TMK Consulting Engineers

ADELAIDE | MELBOURNE | RIVERLAND

TMK Ref. 2202023_R2 | 24 FEBRUARY 2023

STRUCTURAL ASSESSMENT

(BRIDGE) TWENTYFIRST STREET, RENMARK.

for

RENMARK PARINGA COUNCIL

TMK Ref: 2202023
Your Ref: 2827

23 February 2023

RENMARK PARINGA COUNCIL
61 Eighteenth Street
PO Box 730 Renmark
RENMARK SA, 5341

ATTENTION: SHANNON BAXTER Email: sbaxter@renmarkparinga.sa.gov.au

Dear Shannon,

RE: STRUCTURAL ASSESSMENT
AT: 21ST STREET BRIDGE, RENMARK SA 5341

TMK Consulting Engineers is pleased to present a PDF copy of our report on the investigation undertaken at the above location.

If you require further information or clarification regarding any aspect of this report, please do not hesitate to contact the undersigned.

For and on behalf of
TMK Consulting Engineers

BIDUR BHATTARAI

Report Issue	Author	Reviewed	Issue date
2202023_R2	**Bidur Bhattarai** *MEng (EngMgmt), MIEAust, BEng (Civil)* Engineer	**Raik Bosse** *BEng (Civil & Struct.), CPEng, MIEAust, NER* Associate Director	24 February 2023

The work carried out in the preparation of this report has been performed in accordance with the requirements of TMK Consulting Engineer's Quality Management System which is certified by SAI Global to comply with the requirements of ISO 9001.

EXECUTIVE SUMMARY

- TMK attended the site at 21st Street, Renmark SA to investigate the structural condition of the 21st Street Bridge following the recent flooding.
- Additional defects observed on site at the time of inspection confirmed that floodwaters had caused additional significant damages to bridge components.
- The bridge is not considered safe for public access in its current condition. Extensive remedial action or total bridge replacement will be required.

CONTENTS

1 INTRODUCTION

At your request TMK Consulting Engineers have successfully undertaken an asset condition assessment on the 21st Street Bridge, located on 21st Street, Renmark. The visual assessment was undertaken on 15 February 2023.

- The visual condition assessment was carried out on site by Engineers, Mr Bidur Bhattarai and Engineer, Mr Vuk Pijovic.

The aim of this assessment is to provide Council with a record of the condition of the bridge infrastructure following the flood event, such that you may plan for and manage the delivery of the required level of remediation.

Figure 1 - Aerial image of the site in question, 21st Street Bridge, Renmark SA (dated November 2022).

2 EXISTING CONDITION PRIOR TO THE FLOODING EVENT

TMK had attended this site previously in January 2022 to investigate the structural condition of the bridge in question. A report was provided (2202023_R1 dated March 2022) which detailed the existing condition of the bridge structure along with a number of recommendations for repair and remediation.

At the time of the 2022 investigation, the bridge was considered to be in a 'structurally poor' yet reparable condition.

Typical defects observed included:

- Significant cracking to reinforced concrete posts between handrails.
- Typical deterioration of concrete and steel elements to the reinforced concrete bridge soffit and structural steel beams.
- Significant concrete spalling and delamination present to the bridge soffit.
- Minor surface corrosion to structural steel beams.

A CapEx report was provided along with the report to assist with maintenance forecasting.

For further information regarding the condition of the bridge prior to the flooding event please refer to the initial report - 2202023_R1 dated March 2022.

3 SITE OBSERVATIONS POST FLOODING EVENT

Following the recent 2022/23 flooding of the Murray River, TMK reattended site at your request to investigate whether the flooding had caused any additional damages to the bridge superstructure. The site was reattended on 15th February 2023 by Engineers, Mr Bidur Bhattarai and Mr Vuk Pijovic.

Further deterioration / damage to the bridge as a result of the flooding event was observed, detailed as following:

3.1 APPROACHES

The road surfaces to each of the bridge approaches had suffered minor subsidence which was evident due to parallel cracks in the asphalt road surfaces and level difference in the road surface immediately prior to the bridge.

Photo 1 - Cracking and subsidence to road surface at the bridge approach

3.2 ABUTMENTS

The bridge abutments had suffered erosion effects from the floodwater. Floodwaters had caused erosion to base course and subgrade layers beneath the road surface at the abutments – causing loss of portions of the road surface.

Photo 2 - Erosion of road layers

3.3 BRIDGE ROAD & FOOTPATH SURFACES

The asphalted pedestrian walkway on the north-western side of the bridge had been severely eroded and delaminated from the bridge deck due to floodwater activity.

The roadway was visually less affected but possible delamination of the road surface cannot be excluded.

Photo 3 – Severe deterioration & erosion of pedestrian footpath

3.4 PIERS / FOOTINGS

The condition of piers and footings to the bridge appeared unchanged since our prior attendance.

3.5 CONCRETE BRIDGE DECK & SOFFIT

The condition of the concrete bridge deck and soffit remained relatively unchanged since our prior attendance. Minor additional spalling of concrete was noted – likely loose concrete fragments being removed by floodwater activity.

3.6 STRUCTURAL STEEL BEAMS

Grouted end bearings of the steel beams had been eroded due to historic cracking and floodwater activity. Lateral forces imposed by the flow of floodwater likely had contributed to further warping / rotation of the steel support beams due to lack of bridging / cross bracing – an item which was discussed within the initial report.

Photo 4 - Fragments of grout beneath an end bearing had been washed away by floodwater

4 DISCUSSION

Following the 2023 site inspection undertaken by this office, TMK can confirm that the flooding of the Murray River has caused additional structural damage to the Twentyfirst St Bridge.

The structural condition of the bridge was considered borderline reparable following our initial investigation in early 2022. The recent additional damages have significantly lowered the condition rating of the bridge to a degree where, in the opinion of TMK Consulting Engineers, the bridge is no longer safe for public use in its current condition.

The expected degree of remediation to return the bridge to service (incl. reinstatement of a 10t load rating) has surpassed concrete repair alone and would now also require total resurfacing of the bridge and its approaches, stabilisation of the bridge abutments, replacement of handrails along with all other recommendations detailed in our initial report.

5 CONCLUSION

Due to the additional damages caused by the flooding, in combination with the already reported poor structural condition of the bridge, it is the considered opinion of TMK Consulting Engineers that the bridge is no longer safe for public access.

Given the degree of required repairs to the bridge, the costs to remediate are likely comparable with the costs to replace the bridge structure entirely. Council may wish to explore this opportunity to replace the bridge structure rather than remediate the existing structure.

Efforts of remediation will provide only limited benefit to the future performance of an already dated bridge structure whereas a new bridge structure will provide a full design life in excess of 50 years of performance.

6 FINAL STATEMENTS

We trust this report is sufficient for your present requirements. If you have any further queries regarding this matter, please do not hesitate to contact this office.

The conclusions reached in this report have been based on opinions derived from site observations and our experience in understanding the causes of building/asset damage. If you consider that the circumstances in this matter justify any additional testing or measurement, please contact this office so that we can discuss whether any appropriate further testing or procedure may be of assistance to gain further insight to the observed site conditions.

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For and on behalf of
TMK Consulting Engineers