ETHEL STREET, CANTON DECARBONISATION RENDER PROJECT

In partnership with

TAFF

VIVUS
SOLUTIONS

Ethel Street, Canton, Cardiff CF5 1EJ.

The demonstration works were carried out on four houses 2 & 4 then 8 &10 Ethel Street, with funding and in partnership with Taff Housing and ORP

Aim:

1. To introduce a new standard in housing envelope - wall performance, helping RSLs to comply with WHQS(2), Futuregenerations and achieve Societal requirements of hygrothermal efficiency, affordable warmth and decarbonisation through an effective fabric first approach.

2. To successfully control humidity and therefore reduce instances of mould, whilst achieving a minimum 0.7 WmK U insulation value.

3. To demonstrate the use of the new insulating version of the tried and tested Vivus Solutions render coat and utilise these materials as a system, in order to lower interstitial humidity where present and insulate the properties, enabling Landlords and tenants to maintain those balanced levels for the life of the building with minimal future maintenance and therefore:- lower the impact of the buildings on the environment and increase tenant comfort.

Chosen House Archetype

- The selected houses were of early 20th century terraced street blue collar houses, all identical 3 window, 1 door configuration to the front and no access to the gardens to the rear except via entering the house itself.
- Ethel Street is of 270mm brick construction and all are coated in a standard pebble-dash cement render using self coloured brown aggregate, with a lighter spar gravel in the surface.
- The windows are all UPVC double glazed units, measured and fitted to the external opening size in the brickwork.
- Doors are all replacement of varying styles and modern, late 20th Century construction.
- Roofs are Welsh slate.
- Fascia boards are all replacement UPVC white.
- Gutters and external pipes are all plastic replacement.
- All front walls are against and in line with the pavement.
- There are no features or materials of the properties that can be described as anything out of the ordinary. They are the most common house type held in public and RSL ownership and is commonly found throughout the UK.
- The chosen houses currently fall in category D, EPC rating.

Process and Application

- Agreements on scope of works with order and JCT contract
- Commencement and agree the project program and explain to all tenants
- Set up four houses in two pairs for scaffold access and logistics
- Erect scaffold to front and rear on first pair - Nos 2&4
- Remove the existing cement render
- Ascertain condition of brickwork beneath and carry out the repairs as necessary to ensure longevity of the structure.
- Take the opportunity to generally seek out and identify any other unseen and unreported external issues that need to be addressed and also take the opportunity to address them.
- Apply 2 coats of **ThermaSec**, followed by one coat of **DiffuSec**, followed 3 coats **ColourSec** to protect all and give the finish colour required.
- Remove protections and final clean of site.
- During the process, time was allowed to give the coats of render time to dry. The project was carried out in some of the wettest weather to have hit Cardiff - winter 2022/23. This factor significantly hindered progress.
- Due to this additional drying time, the 4 houses became a staggered sequence with the fronts of 2&4 being finished well in advance of the rears and so the decision was made to begin the work to the front of the next pair Nos 8&10 before the rear of Nos 2&4 were complete.
- The result of this wet weather therefore, has been that scaffold on the front of 8&10 has been up for some time as there is access over the roofs to avoid the need to pass through the houses to gain access to rear elevations whilst the rear elevations are completed and again given the chance to dry between coats.

Initial Data Results

Initial data has been independently collected showing very good insulation benefit, where the walls are, as a result of the works, drying out and achieving the desired balance in humidity, even during the inclement weather experienced.

The data was recorded 2 months following the application, once drying had begun.

The entire project has been carried out in some of the wettest weather this year in Cardiff, from Dec 2022 through till March/April 2023

Also shown is the lack of insulation value at low level, where the walls have yet to dry to any form of balanced humidity due to pavement and ground water levels in Canton.

Where the humidity levels in the structure are beginning to dry and balance we have already recorded a U-value, from two separate sensors of an average **0.32WmK.** Sensor 1 @ 0.33 & sensor 2 @ 0.31WmK respectively, better than the initial aim.

(Appendix A - 230321_2_Ethel Street U-value Measurements.pdf recorded and issued by Veritherm and Appendix B - Vivus U-value Certificate for Ethel.pdf are attached to this document and are also obtainable from Vivus Solutions Ltd - sales@vivus.solutions)

Initial Tenant Feedback

The following testimonial was recorded one month following the application, February 2023;-

"I've been living here for years and years, and I always had my central heating on at 30 degrees to keep it comfortable. I probably like my house warmer than others, but now I've got it set at 18 degrees. The central heat is on only half the time now, but it's already more comfortable. And the front room is no longer raw cold when I come down in the morning."

Odette ****** *Ethel Street project tenant, one month after Vivus exterior render*

It seems now that further tenants are requesting that their homes are also included in future works planning. All feedback and comment on the results are positive.

Project Findings - Window Fitment

All the windows had been replaced previously for UPVC double glazing units.

The original windows made from wood, were built in behind the reveal leaf of brickwork. Now all slim UPVC frames, they were fitted to the external opening measurement rather than in behind the reveal leaf.

The result is a void behind the brick leaf of approximately 100mm x 100mm extending up both sides and over the top of each window. The gap / joining-moment to the reveals, sides and heads, was covered by cement render approximately 10 mm in depth.

When the 10 mm depth of cement render was removed to the reveals it opened the gap and it became possible to look into the void and see the back of the internal reveal plaster board.

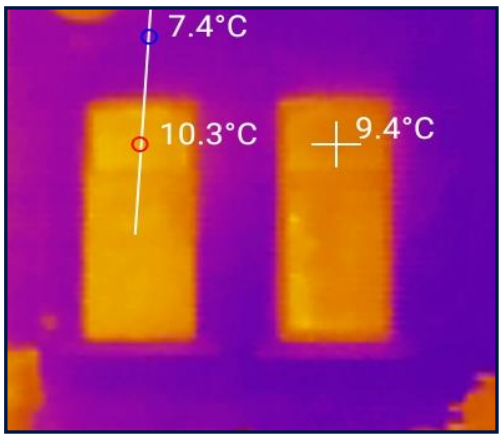
It is probable therefore that this void and minimal cement cover to the outside created such a significant cold-bridge to have negated the entire purpose of fitting the double glazed units.

This was a surprise and could not have been foreseen but was turned into a positive by the resolution method and being able to remove the cold bridge which is found normally beside modern plastic window frames.

Window Fitment Resolution

- The issue surrounding the windows has been satisfactorily resolved by Vivus Solutions Ltd during the project.
- The solution was designed to be simple, cost effective and replicable.
- They remain easily removable for future upgrade and replacement.
- The lack of solidity through insufficient fixings, has been resolved and all windows are now firmly located in place.
- Rain and moisture ingress has been stopped.

- Thermal bridge has been resolved.



Appendix c - full report on window void resolution methodology can be obtained from Vivus Solutions Ltd - sales@vivus.solutions

Project Findings – Concrete Render on Block

To the rear of the houses, small concrete block extensions have been previously built to give space at ground level for the back door and a larger bathroom over.

They are all coated in extremely hard and impervious cement and over-coated with an impervious cream coloured paint.

The entire build up of materials have very poor thermal efficiency, are cold to touch and display surface condensation to both internal and external faces, actually gathering to a degree where it runs down the wall.

A timed and measured attempt at removing the cement render was undertaken with two experimental approaches at the removal. Neither proved successful and the process has shown that removing the cement is impossible for time and substrate damage reasons.

The decision was therefore taken to try a different approach altogether;-

Following evidence from previous works at different locations over many years, significantly monitored and demonstrated at Roedean School, Brighton in 2005/6 and most recently monitored and shown for RHA in Ton Pentre, it has been noted that hard impervious stone constructions and very hard impervious brick constructions can be made efficient at removing moisture by the Vivus poultice system in an adapted and bespoke manner.

Taking this previous experience and evidence a method to resolve the issue was constructed.

Concrete Render on Block Resolution

The method is cost effective and replicable. The evidence from the project shows the method to have achieved the aim so far.

There is no external condensation.

There is no internal condensation.

ThermaSec, added to the process will have significantly improved thermal performance.

The render appears to be successfully adhered to the wall.

The finish appearance is the same as the rest of the building.

The slight discolouration shown is due to the photograph being taken the day the scaffold was being removed at the end of February 2023. The walls had not finished their drying process.

Appendix D - full report on concrete render on block issue resolution methodology can be obtained from Vivus Solutions Ltd - sales@vivus.solutions)

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Tenant outcomes for Ethel Street Decarb-Render

- Tenants are giving a very positive response stating their homes are warmer and drier and more comfortable to live in. Further tenants wish to be included in the process.

- The apparent reduction in energy required to heat the house is currently being reported at around 50% of the energy required prior to treatment.

- Tenants are already reporting a reduction in mould formation on furnishings against the external walls.

- Anecdotal evidence would suggest that tenants' perception of the project has been that their quality of life is important to the housing provider and that their housing needs are being prioritised.

Partner outcomes for Ethel Street Decarb-Render

- The rdSAP points are between 6 & 8 giving the ability to raise the EPC rating to that required by legislation.

- There is tenant satisfaction and that indicates continued proactive support from their housing provider.

- Minor issues with the building external envelope have been highlighted and resolved by the process.

- The additional building maintenance costs were significantly reduced by the existing render scaffold and existing team on site.

- Surveying and issue identification is reduced as the work reveals the issues without the need for a separate surveying process.

- In the longer term, building degradation will be significantly reduced and therefore the ongoing maintenance of the building.

- Ultimately, tenant satisfaction can only have a whole range of positive outcomes for the housing provider.

Financials

- The cost of the re-render works to this archetype is approximately £20,000 for both front and back of the houses, inclusive.
- This includes for the costs of scaffold and removal of the existing render along with the re-render process and all materials.
- The actual project cost will always be calculated on house type and M2 area.
- It would always be prudent to allow an additional provisional sum of around 20% to allow for any other fabric issues un-covered as a result of the works to each individual property. Projects of this type should always seek to resolve common issues. It is simply best practice taking advantage of an opportunity.
- In a wet winter the works are difficult for the contractors and trades. Seasonal rates could be considered going forward.
- The total cost of the works is not dissimilar to other 'flat slab' panel insulation and render coating (when one includes all the costs as included above). In general, the rates are within 10% of each other. Outcomes of these alternatives however, do not meet the aims of this demonstration

Conclusions of Ethel Street Decarb-Render Project

- It is anticipated that tenants will feel more engaged with and understand more of their impact on their house through living habits and therefore the wider requirements in connection with the climate agenda by increased consciousness of the overall effect of lowering their impact. Every small change makes a difference.
- It is widely accepted that streetscape facade improvement and the whole appearance of a community has a positive sense and outcome. It increases pride of place and a sense of wellbeing. The four facades on Ethel Street are a start.
- Positive independent data collection has been achieved and is showing positive benefit in insulation and humidity control within the houses with independent insitu date recording of **0.32Wm/K U-value** for this type of wall construction.
- Drying of the walls is effective but at the time of writing the timescale is unknown for the bottoms of the walls, specifically where they have been historically saturated and are located against the pavement. It is expected by Vivus Solutions, from previous experience, that they will eventually dry out and reach a suitable balance in the summer, timeline will depend on rainfall and resultant splash-back.

Outcome of Ethel Street Decarb-Render

A fabric first demonstration and introduction to a new standard in housing envelope - wall performance, helping RSLs to comply with WHQS(2), Futuregenerations and achieve Societal requirements of hygrothermal efficiency, affordable warmth and decarbonization.

The external appearance is a traditional vernacular finish - enhancing streetscapes and therefore the houses have not been changed by retrofit measures other than improvements in aesthetic quality. The historic nature and integrity of the buildings has only been enhanced. The insulation performance does not require the considerable ruination of the façade and streetscape by the addition of flat slab insulation materials and modern render.

The visible increase in depth of render over the cement pebbledash is imperceptible.

It can be reasonably expected that this approach will contribute to a scope reduction of additional retrofit measures as the homes will be performing to an optimum in themselves.

In writing this report we have tried to be objective and impartial and in partnership with TAFF Housing.

TAFF

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Project Address
2,4,8 & 10 Ethel Street
Canton
Cardiff
CF5 1EJ

Project Reference
Ethel Decarbonisation Render

Building Use:
Domestic

Build Type:
Refurbishment

Element Type:
External Wall - Solid Brick

Material	Conductivity W/mK	Percent %	Thickness mm	Resistance m^2K/W
Internal Surface (Rsi)	.	.	.	0.1300
Bricks dense *	0.9600	90 ***	270	0.2531
Plaster dense *	0.5700	100	8	0.0140
Rendering external **	0.022	100	65	2.9545
External surface (Rse)	.	.	.	0.400

** Denotes Industry accepted values for conductivity*
*** Denotes The required result figures in order to calculate the actual recorded data @ No2 Ethel Street of 0.32 W/m²K*
**** Denotes 10% allowance for the possibility of voids between bricks in the vertical plane.*

Total thickness: 343mm

Total resistance: RT = Rsi+R+Rse = 3.174 m^2K/W

U-Value (uncorrected): $U = {}^1/_{RT} = 0.315\ W/m^2K$

Total ΔU: 0.010

U-Value (corrected): $U = {}^1/_{RT} + \Delta U =$ **0.325 W/m^2K**

Actual U-Value (recorded insitu) = **0.320 W/m^2K**
All measurements were carried out according to the ISO9869-1:2014 method using BTS' ISO 9869 U-value Measurements System which measures heat flow using heat flux plates.

The on site recorded value follows the application of Thermasec/Diffusec and is necessarily in part, due to the successful reduction in structural humidity.