LANARK COUNTY

Andrewsville Bridge Site No. 015-0013

Investigation and Recommended Rehabilitation Report

MRC McCORMICK RANKIN CORPORATION

October 2005

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EXECUTIVE SUMMARY

The Andrewsville Bridge, located on Main Street in the hamlet of Andrewsville, is a two span, single lane, simply supported structure. The bridge is composed of two separate structures: a steel through truss with timber deck, and a timber deck on rolled steel girder structure. The exposed surface of the substructure is currently concrete; however, the concrete is likely a refacing over the original masonry.

The bridge is in poor condition. The asphalt is in poor condition with several wide transverse cracks, alligator cracks, medium progressive edge cracking and potholes. The timber deck is in fair condition with localized areas requiring replacement. The steel truss is in poor to fair condition with scattered light corrosion throughout. The steel below the deck is in poor to fair condition as the stringers at the west abutment have severe web section loss. The steel roller bearings are in poor condition and are severely corroded. The pier and abutments are in poor condition with extensive scaling, delaminations, spalls and widespread alkali-aggregate reaction. The bridge railing and approach guiderail are substandard.

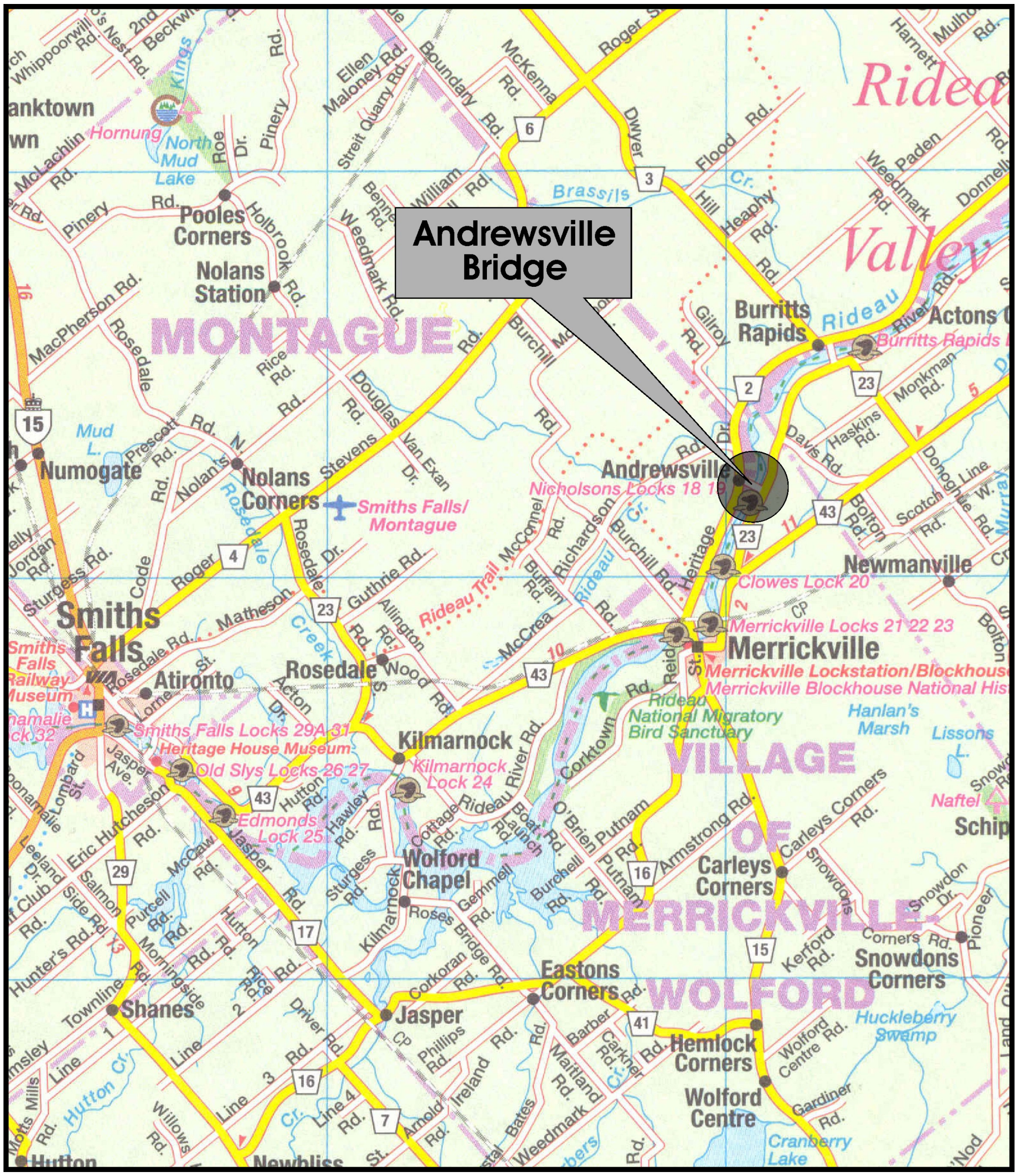
It is recommended that the webs of three of the stringers in the truss span at the West Abutment be strengthened by replacing a section of the deteriorated stringer. It is further recommended that this work be undertaken in the fall of 2005. The cost for this work is estimated to be $7,000.00.

The bridge is 88 years old and is nearing the end of its service life. Five rehabilitation and replacement alternatives were investigated, and it was determined that a single lane structure is adequate to meet future traffic requirements, and that structure replacement (estimated cost of $850,000) is not recommended at this time. It is recommended that the service life of the structure be extended with a major rehabilitation within the next few years. Work under this rehabilitation will include, but not be limited to, the following:

- Abrasive blast clean and recoat the structural steel;
- Remove the existing timber deck and construct a new timber deck;
- Install a crash-tested PL-1 barrier railing on the bridge;
- Remove and repair all deteriorated concrete in the substructure;
- Jack the bridge and replace all bearings with elastomeric bearings;
- Construct a reinforced concrete slab-on-grade on the east approach stone retaining walls;
- Upgrade the approach railing systems to meet current code requirements.

The cost for this rehabilitation is estimated to be $400,000.00.

KEY PLAN


Andrewsville Bridge
Andrewsville
Nicholsons Locks 18 19
Burritts Rapids
Burritts Rapids
Merrickville
Merrickville Locks 21 22 23
Merrickville Lockstation/Blockhouse
Merrickville Blockhouse National His
Clowes Lock 20
Newmanville
MONTAGUE
VILLAGE OF MERRICKVILLE-WOLFORD
Rideau Valley
Smiths Falls
Smiths Falls Locks 29A 31
Heritage House Museum
Old Slys Locks 26 27
Edmonds Lock 25
Kilmarnock
Kilmarnock Lock 24
Rosedale
Atironto
Nolans Corners
Smiths Falls/ Montague
Nolans Station
Pooles Corners
Numogate
Wolford Chapel
Jasper
Shanes
Eastons Corners
Hemlock Corners
Wolford Centre
Carleys Corners
Snowdons Corners
Rideau National Migratory Bird Sanctuary
Hanlan's Marsh
Huckleberry Swamp
Cranberry Lake
Rideau Trail
Acton

Inventory Data:					
Structure Name	Andrewsville Bridge				
MTO Region	Eastern	Main Highway	County Rd. 2	On □	
MTO District	Kingston	Owner	County of Lanark		
County	Lanark	AADT	-		
Township	Montague	Inspection Route Sequence			
Structure Type	Steel Truss, wood deck on steel girders				
Total Deck Area	236.80 (sq.m)	Interchange Structure Number			
Total Deck Length	47.79 (m)	Overall Structure Width	5.343	(m)	
No. of Spans	2	Roadway Width	4.460	(m)	
Span Lengths	38.545 m, 9.245 m			(m)	

Historical Data:			
Year Built	1915		
Evaluation Year		Current Load Limit	5.0 tonnes
Latest Biennial Inspection	2004	Last BridgeMaster Inspection	
Last Condition Survey		Last Underwater Inspection	
Rehab. History: (Date/description) 1963 – timber deck and curb replaced.			

Field Inspection Information:			
Date of Inspection:	June 9, 2005		
Inspector:	Bill Bohne, P.Eng.		
Others in Party:	Nathan Bakker, EIT		
Weather:	Sunny and humid	Temperature:	30^0C

Additional Investigations Required:	Priority		
	None	Normal	Urgent
Detailed Deck Condition Survey:		X	
DART Survey:		X	
Detailed Coating Condition Survey:		X	
Underwater Investigation:		X	
Fatigue Investigation:		X	
Seismic Investigation:		X	
Structure Evaluation:		X	

1.0 INTRODUCTION

McCormick Rankin Corporation (MRC) was retained by the County of Lanark to undertake the inspection and detailed design for the rehabilitation of the Andrewsville Bridge (MTO Site No. 015-0013). The first phase of the assignment includes a total station survey of the structure and approach roadways, a delamination survey of all exposed concrete components, the evaluation and analysis of rehabilitation alternatives, and the preparation of a preliminary General Arrangement drawing detailing the rehabilitation work to be completed.

This report summarizes the results of the field investigation, including photographs, recommendations for rehabilitation and studies as required and preliminary cost estimates. Photographs of existing conditions and significant areas of deterioration are included in Appendix A. A preliminary General Arrangement drawing is included in Appendix B. A description and history of the structure, a summary of significant findings, and a discussion of recommended rehabilitations and cost estimates are detailed in Sections 2 through 5 inclusive.

2.0 STRUCTURE DESCRIPTION AND HISTORY

The Andrewsville Bridge spans the Rideau River in the hamlet of Andrewsville, located between Merrickville and Burritts Rapids. Constructed in 1918, it is comprised of two simply supported structures: a 38.5 m steel modified Warren truss and a 9.2 m long steel girder (Photographs 1 and 2). The deck on both spans is 52 mm x 152 mm (2" x 6") transverse timbers laid on their sides. The timber deck has an asphalt topping and a 152 mm x 152 mm timber curb. The substructure consists of two concrete abutments and one concrete pier founded on spread footings on bedrock. In its current configuration, the structures permit one lane of traffic, with oncoming traffic yielding to vehicles on the bridge (Photograph 4). The west approach through the town of Andrewsville is two lanes. The embankment on the east approach is a single lane comprised of two dry stone retaining walls approximately 70 m in length (Photograph 3). The road continues as a two lane roadway to the east of the embankment where is crosses the Rideau Canal at Nicholsons Locks (approximately 500 m from the Andrewsville Bridge).

Information on previous rehabilitations of the Andrewsville Bridge is limited. Records indicate that the timber deck was replaced in 1963 with creosote-treated jack pine timbers. Field observations on the condition of the substructure indicate that the original substructure was likely masonry that was later refaced with concrete, but there are no records to substantiate this observation.

3.0 SUMMARY OF SIGNIFICANT FINDINGS

3.1 General

The truss structure is posted at 5 tonnes, and the posted speed limit across both structures is 10 km/hr. The west approach is tangent to the structures and there is a sharp horizontal curve just past the limits of the stone retaining wall at the east approach (Photograph 5). The width of the travelled lane across the structures is approximately 4400 mm.

3.2 Superstructure

The timber deck is in fair to poor condition. The timbers are connected to the stringers with steel clip angles (Photograph 18). At many of these clip angles, the timbers have separated (Photograph 9), permitting runoff through the timbers. The runoff has removed the protective creosote in these locations, and there is evidence of brown and white rot in the timbers (Photographs 10, 11, 12). The asphalt wearing surface has also failed in these locations (Photographs 7 and 8). The deck has separated from the steel stringers in several locations and the timbers were observed to deflect upwards under traffic loads. There is evidence of numerous previous repairs to the asphalt over the expansion joints (Photograph 6).

The steel truss is in fair condition, with widespread light corrosion and minor section loss throughout. The structural steel in the truss is typically in better condition above deck than below deck. The below deck steel floor system consists of longitudinal stringers and transverse floorbeams, which are suspended below the bottom chord in the truss span (Photograph 13) and tie into the exterior girder in the short span (Photograph 17). The steel floor systems are generally in fair condition, with the exception of the stringers at the West Abutment, which exhibit very severe section loss (Photographs 19 and 20).

Lateral bracing for the steel floor system is provided by square iron bars that are anchored to, and pass through, the floorbeams (Photographs 15 and 16). The bracing is in fair to poor condition.

The truss bearings are fixed steel bearing plates at the pier and nested roller bearings at the West Abutment. The north roller bearing is in poor condition (Photographs 21 and 22), and the south roller bearing is in fair to good condition (Photograph 23). The longitudinal stringers on the truss do not tie into the transverse floorbeams at the bearings, but are individually supported on brick bearing pads (Photograph 24). The short span is fixed at both ends.

3.3 Substructure

The abutments and pier are in poor condition with extensive scaling, delaminations, spalls, deterioration, and alkali-aggregate reaction (Photographs 27, 26, 28, 29). The bearing seats are similarly delaminated, severely scaled and disintegrated at the pier and East Abutment (Photographs 31 and 32). The East Abutment ballast wall exhibits severe deterioration (photograph 30) and undermining of the north bearing plate (Photograph 25). Based on field observations, it appears that the existing substructure, likely masonry, has been encased in concrete (Photograph 32). However, further investigation would be required to confirm visual observations. The top of the footings were exposed and wide cracks, delamination, and spalls were noted throughout.

The severe deterioration of the substructure components is consistent with the deterioration typical when masonry structures are encased in concrete. It is therefore likely that the existing substructure was constructed of masonry shafts with concrete bearing seats and ballast walls (see Photographs 31 and 32).

3.4 Miscellaneous Components

The bridge railing, consisting of 3 x 50 mm diameter hollow tubular steel sections mounted to the truss members exhibits extensive light to medium corrosion and has been damaged in several locations (Photograph 4). The bridge railing is substandard with respect to current code requirements.

The fills in the east approach are retained by an ungrouted masonry retaining wall (photograph 3). The wall is in fair to poor condition. The wall has settled on the south side, which has deformed the guiderail (Photograph 34).

Similar to the bridge railing, the approach railing is substandard and has been damaged in several locations. On the east approach, the railing posts are cast into concrete blocks that sit on an ungrouted masonry wall (Photograph 3).

The curb on the deck consists of 152 mm x 152 mm timbers (Photograph 33), and is in fair to good condition.

4.0 REHABILITATION ALTERNATIVES AND RECOMMENDATIONS

4.1 Short Term Rehabilitation

Three of the stringers supported on the West Abutment exhibit very severe deterioration and it is recommended that they be repaired immediately by removing a 600 mm long section of the deteriorated stringer and replacing it with a section of S200x27. A complete scope of work for, and details of, the repair may be found in Appendix B.

4.2 Long Term Rehabilitation

The selection of any long-term rehabilitation methodology for the Andrewsville Bridge must address the following concerns:

- The existing bridge is in fair to poor condition, is a single lane structure, and is nearly 90 years old;
- The structure is posted for 5 tonnes, but there are no records to indicate when this posting was implemented, nor if any structural evaluation was undertaken to determine this posting;
- The bridge railing system is connected directly to the truss members, and likely could not withstand any significant impact, which could result in significant damage to or complete failure of the truss;
- The existing timber deck is exhibiting severe deterioration and is more than 40 years old;
- The substructure is masonry encased in concrete, and the condition of the masonry cannot be determined without extensive destructive testing;
- The east approach alignment is substandard;
- The approach guiderail is substandard, and the configuration of the approach will not permit upgrading of the approach without significant widening (including reconstruction of the existing stone walls at the east approach).

The Canadian Highway Bridge Design Code (CHBDC) and the MTO Structural Financial Analysis Manual indicate that the assumed service life of a bridge is 75 years. Given the age of the structure and the extent of deterioration, the next major rehabilitation would typically involve replacement of the structure. However, due to the low traffic volume (AADT = 200) and the severe load posting, it is anticipated that the service life of the bridge can be extended by approximately 10 years with the rehabilitation of the primary components. Accordingly, both replacement and rehabilitation alternatives have been considered. A summary of the advantages and disadvantages of each alternative is detailed in Table 1.

Alternative 1 – Do Nothing

Although this is the least expensive alternative (no capital outlay in the near future other than the stringer repairs detailed in Section 4.1), potential liability issues with the bridge and approach railings are not addressed. The continued deterioration of the timber deck will eventually result in punch-trough failures, which could close the bridge until repairs are effected. Accordingly, this alternative is not recommended.

Alternative 2 Replace Timber Deck, Upgrade Bridge Railing, Repair Substructure

In this alternative, the timber deck is replaced in kind and the concrete substructure is repaired. The bridge is jacked and the existing bearings are replaced with elastomeric bearings. The existing railing is removed and replaced with a Performance Level 1 (PL-1) railing system from the MTO publication "Crash Tested Bridge Railings" which is anchored to the new timber deck. A structural evaluation is undertaken to determine the required load posting.

The advantage of this alternative is that the potential for severe damage or total collapse of the structure due to impact damage is addressed, and the service life of the structure is extended with the repairs to the deck and substructure. The primary disadvantage is that the potential liability issues with the substandard approach railing are not addressed.

Alternative 3 Replace Timber Deck, Upgrade Bridge and Approach Railings, Repair Substructure

This alternative is similar to Alternative 2 with the addition of upgrades to the approach guiderail system. The new approach railing system cannot be anchored into the existing masonry wall, so a reinforced concrete slab will be constructed over the entire width of the approach fills, and the railing system will be anchored to the slab. All potential liability concerns are addressed with this alternative. However, it represents a significant outlay of capital for a single lane structure. In addition, the construction of the approach slab will necessitate closure of the bridge for a prolonged period of time.

Alternative 4 New Single Lane Structure

In this alternative, the existing structure is replaced with a single lane slab-on-girder structure (MTO Guidelines for the Design of Bridges on Low Volume Roads permits the construction of new single lane bridges on roads with AADT < 400). The east approach fills are reconstructed to meet current code requirements. This alternative represents a significant outlay of capital for a

low volume road. In addition, the widened fills and required wall reconstruction on the east approach may have detrimental environmental impacts on the watercourse.

Alternative 5 New Two Lane Structure

In this alternative, the existing bridge is replaced with a two lane slab-on-girder bridge. This alternative resolves all geometric and structural concerns, but requires significant widening of the east approach.

It is our understanding, through discussions with the Counties of Lanark and Leeds & Grenville, that it is unlikely that the approach roadways will be widened to two lanes in the near future. The bridge over the Rideau Canal to the east of the Andrewsville Bridge is a single lane structure, and no long-term widening of this bridge is planned. Accordingly, this alternative is not recommended.

4.3 Recommended Rehabilitation

It is recommended that the Andrewsville Bridge be rehabilitated in accordance with Alternative 3. This alternative addresses all structural deficiencies and potential liability concerns while extending the service life of the structure and minimizing impacts to the watercourse associated with structure replacement. A detailed breakdown of the work included in the alternative is summarized in Section 5.0 – Cost Estimates, and a preliminary General Arrangement drawing is included in Appendix B. It is our understanding that the County of Lanark is considering implementing Alternative 2 and accepting the liability associated with maintaining the east approach as is.

However, prior to the implementation of any rehabilitation alternative, it is strongly recommended that a structural evaluation be undertaken on the bridge to determine the actual load posting on the structure. The recommended rehabilitation requires a significant outlay of funds (approximately $400,000), and it is prudent to ensure that the existing structure will meet the current and intended use of the bridge for the next decade.

Table 1 – Rehabilitation Alternatives

Alt.	Description	Advantages	Disadvantages	Estimated Cost ($2005)
1	• Maintenance repairs as required.	• Minimal outlay of capital in 2006	• Deficiencies in structure and approaches are not addressed • Actual capacity of structure is not known • Potential risk to the County due to deficiencies is not addressed	-
2	• Remove and replace existing asphalt and timber deck • Install PL-1 crash tested bridge railing system • Repairs to the structural steel as required • Remove rollers and replace with elastomeric bearing pads • Repair deteriorated concrete in piers and abutments	• Least expensive of rehabilitation alternatives • Service life of structure is extended through deck replacement and substructure repairs • Potential for structure collapse due to vehicular impact is mitigated by installation of bridge railing system	• Substandard approach railing and potential liability due to the railing is not addressed • Poor approach alignment not addressed • Actual capacity of structure is not known	$85,000
3	• Same repairs as detailed in Alternative 2 above • Construct concrete slab-on-grade on east approach fills • Construct a crash-tested railing system on approach slab	• Service life of structure is extended through deck replacement and substructure repairs • Potential for structure collapse is avoided by installation of bridge railing system • Approach railings meet current code requirements • Potential for liability associated with bridge collapse and approach railing failure is addressed	• Significant outlay of capital for a structure with limited remaining service life • Poor approach alignment not addressed	$400,000
4	• Replace existing structure with single lane structure • Construct a concrete slab on east approach fills and upgrade guiderail	• Structural and guiderail deficiencies addressed	• Significant outlay of capital for a single lane bridge • Potential environmental impacts due to minor widening	$850,000
5	• Replace existing structure with two lane structure • Widen east approach to permit two lanes of traffic • Upgrade approach guiderail	• All deficiencies addressed	• Two lane bridge not required • Significant outlay of capital • Potential environmental impacts due to significant widening	$1,650,000

5.0 COST ESTIMATES

Cost estimates for the rehabilitation alternatives discussed in Section 4.0 are tabulated below. All costs are in 2005 dollars. For the duration of the rehabilitation, the structure would be closed, which will result in a detour of approximately 10 km.

It is estimated that a structural evaluation of the Andrewsville Bridge would cost approximately $8,000.00.

Table 2 – Upgrading Bridge Railing and Approach Guiderail

Description	Unit	Quantity	Unit Cost	Item Cost
Traffic Control	L.S.	-	-	$5,000
Removal of Existing Timber Deck and Asphalt	L.S.	-	-	$10,000
Timber Replacement	L.S.	-	-	$45,000
Jacking Bridge Deck	L.S.	-	-	$5,000
Bearing Modifications (removal of rollers, installation of pads)	L.S.	-	-	$10,000
Concrete Removals, Partial Depth Type C	m^3	5.5	$3,500.00	$19,250
Concrete Repairs, Formed Surfaces	m^3	4.6	$2,000.00	$9,200
Concrete Refacing	m^3	4.0	$1,000.00	$4,000
Recoating Structural Steel (including environmental protection)	L.S.	-	-	$50,000
Concrete in Approach Slab	m^3	45	$1,000.00	$45,000
Reinforcing Steel	t	3.1	$1,800.00	$5,580
Coated Reinforcing Steel	t	3.1	$2,400.00	$7,440
Bridge Railing System	m	96	$700.00	$67,200
Steel Beam Guiderail	m	140	$85.00	$11,900
Steel Beam Guiderail with Channel	m	40	$115.00	$4,600
			Subtotal	**$304,170**
			Contingency (15%)	**$45,626**
			Total	**$350,000**
			Engineering (15%)	**$50,000**
			Rounded Total	**$400,000**

Report Prepared By: Report Reviewed By:

Bill Bohne, P.Eng. Michel Vachon, P.Eng.

APPENDIX A

SITE PHOTOGRAPHS

Photograph 1: North elevation of Andrewsville Bridge.

Photograph 2: Detail of truss span and slab on girder span.

Photograph 3: North elevation of east stone retaining wall.

Photograph 4: View across truss span, looking east.

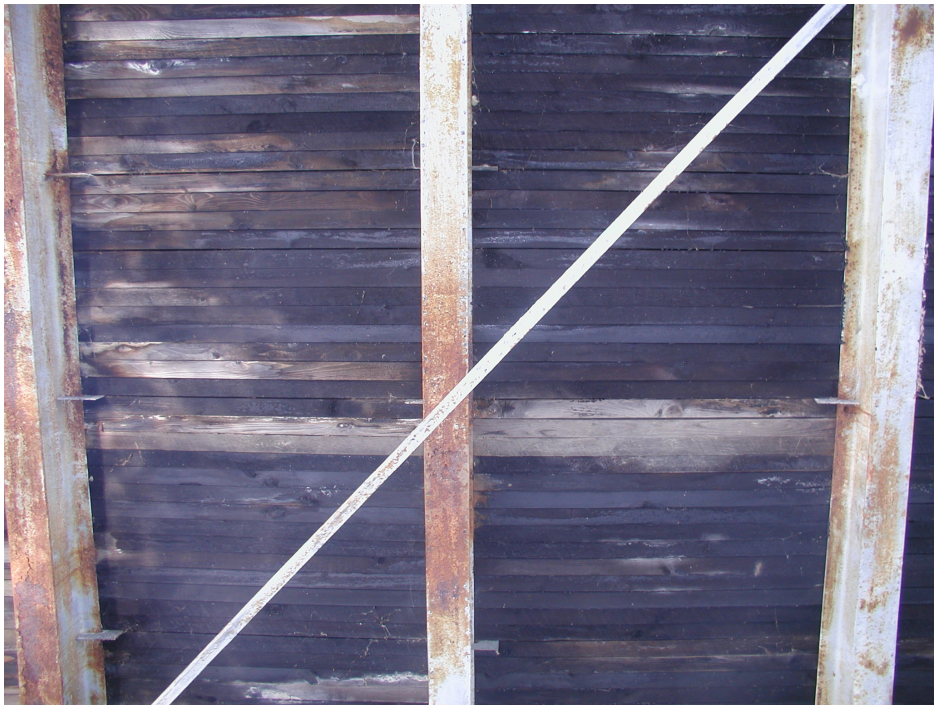
Photograph 5: View of east approach, looking east from East Abutment.

Photograph 6: East expansion joint, looking south.

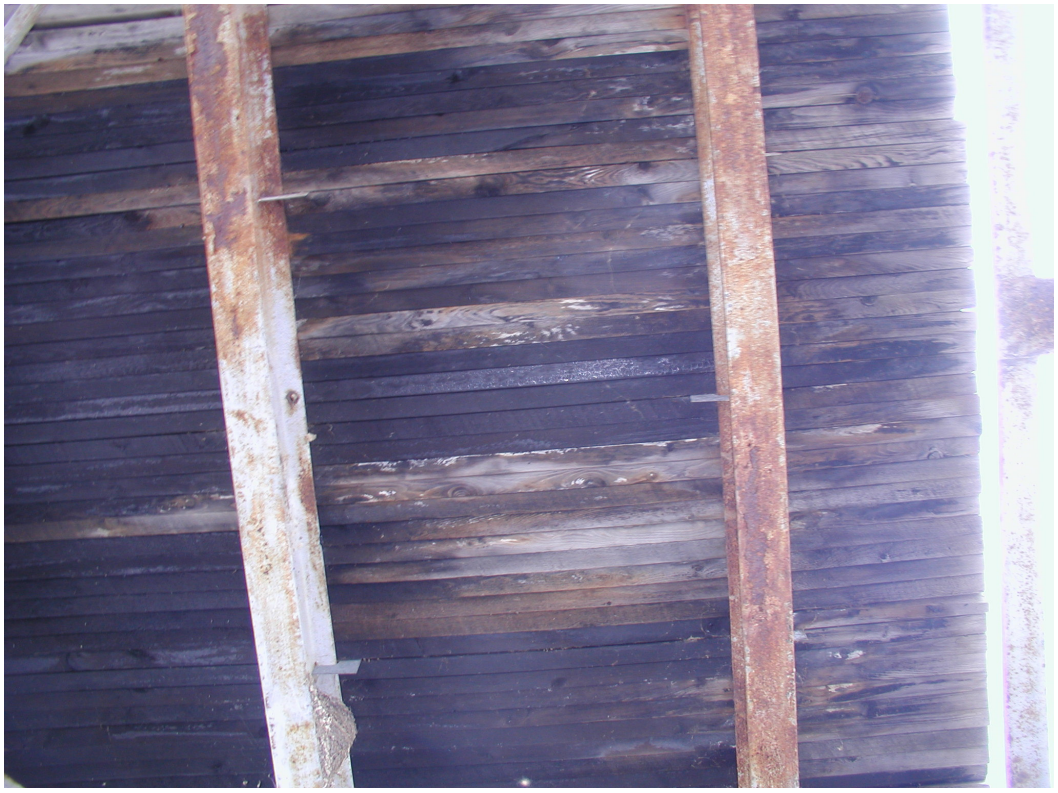
Photograph 7: View of west expansion joint, looking east.

Photograph 8: Detail of asphalt deterioration on timber deck.

Photograph 9: Detail of deteriorated asphalt showing gap between underlying timbers.



Photograph 10: Typical condition of underside of deck.



Photograph 11: Exterior stringers typically exhibit more corrosion than interior stringers.

Photograph 12: Creosote is generally missing on timbers in locations of gaps, which have allowed penetration of water.

Photograph 13: Configuration of below-deck structural steel in truss span.

Photograph 14: View of longitudinal stringers and deck just west of pier.

Photograph 15: Detail of cross-bracing as it passes through the web of the floorbeam.

Photograph 16: Detail of cross-bracing connection at floorbeam.

Photograph 17: Configuration of below-deck structural steel in slab-on-girder span.

Photograph 18: Detail of clip attaching deck to stringer,

Photograph 19: Very severe section loss in web of middle stringer, West Abutment.

Photograph 20: Section loss and crack in web of exterior stringer, West Abutment.

Photograph 21: Bearing configuration at West Abutment.

Photograph 22: Detail of deterioration of north roller bearing, West Abutment.

Photograph 23: Detail of south roller bearing at West Abutment.

Photograph 24: Detail of bearing pads on interior girders, East and West Abutments.

Photograph 25: North bearings at pier. Note undermining of east bearing.

Photograph 26: Face of West Abutment is characterized by extensive scaling, delaminations, and alkali-aggregate reaction. Condition of face of East Abutment is similar.

Photograph 27: Elevation of south wingwall at West Abutment.

Photograph 28: Deterioration of west face of pier nosing. Note extensive deterioration and alkali-aggregate reaction. Condition of east face is similar.

Photograph 29: Condition of east face of pier. Condition of west face is similar.

Photograph 30: Detail of deterioration of ballast wall of East Abutment, north side.

Photograph 31: Deterioration of bearing seat and ballast wall, East Abutment.

Photograph 32: Detail of top of East Abutment, showing concrete encasement. West Abutment similar.

Photograph 33: Detail of curb on timber deck.

Photograph 34: Deformed railing on south side of east approach retaining wall as a result of slope erosion undermining posts.

GENERAL NOTES

1. ALL STRUCTURAL STEEL SHALL CONFORM TO CSA STANDARD CAN/CSA-G40.21-M92 GRADE 350. ROLLED SECTIONS SHALL CONFORM TO CSA STANDARD CAN/CSA-G40.21-M92 OR ASTM SPECIFICATION A588.
2. BOLTS SHALL BE GALVANIZED ASTM A325M TYPE 1, M22. BOLT THREADS SHALL BE EXCLUDED FROM THE SHEAR PLANES.
3. DIMENSIONS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL VERIFY EXISTING DIMENSIONS PRIOR TO THE COMMENCEMENT OF WORK AND REPORT ANY DISCREPANCIES TO THE ENGINEER.
4. ALL NEW STEEL SHALL BE ABRASIVE BLAST CLEANED TO SSPC SP10 (NEAR WHITE) AND PRIMED WITH A ZINC RICH PRIMER.

SCOPE OF WORK

1. ERECT TEMPORARY TRAFFIC CONTROL AND CLOSE BRIDGE TO TRAFFIC.
2. INSTALL TEMPORARY HARDWOOD BLOCKING AND SHIM TO FIT.
3. REMOVE DETERIORATED STEEL SECTION ON THREE (3) STRINGERS AT WEST ABUTMENT TO LIMITS SHOWN ON CONTRACT DRAWINGS. ALL STRUCTURAL STEEL REMOVALS SHALL BE UNDERTAKEN IN ACCORDANCE WITH OPSS 906.
4. POWER TOOL CLEAN EXISTING STEEL FAYING SURFACES TO BARE METAL IN ACCORDANCE WITH SSPC-SP-11 AND PRIME WITH ZINC RICH PRIMER.
5. INSTALL NEW STEEL MEMBER AND SPLICE PLATES. BOLTS TO BE TIGHTENED USING THE "TURN OF THE NUT" METHOD.
6. REMOVE TEMPORARY HARDWOOD BLOCKING, REOPEN BRIDGE TO TRAFFIC.

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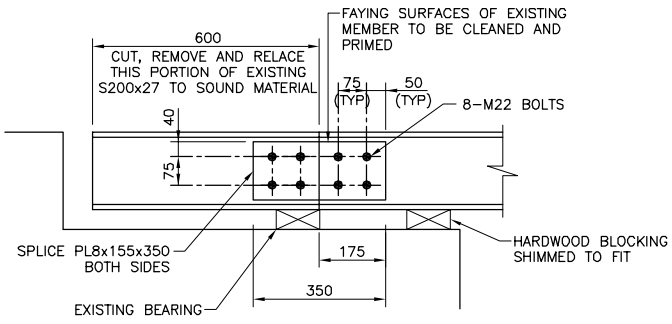

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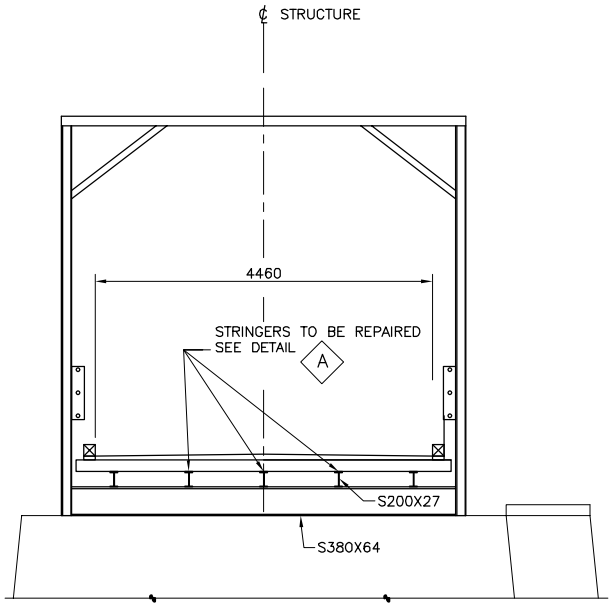

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REVISIONS			DESCRIPTION

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DRAWN MS	CHK WRB	SITE 015-0013	STRUCT	SCHEME	DWG

COUNTY OF LANARK
5 BRIDGE REHABILITATIONS
ANDREWSVILLE BRIDGE

STRINGERS REPAIR DETAIL
WEST ABUTMENT

SHEET

McCORMICK RANKIN CORPORATION

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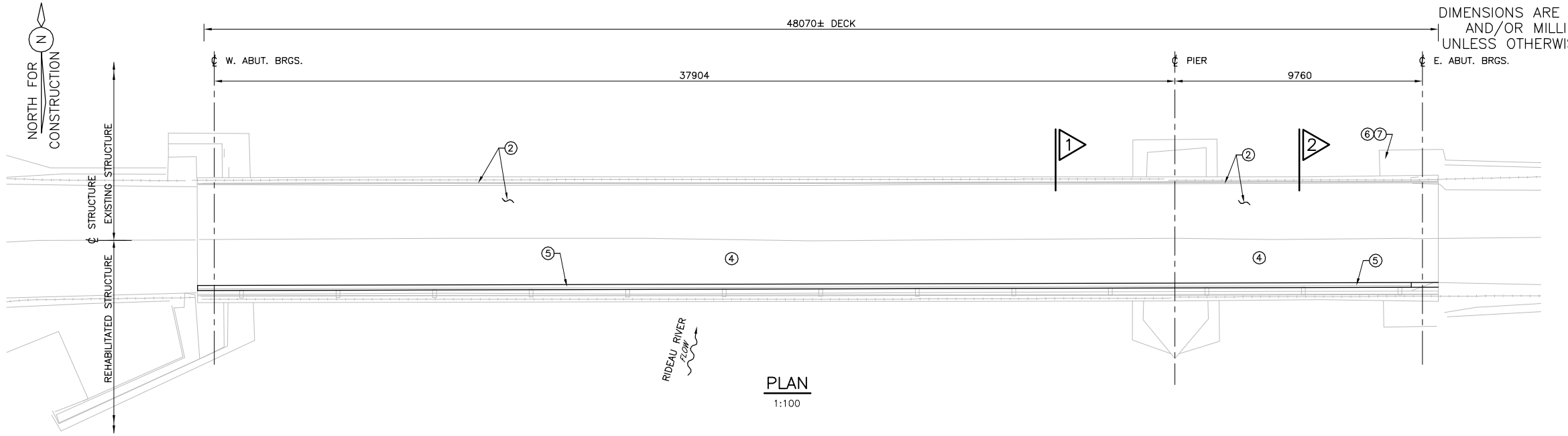

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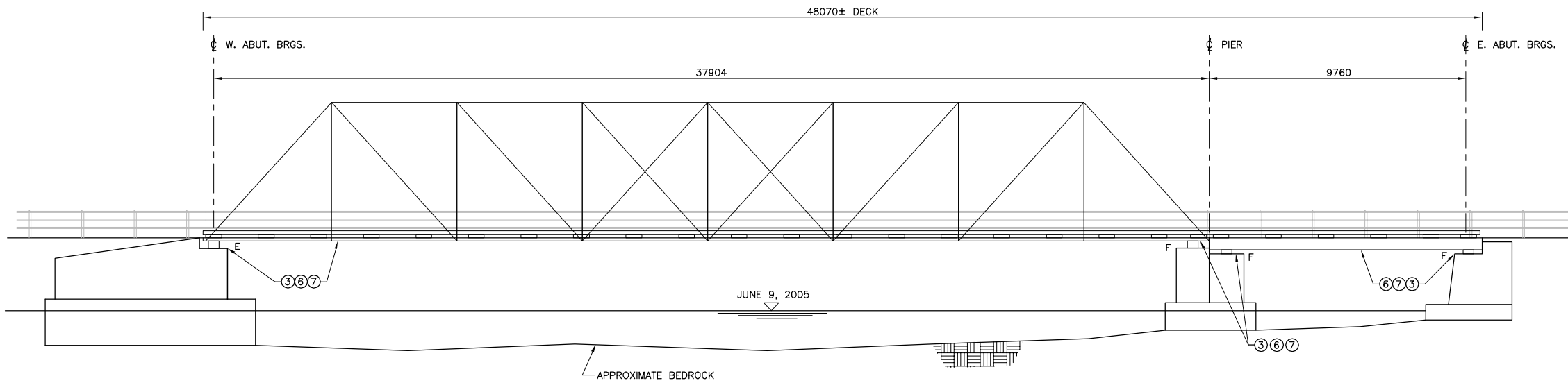

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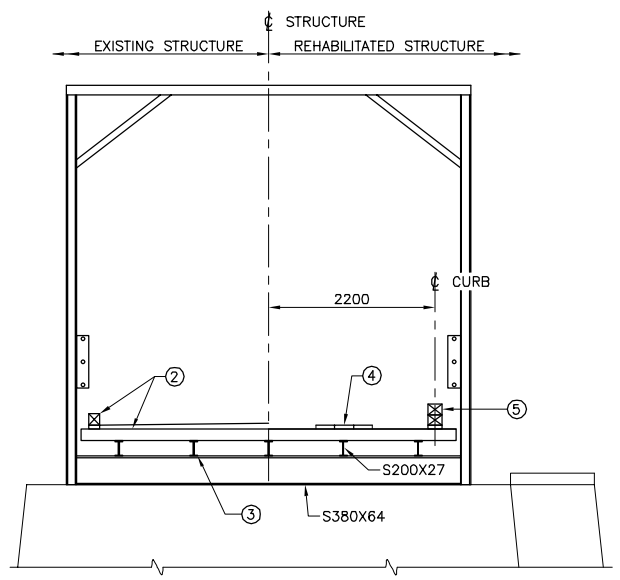

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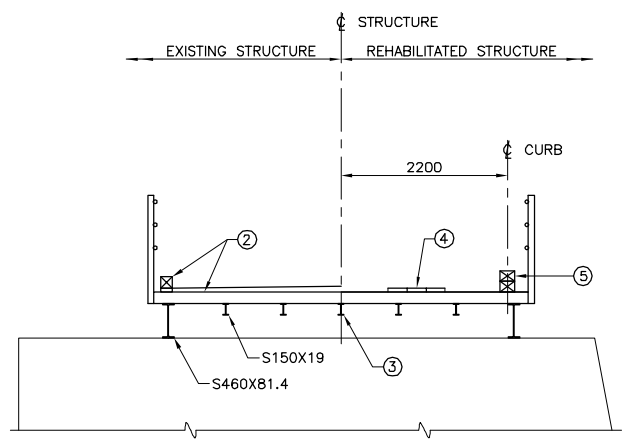

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DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

LANARK COUNTY

COUNTY OF LANARK
ANDREWSVILLE BRIDGE
REHABILITATION

SHEET 1

GENERAL ARRANGEMENT

McCORMICK RANKIN CORPORATION

GENERAL NOTES

1. CLASS OF CONCRETE

CLASS OF CONCRETE SHALL BE 30 MPa.

2. CLEAR COVER TO REINFORCING STEEL

FOOTINGS. . . . . 100 ±25

DECK TOP . . . . . 70 ±20
BOTTOM . . . . . 40 ±10

REMAINDER – UNLESS OTHERWISE NOTED. . . . . 70 ±20

3. STRUCTURAL STEEL

ALL STRUCTURAL STEEL SHALL CONFORM TO CSA STANDARD CAN/CSA – G40.21–M92. STRUCTURAL STEEL SHALL BE GRADE 350

ROLLED SECTIONS SHALL CONFORM TO CSA STANDARD CAN/CSA – G40–M92 OR ASTM SPECIFICATION A588.

BOLTS SHALL BE ASTM A325M TYPE 1, M22. BOLT THREADS SHALL BE EXCLUDED FROM THE SHEAR PLANES OF STRUCTURAL STEEL.

THREADED ROD SHALL BE ASTM A307.

4. TIMBER

DECK TIMBER SHALL BE S–P–F No. 2 OR BETTER.

ALL S–P–F SHALL BE PRESERVATIVE TREATED IN ACCORDANCE WITH CSA STANDARD CAN/CSA O88–M02.

CURB TIMBER SHALL BE D.Fir–L No. 2 OR BETTER.

NAILS, SCREWS AND LAG BOLTS SHALL CONFORM TO CSA STANDARD CAN/CSA – B111–03

NAILING CLIPS SHALL CONFORM TO CSA STANDARD CAN/CSA – G40.21–M92, GRADE 300

NAILS, SCEWS, LAG BOLTS AND NAILING CLIPS SHALL BE HOT DIP GALVANIZED IN ACCORDANCE WITH CA/CSA – G164–M03

5. CONSTRUCTION NOTES

DIMENSIONS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL VERIFY EXISTING DIMENSIONS PRIOR TO COMMENCEMENT OF WORK AND REPORT ANY DISCREPANCIES TO THE ENGINEER.

EXISTING STRUCTURE IS LOAD POSTED FOR 5 TONNES GVW.

SCOPE OF WORK

(1) ERECT TRAFFIC SIGNAGE AS INDICATED IN CONTRACT DOCUMENTS.

(2) REMOVE EXISTING ASPHALT WEARING SURFACE, TIMBER CURB AND TIMBER DECK.

(3) STRENGTHEN / REPLACE DETERIORATED STEEL.

(4) CONSTRUCT TIMBER DECK AND WEARING SURFACE.

(5) INSTALL TIMBER CURB.

(6) REMOVE DETERIOTRATED CONCRETE FROM SUBSTRUCTURE AS DIRECTED BY THE ENGINEER.

(7) REPAIR CONCRETE IN SUBSTRUCTURE USING LOW PRESSURE "FORM AND PUMP" TECHNIQUES.

REVISIONS			DESCRIPTION

DESIGN WRB	CHK MV	CODE CHBDC2006	LOAD		DATE DEC 07	
DRAWN SH	CHK WRB	SITE 015–0013	STRUCT	SCHEME	DWG S1	

MINISTRY OF TRANSPORTATION, ONTARIO PR–D–707 88–05

FILE LOCATION–M:\6075\CURRENT\SHEETS\ANDREWSVILLE BRIDGE\
DRAWING NAME: 6075–ANDREW–GA–001.DWG PLOTTED: 08/01/03 11:51:47 Revised
DRAWN BY: STEVEN HUANG