"The largest and most complex 'DIY' self-build personally carried out by the "Self-Build-Pro" himself!"

"Defying Gravity"!

Location: Rural Wiltshire (UK)

When the sub-contractors went 'AWOL' at the last minute; the "Self-Build-Pro" personally saved the day by stepping into the 'breach' to build his thirteenth timber-framed house in 30 years!

The construction of this project had been designed using the ProFrame® bespoke system of advanced timber-frame design and eco-friendly approach to erection in order to maximise the potential cost savings using a fully managed, sub-contracted approach to build the house.

- The clients had bought the plot complete with detailed planning consent but it was impossible to implement the original planning consent because, presumably unbeknown to the powers that be, it would have involved building within 10 metres of a medium-pressure district gas distribution 'main' running along the frontages of the various properties under the verge! (Which proves the point that the existence of a valid planning consent ***NEVER*** guarantees that you can actually build what has been approved!)

Fortunately; the clients didn't really like the existing design anyway and drew up their own proposals for a larger house based upon our suggested floor plans, but they only gained planning consent for their proposals after agreeing to completely re-design the roof to accommodate the planners' aesthetic requirements.

- **The clients loved the house layout because it had achieved very generous family accommodation comprising an integral double garage, entrance hallway, lounge, dining room, family room/kitchen, utility, cloakroom/WC and study on the ground floor and a master bedroom suite with ensuite shower room and walk-in wardrobe, plus a main bathroom and another four bedrooms ~ two being ensuite with a "shared" second bathroom ~ all with built-in wardrobes; on the first floor; on what was a relatively 'tight' site.**

Unfortunately the changes demanded by the planners for the roof meant that the roof structure would no longer simply span between the front and rear external walls; in fact the revised roof design made it **impossible** for **any** of the roof trusses to be supported by an external wall at **both** ends ~ with some trusses not having any support from an external wall for support at all! Typically; despite first floor joists spanning between 9.3 m - 10.6 m / 30'6" - 34'9" ~ the house had already been designed so that none of the ground or first floor internal walls needed to be load-bearing! With the clients adamant about not changing the internal room layouts; we then had to "design out" the need for the revised roof structure to have any support from the internal walls as well!

Having successfully dealt with one potential disaster; an even worse problem arose!

- The planning drawings drawn up by the clients showed the house sitting "comfortably" between the side boundaries of the plot; however when we checked the dimensions, the actual site turned out to be nearly two metres narrower than what the clients had shown on an already 'tight' site-plan and didn't leave enough space to provide for an external rear access down even one side of the house! Again the clients were adamant that the house was not to be altered or

made smaller so, as the boundaries were also fixed, we had to find other ways to reduce the house's width; otherwise the whole rear area of the property would only have been accessible from inside the house!

We created one rear access via the back of the integral garage and 'slimmed down' the thickness of all the internal and external walls. Foundations were cast around the boundary fence-posts to get as close as possible to the boundary and the second rear access was slimmed down to 90 cm / 2'11" minimum width ~ result ~ we managed to maintain the size of all the internal rooms and keep the clients happy!

The groundworks sub-contractors put in the foundations, the timber-frame materials were due for delivery and then, "out-of-the-blue", the timber-frame sub-contractors reported that they had taken on an additional contract in Suffolk so wouldn't be able to get to the job for another two months!!!

As can be seen; the whole ground floor, apart from the garage area, is a suspended LVL joist floor above the oversite concrete "blinding". The garage area will have a concrete "beam & block" floor topped off with a reinforced cement & sand screed.

As the neighbour wouldn't agree to the garage wall face forming the actual property boundary, the foundations were cast around the boundary fence posts to get the wall as close as possible to the rear of the fencing!

The main floor-joists are 9.3 m / 30'6" long at 600 mm centres ***with solid blockings to alternate spans so as to brace each joist at quarter spans***. (A typical ProFrame® solution that is far more efficient than using of multiple rows of steel or timber "herringbone strutting" between the joists!)

Joists parallel to the external wall have noggins at 600 mm centres to brace the rim-joist and provide support under the wall-panels.

The "pattern" of solid blockings can be clearly seen above.

The suspended floor construction was a late change after the groundworks sub-contractor excavated the foundation trenches and discovered that the vegetable (top) soil extended nearly 90 cm / 3'0" below the surface over the whole area!

(It was cheaper and quicker to frame-up a LVL joist floor than use concrete "beam & block" and much, more eco-friendly too.)

As there was a risk of water penetration into the underfloor ‘quilt’ insulation; that would have rendered the insulation permanently useless; it was decided to leave the floor deck open during erection of the house and to fit the insulation after the house was weathertight. The plywood floor sheathing sheets were to be 2400 mm x 1200 mm (8' x 4') nominal T&G all edges so the entire perimeter of the house floor was fitted with 200 mm / 8" wide floor sheathing strips; groove-edged along one long side with 45 degree splayed-edge along the opposite long side and similarly to front and rear edges of the house floor ~ thus facilitating an easy fitting of the floor sheathing later with no loss of edge support!

Ground floor wall-panels erected to front of Lounge & Hallway with Garage to left ~ ***note the lack of lintels over all the structural openings*** including the garage door!

Outside the 'Lounge' wall-panels (see right) projects the base for the splayed bay window ready for the under-sill wall-panels to be framed and fitted later.

Wall-panels have also been erected to the other side of the Garage and down side of house ***with Study and Utility openings "sheathed" over***. Notice how once again ***there are <u>no</u> lintels above the structural openings;*** just one of many typical ProFrame® system design features that save both time and money!

Whenever there are two or more wall-panels in the same wall-length, the wall-panels are supported with temporary bracings; <u>until</u> the first floor joists are fixed and fully sheathed to provide full structural integrity to the ground floor walls.

Wall-panels around the Kitchen area. The framing to the side wall of the Kitchen is the <u>only</u> section in the entire house with framing at 400 mm (16") centres due to the higher weight-loads carried by that section of wall. Everywhere else the framing is at 600 mm (24") centres.

The picture (left) also shows the "laths" nailed to the underside of the floor joists ready to support the underfloor insulation quilt.

From the outside; the rear of the house looks quite strange with breather membrane overlaid with adhesive tape marking the framing positions ready for the bricklayers to nail stainless steel cavity ties when the reconstituted stone (Bradstone) outer veneer is built. The breather is being cut and pinned back around the openings ready for the timber fire-stops and windows to be fitted in place.

The picture on the previous page (bottom-right) shows the same window openings from inside the house. The polythene sheeting over the first floor sheathing is only there to minimize the risk of "water staining" as the sheathing will be the final finish before carpets are laid.

Note all the temporary bracings to the wall-panels which will remain in place until all the roof trusses are fixed and fully braced to provide structural integrity to the first floor walls.

Two views showing the wall-panels at the front of the house; looking into the Master Bedroom area on the left and Landing/Bedroom 2 area on the right; the last wall-panel ~ lying on the Master Bedroom floor ~ won't be fixed until the roof trusses have been lifted and stacked on the first floor deck.

The picture to the right ***shows the only two structural openings with lintels over***; that's just two openings out of an overall total of nineteen openings in the structural walls! (All external openings would normally have timber lintels but ProFrame® is a 'bespoke' design system that saves time, labour and material by 'designing-out' everything that isn't actually needed!)

This view (left) across a neighbour's garden shows the Master Bedroom windows have been fitted but not the main Bathroom window on the side!

(The "projection" above the wall is the end of a roof truss propped against the inside of the wall!)

Note the absence of scaffolding! The ProFrame® system doesn't require the use of scaffolding or hoisting gear ~ even when working completely alone!

However; even with all his experience the Self-Build-Pro still needs to be able to get up to "ceiling" level in order to lift and fix roof trusses ~ the solution is the simple 'work-platform' he has constructed for the task as shown in the picture on the next page (top-left)!

(The bracing "gussets" have been cut from scrap wall sheathing plywood; the "legs" are four lengths of 100 x 50 (4"x2") CLS timber; the top is cut from scrap floor sheathing plywood and supported on a couple of lengths of cut-down LVL floor-joists.)

The revised roof layout required by the planners before they would grant planning consent for the client's house design would normally have needed multiple ‘load-bearing’ support walls. However maintaining the clients' internal room layouts for ground and first floor levels meant that ***NO*** such walls could be used!

Using the ProFrame® system generally means that internal load-bearing walls are avoided anyway ~ saving money and creating maximum room size and layout flexibility.

General Note

Whatever style or type of house design is involved; ProFrame®'s bespoke design work to minimise labour and materials always comes as standard! Whether fabricated on-site or off-site; as professional consultants we believe in using our abilities to save the clients' money ~ not to take the 'soft' option and churn out 'industry-standard' design work to the client's detriment and expense!

The "cathedral" ceiling with exposed ties over the Master Bedroom (seen above) was the only part of the entire roof structure not using trussed rafters *AND* having both ends supported on external walls.

None of the roof trusses had both ends supported on external walls ~ several had neither end bearing onto a wall ~ being supported solely by girder trusses each end (as can be seen in the picture on the left). Even the girder trusses only had only one end supported on an external wall!

Apart from the gable wall to the upper part of the Master Bedroom shown in the view above (top-right); all other gables used the relevant roof truss as a fully braced "template" for the vertical framing, thus avoiding the need for any sheathing, with the (roofing grade) breather membrane simply being fixed over the open framework (seen left)!

Hence the "grey" gable in the view on the right and at the top (centre) of the next page!

The work to close in the roof and make it weathertight was done from the "inside"; i.e. without the need for any scaffolding; that left just a small final piece of the roof breather membrane (seen above the guttering to the Master Bedroom in the picture below) to be secured using a ladder for external access.

The views left and below left both show progress on getting gable undercloaks fitted, with the eaves fascia-boards, soffites and rainwater gutters also fitted. The roof breather-membrane has also been fitted and is held in place with plywood counter-battens. (Note the two 'Velux' roof windows can also be seen on the roof above the Master Bedroom.)

Tidying up time!

Having created and secured a weather-tight house, the Family Room annexe is finally framed up and erected. The "French" door-frame and windows came pre-assembled as a single unit although; due to the weight involved; the double-glazing units were supplied 'loose' for installation after the door/window unit had been fitted into place!

As the roof over the Family Room annexe was a straightforward "lean-to" sloping roof, it allowed the rafters to be fixed straightaway directly to the main house wall-panels, together with fascia-board, breather-membrane, etc.

The "stone" claddings will 'span' across the roof; above the sloping rafters; on a standard steel "outer skin" cavity lintel set immediately above the top of the rafters.

Having a 'hipped' roof; the Lounge splayed bay window posed a more awkward problem. The "stone" claddings will have an overlap with the window opening from both sides and so will be supported off a standard steel "outer skin" lintel fixed immediately above the bay window's ceiling joists ~ hence the temporary "roof" made out of breather-membrane to keep it weathertight ~ seen in the view (top-left) on the next page!

The rafters will be "planted-on" to the front of the "stone" cladding after it is built.

The view (right) shows the same view seen on the previous page (middle-left) but with the Lounge bay window fitted. The roof breather-membrane has also been finished off above the Master Bedroom!

Whilst the outside is ready for the bricklayers to arrive and start building the "Bradstone" outer skin; inside the house, the ground floor insulation quilt was laid between the joists and the floor sheathing cut and laid so all the internal walls could be framed up and fixed into place.

With that done; 90 mm (3.5") thick foil-faced urethane insulation is already being fitted around the external walls as seen below.

Upstairs; partition walls forming the ‘ensuite’ second bathroom serving Bedrooms 2 & 3 and the respective back-to-back built-in wardrobes ~ are seen in the view (left) ~ as viewed from Bedroom 3. The Landing and stairwell "hole" can just be seen beyond the studding!

With ground floor insulation completed; cutting and fitting of the 90 mm (3.5") thick foil-faced urethane insulation around the upstairs' external walls will follow shortly!

Meanwhile; external cladding is well underway and scaffolding has finally made an appearance for the bricklayers to build the "Bradstone" wall cladding!

NB: The plastic sheeting is being used to protect the newly laid stonework from the rain and avoid cement mortar "runs" spoiling the appearance of the "Bradstone" cladding!

The frontal view (right) shows the "Bradstone" wall cladding is virtually completed on a dull, wet day and everything almost ready for the stone roof slates to be laid ~ whilst the view below shows the same elevation just a few days later with the stonework and roofing completed and the scaffolding gone!

Similarly; the view on the previous page (bottom-right) was also transformed by the removal of the scaffolding after completion of the stonework and roofing; as shown by the view seen below!

The weather had improved too.

The views above and left show the two "master-bedroom" windows above the garage doorway, with Landing and Bedroom 2 windows to the left. Downstairs is the front door, Hallway window and the Lounge bay-window!

The frontal view also illustrates how tight the site width is ~ whilst there is a 900 mm pathway between house and fence; the opposite side has the wall-face virtually touching the fencing!

Foul drainage from the three 1st floor bathrooms and the ground floor cloakroom is gathered into a single SVP (soil & vent pipe). The Utility and Kitchen 'sinks' connect to a 'back-inlet' trapped gulley before draining into a Klargester "Bio-Disc" sewage plant in the compact rear garden.

Having carried out a percolation test to check-out the porosity first; using the entire rear garden area provided just enough space to lay out all the necessary "tail-drains" to percolate the effluent into the sub-soil on-site!

The view left shows the finished version of the earlier rear view of the house seen two pages earlier!

Upstairs are the windows to Bedrooms 3, 4 & 5; downstairs the Kitchen window is seen on the left with the "annexe" to the Family Room in the middle and the Dining Room "French doors" on the right; below the window to Bedroom 3.

The final two views show the finished* house resplendent in its "Cotswold" stone claddings (Bradstone) as seen from across one neighbour's garden and the other neighbour's drive respectively.

*The 'bespoke' overhead garage door had been removed for (car) damage to be repaired!

Despite the trees now being in full leaf ~ the views compare well with the same views ~ as seen five pages and two pages earlier respectively ~ taken at an earlier stage of construction.

Changed circumstances meant that this client's project very conveniently provided the primary source of material used for the Self-Build-Pro's "An Insider's 'Hands-ON' Construction Guide" which was written and published in 2008!

At nearly 2,500 ft^2 / 230 m^2 internal floor area; this was rather a large project for a 'DIY' build, especially after the changes to the roof design complicated the entire layout of the roof trusses and extra framing work to provide a totally 'new' means of support for them! The switch to having a 'suspended' joist ground floor also increased the framing work involved. Despite that; this project successfully proved (yet again) that physical timber-frame work is 'unskilled' and that even a single-handed 'DIY' enthusiast can build reasonably large, complex houses and complete them; so that they are weathertight ~ ready for roof tiling and external claddings ~ without needing to use scaffolding or lifting gear ~ by simply following our advanced ProFrame® framing and erection methods!

The project highlights many of the advantages of our ProFrame® 'bespoke' timber-frame design software compared to 'normal' timber-frame design practices as well as the inherent practicality of our ProFrame® erection methods; as summarised below.

For instance; when 'external' design problems arose; i.e. the switch to a 'suspended' ground floor construction, the 'slimming-down' of the width of the house without reducing internal room widths, the drastic re-design of the roof truss layout and revised structural support; they were all quickly dealt with and accommodated with minimal 'fuss' and cost-impact. Similarly; the 'bespoke' design software allowed the structural effect of the reduction of stud depth to be calculated quickly and efficiently; so that only one individual wall-panel required framing at 400 mm centres ~ compared to the 'normal' requirement that all external ground floor walls need to have the framing at 400 mm centres; whenever 100 mm x 50 mm (nominal) vertical framing is used.

The ground and first floor joists; upto 10.6 m / 34'9" long; were cut and fitted single-handed with blockings only provided to alternate spans ~ which meant the floor-joists were fully-braced at quarter spans ~ without incurring all the usual costly 'full-strutting' ~ they also cost less than 70% compared to the cost of using 'I' joists as well as being quicker to complete with no 'web-stiffeners', etc. to worry about either.

Despite the usual provision of lintels over all external wall openings in timber-frame houses; our ProFrame® software also 'designed-out' the need for any lintels over seventeen of the nineteen external openings in this house. It also 'designed-out' the need for internal load-bearing walls and the need for foundations under them; despite the revised roof design rendering the original roof truss support points totally inadequate!

All of which superbly illustrates the fact that our ProFrame® 'bespoke' design software and advanced timber-frame assembly & erection methods can cope with virtually anything; quickly, easily and effectively; i.e. with minimum 'fuss' and/or expense.