WAKA KOTAHI NZ TRANSPORT AGENCY

Preliminary Present Value End of Life (PVEOL) Analysis

Network area:	Highway:	RP:	BSN:	Structure name:	Owner:	Far North District Council
Northland	Kahikatoa Rd	1607		**Kahikatoa Road Culvert No. M35**	RCA:	Far North District Council

General Structure Data		PVEOL Questions:	Yes/No	Brief explanation of restrictions
Year constructed:	Unknown	Is the bridge over 80 year old	No	
One Network Road Classification (ONRC):	Access (low volume)	Is there significant maintenance required in the next 3 years	Yes	
Vehicles per day:	<50	Is the bridge inspected in accordance with NZTA-S6	Yes	
% heavy vehicles:	10.0%	Is the bridge on special inspections	Yes	
Number of Spans	2	Has a live load assessment been carried out based on the known condition	No	
Total Length of Bridge	3.1m	Are there any brittle and/or vulnerable details on the bridge	Yes	
Road width between Kerbs/rails	4m (soffit 6m)	Are there live load or speed restrictions across the bridge	No	

Structure description

The structure is a twin-barrel reinforced concrete box culvert. Each barrel is 1.2m wide by 1.5m high, and 6m long at the soffit. It is situated on a single lane unsealed road. Both the inlet and outlet of the culvert are un-armoured over their height. The deck is thin with the depth from road level to soffit of approximately 0.5m. No side protection is present.

Photo from Road Level

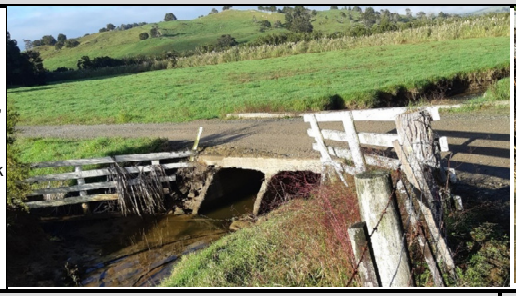
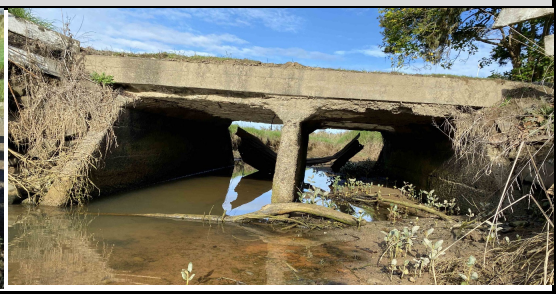


Photo of Elevation



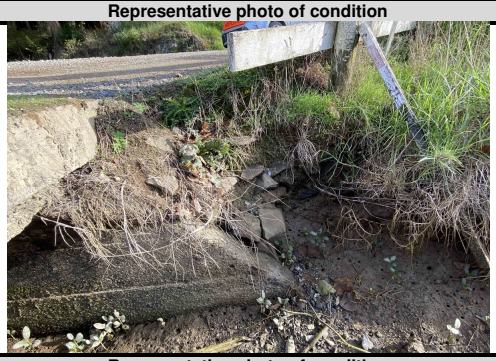
Current Condition: Parapets / Barriers / Surfacing

Briefly explain the current defects

N/A

Maintenance Interventions Required	Year	Cost ($k)
1.)		
2.)		
3.)		
4.)		

Representative photo of condition



Current Condition: Superstructure

Briefly explain the current defects

Kahikatoa Road culvert M35 is subject to significant spalling in the soffit of the culvert deck slab caused by corrosion of most of the bottom reinforcing in the slab. The majority of the reinforcement in the soffit is exposed. Corrosion is severe in places with some reinforcing bars completely corroded away or failed.

Maintenance Interventions Required	Year	Cost ($k)
1.) Repair the culvert through extensive repair of existing reinforcement, and lap welding of new reinforcement, together with significant concrete repairs	2021	$75
2.) General Maintenance	2026	$25
3.) Replace Structure	2031	$175
4.)		

Representative photo of condition

Current Condition: Substructure

Briefly explain the current defects

N/A

Maintenance Interventions Required	Year	Cost ($k)
1.)		
2.)		
3.)		
4.)		

Representative photo of condition

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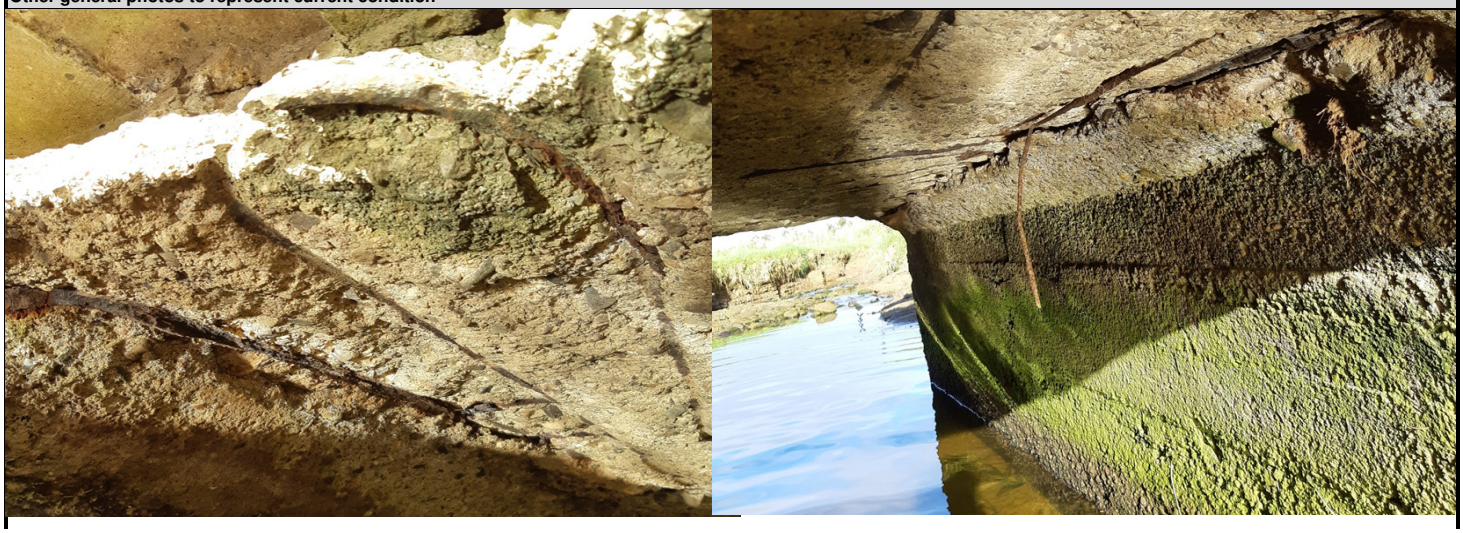
Other general photos to represent current condition



Hypothetical "like for like" bridge Replacement		Brief discussion
Total Length of Bridge	3.1m	Costs include for establishment, traffic management and nominal approach works. Costs do not include for consultancy fees, resource consent fees or geotechnical investigation fees.
Road width between Kerbs/rails	4m	
NZTA replacement rate (m2)	N/A	
Replacement cost ($k)	$175,000	

Maintenance Scenarios

Scenario 1 - Minimal / Routine Maintenance and look to replace the bridge as early as possible (1-3 years)

Component	Maintenance Interventions Required	Year	Cost ($k)	NPV ($k) 4% discount
All	Install new reinforced concrete culvert	2021	$175	$168
		Totals	**$175**	**$168**

Scenario 2 - Maintain the bridge in the medium term (3-10 years) followed by bridge replacement

Component	Maintenance Interventions Required	Year	Cost ($k)	NPV ($k) 4% discount
Culvert	Reinforced concrete repairs	2021	$75	$72
Culvert	General maintenance	2026	$25	$20
Culvert	Install new reinforced concrete culvert	2031	$175	$114
		Totals	**$275**	**$206**

Proposed Strategy

Having considered the condition of the culvert, there is potential that significant, potentially catastrophic failure may occur within 1 to 3 years if maintenance actions or replacement of the structure are not undertaken. The PVEOL analysis over 10 years of asset life gives a 19% ($38K) saving which shows that the culvert is at the end of its economic life, and therefore the preferable option is to replace the culvert immediately. Due to the deterioration of the structure, the culvert is also effectively at the end of its useful life and will require replacement in the short to medium term, irrespective of any maintenance works level chosen.

Document preparation

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Approved by:	**Dewi Todd-Jones**	**Title:**	Work Group Manager - Bridges, Civil & Structures	**Date:**	**29/09/2021**

Document review - Waka Kotahi response

Reviewed by:	Liam Coleman	**Title:**	Team Lead Structural Performance	**Date:**	30/09/2021

Outcome:	Comments:
APPROVED	6600/m2 value should be used to for ecominical reasons. But the reality for this asset is the bridge will need so much mainteance it will practically be a new bridge. Replacment should be carried out as soo as possible