Building Design Guide

- contemporary glazing of a Grade II building
- installation of UK’s first LPG-powered CHP unit
- use of environmentally sustainable technologies

Crofter’s Café

Conversion of existing restaurant into new catering facility
June 2007
**Project brief**

**Background**

Trelissick Garden near Truro in Cornwall had insufficient catering capacity to deal with increasing visitor numbers, relying on a small, seasonal café and an outdated full service restaurant housed in the upper storey of a Grade II listed cart shed. The project involved conversion of the ground floor of the cart shed into a modern new café, upgrading of the restaurant into a new function room and improvements to the catering infrastructure and plant involving the installation of environmentally sustainable products and systems.

The project brief aimed to:

- replace the seasonal self-service catering facilities with a new, modern café in the ground floor of the cart shed
- convert the full service Barn Restaurant into a new function room
- use the courtyard as an overflow eating area
- improve the appearance of the courtyard through the implementation of an attractive landscaping scheme
- make all catering facilities accessible to disabled visitors
- improve the standard of catering facilities for all users
- improve the layout of the kitchen/wash-up/storage areas
- provide internal toilet facilities for those using the proposed function room
- install more energy efficient equipment, solar panels, an air source heat pump and a water-harvesting scheme

**CDM**

- The CDM regulations had little impact on the project as there were no unusual hazards involved.
- Health and safety matters were co-ordinated by an external consultant.

**Key factors**

- Modernisation of catering facilities to meet the changing needs of visitors and their increasing numbers.
- Efficient and sensitive re-use of the listed cart shed without reducing its historic interest.
- Innovative environmental and energy efficiency measures.
- Use of high quality finishes.
- Low maintenance buildings and plant.
- The leasing of temporary catering facilities made timing very important.

**Stakeholders**

- Feock Parish Council
- Carrick District Council
- English Heritage

**Designations**

- The cart shed is Grade II listed

![Courtyard and cart shed before work began](image)
Site issues

Drainage
- There were some drainage issues on the site, but these were rectified before work began.

Visitors
- The site remained part of a busy tourist attraction so special consideration had to be given to the separation of visitors from the working areas.

Archaeology
- It was thought that the original, probably eighteenth-century courtyard surface might be exposed during the course of the works. It was also known that Nissen huts had been sited in the courtyard during the Second World War. An archaeological watching brief on the courtyard area was made a condition of planning consent and carried out by Cornwall's County Archaeologist, although little of historic interest was unearthed.

Design approach

Accommodating the new facilities
Having recognised the need to relocate the first floor self-service cafeteria, ground floor accommodation in buildings which surround the courtyard was considered. The only practicable proposition seemed to be the conversion of the open-fronted cart shed (the undercroft). It had already been concluded that new build would not be feasible owing to lack of space and the disposition of existing buildings. A site meeting was held with the Conservation Officer at Carrick District Council. He did not object in principle to the enclosure of the undercroft provided that various alternative design options were considered, that sound justification was provided for the chosen option and that the details of the design were in the highest tradition of the Trust.

Enclosure of the undercroft
The most difficult decision was the method by which the undercroft of the cart shed should be enclosed and thus made available for conversion into a new café. It was agreed that it would be desirable to set back the doors and windows inside the original brick columns so that they would be in shadow and as inconspicuous as possible. This would also leave the columns unaffected by the development. Two alternative options were considered for the glazing: a traditional, small-pane treatment for the doors and windows, and frameless windows glazed to newer columns which were behind the originals and dated from work carried out in the 1970s. The intention was to preserve the open character of the undercroft as far as possible when

Project team
The project team comprised people and companies providing internal and external expertise including:
- Project Manager
- Project Administration
- Environmental Adviser
- Draughtsman
- Curator
- Main Contractor Darren Healey Building Contractors Ltd
- Landscape Contractor
- Electrical and Lighting Contractor Davey and Gilbert Ltd
- CDM Co-ordinator Health and Safety Associates Ltd
- Structural Engineers Highgate Ltd
viewed from the courtyard. It was felt that the frameless window option would have the least impact on this open character and therefore be best from the conservation point of view. The use of non-reflective glass and the setting back of the doors and windows was designed to be as discreet as possible respecting the original purpose of the undercroft while allowing it to provide for the current needs of the complex.

The courtyard
Prior to the works, the courtyard comprised a grass quadrangle surrounded by a gravel path, however its original use was as a farm yard and it would probably have had a cobbled surface throughout. It was decided to attempt to both restore some of the original character of the courtyard, and make it easier to use, by substituting the grass with a hard surface, compliant with DDA legislation.

Existing kitchen facilities
Along with the principal works converting the undercroft into a new café, it was decided to rationalise the facilities throughout the building. The small kitchen and wash-up areas were redesigned, new ventilation provided and fridge compressor units removed to a remote location to prevent excess heat discharge into the rooms.

Products and services

- **Heat Pump**: Manufactured by Dimplex (UK) Ltd
  Millbrook House, Grange Drive, Hedge End, Southampton, Hants S030 2DF
  Telephone: 0845 600 5111
  www.dimplex.co.uk
  Supplied by Earth Energy Ltd
  Falmouth Business Park, Bickland Water Road, Falmouth, Cornwall TR11 4SZ

- **DACHS CHP Unit**: Baxi (UK) Ltd
  Brooks House, Coventry Road, Warwick, CV34 4LL
  Telephone: 08706 049049
  www.baxi.co.uk

- **Solar panel**: Solar Twin Ltd
  2nd Floor, 50 Watergate Street, Chester CH1 2LA
  Telephone: 0845 1300 137
  www.solartwin.com

- **Underfloor heating**: Eco-systems
  Norfolk Lodge, Chimney Street, Hundon, Sudbury, Suffolk CO10 8DX
  Telephone: 01440 786878

- **Internal ‘Perfecta’ paving to ground floor restaurant**: Marshall’s Plc
  Birkby Grange, Birkby Hall Road, Birkby, Huddersfield HD2 2YA
  Telephone: 0845 820 5000
  www.marshalls.co.uk

- **External granite paving to courtyard**: De Lank Granite
  De Lank Quarry, St. Breward, Bodmin, Cornwall PL30 4NQ
  Telephone: 01208 850217
  www.silvergreygranite.com

- **Resin bonded gravel to courtyard**: Cornwall Specialist Surfacing Ltd
  Bluebells Boswinger, Gorran, St Austell, Cornwall PL26 6LL
  Telephone: 01726 843992
  www.cornwallsurfacing.co.uk

- **Rainwater capture and storage system**: Klargester Environmental Ltd
  College Road North, Aston Clinton, Aylesbury, Bucks HP22 5EW
  Telephone: 01296 633000
  www.klargester.com

- **‘Click’ Light fittings**: Scolmore International Ltd
  Scolmore Park, Landsberg, Lichfield Road Industrial Estate, Tamworth, Staffordshire B79 7XB
  Telephone: 01827 63454
  www.scolmore.com

- **‘Megaman’ Lightbulbs**: Megaman Ltd
  1 Quadrant Park, Mundells, Welwyn Garden City, Herts AL7 1FS
  Telephone: 0845 408 4625
  www.megamanuk.com

- **Glazing to cart shed arcade**: Cornwall Glass & Glazing Ltd
  Sternack Road, Holmibush Industrial Estate, St Austell, Cornwall PL25 3JQ
  Telephone: 01726 66325

- **Refrigeration**: Meridian Refrigeration Ltd
  Unit 15, Cradle Hill Industrial Estate, Seaford East, Sussex BN25 3JE
  Telephone: 01622 687663
  www.meridianref.co.uk
Construction

Conservation work

One of the unusual aspects of the project was that no conservation work was needed despite the project involving the conversion of a mid eighteenth-century building. This was partly because the building was in very good condition, its rubble walls, brick arches and slate roof all being structurally sound. It was also a result of the minimal interference with the old building ensured by the design. The new glazing did not impinge on the historic structure at all, while the only modifications to original fabric were the insertion of a door between the kitchen and the new café, and the boring of a hole in one of the walls to accommodate a ventilation unit.

Environmentally sustainable mechanical and electrical services

- **Combined heat and power (CHP)** Commission and installation of the UK’s first LPG-powered CHP DACHS unit. This is a 12kW boiler which in addition generates 5kW of electricity to contribute towards the needs of the building, although it does not fulfil all of these and mains power is still required. CHP is an extremely efficient way of producing usable heat and generating electricity simultaneously at the point of use from a single fuel.
  
  Key features of the unit include:
  - 5.5 kW gross electrical output, depending on fuel type
  - 10.4 to 12.5 kWth heat output
  - Overall fuel efficiency between 79% and 92%
  - Noise levels as low as 52 dB(a) at 1 metre
  - Ease of installation and operation
  - Compact, integrated package design
  - 80,000 running hour design life
  - Complies with G83/1 recommendations for SSEG
  - Integrated modem for off-site monitoring and control

- The CHP unit replaced the former oil-fired heating system, almost 25 years old. The ducted air outlets and electric radiators were replaced with a wet system using traditional cast iron radiators in the new upstairs function room. Silent fans were also installed to counteract the heat rising and becoming trapped in the open roof, thus improving efficiency.

- **Fridge compressors** moved from the kitchen to a separate outbuilding by means of underground pipes has prevented their discharging hot air and noise into the kitchens. This made these rooms more pleasant to work in and removed the need for further air cooling systems, thus improving efficiency. The compressor units were used to contribute heat to the...
underfloor heating system in the new café, further increasing efficiency. The pipes between both the fridges and the compressors and the heat exchange unit and the underfloor heating circuit are super-insulated and of a type originally designed for communal heating systems.

- **Air-to-water source heat pump** installed which recovers heat rejected from the fridge compressors thus improving the coefficient of performance. The heat pump is the primary means of heating the undercroft, which can also be supplied from the LPG CHP unit/LPG boilers via a plate heat exchanger should the heat pump be unavailable. The warm air coming off the back of the compressors was sucked into the heat pump. This pre-warmed air improves efficiency.

- **Solar panel to heat water** This was set on a concrete pad on a south-facing bank west of the main building in an area not used by the public. The solar panel feeds a pre-heat vessel which then feeds an LPG-fired water heater. The preheat tank can be heated from the thermal store to maximise CHP operation, or, if the CHP is not in service, from two LPG boilers as demand requires. As it is a Solartwin system, it has a PV panel to power the pump.

- **Rainwater recycling tanks** were installed in the courtyard and captured rainwater from the building which was then used to flush the toilets. Trelissick receives around 1.2m of rainfall per year. Rounding this down to a cautious estimate of 1m per year, it was calculated that 260,000 litres of water per year could be recovered and used in this way. An overflow from the tank has been provided, but it was expected that this would rarely be needed, as has proved to be the case. A small pump has been used, which will be serviced each year.

- **Low-energy lights** (LEDs and conventional down lighters) installed throughout.

### The Linhay

This outbuilding was only used very lightly before the project, and was taken over for a range of service functions to release space in the main building. The Linhay has a stone floor which has been retained beneath polythene. Above this is a mixture of hardcore and sand with a new floor on top. Although concrete bases have been installed to support the machines housed in the building, these have linings at the base to allow them to be broken up if this is desired in the future. Hence the structural work to the building was entirely reversible in accordance with the best principles of building conservation. Apart from the floor, the only work to the structure was a series of minor repairs to the roof. The Linhay now contains the CHP unit, accumulator, additional boilers, the water heater fed by the external solar panel, and the building management computer controlled from the Catering Manager’s office.

### Former log shed

The existing structure down to the blockwork walls was demolished and a new timber structure built to house the fridge compressors and air-source heat pump.

### Service area

Service routes were consolidated and housed in new plywood ducting. A new telephone system was also installed for the property in this area, reducing sixteen lines in the old system to just six.
Wash-up area
This was formerly two rooms filled with a staircase, ducting, swing-opening double doors and other encroachments. All of these were removed to make a single larger room which was given a completely new fit-out and its walls covered in Altro-Whiterock. A doorway to the new self-service café was created, one of only two interventions into the historic fabric of the listed building.

Courtyard room
Little work was required here except the removal of the old servery and the installation of a new wet radiator system in place of the old electric system.

New café
The conversion of the ground floor undercroft into the new café required remarkably little work. Wooden boarding dating from the 1970s was removed to allow tanking of the walls where they were sunk into the ground, but the panelling was subsequently re-fixed in its original position. A suspended ceiling was installed to conceal pipework and services installed both for the new café and the renovated kitchens. Granite slab flooring was introduced and a new doorway made through the original wall to the kitchen. Of the five openings to the courtyard, one was fitted with a false door behind which retail stands for the café could be positioned, while four were glazed. The glazing was attached to the underside of the first floor and the new ground floor and therefore clear of the historical parts of the building.

Procurement
- Competitive tender to written specification.
- Six contractors invited to tender.
- Lowest tender accepted.
- Form of contract: Intermediate.

Project duration
- Commenced on site: October 2006
- Project completion: June 2007

Funding
The project was funded by the National Trust.
Comparison with project brief

Overall, the project matched the brief remarkably well as it was carried out on time and to budget, delivering new facilities which are a demonstrable improvement on those previously on offer. This was achieved at the same time as meeting the environmental and conservation aspirations of the brief.

Best practices

- Frequent reassessment of the specification during the project, facilitated by the constant involvement of the project’s administrator and quantity surveyor. This approach delivered substantial savings to the build side of the project.
- Involvement of the surveyor at the earliest stage to allow for accurate forecasting of costs of building work.
- In-house completion of the design elements of the build side of the project, thus ensuring savings of at least 10% which would otherwise have been spent on architect’s fees.
- Customer service was maintained by the use of a marquee containing the services usually held within the building.
- Use of the marquee gave staff from the kitchen and front of house teams an opportunity to work closely together improving their understanding of each other’s role.

Lessons learnt

- Reassessment of the specification for the build side of the project impacted upon the catering business plan.
- In hindsight an explanatory ‘user guide’ for the new catering facility would have been useful.
- Consultation over the design process resulted in delays.
- There was an overspend on the catering fit-out, balanced by savings in the build element of the scheme.
- There was a loss of retail trade despite the use of the replacement marquee during building works.
- More money was required in the budget for project management time as much of the administration was carried out by existing staff with already heavy workloads.
- The flooring in the new cafe has a tendency to retain food and drink stains, so an alternative would probably be used on another occasion.
Feedback

- Generally the project has had a very positive impact indeed. Most obviously this is seen in the improved appearance of the facilities and their increased convenience for both visitors and staff. The project has delivered modern fully accessible self-service facilities. For staff, cramped and overheated facilities have been replaced with simplified and improved kitchens with the functions consolidated.
- The effects of the project can be assessed more precisely in financial terms. Labour costs have been significantly reduced because of the improved efficiency of the facilities. The catering unit’s profitability has vastly increased as a result, now ranking fifth out of 142 National Trust catering units by this measure. The unit is running 34% ahead of budget, one of only twelve in the country to be ahead of budget and the only one in Devon and Cornwall. Profits are up 133% from last year.

Future plans for the site

- Great improvements have also been delivered by the new function room in the former Barn Restaurant. Truro has few conference facilities and those at Trelissick are proving very popular, drawing in groups who have never visited the property before. The function room now operates entirely independently of the public catering facilities and is occupied for 341 days of the year.
- The new heating system has excess capacity deliberately built in to accommodate a proposal to convert Trelissick’s art gallery, also in the courtyard, from electric heating in the near future.
- The property is to embark on a monitoring project for all the environmentally sustainable mechanical and electrical engineering works installed during the project. This will display their outputs and savings of electricity, heat and water on an LCD screen in one of the public areas of the building.
Further information

If you require this information in alternative formats, please telephone 01793 817791 or email buildingdesignguide@nationaltrust.org.uk

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Acknowledgements

Content: Matthew Williams and Peter Bee
Images: Matthew Williams, Peter Bee and Chris Curtis
Design: Inkcap Design

The Building Design Guide concept was devised by Rory Cullen and developed by Jonathan Howard, with acknowledgements to Jacky Ferneyhough, Ingrid Chesher and Angela Collins.

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