Building Regulations Application Supporting Documentation

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Date: June 23, 2023

1 General summary

Alteration to existing extension and garage of single semi-detached dwellinghouse. Construction of porch.

2 Current property

The property is a 1940s-build three-bedroomed semi-detached dwellinghouse. At the time of construction, it consisted of the main house with a standalone garage. During the 1970's a single-storey extension was built in the space between the main house and the garage; the extension is approximately 0.5 m taller than the garage. The garage and extension are set-back from the main house by approximately 1.6 m. The soil conditions are firm clay.

3 Summary of proposed alterations

Proposed is a series of modest alterations to the front and interior of the property:

1. A small porch with a footprint of 1.3 m×2.3 m (area = 3 m^2) and a height of 3.13 m will be added to the front of the property; see §3.1);
2. The front elevation of the existing extension and garage will be brought in-line with the front elevation of the main property. A new doorway in a load bearing wall will give access to the extension; see §3.2;
3. A utility room will be built at the back of the existing garage. A new doorway in a load-bearing wall will give access to the utility room; see §3.3.

Detailed drawings with accompanying structural and U-value calculations are included with this application. What follows is a detailed description of the proposed build, including references – in square brackets – to details of and links to the materials.

3.1 Porch

With a footprint of less than 30 m^2, and requiring no structural changes to the existing structure, building regulations approval is not required for the proposed small porch; it is only included here for completeness.

3.1.1 Structural

- **Impact on existing structure:** The porch will lead to the existing front door, so its construction will not involve any structural work on the existing property.
- **Walls:** The external walls will consist of a single leaf of clay bricks and 7.3 N standard Dense Concrete Blocks (DCBs), tied to the existing building every 225 mm vertically. A Damp Proof Course (DPC) will run at least 150 mm above the ground level.
- **Footings:** The walls will sit on 900 mm deep, 225 mm thick, 500 mm wide concrete strip footings.
- **Openings:** A single-leaf steel lintel with a Safe Working Load (SWL) of 5 kN[1] will support 0.4 kN load above the new front door. A concrete lintel[2] will support the max. 0.4 kN load above the window.
- **Roof:** A cold flat roof will be supported by 47 mm $\times$ 120 mm C16 joists. One end of the joists will rest on the new wall, to which the joists will be tied, with the other end supported by joist hangers attached to a 47 mm $\times$ 120 mm C16 ledger running the length of the porch. The ledger will be bolted to the existing structure using M12 bolts resin-fixed to the existing structure at max. 400 mm horizontal spacings.

3.1.2 Heat and Sound Insulation

While the porch will not be heated, it will be insulated. Details follow:

- **Floor:** A 50 mm layer of Expanded Polystyrene (EPS)[3] insulation will insulate the concrete floor from the ground.
- **Walls:** Brick walls will be lined internally with studwork which will be in-filled with 100 mm EPS insulation.
- **Windows:** The single window will be double-glazed with uPVC frames.
- **Roof:** The inter-joist space will be filled with 100 mm of mineral wool insulation.[5]

3.1.3 Water runoff

- **Roof:** 20:1 firring strips will be used to create a slope on the flat roof. A 1.2 mm thick EPDM membrane[6] fitted according to manufacturer guidelines will be used to waterproof the roof.
- **Drainage:** Rainwater will drain into a gutter that will ultimately flow into an existing drain next to the garage.

3.1.4 Utilities

- **Electrical:** No electrical sockets are planned for the porch. A single internal electrical internal light will be installed in the ceiling, and downward-directed external lights will be installed externall. All electrical light fittings will be installed or approved by a qualified electrician.
- **Heating:** The porch will not be heated.
- **Water:** N/A

3.2 Extension

The alterations to the existing extension will involve the demolition of the front-facing wall and the construction of three walls: one parallel to the front elevation of the house (labelled as Cutaway A on plans), and two parallel to the side elevation. One of the latter will extend the existing wall between the extension and the garage (Cutaway B), the other will extend the external garage wall (Cutaway C).

3.2.1 Structural

- **Impact on existing structure:** A new 832 mm-wide doorway will be cut in an existing load-bearing wall to give access to the extension from the existing hallway. There are no point loads or openings above the planned doorway, and the first floor joists of the existing structure are above the 45° load triangle. A 1200 mm Stressline SL90 Steel Lintel rated to 16 kN will support the 0.64 kN load above the opening. The lintel will rest on 180 mm-wide bearings with padstones used if required.
- **Walls:** The walls of the extension will consist of a double leaf of clay brick and 7.3 N DCBs tied to the existing building every 225 mm vertically. The inner and outer leaves will be tied together every 600 mm horizontally and 450 mm vertically, reducing to 225 mm around openings. The garage wall will consist of a single leaf of clay brick and 7.3 N DCBs tied to the existing building every 225 mm vertically. The single leaf wall will have a 327×215 mm pier at the end, which is 1300 mm from a pier in the existing garage wall. All walls will have separate DPCs for the inner and outer leaves at least 150 mm above the ground level.
- **Footings:** The double-leaf walls will sit on 900 mm deep, 225 mm thick, 600 mm wide concrete strip footings. The single-leaf wall will sit on 900 mm deep, 225 mm thick, 400 mm wide concrete strip footings.
- **Openings:** The front wall of the extension will include a large opening to accommodate a near floor-to-ceiling window. The opening will extend upward to the roof joists, so no load-bearing lintel is required.
- **Roof:** A warm flat roof will be supported by 47 mm × 120 mm C16 joists, separated by noggins. One end of the joists will rest on the inner leaf of the extended wall between the extension and the garage, to which every other joist will be tied. The other end of the joists will be supported by joist hangers attached to a 47 mm × 120 mm C16 ledger running the entire length of the extension. The ledger will be bolted to the existing structure using M12 bolts resin-fixed to the existing structure at max. 400 mm horizontal spacings. The existing uninsulated garage roof will be extended forwards to meet the new front of the garage. The extension to the garage roof will be supported by 47 mm × 120 mm C16 joists. One end of the joists will rest on the outer leaf of the extended wall between the extension and the garage, to which every other joist will be tied. The other end of the joists will be rest on the single leaf garage wall, to which every other joist will be tied.

3.2.2 Heat and Sound Insulation

- **Floor:** A 100 mm layer of Expanded Polystyrene (EPS)[8] insulation will insulate the concrete floor from the ground. The overall U-value of the floor is 0.15 $W\,m^{-2}\,K$.
- **Walls:** The 140 mm front-facing wall cavity will be partially filled with a 115 mm layer of Cavity Board Insulation.[9] The overall U-value of the front-facing wall is 0.15 $W\,m^{-2}\,K$. The

85 mm cavity in the wall separating the extension from the garage will be fully-filled with mineral wool.[10] A wider cavity cannot be created as the wall is extending an existing wall forward. The overall U-value of the extension/garage wall is 0.33 $W\,m^{-2}\,K$. The single leaf garage wall will not be insulated.

- **Windows:** The window will be double glazed and have a uPVC frame. Unusually, the window will sit on the inner leaf wall to accommodate the external louvres shown on the plans. This potentially introduces a thermal bridge which will be overcome by surrounding the window with CompacFoam.[11]
- **Roof:** The warm flat roof will contain a 150 mm-thick layer of thermaset insulation.[12] The overall U-value of the roof is 0.15 $W\,m^{-2}\,K$.

3.2.3 Water runoff

- **Roof:** 20:1 firring strips will be used to create a slope on the flat roof. A 1.2 mm thick EPDM membrane[6] fitted according to manufacturer guidelines will be used to waterproof the roof.
- **Drainage:** Rainwater will drain into a gutter that will ultimately flow into an existing drain next to the garage.

3.2.4 Utilities

- **Electrical:** The existing ring-main will be extended to accommodate two double plug sockets. The existing light switch will be moved to the new entrance spotlights will be installed in the ceiling. All electrical light fittings will be installed or approved by a qualified electrician.
- **Heating:** The extension will be heated. The current wall-mounted radiator will be replaced by a larger one.
- **Water:** There will be no mains water supply in the extension.

3.3 Utility Room & WC

The rear of the existing garage will be partitioned-off and converted into a utility room and w/c (collectively referred to as the "rear room" hereafter). The existing wooden rear wall of the garage will be replaced by a double leaf of brick and blockwork. The existing single-leaf garage wall will be insulated. An insulated partition wall lined with BS-EN-520-compliant plasterboard[13] will be constructed between the rear room and garage.

3.3.1 Structural

- **Impact on existing structure:** A new 830 mm-wide doorway will be cut in an existing brick wall to give access to the rear room from the existing kitchen. There are no point loads or openings above the planned doorway, and the ceiling joists of the existing structure are above the 45° load triangle. A 1200 mm Stressline SL90 Steel Lintel rated to 16 kN will support the 0.64 kN load above the opening. The lintel will rest on 180 mm-wide bearings with padstones used if required.
- **Floor:** A suspended floor will be installed. The floor will be supported by 47 mm × 120 mm C16 joists – separated by noggins – which will rest on 160 mm sleeper walls. Breather bricks will be installed in the rear wall to ensure good ventilation within the floor cavity.

- **Walls:** The rear wall of the rear room will consist of a double leaf of clay brick and 7.3 N DCBs tied to the existing building every 225 mm vertically. The inner and outer leaves will be tied together every 600 mm horizontally and 450 mm vertically, reducing to 225 mm around openings. The rear wall will have separate DPCs for the inner and outer leaves at least 150 mm above the ground level. The existing single-leaf garage wall will be raised by roughly 650 mm to match the height of the opposing wall and be lined with an insulated stud wall. The partition wall between the rear wall and garage will consist of three courses of brick including a DPC onto which an insulated and fire-proofed stud wall will be built. A sound-insulated stud wall (not shown on plans) will be constructed between the utility room and w/c.
- **Footings:** The double-leaf rear wall will sit on the existing wall of the garage. Existing plans from when these were constructed show that they sit on 600 mmwide, 225 mm thick footings. The wall between the rear room and the garage will sit on the existing gararge floor, which existing plans show to consist of a 100 mm thick layer of concrete.
- **Openings:** The rear wall of the extension will include a 830 mm-wide opening to accommodate an external door, and a 500 mm-wide opening to accommodate a window. 1200 mm and 900 mmStressline SL130 lintels,[7] rated to 16 kN will support the 0.68 kN and 0.5 kN respective loads above the openings. The lintels will sit on min. 150 mm-wide bearings.
- **Roof:** A warm flat roof will be supported by 47 mm $\times$ 120 mm C16 joists, separated by noggins. One end of the joists will rest on existing wall between the utility room and kitchen, the other end will rest on the raised single-leaf garage wall. Every other joist will be tied to the walls at each end.

3.3.2 Heat and Sound Insulation

- **Floor:** The suspended floor will be insulated with 100 mm Kingspan K103 insulation, or similar, between the floor joists and held in place with wooden batons. The overall U-value of the floor is 0.19 $W\,m^{-2}\,K$.
- **Walls:** The 140 mm rear-facing wall cavity will be partially filled with a 100 mm layer of Cavity Board Insulation.[15] The overall U-value of the rear-facing wall is 0.17 $W\,m^{-2}\,K$. The 125 mm cavity on the side wall will be fully-filled with Kingspan K106 or similar.[16] The overall U-value of the size wall is 0.16 $W\,m^{-2}\,K$; the U-value calculation assumed that the internal timber frame accounts for 15 per cent of the wall area. The stud wall between the rear room and the garage will be fully-filled with Kingspan 125 mm Kingspan K106[16] insulation and lined on the rear room-side with 40 mm insulated plasterboard.[17] The total U-value for the rear room/garage wall is 0.17 $W\,m^{-2}\,K$, again assuming the timber frame accounts for 15% of the wall area.
- **Windows:** The window will be double glazed and have a uPVC frame.
- **Roof:** The warm flat roof will contain a 150 mm-thick layer of thermaset insulation.[12] The overall U-value of the roof is 0.15 $W\,m^{-2}\,K$.

3.3.3 Utilities

- **Electrical:** The existing ring-main will be extended to accommodate a double plug socket in the utility room. New light switches and fittings will be installed. All electrical light fittings will be installed or approved by a qualified electrician.

- **Heating:** The utility room will not be heated, but the w/c will be heated by a small towel rail connected to the central heating system.
- **Water:** Water will be provided to the sink and toilet in the w/c by extending the existing mains supply from the kitchen. Drainage from the toilet and sink will run into a foul waste pipe initially running under the suspended floor (supported to ensure a 1:40 gradient), then leaving through the newly-built rear wall to join the existing foul water pipe at the rear of the house.

3.3.4 Water runoff

- **Roof:** 20:1 firring strips will be used to create a slope on the flat roof. A 1.2 mm thick EPDM membrane[6] fitted according to manufacturer guidelines will be used to waterproof the roof.
- **Drainage:** Rainwater will drain into a gutter that will ultimately flow into an existing drain next to the garage.

Materials

[1] Catnic External Solid Wall Single Leaf Angle Lintel ANG BSD1002700 $88 \times 91 \times 1200$ mm.

[2] Supreme Prestressed Textured Concrete Lintel $65 \times 100 \times 900$ mm P100

[3] 50 mm Celotex PIR Insulation Board GA4000. Thermal conductivity: 0.022 W/mK

[4] 100 mm Celotex PIR Insulation Board GA4000. Thermal conductivity: 0.022 W/mK

[5] 100 mm Knauf Insulation OmniFit Insulation Roll. Thermal conductivity: 0.04 W/mK

[6] ClassicBond 1.2mm EPDM Rubber Roof Membrane

[7] Stressline Standard Leaf Cavity Wall Lintels. Rated to 16 kN.

[8] Kingspan 100mm Thermafloor TF70. Thermal conductivity: 0.022 W/mK

[9] Kingspan 115mm Kingspan Kooltherm K106 Cavity Board. Thermal conductivity: 0.019 W/mK

[10] Knauf Dritherm Cavity Slab 32 85mm. Thermal conductivity: 0.032 W/mK

[11] CompacFoam 200

[12] 150 mm Kingspan Thermaroof TR27 insulation. Thermal conductivity: 0.024 W/mk

[13] British Gypsum Gyproc Fireline Plasterboard Square Edge 12.5mm

[14] 100mm Kingspan Kooltherm K103 Floorboard Insulation. Thermal conductivity: 0.019 W/mK.

[15] Kingspan Kooltherm K108 Partial Fill Cavity Wall Insulation. Thermal conductivity: 0.019 W/mK.

[16] Kingspan Kooltherm K106 Full Fill Cavity Wall Insulation. Thermal conductivity: 0.019 W/mK.

[17] Celotex PIR Thermal Laminated Insulation Board. Thermal conductivity: 0.022 W/mk.