



ANDREWSVILLE BRIDGE UPDATE

Public Works Committee

August 29, 2018

Terry McCann, C.E.T.,
Director of Public Works

PERFORATION OF APPROACH STRINGER 2 AFTER PROBING



GENERAL VIEW OF WEST BAY OF
APPROACH SPAN LOOKING DOWNSTREAM.
PERFORATIONS CIRCLED.





**MINUTES
SIXTH MEETING OF 2018
PUBLIC WORKS
COMMITTEE OF THE WHOLE**

The Public Works Committee of the Whole met in regular session on Wednesday, August 29, 2018 immediately following the Economic Development Committee meeting at the Lanark County Administration Building, 99 Christie Lake Road, Perth, Ontario.

Members Present: Chair B. Campbell, Warden J. Fenik, Councillors J. Hall, S. McLaughlin, J. Torrance, B. Dobson, K. Van Der Meer, B. Dobson, J. Gemmell, K. Kerr, R. Kidd, S. Mousseau, L. Antonakos, A. Churchill and G. Code

Staff/Others Present: K. Greaves, CAO
L. Drynan, Clerk/Deputy CAO
C. Whitar, Research Assistant
T. McCann, Director of Public Works
J. Tysick, PW Business Manager

Regrets: Councillors B. Stewart and J. Flynn

PUBLIC WORKS

Chair: Councillor Brian Campbell

1. CALL TO ORDER (Reminder please silence all electronic devices)

The meeting was called to order at 5:40 p.m.
A quorum was present.

2. DISCLOSURE OF PECUNIARY INTEREST

None at this time.

3. APPROVAL OF MINUTES

MOTION #PW-2018-32

MOVED BY: John Gemmell **SECONDED BY:** Gail Code

"THAT, the minutes of the Public Works Committee meeting held on June 27, 2018 be approved as circulated."

ADOPTED

4. ADDITIONS AND APPROVAL OF AGENDA

MOTION #PW-2018-33

MOVED BY: John Hall **SECONDED BY:** Louis Antonakos

"THAT, the agenda be approved as amended."

ADOPTED

5. DELEGATIONS (10 MINUTES)

- | | | |
|----|--|-------|
| i) | Ottawa Street and Martin/Queen Street Intersection
in Almonte | Page |
| | Steve Maynard | 6 - 9 |

S. Maynard presented a power point presentation,
please see attached.

6. PRESENTATIONS

None

7. COMMUNICATIONS

- i) North American Pollinator Protection Campaign: Pollinator Advocate Award

Staff was directed to prepare a news release highlighting the achievement of the Public Works Department with the Pollinator Advocate Award.

MOTION #PW-2018-34

MOVED BY: Bill Dobson **SECONDED BY:** Aubrey Churchill

"THAT, the communications for the August Public Works Committee meeting be received as information."

ADOPTED

8. CONSENT REPORTS

None

9. DISCUSSION REPORTS

- | | | |
|----|---|-----------------|
| i) | Report #PW-21-2018 ANDREWSVILLE BRIDGE
UPDATE
Director of Public Works, Terry McCann | Page
10 - 11 |
|----|---|-----------------|

T. McCann presented a power point presentation,
please see attached.

MOTION #PW-2018-35

MOVED BY: John Hall **SECONDED BY:** Gail Code

"THAT, the Public Works Committee accepts Report #PW-21-2018, Andrews ville Bridge Update as information;

AND THAT, the Clerk circulates Report #PW-21-2018 to the Township of Montague, Village of Merrickville-Worlford and the United Counties of Leeds and Grenville."

ADOPTED

- | | | |
|-----|---|-----------------|
| ii) | Report #PW-22-2018 REQUEST FROM MUNICIPALITY
OF MISSISSIPPI MILLS: COUNTY ROAD #17 (MARTIN
STREET NORTH) BICYCLE LANES
Director of Public Works, Terry McCann | Page
12 - 13 |
|-----|---|-----------------|

T. McCann presented a power point presentation, please see attached.

MOTION #PW-2018-36

MOVED BY: Keith Kerr **SECONDED BY:** John Fenik

"**THAT**, the Public Works Committee recommend to County Council that the request from the Municipality of Mississippi Mills, for bicycle lanes on County Road #17 (Martin Street North) between Victoria Street/Princess Street and Teskey Street, be approved, conditional that all construction costs and ongoing maintenance costs of the line painting and signage required for the bicycle lanes, be the responsibility of the Municipality of Mississippi Mills;

AND THAT, the Clerk prepare the necessary No Parking By-Law for the September 5, 2018 County Council meeting;

AND THAT, the Clerk sends Report #PW-22-2018 to the Municipality of Mississippi Mills Clerk, for information."

ADOPTED

10. VERBAL REPORTS

- i) Report #PW-19-2018 Construction Projects Update
Director of Public Works, Terry McCann

T. McCann updated Council on a number of completed projects and advised of timelines for those projects still in progress.

MOTION #PW-2018-37

MOVED BY: Keith Kerr **SECONDED BY:** Aubrey Churchill

"**THAT**, Report #PW-19-2018 Construction Projects Update be received as information."

ADOPTED

11. DEFERRED REPORTS

None

12. CONFIDENTIAL REPORTS

None

13. NEW/OTHER BUSINESS

14. ADJOURNMENT

The Committee adjourned at 6:17 p.m. on motion by Councillors
Van Der Meer and Gemmell

A handwritten signature in dark ink, appearing to read 'LDrynan', is positioned above the printed name.

Leslie Drynan, Clerk/Deputy CAO

LANARK COUNTY

ANDREWSVILLE BRIDGE UPDATE

Public Works Committee
August 29, 2018
Terry McCann, C.E.T.,
Director of Public Works

PERFORATION OF APPROACH STRINGER 2 AFTER PROBING



LANARK
COUNTY

GENERAL VIEW OF WEST BAY OF
APPROACH SPAN LOOKING DOWNSTREAM.
PERFORATIONS CIRCLED.



LANARK
COUNTY

THE COUNTY OF LANARK

PUBLIC WORKS COMMITTEE

September 26, 2018

Report # PW-24-2018 of the
Director of Public Works

ANDREWSVILLE BRIDGE UPDATE AND CONSULTING ENGINEER'S 2018 WADING INSPECTION REPORT

1. STAFF RECOMMENDATIONS

"**THAT**, the Public Works Committee accepts Report #PW-24-2018, Andrewsville Bridge Update and Consulting Engineer's 2018 Wading Inspection Report, as information;

AND THAT, the Clerk prepare the necessary By-Law for the October 10, 2018 County Council Meeting, to authorize an Annual, Temporary Bridge closure of the Andrewsville Bridge, from December 1 to March 31;

AND THAT, the Director of Public Works be authorized to obtain quotations for the required work and proceed to have the work completed during the bridge closure during the Winter of 2018/2019;

AND THAT, the Clerk circulates Report #PW-24-2018 to the Township of Montague, Village of Merrickville-Wolford and the United Counties of Leeds and Grenville."

2. PURPOSE

To provide the Consulting Engineer's Report on the condition of Andrewsville Bridge and provide recommendations.

3. BACKGROUND

At the August 29, 2018 Public Works Committee Meeting, staff advised that further deterioration of the bridge had occurred and that a Consulting Engineer's Report was forthcoming. The Committee was also informed that a decision would be required in regards to an annual bridge closure during the winter.

4. DISCUSSION

Keystone Bridge Management Corp.'s "Andrewsville Bridge 2018 Wading Inspection" Report is attached at Appendix "A".

The immediate repairs are noted on Page 4 of the Report under Recommendations - Immediate Needs.

Subject to prices received, it is anticipated that the costs of the above noted work will range between \$75,000 - \$100,000.

The estimated cost of a complete bridge replacement is \$3.3 Million Dollars.

5. ANALYSIS AND OPTIONS

Option 1 (Recommended):

Complete the necessary immediate repairs and pass a By-Law to effect an annual, temporary road closure from December 1 thru March 31.

Option 2 (Not Recommended):

Do nothing and close the bridge.

6. FINANCIAL IMPLICATIONS

The existing commitment by the Counties, covering the period ending April 2028, has approximately \$110,000 remaining, which should be sufficient to complete the repairs.

7. LOCAL MUNICIPAL IMPACT

The Andrewsville Bridge is a landmark for the local communities and public interest is high, especially with members of the Friends of the Andrewsville Bridge.

8. CONCLUSIONS

The Director is recommending that the necessary By-law be presented at the October 10, 2018 County Council Meeting, to put an annual, temporary bridge closure in effect from December 1 until March 31, each year, and that the immediate repairs be completed during the 2018/2019 Winter Season bridge closure.

Future consideration will need to be given to the long term status of the Andrewsville bridge.

9. ATTACHMENTS

Appendix "A" – Andrews ville Bridge 2018 Wading Inspection.

Recommended By:

Janet Tysick
Business Manager

**Approved for
Submission By:**

Terry McCann
Director of Public
Works

**Manager Approval
By:**

Kurt Greaves
Chief Administrative
Officer

Andrewsville Bridge 2018 Wading Inspection

Introduction

Keystone Bridge Management was retained by the County of Lanark to complete a wading inspection of the underside of the Andrewsville Bridge over the Rideau River downstream of Merrickville, Ontario. The inspection was completed on August 9, 2018. Harold Kleywegt, P.Eng., was the principal inspector. He was assisted by Steve Reid, C.E.T. and engineering student Brad Lair. Two student staff from Lanark County were on hand to observe the inspection and assist with the ladders.

Access to the underside of the bridge was obtained by setting up a 10' step ladder and 24' extension ladder on the river bottom. The depth of water and uneven bottom prevented ladder access to about half of the plan area of the truss and about three-quarters of the plan area of the east approach span. River flows were modest at the beginning of the inspection but increased considerably as the inspection progressed.

The Rideau River is flowing principally north at the Andrewsville Bridge. Accordingly, the east abutment is on the United Counties of Leeds & Grenville side of the bridge and the west abutment is on the Lanark County side.

The bridge has two spans, a 38.5 m long main truss forming the west span and a 9.2 m steel girder flanking east span. The truss has 9 panel points supporting floor beams spaced at 4.88 m. Floor beams are only located at the interior panel points.

Spanning from floor beam to floor beam on the truss are five steel S200 x 27 stringers spaced at 1.22m. They directly support the laminated timber deck.

The structural steel framing on the east approach span consists of two main girders, a connecting floor beam and five stringers spaced at 914 mm. The S150 x 19 approach span stringers are a lighter section than the truss stringers.

For the purpose of this report the area between floor beams is referred to as "Bays." There are 8 Bays comprising the truss floor system. They are numbered from west to east with Bay 1 closest to the west abutment, and Bay 8 closest to the pier. The stringers are numbered 1 to 5 from south to north. This convention has been followed in captioning the images included with this report.

The Bay 1 stringers were not inspected as they were replaced in late 2016.

Main Truss Findings

The structural steel of the floor system of the main truss is almost fully involved in corrosion except for the replaced stringers adjacent the west pier.

The principal concern is the condition of the stringers. The stringers exhibit areas of severe corrosion with slab rust and severe thinning of the webs and flanges. In some localized areas the stringers may have lost an estimated 40% of their design strength due to section loss caused by corrosion.

The ends of the floor beams are most heavily involved in corrosion. Slab rust is evident on the webs and flanges of the floor beam ends. There is still residual paint on the centre sections of the floor beams. Although the floor beams are slightly weakened by corrosion, they are more than adequate for the present load limit on the bridge.

There is very little change to the bottom chords of the main truss since previous inspections. The bottom chords are deemed to be adequate for the present load posting.

Approach Span Findings

Stringer 2 of the east approach span is severely perforated both west and east of the intermediate supporting floor beam. This stringer has almost no remaining strength.

Stringer 4 of the east approach span has one perforation and is otherwise heavily corroded.

The remaining stringers of the approach span, Stringers 1, 3, 5 fortunately are not as severely corroded. They however all exhibit varying degrees of moderate to severe corrosion with some corresponding section loss.

The stringers have more severe local corrosion and section loss where they bear on the pier and east abutment. Difficult access and the presence of debris hindered a more thorough examination.

The single floor beam of the approach span is mostly in fair to good condition, and structurally adequate for the present load posting.

The two main girders of the east approach span exhibit the most corrosion in the bearing areas. However, they are in overall satisfactory condition.

Deck

The main truss deck consists of laminated 2 x 6 lumber on edge. The approach span deck has laminated 2 x 4 lumber on edge. The laminations are pressure treated. The deck has at least five and may have ten to fifteen years of remaining service life.

The timber curbs on the deck exhibit significant decay and are at the end of their service life. The curbs were not pressure treated, and hence their reduced service life.

The deck running boards consist of 2 x 10 unsized lumber lag bolted to the deck laminations. The running boards are in overall fair condition, with some repairs required.

Concrete

The concrete in the pier and abutments lacks air entrainment, exhibits alkali aggregate reactivity and this has resulted in localized severe disintegration. The substructure concrete is adequate for the structural loading but would benefit from preservation repairs.

Conclusions

The floor system of the truss and east approach span is substantially corroded and weakened as a result. This corrosion is principally due to de-icing salts penetrating the timber deck and wetting the floor system. The floor system of the main truss has possibly five to ten years of service life at the present rate of corrosion. Thereafter it will likely require full or partial replacement.

The stringers of the east approach span should be replaced at this time. Both the deck and stringers have deteriorated since the previous wading inspection, and the deck/stringer system reliability is less than ideal.

The curb timbers of the main truss and approach span require replacement at this time.

Construction Considerations

To remove and replace the stringers of the east approach span, it will be necessary to remove the laminated timber deck of the approach span. The nature of the laminated deck is such that it can not be salvaged and re-instated. Therefore, it will be necessary to replace the approach span deck in its entirety when replacing the stringers.

Recommendations

The following recommendations will help extend the operational life of the present bridge:

Inspection

1. Until the floor and bottom chords of the bridge are substantially rehabilitated, a wading inspection of the underside of the bridge should be scheduled annually.
2. When the deck and stringers are removed at the east approach span, the pier, east abutment, main girders, and floor beam should be closely inspected to fully document their condition.

Operational

3. The bridge should be taken out of service during the winter months from December 1 to March 31 of each year when it is possible for de-icing salts to track onto the bridge.
4. The floor system and bottom chords and bearing areas should be pressure cleaned every year, preferably in the spring.

Immediate Needs

5. The stringers of the east approach span should be replaced at this time.
6. The timber deck curbs should be replaced at this time.

5-10 Year Needs

7. Coating the floor system should be considered to preserve the bridge.
8. The bottom chords of the truss should be painted in the next 5 years if it is intended to keep the bridge in service for more than another 10 years.
9. The deck of the main truss should be scheduled for replacement in ten years. At that time the truss stringers should be removed and replaced. The actual timing of replacement will depend on regular updates of the deck and stringer condition.

Outlook

If the Counties and local Municipalities truly want to save the Andrewsville Bridge, they should support any measures that reduces the amount of salt tracked onto the bridge during winter maintenance operations. The only effective way to prevent salt tracking onto the bridge is to prevent vehicle traffic on the bridge during the winter months.

Without salt induced corrosion of the structural floor system and bottom chords of the truss, the Andrewsville Bridge can be maintained in summer operational status well into the future.

Other Concerns

The following concerns are reintroduced from the 2016 report:

The dry-stone masonry retaining walls of the bridge approaches are a concern. There is notable bulging and displacement of the wall in the NW quadrant. A portion of the wall has failed in the SE quadrant. The integrity of the wall has been somewhat affected by the imposition of the railing system foundations into the top of the wall.

The causeway on the east approach has at least one dry stone culvert type opening through it at the base. There is iron strapping helping to form these openings. The iron strapping is substantially corroded.

The approach embankments are in a precarious condition. They are in a partial state of failure and further collapse may occur at any time with little or no warning. Such collapses are not anticipated to be catastrophic but would encroach on the roadway shoulders.

Further investigation and assessment of the approaches by a geotechnical engineer is recommended.

Closing

Keystone Bridge Management Corp. is pleased to report on the wading inspection of the underside of the Andrews ville Bridge. We hope this assessment is sufficient for your purposes and will help guide the long-term management of this bridge.

Harold Kleywegt, P.Eng.
Managing Director
Keystone Bridge Management Corp.

(20 captioned images follow)



Image 1. West abutment and replaced Bay 1 stringers, Floor Beam 1 in foreground.



Image 2. North end of Floor Beam 1 (FB 1) with slab rust evident



Image 3. Stringer 4 north side adjacent FB 2, slab rust, severe corrosion



Image 4. Bay 3 looking south, Stringers 4,3,2,1 visible



Image 5. Stringer 5, Bay 3 with top flange thinning



Image 6. Slab rust on north face of web of Stringer 4 adjacent FB 3



Image 7. North face Stringer 4 between FB 4 & 5, flange& web thinning, slab rust present



Image 8. South face Stringer 2 between FB 5 & 6, representative corrosion for most stringers



Image 9. South face of Stringer 3 between FB 7 & pier, slab rust and general section loss



Image 10. North face of Stringer 4 between FB 7 & pier, severe thinning of top flange



Image 11. South face of main truss Stringer 5 at pier bearing



Image 12. North face of truss Stringer 3 at pier bearing



Image 13. Perforated Stringer 2 west end approach span, looking north



Image 14. Perforated Stringer 2 west end approach span, looking north



Image 15. Perforated Stringer 4 west end approach span, looking north, severe flange thinning



Image 16. Perforated Stringer 2 east end approach span, looking north



Image 17. Approach span stringer resting on east abutment



Image 18. Outrigger attached to approach girder supporting Stringer 5 at pier



Image 19. Floor beam, stringers and east abutment at east approach span.



Image 20. Upstream face of pier between truss and east approach span



**MINUTES
SEVENTH MEETING OF 2018
PUBLIC WORKS
COMMITTEE OF THE WHOLE**

The Public Works Committee of the Whole met in regular session on Wednesday, September 26, 2018 immediately following the Economic Development Committee meeting at the Lanark County Administration Building, 99 Christie Lake Road, Perth, Ontario.

Members Present: Past Chair K. Van Der Meer, Warden J. Fenik, Councillors J. Hall, S. McLaughlin, B. Dobson, K. Van Der Meer, B. Dobson, J. Gemmell, R. Kidd, S. Mousseau, L. Antonakos, J. Flynn, A. Churchill and G. Code

Staff/Others Present: K. Greaves, CAO
L. Drynan, Clerk/Deputy CAO
T. McCann, Director of Public Works
J. Tysick, PW Business Manager
J. Stewart, County Planner

Regrets: Councillors B. Stewart, J. Torrance, B. Campbell and K. Kerr

PUBLIC WORKS

Chair: Councillor Klaas Van Der Meer

1. CALL TO ORDER (Reminder please silence all electronic devices)

The meeting was called to order at 6:15 p.m.
A quorum was present.

2. DISCLOSURE OF PECUNIARY INTEREST

None at this time.

3. APPROVAL OF MINUTES

MOTION #PW-2018-38

MOVED BY: John Gemmell **SECONDED BY:** Gail Code

"**THAT**, the minutes of the Public Works Committee meeting held on August 29, 2018 be approved as circulated."

ADOPTED

4. ADDITIONS AND APPROVAL OF AGENDA

MOTION #PW-2018-39

MOVED BY: Aubrey Churchill **SECONDED BY:** Gail Code

"**THAT**, the agenda be approved as presented."

ADOPTED

5. DELEGATIONS (10 MINUTES)

None

6. PRESENTATIONS

- i) Recognition of Provincial Rodeo Winner, John Gleeson
(Municipality of Mississippi Mills)
Klaas Van Der Meer

T. McCann presented Mr. John Gleeson with his award.

7. COMMUNICATIONS

None

- i) Township of Montague - Andrews ville Bridge

MOTION #PW-2018-40

MOVED BY: John Gemmell **SECONDED BY:** Bill Dobson

"**THAT**", the communication for the September Public Works Committee meeting be received as information."

ADOPTED

8. CONSENT REPORTS

- i) Report #PW-23-2018 PUBLIC WORKS ACTIVE CONTRACTS STATUS REPORT #2018-3

MOTION #PW-2018-41

MOVED BY: Gail Code **SECONDED BY:** Aubrey Churchill

"**THAT**", the following Consent Reports for the September Public Works Committee meeting be received as information:

Report #PW-23-2018 PUBLIC WORKS ACTIVE CONTRACTS STATUS REPORT #2018-3."

ADOPTED

9. DISCUSSION REPORTS

- i) Report #PW-24-2018 ANDREWSVILLE BRIDGE UPDATE AND CONSULTING ENGINEER'S 2018 WADING INSPECTION REPORT
Terry McCann, Director of Public Works

Council directed the Warden and staff to meet with the County of Leeds & Grenville to discuss a joint long term plan for the bridge.

MOTION #PW-2018-42

MOVED BY: John Gemmell **SECONDED BY:** Aubrey Churchill

"**THAT**", the Public Works Committee accepts Report #PW-24-2018, Andrews ville Bridge Update and Consulting Engineer's 2018 Wading Inspection Report, as information;

AND THAT, the Clerk prepare the necessary By-Law for the October 10, 2018 County Council Meeting, to authorize an Annual, Temporary Bridge closure of the Andrewsville Bridge, from December 1 to March 31;

AND THAT, the Director of Public Works be authorized to obtain quotations for the required work and proceed to have the work completed during the bridge closure during the Winter of 2018/2019;

AND THAT, the Clerk circulates Report #PW-24-2018 to the Township of Montague, Village of Merrickville-Wolford and the United Counties of Leeds and Grenville."

ADOPTED

10. VERBAL REPORTS

None

11. DEFERRED REPORTS

None

12. CONFIDENTIAL REPORTS

None

13. NEW/OTHER BUSINESS

14. ADJOURNMENT

The Committee adjourned at 7:00 p.m. on motion by Councillors Gemmell and Fenik.



Leslie Drynan, Clerk/Deputy CAO

**THE CORPORATION OF THE COUNTY OF LANARK
BY-LAW NO. 2018-41**

**A BY-LAW TO AUTHORIZE AN ANNUAL, TEMPORARY CLOSURE OF THE
ANDREWSVILLE BRIDGE FROM DECEMBER 1 TO MARCH 31**

WHEREAS, by Section 5 of the Municipal Act, 2001, S.O. 2001, c. 25, the powers of a municipal corporation are to be exercised by its Council;

AND WHEREAS, by Section 11 (2) of the Municipal Act, 2001, S.O. 2001, c. 25, the powers of every Council are to be exercised by By-Law;

AND WHEREAS, by Section 44(1) of the Municipal Act, 2001, S.O. 2001, c. 25, the municipality that has jurisdiction over a highway or bridge shall keep it in a state of repair that is reasonable in the circumstances, including the character and location of the highway or bridge;

AND WHEREAS, Council deems it necessary to put an annual, temporary bridge closure in effect from December 1 until March 31, each year, and that the immediate repairs be completed during the 2018/2019 winter season bridge closure;

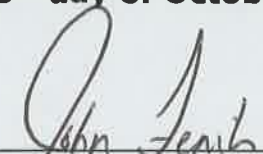
NOW THEREFORE BE IT RESOLVED THAT, the Council of the Corporation of the County of Lanark enacts as follows;

1. The Director of Public Works is hereby authorized to put an annual, temporary closure on the Andrewsville Bridge from December 1 until March 31, each year.
2. This By-law will come into force on the date of its passing.

By-Law read a first and second time this 10th day of October, 2018

By-Law read a third time and finally passed this 10th day of October, 2018


Leslie Drynan
Clerk/Deputy CAO

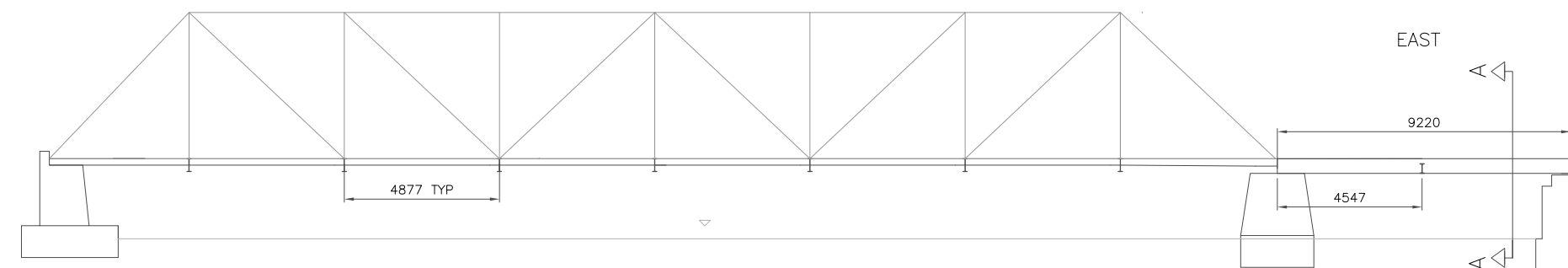

John Fenik, Warden



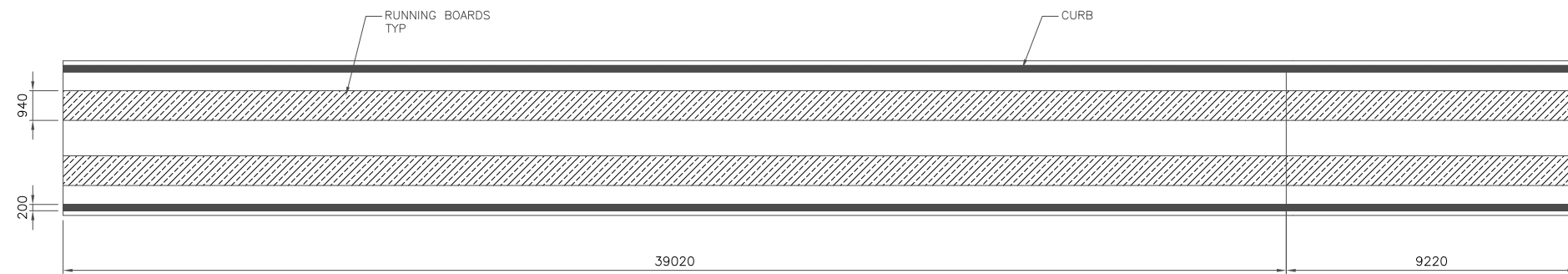


KEY PLAN

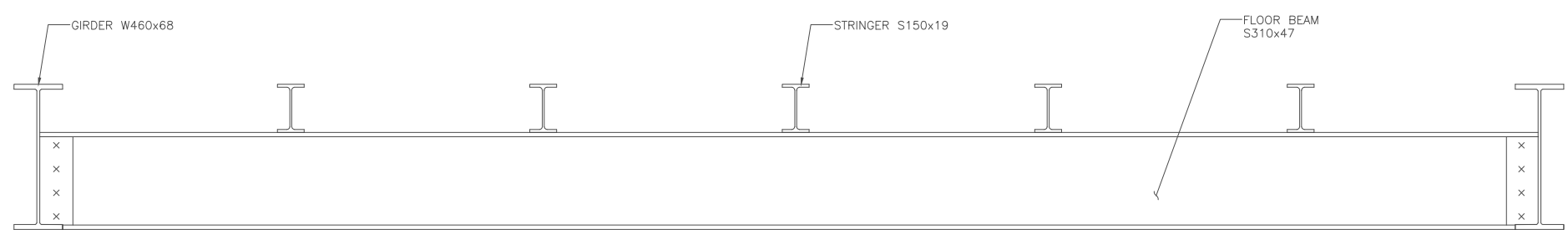
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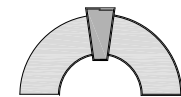
EXISTING BRIDGE SOUTH ELEVATION
1:100



EXISTING DECK PLAN VIEW
1:100



TYPICAL CROSS SECTION "A-A" AT FLOOR BEAM
1:10



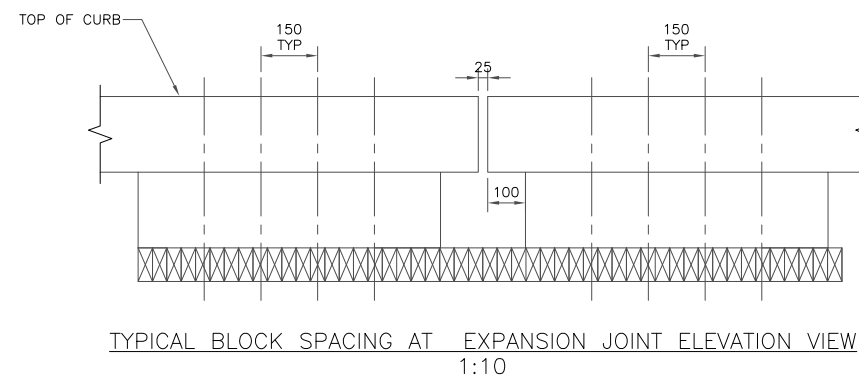
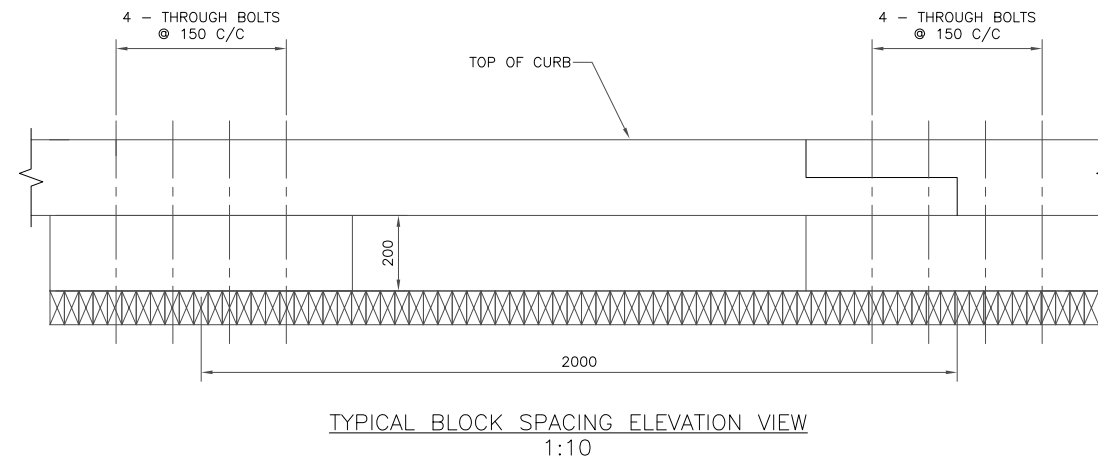
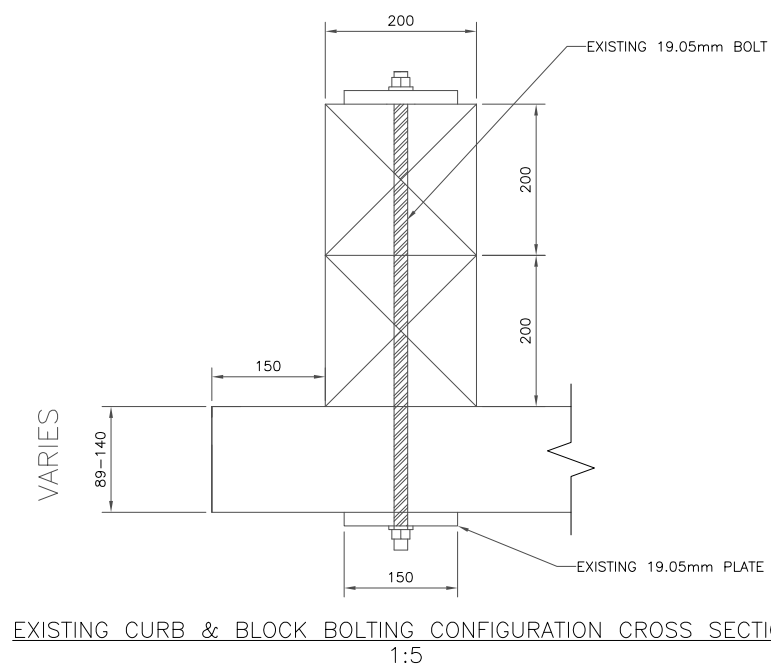
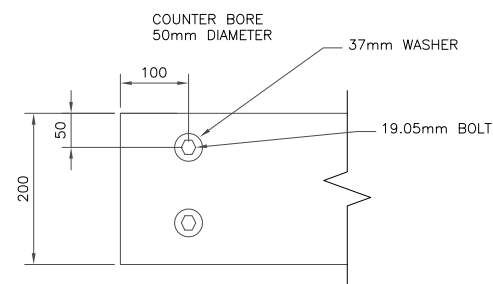
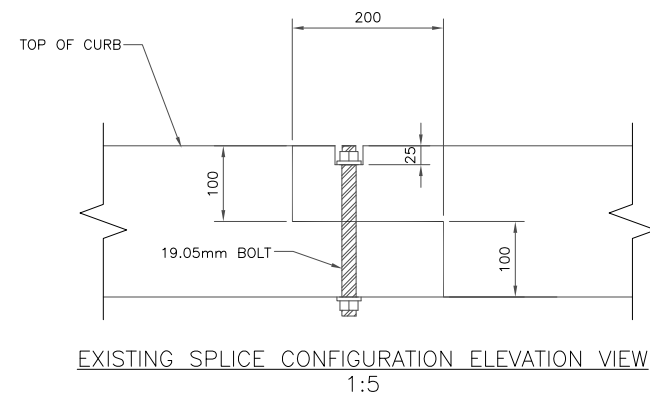
Keystone Bridge
Management Corp.

GENERAL NOTES

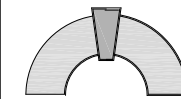
1. REMOVE EXISTING TIMBER CURB SYSTEM; FULL LENGTH BOTH SIDES AND REPLACE IN KIND.
2. REMOVE COMPLETE DECK FROM EAST APPROACH SPAN.
3. ESTABLISH ACCESS UNDER BRIDGE AS REQUIRED.
4. REMOVE STEEL STRINGERS FROM FLOOR SYSTEM OF EAST APPROACH SPAN AND REPLACE IN KIND.
5. REPLACE DECK OF EAST APPROACH SPAN.



REVISIONS						DESCRIPTION		DATE	
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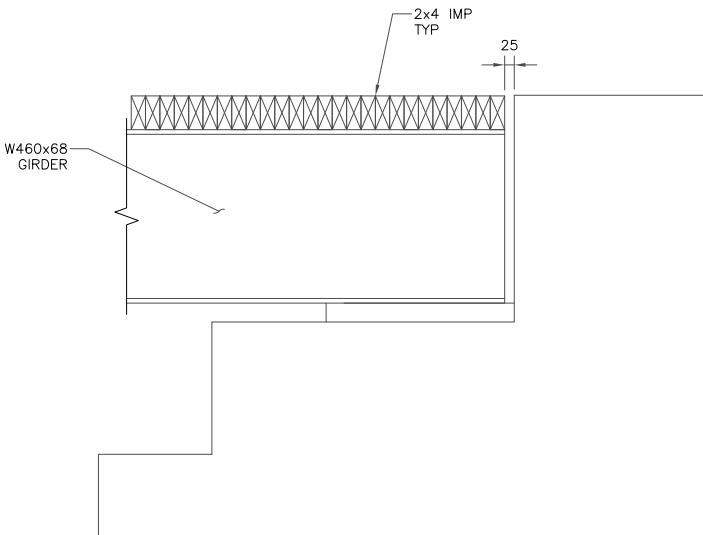
CURB HARDWARE		
APPROACH	DECK	SPLICE
80 BOLTS	160 BOLTS	64 BOLTS
80 PLATES	160 PLATES	
80 WASHERS	160 WASHERS	



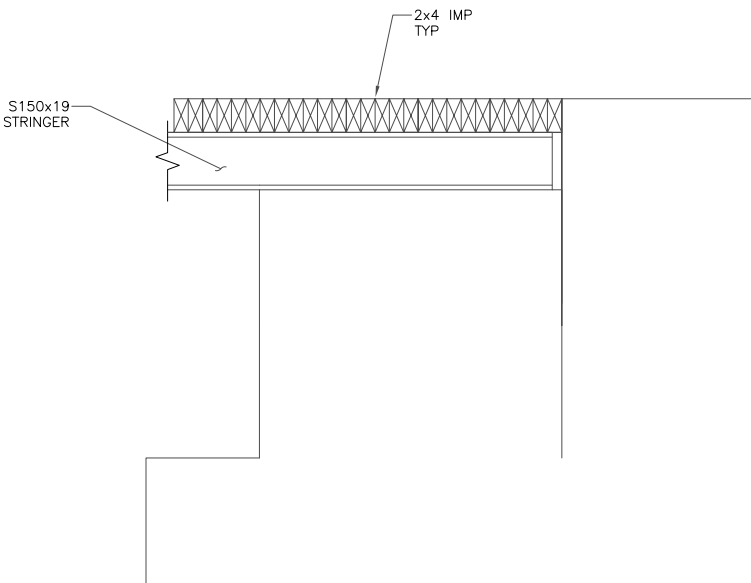
**Keystone Bridge
Management Corp.**

CURB NOTES

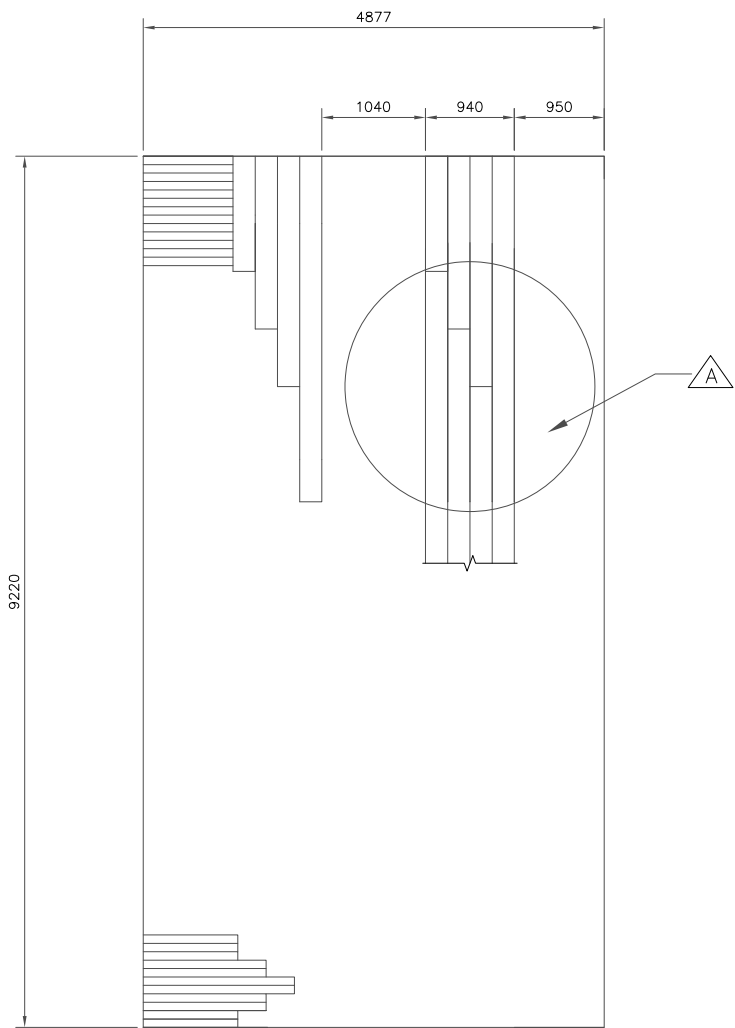
1. CURBS TO BE REPLACED IN KIND.
2. SALVAGE AND REUSE ALL THROUGH BOLTS, NUTS & WASHERS.
3. ALL CURB TIMBER SHALL BE UNSIZED 8"x8" HEMLOCK OR SPRUCE.
4. RE-UTILIZE HOLES THROUGH EXISTING DECK TO GREATEST EXTENT PRACTICAL.
5. TREAT ALL NEW HOLES IN DECK WITH PRESERVATIVE.
6. SPLICE CURBS AS SHOWN ON DRAWING.



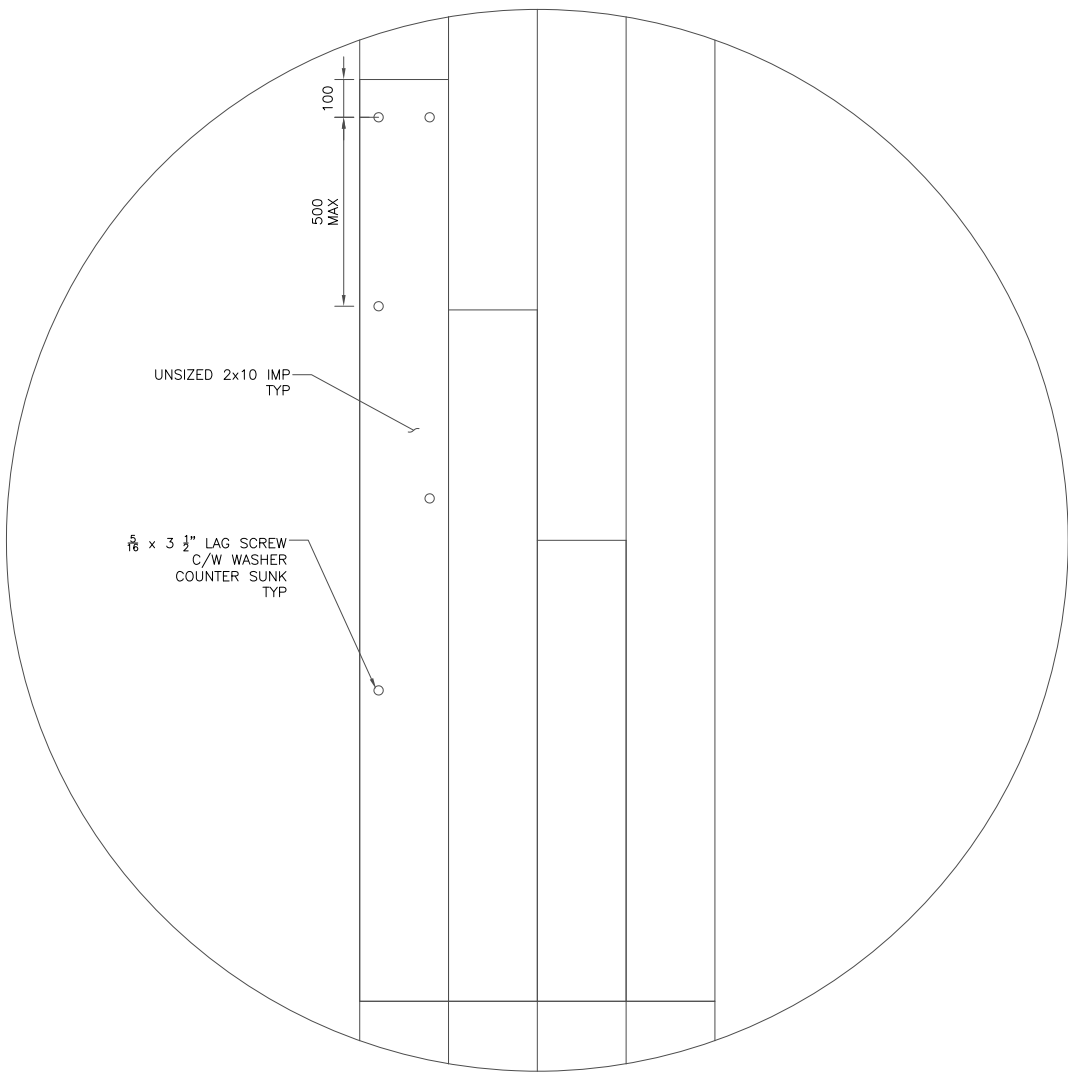
EAST ABUTMENT CROSS SECTION AT GIRDER ENDS
1:10



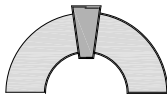
EAST ABUTMENT CROSS SECTION AT STRINGER ENDS
1:10



EAST APPROACH SPAN
DECK PLAN VIEW
1:40



RUNNING BOARD DETAIL PLAN VIEW
1:10



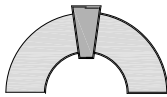
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TIMBER DECK NOTES

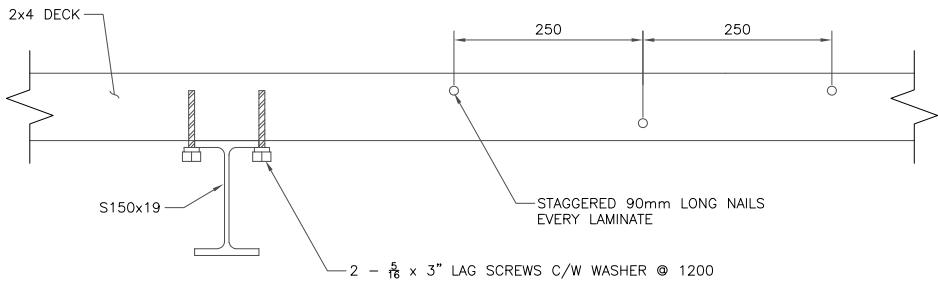
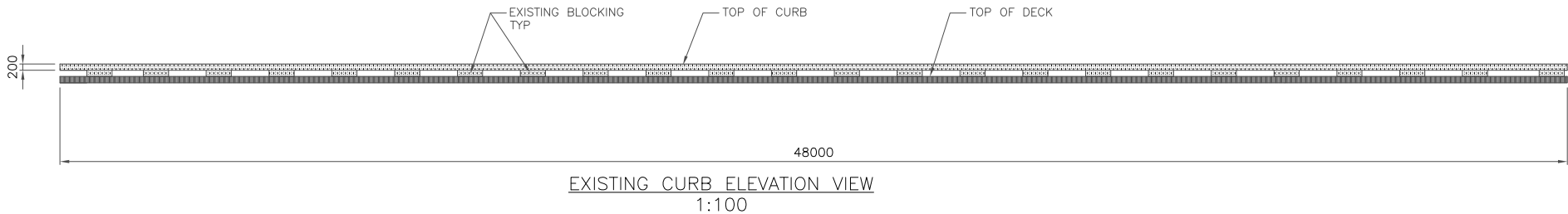
1. EACH LAMINATE SHALL BE NAILED AT MAXIMUM 250MM CENTERS, STAGGERED AS SHOWN.
2. REVERSE STAGGER EVERY SECOND LAMINATE.
3. EACH END OF ALL RUNNING BOARDS SHALL BE SECURED WITH TWO LAG SCREWS.
4. FIELD OF RUNNING BOARDS SHALL BE LAG SCREWED AT MAXIMUM 500mm SPACING AND STAGGERED AS SHOWN.
5. DECK SHALL BE ATTACHED TO ALL STRINGERS WITH PAIRS OF LAG BOLTS SPACED AT 1200MM AS SHOWN.



REVISIONS						DESCRIPTION		DATE	
	DESIGN	HK	CHK					SEPT	2018
	DRAWN	SR	CHK	HK	SITE	99-001		DWG	4



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DECK NAILING STRINGER LAG SCREW DETAIL (GIRDER SIMILAR)
1:5



REVISIONS									
DESCRIPTION									
DESIGN	HK	CHK						DATE	SEPT 2018
DRAWN	SR	CHK	HK	SITE	99-001			DWG	5