

Assignment Part 1 - Case Study: Fundamentals of Construction Technology

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Abstract

This is a case study examining the six respective houses on the Rhyd-Y-Car Terrace in St Fagans National Museum of History. Each house on this terrace is from a different decade; 1805, 1855, 1895, 1925, 1955 and 1985 respectively. We can use this row of terraces to demonstrate how building practices, standards, preferences, techniques and materials have changed throughout the 19th and 20th centuries in the UK.

Introduction

The purpose of this case study is to examine the differences in construction techniques, standards and use of materials in different eras in the UK. More specifically, the houses being investigated in this case study are typical houses from working-class towns in South Wales for their era. The timeline that is explored in this case study is important to look at because during this time there are major societal and economic events which would be expected to have large impacts on the construction industry.

Firstly, between the 1805 Georgian-era house, 1855 mid-Victorian era house and 1895 era houses you see an evolution of aesthetic styles and preferences for the different generation as well as being able to view the impact that rapid industrialization may have affected the construction industry and whether working-class construction projects mirrored this progress. There was also huge economic growth, and population

increases during the later 19th century according to data collected that (Warwick.ac.uk, 2022) extracted from (Broadberry et al., 2015).

Furthermore, we can see investigate the differences between early the 20th century house, where the construction industry would be impacted by the aftermath of the First World War in the form of delayed and halted projects, labour shortages due to military personnel and munitions factories requiring labour and the war's effect on vital infrastructure such as transport. (Atkin, 2020)

Post-Second World War, there would have been a significant need for urban housing due to events such as the blitz. When there is a greater demand for housing which the construction industry can not fulfil, this would likely force innovation and change in order to solve the crisis. Therefore, you would expect houses built in this time to have been built using newer techniques and technologies than building projects from earlier periods. (Chain, 2023)

Finally, the house built latest in this case study, in 1985, was built after a period of economic crisis and recession in Britain during the 1970s. According to Talk.build (2025), the Right to Buy policy enacted by the UK Government during this period increased the amount of social housing built in the UK. Due to these factors on top of emerging technologies during this period, construction practices would have yet again evolved.

Overall, there may be many interpretations of the cause of the evolution of construction on Rhyd- Y-Car Terrace. However, only using the 6 houses on the Rhyd-Y-Car Terrace exhibit in the St Fagans Museum limits the insight we can gain. Rhyd-Y-Car Terrace does not show pre-industrial revolution construction projects or modern projects. Also, we cannot make comparisons between rural and urban developments in this time and how they could possibly differ. There may also be large differences between social class housing in these different times which we would not be able to evaluate with additional factors such as the difference between construction projects in different regions across the UK. A larger dataset could serve to demonstrate the impact of social housing on British residential construction. The dataset is not large enough to be able to determine if Government social housing projects have increased or decreased the standards of housing for working class persons in Britain but it is important to mention that government regulations and standards likely played a large role in the evolution of the houses on Rhyd-Y-Car Terrace due to the increase in social housing in this period.

An example of this is asbestos regulations that came into law in 1985 in the UK which prohibited the use of crocidolite, a form of asbestos colloquially known as blue asbestos, which would have been prevalent in concrete used in houses prior to this legislation's existence. (Legislation.gov.uk, 2026)

The houses on the Rhyd-Y-Car Terrace will not be able to demonstrate changes in house sizes and floor plans over time as they are all terraced houses. Due to the post-war economic boom in the 20th century, the housing market had to accommodate for a greater demand for detached and semi-detached housing which became more popular through time. Furthermore, this case study is somewhat limited as the Rhyd-Y-Car

Terrace is a display of working class houses therefore it does not necessarily serve as a marker for when new construction technology and methods were introduced but rather when they became affordable for working class persons. Certain materials and techniques would perhaps be more prevalent in more expensive residential projects for a period but not typically found in residential projects for working class persons until they became significantly cheaper to be included in the development.

Discussion

Windows have changed over the time frame between the construction of the 1805 house and the 1985 house due to changes in technology and methodology of glass production which made windowpane production cheaper and quicker as well as producing higher quality grades of glass. (History of Windows & Glass, 2007)

The ability for the construction industry to source materials became greater over time also. Transportation of materials over greater distances became possible and cheaper during this time period with the advent steam trains, motor vehicles and the infrastructure to support it.

The 1805 house has traditional casement windows as shown in Figure 1. These windows are made up of crown glass. The windows have small panes and more glazing bars as windowmakers at the time did not often make large panes because the glass type, crown glass, was brittle and it would be more expensive to produce larger panes and

quite likely that most glass manufacturers lacked the technology to do this. Because of the relatively high brittleness of crown glass in comparison with modern alternatives, these windows are more likely to get damaged in harsh weather conditions such as storms. Also, the glass in these panes is relatively less smooth in comparison with modern alternatives and therefore produces an optical effect in the form of ripples. These ripples cause a smaller amount of natural light to enter the house. The sashes are likely made of oak or pine.

The windows of this era were not especially good insulators. The amount of joins due to the glazing bars would potentially result in a larger amount of heat transmitted externally because they were not sealed or weatherproof. These windows were also prone to leaks due to the fact that they didn't have cills designed to stop water seeping underneath the window. It is clear from Figure 1, Figure 2 and Figure 4 that insulation was also not a priority for construction projects during the 19th century. The window glass is not glazed, the joints are not sealed and the doors are not flush to the floor and there is no stripping around the doors in these houses. Modern construction projects place a large emphasis on insulation to improve the value of the house and reduce the need for the use of central heating.

Through time the design of the windows changed. In Figure 5 and Figure 6, the 1895 and 1935 houses, you can see that the design of the window has changed to a box and frame sash window. The components of this window are larger panes of glass, less glazing bars and the ability to open the windows for ventilation. A different type of glass was used compared to earlier years called plate glass. This allowed the production of

larger panes and the use of less glazing bars. This has a positive effect on the amount of natural light you receive internally and is more weather resistant than glass materials used in earlier periods.

The 1955 house has a side hinged window that uses less panes that is storm proof and likely uses a type of glass called Pilkinton glass which allowed larger pane manufacture, was a smoother glass and more weatherproof than glass of previous generations. As seen in Figure 8 the window in this era has now been side-hinged to allow it to open freely without having two separate panes like the box and frame design. This makes it a more insulated window as the seals are now only found in the seals of the frame instead of having a seal between the stationary and moveable pane in the box and frame window. In Figure 10 and Figure 8, you can see that the window now has iron handles added to the window.

The doors in the houses in the 19th century are less effective than the ones seen in the latter part of the 20th century as insulators. In Figure 10, you can see that the door is one whole piece of timber with panels as opposed to earlier doors like in the 1855 house (Figure 4). The door in the 1855 house is made up of several pieces of wood planks joined together. This is a less durable door design because there is more joins. A higher number of joins in the door also allows more areas where heat energy can be lost from within the house. Figure 11 also shows how earlier houses used a lintel built into the masonry, likely made of locally sourced hardwood, mortared into a brick archway above it. The lintel on the most modern house in Figure 11 is not incorporated into the

structure in this way. The lintel in that house is most likely a concrete lintel which is more durable than hardwood because it does not rot.

The floors in the houses are all composed of natural stone, which was likely sourced locally except from the 1955 house and the 1985 house where you can see different flooring materials used. There is a manufactured flooring material in the 1955 kitchen as shown by Figure 7. This material appears to be linoleum. The use of different materials for flooring can prevent heat loss as well as prevent moisture from the ground rising upwards. Style preferences and comfortability are also factors as to why materials used for flooring changed over time. Moreover, the same factor applies to every component of these housing projects which evolved over this time period, which is that supply chains and procurement methods became vastly different in terms of cost, efficiency and optionality. While the construction industry in the 19th century would have been forced to source more materials locally because there was limited infrastructure to transport materials from elsewhere and it was likely more costly to do so if you were able to. The construction industry in 1955 and 1985 did not have this same barrier to using non-locally sourced materials.

The potential changes in how foundations and walls are designed across the different houses in Rhyd-Y-Car terrace we cannot determine from photos. However, the interior of the walls changes from natural stone with lath and plaster in the earlier houses to plasterboard in the most modern house. During this time foundations would have changed to prevent heat loss and rising damp as well as becoming more stable by using

concrete slabs instead of having air space beneath your floor but we are unable to see that from the view of Rhyd-Y-Car in St Fagans. Walls would have also changed design in this time. Early walls would be one brick thick. Early 20th century walls on Rhyd-Y-Car may potentially have a cavity wall to prevent moisture from entering the house. The post-war period house could contain a second leaf wall that is made of concrete blocks with a cavity in between the concrete blocks and the external brickwork. We are only likely to see some sort of insulation in the cavity walls in the most modern house. This could be quilted insulation or mineral wool among other materials.

Conclusion

The manufacturing of materials such as: PVC, which is used in modern windows; concrete, which would be used on roof tiles in post-war houses more frequently and effectively (Figure 11) than roof tiles used on 19th century houses (which were more likely to use slate); or reinforced concrete, which would be used in foundations in the more modern houses instead of locally sourced hardcore stone which would be used in 19th century foundations is something which developed over this time period. This is a major driver behind the changes visible in Rhyd-Y Car. The manufacturing industry, especially during the post-World War 2 era where you can see its effect on Rhyd-Y-Car, standardized materials in the factory production of them. This should decrease the time

it takes to build homes because it makes construction more consistent and removes issues that may arise during construction.

An example of this issue could be sourcing timber joists that are the correct length for the project. Modern joists are manufactured by the steel industry or can be made of multiple individual pieces of timber which are joined together by galvanized steel. Moreover, the development of the manufacturing industry means that the large demand for construction materials in the modern era, and in the post-war rebuild during the 40s and 50s, can be met because vital materials such as steel, brick, cement can be mass produced. Even if resources are limited across Britain, due to globalization that occurred in the latter part of the 20th century, these materials can be mined, produced and transported from locations where they are far more abundant.

Appendix

Figure 1



(Museum Wales, 2026)

Figure 2



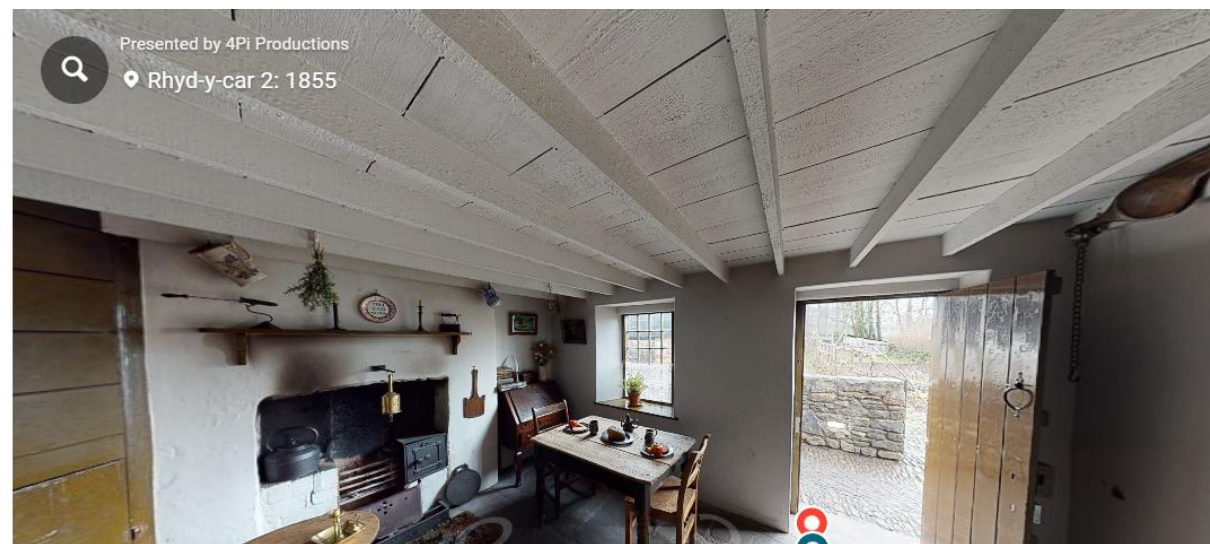
(Museum Wales, 2026)

Figure 3



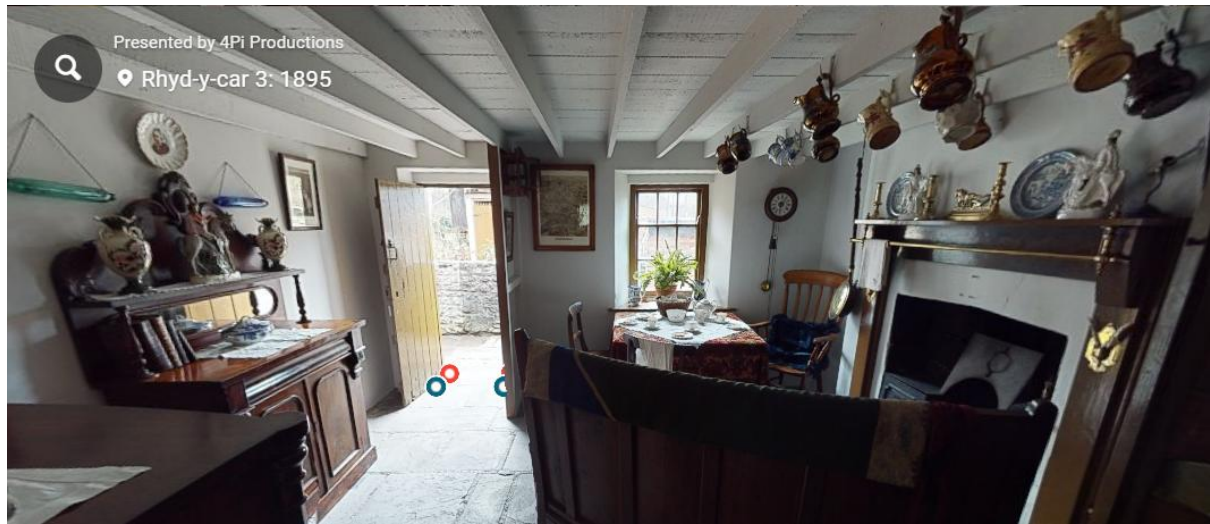
(Museum Wales, 2026)

Figure 4



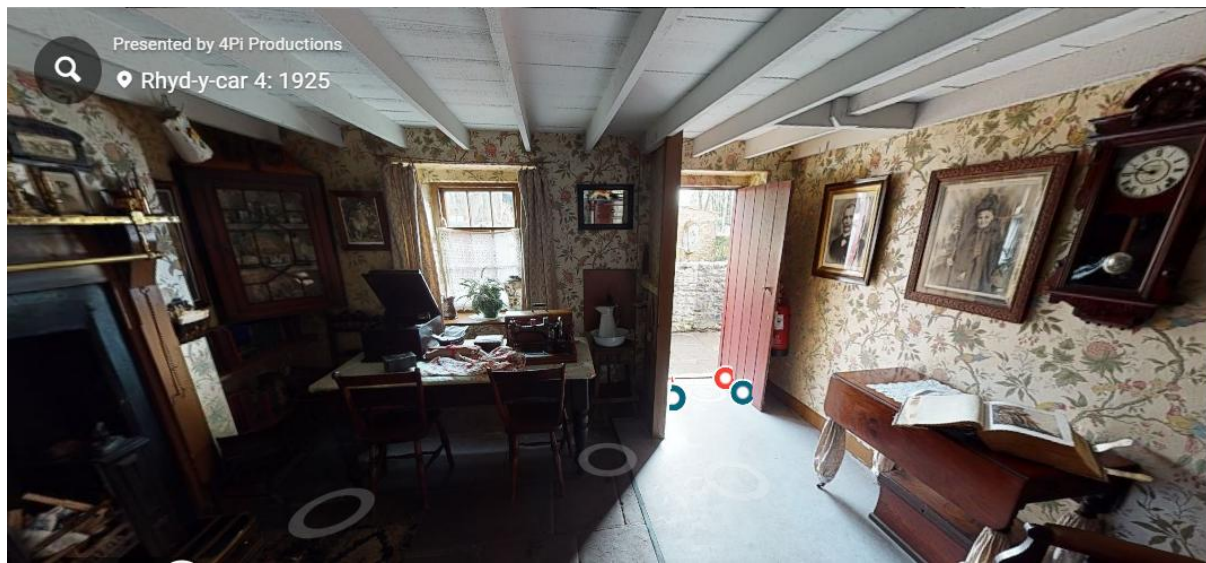
(Museum Wales, 2026)

Figure 5



(Museum Wales, 2026)

Figure 6



(Museum Wales, 2026)

Figure 7



(Museum Wales, 2026)

Figure 8



(Museum Wales, 2026)

Figure 9



(Museum Wales, 2026)

Figure 10



(Museum Wales, 2026)

Figure 11



(Museum, n.d.)

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Assignment Part 2 - Labelled Sketches of Pre-1900, 1950s and 2000s Houses

