

Feasibility Assessment for the proposed movement of the Adelaide University Gatehouse



FMG REF: S49713 – 270694
ISSUE DATE: 30 June 2020
SITE ADDRESS: Adelaide University Gatehouse, Cnr Fullarton & Cross
Road, URRBRAE, SA 5064
CLIENT: DPTI Facilities Services
CLIENT REF: PO#2001194313

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Document Status

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1.0 Introduction

- 1.1 FMG Engineering ('FMG') has been engaged by DPTI Facilities Services to prepare a high-level feasibility assessment of moving the Adelaide University Gatehouse building, which is located at the corner of Fullarton & Cross Road, URRBRAE, SA 5064.
- 1.2 FMG understands that due to the proposed the Cross Road - Fullarton Road Intersection upgrade project, DPTI Facilities Services is investigating the feasibility of moving the State Heritage listed 'Adelaide University Gatehouse' (Heritage ID: 10644) away from the intersection.
- 1.3 The purpose of FMG's investigation is undertake a review of items which need to be considered when relocating the building. A site inspection was carried out by Matthew Eakins, Forensic Engineer at FMG, on 19 June 2020, to facilitate the assessment.
- 1.4 The extent of FMG's investigation is limited to the area of concern, namely the structure of the subject building. Regions of the site and property outside of this area have not been inspected, nor do they form part of this assessment, beyond what FMG deemed necessary.
- 1.5 An aerial photograph and photographs taken during the inspection are provided in Appendix A. These photographs are referenced in the report as [1], [2], [3] etc. A floor plan is provided in Appendix B.

2.0 Description of site and building

- 2.1 For the purpose of this investigation the front of the subject building is assumed to face west towards Fullarton Road.
- 2.2 The subject building is a single storey solid masonry building, understood to have been initially constructed circa 1890. The general construction of the original building comprises:
- Roof – Slate tiles supported on conventional timber framing.
 - External walls – Solid masonry walls with an exposed masonry finish externally and a hard-set plaster finish internally.
 - Internal walls – Solid masonry walls with a hard-set plaster finish.
 - Floor – Timber framed construction supported by the footings.
 - Footings – Bluestone type footings supporting the masonry walls and expected dwarf walls supporting the internal floor areas.
- 2.3 The original building has been subsequently extended, and the general construction of the extension comprises:
- Roof – Profiled metal sheeting supported on timber framing.
 - External walls – Solid masonry walls with an exposed masonry finish externally and a hard-set plaster finish internally.
 - Internal walls – Timber framed stud walls with plasterboard linings.
 - Floor / Footings – Concrete raft slab on ground.

3.0 Feasibility assessment

- 3.1 FMG understands that due to the proposed the Cross Road - Fullarton Road Intersection upgrade project, DPTI Facilities Services is investigating the feasibility of moving the State Heritage listed 'Adelaide University Gatehouse' (Heritage ID: 10644) away from the intersection.
- 3.2 From FMG's inspection of the building and its construction, it is FMG's opinion that the proposal to move the building is feasible from a structural point of view. However, FMG recommends that consideration must be given to the issues discussed below.

Methodology considerations

- 3.3 In outline, FMG expects the methodology to move the building would require the installation of the steel frame at the base of the walls, jack up the building on that steel frame, and then transport the building using prime movers.
- 3.4 In their normal condition the masonry walls of the building act in compression and are uniformly supported by the footings. However, it is expected that the lifting frame will only provide non-continuous support along the base of the walls, and this is expected to generate localised areas of high stress and tension within the wall fabric, which could adversely affect the structural integrity of the walls. Therefore, FMG recommends that the building lifting methodology must ensure that the structural integrity of the wall fabric is maintained at all times, with appropriate controls in place to protect against tensile stresses generated within the walls.
- 3.5 As the existing footings of the original building are bluestone type strip footing, FMG recommends that the existing footings be left in situ and demolished after the superstructure has been moved. Therefore, new footings will need to be designed and constructed for the relocation site prior to the building being moved. The new footings will need to be designed and constructed in accordance with the Australian Standard AS2870-2011 *Residential slab and footings*, with appropriate detailing to allow the relocated superstructure to be lowered onto the new footings with structurally sound bedding/connection.
- 3.6 FMG further recommends that the building lifting methodology provides adequate redundancies to mitigate against excessive deformation or critical failure occurring in the supporting framework or the lifting system while the building is being lifted, moved and lowered.

Building specific factors

3.7 Consideration also need to be given to the following items that are specific to the subject building:

- Building construction joints. FMG notes that there are at least two separate extensions have been added to the eastern side of the subject building since the time of the original construction. These extensions are constructed separate footing systems with construction joints between the different sections. FMG recommends that adequate/additional support be provided at these joint locations and that the building is lifted uniformly in order to ensure that there is no differential movement at the joint locations during the relocation works. FMG recommends that these joints are appropriately monitoring during the location works.
- Chimneys / parapets. FMG observed multiple chimneys and parapet walls which extend above the roof of the subject building. FMG recommends that the current lateral support of these building elements be investigated and notes that temporary support measures will most probably be required in order to reduce the risk of damage.
- Ceiling lining. FMG observed that sections of the ceiling construction of the original building were in a deteriorated condition or have been previously reinforced with temporary timber battens fixed to the roof framing. FMG recommends that a comprehensive inspection of the ceiling lining be undertaken to determine the structural integrity of the ceiling linings and whether any further protection measures are required, such as removal or additional propping. FMG notes that a degree of additional cracking should be expected to occur to brittle finishes, such as the ceiling and wall plaster, during the relocation works.
- Rising ramp. FMG noted sections of the masonry walls where the stone units were deteriorated at the base of the wall, and there was a loss of cross-sectional area. FMG recommends that all such damage be repaired prior to the relocation works because locally weakened/deteriorated areas of the wall structure would be more prone to failure during the relocation works.
- Existing crack damage. FMG observed brickwork cracking throughout the property. FMG recommends that these cracks be monitored during the relocation works and mitigation measures be implemented if they start to get larger or widen.
- Flashing and roof plumbing. Ensure that no damage/deterioration is caused to the existing roof flashing/plumbing of the building; any damage/deterioration should be made good after the building has been relocated.
- Utilities connections. If new building utilities (water, sewer, power) are to be installed at the relocation site prior to moving the building, ensure that there is sufficient tolerance in the

new utilities connections to allow for any misalignment of the building when positioned upon the new footings.

- Changed wind load. While FMG understands that the proposal is to only move the building a comparatively short distance, FMG recommends that the building should be assessed for the design wind loading at the relocation site and any required strengthening work arising therefrom to be undertaken after relocation.

Footings

3.8 FMG recommends that the following be considered when designing the new footings for the building at the relocation site:

- A geotechnical investigation of the relocation site should be undertaken so that the new footings can be appropriately designed taking into consideration the site-specific conditions.
- Depending on the site conditions of the re-location site, FMG recommends that the effect of any nearby trees (or recently removed trees) be considered in the design of the new footings.
- FMG notes that a greater than standard building tolerance must be allowed during the construction of the new footings to facilitate the placement of the building onto the new footing. This would include a general widening of the footings edges to accommodate misalignment.
- FMG recommends that all existing flooring, such as timber floor boards, tiled surfaces and linoleum should be salvaged wherever possible or recorded. Following the relocation of the building, all salvaged flooring shall be reinstalled, or new equivalent floor finishes should be supplied and installed to match the pre-existing conditions.

Wet-areas

3.9 FMG recommends that due to the level of deterioration observed through the wet-areas of the subject building, following the relocation of the building, the water-proofing of all wet areas (bathroom and laundry) should be upgraded to comply with all current building regulations.

Transport considerations

3.10 FMG has not been informed about the location of relocation site, but FMG understands that it is intended for the building to remain on the Urrbrae estate. This is expected to minimise typical limiting factors for transportation of the building, such as road widths, traffic management and the like. However, FMG notes that there are a number of large trees located in the vicinity of the existing site and therefore careful consideration of the route is required in order to minimise the tree removal of to accommodate the transport of the building.

3.11 Any above ground or underground services should also be mapped to ensure that there is no critical height or weight restrictions along the chosen route.

Fire Safety

3.12 FMG notes that if the building is relocated to a designated bushfire prone area the building will need to comply with the relevant planning and building regulations.

New / Upgrade Work

3.13 The process of moving the building will impose new loads on the building and provide a good test of the building's structural integrity. Once the move is completed, the building should be inspected for any signs of distress that may indicate hidden structural flaws.

3.14 FMG notes that any new works carried out as part of the building relocation will need to comply with current building regulations.

3.15 Upon the relocation of the building FMG recommends that consideration should be given to upgrade the following aspects of the building to meet the requirements of the current building regulations:

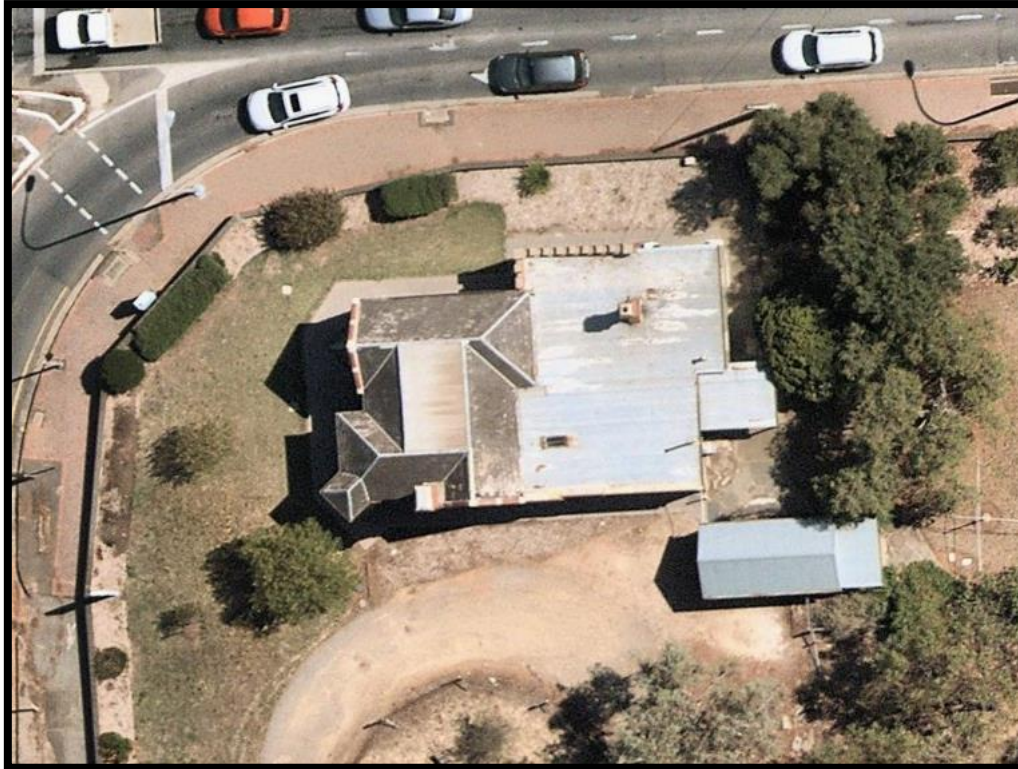
- Ground clearance;
- Earthquake resistance;
- Energy efficiency;
- Fire safety;
- Accessibility;
- External paving;
- Rainwater tank;
- Verandas;
- Stairs;
- Decks;
- Landings.

Client Ref:
Site Address:

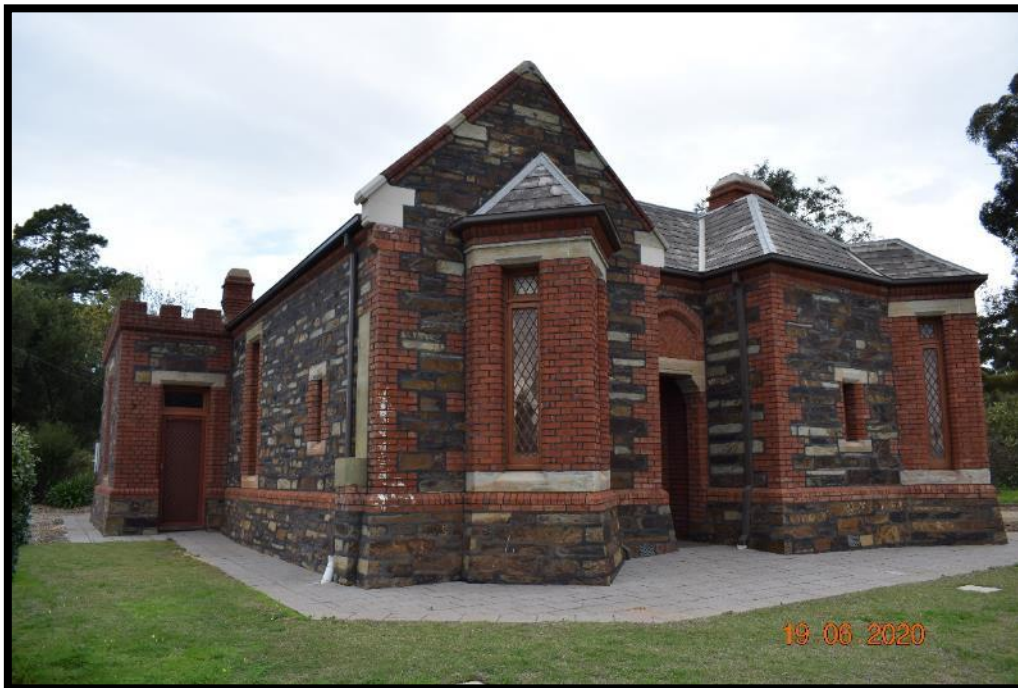
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Appendix A

Photographs



Photograph 1 – Aerial Photograph. Source: NearMap. Capture date: 05 February 2020.



Photograph 2 – Overview of building.



Photograph 3 – Bedroom G2. Note deterioration of the stone masonry including loss of cross-sectional area.



Photograph 4 – Living G4. Note deterioration of the stone masonry.



Photograph 5 – Hallway G1. Deteriorated ceiling lining and wall cracking.



Photograph 6 – Hallway G1. Deteriorated ceiling lining and wall cracking.



Photograph 7 – Bedroom G3. Note slight cracks in ceiling lining



Photograph 8 – Note retrofitted movement joints and propping of the ceiling lining



Photograph 9 – Bedroom G3. Note wall cracking and retrofitted movement joints



Photograph 10 – Chimney. Note height of chimney extending above the roof level.



Photograph 11 – Chimney. Note height of chimney extending above the roof level.



Photograph 12 – Parapet wall. Note flashing.



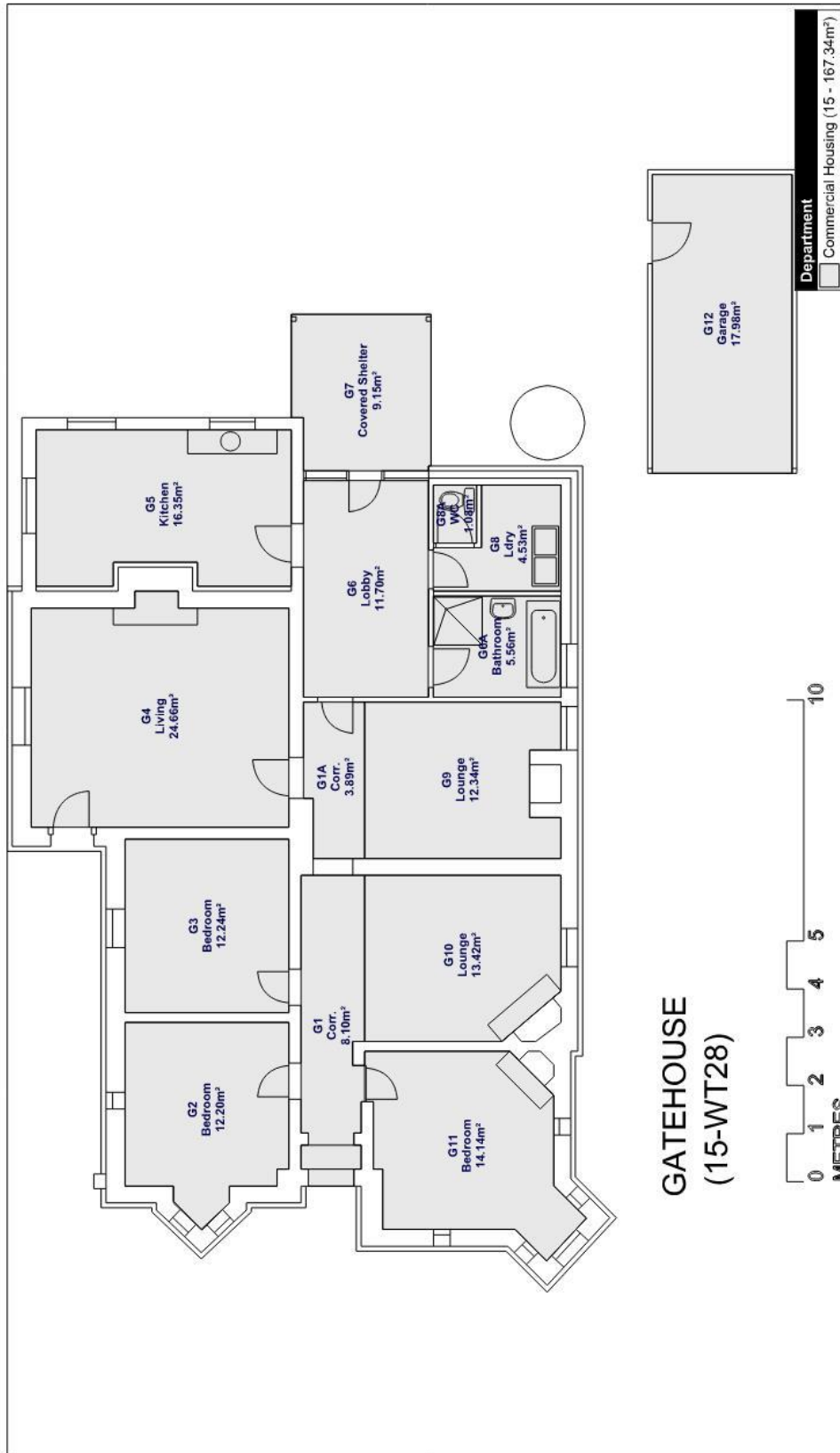
Photograph 13 – Parapet wall. Note flashing.

Client Ref:
Site Address:

PO#2001194313
Adelaide University Gatehouse, Cnr Fullarton & Cross Road, URRBRAE, SA 5064

Appendix B

Site plan



Department Commercial Housing (15 - 167.34m²)

**GATEHOUSE
(15-WT28)**

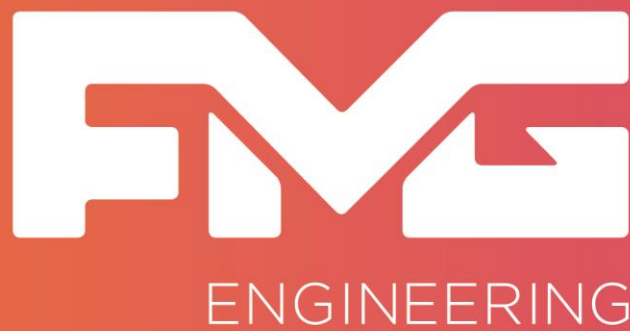


Waite
 Building WT28
 Gate House
 GN
 3/06/2020 floor

CAMPUS :
 BUILDING # :
 BUILDING NAME :
 FLOOR LEVEL SEQUENCE # :
 DATE PRINTED :

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 AND SPACE ANALYSIS ONLY.
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Figure B1 – Provided site plan
 (Plan is indicative only. Source: The University of Adelaide. Received: 15 June 2020)



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