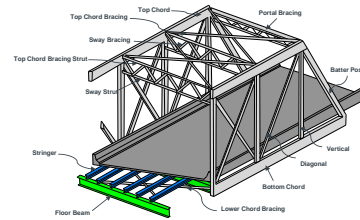


INSPECTION OF TRUSSES

0

Truss Members & Elements



1

1

Level II Truss Inspection

Trusses for Alberta Highways

- Bridge system has about 340 sites with 470 truss spans
- Majority of these trusses were fabricated between 1920 & 1930
- Most of the spans are now on secondary highways and local roads
- Approximately 55 truss spans remain in active use on primary highways
- Some structures have been used at more than one crossing
- Level II Truss inspection started in the early 1970's
- Second round of U/T inspection in 1983 revealed numerous cracked members

2

2

Level II Truss Inspection

Frequency of Inspection

- Provincial highways 4 – 5 years
- Local roads 6 years
- Special monitoring – varies depending on truss condition, age, and traffic volumes.

3

3

Level II Truss Inspection

Preparation for Inspection

- Check previous reports
- Obtain inspection forms
- Hire ND inspection company
- Equipment for U/T
 - Ultrasonic testing machine with 60° and 70° probes
 - Coupling fluid
 - Spare batteries and charging unit
 - Extra probe and leads

4

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4

Level II Truss Inspection

Preparation for Inspection

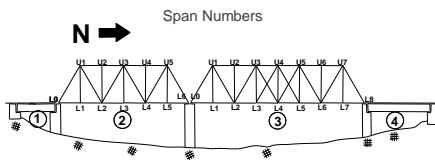
- Submit traffic safety and fall protection plans and obtain approval
- Access equipment:
 - Lift truck
 - Snooper truck
- Inspection tools
- Personal safety attire

5

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5

Truss Inspection

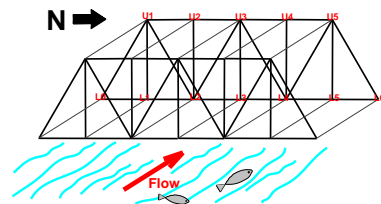


6

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6

Truss Member Notation

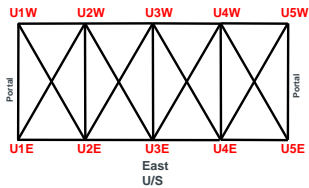


7

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7

Top Chord Bracing

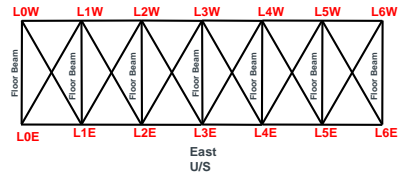


8

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Lower Chord Bracing



9

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Level II Truss Inspection

Visual Inspection

- Check all members and connections for:
 - Cracks
 - Missing or loose bolts
 - Welds
 - Scabs, delamination, gouges and elongated holes
 - Note any strain indication
 - Note any collision damage
 - High water damage on bottom chord and bottom laterals

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10

Level II Truss Inspection

Visual Inspection

- Check all members and connections for:
 - Sags and buckling characteristics
 - Measure and report distortion
 - Floor beam copes
 - Report on extent of corrosion, pitting and section loss
 - Measure and report any top chord sweep for pony trusses
- Identify member/s requiring replacement

11

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11

Level II Truss Inspection

Visual Inspection

- Check posted and actual vertical clearance for through trusses
- Report condition of deck elements
- Check bearings
- Check railing

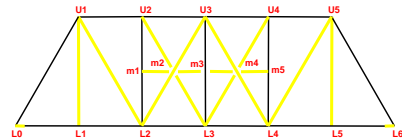
12

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12

Level II Truss Inspection

Ultrasonic Inspection



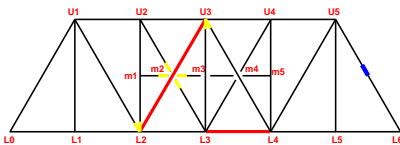
13

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13

Level II Truss Inspection

Ultrasonic Inspection



14

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14

Level II Truss Inspection

Ultrasonic Inspection

- Report any rough holes
- Mark any member which has a crack
- Report all the findings on the U/T forms
- Try to determine the cause of cracking

15

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15

Level II Truss Inspection

Photographs

- Take overall photograph of the entire bridge.
- Take photographs to show condition of:
 - Deck, curbs, wheel guards
 - Bridgerail, bearings
 - Overall condition of paint
 - Typical underside
 - General condition of substructure
 - Specific problems

16

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16

Level II Truss Inspection



Looking East
D/S

17

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17

Level II Truss Inspection



Dirty strip deck
with broken &
worn planks

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18

Level II Truss Inspection



Damaged
wheel guard
at SE corner

19

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19

Level II Truss Inspection



Typical U/S

20

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20

Level II Truss Inspection



Sp. 1- Pier #2 bearing over expanded by 125 mm & bent anchor bolt

21

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21

Level II Truss Inspection



Abut. #1 bearing over expanded by 60 mm, twisted 25 mm and broken anchor bolt

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Level II Truss Inspection



South abut. bearings are over expanded, neoprene pads are at the edges of masonry plates. Trusses are against the backwall.

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23

Level II Truss Inspection



Lattice rail damaged at L1S

24

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Level II Truss Inspection



Bent bottom chord, L7-L8W (US)

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Level II Truss Inspection



Erosion at West abutment

26

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26

Level II Truss Inspection



Timber planks missing at South pier

27

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27

Level II Truss Inspection



Broken stringer second from U/S East approach

28

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28

Level II Truss Inspection



Top chord bracing U3S-U4N has broken gusset at U3S

29

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Level II Truss Inspection



Modified sway brace connections were welded to the verticals, and then the welds were removed and bolt fasteners installed.

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Level II Truss Inspection



Span 2, top chord bracing U3N-U3S have slotted holes at U3N

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Level II Truss Inspection



Span 2, at U9N, there are six loose bolts

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Level II Truss Inspection



Outside top chord U4USN is missing 3 bolts

33

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33

Level II Truss Inspection



Portal U7EU7W is damaged with two 50 mm notches and broken clearance sign.

34

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Level II Truss Inspection



Bottom sway bracing L1S-L2N is cracked at L1/S. Note corrosion section loss.

35

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Level II Truss Inspection



All verticals have plug welds at original sway brace bolt location.

36

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Level II Truss Inspection



Vertical U4-L4N at m5 strut connection is buckled and has notches

37

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37

Level II Truss Inspection



All USN, bevel faying fit is torched. Reduced edge distance

38

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38

Edmonton
City of Champions

TRUSS INSPECTION

MEMBER	USN			US			OTHER ITEMS	REMARKS
	WELD	BEVEL	FAYING	WELD	BEVEL	FAYING		
TOP CHORD								
U1-U2								
U2-U3								
U3-U4								
U4-U5								
U5-U6							Welded, BUT done - no crack	
VERTICALS								
V1-V2								
V2-V3							Revised done-20 x 200mm m 14	
V3-V4								
V4-V5								
V5-V6								

MEMBER NAME: **USN/US** | DATE: **7-3-17** | DRAWN BY: **...** | CHECKED BY: **...** | SCALE: **...** | SHEET: **...** | TOTAL SHEETS: **...** | PAGE: **1**

39

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39

TRUSS INSPECTION
East - TRUSS
LUS

MEMBER	ULTRASONIC INS.			OTHER ITEMS	MEMBER
	A END	B END			
U1-L2	✓	✓	✓		✓
U2-L2	✓	✓	✓		✓
U3-L2	✓	✓	✓		✓
U3-L4	✓	✓	✓	75mm dent and 13mm crack at L2	X
U4-L4	✓	✓	✓		✓
U4-L2	✓	✓	✓		✓
U5-L4	✓	✓	✓	bullet hole near middle of inside flange	✓
U6-L2	✓	✓	✓		✓
U6-L4	✓	✓	✓		✓
U7-L2	✓	✓	✓		✓
U7-L4	✓	✓	✓		✓
U8-L2	✓	✓	✓		✓
U8-L4	✓	✓	✓		✓
U9-L2	✓	✓	✓		✓
U9-L4	✓	✓	✓		✓

BRIDGE NAME: **Whitford Cr.** SPAN NO.: **2** OF **4** DATE: **11/06/06** FILE: **13111**
 TRUSS IDENT: **75-3** - 4 PANEL TRUSS - FT.W. SPAN, INSPECTION: **J. Doe** PAGE: 3

TRUSS INSPECTION
East - TRUSS
LUS

MEMBER	ULTRASONIC INS.			OTHER ITEMS	MEMBER
	A END	B END			
L2-L1	✓	✓	✓		✓
L3-L1	✓	✓	✓		✓
L3-L4	✓	✓	✓	75 x 200mm dent near L4	✓
L4-L2	✓	✓	✓		✓
L4-L4	✓	✓	✓		✓
L5-L4	✓	✓	✓		✓
L6-L2	✓	✓	✓		✓
L6-L4	✓	✓	✓		✓
L7-L2	✓	✓	✓		✓
L7-L4	✓	✓	✓		✓
L8-L2	✓	✓	✓		✓
L8-L4	✓	✓	✓		✓
L9-L2	✓	✓	✓		✓
L9-L4	✓	✓	✓		✓

BRIDGE NAME: **Whitford Cr.** SPAN NO.: **2** OF **4** DATE: **11/06/06** FILE: **13111**
 TRUSS IDENT: **75-3** - 4 PANEL TRUSS - FT.W. SPAN, INSPECTION: **J. Doe** PAGE: 3



TRUSS INSPECTION
East - TRUSS
LUS

MEMBER	ULTRASONIC INS.			OTHER ITEMS	MEMBER
	A END	B END			
U3-L4	✓	✓	✓	20mm notch at CL. Overall bow of 15mm.	✓
U4-L4	✓	✓	✓		✓
U4-L2	✓	✓	✓		✓
U4-L4	✓	✓	✓		✓
U5-L4	✓	✓	✓		✓
U5-L2	✓	✓	✓		✓
U6-L2	✓	✓	✓		✓
U6-L4	✓	✓	✓		✓

BRIDGE NAME: **Whitford Cr.** SPAN NO.: **2** OF **4** DATE: **11/06/06** FILE: **13111**
 TRUSS IDENT: **75-3** - 4 PANEL TRUSS - FT.W. SPAN, INSPECTION: **J. Doe** PAGE: 4

TRUSS INSPECTION
East - TRUSS
LUS

MEMBER	ULTRASONIC INS.			OTHER ITEMS	MEMBER
	A END	B END			
L2-L1	✓	✓	✓		✓
L3-L1	✓	✓	✓	3mm section loss at horiz. gusset	✓
L3-L2	✓	✓	✓		✓
L3-L4	✓	✓	✓		✓
L4-L2	✓	✓	✓		✓
L4-L4	✓	✓	✓		✓
L5-L4	✓	✓	✓		✓
L6-L2	✓	✓	✓		✓
L6-L4	✓	✓	✓		✓
L7-L2	✓	✓	✓		✓
L7-L4	✓	✓	✓		✓

BRIDGE NAME: **Whitford Cr.** SPAN NO.: **2** OF **4** DATE: **11/06/06** FILE: **13111**
 TRUSS IDENT: **75-3** - 4 PANEL TRUSS - FT.W. SPAN, INSPECTION: **J. Doe** PAGE: 4



TRUSS INSPECTION
East - TRUSS
L15

MEMBER	ULTRASONIC INS.				OTHER ITEMS	MEMBER
	A	B	C	D		
	100%	100%	100%	100%		
FLOOR BEAMS						
L1-L2					overall bow of 38mm	✓
L2-L3						✓
L3-L4						✓
L4-L5						✓
L5-L6						✓

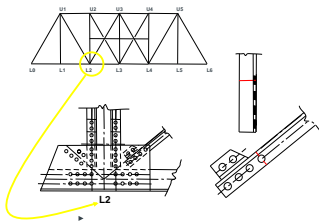
NOTE ANY STRINGERS, GUSSET PLATES, TOP CHORD BRACING STRUTS, HANGING PANELS ETC. USE THIS SYSTEM OF NOTATION IF POSSIBLE AND MARK ON THE LINE DIAGRAM. BE SURE TO NOTE IF SPLICE PLATE IS INSIDE, OUTSIDE, UPPER OR LOWER ETC.

INSPECTOR: Whitford Ch SPACING: 2 OF 4 DATE: 10-01-01 PLN: 2333
TRUSS GROUP: 75-3 1 PANEL, TRUSS 17.16 METERS INSPECTION: J. Cox PAGE: 4

Where to Find Cracks in Trusses?

- Damaged members.
- Tension members
- Rough holes
- Welds.
- Members with stress reversal

Truss Member Fatigue Crack



Questions?