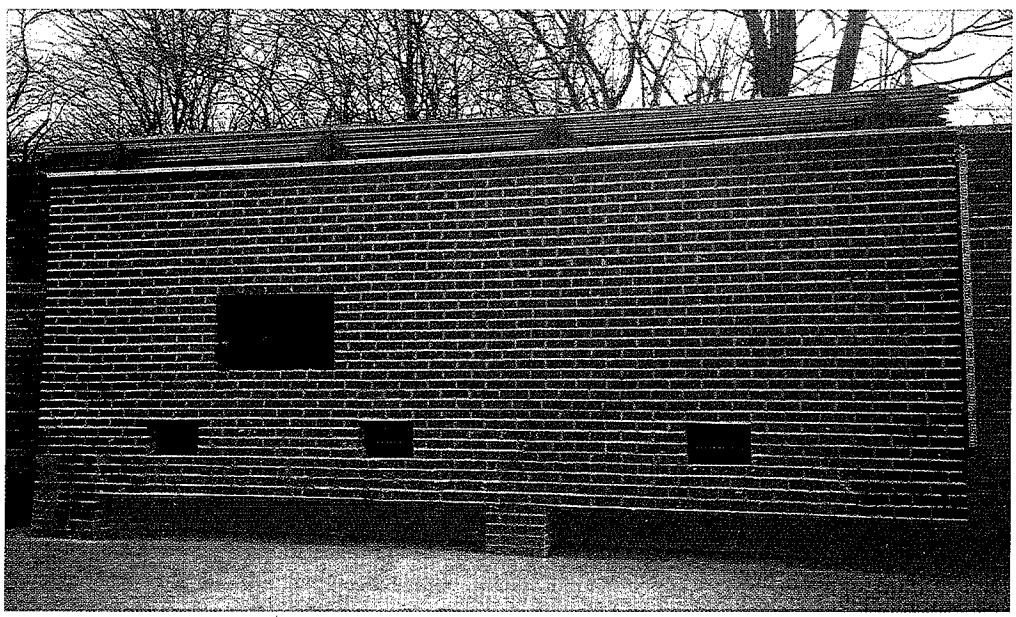
VAN ELLE

BRICKBEAM®

POST-TENSIONED MASONRY SYSTEMS



Patent Pending

INNOVATION IN ACTION

INTRODUCTION

It is well proven that masonry in compression is very strong and rigid, as has been proved by many years of successful installations of our Hoopsafe® system to structures of all sizes and configurations. However many structures suffer localised movements as in the case of corners, bay windows and extensions, settling differentially to the main building.

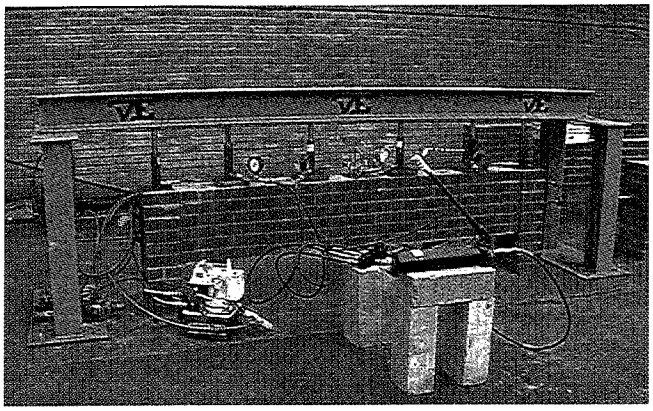
The time spent monitoring and investigating the cause can often outway the cost of mitigating the relatively small problem.

Van Elle's Brickbeam® system has been developed to stabilise both structures as a whole but also partial elements of structures such as those described above.

Brickbeam® is quick and cost effective to install and involves very little disruption to the structure or surrounding environment.

RESEARCH AND DEVELOPMENT

As a continuation of Van Elle's ongoing program of research to establish cost effective solutions in the field of ground related movement, Van Elle have undertaken the development of the Brickbeam® system of post-tensioning masonry. Like its sister product, Hoopsafe®, the system is designed to reintroduce the integrity of fractured masonry by means of inducing lateral compression into the brickwork. The Brickbeam® system however achieves this by directly applying compression to the affected brick panel itself.



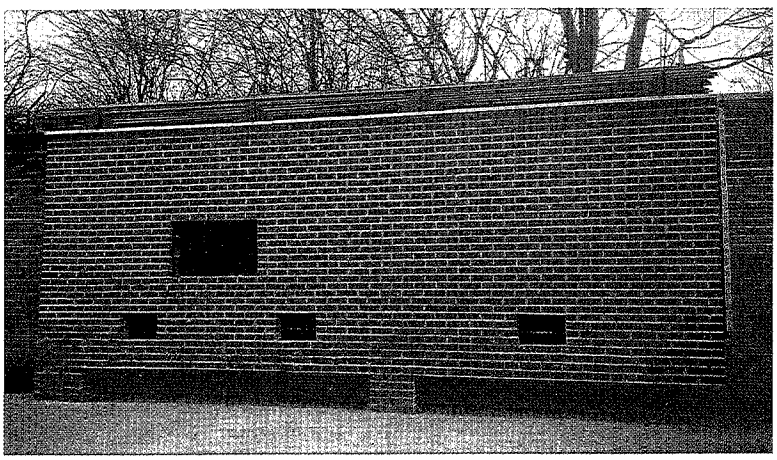
Initial testing of post tensioned masonry panel. Note how the steel beam has deflected under imposed load.

Initial comparative testing on short span masonry panels undoubtedly proved the benefit of post tensioning masonry over the established methods of remedial masonry reinforcement, indeed the strength induced within the initial test panels by far exceeded Van Elle's original expectations.

Further testing was subsequently undertaken to establish the maximum lateral compression which could be applied directly to the brickwork in order to achieve the optimum benefit to a structure without detriment to the brickwork itself. With this in mind, consideration had to be given as to the achievable bearing area of the anchorage system as well as the likely compressive strength and condition of the masonry units, mortar designation etc. Calculation and continued testing established an optimum force of approximately 55Kn.

Subsequent testing has been carried out to determine the practicalities of installation of the system under site conditions whereby the tendon is located within a diamond cored duct, nominal diameter 40mm. Service and structural openings are represented as well as the inclusion of debonding membranes. Additionally the testing must take into account the anticipated poor condition of the existing masonry and the extent to which ground movement has affected the structure.

To this end a 275mm cavity panel was constructed supported on isolated piers so as to produce a clear span of 4.0mtrs and a cantilever of 3.0mtrs, the panel itself was some 3.0mtrs in depth giving a self weight of approximately 14Kn/m. Immediately following post tensioning, precise levelling commenced and temporary supports were removed. The test panel was then subjected to further loading and a UDL in excess of 41Kn/m was achieved without any measurable deflection.



Brick panel loaded showing 4m span and 3m cantilever. Note tendon located through service-ducts.

INSTALLATION

As noted above, the system's installation is a relatively simple process. Initially a shallow pit is excavated to expose the sub structure masonry and allow siting of the drilling rig. Coring is undertaken through the sub structure, open cavities or voids being grouted if required. The sub structure is locally broken out to allow fixing of the dead end anchorage, a tendon and live end anchorage are located, and following tensioning, the substructure brickwork is made good along with the repair of fractured masonry above ground level.

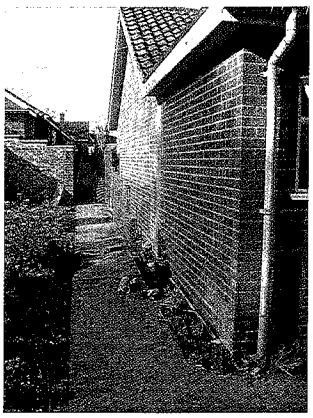
Where strengthening is required at a higher level, tendons may be located within an existing cavity and slip bricks used to mask the anchorage fixings.

CASE HISTORY

Extension to be stabilised

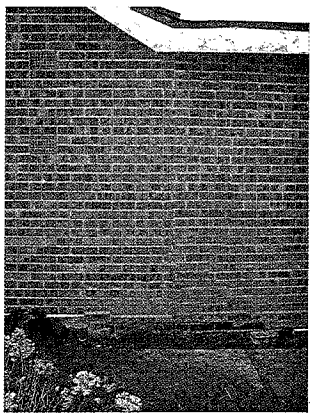
Diamond coring in process below ground level through masonry.

Tendon located within cored duct and dead anchor plate positioned.



Installation in progress, note lack of disruption.

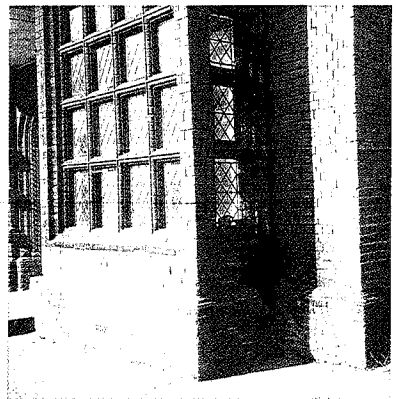
Post tensioning in progress.



Brickwork made good on completion.

Grade II Listed Moathouse

Extensions



Bay Windows

EXAMPLES OF USE

Isolated elevation and Bay Windows