



Technical Note

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Subject:	Orangery Waterproofing System	Page:	4 of 4

Substantiation for the Proposed Type C cavity Drain System

The following document is identified as a technical note in response to queries raised during the documentation submitted for Listed Building Consent.

A timber and damp survey was completed by environmental and building pathology experts Hutton and Rostron. The Hutton and Rostron Report survey that was completed on the orangery identified several areas of the orangery walls which were suffering from damp.

The areas identified were primarily the North side of the orangery, where the wall is partially submerged within the external ground level. The internal floor levels are approximately 700mm in difference internally to the external ground levels. It is assumed that from historic maps, that the North external walls had, and had later been infilled in a series of development phases to the orangery. The wall has been partially compromised through the installation of a more recent external doorway providing access into the space.

The refurbishment of the Orangery should be seen as key catalyst towards the future use of the Grade I listed Heaton Hall, and providing a suitable space for an operator to successfully function is significant importance. In addition, it is hoped that ongoing security and vandalism issues that occur will be mitigated due to the presence of a functioning event space. Ancillary facilities required to create an operational building are proposed to be installed in less significant spaces which have been more compromised than the main orangery space. Space is heavily restricted, and ancillary staff facilities are a key component in ensuring the successful design of the project.

Existing Condition of Spaces

Existing Modern WC

The existing modern WC is a modern intervention which infills a section of the originally external area of the orangery. The original garden wall is still in situ and can be seen internally. To the periphery of this wall, and external dwarf wall exists which has. It is anticipated that this gap within the walls be cleaned to ensure no moisture can bridge the gap.

Existing North East Room (Proposed staff lobby and wc)

Currently, the walls to the interior of the proposed staff facilities area are clad in PVC cladding as well as gypsum plaster, both of which are non-permeable. In addition, there is a concrete floor featuring a vinyl covering. This space has been heavily adapted previously, with the roof completely modern in construction. It is assumed that the only remnants of the space.

Given the proposed use of the space, there is a need to provide a suitable dry environment for staff. The current condition of this space is not suitable for operational use.

Care has been taken to mitigate the footprint of the orangery through the design development, making use of any ancillary space where possible to retain the main orangery space as open as possible. This includes moving

During design development, several options have been reviewed as to the most suitable design waterproofing options available given listed status of the building, and the location of areas.

Consultation with Specialists

During the design development of options, we have consulted with several key specialists to look at options available as to how to make space suitable for use as part of the project.

This has included consultation with Hutton and Rostron and Buttress Technical Conservation lead to discuss the options available to ensure successful re-use of the space.

Option 01 - Removal of the gypsum plaster to interior, cementitious render to exterior (where identified) and replacement of concrete floor with breathable limecrete floor.

Benefits

- A standard approach undertaken within many traditional buildings where conditions are right, this is always the preferred option where possible to enable maximum breathability to the existing fabric ensuring that both walls and floors can breathe to minimise any moisture moving up the walls.
- No impact externally to the building at ground level.

Drawbacks

- No guarantee that this approach would and resolve the current issues that area present given the level differences between internal and external ground level, which is approximately 700mm rendering the space as unsuitable for its intended use by the commercial operator.
- Potential risk of disturbance and damage to existing fabric through the removal of the concrete slab.
- Required excavations within localised areas to install limecrete slab and required base preparation would likely surpass the footings of the walls, and create complexities in completing a suitable substrate for the wall.

Option 02 – Liquid applied waterproofing or render

- This was discounted immediately, as any form of waterproofing render or liquid solution would trap moisture within the walls, potentially causing further damage to the existing walls. This is not an appropriate methodology for a Grade I listed building.

Option 03 - External Drainage and External Waterproofing Solution

An external drainage solution with external membrane waterproofing has been reviewed as a potential option. This would require an external land drain to be installed close to the footing of the building, alongside an external dimple membrane with sheeting.

Pros

- Partially prohibits moisture ingress from the exterior ground level to internal wall.
- Internal walls could be finished with an appropriate breathable lime plaster finish.

Drawback

- The approach would only partially be suitable and not provide a guaranteed environment for the re-utilisation of the space as areas around the footings would still be exposed to the ground level.
- The need to excavate around the perimeter would be invasive and impact on potential archaeology and potential damaged to the historic fabric.
- Reversibility is possible but invasive.

Option 04 - Type C Membrane – Drained Cavity System

A drained cavity membrane or Type C Membrane are a common damp proofing and waterproofing methodology for use in existing buildings where there is a need to protect internal areas from damp walls, without resulting in additional pressure on the existing fabric. Systems are designed to permit moisture through the wall and to run down between the face of

Benefit

- Installed from the interior only (where most of modern alterations have taken place, mitigating any impacts externally).
- Fully reversible system.
- No potential damage to historic fabric through excavations
- Fully compliant system to relevant British Standards that provides a much needed usable space, that otherwise would need to be re-located.

Drawback

- The water can freely penetrate through the walls and any water movement and pressure is relieved off the existing fabric. Any moisture ingress drains between the membrane and fabric to either a natural drainage point or sump pump system.
- Breathability is enhanced from the current materiality found on site
- Not a full breathable system.

Conclusion

If the internal ground level was aligned with external levels, then Option A would be a clear choice. Given the considerable ground level difference and moisture within the retained earth this is a high risk approach that is likely to fail and not provide a suitable environment required for this project and render an internal space un-usable. If this space cannot be converted into a usable space we will be required to relocate these ancillary spaces to the modern extension significantly reducing the WC capacity and in turn the number of covers that the operator be able to support. Ensuring that this becomes a functional space is critical to the financial sustainability of the building.

Option 03, an external system would be too invasive, with a potential to disturb potential archaeology and damage existing historic fabric. The system would unlikely provide a suitable environment for this area.

The design development undertaken during the design stages of the project identified that the proposed Type C membrane is the most suitable system to be installed within this area, given the environmental conditions on-site and the interior alterations that have already taken place within these areas.

A Type C Membrane drained cavity system is a fully reversible system, which can be removed at a later date if desired. The installation of the membrane would be fixed to the walls through wall plugs at every 1m direction. This would then allow a fixing point for battens to fix into the wall appropriately. The only considered way to manage the moisture ingress is through a drained cavity system as identified within the Hutton and Rostron Report 5.2.6.3 (Page 12).

The proposed solution is not different than the currently located in the orangery which has gypsum based plaster and PVC cladding. The proposed Type C membrane is an improvement on the existing, as it does allow for moisture to move between the wall and evacuate between the membrane and internal face of the wall and suitably drain accordingly, where the current gypsum based plaster does not allow moisture through the wall.

The floor is a concrete floor and the addition of a membrane to the floor allows for a drainage point across the floor to the gulley. There is not impact to the existing fabric on the floor.