FLOORBOARDS AND FOOTPRINTS -CONSTRUCTION OF THE FIRST FLOOR IN THE WEST FRONT AT CHATSWORTH

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INTRODUCTION

Details of the floor construction of the West Front of Chatsworth have recently been uncovered by an ongoing archaeological survey of the interior of the house. This survey has been undertaken as part of the Masterplan restoration project, one aspect of which includes the formation of a series of fire compartments within the walls and below the floors. This has resulted in areas of historic fabric being temporarily removed to undertake this essential work. This article discusses the constructional sequence of the first floor of the West Front, incorporating new and unexpected evidence in the form of footprints discovered beneath the floorboards originating from the craftsmen who were contracted to undertake the work in the 1830s.

LAYOUT OF THE WEST FRONT

The West Front of Chatsworth was built between 1699 and 1702 to a design by Thomas Archer (Thompson 1949, 70) and immediately followed the dismantling of the former Elizabethan range. The building accounts detail that new materials were sourced, including stone, timber, and lead and over 100,000 bricks were ordered in 1701 from Godfry Smith, many of which were destined for the new building (Chatsworth Building Accounts 1700-70, vol.7, 15). The four adjoining ranges surrounding the central courtyard are structurally different from one another with respect to their constructional details, reflecting the piecemeal re-building of the 16th century building in four stages between 1687 and 1707.

The West Front is orientated north-south, and on each floor the arrangement of rooms follows a standard layout, forming interconnected suites, or apartments with large windows providing views overlooking the River Derwent to the west. Each adjacent room could be accessed via an arrangement of sequential doorways in the west-east dividing walls along the west side of the range, forming an Enflade – a characteristic feature of Baroque palaces and large houses. Only the central room spanned the original width of the range, with a window overlooking the courtyard. Whilst there were windows along the east courtyard elevation on each floor, they lit a narrow corridor that provided a service function along the rear (east) side of the West Front. Secondary doorways from the principal rooms, often disguised as jib-doors, opened onto this east corridor.

Principal access between each floor was via a large staircase, the West Stair, which has a cantilevered design and open metal balustrade. Additional access was provided from the east corridor, thus creating a distinct division of space between the private family spaces and those principally used by the house staff. At the north end of the corridor, additional access was provided by a narrow stair that comprised of straight flights, whilst at the south end of the range on the other side of the West Stair, a closed well staircase provided a direct link between the ground floor, and the low attic spaces in the roof. The only extant evidence for either of these stairs is a short section of the south staircase within the roof space, although there is no direct access today as subsequent alterations on the floors below removed the lower sections.

THE FLOOR CONSTRUCTION 1699-1702

The construction of the first and second floors within the West Front is identical and their structure forms an integral structural element to the building, however, it is the first floor that is considered in detail here. Within each room, the floor comprises three principal beams (or girders) cut from oak, orientated north-south, and which span between the brick dividing walls forming each room. They are not equally spaced, which reflects the requirement for a corridor along the east side of the range – the rooms measuring 5.9m in width and the corridor measuring 2.3m in width. The ends of each beam are housed in recesses 20cm deep within the brickwork, the bases of which contain a narrow timber pad, clearly inserted as the walling was built up. The central beam and the one in the western half of the rooms, are on average 35cm x 35cm in scantling, whilst the third beam in the east half is smaller, only measuring 22cm x 22cm. As the internal carpentry was constructed within each room, this narrow beam was incorporated into a continuous stud partition, which acted as a load bearing wall throughout all of the floors.

Spanning between the principle beams is a double joist floor construction, the upper joists are the principle members supporting the floorboards, whilst the lower, secondary joists, support the ceiling of the rooms below. The principal joists are tenoned with a tusk-tenon into the principal beams, many of which are pegged from above, although the frequency with which pegs were used varies from one room to another. These joists measure 6.5cm x 16cm in scantling, with surface striations indicating that they were pit sawn. Where the upper faces of these joists meet the principal beams, crudely incised numerals were recorded. The arrangement of these numbered beams was, however, intermittent and there was no clear sequence of construction, and it is therefore suggested that they may represent the reuse of joists from an earlier phase of the house.

The upper faces of the principal joists are flush with the top of each of the principal beams, and the only exception to this is in relation to the stud wall that forms the corridor along the east wall. Here the joists are positioned above the floor beam, which has narrower dimensions and is set slightly lower within the floor. The corridor still survives in many of the rooms along the West Front, although in those instances where it has been removed evidence for the former studwork survives as cut mortices in the upper face of the east floor beam.

The lower joists within each floor appear to have had a smaller scantling than the principals above, however the majority of the original lower joists have been removed as part of subsequent alterations, being replaced by softwood timbers often set on an alignment different from that of the original 1700s floor. The evidence for the earlier ceilings survives as horizontal mortice slots in the lower face of the principal beams. Opposite each slot on the opposing principal beam were small tenons, into which the ceiling joists would have been slotted at one end, then slid sideways along the horizontal tenon until arranged at right angles to the principal beam. This technique enabled the flooring and ceilings to be assembled independently of one another as the construction programme dictated.

FLOORING ALTERATIONS c.1830s

The flooring of the West Front appears to have remained relatively unaltered, at least until the 1830s, when Jeffry Wyatville was commissioned to undertake an extensive re-modeling of the whole house by the 6th Duke undertaken between the 1820-30s. Within the West Front, Wyatville oversaw the replacement of all of the flooring, which coincided with a redesigned of the interior that incorporated a new decorative scheme. In fact, throughout the West Range, apart from the West Stairs and Sabine Room, all of the ceilings appear to have been substantially altered, or completely replaced. By 1838, Wyatville had added a new corridor at ground, first and second floors against the east courtyard elevation, which improved circulation patterns, although this was only achieved by the partial removal of sections of the east corridor.

The new flooring on the first floor comprised of two elements – the introduction of a layer of puggin, and the laying of new floorboards. To achieve this, many of the floors were raised by c. 2-3cm, involving the addition of a new softwood baton on the upper face of each of the principal floorboards from the earlier 1700s floor. Narrow strips of timber were then nailed approximately half way down each of the side faces of these raised joists to form shallow ledges. Narrow sections of plank, c.31cm in width, were then secured above those ledges with nails or secondary strips of wood. This effectively created a shallow trough within the thickness of the floor void that spanned between each principal floor joist. A layer of puggin, or deafening (Ashurst and Ireland 2011, 118), was then laid in the trough, which was poured as a wet plaster mix, levelled with a flat tool, and then allowed to set, to a depth of 5-6cm.

Once the puggin was set, new floorboards were fixed onto the softwood batons at the desired height, to create a continuous level surface between each room of the first floor. The floorboards were made of softwood, measuring 13.5-14cm in width and 2.5cm in thickness. They were secured with concealed horizontal metal dowels, set in drilled holes symmetrically aligned in the sides of each floorboard. All these dowels were hand forged with tapering ends and were 6cm in length. The method used by the carpenters to secure the floorboards was established following the interpretation of irregular spaced vertical holes that had been drilled within the upper face of the softwood batons added to the principal joists. These holes were used to hold a device that enabled horizontal pressure to be placed on each floorboard, thus forcing them together in tension to allow angled nails to be hammered between the metal dowels securing them in position. Once complete, there was no evidence from above as to how the floor was constructed, or fixed together.

During the archaeological recording, evidence for the craftsmen who worked on this phase of flooring alterations was identified in the form of pencilled initials on the underside of many of the floorboards, presumably representing a method of tracking the amount of work undertaken by each carpenter. In addition to this, footprints were identified as shallow impressions within the upper surface of the layer of puggin in many of the first floor rooms of the West Front (Plate 1). The footprints were completely random in their orientation, often surviving only as heel impressions. The principal characteristic of each print was the use of hob-nails that formed banded edges to each sole and around the heel. The shape of the nails varied from square, to rounded nails, some even covered the whole of the underside of the shoe. It was not possible to identify exactly how many different shoes were represented, however at least seven different impressions were noted, ranging in size from 20cm to 24cm in length. One sole was particular notable in having a stirrup, or horseshoe attachment around the heel, presumably offering a greater level of durability than those only shoed with nails.



Plate 1: Footprint impressions discovered in the upper surface of the puggin on the first floor of the West Front.

The layer of puggin within the West Front essentially comprised of plaster, however various additional materials had been added, either deliberately as a binder, or, they are representative of the general rubbish that was lying around where the mix was prepared. This additional material, some of which can be broadly dated to the first half of the 19th century, included fragments of coal, a fragment of butchered bone, mould-blown green bottle glass, and fragments of wine bottle, clay pipe stems (some with the green glazed mouth-piece surviving), and sherds of pottery, including utilitarian glazed Stoneware, and fragments derived from bone china and porcelain tablewares (Cumberpatch 2013, 1). A single gilt livery button was also recovered, that was stamped with 'G.BOGGETT LONDON', who was a manufacturer at 50 St Martins Lane, London between 1824-1835 (Nayler 1993, 14). Individually, each artefact is of limited archaeological significance, however when considered as a group they are a fascinating assemblage that corroborate the historical records from the 1830s when the floors were laid.

The archaeological recording has also established that narrow sections of planks, used to form the shallow troughs for the puggin, all appear to have been re-used. Many were sawn to length, then split with an axe to form narrow strips for insertion below the floorboards. Fragments of painted timber beading and moulded panels were recorded, along with eight pieces of plank with painted lettering (Plate 2), some of which could be reassembled together. Enough survived of these to reconstruct the original inscription: "...to clerk of works Chatsworth by Cromford Canal..." and "..No.145..". It can be inferred that in addition to the recycling of sections of timber panelling, and shutters, the workmen were using the softwood packing cases that had been shipped to the house along the Cromford Canal.



Plate 2: Reassembled fragment of softwood packing case used to transport materials from London to Chatsworth.

Many of the floor voids were found to be almost totally clear of loose material, suggesting that some of the ceilings in the rooms below were replaced after the puggin had been laid, and thus any discarded material had fallen out during the re-plastering. The only items that were recovered were occasional fragments of wallpaper, or 20th century rubbish, left behind where workmen had installed heating pipes, or electrical cables, and had broken through the surface of the puggin.

The composition of the mixture of the puggin was relatively consistent throughout the rooms, apart from in what is now the Red Velvet Room, immediately to the south of the West Stairs. In this room, the puggin contained more fragments of crushed brick and a large amount of grass, or straw within the mixture. There was also a lower layer of softwood boards on a north-south orientation, resulting in the direction of the upper oak boards, being in a different direction to those within the other rooms on the first floor.

CONCLUSIONS

The archaeological recording of the first floor of the West Front has not only provided a greater understanding of the construction of this part of Chatsworth, c.1700 in date, but has offered a unique insight into the craftsmen who undertook the extensive re-modeling in the 1830s.

The discovery of footprints of differing sizes from a variety of work boots and shoes, was an unexpected observation, however it is highly likely that more examples will survive in other buildings where layers of puggin lie undisturbed below floorboards. It can be suggested that whilst the puggin had clearly set, due to its thickness it must have taken a considerable time to cure, which may be inferred from the acceptance that it was firm enough for walking on whilst still soft, an activity clearly not regarded as being detrimental to its overall stability and durability. An alternative explanation for the prints is that they may represent a deliberate stage in the process of laying the puggin, where the surface was compacted to expel any trapped air pockets, or voids.

The floors also provide strong evidence that there was a culture of re-use and re-cycling, presumably to reduce the overall construction costs. The reverse and breaking up of packing cases, and sections of decorative moulded panels, are just two instances of this. The Chatsworth account books from the 1830s regularly list payments to Wheatcroft and Sons who, along with other enterprises (Glover 1829, 39), acted as wharf finger at Cromford Wharf, responsible for the transportation of materials along the Cromford Canal. They are frequently listed in the Chatsworth Accounts, for example on the 31st December 1832, they were paid £11.15.1 for 'freight by canal from London to Cromford'. Such an entry is perhaps not that striking, but it confirms the regular transportation of boxes to Chatsworth, an activity which is corrobrated by the discovery of the painted wording on the broken up packing cases re-used within the flooring.

This article has attempted to explore the value of a combined approach of the detailed analysis of architectural construction techniques, in conjunction with an examination of historical documentary accounts and an assessment of archaeological artefactual remains. The recording at Chatsworth is ongoing and further investigations will no doubt further refine our understanding of the sequence of floor construction throughout each of the ranges that comprise the House.

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