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Case Study

Rhyd-y-car Terrace

Student Name: Yimi Calix

Student ID: 2514038

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Lecturer: Rhodri Thomas

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1. Introduction

Near the city of Cardiff, at the St Fagans National Museum of History, Rhyd-y-car Terrace is located. It represents a valuable example of working-class housing in South Wales, reflecting approximately 150 years of social and industrial change. The houses were originally built around 1795 by the iron industrialist Richard Crawshay, with the aim of providing appropriate housing for workers employed in the mines and ironworks of Merthyr Tydfil during a period of rapid industrial expansion. (Museum Wales, n.d.)

In each historical period, these dwellings were considered to be of good quality for the working class, as their purpose was to attract skilled ironworkers, who at that time benefited from higher wages compared to other sectors. Although the houses were relatively small in scale, they offered better living conditions than many other dwellings, particularly those located in rural or semi-rural areas where many industrial centres were established. (Historic England, 2025)

At St Fagans, six houses from the original terrace have been preserved and restored to show how they may have been occupied in the years 1805, 1855, 1895, 1925, 1955, and 1985. This representation, based on specific time periods, allows a direct observation of how construction methods evolved over time, as well as changes in internal spatial layout and the introduction of services, in response to economic changes, public health concerns, and advances in construction. For this reason, Rhyd-y-car Terrace constitutes a valuable case study for understanding the evolution of construction in Wales.

2. Case Study Analysis

2.1. Historical Context of Rhyd-y-car Terrace

Rhyd-y-car Terrace developed within a context of profound social and economic transformation associated with the Industrial Revolution in South Wales. By the late eighteenth century, Merthyr Tydfil changed from a predominantly rural environment into one of the main industrial centres in the United Kingdom, initially driven by iron production and later by coal mining.

Merthyr Tydfil became widely known as the iron capital of Wales, as increasing industrial demand transformed what had previously been a largely rural landscape. The rapid expansion of iron production led to the introduction of industrial structures, such as furnaces and chimneys, which were imposed onto the surrounding countryside (Age of Revolution, n.d.).

The rapid expansion of industry generated a strong demand for labour, which resulted in population growth near the centres of employment and, an increasing need for housing. During this period, industrial entrepreneurs such as Richard Crawshay promoted the construction of workers' housing in order to attract and retain a skilled workforce (National Library of Wales, n.d.).

These dwellings, generally arranged in terraced rows, were located close to workplaces in order to reduce travel distances and ensure productivity at a time when transport options were limited.

2.2. Comparison of construction elements over time.

This section analyses the evolution of different construction elements observed at Rhyd-y-car Terrace, comparing how they developed over time as represented in the museum. The changes observed reflect both the need to provide improved services and comfort within the dwellings and to correct shortcomings in the original constructions, as well as the influence of new technologies and changing social expectations related to housing.

Through the study of windows and doors, wall finishes, roofs, eaves and rainwater drainage systems, floors, and internal joinery, it is possible to observe a gradual transition from basic construction solutions towards methods aimed at

improving comfort, durability, and sanitary conditions (Public Health Act 1848, n.d.).

This analysis also allows an understanding of how domestic construction evolved in response to recurring issues such as dampness, poor ventilation, and the lack of services, while still maintaining limitations related to cost and available space.

2.2.1. Windows and Doors

The windows in the dwellings corresponding to the early period present reduced dimensions and timber frames with single glazing divided into small panes. The small timber-framed windows observed in the earlier houses are consistent with traditional flush casement windows, which offered limited resistance to weather conditions due to gaps between the sash and the frame. This type of window was common in early domestic construction and performed poorly under harsher weather conditions (see Appendix A).

This configuration was typical in the late eighteenth century, when glass was an expensive material and its production was limited. The proportion between openings and solid walls is small, which restricts the entry of natural light and ventilation. The thick walls create deep window jambs, reinforcing the sense of enclosed internal spaces. As a result, internal ventilation depended largely on the opening of the main door, indicating that the windows were not designed to provide thermal comfort, but rather to fulfil a basic function of lighting and minimal ventilation (Wychavon District Council, 2007).

2.2.2. Wall coverings

The wall finishes at Rhyd-y-car Terrace clearly reflect the evolution of traditional construction and living conditions over time. In the earliest periods, the dwellings present solid stone masonry walls, built as solid walls without cavities and using lime mortar. These walls, of considerable thickness, provided structural stability and durability; however, they offered limited thermal insulation and were vulnerable to damp-related issues. A lack of control over thermal insulation can also be observed, particularly due to the absence of a damp-proof course (DPC), which was a common characteristic of traditional construction prior to 1919.

Through simple observation, (see Appendix A), it can be noted that in the earliest houses the internal finishes were basic, typically consisting of plastered or limewashed walls applied directly onto the masonry. The use of lime allowed the walls to “breathe”, facilitating moisture evaporation, although it did not prevent the appearance of damp patches or surface deterioration. Externally, the walls were often rendered or limewashed, as observed on the façades, in order to improve protection against weather exposure and to unify the overall appearance of the terrace.

Over time, particularly towards the late nineteenth century and throughout the twentieth century, more decorative internal finishes were introduced, such as wallpaper, which concealed irregularities in the substrate and responded to changing expectations of comfort and aesthetics. However, these finishes could also exacerbate damp-related problems by reducing the wall’s ability to evaporate moisture. In more recent periods, wall finishes show greater standardisation and a clearer separation between structural function and internal finish, reflecting the transition towards more controlled construction solutions oriented towards domestic comfort (Historic England, 2025).

2.2.3. Roof Coverings

The roof covering systems observed at Rhyd-y-car Terrace show a gradual evolution that responds both to the availability of materials and to the need for protection against the climate. In the earliest periods, the dwellings present pitched roofs covered with local stone elements, used in the form of slabs or small stone flags. This type of roofing was common in South Wales, where stone was an accessible and durable material; however, its considerable weight required robust roof structures to support the imposed loads (see Appendix B).

Stone slabs provided good resistance against rain and wind, but their installation was labour-intensive and depended largely on the correct overlapping of the pieces in order to prevent water ingress. In the earliest roofs, there was no continuous waterproof membrane beneath the covering; therefore, watertightness relied almost entirely on the roof pitch and the overlap between the stone slabs. This condition made the roofs vulnerable to water penetration under adverse weather conditions.

With the progress of the nineteenth century and the improvement of transport networks, the use of slate became more common, as it could be distributed on a larger scale from quarrying areas. Slate offered a lighter and more regular solution than stone, allowing more uniform installation and reducing the loads acting on the roof structure. In later periods, secondary protective layers were introduced beneath the roof covering, improving moisture performance and increasing the overall durability of the system. These changes reflect a transition from traditional solutions based on local materials towards more standardised and efficient roofing systems (Derbyshire County Council, 2013).

2.2.4. Eaves details and rainwater goods

The eaves details and rainwater drainage systems at Rhyd-y-car Terrace show a clear evolution in response to the need to protect the walls and improve moisture control. In the earliest periods, the roofs present very limited or almost non-existent eaves, with the roof edge aligned directly with the façade. This solution was common in traditional construction but offered limited protection against rainfall, allowing water to run directly onto the masonry walls (see Appendix B).

The absence of effective rainwater drainage systems in the earliest dwellings meant that rainwater control relied almost exclusively on the roof pitch and the durability of the materials. As a result, external walls were more prone to surface dampness and deterioration of the wall finishes, particularly in humid climates such as that of South Wales.

Over time, gradual improvements were introduced in the eaves details, slightly increasing the roof overhang in order to direct water away from the façades. At the same time, gutters and downpipes began to be incorporated, initially manufactured from cast iron, allowing rainwater to be collected and directed in a more controlled manner. These systems reduced the direct exposure of the walls to water and contributed to an improved hygrothermal performance of the building.

In more recent periods, rainwater drainage systems show greater standardisation and more efficient design, reflecting an increased understanding of the importance of water control in building durability. The evolution of eaves and

drainage elements therefore demonstrates a shift from minimal solutions towards more effective strategies for protecting the building envelope (Derbyshire County Council, 2013).

2.2.5. Floor coverings

The floor finishes at Rhyd-y-car Terrace reflect both the technical limitations of traditional construction and the evolution of comfort expectations over time. In the dwellings corresponding to the earliest periods, ground-floor floors are characterised by simple and durable solutions, such as solid floors laid directly onto the ground. These could consist of compacted earth or surfaces finished with stone slabs or simple ceramic tiles, primarily designed to withstand wear and moisture rather than to provide thermal comfort (see Appendix A).

At upper levels, and in some cases also in later ground floors, suspended floors formed by timber joists and boarded decking were introduced. The timber boards, usually laid perpendicular to the joists, served both as the structural element of the floor and as the final finish. This type of floor covering provided a warmer and more flexible surface than solid floors, although initially it lacked thermal or acoustic insulation. With prolonged use, the natural movement of the timber and the loosening of nails produced characteristic creaking sounds, a common feature in historic buildings.

Throughout the twentieth century, the introduction of additional floor finishes such as carpets and linoleum can be observed, reflecting increased concern for comfort, hygiene, and noise reduction. These changes did not necessarily involve modifications to the floor structure itself, but rather adaptations to the surface finish. Overall, the evolution of floor coverings at Rhyd-y-car Terrace illustrates the transition from purely functional solutions towards approaches aimed at improving habitability without significantly altering the original construction (Museum Wales, n.d.)

2.2.6. Internal Joinery

The internal joinery at Rhyd-y-car Terrace shows a gradual evolution that reflects both the economic limitations of working-class housing and changes in expectations of comfort and privacy over time. In the earliest periods, joinery

elements were scarce and very simple in design. Internal doors were typically made of assembled timber boards, without decorative mouldings, and the frames were integrated directly into the masonry walls. Functionality and durability were prioritised over any aesthetic considerations (see Appendix B).

Internal staircases, where present, were narrow and steep, constructed from solid timber and designed to occupy the minimum possible space. Other joinery elements, such as skirting boards or mouldings, were limited or non-existent, reinforcing the austere character of the interiors. This simplicity responded both to the cost of materials and to the need to make maximum use of the available space in dwellings of reduced size.

Over time, particularly towards the late nineteenth century and throughout the twentieth century, a greater presence of internal joinery elements can be observed. Doors acquired more refined finishes, and simple mouldings began to appear around frames and ceilings. The introduction of built-in cupboards, shelving, and other fixed timber elements reflects a growing concern for space organisation and domestic comfort.

In more recent periods, internal joinery shows a higher level of standardisation, with industrially manufactured components and uniform finishes. These changes demonstrate a transition from minimal and craft-based solutions towards more comfortable and functional interiors, without significantly altering the original structure of the dwellings (Historic England, 2025).

Table 1. Summary of construction elements across periods at Rhyd-y-car Terrace
Source: Own elaboration

Construction element	Early periods (c. 1805–1855)	Intermediate periods (c. 1895–1925)	Later periods (c. 1955–1985)
Windows and doors	Small timber-framed windows with single glazing and small panes. Solid timber doors with a functional design.	Introduction of sash windows allowing improved ventilation and daylight. Gradual improvement in ironmongery and joinery.	More standardised window units with improved sealing and larger openings. Doors with more refined finishes and fittings.

Wall coverings	Solid masonry walls finished with lime-based plaster or limewash, allowing breathability.	Introduction of decorative finishes such as wallpaper applied over existing walls.	More uniform and decorative wall finishes, often reducing wall breathability.
Roof coverings	Pitched roofs covered with local stone slates. Heavy construction relying on roof pitch and overlap for weather protection.	Increasing use of natural slate, offering a lighter and more regular roof covering.	More standardised roof coverings with the addition of secondary moisture protection layers.
Eaves and rainwater goods	Minimal or no eaves. Absence of gutters, allowing rainwater to run directly over external walls.	Introduction of cast iron gutters and downpipes providing controlled rainwater disposal.	More efficient and standardised rainwater goods improving façade protection.
Floor coverings	Solid ground floors of compacted earth, stone flags or simple tiles.	Timber floorboards introduced, particularly on upper floors; use of rugs and carpets.	More comfort-focused finishes such as linoleum and fitted carpets over existing floor structures.
Internal joinery	Minimal internal joinery: simple timber doors, narrow staircases and little or no decorative mouldings.	Increased use of simple mouldings and improved door finishes reflecting changing expectations of comfort.	More standardised internal joinery, including fitted cupboards and improved space organisation.

During the twentieth century, housing construction in the UK increasingly adopted standardised materials and methods aimed at improving comfort, efficiency and durability, reflecting wider changes in building practice (NHBC, 2019).

3. Part 2: Annotated Construction Sketches

The following section presents annotated construction sketches illustrating typical building arrangements for three key periods represented at Rhyd-y-car Terrace: pre-1900, the 1950s and post-2000. The sketches focus on fundamental construction elements, including walls, floors, roofs and damp control, and are intended to support the analysis presented in Part 1.

3.1. Pre-1900 construction sketch

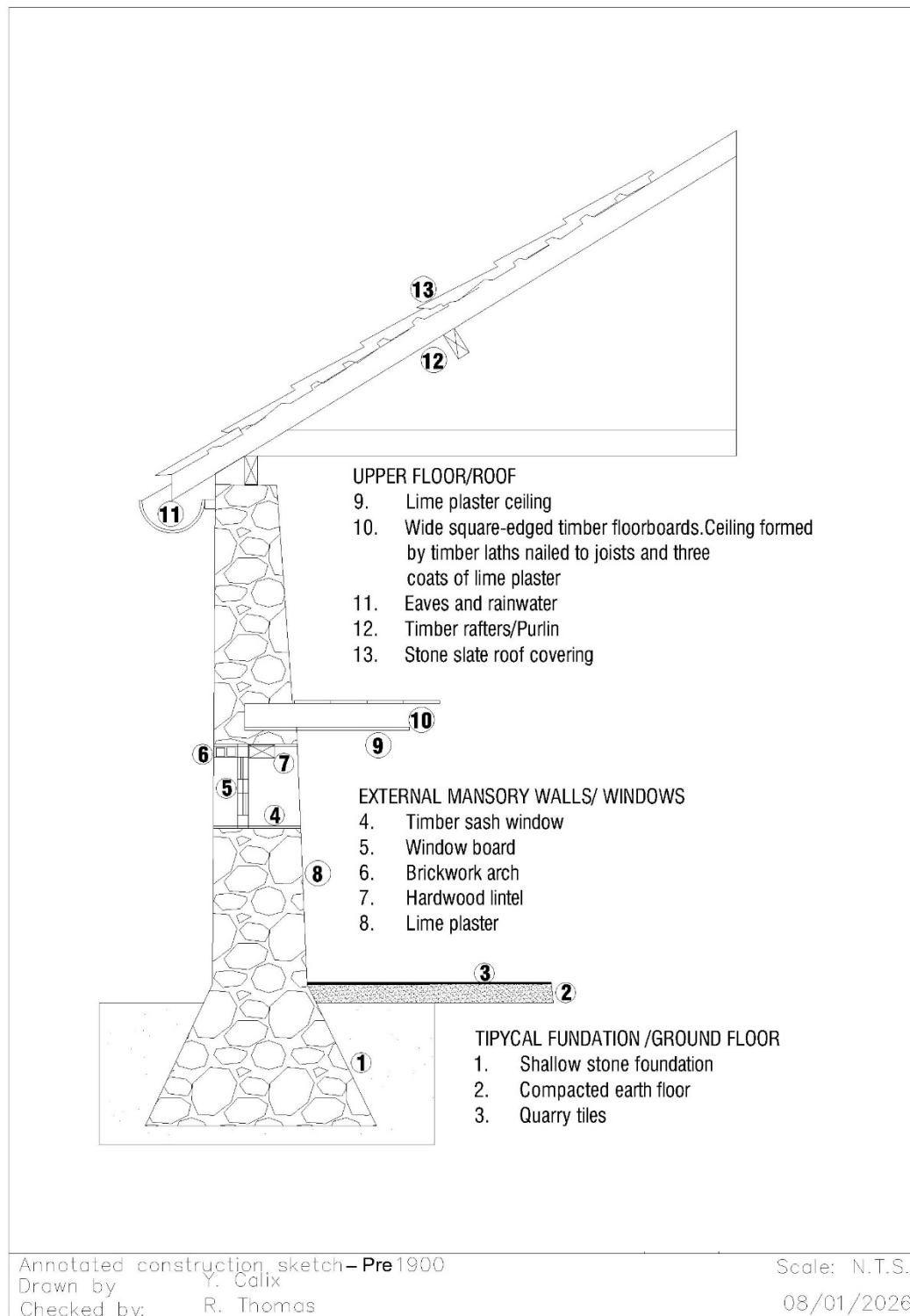


Figure 3.1: Annotated construction sketch – 1950s.

Source: Author's own DWG sketches, selected terminology informed by (Thomas, 2025).

3.2. 1950s construction sketch

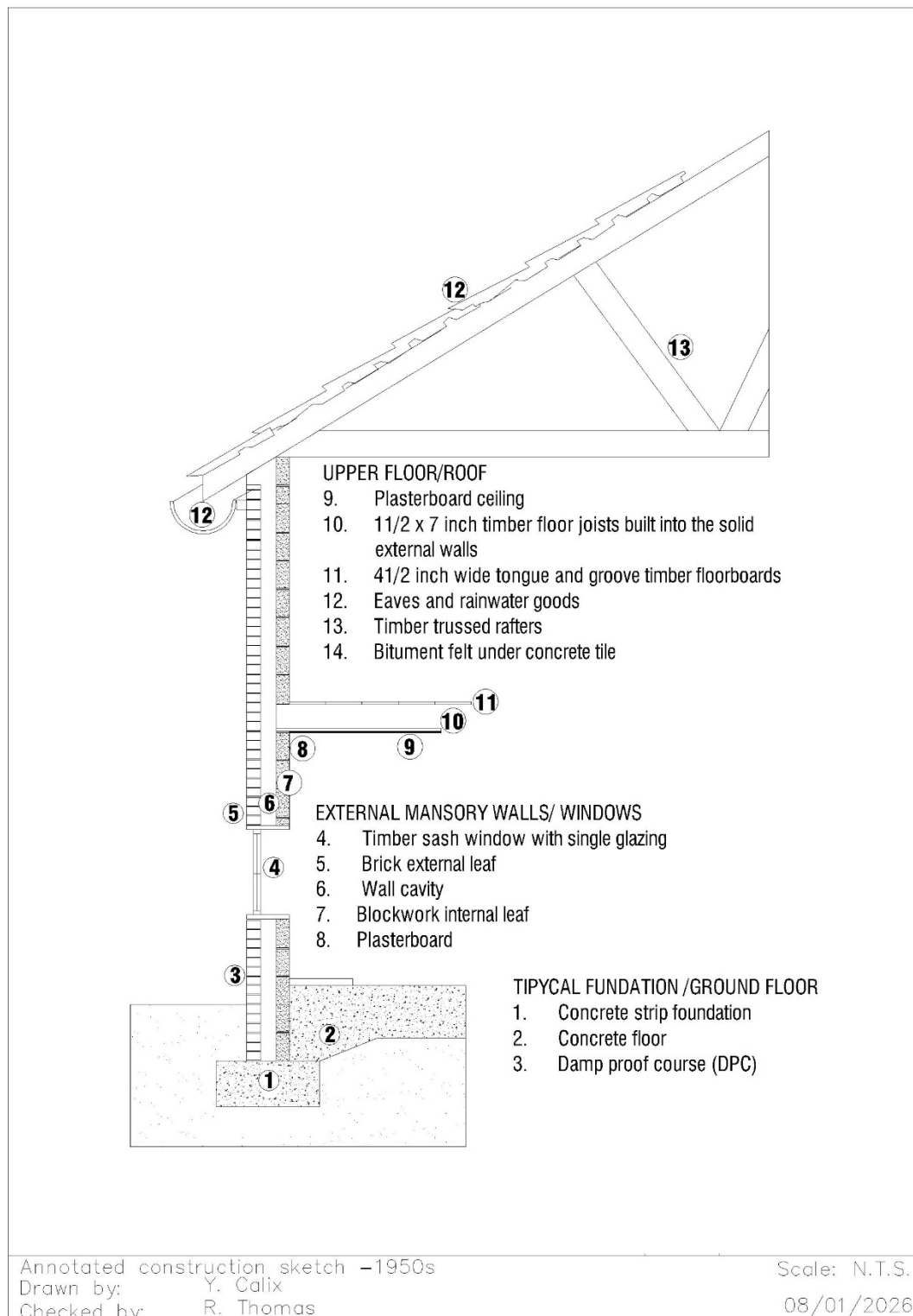


Figure 3.1: Annotated construction sketch – 1950s.

Source: Author's own DWG sketches, selected terminology informed by NHBC guidance).

3.3. Post-2000 construction sketch

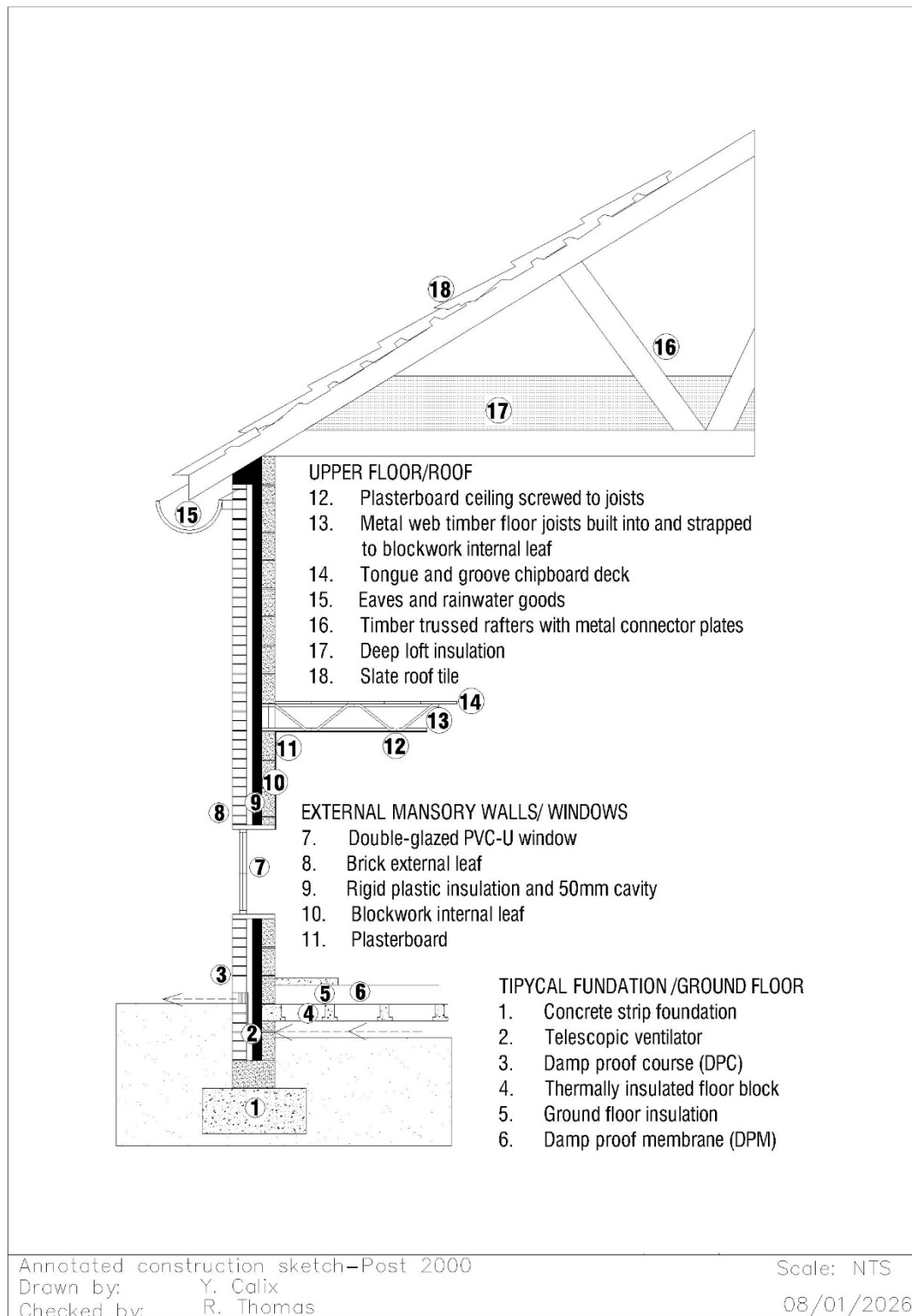


Figure 3.3: Annotated construction sketch – Post 2000.

Source: Author's own DWG sketches, selected terminology informed by NHBC guidance).

4. Conclusion

The case study of Rhyd-y-car Terrace demonstrates how the evolution of domestic construction was closely linked to social, technological, and public health changes. The changes identified in the main construction elements described in this study such as walls, floors, joinery, roofs, and rainwater drainage systems show a transition from craft-based techniques towards more standardised systems, oriented towards improving durability and habitability.

The construction sketches developed for the pre-1900, 1950s, and post-2000 periods visually reinforce this evolution, illustrating solutions from each period that improved service levels and living comfort, such as moisture control through the introduction of the damp-proof course and thermal insulation. These developments were not solely technological changes, but also responses to public health challenges during the nineteenth century, particularly disease outbreaks associated with poor sanitary conditions in working-class housing. This situation drove legislative reforms and contributed to the evolution towards improved hygiene and environmental comfort (Public Health Act 1848, n.d.).

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6. APPENDICES

Appendix A



Figure A1: External view of terrace houses (a), Interior wall finishes (early period). Sub-figures (a–h)

Source: author's own photographs.

Appendix B



Figure B1: Roof covering detail (a-c) and some internal joinery across different periods (d-j)
Source: Author's own photographs.