LEVEL II INSPECTION

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Introduction

Level I
- primarily visual with standard tools
- no special access
- in accordance with BIM manual

Level II
- specialized knowledge / training and equipment
- detailed information on a particular component or components
- supervised by certified bridge inspector – usually CI. A
- often includes a completion of an updated Level 1 inspection

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Level II Inspection Types

- Copper Sulfate Electrode (CSE Testing)
- Chloride Testing
- Concrete Deck Inspection
- Ultrasonic Truss Inspection
- Culvert Barrel Measurements
- Vertical Clearance Measurements

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Level II Inspection Types

- Concrete Girder Inspection
- Paint Inspection
- Timber Coring
- Scour Monitor
- Special Structure Monitor
- Underwater Inspection
- Steel Culvert Corrosion Testing
- Pin and Hanger Connection Testing
- Steel Girder Cover Plate Inspection

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General Principles

- BIM condition rating system applies
- Quantifies rating categories
- Provides technical data / measurements
- As required / ordered by Level I Inspector
- Regular / predetermined schedule

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When Required?

- Special access required
  - swing stages, manlifts, snoopers
  - dewatering culverts
  - underwater (scour or foundations)
- Overall assessment for rehabilitation or major maintenance
  - deck or paint inspections
  - condition evaluation
  - CSE, timber coring, ultrasonic

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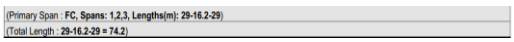
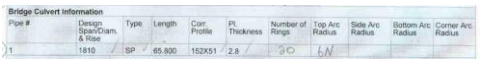
Level II Inspection Forms

Bridges


(Primary Span : **FC, Spans: 1,2,3, Lengths(m): 29-16.2-29**)
(Total Length : **29-16.2-29 = 74.2**)

Culverts


Bridge Culvert Information

Pipe #	Design Span/Diam. & Rise	Type	Length	Corr. Profile	Pl. Thickness	Number of Rings	Top Arc Radius	Side Arc Radius	Bottom Arc Radius	Corner Arc Radius
1	1810	SP	65.800	152X51	2.8	30	LN			

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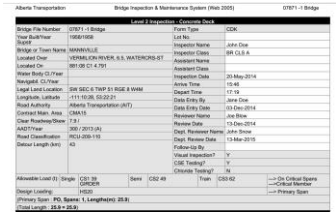
Level II Inspection Forms – Common Inventory Information


Alberta Transportation — Bridge Inspection & Maintenance System (Web 2005) — 07871 -1 Bridge

Level 2 Inspection - Concrete Deck

Bridge File Number	07871 -1 Bridge	Form Type	CDK
Year Built/Year Rebuilt	1958/1958	Lot No.	
Bridge or Town Name	MANNVILLE	Inspector Name	John Doe
Located Over	VERMILION RIVER, 8.5, WATERCRS-ST	Inspector Class	BR CLS A
Located On	SW-36 C1 4.791	Assistant Name	
Water Body ID /Year		Assistant Class	
Navigabil. Cl./Year		Inspection Date	20-May-2014
Legal Land Location	SW SEC 4 TWP 51 RGE 8 W4M	Arrive Time	15:45
Long/Lats. Latitude	-111:10:26, 53:22:21	Depart Time	17:10
Road Authority	Alberta Transportation (AT)	Data Entry By	Jane Doe
Contract Main. Area	CMA15	Data Entry Date	03-Dec-2014
Clear Roadway/Share	7.3 /	Reviewer Name	Joe Blow
AADT/Year	350 / 2013 (A)	Review Date	13-Dec-2014
Road Classification	RCU-209-110	Dept. Reviewer Name	John Snow
Detour Length (km)	43	Dept. Review Date	13-Mar-2015
		Follow-Up By	
		Visual Inspection?	Y
		CSE Testing?	Y
		Chloride Testing?	N

Allowable Load (t) : Single	CS1.39 CRDEK	Semi	CS2.49	Train	CS3.62	--> On Critical Spans --> Critical Member
Design Loading:	HS20					--> Primary Span

(Primary Span : **FC, Spans: 1, Length(m): 25.9**)
(Total Length : **25.9 = 25.9**)

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Level II Inspection Forms – Inspection Scheduling Information

Previous Level 2 Inspector's Name		Previous Level 2 Insp Date	18-Aug-2008		
Next Level 2 Insp Date	20-May-2020	Discontinue Level 2 Insp? (Y/N)	No		
Level 2 Insp Previously Completed	7	Level 2 Insp Cycle (Default) (Months)	72		
Detailed Report/Diagram? (Y/N)	Yes				
Level 2 Insp Comments	There is erosion at the northeast corner of the bridge, beginning to encroach into roadway (0.5m x 0.1m)				
Next Level 2 Inspection/Test	Concrete Deck Insp? (Y/N)	Yes	CSE Testing? (Y/N)	Yes	Chloride Testing? (Y/N) No
Department Reviewer Comments					

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Level II Inspection Forms – Inspection Scheduling Information

Structural Condition Rating (%)	**55.6**	**Sufficiency Rating (%)**		**61.0**		Est Repl Year		2030	
Level 1 Insp Date	28-Oct-2014	Next Level 1 Insp Date		28-Jan-2018		Current Level 1 Insp Cycle (Default) (Months)		39	
Special Comments for Next Insp									
Snooper? (Y/N)	No	Lift? (Y/N)	No	Traffic Control? (Y/N)	Yes	Boat? (Y/N)	No	Ladder? (Y/N)	No
Other Special Requirements Comments									

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Level II Inspection Forms – Maintenance Recommendations

Alberta Transportation Bridge Inspection & Maintenance System (Web 2005) 07871 -1 Bridge

Maintenance Recommendations

Inspector Recommendations	Year	Inspector Comments	Department Comments	Target Year	Est. Cost	Cat #
SEAL CURBS						
PATCH DECK						
SEAL DECK						
OVERLAY DECK						
REPAIR/REPLACE DECK JOINTS						
WASHING						
OTHER ACTION						
CRACK REPAIRS/TREATMENT						
PATCH CURBS/PARPETS						
OTHER ACTION						
OTHER ACTION						
OTHER ACTION						

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Level II Inspection Forms – Maintenance Recommendations

LEVEL1 INSPECTION	CORE TIMBER CAPS/CORBELS
CONCRETE DECK INSPECTION	REPAIR/REPLACE TIMBER CAPS
CONCRETE GIRDER INSPECTION	REPAIR ABUTMENT SCOUR/EROSION
VERTICAL CLEARANCE MEASUREMENT	PLACE ADDITIONAL RIP RAP
CHLORIDE TESTING	REMOVE DRIFT ACCUMULATION
COPPER SULPHATE ELECTRODE TESTING	INSTALL CATHODIC PROTECTION
PAINT INSPECTION	INSTALL CONCRETE/STEEL LINING
STEEL CULVERT BARREL MEASUREMENT	INSTALL STRUTS
SPECIAL STRUCTURE MONITOR	INSTALL CONCRETE COLLAR/CUTOFF
ULTRASONIC TRUSS INSPECTION	REPAIR SEAMS
SCOUR SURVEY INSPECTION	OBTAIN CORROSION ANALYSIS DATA
REPAIR/REPLACE BRIDGERAIL	REPAIR/REPLACE SIGNING
GALVANIZE/PAINT BRIDGERAIL	PATCH/REPAIR ACCESS PLATFORM
RETROFIT BRIDGERAIL	ADJUST/PAINT PEDESTAL BEARING AREA
SEAL CURBS	OTHER ACTION
PATCH DECK	REPAIR/REPLACE TIMBER CORBELS
SEAL DECK	REPAIR/REPLACE TIMBER PILES
OVERLAY DECK	LOAD POST BRIDGE
REPAIR/REPLACE DECK JOINTS	REPLACE MEMBERS
REPLACE STRIP DECK	STRAIGHTEN MEMBERS
REPLACE SUB DECK	REPAIR MEMBERS
RESET/ PAINT BEARINGS	INSTALL BOLTS
REPAINT SUPERSTRUCTURE	REPAIR BEARINGS
STRAIGHTEN/REPLACE MEMBERS	CRACK REPAIRS/TREATMENT
WASHING	PATCH CURBS/PARPETS
FILL BOLT HOLES	REPAIR STRUTS
SHOTCRETE REPAIRS	REPLACE CULVERT

Table 11.1 – Maintenance work types

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Concrete Deck Inspection

- Primarily visual with standard tools (hammer, chains, etc.)
- Measurement of damage / condition
- Components inspected are
  - wearing surfaces
  - concrete overlay
  - concrete deck
  - concrete edge elements
  - deck joints

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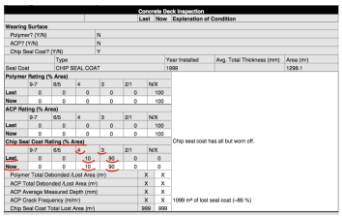
Concrete Deck Inspection – Wear Surface Inventory and Condition



Concrete Deck Inspection

	Last	Now	Explanation of Condition
Wearing Surface			
Polymer? (Y/N)	N		
ACP? (Y/N)	N		
Chip Seal Coat? (Y/N)	Y		

	Type	Year Installed	Avg. Total Thickness (mm)	Area (m²)
Seal Coat	CHIP SEAL COAT	1999		1298.1

Polymer Rating (% Area)

	9-7	6/5	4	3	2/1	N/X
Last	0	0	0	0	0	100
Now	0	0	0	0	0	100

ACP Rating (% Area)

	9-7	6/5	4	3	2/1	N/X
Last	0	0	0	0	0	100
Now	0	0	0	0	0	100

Chip Seal Coat Rating (% Area) — Chip seal coat has all but worn off.

	9-7	6/5	4	3	2/1	N/X
Last	0	0	10	90	0	0
Now	0	0	10	90	0	0

Polymer Total Debonded /Lost Area (m²)	X	X
ACP Total Debonded /Lost Area (m²)	X	X
ACP Average Measured Depth (mm)	X	X
ACP Crack Frequency (m/m²)	X	X
Chip Seal Coat Total Lost Area (m²)	869	869

1089 m² of lost seal coat (~85 %)

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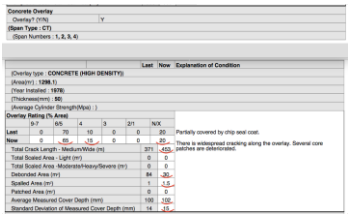
Concrete Deck Inspection – Concrete Overlay Inventory and Condition



Concrete Overlay

Overlay? (Y/N)	Y
(Span Type : CT)	
(Span Numbers : 1, 2, 3, 4)	

	Last	Now	Explanation of Condition
(Overlay type : **CONCRETE (HIGH DENSITY)**)			
(Area(m²) : **1298.1**)			
(Year Installed : **1970**)			
(Thickness(mm) : **50**)			
(Average Cylinder Strength(Mpa) :)			

Overlay Rating (% Area)

	9-7	6/5	4	3	2/1	N/X	
Last	0	75	10	0	0	20	Partially covered by chip seal coat.
Now	0	65	15	0	0	20	There is widespread cracking along the overlay. Several core patches are deteriorated.

Total Crack Length - Medium/Wide (m)	371	455
Total Scaled Area - Light (m²)	0	0
Total Scaled Area - Moderate/Heavy/Severe (m²)	0	0
Debonded Area (m²)	84	30
Spalled Area (m²)	1	1.5
Patched Area (m²)	0	0
Average Measured Cover Depth (mm)	100	100
Standard Deviation of Measured Cover Depth (mm)	14	15

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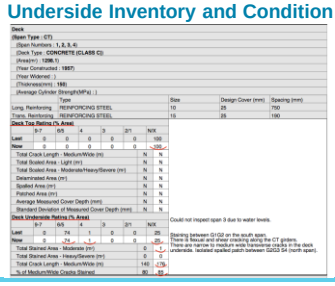
Concrete Deck Inspection – Concrete Deck and Underside Inventory and Condition



Deck

(Span Type : CT)	
(Span Numbers : 1, 2, 3, 4)	
(Deck Type : **CONCRETE (CLASS C)**)	
(Area(m²) : **1298.1**)	
(Year Constructed : **1957**)	
(Year Widened :)	
(Thickness(mm) : **150**)	
(Average Cylinder Strength(MPa) :)	

	Type	Size	Design Cover (mm)	Spacing (mm)
Long. Reinforcing	REINFORCING STEEL	10	25	750
Trans. Reinforcing	REINFORCING STEEL	15	25	190

Deck Top Rating (% Area)

	9-7	6/5	4	3	2/1	N/X
Last	0	0	0	0	0	100
Now	0	0	0	0	0	>50

Total Crack Length - Medium/Wide (m)	N	N
Total Scaled Area - Light (m²)	N	N
Total Scaled Area - Moderate/Heavy/Severe (m²)	N	N
Delaminated Area (m²)	N	N
Spalled Area (m²)	N	N
Patched Area (m²)	N	N
Average Measured Cover Depth (mm)	N	N
Standard Deviation of Measured Cover Deph (mm)	N	N

Deck Underside Rating (% Area) — Could not inspect span 3 due to water levels.

	9-7	6/5	4	3	2/1	N/X	
Last	0	75	1	0	0	25	Staining between G1/G2 on the south span. There is flexual and shear cracking along the CT girders. There are narrow to medium wide transverse cracks in the deck underside, located spalled patch between G2/G3 S4 (north span).
Now	0	74	1	0	0	25	

Total Stained Area - Moderate (m²)	0	0
Total Stained Area - Heavy/Severe (m²)	0	0
Total Crack Length - Medium/Wide (m)	140	170
% of Medium/Wide Cracks Stained	80	80

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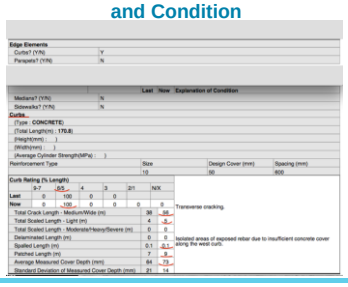
Concrete Deck Inspection – Edge Elements Inventory and Condition



Edge Elements			
Curbs? (Y/N)	Y		
Parapets? (Y/N)	N		
	Last	Now	Explanation of Condition
Medians? (Y/N)	N		
Sidewalks? (Y/N)	N		
Curbs			
(Type : **CONCRETE**)			
(Total Length(m) : **170.0**)			
(Height(mm) :)			
(Width(mm) :)			
(Average Cylinder Strength(MPa) :)			
Reinforcement Type	Size	Design Cover (mm)	Spacing (mm)
	10	50	600

Curb Rating (% Length)	8-7	6-5	4	3	2-1	N/X	
Last	0	100	0	0			
Now	0	100	0	0	0	0	Transverse cracking.
Total Crack Length - Medium/Wide (m)						38	38
Total Scaled Length - Light (m)						4	5
Total Scaled Length - Moderate/Heavy/Severe (m)						0	0
Delaminated Length (m)						0	0
Spalled Length (m)						0.1	0.1
Patched Length (m)						7	9
Average Measured Cover Depth (mm)						84	75
Standard Deviation of Measured Cover Depth (mm)						21	14

Isolated areas of exposed rebar due to insufficient concrete cover along the west curb.

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Concrete Deck Inspection – Deck Joint Inventory and Condition

Deck Joints			
(Type : **GLAND (WABO-MAUER, TRANSFLEX, ETC)**)			
(Number of Joints : **2**)			
(Expansion / Fixed? : **EXPANSION**)			
(Location : **A1, A2**)			
% Inspected	100	100	Inspected joints after a hard snow/rain, no leakage was observed.
% Joints Leaks	0	0	
% Joint Length Leaks	0	0	There are horizontal cracks in the abutments. There are vertical cracks along the piers.
Superstructure Damage Rating	6	6	
Substructure Damage Rating	6	6	
Level 1 Joint Rating	7	7	

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Questions?

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