February 2010

Climate Change

And the Case for Traditional Masonry Housing

Hatfield Flats, Saturday 11th August 2007. Photography by Mathew Cashmore

Compiled by Besblock Limited

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L1A 2010

Modern Method of Construction has been scrapped

The decision to abolish the requirement for developers to adopt Modern Method of Construction (MMC) as a prerequisite to obtaining government HAG funding was announced by Mr Steven Carr, of the Homes and Communities Agency, in mid-2008. The English Partnerships website also confirms that they no longer require Modern Methods of Construction.

Further, where schemes consist totally of social housing, and the original intention was to use MMC, this decision can now be revisited at the second stage of the grant application.

- **Prefabricated off-site manufacture is no longer a prerequisite to obtaining government HCA funding for social housing schemes.**

The Reasons

1) Climate change and global warming

MMC targets have resulted in a significant increase in the use of lightweight timber-frame structures. In the light of a prediction that summer temperatures could reach 40 degrees Celsius in London by 2050, we must encourage the incorporation of 'thermal mass' into our new homes.

Thermal mass (heavier masonry structures) can play an important role in moderating temperature swings in highly insulated dwellings, and they assist by retaining heat in winter and keeping the buildings cool in summer.

- **We must encourage the incorporation of thermal mass into our new homes.**
- **With predicted summer temperatures possibly reaching 40 degrees Celsius by 2050, traditional masonry structures will assist in moderating temperature swing, by retaining heat in winter and keeping buildings cool in summer.**

2) Economic benefits and sustainability

Transportation

Approximately 60% of the timber in a timber-frame house is imported. The environmental impact of the transportation of the product is measured only from the port of entry, thereby ignoring the impact of the main, often lengthy, transportation distance from the point of origin. While this is the current methodology for calculating the environmental impact of transportation, it is morally wrong. In addition, when producing a timber-frame house no consideration is given to the effects of harvesting the timber used, i.e. deforestation.

Imported timber is detrimental to the UK balance of payments and is subject to currency fluctuations.

Jobs

- **The primary requirements of all publicly funded social homes projects are the need to incorporate local sourcing, and to create much-needed employment.**

Sir Bob Kerslake, Chief Executive of the HCA: "Homes and jobs should go hand in hand in creating thriving communities."

Gill Taylor, Chief Executive of the HCA Academy: "Apprenticeships and local labour initiatives help to secure existing jobs as well as creating new ones, helping to maintain the sector's capacity to build when the upturn comes."

- **Housing Minister John Healey, pledged to make apprenticeships and local labour initiatives a condition of receiving HCA funding.**

3) Other problems associated with timber-frame housing

Fire

Reports in the press and other media of timber-frame house fires are becoming all too frequent. The construction industry suffers losses estimated at £400 million per year as a result of fire. When a fire takes place in a masonry home, often the contents of the house will catch fire but then eventually burn out. In a timber-frame home, if the contents are the first to catch fire that is quickly followed by the structure itself catching fire and the subsequent loss of structural stability. Timber-frame buildings tend to suffer complete burn-out in such a fire, requiring complete replacement of the structure and in many cases the adjoining structures as well. The most contentious issue is that the burning of the timber frame in a fire can lead to the separation of the wall ties from the timber frame, rendering the external masonry leaf unstable.

- **Timber-frame structures are highly vulnerable to fire in the construction stage, before the external cladding is in place. Vandalism and arson pose particular risks in inner-city areas.**
- **Often the intense heat causes the destruction of the floor-slab insulation and the plastic services therein, requiring the removal and replacement of the floor-slab insulation and services.**
- **When ignited at this stage, structures burn rapidly, generating large amounts of intense radiant heat, which often spread damage and destruction to neighbouring dwellings (see image of Peckham fire overleaf).**
- **A timber-frame housing development at Colindale in North London *"burned to the ground in less than nine minutes"*.**

Sumner Road, Peckham 29th November 2009

The illustration shows the total destruction of the timber frame of 39 new homes under construction. Only the scaffolding was left standing. Three hundred people had to be evacuated. The fire spread, causing damage to the traditionally constructed buildings opposite. *"What would be a small fire in a traditionally constructed building will be a major conflagration in a large timber-frame building,"* said John Bonney, President of the Chief Fire Officers' Association.

As mentioned above, a likely – but maybe unexpected – consequence of a fire such as that at Sumner Road will be the melting of the floor-slab insulation and all the ducting and piped services therein, requiring the removal and recasting of the slab and its services.

Damage to the main services outside the perimeter of the building is also likely. In addition, the extreme heat will cause the fusion of the scaffolding.

A primary recommendation of a report issued by The Association of British Insurers and the Association of Chief Fire Officers on December 10th 2009 is as follows:

"We urgently need to consider what can be done to better understand the fire performance of MMC building types and how to rescue risks associated with them.
We should also consider how these building types can be identified to the Fire and Rescue Services."

The Besblock traditional masonry system

- **The Besblock Star Performer is manufactured from natural, quarried aggregates and therefore gives high thermal mass to help moderate temperature swings in highly insulated dwellings. Typical Kappa value (k) for traditional masonry filled cavity construction with plasterboard on dabs internal finish is 78.3 kJ/m^{2}K.**
- **It encourages apprenticeships and local labour initiatives.**
- **Green guide rating is A+.**
- **It is flexible in build, unlike a prefabricated panel system.**
- **It is highly resistant to fire; a 100mm block gives 2 hours of fire resistance.**
- **It has excellent sound-reducing qualities. Current Robust Detail for this block includes E-WM-5: E-WM-8: E-WM-11: E-WM-19:**
- **Owing to the high versatility of the product, generally only one 100mm block type will be required on site.**

The Besblock thermal modelling system, CSH 3 and L1A 2010

New Approved Document L1A 2010 is due for release in April 2010, coming into effect in October 2010. This will require a 25% carbon emission reduction compared with L1A 2006 for all new dwellings.

The current CSH 3 requires under ENE 1 that dwellings have a 25% improvement in DER over TER. The Besblock thermal modelling system with its associated lower y-values enables this 25% improvement to be achieved often without renewables.

- **Often, assessors will increase fabric insulation in an attempt to reduce DER by 25% to achieve code points for ENE1.**
- **With U-values often as low as 0.14, 0.18 and 0.27 for the various elements of the fabric, by the law of diminishing returns this is not always the most cost-effective option.**
- **A more effective method is to minimise the heat loss at thermal bridges, openings and junctions by adopting a product with a low y-value.**

What is a y-value?

- **The y-value in the SAP 2005 is a factor used to estimate the heat loss at junctions in new dwellings. The lower the y-value, the less heat is lost.**
- **The SAP 2005 default value is y = 0.15. For Accredited Construction detail, y = 0.08. In the Besblock thermal modelling system, y = 0.035 for a typical terraced house.**
- **In SAP 2009 the use of y-values will be restricted to the default value of y = 0.15. All other thermal bridge losses will be calculated using Ψ values. Typically, using the Besblock set of Ψ values results in 50% less thermal bridge heat loss than the accredited Ψ values.**
- **Junction details and Ψ based on Accredited Details can be downloaded at our website: www.besblock.co.uk**

What does this mean?

- **The SAP calculates the total area of all exposed elements of the building fabric and multiplies each element by its U-value to give the heat loss for that element. The sum total of the elements gives the total heat loss for the fabric.**
- **Whichever y-value is adopted, the total fabric area will be multiplied by that figure and the result is added into the total heat loss calculation.**

Looking at the example below:

- **Default: y = 0.15:** Fabric area is multiplied by 0.15. The resultant figure is added into the heat loss which becomes 182.13 W/K.

y = 0.08 (accredited construction detail): Fabric area is multiplied by 0.08. The resultant figure is added into the heat loss which becomes 157.13 W/K.

Besblock TM system: y = 0.035: Fabric area is multiplied by 0.035. The resultant figure is added into the heat loss which becomes 141.06 W/K.

Example

A house has a total exposed element area of 357.20 m^2, made up as follows:

Element	Area m2	U-value	Total heat loss W / K
Doors	1.95	2.45	4.78
Windows	29.04	1.68	48.76
Ground floor	71.09	0.21	14.93
Walls	184.04	0.28	51.53
Roof	71.08	0.12	8.53
Total area exposed elements:	**357.20**	**Total fabric heat loss (no correction)**	**128.55**

Estimated heat loss at junctions for this dwelling

	y=	Estimated heat loss at junctions (W/K)	Revised heat loss for dwelling (W/K)
SAP default	0.15	53.6	182.13
Accredited construction detail	0.08	28.6	157.13
Besblock TM system	**0.035**	**12.5**	**141.06**

"93% of consumers interviewed in a Mori October 2009 poll said they would prefer to live in a brick and block house."

In summary:

- The raw materials and finished product are produced locally and installed on site by skilled trades people, protecting much needed UK jobs.
- Manufacturers have worked hard to reduce embodied energy, and the shorter transportation distances due to local manufacture make brick and block truly sustainable.
- Brick and block construction has been proven to have a design life in excess of 100 years.
- Incorporates re-cycled aggregates.
- Is highly resistant to fire.
- Brick and block provides thermal mass which is missing from lightweight structures. This is vital to cater for our warming climate.
- The products offer excellent sound reducing properties.
- Brick and block when combined with a variety of insulation materials will cost effectively meet all the challenges posed by the Code for Sustainable Homes and the future changes to the Building Regulations.
- Masonry is available off the shelf for maximum flexibility and is adaptable to meet the changing needs of the homeowner.

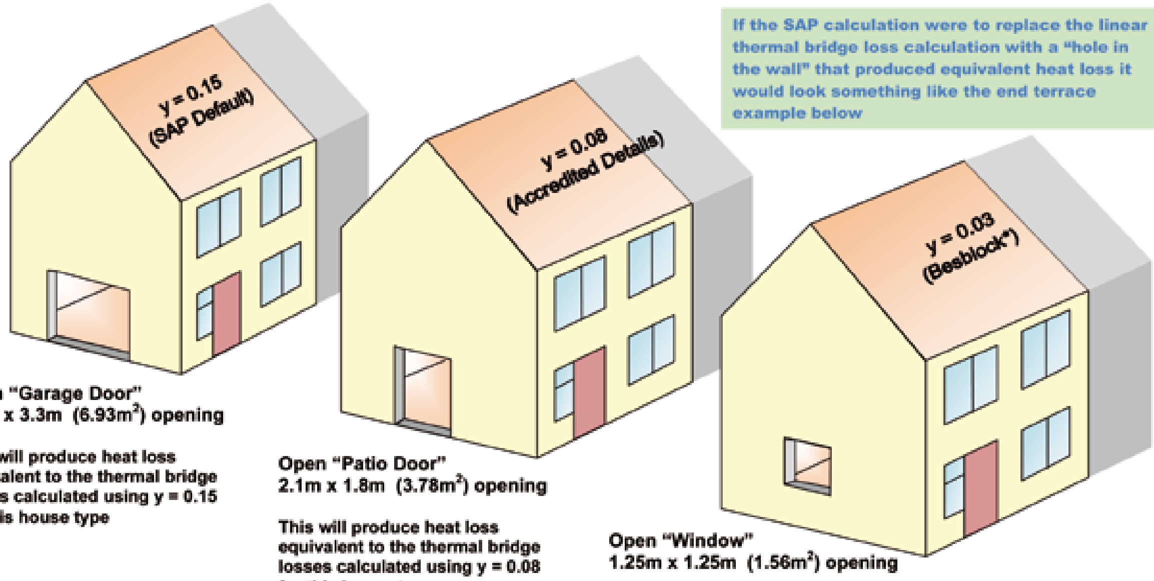
For more information on our services

- Energy advisory service.
- Carbon emission calculations.
- SAP calculations.
- Air Leakage testing domestic dwellings.
- Accredited Code for Sustainable Homes assessors.

Contact Besblock Technical Services Department
Tel 01952 685000 or email technical@besblock.co.uk

WHAT DOES A *Y-VALUE* LOOK & FEEL LIKE?

If the SAP calculation were to replace the linear thermal bridge loss calculation with a "hole in the wall" that produced equivalent heat loss it would look something like the end terrace example below



Open "Garage Door"
2.1m x 3.3m (6.93m²) opening

This will produce heat loss equivalent to the thermal bridge losses calculated using y = 0.15 for this house type

Open "Patio Door"
2.1m x 1.8m (3.78m²) opening

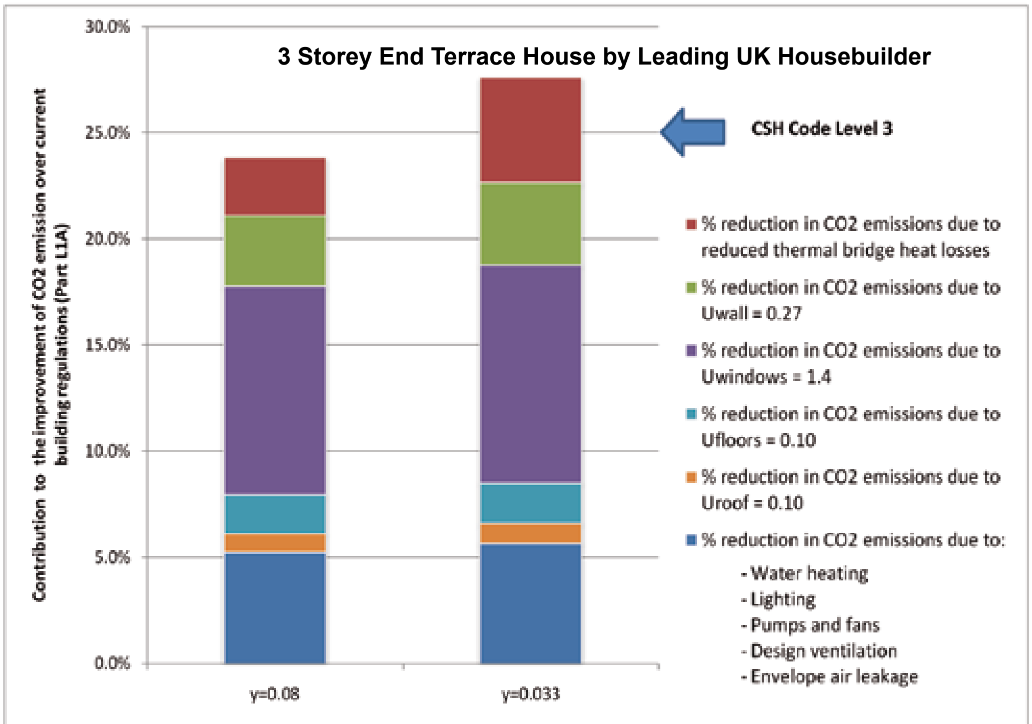
This will produce heat loss equivalent to the thermal bridge losses calculated using y = 0.08 for this house type

Open "Window"
1.25m x 1.25m (1.56m²) opening

This will produce heat loss equivalent to the thermal bridge losses calculated using y = 0.03 for this house type

Wall Specification:

External Leaf:	100mm brick
Cavity:	100mm mineral wool full-fill insulation
Inner leaf:	100mm Besblock *"Star Performer"*
Lintels:	Independent steel lintels for the external and internal masonry leafs
U-value:	0.30 W/m².K



The above chart illustrates the relative contributions made by improvements in the building fabric to exceeding the requirements of the Building Regulations (Part L1A).

Note: Anomalies in the SAP calculation mean that some M&E systems such as lighting, pumps and fans, and the design ventilation may appear to increase CO_2 production when compared to the Target Emissions Rate (TER). This is because there is small scope for improvement in these items, but the TER assumes a 20% improvement across the board to just to meet Building Regulation requirements.

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