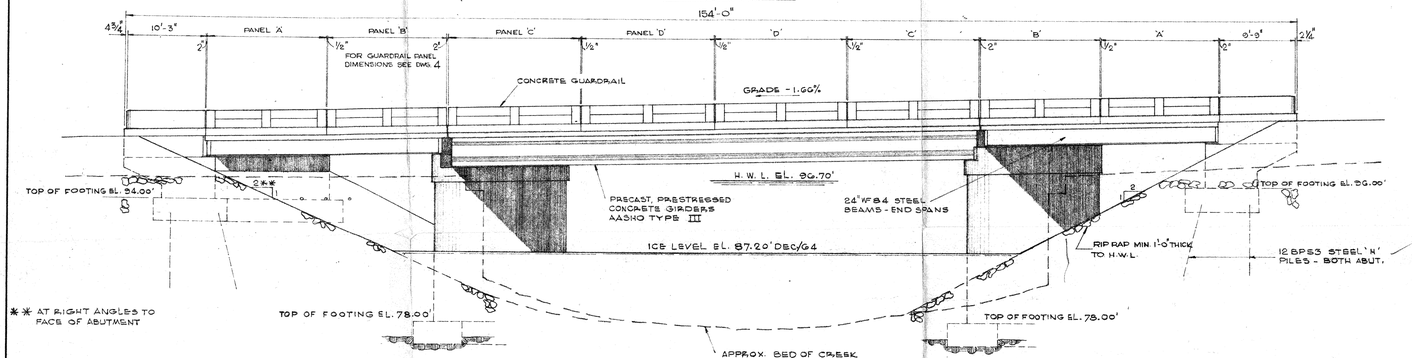
SITE PLAN & PROFILE

D.H.O. RECEIVED FEB 28 1966 TORONTO

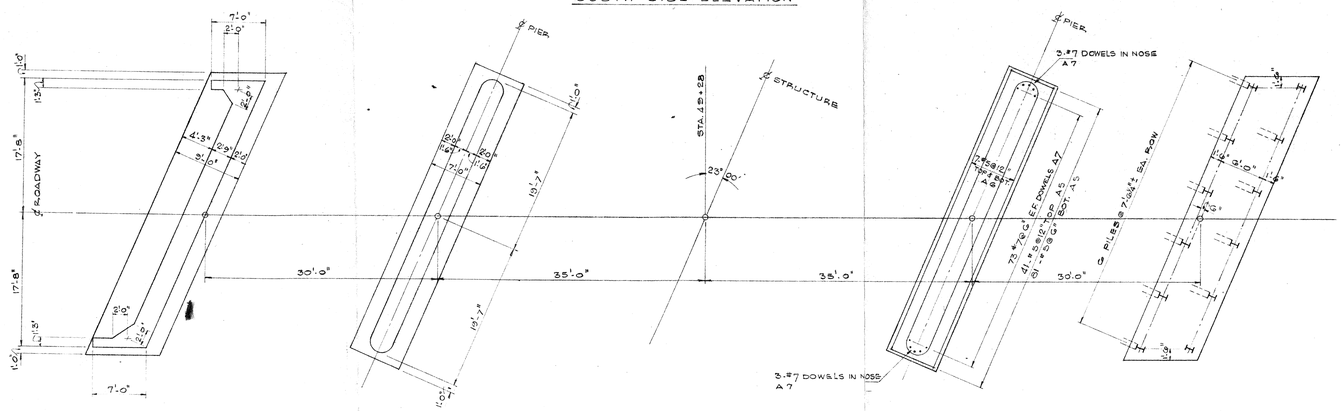
STRUCTURE SITE No. 9-68
DATE FEB. 21, 1966
DESIGN ENGINEER
BRIDGE NAME DENNIS BRIDGE
LOADING H20-S16
BRIDGE NO. 11-68
DWG. NO. 1



DECK PLAN



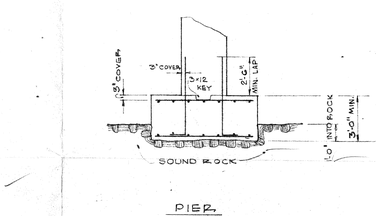
SOUTH SIDE ELEVATION



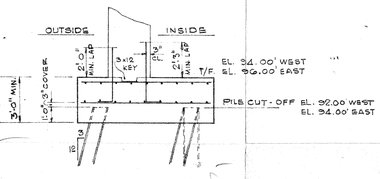
ABUTMENT LAYOUT | PIER LAYOUT | PIER FOOTING REINFORCING | PILING PLAN

FOUNDATION PLAN

SCALE 1/8" = 1'-0"



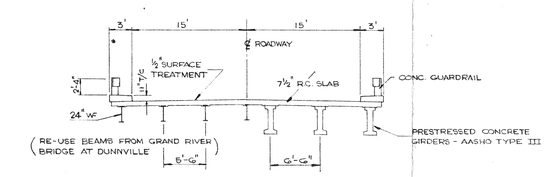
PIER



ABUTMENT

FOOTING SECTIONS

SCALE 1/4" = 1'-0"



AT END SPANS | AT CENTRE SPANS

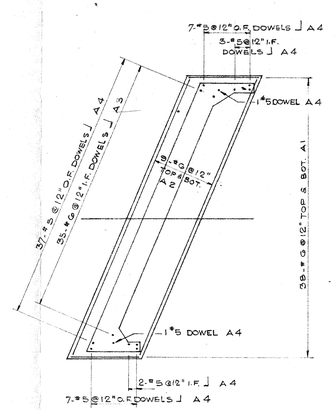
SCALE 1/8" = 1'-0"

GENERAL NOTES

STRUCTURE DESIGNED FOR H20 - S16 LOADING.
FOR PRESTRESSED GIRDER NOTES AND STRUCTURAL STEEL NOTES SEE DRAWING N° 4.
EXCAVATION FOR FOOTINGS TO BE MADE AS NEATLY AS POSSIBLE AND FILLED COMPLETELY WITH CONCRETE.
NO CONCRETE TO BE PLACED IN FOOTINGS BEFORE THE EXCAVATION FOR THE FOOTINGS HAS BEEN APPROVED BY THE ENGINEER.
CONCRETE IN THE SUBSTRUCTURE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 P.S.I. AT 28 DAYS.
CONCRETE IN DECK, CURBS AND GUARDRAIL SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 P.S.I. AT 28 DAYS.
CONCRETE COVER FOR REINFORCING.

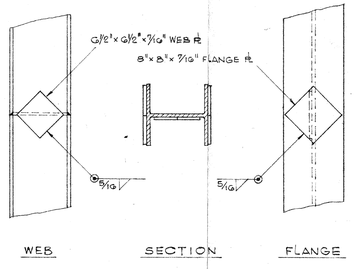
FOOTINGS, ABUTMENTS, PIERS, AND WINGWALLS -	3"
BALLAST WALLS	3" I.F. 2" O.F.
DECK	1½" TOP 1" BOT.
CURBS, GUARDRAIL AND END POSTS	2"

NO CONCRETE TO BE PLACED BEFORE MATERIALS HAVE BEEN APPROVED AND A MIX ESTABLISHED TO THE SATISFACTION OF THE ENGINEER.
NO CONCRETE TO BE PLACED BEFORE FORMWORK FALSEWORK AND REINFORCING STEEL HAVE BEEN CHECKED AND APPROVED BY THE ENGINEER.
ALL EXPOSED CONCRETE EDGES TO HAVE A 1"×1" CHAMFER UNLESS NOTED.
ALL REINFORCING BAR SPLICES TO BE LAPPED 35×DIA.
ALL CONCRETE BEARING SEATS TO BE PLACED ⅛" - ¼" HIGHER THAN NECESSARY AND BUSH HAMMERED TO THE CORRECT ELEVATIONS.
BALLAST WALLS SHALL NOT BE PLACED UNTIL GIRDERS HAVE BEEN ERECTED.



PILE SPLICE DETAILS

SCALE 1" = 1'-0"



PILES MUST HAVE FULL BEARING AT SPLICE.
IF ENDS HAVE BEEN CUT IN FIELD, WEB AND FLANGES OF UPPER SECTION MUST BE BEVEL CUT AND JOINT FULLY WELDED.
WELDING TO CONFORM TO A.W.S. D2.0-63 AND BE DONE BY A WELDER QUALIFIED ACCORDING TO C.S.A. SPEC. W47-1947.

FOUNDATION CONSTRUCTION NOTES

ALL PILES ARE 12 BP 53 STEEL 'H' PILES
ALL PILES TO BE DRIVEN TO A CAPACITY OF 50 TONS.
H DENOTES VERTICAL PILES.
⌶ DENOTES 3 IN 12 BATTERED PILES.

PROPERTIES OF 23°00' SKEW	
SINE	.390731
COSINE	.920505
TANGENT	.424475

13737-2

C. C. PARKER AND ASSOCIATES LIMITED
Consulting Engineers
LONDON HAMILTON OTTAWA

COUNTY OF HALDIMAND
DENNIS BRIDGE
OVER SANDUSK CREEK
TOWNSHIP OF WALPOLE
LOT 16 CON. I & II

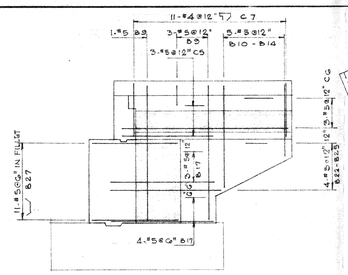
H. O. TORONTO
RECEIVED
FEB 28 1966
BRIDGE OFFICE

D. C. CRAMM
PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

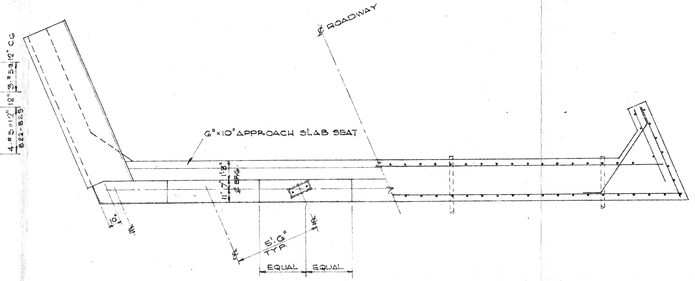
GENERAL ARRANGEMENT

DESIGN J.M.	PROJECT NO. 2243		
DRAWN G.S.N.		DRAWING NO.	2
CHECK K.	DATE FEB. 21/1966		

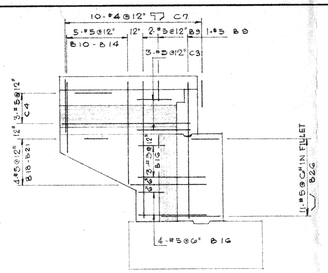
STRUCTURE SITE No. 9-68



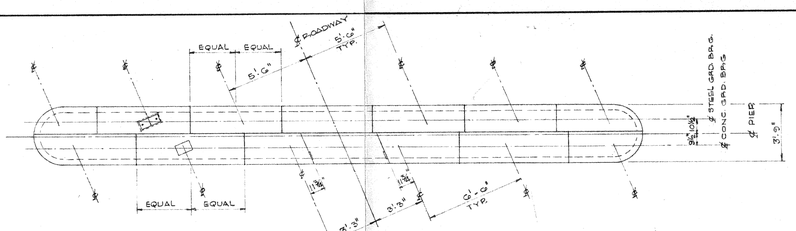
INSIDE FACE



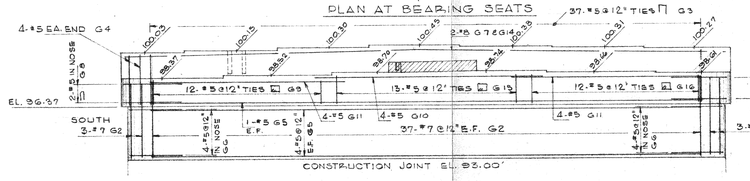
HALF PLAN AT BEARING SEATS



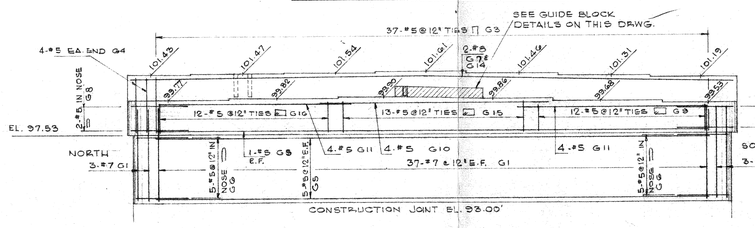
INSIDE FACE

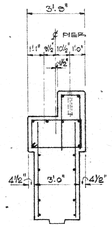


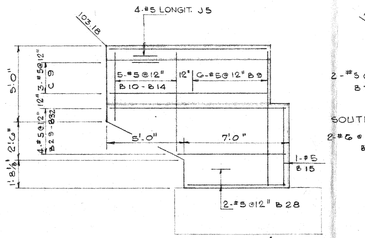
PLAN AT BEARING SEATS



WEST PIER CAP REINFORCING

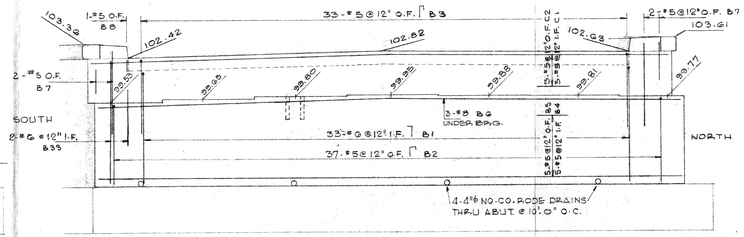




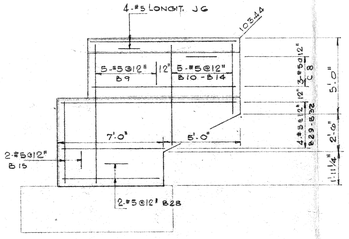


OUTSIDE FACE

SOUTH WEST WING WALL REINFORCING

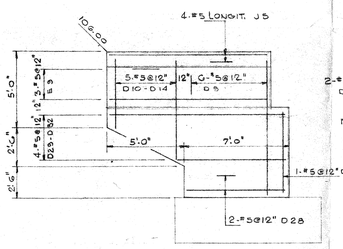


WEST ABUTMENT REINFORCING

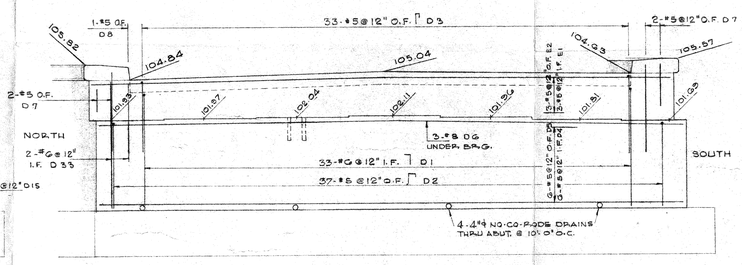


OUTSIDE FACE

NORTH WEST WING WALL REINFORCING

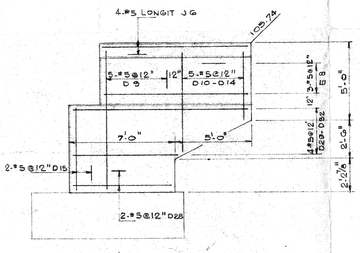


OUTSIDE FACE

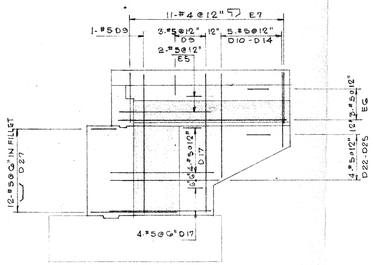


EAST ABUTMENT REINFORCING

SCALE ½"=1'-0"

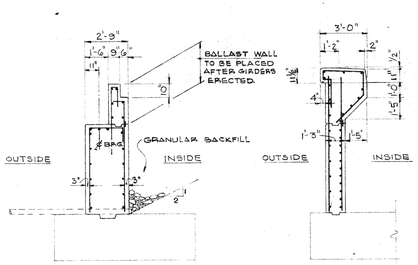


OUTSIDE FACE



INSIDE FACE

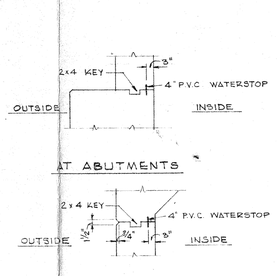
NORTH EAST WING WALL REINFORCING



THRU ABUTMENTS

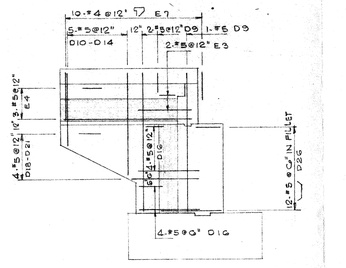
THRU WING WALLS

TYPICAL SECTIONS



AT WING WALLS

CONSTRUCTION JOINT DETAILS

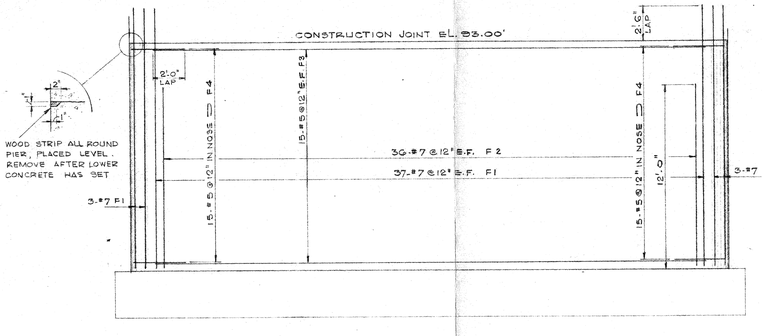


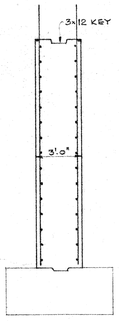
INSIDE FACE

SOUTH EAST WING WALL REINFORCING

EAST PIER CAP REINFORCING

TYP. PIER CAP SECTION



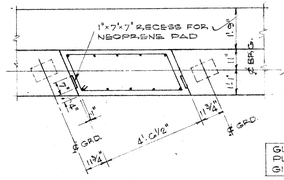


SECTION

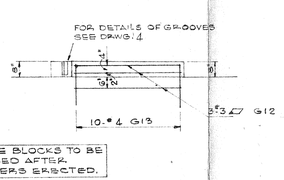
FOR GENERAL NOTES, SEE DRWG. 2.

PIER REINFORCING

SCALE ½"=1'-0"



PLAN



ELEVATION

GUIDE BLOCKS TO BE PLACED AFTER GIRDERS ERECTED.

PIER GUIDE BLOCK DETAILS

SCALE ⅜"=1'-0"

D. C. CRAMM

PROFESSIONAL ENGINEERS PROVINCE OF ONTARIO

C. C. PARKER AND ASSOCIATES LIMITED
Consulting Engineers
LONDON HAMILTON ONTARIO

COUNTY OF HALDIMAND

DENNIS BRIDGE

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TOWNSHIP OF WALPOLE

LOT 16 CON. I & II

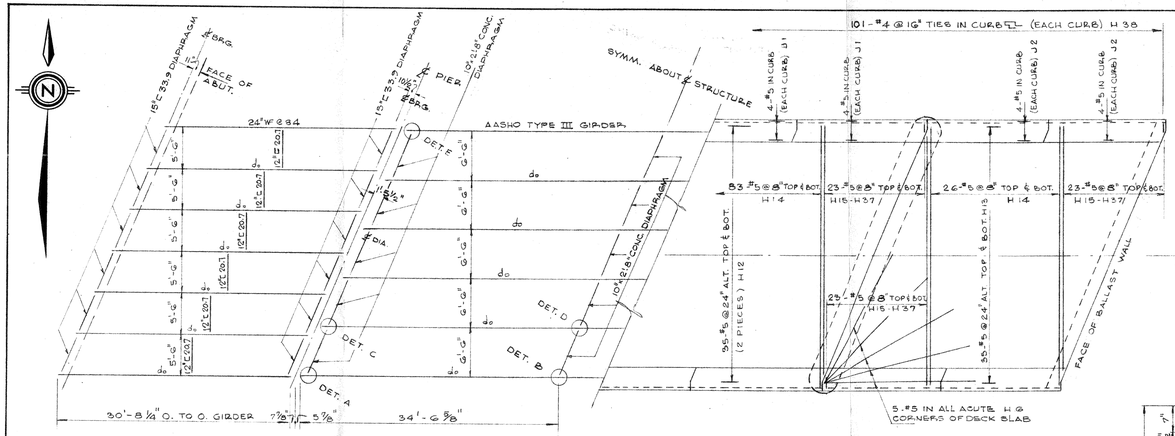
D.H.O. TORONTO
RECEIVED
FEB 28 1966
BRIDGE OFFICE

ABUT., WING WALLS & PIER DETAILS

DESIGN: J.M.	JOB NO. 2243	DRAWING NO. 3
DRAWN: G.S.N.	DATE FEB. 21, 1966	
CHECK: K.		

STRUCTURE SITE NO. 0-68

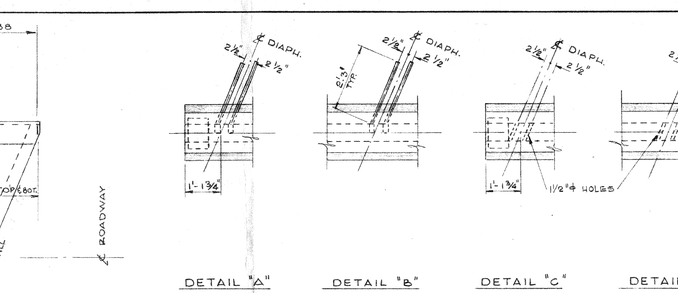
13737-3



HALF DECK FRAMING PLAN

HALF DECK REINFORCING

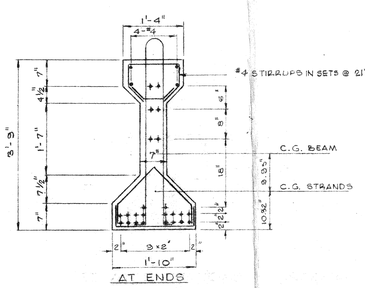
SCALE 1/8" = 1'-0"



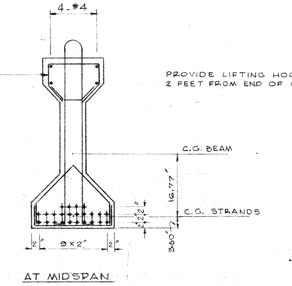
DETAIL "A" DETAIL "B" DETAIL "C" DETAIL "D" DETAIL "E"

DIAPHRAGM CONNECTION DETAILS

SCALE 1/2" = 1'-0"



AT ENDS

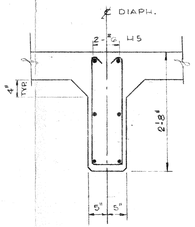


AT MIDSPAN

PRECAST PRESTRESSED CONCRETE GIRDER STRAND LAYOUT

SCALE 3/4" = 1'-0"

STRANDS	—	24 - 1/2" ℄ 270,000 P.S.I
HOLD DOWN POINT FOR STRANDS, EACH SIDE OF ℄	—	3'-0"
INITIAL PRESTRESSING FORCE	—	680 KIPS
LOSSES	—	128 KIPS
RELEASE CONC. STRESS	—	4,100 P.S.I



INTER. DIAPHRAGM CENTRE SPAN

SCALE 3/4" = 1'-0"

NOTE:

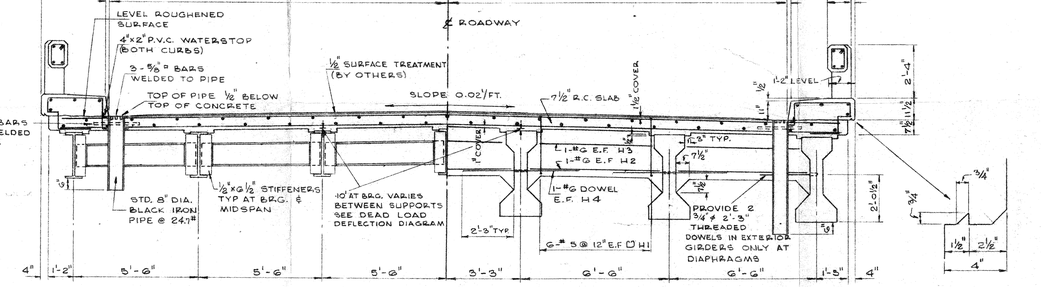
FOR GENERAL NOTES SEE DRAWING NO. 2

NOTES FOR PRESTRESSED GIRDERS.

THE TOTAL LOSS IN PRETENSIONING STEEL SHALL BE ASSUMED TO BE 35,000 P.S.I..
CONCRETE COMPRESSIVE STRENGTH SHALL BE 5,000 P.S.I. AT 28 DAYS.
GIRDER SOFFIT TO BE CAST STRAIGHT.
PICK-UP INSERTS FOR 3/4" DIA. DOWELS SHALL BE CAPABLE OF DEVELOPING FULL STRENGTH OF DOWELS.
3/8" DIA. DOWELS FOR EXTERIOR GIRDERS SHALL BE TREADED AT ONE END TO MATCH PICK-UP & BENT TO FIT DIAPHRAGMS AS SHOWN.
ALL DOWELS AND INSERTS SHALL BE SUPPLIED AND INSTALLED BY THE PRESTRESSED CONCRETE CONTRACTOR.
NOTIFY THE D.H.O. BRIDGE OFFICE ONE WEEK BEFORE COMMENCEMENT OF STRESSING OPERATIONS GIRDERS DESIGNED AS COMPOSITE SECTIONS WITH DECK SLABS.

STRUCTURAL STEEL NOTES

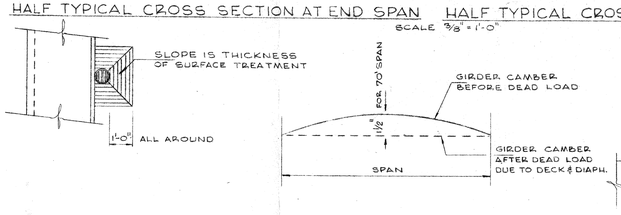
DESIGN, FABRICATION, ERECTION AND PAINTING OF STRUCTURAL STEEL SHALL BE ACCORDING TO C.S.A. SPECIFICATIONS S6.1, 1952.
ALL WELDING SHALL BE ACCORDING TO A.W.S. "STANDARD SPECIFICATIONS FOR WELDED HIGHWAY & RAILWAY BRIDGES" D 2.0 - 1963 AND SHALL BE DONE BY A WELDER QUALIFIED UNDER THE PROVISION OF C.S.A. SPECIFICATION W47 - 1947. ELECTRODES USED SHALL BE CLASSIFIED E 7015 OR E 7016 ACCORDING TO C.S.A. SPECIFICATION W48.1, 1952.
ALL FIELD CONNECTIONS MUST BE MADE WITH 3/4" DIA. HIGH STRENGTH BOLTS.
ALL CONTACT SURFACES BETWEEN STEEL AROUND BOLT HOLES SHALL NOT BE SHOP PAINTED, BUT SHALL BE THOROUGHLY CLEANED OF ALL MILL SCALE AND RUST BEFORE BEING SHIPPED AND SHALL BE SHOWN ON SHOP DRAWINGS.

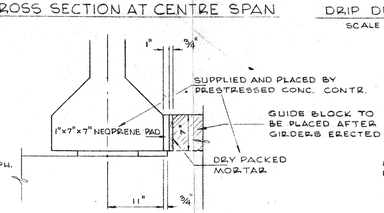


HALF TYPICAL CROSS SECTION AT END SPAN

HALF TYPICAL CROSS SECTION AT CENTRE SPAN

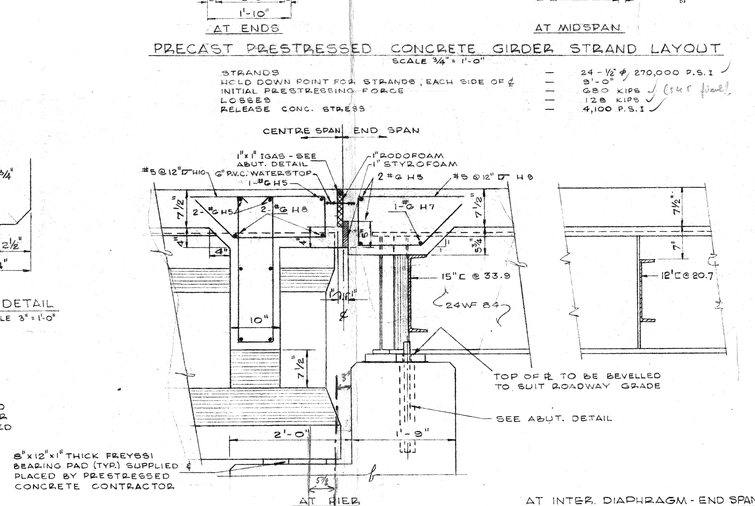
SCALE 3/8" = 1'-0"



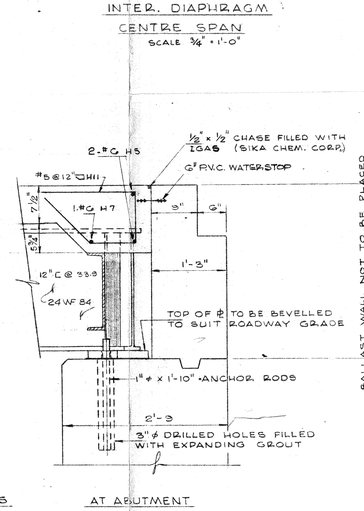


DRIP DETAIL

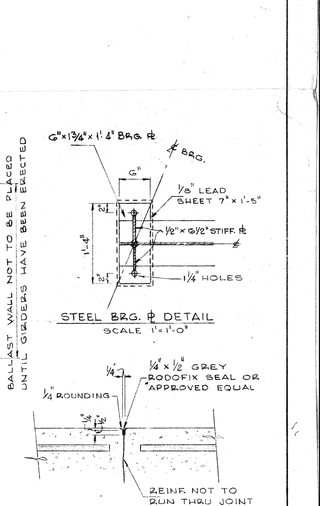
SCALE 3" = 1'-0"



AT PIER



AT ABUTMENT



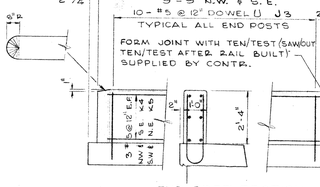
STEEL BRG. ℄ DETAIL

SCALE 1" = 1'-0"

CURB CONTRACTION JOINT

PLAN OF DECK DRAIN AT ROADWAY

SCALE 3/8" = 1'-0"



DEAD LOAD DEFLECTION DIAGRAM

N.T.S.

SECTION THRU GUIDE BLOCK GROOVE

SCALE 1" = 1'-0"

TYPICAL SECTION THRU DIAPHRAGMS

SCALE 1" = 1'-0"

GUARDRAIL SECTION

SCALE 3/8" = 1'-0"

RAIL SECTION

PROFESSIONAL ENGINEERS PROVINCE OF ONTARIO — CIVIL — D.C CRAMM

C. C. PARKER AND ASSOCIATES LIMITED
Consulting Engineers
LONDON HAMILTON OTTAWA

COUNTY OF HALDIMAND
DENNIS BRIDGE
OVER SANDUCK CREEK
TOWNSHIP OF WALPOLE
LOT 16 CON. I & II

D. H. O. TORONTO
RECEIVED
FEB 28 1966
BRIDGE OFFICE

GIRDERS, DECK & GUARDRAIL DETAILS

DESIGNED	K.	2843	DRAWING NO. 4
DRAWN	J.W.B.	DATE	
CHECKED	J.M.	FEB. 21, 1966	

13737-4

STRUCTURE SITE NO. 9-68

APPENDIX C

Species at Risk Mitigation Report

APPENDIX C

Species at Risk Mitigation Report

Dennis Bridge

SPECIES AT RISK MITIGATION PLAN

Prepared for

G.D. Vallee Ltd.

February 2019
Project No. P2018-342

Prepared by

GeoProcess Research Associates Inc.
133 King Street West
PO Box 65506 DUNDAS
Dundas, ON L9H 6Y6

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1. Introduction

GeoProcess Research Associates Inc. (GRA) was retained by G.D. Vallee Ltd. to conduct a Species at Risk (SAR) assessment and mitigation plan with respect to a bridge rehabilitation of a structure located on Rainham Road in Haldimand, ON. The work of the Dennis Bridge Rehabilitation (Structure 980305) involves the replacement of existing guiderail and asphalt with new, repair of the existing concrete deck, wingwalls, abutments and soffit via chipping and patching concrete, installation of cofferdams around the piers for pier concrete rehabilitation, replacement of bridge beam bearings, abrasive blasting and coating of existing steel beams and associated elements, and rip rap installation on the embankments. The bridge spans Sandusk Creek, which outlets directly into Lake Erie.

The structure is at a high elevation from the watercourse, with vegetated banks at both abutments. The watercourse is under the jurisdiction of Long Point Conservation Authority.

The screening determined if Species at Risk are potentially present and makes recommendations on SAR mitigation (if necessary), and sets out a program for monitoring the effectiveness of the mitigation measures per O. Reg. 242/08.

2. Project Policy

The Endangered Species Act, 2007, S.O. 2007, Chapter 6, protects the biodiversity of Ontario by using the best available scientific, community and aboriginal traditional knowledge and the precautionary principle as its doctrine. The purpose of the Act is to identify species at risk, protect species at risk and their habitats, and to promote the recovery of species at risk and stewardship activities which assist in these goals.

The following mitigation plan was prepared based on the requirements of O. Reg. 242/08, s. 23.18 and its last amendment O. Reg. 176/13, s. 14. The section "Threats to health and safety, non-imminent" allows for an exemption of subsection (8), clauses 9 (1) (a) and subsection 10 (1) of the Endangered Species Act, 2007 (ESA) regarding qualified work if conditions described in subsection (5) are met and the mitigation plan as required by subsection (6) and (7) is completed.

To qualify for the exemption under Section 23.18 the following conditions must be met:

Work to maintain, repair, remove or replace an existing structure or any infrastructure described in subsection (2), including the decommissioning of a mine, or to upgrade an existing structure or any infrastructure described in subsection (2) to meet a safety standard, if,

i. the maintenance, repair, removal, replacement, decommissioning or upgrade does not require,

A. a temporary or permanent change to the location of the structure or infrastructure, or

B. a temporary or permanent extension of the area the structure or infrastructure occupies, except in the case of the replacement of an existing culvert with a new culvert that is larger than the one it replaces, or

ii. in the case of work to maintain, repair, replace or upgrade a structure or infrastructure, the work does not alter the way in which the structure or infrastructure is used or operated.

Please note that Section 23 exemptions require a *Notice of Activity* before the work activity commences.

3. Study Area

The Study Area is located in a rural area surrounded by active agricultural and scattered rural homesteads. The north of the bridge, both banks are vegetated by juvenile and mid-age Manitoba Maple (*Acer negundo*). The northeast bank has little to no understory and is composed of turf grass mowed up to the watercourse edge. The northwest bank mid-age Bur Oak (*Quercus macrocarpa*), White Ash (exhibiting signs of Emerald Ash Borer) in addition to Manitoba Maple. The understory is disturbed and composed primarily of Common Buckthorn (*Rhamnus cathartica*) and Tartarian Honeysuckle (*Lonicera tatarica*). Riverbank Grape (*Vitis riparia*) figures prominently throughout this portion of the Study Area.

The southern portion of the Study Area is consistent with the northern half in terms of vegetation. A few occurrences of larger mature trees include a few Red Oak (*Quercus rubra*) on the southwest side further up the bank and a mid-age multi-stem Freeman's Maple (*Acer x freemanii*) on the south east side.

4. Project Description

The work of the Dennis Bridge Rehabilitation (Structure 980305) involves the replacement of existing guiderail and asphalt with new, repair of the existing concrete deck, wingwalls, abutments and soffit via chipping and patching concrete, installation of cofferdams around the piers for pier concrete rehabilitation, replacement of bridge beam bearings, abrasive blasting and coating of existing steel beams and associated elements, and rip rap installation on the embankments.

Policy Applicability Review

The project is the replacement of an existing culvert structure with a concrete box culvert. The works are required to meet a safety standard.

Associated works including the installation of new barriers, new bridge approach guiderails and new asphalt and granular base at both approaches is required.

As a replacement of infrastructure to meet today's current safety standards in the same location, without extension or change in use, this project should meet the requirements for the exemption under Section 23.18 of Ontario Regulation 242/08.

5. Potential Species at Risk

5.1. Study Methodology

Existing information regarding SAR within the project area is summarized from data collected through a desktop review and in-field survey. A desktop background review was conducted using the Natural Heritage Information Center database, Fisheries and Oceans Canada Aquatic Species at Risk Maps and the surrounding areas SAR lists provided by the City of Hamilton and Alymer MNRF. The Natural Heritage Information Center (NHIC), operated by the Ontario Ministry of Natural Resources and Forestry, collects, reviews, manages and distributes information on Ontario's biodiversity. Data distributed by the NHIC is used in conservation and natural resource management decision making and is of valued assistance for the purpose of this report. Data on species, plant communities, wildlife concentration areas and natural areas is made accessible to the public and professionals using generalized 1-kilometer grid units to protect sensitive information. The mapping interface provides current and historical occurrences of SAR within the vicinity of the proposed works location. The database also identifies environmental designations which provide insight into habitat potential including wetland, areas of natural and scientific interests and woodlands. Results from the Fisheries and Ocean Aquatic Species at Risk Maps and SAR lists from surrounding areas were combined with this information to assess the suitability of habitat within the vicinity of the proposed works.

An in-field survey was conducted based on the background information review and the potential suitable SAR habitat identified. The study area included 50 m radius from the center of the structure. The in-field survey included a sweep for any species with element occurrences in the past 50 years, as provided by the NHIC, and a general survey for all other SAR based on the general area list and suitable habitat conditions. The in-field survey was conducted in December 2018. The findings of the two-step SAR screening are presented in table format providing an assessment of the required habitat of potential SAR, the presence or absence of that habitat and the likelihood of the species being present.

5.2. Screening Findings

Details of the desktop SAR screening include an amalgamation of historical occurrence records within the vicinity of the proposed works as per current NHIC database records, Fisheries and Oceans Canada Aquatic Species at Risk Maps and a conglomerated list of potential SAR species, their habitat specifications, and rationale on habitat presence/absence at the location of the proposed works. Refer to Table 1 and 2 below for NHIC element occurrences within a 1 km radius of the Study Area and Table 2 potential SAR within the Study Area.

Table 1: NHIC Species Occurrences Records

Element Type	Common Name	Scientific Name	SRank	SARO Status	COSEWIC Status	Last Obs Date
SPECIES	Bobolink	Dolichonyx oryzivorous	S4B	THR	THR	2003-06-10

Table 2: Potential SAR

Species		Species' Status in Ontario	S-Rank	Habitat Requirements	Potential Habitat in the Study Area	Rationale
Scientific Name	Common Name					
Castanea dentata	American Chestnut	Endangered	S2	Prefers dryer upland deciduous forests with sandy, acidic to neutral soils.	No	Habitat not present within Study Area.
Frasera carolinensis	American Columbo/ Carolina Gentian	Endangered	S2	Open deciduous forests, and to a lesser extent along open forest edges and dense shrub thickets. Commonly found in dry uplands.	No	Habitat not present within Study Area.
Panax quinquefolius	American Ginseng	Endangered	S3	Rich, moist, but well-drained, and relatively mature deciduous woods dominated by Sugar Maple, White Ash and American Basswood.	No	Habitat not present within Study Area.
Juglans cinerea	Butternut	Endangered	S4	Mixed deciduous forests.	No	No occurrences of this species identified within the Study Area.
Cornus florida	Eastern Flowering Dogwood	Endangered	S2?	Under taller trees, in mid-age to mature deciduous or mixed forests. Commonly found in floodplains, slopes, bluffs,	No	No occurrences of this species identified within the Study Area.

Species		Species' Status in Ontario	S-Rank	Habitat Requirements	Potential Habitat in the Study Area	Rationale
Scientific Name	Common Name					
				ravines, sometimes roadsides and fence rows.		
Trichophorum planifolium	Few-flowered Club-rush/ Bashful Bulrush	Endangered	S1	Steep slopes of oak forests.	No	Habitat not present within Study Area.
Pycnanthemum incanum	Hoary Mountain Mint	Endangered	S1	Dry, Oak woodland, on steep slopes that are warmer than normal. Open areas with ample sunlight, in habitats with depend on fire for maintenance.	No	Habitat not present within Study Area.
Morus rubra	Red Mulberry	Endangered	S2	Moist, Forested valleys and floodplains. Sandy and limestone-based loamy soils. Prefers sun from breaks in canopy.	No	No occurrences of this species identified within the Study Area.
Chimaphila maculata	Spotted Wintergreen	Endangered	S2	Dry, oak-pine woodlands with sandy soils.	No	Habitat not present within Study Area.
Eurybia divaricata	White Wood Aster	Threatened	S2S3	Open, dry deciduous forests dominated by Sugar Maple and Beech. Found mixed in with other asters.	No	Habitat not present within Study Area.

Species		Species' Status in Ontario	S-Rank	Habitat Requirements	Potential Habitat in the Study Area	Rationale
Scientific Name	Common Name					
Colinus virginianus	Northern Bobwhite	Endangered	S1	Grassland, prairie or hay fields with woody cover in form of thickets, tangles of vines, shrubs; fence rows or woodland edges; abandoned farm fields; well-drained sandy or loamy soil; pond edges.	No	Habitat not present within Study Area.
Empidonax virescens	Acadian Flycatcher	Endangered	S2B, S3B	Mature, shady forests with ravines, or in forested swamps with lots of maple and beech trees.	No	Habitat not present within Study Area.
Riparia riparia	Bank Swallow	Threatened		It nests in a wide variety of naturally and anthropogenic vertical banks, which often erode and change over time including aggregate pits and the shores of lakes and rivers.	No	Habitat not present within Study Area.
Hirundo rusica	Barn Swallow	Threatened	S4B	Human-made structure, bridges, barns, culverts.	No	No nesting structures were identified within the Study Area.
Dolichonyx oryzivorus	Bobolink	Threatened	S4B	Hayfields, open grass fields.	No	Habitat not present within Study Area.

Species		Species' Status in Ontario	S-Rank	Habitat Requirements	Potential Habitat in the Study Area	Rationale
Scientific Name	Common Name					
Dendoica cerulean	Cerulean Warbler	Threatened	S3B	Mature, deciduous forests with large, tall trees and an open under storey.	No	Habitat not present within Study Area.
Chaetura pelagica	Chimney Swift	Threatened	S4B. S4N	Urban settlements where they nest and roost in chimneys or other manmade structures.	No	Habitat not present within Study Area.
Sturnella magna	Eastern Meadowlark	Threatened	S4B	Moderately tall grasslands, such as pastures and hayfields.	No	Habitat not present within Study Area.
Antrostomus vociferus	Eastern Whip-poor-will	Threatened	S4B	Mix of open and forested areas, such as savannahs, open woodlands or	No	Habitat not present within Study Area.
Ammodramus henslowii	Henslow's Sparrow	Endangered	SHB	Abandoned farm fields, pastures and wet meadows. Prefers tall, dense grasslands with little shrub and tree cover.	No	Habitat not present within Study Area.

Species		Species' Status in Ontario	S-Rank	Habitat Requirements	Potential Habitat in the Study Area	Rationale
Scientific Name	Common Name					
Rallus elegans	King Rail	Endangered	S2B	Densely vegetated freshwater marshes with open shallow water that merges with shrubby areas. Prefer larger, coastal wetlands.	No	Habitat not present within Study Area.
Ixobrychus exilis	Least Bittern	Threatened	S4B	Wetland habitats, cattail marshes with a mix of open pools and channels.	No	Habitat not present within Study Area.
Protonotaria citrea	Prothonotary Warbler	Endangered	S1B	Flooded woodlands or swamps. Silver maple, ash, yellow birch with holes used for nesting.	No	Habitat not present within Study Area.
Ambystoma jeffersonianum	Jefferson Salamander	Threatened	S2	Moist woodlands with vernal pooling.	No	Habitat not present within Study Area.
Emydonidea blandingii	Blanding's Turtle	Threatened	S3	Shallow water in large wetlands and shallow lakes with abundant aquatic plant life. Organic soil, sand, gravel and cobblestone bottoms. Overwintering sites requires a water depth of 1m or more.	No	Habitat not present within Study Area.

Species		Species' Status in Ontario	S-Rank	Habitat Requirements	Potential Habitat in the Study Area	Rationale
Scientific Name	Common Name					
Heterodon platirhinos	Eastern Hog-nosed Snake	Threatened	S3	Sandy, well-drained habitats such as beaches and dry forests.	No	Habitat not present within Study Area.
Apalone spinifera	Spiny Softshell	Endangered	S2	Rivers and lakes, creeks and ditches, highly aquatic. Deep pools and basking sites. Open sand or gravel for nesting.	No	Habitat not present within Study Area. Occurrences of this species are restricted to southwestern Ontario in Lake St. Clair, two sites Lake Erie with the majority found in the Thames and Sydenham Rivers.
Regina septemvittata	Queensnake	Endangered		Generally, require a permanent body of water, flowing or still, with a temperature remaining at or above 18.3°C throughout most of the active season; abundant cover, such as flat rocks submerged and/or on the bank; and an abundance of crayfish. Other important habitat features may include rocky, gravelly, or slate stream-bed substrates, swift to moderate current, and woodland surroundings.	No	Habitat not present within Study Area.

Species		Species' Status in Ontario	S-Rank	Habitat Requirements	Potential Habitat in the Study Area	Rationale
Scientific Name	Common Name					
Taxidea taxus jacksoni	American Badger	Endangered	S2	Tall grass prairie, sand barrens and farmland.	No	No existing dens were identified within the Study Area during the field investigations.
Myotis leibii	Eastern Small-footed Myotis	Endangered		Overwintering habitat: Caves and mines that remain above 0 degrees Celsius. Maternal roosts: primarily under loose rocks on exposed rock outcrops, crevices, and cliffs, and occasionally in buildings, under bridges and overpasses and under tree bark.	No	Habitat not present within Study Area.
Myotis lucifugus	Little Brown Myotis	Endangered	S4	Roost in trees and buildings. Forages over open aquatic, forest edges, gaps in forest canopy's, and across other open terrain.	No	Habitat not present within Study Area.

Species		Species' Status in Ontario	S-Rank	Habitat Requirements	Potential Habitat in the Study Area	Rationale
Scientific Name	Common Name					
Perimyotis subflavus	Tri-coloured Bat	Endangered		Variety of forested habitats in summer and forages over water and along streams in forests. Forms day roots and maternity colonies in older forests. Overwinter in caves.	No	Habitat not present within Study Area.
Esox americanus vermiculatus	Grass Pickerel	Special Concern	MNRF	Found in wetlands, ponds, slow-moving streams and shallow bays of larger lakes with warm, shallow, clear water and an abundance of aquatic plants.	No	Habitat not present within Study Area.
Moxostoma duquesnei	Black Redhorse	Threatened		Generally, lives in moderately sized rivers and streams, with generally moderate to fast currents and sandy or gravel bottoms.	No	Habitat not present within Study Area. Found only in a few locations in the Bayfield River, Maitland River, Maitland River, Ausable River, Grand River, Thames River and Spencer Creek watersheds.
Notropis photogenis	Silver Shiner	Threatened		Moderate to large size streams with swift currents and gravel or boulder bottoms.	No	Habitat not present within Study Area.

Species		Species' Status in Ontario	S-Rank	Habitat Requirements	Potential Habitat in the Study Area	Rationale
Scientific Name	Common Name					
Bombus affinis	Rusty-patched Bumble Bee	Endangered		Generally, inhabits a range of diverse habitats including mixed farmland, sand dunes, marshes, urban and wooded areas. It usually nests underground in abandoned rodent burrows.	No	Sightings of this species has only occurred within the Pinery Provincial Park on Lake Huron.
Ligumia nasuta	Eastern Pondmussel	Endangered	S1	Sheltered areas of lakes, slow moving rivers and canals, sand or mud bottoms.	No	Habitat not present within Study Area
Villosa iris	Rainbow Mussel	Threatened		Medium sized rivers with a moderate to strong current.	No	Habitat not present within Study Area
Lampsilis fasciola	Wavy-rayed Lampmussel	Threatened		Generally, inhabit clear rivers and streams of a variety of sizes, where the water flow is moderate, strong and steady and the substrate is stable.	No	Habitat not present within Study Area. Not within known range.

6. Screening Results and Impact Assessment

The following Table provides a description of SAR and SAR habitat identified with the potential to occur within the Study Area, potential impacts to the species and/or habitat and associated mitigation measures. Residual effects, those effects remaining after the employment of the mitigation measures directed to lessen the impacts of the proposed works on potential SAR and SAR habitat, are also identified within the assessment.

Table 3: SAR Results and Assessment

SAR Habitat Type and Potential SAR	Impact Assessment	Mitigation Measures	Residual Effects
Aquatic habitat Fish Habitat	Projects near water must be self-assessed for project review by the DFO. Sediments pose a potential impact during construction if appropriate sediment and erosion control measures are not implemented. Spills from construction equipment present a potential impact if measures to avoid and respond to spills are not implemented.	Complete work in accordance with the Measures to Avoid Harm to Fish and Fish Habitat (refer to Section 8) No machinery within the watercourse. Preparation of an ESC plan and implementation including regular inspections. ESC fencing is to be removed following construction period. Completion of a SAR Occurrence form (provided in **Appendix A**) should be completed and submitted to the local Conservation Authority in the chance of an observation during construction works.	None

7. Mitigation Measures

The proposed works requires measures to mitigate harm to potential fish habitat. Based on the assessment of habitat and the likelihood of encounters on the site, the following mitigation measures are recommended.

1. Limits of Construction;
2. Timing of activities; and,
3. Habitat restoration.

7.1. Limits of Construction

Most potential impacts to SAR and SAR habitat can be avoided by maintaining limits of construction which exclude the habitat of species at risk.

- Limits of construction are to be clearly defined on all print site plans and are to be installed in field with the use of stakes, flagging, erosion and sediment control fencing and/or exclusion fencing.
- Limits of construction are to be established prior to the arrival of heavy machinery, or clearing and earth works.
- All work is to be contained within the limits of construction, including machinery staging and the storing of materials.

7.2. Timing of Activities

In water works are restricted to prevent the disruption of fish spawning activity. The project is located within the southern Region which has a restriction against in-water work during from March 15 to July 15th.

Tree removal (including dead snags) should be completed between October 1st and March 31st to avoid harming nesting migratory birds and roosting bats. If clearing is to proceed within the breeding bird window, the Study Area should be screened to determine if any migratory song birds are nesting within the work zone.

7.3. Habitat Restoration

All disturbed areas within the limits of the construction along the road's right of way and the creeks banks should be restored to a vegetated condition following the completion of work. Restoration prevents the colonization of the landscape by non-native invasive species and provides erosion control, runoff energy dispersion, and wildlife habitat. Re-vegetation should be comprised of native shrub plantings and native Ontario roadside seed mix to establish vegetative cover and provide buffering capacity to the adjacent natural heritage features.

8. Fisheries and Oceans Self Assessment

The project was assessed using the DFO self assessment tool and was determined to not require a review by the Fisheries and Oceans Canada based on the project scope and the absence of aquatic Species at Risk (**Appendix B**). The project is required to be undertaken in a manner that protects fish and fish habitat, and should implement the measures outlined in the 'Measures to avoid causing harm to fish and fish habitat'. Refer to http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html) for details.

9. References

Ontario. Ministry of Natural Resources and Forestry. N.d. Various species information pages. Retrieved from https://www.ontario.ca/page/species-risk.

Ontario Nature. N.d. Ontario Retile and Amphibian Atlas. Retrieved from https://www.ontarionature.org/protect/species/herpetofaunal_atlas.php.

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Species at Risk Mitigation Plan
Dennis Bridge

Prepared for G.D. Vallee Ltd.

February 2019

Prepared by:





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Jenn Reader, B.Sc., ERPG
Ecologist, Certified Arborist #ON-1792A

Disclaimer

We certify that the services performed by GeoProcess Research Associates were conducted in a manner consistent with the level of care, skill and diligence to be reasonably exercised by members of the engineering and science professions.

Information obtained during the site investigations or received from third parties does not exhaustively cover all possible environmental conditions or circumstances that may exist in the study area. If a service is not expressly indicated, it should not be assumed that it was provided. Any discussion of the environmental conditions is based upon information provided and available at the time the conclusions were formulated.

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Project Number P2018-342



Figure 1



GeoProcess RESEARCH ASSOCIATES

Dennis Bridge (980305)
Species at Risk Assessment

Figure 1. Study Area

CREATED BY:	KJW	PROJECT NO.:	P2018-342
CHECKED BY:	IR	DATE:	Dec 13, 2018

Legend

Study Area

0 25 50 75 100 metres

N

Prepared using QGIS and Bing Satellite.

G:/My Drive/Projects/P2018-342- SAR Bridges- Norfolk 2018/GIS/Basemap/Basemap (all locations).qgs

Appendix A

SAR Observation Sheet

SAR Observation Records of Occurrence

Date	
Location	
Time	
Notice of Activity Number	

Notes on Occurrence:

Species, activity, timeline, actions, due diligence, next steps, contact information, pictures provided, etc.

Signed:

Environmental Officer at Site	
General Foreman at Site	

To be submitted to the LPRCA and the local OMNRF office.

Appendix B

DFO Self Assessment

DFO Project Self Screening - Bridges

Project Name: Dennis Bridge	Date: December 21, 2018	
Project Location: 42°49'25.6"N 79°59'37.6"W 42.823776, -79.993769		
Criteria	Comment	Review required
Repairs No temporary or permanent increase in existing footprint below the High Water Mark No new temporary or permanent fill placed below the High Water Mark.	Bridge rehabilitation will not increase the footprint of the bridge below the High Water Mark temporarily or permanently. No fill will be placed below the High Water Mark	No
All removal activities	Removal activities will be conducted according to the measures to avoid causing harm to fish and fish habitat.	No
Criteria related to Aquatic Species at Risk		
No permanent increase in existing footprint above the high water mark if the riparian area is identified as part of the critical habitat of an aquatic listed species at risk.	N/A – Aquatic Species at Risk not present based on the Aquatic Species mapping.	-
Where SARA-listed shellfish occur, no scaffolding or support structures will be placed directly on the bed of the watercourse.	N/A – Aquatic Species at Risk not present based on the Aquatic Species mapping.	-

Appendix C

Photo plate



Northwest ramp



Northwest bank, upstream



Upstream, view north



Northeast bank



Northeastern ramp



Southern side, view east



Southeastern bank



Downstream (south)



Southwestern bank



Southern profile, view west

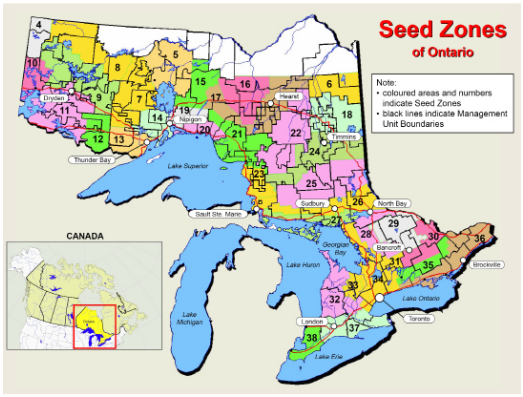
APPENDIX D

Ontario Native Roadside Seed Mix

Ontario Native Roadside Mix

Description

A robust seed mix designed for single pass application to establish a native meadow suitable for the general road side environment in Southern Ontario. Application of this native seed mix for conservation is appropriate in Seed Zone 34, 37 & 38. The vegetation mix is quick to establish and will succeed to later successional species that will provide good erosion control, having good drought and salt tolerance. The mix includes a quick establishing grass combined with attractive persistent native grasses and wildflowers once common throughout this region of Ontario.



Application

For all roadside areas including uplands, slopes, and lower ditched (periodically wet) areas as a single mix.



Application Rate

20kg/hectare

Maintenance

Well adapted for occasional mowing, or can be left alone for a more natural appearance; periodic mowing once every couple of years, in early to mid summer, can help to rejuventate native meadow if burning is not possible, but may only be necessary if weedy or shrubby species become a problem.

Can be established by hydroseeding, drilling or broadcast application; seed should be on the surface with good seed soil contact for best results. Spring or Fall seeding recommended.

Prices and components are subject to change without notice.
Please call for pricing and availability.

To order, please call toll-free 1 866 640 8733 or email sales@stwilliamsnursery.com

www.stwilliamsnursery.com

Ontario Native Roadside Seed Mix

Common Name	Scientific Name	Quantity/Hectare (kg PLS*)	% Mix by Weight	Zone 34	Zone 37	Zone 38
Grasses						
Big Bluestem	*Andropogon gerardii*	2.00	10.00	x	x	x
Canada Wild Rye	*Elymus canadensis*	1.00	5.00	x	x	x
Slender Wheatgrass	*Elymus trachycaulus*	0.50	2.50	x	x	x
Virginia Wild Rye	*Elymus virginicus*	1.00	5.00	x	x	x
Switch Grass	*Panicum virgatum*	2.00	10.00	x	x	x
Little Bluestem	*Schizachyrium scoparium*	1.00	5.00	x	x	x
Indian Grass (savanna)	*Sorghastrum nutans*	1.00	5.00	x	x	x
Sand Dropseed	*Sporobolus cryptandrus*	0.55	2.75	x	x	x
Annual Ryegrass	*Lolium multiflorum*	10.00	50.00	x	x	x
	Subtotal Grasses	**19.05**				
Sedges and other graminoids						
Grain Sedge	*Carex granularis*	0.05	0.25	x	x	x
Fox Sedge	*Carex vulpinoidea*	0.05	0.25	x	x	x
Dark Green Bulrush	*Scirpus atrovirens*	0.05	0.25	x	x	x
Wool-grass	*Scirpus cyperinus*	0.05	0.25	x	x	x
	Subtotal Sedges & Other graminoids	**0.20**				
Forbs						
Showy Tick Trefoil	*Desmodium canadense*	0.10	0.50	x	x	x
Sweet Ox-eye	*Heliopsis helianthoides*	0.10	0.50	x	x	x
Round-headed Bushclover	*Lespedeza capitata*	0.10	0.50	x	x	x
Wild Bergamot	*Monarda fistulosa*	0.02	0.10	x	x	x
Evening Primrose	*Oenothera biennis*	0.10	0.50	x	x	x
Tall Cinquefoil	*Potentilla arguta*	0.05	0.25	x	x	x
Brown-eyed Susan	*Rudbeckia hirta*	0.10	0.50	x	x	x
Early Goldenrod**	*Solidago juncea*	0.01	0.05	x	x	x
Grey Goldenrod**	*Solidago nemoralis*					
Heath Aster***	*Symphyotrichum ericoides*	0.01	0.05	x	x	x
New England Aster***	*Symphyotrichum novae-angliae*			x	x	x
Sky Blue Aster***	*Symphyotrichum oolentangiense*	0.01	0.05	x	x	x
Frost Aster***	*Symphyotrichum pilosum*			x	x	x
Blue Vervain	*Verbena hastata*	0.10	0.50	x	x	x
Hoary Vervain	*Verbena stricta*	0.05	0.25	x		x
Foxglove Beardtongue	*Penstemon digitalis*	0.05	0.25		x	
	Subtotal Forbs	**0.75**	**3.75**			

* Pure Live Seed
** Goldenrod species may be a mix of all Goldenrod species listed
*** Asters may be a mix of all Aster species listed

SAMPLE SUBMISSION LABEL

Manager Support Services/Designate
Haldimand County
45 Munsee Street North, Cayuga N0A 1E0

TENDER NAME: **Dennis Bridge Rehabilitation (Structure No. 980305)**

TENDER NUMBER: **ENG 19-050**

BID CLOSING DATE: **before 2:00:00 p.m. on Tuesday, March 19, 2019.**

BIDDER NAME: _____