

Our Ref: 2103903REa Maitland Gaol Experience- Heritage Structural Commentary

MAITLAND GAOL TOWER EXPERIENCE: HERITAGE STRUCTURAL COMMENTARY.

1. INTRODUCTION

It is proposed to construct a new spiral stair case within Tower 1, at Maitland Gaol as part of the new proposed Tower Experience tour. The general arrangement of the new stairs is provided in Architectural Drawing by Donn Architects, Reference: 22-087 A101

There is an existing concrete slab to the floor of the tower, this slab is a solid slab with no existing openings as this tower is accessed from the other towers within the Gaol.

The constraints that have been placed on the creation of these new stairs from a design perspective include; working within a small space, and the requirement for achieving structural stability with minimal fixings into the stone work. The stairs will need to be installed with manual labour and minimal lifting equipment, the use of a crane to install these stairs is not possible. Consequently the stairs are designed to be installed in a modular manner, with small segmental pieces that are easily handled, with manual labour. We have evaluated the general structural sizing of the members allowing for a workable design to be produced.

The existing gentries and balustrades in their original condition are considered to be structurally adequate and fit for purpose, capable of withstanding the design loads as prescribed by AS1170.01. Some minor remedial works are required to the fixing of the gantry to the wall on the eastern side of Tower 6.

The main structural requirements for the new stairs are the creation of a new structural slab at the base of the tower and the creation of a new penetration within the existing slab at the top of the tower.

2. COMMENTS

2.1. New Structural Slab at ground level.

2.1.1. The removal of the existing slab at the base of the tower is required to create a new foundation for the spiral stairs. The stairs are primarily supported by this new foundation. Without the creation of this new foundation, there would be a requirement to fix the stairs to the sandstone of the tower, along the height of the stairs at regular intervals.

2.1.2. The mid landing of the stairs, will also bear upon this new foundation slab, by allowing this to happen, the requirement for fixing into the existing sandstone is removed.

2.2. The Existing slab

2.2.1. The existing structural condition of the concrete slab at the Tower is unconfirmed. However from observations that have been made, the under side of the slab appears to be reinforced with longitudinal bars, which are not adequately covered by concrete. From the observations of the slab from the underside, there are questions regarding the stability of the slab following the creation of the required penetrations. Consequently, a conservative approach has to be taken in the creation of this new penetration. A view of the underside of the slab is provided below.



2.2.2. Several options have been considered for the creation of the new opening within the existing slab, they are listed below, with reasons as to why they have not been adopted in this final design:

- **Slab removal back to inside face of sandstone tower shaft, leaving the remaining portion of the slab intact.** The condition of the slab reinforcement is unlikely to allow for the adequate support of the remaining sections of concrete which remain between the sandstone tower and the Tower. This is due to the unusual reinforcement seen in the concrete slab .
- **Entire slab removal, including the section under the Tower.** Removal of the entire slab, will require the Tower above the slab to be supported whilst the slab under the walls is removed, this option will not only cause disruption to the Tower itself, but also mean that the slab, with its unusual reinforcement, will be lost.
- **Slab removal extent to suit '3 o'clock shape' spiral stair penetration with use of trimmer beams radiating out from central CHS.** This method of creating the penetration is an idealised method of being able to support the remaining slab, whilst minimising the fixings into the sandstone walls. However, due to the unconfirmed structural condition of the slab, this idealised support methodology is not likely possible to be implemented.
- **Slab removal extent to suit '3 o'clock shape' spiral stair penetration, with new steelwork, fixed to the sandstone, which supports the remaining concrete slab.** This is the more conservative approach for the treatment of slab support. A support frame will be installed under the slab, which is fixed off to the sandstone walls. This support frame will allow for the adequate support of the remaining concrete slab and also offer a floor frame to fix-off an infill steel floor that will need to be constructed at the same level as the remaining slab.

2.2.3. The final method of support for the concrete slab will be decided once the works to install the stairs are commenced, as the underside of the slab will be accessible. It is desirable that where possible, the amount of steel frame work to support the slab be minimised. The fixings into the sandstone will be minimised and they will be carried out, inline with best practice for fixing into a heritage building; they will be 316 S/S chemical anchor fixings, designed to not damage the sandstone they are being fixed into.

2.2.4. By being able to create a new foundation slab at the base of the tower, the overall impact to the existing tower is also minimised as the new slab is able to support the additional structural loads, created by the installation of the new spiral staircase.

2.3. Existing Gantry remediation

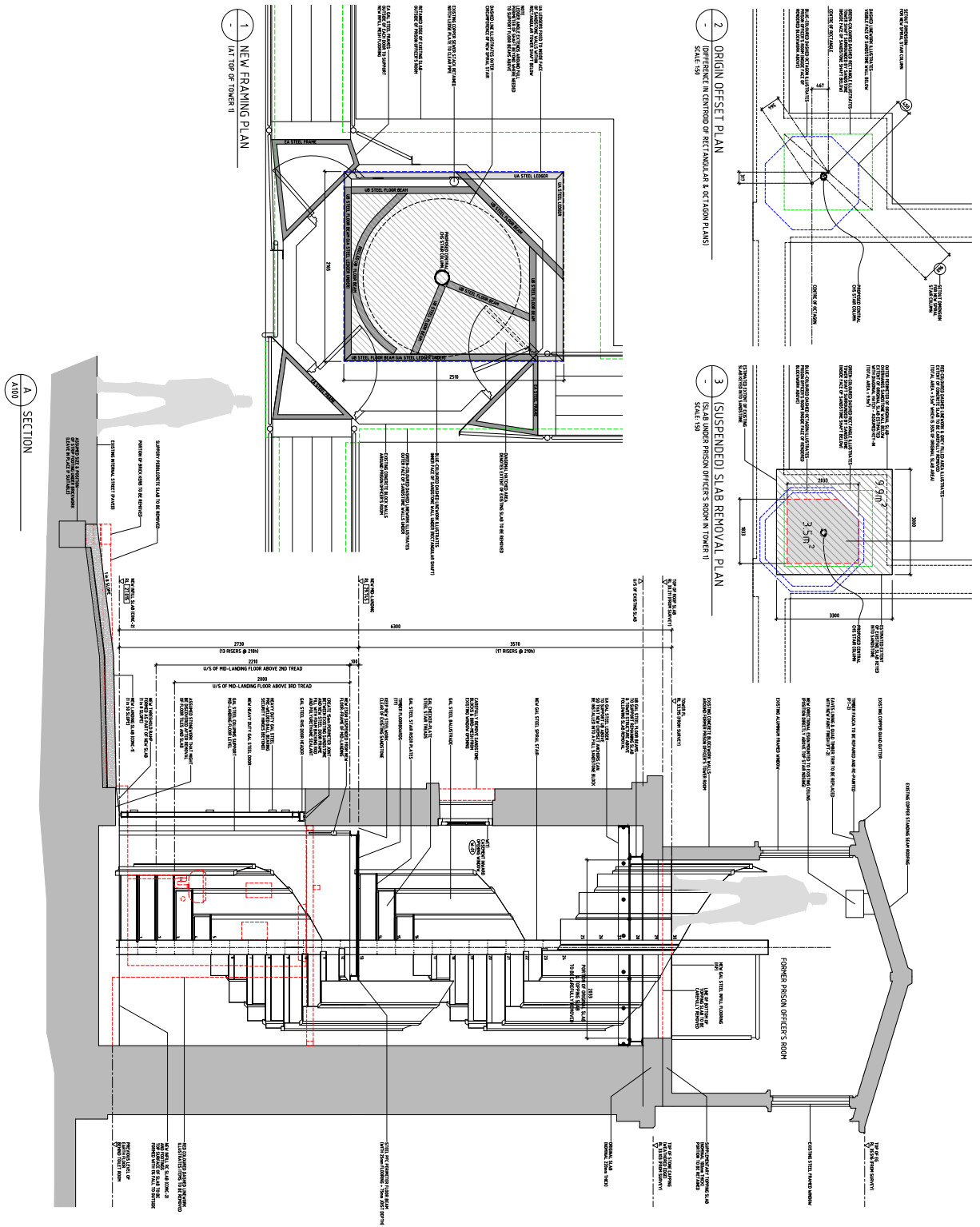
2.3.1. The eastern section of the gantry to Tower 6, deflects to a greater extent laterally, compared to the other sections of the gantry. Due to this difference in lateral performance under load, compared to the other sections it is believed that the fixing of the gantry to the wall will need to be remediated.

2.3.2. The remediation of the fixing, will be undertaken by either replacing the existing fixings with new fixings or the addition of a vertical steel support member to the wall, similar to that which has been used to install the gantry sections to other locations of the wall. The decision as which is the required structural solution will be decided once works to site commence. An image of the sections with a vertical steel member is shown below for reference.

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MAITLAND CITY COUNCIL

PROJECT: CONSERVATION REMEDIATION - TOWER 1

CLIENT: MAITLAND CITY COUNCIL

DATE: 1/2018 TO 1/2020

PROJECT NO: 22-087

DRAWING NO: A101

SCALE: A

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