

Barbrook Passivhaus, Exmoor, Devon

Barbrook Passivhaus is part of the national Retrofit for the Future competition; the aim was to retrofit two social housing properties to achieve an 80% CO2 reduction. The two semi-detached houses are on the edge of Exmoor National Park, they were built in the 1930s of poured concrete with asbestos shuttering. The refurbishment involved stripping the houses right back to only the walls, a new timber-frame was built on the outside.



Energy Action Devon and client North Devon Homes devised the scheme with architect Clive Jones Ltd and structural engineers Gavin Jones and Curtins Consulting.

The existing concrete structure consisted of clinker concrete walls varying from 160mm to 170mm in thickness with 90mm x 55mm pressed metal channel sections at 1.20m centres vertically with 7mm rebar running horizontally at about 90mm centres.

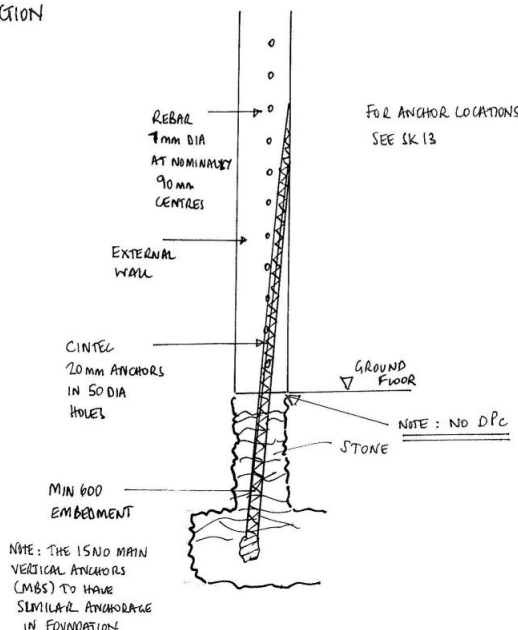
The reinforcement was severely corroded thereby the whole structure could not be relied upon and was unsafe. Diagram of existing shown below.

Curtins Consulting devised a strategy of restoring structural integrity to the pair a house by introducing a new reinforced concrete skeleton into the existing structure using the Cintec anchor system.

This included both wall and foundation strengthening works.

Cintec 20mm diameter anchors in 50mm holes were drilled and inserted through the lower section of the walls and into the foundations as shown below.

7 & 8 Barbrook Rd, Barbrook Job No: 45411 Sketch No: 14
FOUNDATION STRENGTHENING Scale: NTS Date: June 2010
WORKS BY SPECIALIST CONTRACTOR
SECTION



SKETCH

Curtins consulting

3-8 Redcliffe Parade West, Bristol, BS1 6SP
T: 01179 252 825 F: 01179 252 734
E: bristol@curtins.com www.curtins.com

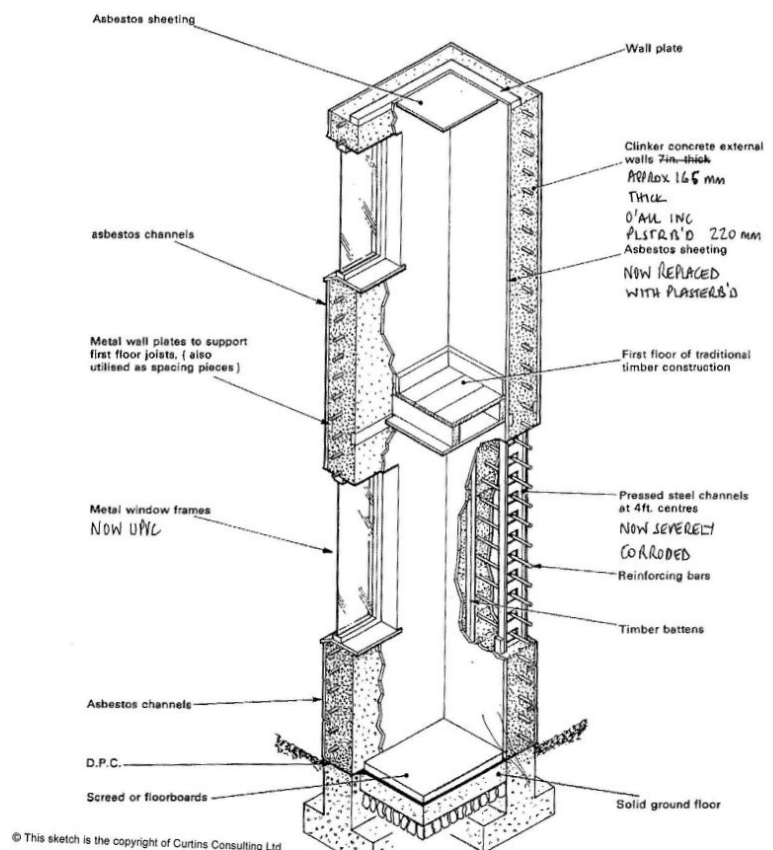
7 & 8 Barbrook Rd, Barbrook
FORM OF CONSTRUCTION

Job No: 45411

Sketch No: 03

Scale: NTS

Date: June 2010



7 & 8 Barbrook Rd, Barbrook

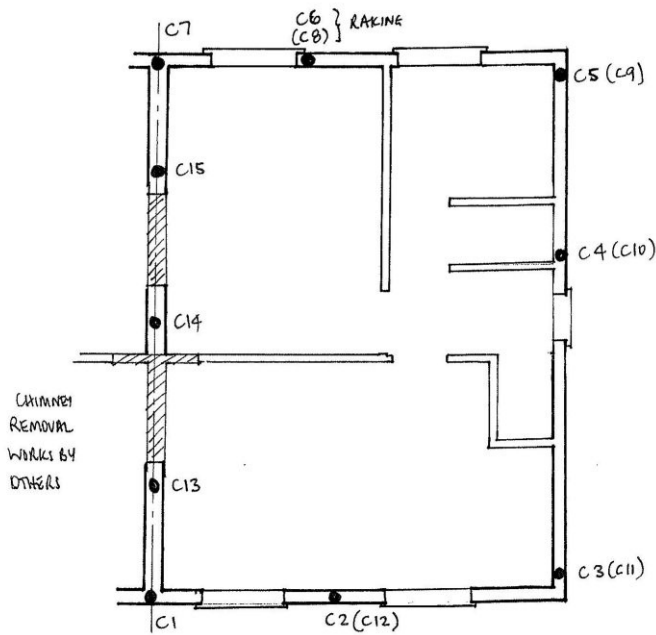
Job No: 45411

Sketch No: 09

FIRST FLOOR PLAN
WORKS BY SPECIALIST CONTRACTOR
WALL STRENGTHENING WORKS

Scale: NTS

Date: June 2010



7 & 8 Barbrook Rd, Barbrook

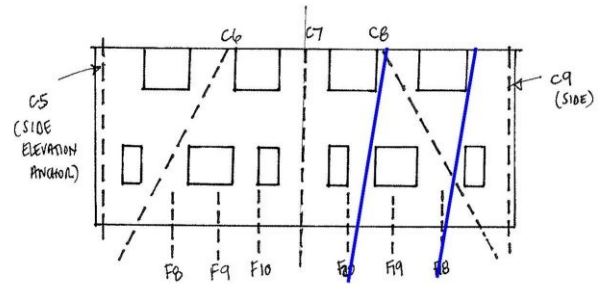
Job No: 45411

Sketch No: 15

REAR ELEVATION
SHOWING SPECIALIST
CONTRACTOR WORKS

Scale: NTS

Date: June 2010



The engineers scheme entailed drilling and installing both vertical and inclined anchors within the existing clinker concrete walls to create a reinforced concrete frame to restore structural integrity and including connecting the superstructure to the foundations.

Highly accurate drilling was required as the wall were thin and the anchors mainly 6000mm long in 65mm diameter core drilled holes.



Accurate drilling was essential and the existing steel reinforcement and metal channels had to be drilled through for the installation of the Cintec skeletal frame.

Below: anchor before and after grouting.





16 Cintec Multi-bar anchors consisting of 5 x 8mm deformed bars in the matrix x 6.00m long were inserted vertically through the existing clinker concrete walls in 65mm diameter holes.

An additional 22 No Cintec 20mm diameter anchors in 50mm diameter holes were installed through the lower section of the external walls and into the existing building foundations.

At wall plate level a stainless steel flat plate 125mm wide x 10mm thick was bolted to the top of the anchors.



Above: A Cintec M16 anchor 5.50m long being installed in 2 No sections with a coupled joint and then sock attached prior to grouting.



Left:

Presstec grout being injected at low pressure to fill the sock.

An additional number of Cintec stitching anchors type RWT15 in 30mm holes were used to tie the internal cross-walls to the external walls.