

21 December 2023

Land Information New Zealand (LINZ)
Private Bag 4721
Christchurch 8140

Attention Sarah Thompson

Dear Sarah,

**RE: REVIEW OF STONE RETAINING WALL STRENGTHENING AT NAPIER PRISON, 55
COOTE ROAD, NAPIER**

INTRODUCTION

BMC has been engaged by LINZ to provide comment on the proposed strengthening concepts for the heritage-listed stone retaining walls at the above address. Over the last few years, the walls have been assessed, and concept strengthening proposals have been prepared by Aurecon New Zealand Ltd. They have concluded that some of the walls present a significant Health and Safety risk to the public and heritage structures.

BMC attended site on 27 November 2023 and undertook a non-invasive inspection of the accessible stone retaining walls on the site. This report is based on these site inspections and the limited information provided and researched by BMC, as summarised below: -

1. Aurecon NZ memo, Napier Ex-Prison – Retaining Wall Assessment dated 08/04/2022.
2. Aurecon NZ memo, Napier Ex-Prison – Retaining Wall Assessment – Stage 2 Risk Assessment dated 05/09/2022.
3. Aurecon NZ Concept Design Report, Napier Ex-Prison – Retaining Wall Assessment dated 19/05/2023.
4. Heritage New Zealand Pouhere Taonga, Napier Prison heritage listing from the webpage “The List” dated 09/09/1983.

DESCRIPTION OF WALLS

The Heritage New Zealand listing is for the buildings and structures associated with Napier Prison, and its entry status is “Historic Place Category 1”. Category 1 is the highest listing possible and means the prison is a place of special or outstanding historical or cultural significance. Any work undertaken to the retaining walls or other structures should take into account the historic significance of the place and use ICOMOS NZ conservation principles to develop a reversible solution that protects the heritage values. We understand Underground Overground Archaeology have been engaged to further assess the heritage values of the walls and we refer the reader to their report (this reporting was not available at the time of completing this report).

The walls were built, we understand, early in the 20th Century i.e. prior to 1910-1919, as they are shown in a photo from the Radcliffe Collection from this period. Prior to the wall construction, there appeared to be steep rock faces depicted in the photographic record. From a structural engineering perspective, it is likely that the walls were not designed to be retaining walls but rather to prevent erosion of the cliff faces and prevent prisoners from escaping. Despite this, any movement of the soil above or behind the wall will result in loads being applied to the rear face of the walls.

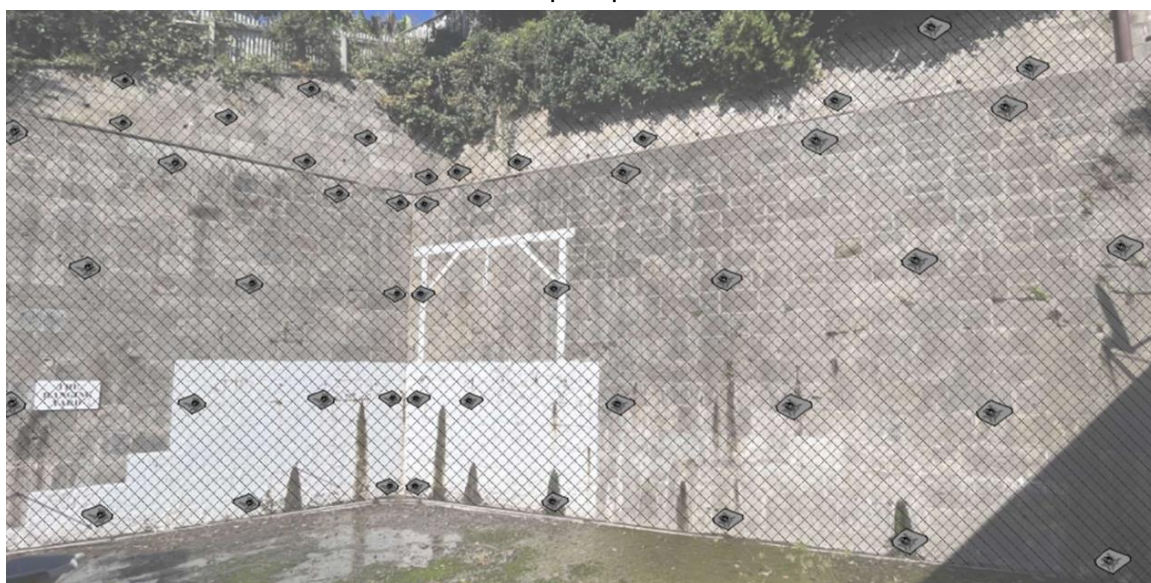
AURECON REPAIR CONCEPTS

Aurecon has prepared two concepts for strengthening the existing retaining walls: -

- Soil Nail Waler Beam Wall



- TECCO G65/4 mesh wall with P33/50 N spike plates



The two concept schemes Aurecon has proposed try to convert the stone wall (Aurecon reference RW10) into a retaining wall to retain the soil behind the wall. In our experience, this is difficult to achieve without significant loss of heritage value.

We have the following concerns with the concept designs: -

Soil Nail Waler Beam Wall

- a) The visual impact of the walers is significantly impacting heritage values.
- b) The walers will collect debris and grow weeds, leading to potential corrosion issues.
- c) The wall is in the sea spray zone and will be difficult to prevent from corroding and hard to maintain.

TECCO G65/4 mesh wall with P33/50 N spike plates

- a) The visual impact of the mesh will significantly impact the heritage values.
- b) The mesh will collect debris and promote weed growth, which is likely to affect the face of the stonework and corrode the mesh.
- c) The wall is in the sea spray zone and will be difficult to prevent from corroding and hard to maintain.

We note that at the time of writing, there has not been a full geotechnical investigation of the ground conditions on the site, and we strongly recommend this is undertaken as soon as possible. It is our understanding that MBIE Module 6 – Earthquake Geotechnical Engineering Practice, the current best-practice design/assessment guidelines, requires a site-specific geotechnical investigation and soil testing to determine design/assessment parameters for retaining walls. The concept designs have made assumptions with regard to the soil conditions and loading on the walls that need to be verified.

ALTERNATIVE STRENGTHENING CONCEPTS

BMC note there are a number of options for providing strength to the walls, which will protect them from collapse in a moderate earthquake whilst retaining the heritage value of the walls. Many of these options involve installing structure either through or behind the wall to provide additional strength to the wall. Attached in Appendix A is one such solution that, once engineered and sized, will provide a more robust wall than is the current case. This solution may not provide the full seismic restraint as either of the Aurecon schemes, however, it is, in our opinion, more in keeping with conservation practices.

Additionally, BMC highly recommends that the ground surface at the top of each wall is covered with an impervious surface that drains away from the face of the wall and to a piped drainage system to prevent moisture from affecting the soil behind the wall.

RISK MITIGATION

BMC are not experts in the fields of risk mitigation or Health and Safety and we provide the following comments as competent structural engineers. From a historical perspective, the walls are over 100 years old and we understand survived the M 7.2 1931 Napier Earthquake, although some repairs were necessary. They appear to have survived intact, i.e. there do not appear to be any signs of replacement stones at the time of our site visit. This gives us some confidence in the overall stability of the walls.

More recently Aurecon have observed some movement of the top of RW10 where some cracks have opened up in the surface of the backfill material. BMC noted a small amount of cracking and outwards displacement of the concrete capping or plaster at the top of the wall. Based on these observations it appears the movement of the wall is likely currently confined to the top of the wall and the backfill between the wall and the stone face.

In light of these issues, Aurecon has reported on the risk to the public and prison buildings if the wall was to collapse in their memo dated 5 September 2022. We agree that the risk of localised collapse is heightened due to the cracks observed and agree that any collapse of the wall could pose a serious risk to personnel or buildings onsite. We agree with the temporary Health and Safety measures that were in place at the time of our visit.

We trust that we have answered the questions you have put to us. If we have failed to correctly interpret your queries, please do not hesitate to contact us for further clarification.

Yours sincerely
Batchelar McDougall Consulting Limited

Produced by



Andrew Marriott

Senior Principal Engineer
BE(Civil), CMEngNZ, CPEng, IntPE(NZ), M.ICOMOS

Reviewed by:



Michael Hobbs

Principal Engineer
BE(Hons), ME, CPEng, CMEngNZ, IntPE(NZ)

Prepared by BMC's Christchurch Office
Ph +64 3 338 3351

APPENDIX A – Wall Strengthening Option

