

Right: Completed loggia forms external café seating area.

Chiswick House Café

LONDON

The construction of Chiswick House Café is part of a recently completed £12.1m regeneration of Chiswick House and Gardens in west London, partly funded by the Heritage Lottery Fund. The programme included extensive landscaping and repairs to the historic structures in the gardens, for which Gifford was the civil and structural engineer.

Peter J Corbett and James Miller of Gifford report.



The loggia seating area surrounds the saloon on three sides.

Chiswick House was completed in 1729 to designs by William Kent and Lord Burlington. It was built as a villa in the classical temple style of Palladio, the influential Italian renaissance architect, and is significant in architectural history for heralding the Georgian style of building using stucco, a trend that soon spread throughout Britain. The surrounding gardens were designed by Kent and started the English Landscape Movement, a more relaxed and natural style of garden.

The new café is an elegant, meticulously designed and well-crafted addition to Chiswick House gardens, echoing many themes of Palladian and classical architecture, yet realised in a distinctive modern style. The building frame is constructed of in-situ white as-struck concrete, which in many places is exposed as an architectural feature. A coffered roof slab is suspended over a large glazed central saloon and a canopy slab, supported on Roachbed Portland Stone piers, forms a loggia surrounding the saloon on three sides. White precast concrete architectural features have also been incorporated into the scheme and a combination of the sensitivity of the setting and the

thorough approach by architect Caruso St John required considerable care and thought to be exercised in the engineering solutions.

Engineering aspects

The roof structure is a concrete solid slab supported on columns at between 5 and 6m centres with a coffered slab over the main dining area. Shear walls and blade columns have been incorporated and exposed as features of the finished scheme. The café is located over archaeological remains and so the foundation solution is a shallow raft slab located above the level established during the archaeological evaluation.

The aesthetic requirements of the exposed as-struck concrete frame meant that the specification of materials and workmanship was crucial. The prescribed concrete was designed to give a 'smooth as struck' finish and the white colour was achieved through the use of a relatively high proportion of white Portland cement. To give a satisfactory finish in terms of uniformity and density, a high amount of cement in conjunction with maximum ratios of 2:1 and 6:1 of sand:cement and total aggregate:cement respectively was specified. This,

(Photos: James Britain photography.)





and a well-rounded coarse aggregate to reduce the risk of ‘aggregate bridging’ at the surface of the concrete, helped to achieve a final finish, which was remarkably free of blemishes and blow holes.

To reduce the risk of cracking up to 0.3mm in the surface of the concrete, which (although permitted in the design code) may have been visible to the discerning eye, the steel reinforcement was chosen to limit flexural cracks to typically no more than 0.1mm.

In order to achieve a glossy, smooth and even finish to the exposed concrete, a birch plywood shutter was used throughout, faced in 120g/m² of phenolic resin, with a thin paper layer included in the board build-up to reduce the chance of staining the white concrete with any tannin in the timber board. The panel layout was specified by the architect as a feature of the finished surface and to mitigate the problems associated with grout loss, the concrete subcontractor spent considerable effort in the formwork joinery and sealing of the joints prior to pouring.

Other requirements placed on the workmanship included stainless steel tie wire to avoid unsightly rusting of loose wires at the roof slab soffit, no day joints

or form ties within the visible areas of concrete and consistent striking times to obtain a uniform concrete colour. As the colour was to be as light as possible, a minimum cube strength was identified to reduce the formwork striking time; this was calculated to be 48 hours and confirmed by cube testing. A RAL code was included in the specification, as well as a viewing distance for blemishes.

Intricately co-ordinated

The structure is intricately co-ordinated with the architecture and finishes; for instance, the roof slab includes a cast-in recess for a sliding partition, a suspended in-situ concrete cooker hood and a local

The glazed central saloon forms the main dining area.

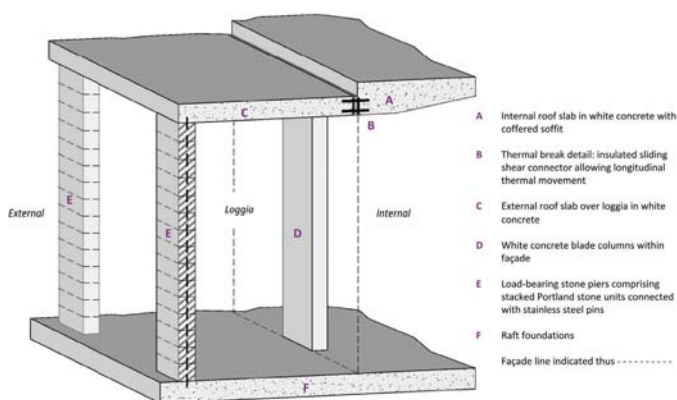
VISUAL CONCRETE



Above: View of loggia with exposed concrete soffit.

Below: External view of the café.





reduction in slab thickness at the leading edge to reduce its visual impact. Internally visible concrete upstands around each rooflight were cast integrally with the main slab with no day joints permitted.

The roof is exposed internally and appears to continue outside where it covers the loggia. To reduce any cold bridging effects a thermal break was introduced along the cladding line. The design team first considered the use of a proprietary cast-in insulating unit, which would allow the transfer of shear and bending moment across the joint. However, these require movement joints in the external slab at between 11 and 12m centres to allow different levels of thermal movement in the internal and external slabs without excessive build-ups in stress within the unit. Since joints in the exposed loggia slab were visually unacceptable, an alternative bespoke detail was developed using a semi-rigid insulation and proprietary sliding shear connectors, eliminating the need for movement joints in the exposed external slab.

Portland stone piers

The external canopy slab over the loggia is supported on one side by the internal slab and along the external edge by solid Portland stone piers. These are pinned together using stainless steel dowels, with thin 5mm mortar joints. It was an architectural requirement to include a mortar joint between the top stone unit and the roof slab, and so an intricate construction sequence was agreed with the contractor. The slab was cast before the stone piers were constructed and then temporarily propped while the piers were built up below. The final stone unit had to be carefully slid into position, with the dowels in the final two joints 'moused' into place – dropped down from lengthened slots formed in the top stone and roof slab once the top stone was in place. The top mortar joint was then formed by first pointing the joint and then flooding the 5mm gap with a wet mortar mix. Once the joints had set, the props were removed and the weight of the roof structure transferred down through the stone piers.

Precast white concrete coping units sit on the roof slab edge hiding a weir gutter, which gives a distinctive three-banded appearance to the roof edge – precast white concrete on in-situ white concrete on Portland stone. Other precast components include exposed as-struck white concrete door portals, with cast-in voids allowing the integration of mechanical and electrical elements.

Elegant addition

The new café forms an elegant addition to an important site and the engineering and buildability challenges have been well executed. Consistency in concrete quality can be hard to achieve on a small scale because of



variations in batching and there is also less benefit to be gained from repeat details. However, the success of this project is clear to any visitor and the new café building stands as an excellent example of how reinforced concrete can complement buildings that have been with us for centuries and architectural styles that have been with us for millennia.

The new Chiswick House Café and magnificently restored Chiswick House gardens are open every day throughout the year. There is no charge to enter the gardens. For information visit: www.chgt.org.uk

Above: Loggia during construction.

Top left: Sketch cutaway of structural model.

Chiswick House Café, London

Client	English Heritage
Project manager	Mouchel
Architect	Caruso St John
Structural engineer	Gifford
M&E engineer	Roger Parker Associates
Quantity surveying	Press and Starkey
Planning consultant	Hasler Collins
Main contractor	Thomas Sinden
Concrete frame contractor	Siday Construction