

MCC, Hammerstone Road

Planning Condition 33 Report

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1.0 Feasibility of Avoiding Loading to the Structure

Planning Condition 33 relates to the Roof Access Stair Culvert Build Over.

Initial information submitted and uploaded onto the Planning Portal on 19th February 2023 has been considered.

A review of the details regarding the proposed access staircase and its relationship to the existing Corn Brook Culvert has been undertaken.

It has been determined that the information currently provided is insufficient for a thorough evaluation of the project's impact on the culvert's integrity and safety.

Additional information is required.

The proposed location of the Roof Access Stair has been determined to provide the most advantageous access location to the roof areas of the existing buildings.

Access is required for periodic maintenance and cleaning of the roof surface and associated guttering together with periodic maintenance of the new solar roof panels.

The location provides access to the main shed roof and adjoining smaller shed roof resulting in the need for a single Roof Access Stair.

Unfortunately, this will result in the requirement for the Roof Access Stair to be constructed over the Corn Brook Culvert and the following pages will describe the arrangements, loadings and risks that are to be considered.

2.0 Sectional View and Loadings

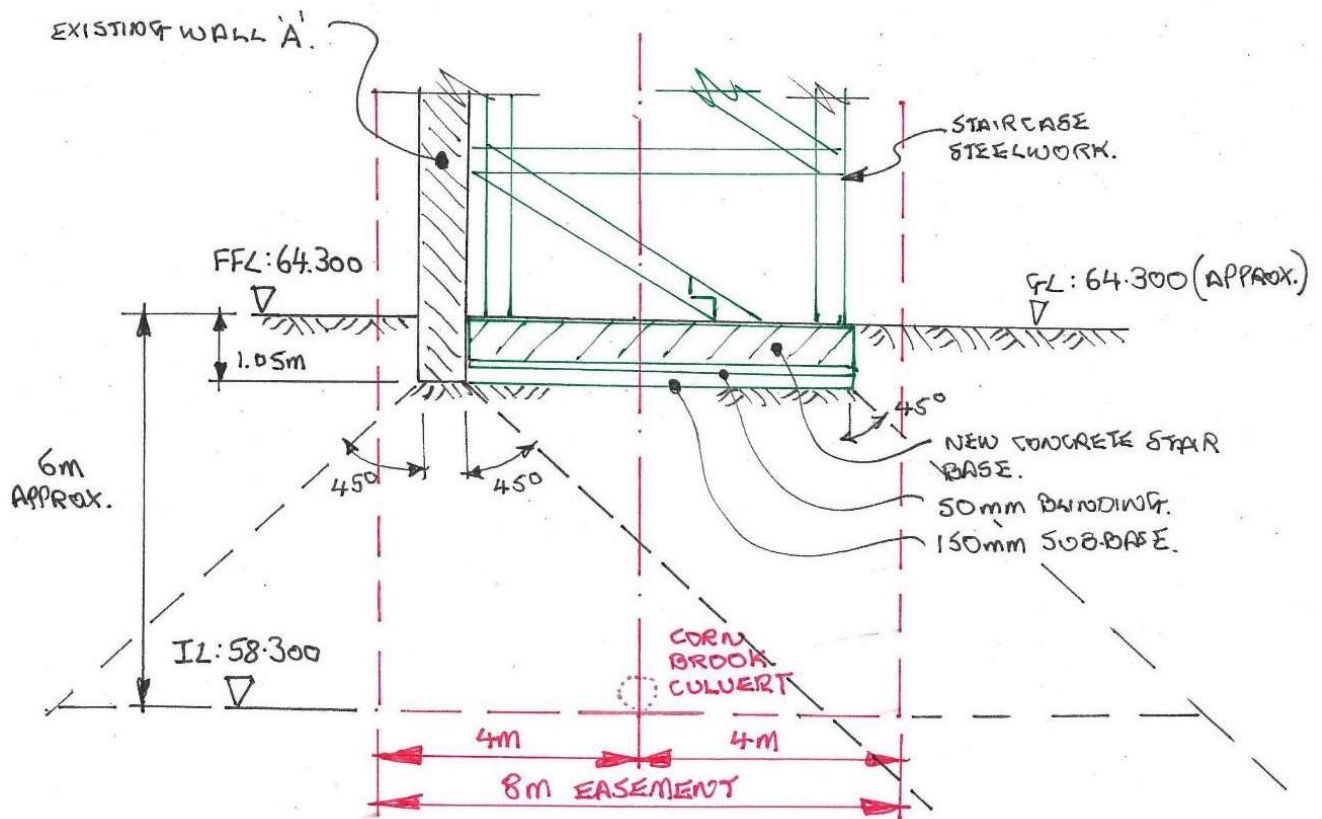


Figure 2.1 – Sectional View

The Sectional View above shown in Figure 2.1 indicates the arrangements of the existing building and proposed staircase and associated concrete slab in relation to the existing Corn Brook Culvert.

The Plan View location of the Section View above is indicated on Figure 3.1 in Section 3.0 Plan View.

The Corn Brook Culvert at the section location has an invert level of 58.300 AOD which equate to approximately 6.0m below the existing ground floor level of the existing building.

The existing building referenced 'Existing Wall 'A'', currently imposed a load on to the Corn Brook Culvert. The underside of the wall at this location has been determined by intrusive investigation as being 1.05m below ground level. The loading of this wall related to the existing and roof loadings.

It is to be noted that in this load assessment the omission of the existing crane load is NOT considered, however, it should be advised that the imposed loads from these very heavy crane loads would impose an even greater load than the load which is to be considered for the purposes of this assessment.

The existing solid brickwork wall is 13.5m high with an average width of 0.6m.

The roof spans approximately 10.0m on top of this wall.

Existing Uniformly Distributed Load (UDL) :

Existing Masonry : $13.5\text{m} \times 0.6\text{m} \times 18.0\text{kN/m}^3 = 145\text{ kN/m}$

Existing Roof : $10.0\text{m} \times 2.1\text{kN/m}^2 = 21\text{ kN/m}$

Total UDL : $145 + 21 = \underline{166\text{ kN/m}}$

The bearing pressure located directly below the underside of the existing wall foundation equates to the above Total UDL divided by the width of the existing wall. In this case the average width will be used of 0.6m.

Bearing Pressure at Foundation : $166\text{ kN/m} / 0.6\text{m} = \underline{276\text{ kN/m}^2}$

As referenced on the Sectional View within Figure 1, this existing bearing pressure is spread over a 45-degree angle, and it is this load that is directly imposed on to the existing Corn Brook Culvert and its surrounding soils.

Based upon the depth of 6.0m to the Corn Brook Culvert, this spread equates to 12.0m.

The existing loading imposed on the Corn Brook Culvert from Existing Wall 'A' and the associated roof is : $276\text{ kN/m}^2 / 12.0\text{m} = \underline{23\text{ kN/m run}}$

The proposed additional loadings applied to the Corn Brook Culvert occur from the proposed new reinforced concrete pad foundation and the steel staircase and its components installed over.

The new concrete : $3.2\text{m} \times 5.8\text{m} \times 0.6\text{m} \times 24\text{kN/m}^3 = 268\text{ kN}$

The new staircase : $310\text{kN} \times 4 = 1240\text{ kN}$ (4 No stair column loads)

Total new load : $268\text{kN} + 1240\text{kN} = \underline{1508\text{ kN}}$

The bearing pressure located directly below the concrete slab on to the existing ground equates to the above total new load divided by the plan area of the pad foundation.

Bearing Pressure of New Concrete = $1508\text{kN} / (3.2\text{m} \times 5.8\text{m}) = \underline{81.25\text{ kN/m}^2}$

As referenced on the Sectional View within Figure 1, this new bearing pressure is spread over a 45-degree angle, and it is this load that is directly imposed on to the existing Corn Brook Culvert and its surrounding soils.

Based upon the depth of 6.0m to the Corn Brook Culvert, this spread equates to 12.0m plus 5.8m equalling 17.8m.

The new loading imposed on the Corn Brook Culvert from the new pad foundation and staircase is : $81.25 \text{ kN/m}^2 / 17.8\text{m} = \underline{4.5 \text{ kN/m run}}$

The above determination of existing and proposed loads results in an increase of applied loading to the Corn Brook Culvert of 4.5 kN/m run which is approximately a 20% increase.

This increase could be considered as being excessive, however, there are three items of note that must be taken into consideration of this result.

Firstly, as indicated earlier in this document, the former crane loads have NOT been considered. These loads would have been very large, imposing very large concentrated and moving loads directly to the existing steelwork embedded within the masonry structure which in turn would have resulted in these large moving loads being applied to the Corn brook Culvert. These loads have now been omitted. The cranes are no longer in the building with the crane rails being retained for overall stability of the existing building only.

Secondly, the use of the building has changed. The previous use of the building as a foundry for the manufacture of railway steam engines has now gone. The imposed loading criteria for foundry buildings, referring to current British Standards, is a minimum of 20 kN/m^2 . For the purposes of the new building use for refuse collection lorries, the current British Standards note a general industrial imposed load of 5 kN/m^2 .

Thirdly, the size of the new staircase and its relation to the existing building. The existing buildings mass is considerable. The above loadings for the existing building have only considered the affect of Existing Wall 'A'. In addition to this wall, as indicated on Figure 3.1, Existing Wall 'B' imposes a similar load to the Corn Brook Culvert. This load occurs in same line as the Corn Brook Culvert, transferring its loads along the length. The location of the new staircase and its pad foundation are small in relation to the size and mass of the existing building.

3.0 Foundation Plan

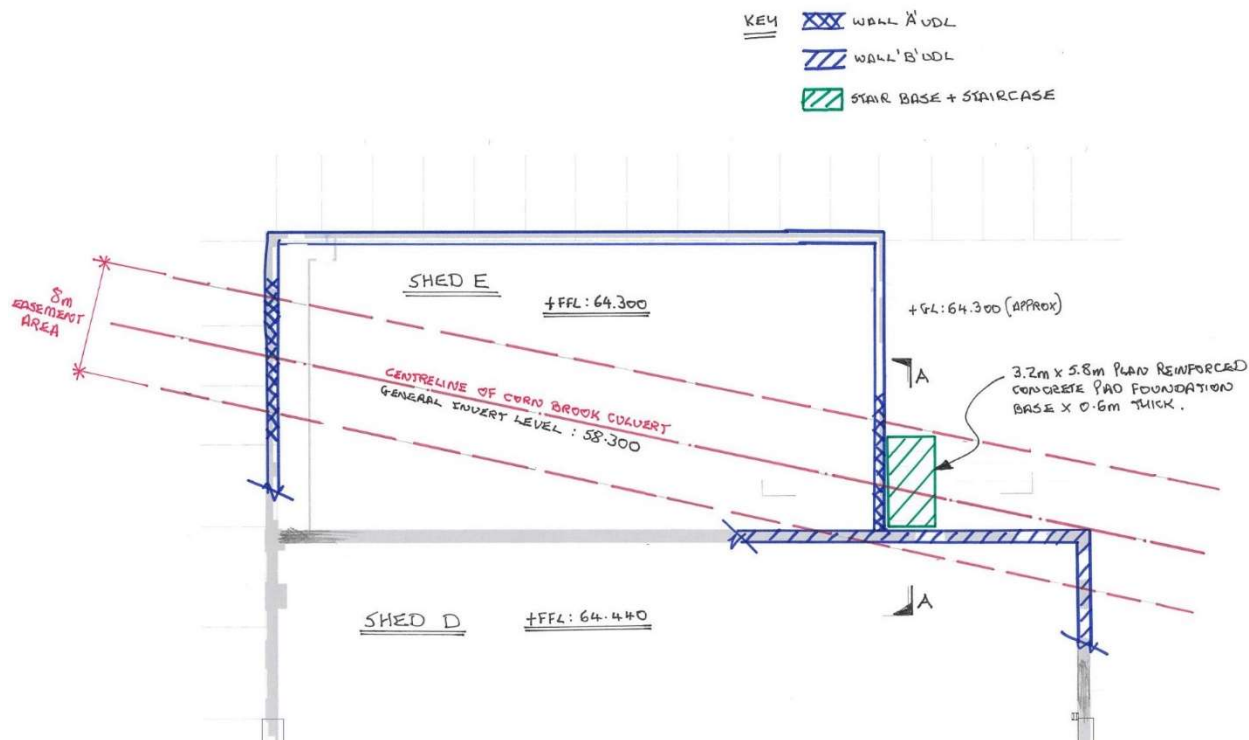


Figure 3.1 – Foundation Plan

With reference to Figure 3.1 above and Figure 2.1 and associated notes, loadings and descriptions within Section 2.0, the relationship between the existing building, existing Corn Brook Culvert and the proposed new staircase and pad foundation are indicated and explained.

As discussed previously, Existing Walls 'A' and 'B' are built directly over the existing Corn Brook Culvert, imposing considerable loads. The new staircase and pad foundation are small in comparison not only in scale but also in actual applied load.

The reduction in the buildings use imposed load and omittance of the existing crane load reduce the effects of loading on to the Corn Brook Culvert.

As determined within Section 2.0, the existing building load applied at the Corn Brook Culvert level is 23 kN/m run, the new staircase and pad foundation create an additional 4.5 kN/m run, and approximate 20% increase. The reduction of the building use-imposed load from 20 kN/m² to 5 kN/m² is a reduction in load of 75%.

To conclude, the overall load to be applied to the Corn Brook Culvert is **REDUCED**.

4.0 Evidence, Assurance, Risk

The new steel staircase is formed of steelwork sections that are assembled on site using bolts. The principal of construction reflects the ability of this structure to be taken down in a controlled manner through a similar method.

The steel staircase is, therefore, considered to be a demountable structure.

The concrete pad foundation is constructed incorporating steel reinforcement.

The footprint of the new concrete has been designed to be no more than is required to support the new steel staircase.

The design of the concrete pad foundation has been determined to spread the steel staircase loads over its area ($3.2\text{m} \times 5.8\text{m} = 18.56\text{m}^2$) to ensure that the load applied to the ground are kept to a minimum and evenly over the area.

These measure have been incorporated into the design of the staircase and support base to ensure that the loads applied over the Corn Brook Culvert are as low as possible (4.5 kN/m run).

The additional reductions in imposed load that have been incorporated into he designs and usage of the building reduce the current loads applied to the Corn Brook Culvert and, therefore, we would conclude that the above construction, load reductions, load spread are adequate to ensure that the resulting risk to the Corn Brook Culvert are reduced to the absolute minimum but ensuring that the required access staircase can be used safely and, in the event of any requirement for access to the Corn Brook Culvert, can be taken down and removed safely.