Welney Sports Pavilion and Community Centre

Structural Inspection of Sports Pavilion and Centre off Herne Drove, Welney, PE14 9SD

November 2017

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20a Tesla Court
Innovation Way
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Peterborough PE2 6FL

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Contents

1 Client Brief

1.1 Following the appearance of defects in the new sports pavilion, shortly after its construction, John Watson & Partners were instructed by John Loveday to inspect the foundations of the building and comment on their suitability.

1.2 This report is limited to the items specified in Clause 1.1 and no liability extends to any third party, other than the person who commissioned the report without the written permission of John Watson & Partners

2 Description of the Building and Site

2.1 The pavilion is a steel framed, timber clad, single storey, sectional building measuring approximately 18 metres x 12 metres on plan. The suspended ground floor is supported on a grid of steel beams which transfer the wall, floor and roof loads to the foundation via steel jacking joints.

2.2 The building has been located in the vicinity of the old pavilion structure on Welney cricket ground and is within close proximity to a Leylandi hedge at the Northern end of the ground. Another mature tree, species unknown is also in close proximity in the adjacent garden just beyond the Leylandi hedge. Several mature trees have been removed from the site that were in close proximity to the Southern edge of the building.

3 Observations and Defects

3.1 At the time of our inspection it was not possible to access the interior of the building to review internal defects, but we understand that part of the floor slopes and some of the external cladding panels have been replaced twice where they have creased and buckled.

3.2 We partially removed a small amount of the timber cladding at the North East and South East corners to expose the foundation arrangement. Whilst visibility and access to the void beneath the suspended floor was limited due to the plastic drain pipe around the building perimeter and the general lack of space beneath the ground floor, it was evident that the building is constructed on two different foundation systems. Part of the building appears to be constructed on the concrete slab that previously supported the old timber pavilion building and in the area where there was no slab, the steel jacks were supported on 600 x 600 paving slabs which sit directly on the grass and topsoil of the cricket ground. Refer to the site plan in Appendix A which shows the approximate extent of the different foundation systems.

3.3 The old concrete slab varies in thickness from 75 to 150 mm and cracks in the slab are clearly visible along the West elevation of the pavilion. The slab edge slopes noticeably and it is clear that the slab has settled significantly over the years. See plates 1, 2 and 3 in Appendix B.

3.4 The isolated paving slabs used to support the building are 600mm x 600mm plan area and 50mm thick. In many instances the slabs are stacked two high but at the North East corner the steel jack rests on a single paving slab. We are advised that MRC, the suppliers of the building, have been to site to repair several single paving slabs that had cracked and these were subsequently replaced with the double slab arrangement. At the time of our inspection there were several broken slabs lying around in the void beneath the building and these are presumably the above mentioned failed slabs. Refer to plates 4 and 5.

3.5 We excavated a 300mm x 300mm x 350mm deep trial hole and a 50mm diameter hand augured borehole at the Northern end of the pavilion to identify soil conditions on the site. The excavation revealed 350mm of brown clay topsoil containing abundant live roots, overlying a 100mm band of soft to firm grey, brown clayey silt /silty clay overlying very soft black clay containing peat bands. The borehole was terminated at 1.2 metres below ground still in very soft clays. The borehole location is indicated on the site plan in Appendix A.

3.6 The pavilion has been located in close proximity to a large Leylandi hedge, which at the North West corner of the building is only 1 to 1.5 metres away. There is a mature broadleaf tree in the neighbouring garden which may also impact the building foundations and we understand numerous mature trees which were in close proximity to the pavilion have been removed. Tree locations are shown on the site plan in Appendix A.

4 Discussions and Conclusions

4.1 The foundation system utilised to support the pavilion is totally unsuitable for a number of reasons and does not even comply with the most basic requirements of the Building Regulations- refer to clause 2E1 and 2E4 of approved Document A. Clause 2E4 clearly states that the minimum depth to the underside of the foundation to avoid frost action should be 450mm. It further states that where shrinkable clay soil is present that the minimum depth of the foundation should be between 0.75m and 1.0m below ground level depending on the shrinkage potential of the clay. The clause further states that deeper foundations may be required to transfer the loads onto satisfactory ground or where trees are present that may influence the ground. It appears that the most basic foundation requirements have been ignored.

4.2 The topsoil on which the slabs are founded is not an appropriate bearing stratum. It will potentially suffer from shrinkage as it dries out in the summer months and swell or soften in the winter as the ground gets wetter, both of which will affect the stability of the foundation slabs. Frost action on the topsoil will also affect the stability of the foundations. Furthermore the ground is not adequate to justify the loads potentially imposed on it. We have not been given the loads acting on the foundations but we would estimate a typical perimeter load on the foundations to be around 20 to 25 kN. This would equate to a bearing pressure beneath the slabs of approximately 55 to 70 kN/m^2. The topsoil is not adequate to support such a load and neither is the peat and soft clays known to exist just below the topsoil. We would estimate an allowable bearing pressure of around 20 kN/m^2 is more appropriate but settlements on this type of ground from isolated pad foundations, even at such a low bearing pressure, would be beyond tolerable and acceptable limits.

4.3 The old concrete slab that has been used to support part of the pavilion is not adequate. It has substantial cracks in places and slopes quite dramatically, indicating that at some point it has failed. The slab may however act as a hard spot as it will distribute the foundation point loads more effectively than the isolated paving slabs - this may result in differential foundation movements which may further exacerbate the movements and damage related to the isolated pads.

4.4 No consideration appears to have been given to the effect that the trees that currently exist in close proximity to the building will have on the foundations, or indeed those that were removed. Where buildings are constructed on shrinkable soils and trees are present or have been removed, it is generally accepted normal practise by all Building Control Authorities and Building Designers that the foundations should comply with NHBC Standards, Chapter 4.2 Building Near Trees. This standard specifies minimum depth of foundations relating to tree type, soil shrinkage potential and distance from the building to the tree. Assuming the soils are medium shrinkage, the Leylandi that exist would require a foundation depth at the North end of the building in excess of 2.5 metres. The foundations as constructed will potentially

suffer from subsidence caused by tree root action or possibly heave (swell) due to the mature trees being removed.

4.5 In view of the very compressible and shrinkable soils that exist on this site and the issue with existing and removed trees, standard spread foundations are not suitable. The pavilion should ideally have been constructed on a piled foundation system.

4.6 If remedial works are not carried out then it is likely that the movement of the building that has occurred will be ongoing indefinitely resulting in further damage to the building.

5 Recommendations

5.1 To arrest the movement permanently and have confidence that the building is adequately supported it would be necessary to install a new foundation system. The most appropriate foundation solution would be a piled system which would transfer the loads to suitable ground at depth and also take due account of potential ground movement issues relating to the trees.

Signed..... **Dated** 6/11/2017

For and on behalf of John Watson & Partners Ltd.

Appendix A – Site Plan

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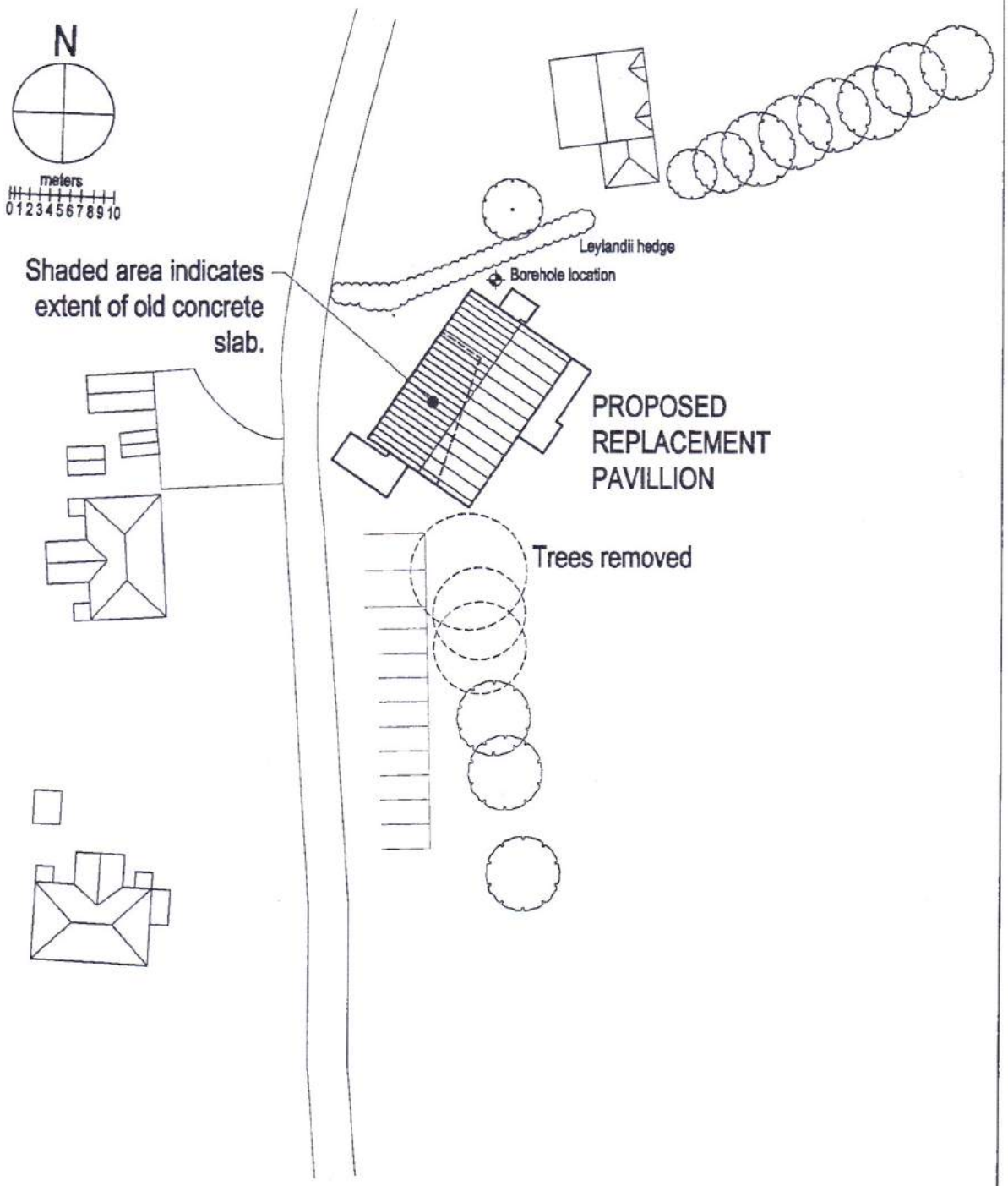
Contract		Job ref
WELNEY SPORTS PAVILLION AND COMMUNITY CENTER		5332
Sketch by: A.N.	Checked by: M.T.	Sketch sheet No./Rev.: SK.01 /
Sketch: SITE PLAN		Date: NOV 2017



Appendix B – Photographs

Plate 1

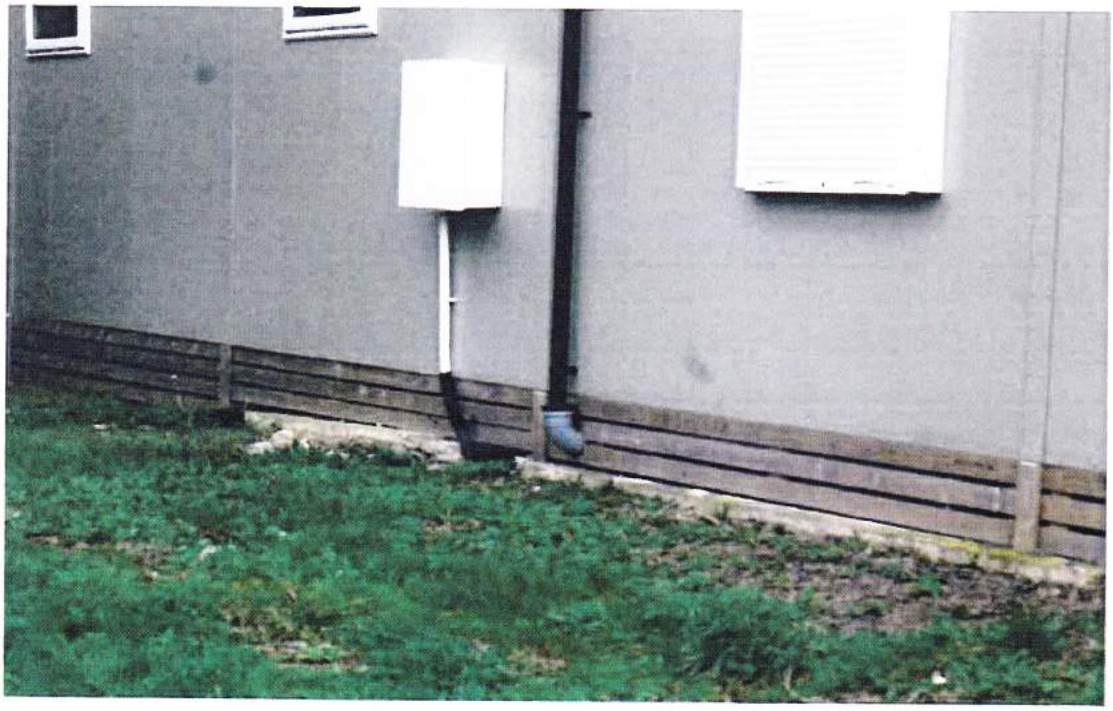
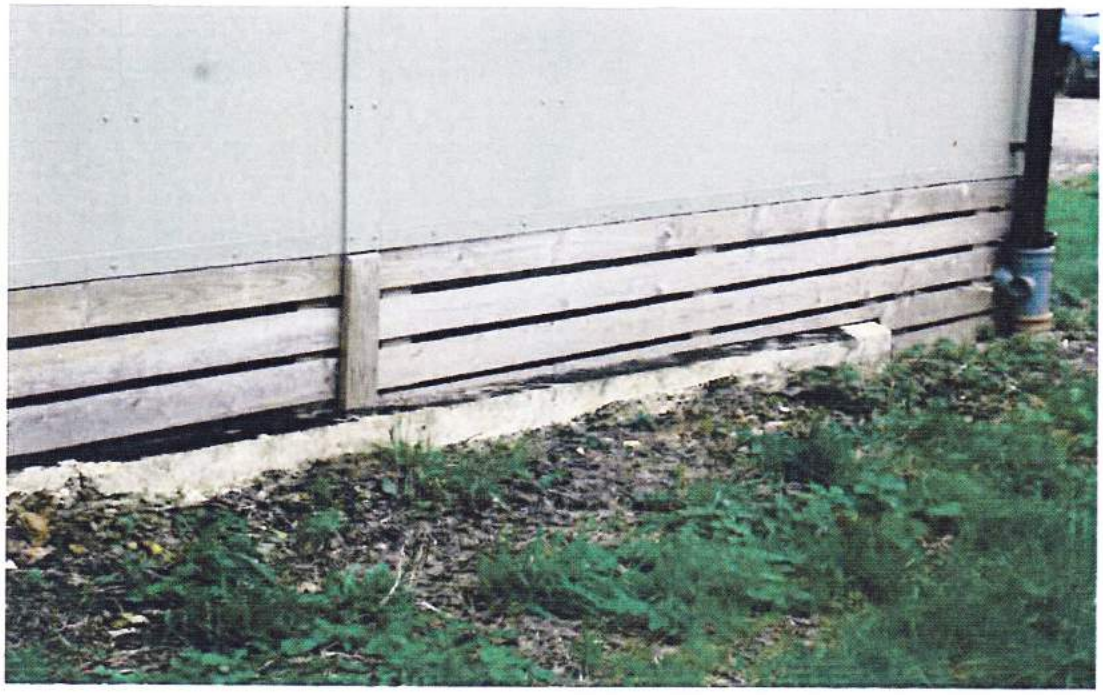


Plate 2



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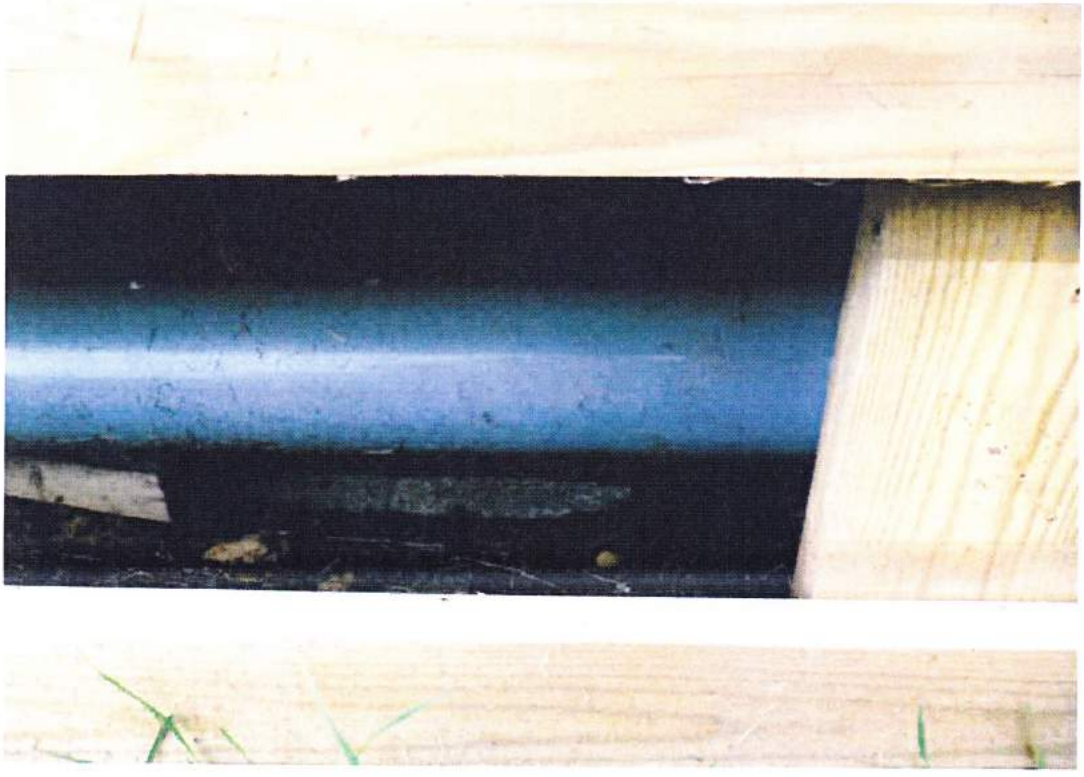

Plate 4

Plate 5