RETROFITTING NON-TRADITIONAL PROPERTIES

It's estimated that some 1.5 million houses were built using non-traditional (non-trad) materials and methods of construction between the 1940s and the 1970s. Chartered Building Surveyor and PAS 2035 Retrofit Coordinator, Matthew Allcock, explains the key considerations for retrofitting these types of housing.

Without going into too much detail, non-trad house building was born out of a severe housing shortage and a post-war environmental impact. There was a need for housing ... and fast.

By definition, traditional house building is represented by brick or brick and block construction with a pitched usually tiled or slated roof. Solid wall popularity was overtaken by a cavity wall build from the late 1930s. Non-traditional construction is considered to be any other method of construction.

Whilst there are hundreds of different types, non-traditional properties can be categorised within four groups:

- Timber frame construction
- Metal frame construction
- Insitu concrete
- Precast concrete.

This article considers an example of each of these types of system-build properties, where the terms non-traditional and system-build are used interchangeably.

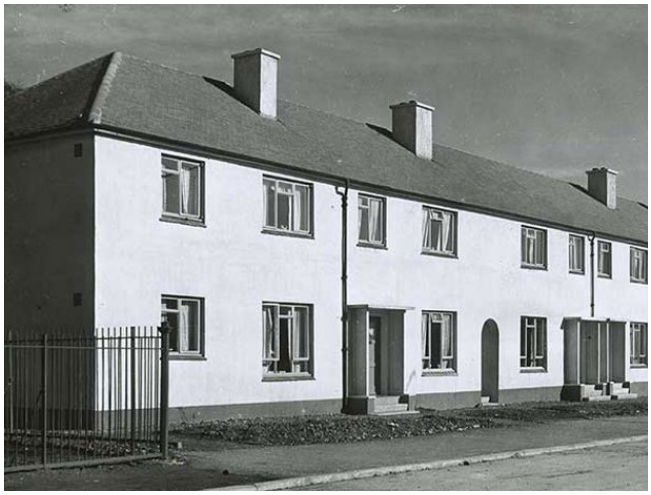
Examples

Name: Unity & Butterley
Type: PRC Construction

- Storey height precast concrete columns linked at first floor and eaves height by steel plate beams running front to rear
- Outer leaf of 75mm wide concrete Panels, inner leaf of concrete blockwork or dry lining
- Pitched roof constructed of timber or concrete rafters with a covering of tiles laid on asbestos boards

Common Identifying Features

- External cladding resembles blockwork laid with continuous vertical joints.



Name: Wimpey No Fines
Type: In Situ Concrete Construction

- Ten-inch (254mm) concrete shell cast in situ
- Cast in one operation using reusable formwork
- Ground floor either concrete or traditional timber joists and floorboards; first floor was made with traditional timber joists and floorboards
- Interior walls were sometimes a mixture of conventional brick and blockwork construction or timber studs and plasterboard (9mm), with load-bearing studs to suit first floor joist spans
- To weatherproof the structure, the external facade was rendered

Common Identifying Features

- Geometric structure, regular grey finish, rice crispy walls!

Name: British Iron and Steel Federation Housing (BISF)
Type: Steel Frame Construction

- Structural steel frame in light sections
- Sheet or lightweight cladding

Common Identifying Features

- Ribbed metal sheeting to first floor external, metal surrounded window projecting from wall face, corrugated asbestos cement roof covering.

Name: Spooner
Type: Timber Frame Construction

- Built as bungalows and 2-storey semi-detached and terraced houses
- Having a steep, medium or shallow pitch gable roof covered with tiles, profiled steel or asbestos cement sheets

Common Identifying Features

- Gable wall of a timber frame building will have a timber spandrel panel forming the gable panel
- Windows fixed to the frame, not to brickwork outer leaf may result in a deeper external reveal.

Name: Laing Easi Form
Type: In Situ Concrete Construction

Baily Garner Feasibility Report on options for:

- Refurbishment
- Retrofit
- Disposal
- Regeneration

We've also worked with Oxford City Council on a similar feasibility including producing design and specification and managing works on site on other schemes.

As noted in BR 469: Identifying Non Traditional Housing in the UK: 1918-1975, because non-traditional building methods were designed to positively impact the severe housing shortage properties, they were built en-masse and mainly on behalf of local councils. Entire low rise housing estates were constructed back in the 1940s 50s and 60s and then came the high-rise residential blocks that were built from the 50s, 60s and into the 70s.
At the time, this created modern-looking estates and established new communities.

The emphasis then was on the speed of build along with the cost of construction. As a result, these properties were built with little regard to standards of amenity and comfort and were only designed as a short-term fix to a major problem. Piecemeal gangs of workers operated inconsistently and at speed. Therein lies the first and most general issue – these estates still exist today and are in pretty much their original state. This is despite the fact that many properties were supposed to have a life of 20 years in many cases. They look old-fashioned and dated, they are cold in the winter and hot in the summer, they incorporate little in the way of insulation so they are difficult and expensive to efficiently heat, they are susceptible to condensation and damp and can often be poorly constructed.

Key considerations

What is the construction type?

Perhaps surprisingly, it is often quite difficult to establish the actual construction type because many types of non-trad incorporated an internal finish and an external additional cladding. These external cladding materials can include brickwork for example, making a timber framed house look like a traditional build. One way to work this out is to check if the main structure continues within the loft void.

Corrosion

Carbonation or the presence of chlorides in the concrete can commonly cause the corrosion of steel reinforcement and corrosion of column bases (in the case of steel frame construction). Corrosion, whilst weakening the affected area, causes metal to expand and as this happens any surrounding concrete will crack. This, in turn, allows for moisture penetration causing subsequent spalling caused by freeze thaw action.

Wall tie failure

In many cases, wall ties have corroded, broken or are no longer fit for purpose – this can be indicated by cracking in the masonry caused by the corrosive expansion and movement as cavity walls bulge outwards. Condition of wall ties should be checked along with quality and quantity of the ties originally used.

Cracking

Whilst cracking can often be caused by the effects of corrosion or even wall tie failure as explained above, these old non-trads are also prone to cracking caused by foundation movement as a result of drains, trees or subsidence over the years.

Age-related issues

These properties are more than 50 years old at best, so you can expect the usual age-related issues, especially when you consider that the historic materials used in

the original construction may not be up to the same standards as modern materials. Seals, decay and details may allow for damp penetration and condensation. Timber frames may have rotted (especially around openings and at sole plate level) and lintels also need to be checked for condition and performance.

No-fines concrete

One very popular material used in the construction of non-trad properties (both low and high rise) is a no-fines concrete. It's estimated to have been used in the construction of over 300,000 houses and hundreds of tower blocks. No-fines concrete is exactly that, a form of concrete which contains no fine aggregate or sand. This results in a very cheap, brittle, honeycomb type concrete. It is a porous, very weak concrete with large air pockets. It has very poor insulation properties and is very difficult to fix into. Pull out tests are recommended. However, a benefit of retrofitting a No Fines property can come with a cost-saving approach to detailing. This was achieved in the project in figure 1, by removing a non-structural corbel in liaison with the Local Planning Authority and Building Control to provide a cleaner, more rationalised building envelope to insulate.

Designated defective

The BRE officially classified a number of non-traditional house types as defective under the 1984 Housing Defects Act (now part XVI of the Housing Act 1985). This can have implications from an insurance and sell-ability perspective.

Insulation

As previously mentioned, non-trads were built with little regard to insulation so current levels are often a big issue. Whilst many were constructed in a way that incorporated a cavity which may have subsequently been insulated, these cavities are typically very narrow and hence any thermal benefit is minimal. That aside, the quality of any insulation needs to be checked as it is likely to be old, often damp or even saturated. It may also have bridged the cavity or failed as a result of slumping.

With regards Social Housing Decarbonisation Fund (SHDF) funding, it is worth noting that while available funding for cavity construction is less than that for solid wall properties, non-traditional properties or those with narrow cavities deemed "hard-to-treat" are in fact classified as solid wall, so there is additional funding available, for which we can assist with your application.

Furthermore, properties which have EPCs with a C rating based on having adequate cavity wall fill may in fact be a D in the case where the CWI is defective. This can be determined by a cavity wall borescope inspection undertaken by a Chartered Building Surveyor and can result in a revised, correct EPC being produced to classify the property as a D and thereby qualify for SHDF funding.

In one of our projects where defective, existing CWI was extracted from a system-build house, a proposed replacement PU foam had been specified to provide structural bonding to the twin concrete leaves. However, because of poor initial construction including unsealed joints and voids, the PU product was deemed inadequate and instead chemically fixed reinforcement ties were installed alongside a blown loose fill. This demonstrates an important lesson learned when it comes to retrofitting system builds.

Other issues

Some other issues include the presence of cable and other items in cavities, defective foundations, deleterious materials such as asbestos, potential issues with structural loading paths, and dew point and moisture layer calculations around vulnerable materials e.g. timber/ steel.

With regards loadings, it is worth considering the proposed MEP strategy and requirement for heavy, modern hot water cylinders or insulated thermal stores. These are often around 200 litres and may impose unacceptable loads on a non-traditional property with system-built upper floors. An example would be in a Unity type with steel lattice joists, where the structural integrity cannot be guaranteed or conclusively evaluated by the project structural engineer and where it may not be possible because of space constraints to install equipment at ground floor. Consideration should be given to resident amenity and potential loss of storage space with conversations held early in the project.

Solutions and tips

Our key tips for retrofitting non-traditional properties are:

- Do your up-front surveys (e.g. concrete, opening up, structural, foundations, loft void, steel corrosion)
- Assess existing defects early using PAS 2035 methodology (e.g. cracking/ spalling visible on external wall)
- Understand requirement for airtightness in terms of both technical performance and any funding parameters. Also, consider the effect at unsealed junctions such as party walls if this applies to the type of property – semi-detached, terraced. Another article in this series covers this in more detail here .
- Detailed design and specification via a traditional route can work better than a design and build arrangement unless you have a model that has

previously worked well. Another article in this series covers Contract Management and the benefits of Measured Term Contracts.
- Expect the unexpected! We advise a larger client-side contingency for retrofitting a non-traditional property. Because system build properties were often built by a variety of individuals on a discreet wage packet, construction of any one element may not be consistent and quality may vary. This is important to recognise when retrofitting a non-traditional property.
- In some cases, when reviewing your asset management strategy, it may be better to consider disposal or rebuild/ regeneration.

Specifications

One potential specification is a Structural External Wall Insulation System (SEWI). The SEWI system provides a rigid, structurally continuous envelope around the property and various aesthetic finishes can be incorporated into the design.

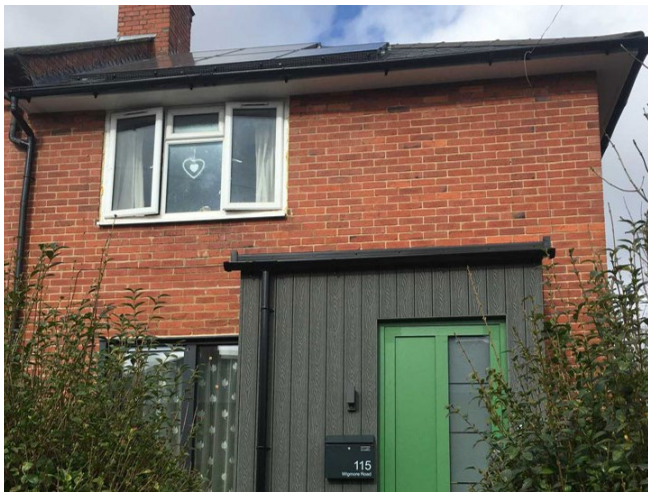
The construction of the unique panels used is based upon a core of rigid insulation set within a steel cage. The panels are strong and rigid yet are sufficiently lightweight for handling by one individual. They can be installed both horizontally and vertically and have a maximum spanning capacity of 3.6m.

The panels do not attach to the substrate but are instead fixed to the structure of the building itself. This, in effect, forms a new substrate which is structural in a reinforcing capacity – not load-bearing.

There is generally no requirement for decanting tenants with this option.

Other solutions might include off-site manufactured panels which are designed from a cloud point survey of the building and target install time of around 20 to 30 days at scale. Though there are still supply chain challenges and cost viability issues with present solutions.

There are still industry challenges with supply chain capacity, cost, material and labour issues, and delivering at scale.
Various M&E solution are available including thermal store and heat pump systems and combined ventilation and heat pump off-site manufactured pod systems.



Key takeaways for retrofitting non-traditional properties

In conclusion, the following are our recommendations for retrofitting non-traditional properties:
- Do your up-front surveys and desktop work
- Understand the type of property you're dealing with
- Engage suitable specialists
- Comply with relevant standards such as PAS 2035
- Take care with requirements of funding
- Future innovation in off-site and at scale? (avoid digging in and messing around overly with existing structure)

How we can help

At Baily Garner we have a team of retrofit experts who can assist with retrofitting non-traditional properties. To find out how we can help contact:

Matthew Allcock
Chartered Building Surveyor
matthew.allcock@bailygarner.co.uk
07966 966091