Stowe House Buckinghamshire

Archaeological Building Analysis and Recording during Phase II of the Stowe Restoration Project

Volume I: Text

Oxford Archaeology

July 2005

Client: Purcell Miller Tritton Architects for: Stowe House Preservation Trust

Issue No: 1
NGR: SP 674 374

Client Name:	**Purcell Miller Tritton for Stowe House Preservation Trust**
Client Ref No:	~
Document Title:	**Stowe House, Buckinghamshire: Historic Building Analysis During Phase II Restoration Works.**
Document Type:	Historic Buildings Client Report
Issue Number:	Version 1
National Grid Reference:	SP 674 374
Planning Reference:	~
OA Job Number:	2043
Invoice Code:	STHOUBS
Archive Location:	OA
Accession Number:	2003.181
Prepared by:	Jody Morris
Position:	Buildings Archaeologist; Supervisor
Date:	July 2005
Checked by:	Edmund Simons
Position:	Buildings Archaeology
Date:	July 2005
Approved by:	Julian Munby
Position:	Head, Buildings Archaeology
Date:	July 2005
Document File Location	Server1://Buildings/ProjectsOngoing/Stowe House/Report/StoweRepDraft2
Graphics File Location	Servergo\\oaupubs1_RtoZ*STHOU03*STHOUBS*Stowe House*EDG*02.06.05
Illustrated by	Jody Morris/Elizabeth de Gaetano

Oxford Archaeology
Janus House
Osney Mead
Oxford OX2 0ES
t: (0044) 1865 263800 e: info@oxfordarch.co.uk
f: (0044) 1865 793496 w: www.oxfordarch.co.uk
Oxford Archaeological Unit limited is a Registered Charity No: 285627

Stowe House Buckinghamshire

Historic Building Analysis on the Central Pavilion During Phase II Restoration Works

Volume I - Report Text

Oxford Archaeology
2005

STOWE HOUSE, BUCKINGHAMSHIRE

HISTORIC BUILDING ANALYSIS

CONTENTS

STOWE HOUSE, BUCKINGHAMSHIRE

HISTORIC BUILDING ANALYSIS

SUMMARY

Oxford Archaeology (OA) carried out archaeological and historical analysis in the central pavilion and south portico of Stowe House, Buckinghamshire as part of Phase II of restoration works to the building. The work was commissioned by Historic Environment Conservation, acting for Purcell Miller Tritton Architects (PMT) and the Stowe House Preservation Trust (SHPT) and was undertaken over the course of 2004.

The conservation and restoration programme of this phase covered the exterior walls on the west, south and eastern sides of the central pavilion as well as the roofs of the central pavilion and the surfaces of the south portico and the steps leading up to it. The northern façade of the house was covered during Phase I of the works. Later the restoration was extended to include the interior of the marble hall, the ornate oval room at the centre of Stowe House. The archaeological work was as a condition of grant from the Heritage Lottery Fund, and Buckinghamshire County Archaeological Service expected that curatorial monitoring be carried out during the works. The analysis and recording would also contribute greatly to the store of knowledge about the house, its fabric and development. The opportunity to examine the fabric of an 18th-century stately home in such detail is comparatively rare. As each area became available for investigation OA carried out a detailed examination and assessment followed by selective recording of details in order to inform understanding. Recording was always tailored to understanding, and thus extraneous production of records was avoided.

No major historical reinterpretation was carried out. However, the archives of Stowe, held in the Huntington Library California, and partially transcribed by Cathy Fisher of PMT were examined and revealed many small details about the teams of workmen involved in the building scheme of the 1770s.

The roofs at Stowe were shown to be well constructed and all dating from a distinct period of development at Stowe, the reordering of the south front by Earl Temple over the 1770s. The east and west roofs are of the same design: a large hipped king-post roof, covered with slates. The south portico roof is asymmetrical, with a hipped side to the north and the flat stone pediment on the southern side. It is a complex construction involving trussing action in two directions. The north roof was much shallower in construction, being totally hidden behind the parapet around the building. It was leaded and, alone among the roof structures, preserves the outlines of earlier historical phases of the central pavilion's development, most specifically the corner towers of the 1720s and the extended stair bays from the 1740s. The construction of the marble hall is perhaps unique. The dome is not a separate structure but is the continuation of a timber-framed barrel forming the basis of the entire room. The decorative interior is all plasterwork, with separate scagliola columns, the only marble being found in the room's floor. Voids in the spandrel corners

between the brick surrounding walls and the timber-framed oval construction allowed a detailed examination of this fascinating structure.

The walls of the central pavilion were revealed to be constructed with an ashlar face backed with a rubble core, presumably with an inner lining of brick although this was not examined. A variety of stone was used, some local, some from further afield, and this gives the south façade much of its character. Decorative details, such as the roundels depicting the seasons, were treated in a different manner with brick backing and the stone panels held in place with iron cramps. The south portico was shown to have an interesting construction with very thin panels of ashlar used in its facing, held back to a brick backing with small iron cramps. The thinness of the ashlar facing, in some places thin enough to be structurally unsound, is suggestive of possible economic shortcuts. Alterations to the width of the niches were seen and the archives showed the name of the craftsman involved in changing them.

The use of iron as a reinforcement method for the roofs and the masonry walls became a point of interest for the archaeological study. Several different types of ironwork were seen in the roof structures, some of a more actively useful design than others. In the walls, particularly around the east and west roofs, iron cramps were used to join the masonry blocks of the cornice stones back to the roof structures. It appears that at Stowe there is evidence of both the position of iron as a relatively new and less well understood material, in comparison to timber. And also evidence of craftsmen looking forward to the 19th century when iron became an actively used material to overcome the structural challenges presented by large buildings.

Key to the investigation of the walls, and enabled by the access provided in the corner voids of the dome, was the possibility of examining the northern wall to the dome. This wall preserved blocked doors and other features from the first phase of Stowe House: the house built on this site in 1676. Although access was still restricted, it was possible to see several features giving clues to the layout of the house, and approximately establish floor levels, confirming the heights specified within the original building contract.

The investigation of surfaces at Stowe was limited to the area of the south steps and the south portico's paving. The most notable discovery here was that the steps are supported on a series of six brick arch vaults. The excavation of the steps and examination of the parapet walls also gave evidence that the pitch of the steps has changed as the steps have been re-laid, and that the parapet walls were also changed, adding a plinth to their lowest courses.

The archaeological investigation and recording at Stowe has inevitably not answered all the questions surrounding the house's development. However, it has answered some questions, has increased the body of knowledge about the house's development and fabric, and has contributed to the base of information from which future works can then build on. It has also shown that there is considerable potential for the archaeological examination of the built fabric of the English country house as a contribution towards an understanding of the technical aspects of building construction in the 18th century.

1 INTRODUCTION

Stowe House is located approximately three miles north of the town of Buckingham (Figure 1), within 10,000 acres of landscaped gardens and parkland. The house is aligned approximately east-west along a long ridge overlooking the town. The house is owned and managed by Stowe House Preservation Trust (SHPT) who have recently begun a long programme of restoration. The park surrounding the house is managed by the National Trust. Oxford Archaeology were commissioned by Historic Environment Conservation acting on behalf of Stowe House Preservation Trust and Purcell Miller Tritton Architects (PMT), the conservation architects undertaking the works. John Heward of Historic Building Surveys Ltd carried out the historic building analysis on the first phase of the restoration project. This first phase covered the north façade of the central pavilion, the curved colonnades and the screen walls that hide the service courtyards. The second phase, the subject of this report, covered the roofs of the central pavilion and the south, east and west façades of the central pavilion.

1.1 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

1.1.1 Stowe House was built by the Temple Grenville family, initially between 1677 and 1683 to the design of William Cleere, Sir Christopher Wren's master joiner. From this period and during the 18th century it, and the extensive grounds, were developed and worked on by a succession of eminent architects including Vanbrugh, James Gibbs, Sir John Soane, William Kent, Battista Borra, George François Blondel and Vincenzo Valdre. The house is listed Grade I and is one of the most important stately homes in the country, a status enhanced by the surrounding landscaped grounds and smaller ornamental buildings.

1.1.2 The present form and appearance of the house is primarily the result of work dating from the later part of the 18th century. However, the north front, which was recorded during the Phase I conservation works, was shown to be closely related to the layout of the 17th century house.[1] The form of the earliest house dictated, to a certain extent, the alterations and extensions that were made.

1.1.3 The south front of that earlier house was on a line that runs through the centre of the Marble Saloon. In contrast to the development of the north front the whole southern half of the earlier house was demolished to make way for the large state rooms and coherent design of the present south front. Traces of this earlier house may be preserved within the walls and roofs of the present house.

1.1.4 Stowe has, understandably, been the subject of much academic research and the main estate archives are held at the Huntington Library, California,[2] alongside the collections held by the Stowe House Preservation Trust and Stowe School itself. During the course of 2001-3 Cathy Fisher undertook programme of research and transcription of the archive, on behalf of Purcell Miller Tritton Architects, producing a basic transcription of many of the

1 See John Heward (2004) *The Restoration of the North Front of Stowe House: An Assessment of Archaeological Evidence Revealed through the Works.*

2 The Huntington Library, Art Collections, and Botanical Gardens, 151 Oxford Road, San Marino, CA 91108 [www.huntington.org]

accounts and summaries.[3] Published studies, and materials assembled for the project have been considered, but no further primary historical research was undertaken as part of this project. The work of Michael Bevington provides perhaps the fullest coverage and summary of the history of Stowe and its buildings (1993 a and b, 2002).

1.1.5 Stowe and its grounds have also been the focus of below-ground archaeological investigation. The National Trust as curators of the large and important landscaped grounds have maintained research into the collection of smaller buildings and monuments in the grounds and the ground's layout and history (Martin Robinson 1990, and also G B Clarke ed. 1990, and Clarke, Inskip and Wheeler 1992).

1.1.6 Closer to the house itself an archaeological investigation was carried out by Andrew Hunn on the north front (Hunn 1995). This work included an investigation of the roofs of the colonnades. OA also carried out an investigation of the foundation trenches for the scaffolding used during this phase of conservation works that revealed evidence of the earlier curved walls preceding the colonnades (OA 2003a). OA has carried out a variety of projects over recent years within the wider grounds of Stowe on behalf of the National Trust (for example 2003b).

1.1.7 This report covers the investigations carried out by Oxford Archaeology from October 2003 to early 2005, it does not summarise the results of previous work and will form only part of the final body of information on the history and fabric of Stowe House. The historic fabric revealed during Phase I of the restoration was investigated and recorded by John Heward.[4]

1.2 ACKNOWLEDGEMENTS

Oxford Archaeology would like to thank Stowe School and particularly Michael Bevington the school historian for his advice and permission to reuse some of his illustrations. Much thanks must go to David Baker from Historic Environment Conservation for his patience, and to Jane Kennedy and Mark Hammond of Purcell Miller Tritton Architects. Thanks to Ian Bird and the carpenters, masons and other staff of Linfords and other site contractors for all their help. John Heward of Historic Buildings Surveys Ltd. Thanks to the staff of Cliveden Conservation and Hirst Conservation. Thanks to the site staff of OA who helped with the on site recording at Stowe: Georgina McHugh, Jane Phimester, Nick Pankhurst, Marc Storey, Jon Gill and Rosey Wheeler. Finally, many thanks to Elizabeth de Gaetano from the OA graphics office for her work on the figures.

2 AIMS

2.1.1 The broadest aim of this project was to gain a fuller understanding of the fabric, construction and phasing of this important 17th and 18th century building. This understanding of the building's fabric will contribute to the developing conservation process at Stowe as well as the archive of

[3] Fisher, C (2001-3) *Stowe Archival Research & Documentation*. For Purcell Miller Tritton Architects.

[4] John Heward (2004) *The Restoration of the North Front of Stowe House: An Assessment of Archaeological Evidence Revealed through the Works*.

information about the house. The analysis and recording is in response to the current phase of restoration.

2.1.2 The current form of the house is largely 18th century but a substantial part of the earlier 17th-century house was presumed to be contained within the later elements. Clarification of the extent of this earlier building and its influence on later alterations was a key part of the building investigation.

2.1.3 As a 17th and 18th century great house of major importance the opportunity to examine Stowe's fabric and establish the means of its construction had the potential to contribute to the understanding of its specific history, building on the results of the first phase of investigation and recording. It will also add to the corpus of knowledge about that period and style of buildings in general.

3 OBJECTIVES

3.1.1 The recording work undertaken by John Heward during the Phase I works highlighted a number of specific questions that were incorporated in the brief for the Phase II archaeological works,[5] briefly paraphrased these were:

- The remains of the roof of the late 17th-century house.
- Evidence in the north wall of the Marble Saloon for the 17th-century house.
- The major construction work of 1770.
- The timber construction of the Marble Saloon.
- The roofs over the Marble Saloon and the south Portico.
- The roofs flanking the Marble Saloon.
- The north roof.
- Changes to the roof construction after the 1770s.

In addition

- Construction technology
- Phasing of the house.

4 METHODOLOGY

4.1 INVESTIGATION

4.1.1 Of prime importance at the outset of the archaeological programme was the understanding of the building, its form and alterations to this form. In order to achieve this, close examination of the building needed to be carried out in advance of selective detailed recording of pertinent areas. OA sought to record the elements of Stowe to an appropriate level, obtaining the maximum of understanding without embarking on needless and extraneous recording.

4.1.2 OA has sought to record the historic fabric at Stowe to an appropriate level to obtain the maximum amount of archaeological information but without engaging in detailed recording without understanding which leads to superfluous records.

5 Fully outlined in Appendix of *Stowe Conservation Plan*, Purcell Miller Tritton, June 2001

4.1.3 Analysis and recording on the areas of the house covered by the Phase II works was approached in spatial units derived by the logic of the building and the contractor's work phases. Each area was examined as it became available through the work of the contractor, Linfords. As well as the opportunity to understand the broad form and function of the house in all its phases the conservation and opening up works enabled the specific detailed investigation of Stowe's historic fabric.

4.1.4 Drawn, photographic and written records of each area were compiled in order that the understanding of the building could easily be demonstrated and future work would be eased by the archive resulting from the Phase II work.

4.1.5 The conservation works provided various different opportunities for investigation where:

- Existing visible fabric was available for investigation and record at close quarters from scaffolding.
- Historic fabric would only temporarily be exposed and covered over again (e.g. the render covered walls of the east and west stair bays).
- Features or fabric were to be lost or substantially altered through the current works.

4.2 THE DRAWN RECORD

4.2.1 Existing drawings compiled by Purcell Miller Tritton Architects provided a basis for general examination of the building. Access from scaffolding enabled close examination of areas that were previously unavailable. All drawn records were produced alongside a written record of notes and descriptive summary.

4.2.2 Where existing drawings were not adequate to illustrate the form or sequence or archaeological detail of the building, scale drawings were produced by hand using pencil on permatrace.

4.2.3 The drawn record consisted of all or a combination of: plans, sections, elevations and details. Not all of these types of recording were always necessary to enable understanding of the building areas. Selection of the type of record undertaken was on the basis of its relevance to clarifying the understanding of the building. Some of the drawings produced on site have been drawn up for inclusion in this report.

4.3 THE WRITTEN RECORD

4.3.1 The written record is linked to the drawn record (by descriptive terms, or numbering). It includes summary descriptive sheets for areas, and (as appropriate) more detailed records for individual features and components.

4.3.2 The drawings were all compiled and added to with a series of detailed annotations. These annotated drawings as well as notes made on site visits form the basis of evidence gathered.

4.3.3 Although not employed throughout the building, on the south portico steps context numbers were assigned to individual archaeological deposits in order that the sequence of development could be more easily understood. The north wall of the dome's space was also treated in this way as it contained multiple

isolated features. Elsewhere on the house, the roofs and walls, descriptive summaries were used, although there were small areas where numbers have been assigned. The descriptions are tailored to outlining the understanding of the house and its structure. Detailed measurements were not made of every timber or stone.

4.3.4 Both clearly defined identifiable features and more obscure, less easily identifiable features revealed were be recorded, the latter may prove to correspond with similar features revealed elsewhere and their significance may only become apparent during later stages of the conservation and investigation work.

4.4 THE PHOTOGRAPHIC RECORD

4.4.1 This was principally made using 35 mm film (black and white prints and colour slides) and includes both general shots of the building and records of areas and specific details. Wherever possible a tripod was used with natural light illumination but with dark interiors flash lighting was used. All films include a chalk board indicating the film number and site code and where appropriate photographs include a photographic scale.

4.4.2 Digital photographs were also taken to supplement the record on film (as well as to provide quick images for the inclusion in this report).

5 BUILDING ANALYSIS

5.1 THE CENTRAL PAVILION - GENERAL INTRODUCTION

5.1.1 The second phase of restoration at Stowe was focused entirely on the central pavilion of the house with the exception of the north façade and colonnades covered during Phase I. This pavilion forms the central block of Stowe House (Figure 2) and contains the principal state rooms. Looking at the house from the south the central pavilion is joined to slightly smaller secondary pavilions to the east and west by galleries containing a dining room to the west and library to the east. The three are visually tied together by their unified design including the two interspersed orders of columns, smaller Ionic and large Corinthian, which continue along the whole front (Plate 1). On the north front (Plate 2) the central pavilion sits within sweeping colonnades and screen walls concealing the large service courts which lie at the rear of the south front's galleries. All of the buildings stretch on an approximate east west alignment at the top of a rise within the large landscaped gardens, which have contributed, largely to Stowe's fame. Views of the house from both the north and south focus on the central pavilion. The history of the landscaped gardens has been discussed elsewhere.[6]

5.1.2 Inside the central pavilion the *piano nobile* (Figure 3) contains the principal state rooms of Stowe. The north side of the house opens into the large north hall with its ceiling by William Kent and flanked by the two broad passages with barrel vaulted and coffered ceilings leading to the stone cantilevered

[6] Clarke (1990) *Descriptions of Lord Cobham's Gardens at Stowe 1700-1750*; Robinson (1990) *Temples of Delight: Stowe Landscape Gardens.* Clarke, Inskip and Wheeler (1992) *English Arcadia: The Landscape and Buildings of Stowe.*

staircases to the upper floor. These passages also open into the Chandos suite and Clarence rooms, once state apartments and now school offices. The centre of the pavilion is filled with the large oval marble hall with its impressive domed and coffered ceiling (Plate 3). The marble saloon opens to the south into the south loggia or south portico, to the east into the State Music Room and to the west into the Temple Room or State Drawing Room.

5.2 PHASING

5.2.1 The central pavilion retains elements of almost all the phases of work on Stowe House. The phases of Stowe's development are broadly understood and are confirmed from historical sources. An outline of these phases and their remaining elements within the central pavilion is necessary to clarify the areas of OA's investigation discussed within this report (Figure 4)

- The earliest **1670s** house is preserved within the northern half of the pavilion, and as Heward (2004) discusses, the later changes to the house and northern façade were partially determined by its arrangement and internal organisation. The southern side of the north wall around the dome contains evidence of this early phase.
- In the **1720s** the north portico was added and towers were raised on each corner of the building. The outline of these towers is visible within the framing of the north roof.
- By the **1740s** changes to the interior of the house, particularly the north hall, led to two new stair cases being built. Whereas previously the east and western elevations of the house had been recessed, the new stairs, still used today, were built within bays projecting beyond the original line of the house. This also created corridors passing behind the rooms on each façade.
- The largest redevelopment of the central pavilion took place in the **1770s** when the entire southern half of the early house was demolished to make way for the grand new south façade we see today. At approximately the same time the northern half of the house was raised giving it a full attic storey hidden behind the balustrade and at the same level as that on the southern front.
- Later alterations to the central pavilion by the Temple-Grenville family included repairs to roofs and façades alongside interior alterations, and changes to other parts of the house that are outside the scope of this phase of restoration.
- In **1923** the upper floors were adapted by the architect Clough Williams-Ellis for use by the school. Later still in the **1960s** the roofs were largely covered with flat softwood and aluminium roofs to provide some protection to the ageing 18th-century structures.

5.3 AREAS OF INVESTIGATION

5.3.1 For the purposes of investigation and analysis, recording and final reporting the central pavilion was divided into three broad categories: the roof structures, the masonry and brick walls and the surfaces, all of which were receiving differing levels of conservation and repair. These categories were also subdivided into units allowing a logical approach to the individual elements of the house. These are located and illustrated in Figure 5 and summarised here:

5.3.2 **The Roof Carpentry:**

- The east and west roofs which are of a similar construction. This area includes some discussion of the masonry wall construction of the stone cornice around the southern half of the house **§6.2**.
- The roof over the south portico and the construction of the plaster decorative scheme on the south portico's ceiling **§6.4**.
- The domed timber framed structure of the marble saloon and the construction of the interior decorative scheme **§6.3**.
- The north roof **§6.5**.

5.3.3 **The Masonry and Brickwork of the Walls:**

- The east and west stair bays after the removal of cement render §7.2.
- The south front where repairs required the removal of stone and opening up of the wall. The most detailed examination went into the examination of large areas of the south portico where ashlar over the niches was failing §7.3.
- The north wall of the marble saloon preserved behind the timber construction of the hall, which contains evidence for the original 17th century house §7.4.
- An extra area of walls that was exposed during the insertion of a disabled lift in the space behind the Temple Room and in the corresponding area at basement level §7.5.

5.3.4 **The Surfaces:**

- The south steps and their underlying construction and the paved floor of the loggia §8.1.

5.4 STRUCTURE OF REPORT

5.4.1 For recording purposes the central pavilion was divided into the areas discussed above. Within this report each area of the building is discussed using the following subdivisions;

- **Introduction**. A brief introduction detailing the location and extent of each area.
- **History and Phasing**. A short assessment of the known historical information and dating that can be tied to the broad physical evidence of each area. This report should not be read as a comprehensive historical summary.
- **General fabric description**. An outline of the construction and physical character of each area.
- **Detailed fabric description**. A more detailed discussion of the individual structural elements surviving in each area.
- **Further questions** arising or unanswered for each area of investigation. A brief summary of the places where our understanding could be further developed in the course of later works on the broad areas of roofs, walls and surfaces. This also essentially forms a qualitative assessment of the limitations of our own work.

5.4.2 The report concludes with a brief summary of what has been discovered during the investigation of the building and an interpretative discussion of the evidence gathered. This report is only one of several prepared over the

duration of the Phase II restoration works, it should be read in conjunction with reports by Cliveden Conservation, Hirst Conservation, the Morton Partnership (see bibliography, § 11.2, for full details).

6 THE CARPENTRY AND CONSTRUCTION OF THE ROOFS

6.1 INTRODUCTION

6.1.1 The roofs of the central pavilion can be split into five distinct areas, each of which is described individually: the east and west roofs, the south portico, the central dome and the north roof. (see Figure 5 and Plate 4).

6.1.2 The roofs are clearly identifiable within the phasing of the house and each roof is, for the most part, the result of one coherent build with little evidence of reconstruction or alterations other than those undertaken in the 1960s. The north roof contains the most evidence for multiple phases of work with the outlines of the corner towers of the 1720s clearly expressed, and the later addition of the roof-top observatory. The South Portico roof contains some reused timber which may be from repairs and some evidence for a change in the design when partially built. Fragments from an earlier roof at Stowe, principal rafters and purlins, have been found in various places within the building and are discussed in the relevant sections.

6.1.3 The roofs are predominantly made of well cut, large softwood members although the north roof is constructed of oak. The Huntington archives show that payments were made to William Adam & Co for Riga and Memel timber, both Baltic ports.[7] and Oak is also used in the ceiling structures and where wood is used in combination with the masonry side walls. The timber structures are reinforced with several different types of iron bracing and bolting; but this is absent from the dome's structure. The terminology used here is that set out by Campbell's article on the vocabulary used for describing post medieval roofs (*Vernacular Architecture* **31**, 2000), and that used in David Yeomans' work (1992).

6.2 THE EAST AND WEST ROOFS

6.2.1 *Introduction*

The east and west roofs were built in the same period and to the same design. They occupy the south east and south west corners of the central pavilion covering the large state rooms of the Temple Room and the State Music Room on *the piano nobile,* to the west and east of the Marble Hall. Externally their shape is almost totally hidden behind the high screen walls and balustrade that run around the southern side of the central pavilion. These roofs, and the south portico roof, were the only ones not to be covered in the 1960s with secondary flat softwood roofs although they did have large skylights inserted into them. Their trussed construction is indicative of the techniques developed by Inigo Jones, Wren and their contemporaries to provide roofs to span the classically styled rooms in 17th and 18th-century houses.

6.2.2 *History and Phasing*

The east and west roofs are a major part of the re-ordering of the south front by Earl Temple who began commissioning designs from eminent architects as early as 1752. The work began with the demolition of the 17th century house's southern half in 1771 and the exterior was finished by 1779. The roofs provide cover for the large state rooms of the piano nobile as well as the series of

7 HL STG Accounts, Box 113 (1767-1777), Bundle 8: 1772

bedrooms, now dormitories, on the first floor. The decorative schemes within the two rooms were probably by Vicenzo Valdre with richly painted walls and plaster work ceilings by James Lovell. Both rooms have niches at their northern ends between decorative columns. In the Music Room these columns are by Bartolli imitating Sienna marble and match those in the Marble Saloon (Bevington 2002, 38).

6.2.3 In the earliest house each set of corner rooms had been a bed room and one or two dressing rooms to either side of the great parlour in the centre of the southern half of the house. By 1766 these had become a small waiting room and private breakfast room in the western corner and in the east, a waiting room, private dining room and small drawing room. These rooms were part of the continuing scheme of individual suites at the four corners of the house, one that was deemed unsatisfactory by Earl Temple in his desire for a suite of suitable grand state rooms on the piano nobile for entertaining.

6.2.4 No less than five plans for the reordering of the front were submitted between 1752 and the early 1770s. The first was by Giambattista Borra in 1752 and George-François Blondel submitted one in 1765. Robert Adam's put forward his first design in 1770 and a second in 1771 with help from his brother James. The final plan chosen was an adaptation of Adam's second design by Thomas Pitt and his brother William, relatives of Earl Temple who himself had an active hand in some elements of the front particularly the projecting south portico and central flight of steps.[8]

6.2.5 The accounts held by the Huntington Library in California record several items probably relating to the construction of the east and west roofs and the walls supporting them. As early as 1771 there are records of men excavating the foundations for the house, but it is not specified where exactly. More specific are references in August and September 1773 to several men working on the foundation of the centre: Benn Wooton and son John, Isorel Stanley and Ed and John Batchelor.[9] The roofs appear to have been framed over six weeks in July and August 1774 by James Cowley and a team of four or five men. They were then raised perhaps in September. However, they were not finished until December of 1775. Cathy Fisher in her work on the archives for PMT discovered that in September 1774 an entire length of the stone cornice collapsed into the State Drawing room, killing Richard Batchelor, one of the stone masons. This accident set work back considerably and it is not until December of 1774 that James Cowley and his team were able to '*finish the roofs each side of the centre*'.[10]

6.2.6 The roofs show few signs of repair or alteration. The interior drain channels may be the work of the modernising undertaken by the third Duke in the 19th century but they appear contemporary with the rest of the roof. The small trussed supports for interior partition walls may also be later although it is likely that they were part of the original construction, merely added after the majority of the structural work was completed and therefore not built in to the

8 These plans are reproduced in Bevington 1993b and reproductions are in the School's photographic library. Battista Borra's 1752 plan is held in the Huntington Library, Stowe Maps and Plans, 9/4. Blondel's plan of 1765: R.C.H.M. BB55/6; Adam's second plan of 1771: Sir John Soan Museum; Adam vol. 28, 56.

9 HL STG Accounts, Box 113 (1767-1777) Bundle 11: 1773

10 HL STG Accounts, Box 113 (1767-1777) Bundle 12: 1774

structure. The largest alterations are the skylights inserted within the roof to give light and ventilation to the dormitory rooms on the upper floors. These softwood structures are intrusive even though they are not visible from the ground. They are being replaced with more historically sympathetic and less obvious metal framed rooflights in line with roof slope as part of the present conservation works. It was not clear where any windows lighting the rooms at this level were originally placed although mouldings cut directly into the trimmer beams of some of the skylights suggest that some of these windows may be from an earlier period. There are references within the archives to men making skylights but there are no specific locations given.[11] Without skylights these rooms would have been very dark, their only windows would be to the east and west. If any skylights were part of the original roof designs, they may have been replaced by the 20th-century windows removed during the 2004-05 works.

6.2.7 *General fabric description*

The roofs are similar in size, approximately 10.50m by 16.50m (34.4 ×54.1 ft), and are steeply pitched with hipped north and south ends (Figures 6, 7, and 8 & Plate 5). Both roofs are divided into six bays, numbered during recording from south to north, with five principal trusses: there are two queen-post trusses under the hipped ends with three king-post trusses forming the central bays. The main roofs extend down to the walls well below the level of the parapet. The sides of these areas are also roofed; their structure rests on the central roof's timbers. No rain water is drained off on the exterior of the building; the gutters collect the water and internal drains carry it into hoppers within the corner spaces of the dome.

6.2.8 The timber used in the roof is sawn softwood, probably pine and almost certainly brought in from the Baltic region. The archives show deliveries in the winter of 1772-73 of large quantities of *'Riga timber'* or *'Memel timber'*.[12] Although not specifically identified, both of these are ports with a history of timber exportation. Riga is the capital of Latvia, Memel is now Klaipeda in Lithuania.[13] Many of the timbers show saw marks but the members also have smooth faces with no obvious tool marks. Oak was used in the joist construction of the ceiling and for the bearer beams built into the masonry side walls, where they may have been more vulnerable to water damage. The carpenters on these roofs used basic joints of mortice and tenons fixed with pegs as well as further reinforcing the construction with ironwork.

6.2.9 *Ironwork*

As well as carpentry joints, both roofs are reinforced with several types of iron ties, straps and bolts. The use of iron in roofs was becoming more common throughout the 18th century alongside the development of the new truss types although it was only employed in the reinforcement of timber structures at this date. The east and west roofs have stirrups passing underneath the tie-beams and each of the principal posts (Figure 12, B). Bridle straps pass over the junction between tie-beams and principal rafters (Figure 12, A)and also at the joints between post-heads and principal rafters. There are also bolts reinforcing the crossing braces of the queen-post trusses.

11 HL STG Accounts (repairs) Box 114 (!766-1796) Bundle 2: 1775
12 HL STG Accounts, Box 113 (1676-77) Bundle 11: 1773
13 http://en.wikipedia.org/wiki/Riga and http://en.wikipedia.org/wiki/Klaip%C4%97da

6.2.10 *Gutters*

The roofs are covered with grey slate, probably welsh suggesting a 19th-century date, and have lead-lined guttering. The complex guttering system collects water not only from the east and west roofs but also from the south portico roof and the north roof, all of which is channelled through the side walls at several points. As well as around the outer gutters, the water is channelled through the interior roof space, and through the dome's walls into collection funnels in the southern corner voids around the dome. This system of drainage ensures that the south façade is not marred by water pipes or guttering although it is not exactly clear why the gutters were directed through the inside of the roof space rather than around the outer gutters. Rainwater was collected as drinking water for the house/school until 1923 (Bevington 2002, 94). The roof covering was replaced with Westmorland Green slate during the 2004-05 restoration based upon evidence for this material in the Huntington Library (*pers. comm.* Mark Hammond PMT, July 2005).

6.2.11 *Carpenter's marks*

Within both roof spaces is a system of chisel cut carpenter's marks, with some round chisel cuts appearing in the east roof. They indicate that the trusses were probably raised from the south to the north. The sets of purlins are also numbered with a climbing sequence for each side of the roof. Each line of principal joists in the ceiling structure is numbered I to VI. The timbers also show marking out and measuring point lines. These are shallow incised lines, probably scored with a knife or chisel edge that allowed measurements to be taken more accurately than from the cut ends of timbers. Measuring points are the centre points of stars scored on the sides of timbers; setting out lines correspond with angled cuts forming joggles or lines on beams showing where posts were to go and where mortices needed to be cut. A date, 1761 in Arabic numerals, is carved into the northern face of the eastern punchion of Truss 4.

6.2.12 *Reused Timbers*

Both roofs also contain a number of separately constructed smaller king-post trusses resting between the tie-beams, from which iron bolts support the partition walls of the rooms below. This support system allows the insertion of partition walls without putting any load onto the ceilings of the state rooms as it is borne by the roof structure and transmitted to the walls at wall-top level. In the east roof several of these were formed from reused timbers; some were obviously sections of roof purlins and principal rafters. Although they could have been errors or mistakes in the construction of the 1770s. Similar pieces found elsewhere (§ 7.2.18 and 7.5.13) suggest that perhaps the reused timbers are from some earlier roof at Stowe.

6.2.13 *Detailed Fabric Description*

The three central trusses of the east and west roofs (Trusses 2-4) (Plate 6) consist of a central king-post with two double punchions and raking braces, iron reinforcements and purlins. The king-posts have splayed heads to take the principal rafters and a housed ridge plate. There are symmetrical sloping joggles on the feet that support raking struts to the sloping joggles at the head of the punchions. There are also raking braces between the feet of the punchions and the principal rafters. A second pair of raking braces is tenoned between king-post and principal rafter half way up the king-post's height; and on Trusses 2 and 4, raking braces lead from this point out to the central principal rafters of the hipped ends.

6.2.14 The king-posts and punchions are tenoned and pegged into the tie-beam with two separate tenons to either side of the post's bases aligned along the tie-beam. The punchions are also tenoned and pegged into the principal rafters. Iron reinforcements are located at the head and foot of each post (and punchion), securing the joints between post and tie-beam and post and principal rafter. These will be discussed more fully below, § 6.2.31.

6.2.15 The Trusses are *c.*4.50 m tall (14.76 ft). The timbers are evenly sized with the main shafts of king-posts and punchions measuring *c.*160 mm by 200 mm (*c.*6 × 7.8 in) with the feet expanded to 360 mm for the king-posts and 280 mm for the punchions. The braces measure *c.*115 mm by 160 mm.

6.2.16 *Queen-post trusses*
Underneath the hipped north and south ends of both roofs are large double cross-braced queen-post trusses (Plate 7). The queen-posts have splayed and expanded heads and support single strainer beams. The queen-posts have symmetric sloping joggles at their feet; the central posts have symmetric joggles at head and feet. Between the joggles of the queen-posts and central posts are crossing braces secured with a screw-threaded bolt and square nut through their centres. There are also raking braces between the queen-posts and principal rafters.

6.2.17 All three posts are tenoned and pegged into the tie-beam with two tenons at either side of the post. The iron reinforcement of the queen-post trusses is the same as that on the king-post trusses. It is found at the base of every post and the heads of the queen-posts as well as the bolts through the centre of the raking struts.

6.2.18 The queen posts are also well cut into even sized members, probably quartered hearts. The queen-post trusses are 2.32 m (7.61 ft) tall. The queen-posts and central post have main shafts of *c.*160 mm by *c.*200 mm; the feet of the queen-posts are approximately *c.*370 mm and that of the central post is *c.*360 mm. The raking braces are *c.*115 mm by 160 mm.

6.2.19 *Rafters and purlins.*
Along the east and west sides of the roofs the principal rafters coincide with the five trusses. At the hipped north and south ends there are two sets of principal rafters. Below queen-post Trusses 1 and 5 the principal-rafters line up with the central four principal ceiling joists and meet the strainer beams. Above the line of these Trusses there is a single principal rafter in line with the ridge. The principal rafters are tenoned into the strainer beams. The hip pieces are nailed into the queen-posts, rather than being jointed in.

6.2.20 Between the principal rafters there are two sets of slotted purlins running continuously around all four sides of the roofs. Both sets are fixed to the principal rafters by means of a free tenon (Figure 9), which runs through the principal rafter with a single central peg. Each end of the free tenons is slotted and pegged into the end of the purlins, and each purlin is slightly housed within the principal rafter. The upper purlins (Plate 8) are angled parallel to the roof pitch (see Figure 7). The lower purlins (Plate 9) are laid horizontally, with the free tenon slotted diagonally through the lower part of the purlin, parallel to the roof pitch.

6.2.21 Common rafters are at *c.*300 mm or 1 ft intervals and are split between the tiers of purlins. The top series are tenoned into the upper purlin and nailed to the ridge purlin; the middle series are tenoned into the upper purlin and nailed to the lower one - or the strainer beam of the queen-post trusses. The lowest tier of purlins is nailed to both the lower purlin and to planks (Plate 10), which rest on top of the tie-beams. At the north and southern walls these planks are also supported by a brick and stone ledge which projects out from the base of the wall, but along the east and west this plank is set into the thickness of the wall along with the feet of the common rafters. All rafters show nail marks where laths had been fixed to support the gutter's lead and slates.

6.2.22 *Ceiling structure.*
Each roof has six principal joists within each bay. They run north to south and are tenoned into the main tie-beams and secured with a single peg. They measure *c.*110 mm by 150 mm (*c.* 4.3 × 6 in), are made of oak and are spaced at approximately 1.5 m or 5 ft intervals. The common joists, also oak, are fixed into the principal joists with chased tenons at one end indicating that they were fitted into the roof after the main roof structure was erected. The principal joists are numbered I to VI from west to east within each bay. The laths for the ceiling plaster are approximately 25 mm or 1 in wide, and are nailed directly to the common joists. The common joists are also tenoned into place within the principal joists, at one end with single tenons and at the other into chased tenons allowing the joists to be slid into position.

6.2.23 Along the western side of the east roof and the eastern side of the west roof, the principal and common joists have been interrupted by the insertion of the softwood skylights. In some cases the sections of principal joists have been immediately reused in the framework of the skylights. Other interruptions can be seen in the modern round chimney flues on the outer edges of both roofs and the large brick chimney in Bay 5 of the west roof. There do not appear to have been any repairs to the ceiling or plaster work as is visible in the south portico roof (see §6.4.11), however, at the time of investigation the roof spaces were not cleaned and had a thick coating of dust and debris.

6.2.24 *Partition supports*
Both east and west roofs contain several small individually built king-post trusses and other timbers which appear to support the internal partition walls of the uppermost floor. The partitions are hung from large iron bolts or straps held by the small trusses (Figure 10). Because they are small trusses the forces are actually lifting the partitions, as explained in David Yeomans work (1992, 144). Other bolts are secured directly through the tie-beams.

6.2.25 In the east roof, resting on the tie-beams in Bays 2, 3 and 4 are a series of six straight beams. The bolts pass through the lath and plaster and support a partition on an east-west alignment. Several of these beams have waney edges and are unfinished although others are nicely squared off. Most of the main beams are boxed hearts - or almost whole trees that have been cut into roughly square shape; many still retain some sign of the uneven outer wood at the corners.

6.2.26 The other supports are more complex being formed as small king-post trusses. As well as transmitting part of the weight of the partitions through to the tie-

beams the king-post form also acts to lift the partitions as the 'rafters' push up against the king-post. The west roof supports are, except one, constructed similarly with a short central post of *c*.400 mm with the diagonal 'rafters' housed in the post (Plate 11). Iron rods pass through the centre of the posts and down to the partition. The other support in the west roof and one in the east roof have notches cut out of the central post, effectively forming sloping joggles which would have given more support than the other kind that support the thrust of the rafters only on the tenon. Two of the supports in the west roof, which are all far more standardised than those in the east, also have a stirrup strap passing under the beam and forelock bolt passing through the post.

6.2.27 In Bay 2 of the east roof the principal beams of two of these partition supports are reused lengths of timber. The eastern one is a length of re-used principal rafter with the mortices for two slotted purlins visible at either end (Plate 12). The one to the west is a re-used purlin, with a tenon, which would have fitted into the mortices on the beam to the east (Plate 13). It was possibly not finished for, although it shows carpenter's marks for the common rafters, the mortice for the tenon on the southern end is not finished and there are no mortices for the common rafters. The type of joint is the same as that used in the purlins on the present roofs although the length of the section of purlin is too short to be from one of the present roof's bays. It may be that an error had been made in measuring or cutting these timbers but the presence of similar ones elsewhere in the buildings suggests that they were part of an earlier roof. It is interesting that the joint type remained consistent between the two periods and perhaps suggests a continuity of craftsmen working at Stowe.

6.2.28 *Side roofs and gutters.*
The outer walls of the east and west roofs, those that do not abut the dome, have steeply pitched secondary roofs from the parapet down to the gutter. The structure of these roofs and the gutter is supported on the backs of the principal rafters of the main roof section (Figure 8). They have a common rafter construction with the rafters spaced approximately 300 mm (1 ft) apart. These rafters supported the batons on which the slates were hung.

6.2.29 Each principal rafter in the main roof supports a short tie, which is nailed to the rafter at one end, and rests on an oak bearer beam set into the walls at the other end (Plate 14). For much of the length of the walls these bearer beams run continuously although there are gaps; there is no regular spacing. On the inner side the tie supports a series of beams dovetailed together to form a plate that goes around three sides of the roof, supporting the base of the guttering. The common rafters of the side roofs rise from this plate. On the outer side of the tie, nearer the walls, posts hold another series of beams against the walls over which the tops of the common rafters are notched and nailed in place. The rafters extend beyond this beam by various lengths. They are not tied in to the wall directly at any point although in some places they rest on the brickwork below the parapet or, in some cases, have irregular timber or stone spacers or wedges between them and the wall (Plate 15).

6.2.30 A secondary set of small timbers, at the same intervals as the common rafters, supports the planking base of the rainwater gutters. Within the northern wall of both roofs are channels which bring in water from the north roof; single channels also bring in water from the south portico roof in the southern inner

corners of the roofs. In addition to this exterior drainage around the east and west roof's, are two lead-lined channels which take water from the outer sides through the interior roof space (Plate 16). Each roof has two of these interior gutters, attached to the sides of Trusses 2 and 4. The gutters are square in section, formed of board and they are supported by diagonal struts and short timbers nailed to the posts of the trusses (Plate17). The northern ones, attached to Truss 4, empty into the exterior gutter running between the roofs and the dome's space. The southern channel carries on through the dome's wall and empties the water into two large square funnels that collect the water in the southern dome voids. The water then continues down to the basement and into brick culverts.

6.2.31 *Iron reinforcements*
Ironwork has been used on the main posts and principal rafters at three points (Figure 12 A and B), the head of the king and queen-posts, the feet of all major posts and the join between tie-beam and principal rafters. At the head of the king-post there are two bridle straps looping over the principals and fixed by a screw threaded bolt through the post. Bridle straps also secure the principal rafters at the ends of the tie-beam (Plate 18). At the foot of each king-post and punchion is a stirrup strap, which is bolted through the post and also hooks over a staple at the top end of the strap (Plate 19). Iron work is also found in the junction between the roofs and the masonry walls (Plates 20 and 21); this is discussed below in more detail.

6.2.32 *Masonry walls*
The complete opening of an area of the western balustrade and wall allowed the examination of the stonework and arrangement of its iron bracing, which is mirrored on the east side (see Figures 8 and 13). The walls around the east and west roofs are principally of roughly coursed rubble limestone with occasional pieces of tooled stone or ashlar, the walls adjacent to the dome are brick. At irregular intervals the outline of chimneys, walled with brick, can be seen leading to the chimney outlets in the parapet; some of these may be later insertions although the coarse character of the mortaring make it difficult to be sure. There is no interruption of the roof framing suggesting they are contemporary with the construction of the new south façade, although the upper parts have been repaired and rebuilt using modern fletton bricks. A later brick chimney has been added within the west roof, projecting into the roof space, and both roof spaces contain round cement flues that are also later insertions. It appears that the upper part of the walls, particularly that along the eastern edge of the east roof, has been rebuilt. It has a hard grey cement mortar and the bricks used are 20th-century fletton bricks.

6.2.33 The timber construction of the side roofs is used to provide some support to the projecting heavy stonework of the cornice on the south façade; this support system is visible on the interior wall. Within the cornice, each of the long modillion stones has an iron cramp set into the top of the stone (Plate 21). It extends back into the fabric of the wall, but does not relate directly to the timber roof construction. Above the modillions, the soffit stones also have an iron cramp set into their tops. These cramps do relate to the timber roof structure and they are visible within the roof space overhanging the bearer beams in the upper part of the wall. This arrangement seems likely to transmit some of the downward or outward weight and pull of the heavy stone cornice into the roof structures, preventing the stones from falling out.

6.2.34 The weight and forces placed upon these upper bearer beams is further dispersed through the timber structures by another series of iron cramps (Figure 13). These run between the two sets of bearer beams within the walls, those at the top of the side roofs and those which support the ties resting on the principal rafters. In the east roof the straps between the two sets of bearer beams are either hooked over the top of the upper beam (and secured with a staple in the lower beam), or secured with a staple at both beams. In the west roof, those straps on the south wall are of this latter type with a staple into the lower beam. However, on the western wall, instead of smaller straps between the two sets of beams, there are four very large straps which hook over the upper beam and descend to below the level of the lath and plaster ceiling where, presumably, they are fixed under a staple into the wall plate beneath the tie-beams of the main roof (See Plate 20).

6.3 THE DOME AND MARBLE HALL

6.3.1 *Introduction*

The Marble Hall occupies the middle of Stowe's central pavilion (see Figure 5) and opens directly into the south portico, the north hall and the state rooms on east and west. Its domed oval ceiling features 160 moulded plaster coffers above a high relief frieze (probably inspired by Pheidias' frieze within the Parthenon), as well as scagliola columns and niches designed to frame statues and torchères (all sold in the 1848 sale). These features make it one of the most spectacular state rooms of this period in the country. Its construction is considerably different from that of other country house domed. These tended to be either a trussed roof construction as can be seen at Kedlestone Hall (Figure 14), James and Robert Adam for Viscount Curzon 1759-65, or a solid mass construction, as at Thoresby House, John Carr for the 2nd Duke of Kingston, 1767-71 (Figure 15; Colvin 1978). The conservation and repair works have offered a rare opportunity to study the structure in detail.

6.3.2 *History and Phasing*

The Marble Hall was part of the Earl Temple's rebuilding of the later 18th century. The great parlour, the central room of the earlier house, was demolished in 1774 and construction work on the hall began in 1775. It probably was not fully completed until 1788 under the Marquis of Buckingham.

6.3.3 The accounts for 1775[14] record that between early August and the end of December 1775 James Cowley and a team of between three to seven carpenters were recorded as working either in the '*center room'*, in the '*Saloon'*, or '*on ye Doom*'. During October 1775 the mason James Bull and his team of four men are paid for '*rising the wals in the Ovell Room*'; although this is slightly ambiguous as the east and west roofs have been completed by this stage, as has the South Portico, and the walls inside the Oval Hall are plaster rather than stone. In February 1776 William Hounslow was paid £25,8s, 9d for 17,000 slates, and in May of that year Thomas Howes was paid £6 5s 6d for '*Laying Slat on ye Center Dome.... For slating the Center Dome of the House*'.[15] Although not explicitly stated here, a payment to William

14 HL STG Accounts, Box 114, Bndl 2: 1775
15 HL STG Accounts, Box 114, Bndl 3b: 1776

Hounslow in 1772[16] was for Stonesfield Slates rather than Westmorland slates, which are specifically identified elsewhere in the accounts. On 14 November 1776, Frances Underwood was paid £3 3s for the skylight of the centre room[17] and this marks the end of the exterior works to the Marble Hall. Interestingly there is no clear reference to the dome being covered in lead or copper, the documentation instead suggesting that its original covering was Stonesfield Slate.

6.3.4 The decorative interior work seems to have spanned two years (Plate 22 and Plate 3) and involved many craftsmen, some brought in from as far as London. From April 1778, after an apparent gap of a year, three men - Terence Smith, John Mander, and Daniel Hooton along with various others - regularly appear in the accounts being paid for lathing and plastering the dome, oval room, or central room. Smith and Hooton are paid for work in many other areas of the house as well and Mander also appears to do carpentry and joinery work as well as some plastering. In May and June 1779 the payments associated with the dome increase, as do the number of men working on it. Experts are brought in from further afield to add their talents and there are references to specific elements of the decorative work. On 29 May, Jethro Smith and four others are paid for 14 days work making the '*skeletons for ye Skyoli Columns*'; although it does not specifically state that they are those within the Marble Hall, they could be those in either the Temple Room or State Drawing Room.[18] On the 6 June, Matt Coogan and his man were paid for working on the composition columns, including travelling to Stowe and lodgings.

6.3.5 On 26th June three other men were paid for carrying out ornamental work in the dome; these were William Coffee and a Mr Bernasconi and Son. Both men came up from London to work at Stowe presumably on the decorative frieze around the hall although this is not explicitly stated.[19]

6.3.6 Initial ideas for a room of this scale are perhaps attributable to Giovanni Battista Borra's proposed elevation of 1753 although the proposed designs for the south front were altered many times and the central oval room was only reinstated in the early 1770s. The decorative scheme and details of the present room are likely that of Georges-François Blondel and Vincenzo Valdres and James Wyatt may also have influenced the design of the hall (Bevington 1993, 15). In 1770 his building, the Pantheon on Oxford Street in London, featured large scagliola columns, reportedly the first use of scagliola in England, and his design for a country house featured in the 1771 Royal Academy's exhibition also had a central oval saloon.

16 HL STG Accounts, Box 113, Bndl 8, 1772
17 HL STG Accounts, Box 114, Bndl 3d, 1776-7
18 HL STG Accounts, Box 114 (1766-1796), Bundle 6a:1779
19 This may be the same William Coffee as that who left England in 1816 and worked for Thomas Jefferson on the plastering of some of the pavilions at the University of Virginia. Beard (1981, 246) records two Bernasconis, a Bernato and a Francis, reportedly the son of Bartholemew Bernasconi. It is not clear whether Bernato and Bartholemew are the same person. Bernato was working at Claydon House, Buckinghamshire between 1770 and 1784. It is an interesting possibility that the 'Bernasconi and Son' who worked at Stowe are Bernato or Bartholemew and his then young son Francis, who went on to such decorative achievements as Buckingham Palace, Shugborough, and Kensington Palace among many others.

6.3.7 The rain water spilling off the dome was used as drinking water until 1923 (Bevington 2002, 36, 94). The large tanks (Plates 23, 24) around its perimeter were inserted in the early 20th century, probably as part of the conversion by Clough William-Ellis of the house into a school. As discussed above the accounts show no clear record of lead or copper being supplied to cover the dome, despite these being the assumed covering materials. However, analysis on the timbers (Sandberg Consulting Engineers, March 2004) has shown traces of both lead and copper surfaces. Accounts suggest a Stonesfield Slate covering and later it was again covered with slate, perhaps when the third duke re-roofed much of the central pavilion in 1865. In the later 1960s the whole dome was covered completely by a flat roof, removed by Linfords in 2004-05 so as to expose the dome to view once again.

6.3.8 *General fabric description*
The Marble Hall consists of three principal interrelated elements. The first is the decorative oval interior consisting of plaster work, scagliola columns, niches and the marble floor. The second is the exterior timber structure. This sits within the third element - the rectangular brick box containing the oval hall and also forming the walls of the state rooms to east and west, the north hall and south portico. Examination of the whole structure showed it to be remarkably consistent, so it was decided that detailed recording of one quarter together with small areas of the decorative interior, opened as part of the conservation works, was sufficient to explain whole structure.

6.3.9 The oval hall and dome sits within a rectangular space, partly formed by the northern half of the 17th-century great parlour. The south, east and western walls are of a consistent build, dating to the re-ordering of the south front in the 1770s. This space was constructed to house the central hall; however, the dome structure is only directly built into the walls on the east and west ends. Elsewhere the timber structure is only occasionally tied out to the brickwork with timber struts. No later insertions or repairs were seen other than those visible in the upper parts of the walls where the iron tanks were positioned. The brick walls rise from substantial stone foundations, which on the lower southern side are above ground level, but on the northern side form basements where ground level is higher. As the walls rise they step in twice, becoming narrower to reduce the weight of the wall. The north wall is that of the original house's great parlour and contains several traces of the demolished southern half of that house. This wall and the features within it are discussed in more detail in §7.4.

6.3.10 The framework supporting the oval hall's interior is timber-framed and consists of six tiers of posts divided by large ring-beams or ring-purlins (Figure 17). The lower three of these tiers form the vertical sides of the hall and the upper three are raked to support the dome itself, tapering in towards the uppermost ring beams that support the iron framed oculus. The timber framework sits upon a massive oval stone foundation wall that is joined to the stone foundations of the rest of the house. Inside this are brick groin or cross-vaults supporting the weight of the marble floor and now forming the school's cellar bar. This level was recorded as the first tier of the structure. At each of the ring beams within the vertical section are several straight struts out to sockets within the brick walls. At roof level in each corner are large spandrels in the space between the dome and the brick walls. Each one of these contains an access doorway into the voids. Scaffold platforms and inserted into these

voids in 2004-05 for access and maintenance for the school, and they also allowed the structure to be examined and recorded. The most accessible corner was the south-western corner.

6.3.11 The three vertical tiers (Tiers 2, 3 and 4) are divided into irregularly spaced bays by large principal posts with slightly smaller common posts between them. The principal posts also form the sides to each niche. The three upper domed tiers (Tiers 5, 6, and 7) have no clear division into bays and the timbers are more consistent in their size. This corresponds to the decorative treatment inside the hall with the divisions in the lower tiers corresponding to the arrangement of pillars and niches, and the upper sections undivided, matching the uniform frieze and coffered ceiling.

6.3.12 The decorative ceiling is formed separately inside the main framework and is simply supported on the super-structure of tiers and raking rafters. The basic support for the plaster ceiling is hung below the upper three tiers of rafters and consists of a series of smaller, curved members aligned very differently to the main structure's radial rafters. Over the central portion of the dome the curved timbers are aligned to the outer walls, north-south, east-west, and at the two narrower ends they are arranged radially. These appear almost like a 'net' over the dome's shape (Figure 18).

6.3.13 On the inside of the upper part of the dome, this 'net' of curved pieces is covered with laths and two layers of hair-plaster and in some places a painted finish or coat of distemper (Hirst Conservation team, *pers. com.* June 2004). This blank initial plastering was probably the sole covering of the dome for some considerable time, perhaps acting as some form of weather or dust protection. It also allowed the plaster to be marked up with a series of reddish brown chalk lines and incised lines (Plate 25) to show two things. Firstly, they could mark on the interior the location of the exterior supporting studs to enable the plasterers to fix the boards making up the coffers up accurately; and secondly, the detailed layout of the final decorative scheme. Within several of the coffers on the upper part of the dome incised setting out lines of ovals and radiating lines are still visible beneath the applied bench-moulded elements.

6.3.14 The timbers making up the dome's structure are sawn softwood, mainly secured with nails and basic carpentry joints - such as simple scarf joints, notched and halved posts and pegs. There is a comprehensive set of carpenter's marks only on the upper part of the structure and at the joints within the ring beams. Marks on the common rafters are slightly irregular in their sequencing, but their standardised size would prove less of a problem for exact placement, as would the repetitive nature of the structure. Unlike the other roofs at Stowe the construction of the marble hall's frame did not involve the use of iron reinforcements. The Dome's original exterior covering was reputedly copper; however, the accounts suggest that actually it was slated with Stonesfield Slate (see §6.3.3). The boards found covering the dome today (Plates 26 and 27), suggest a metal sheet covering of either lead or copper (the latter used in 2004-05) as slate pegs would not have hung well over solid boards.

6.3.15 Each tier will be discussed in detail from the ground up, discussing the features of the interior - niches, cornice, coffers etc. - and how they are supported within the larger superstructure. The descriptions are based upon

detailed observations and analysis of the south west corner void, which was the most easily accessible, but the rest of the structure did not differ substantially. Where different details were observed their location is identified in the text. The exterior descriptions will be followed by detailed description of the evidence for the construction of the coffered ceiling (§6.3.40). Reference should also be made to the conservation reports and summaries of Hirst Conservation who carried out the initial cleaning and consolidation as well as undertaking analysis of paint samples found on the interior of the hall (2003, 2004); and also the reports of Cliveden Conservation who carried out the restoration of the decoration of the hall's plasterwork (no references as of July 2005).

6.3.16 *Detailed Fabric Description*

Tier I consists of the large rubble stone foundation wall, 0.55 m thick, that supports the whole structure. Within this oval foundation, approximately 1.20m above the concrete floor, are a series of three sockets; two of which are empty and one still contains a timber extending out to the south stone foundation wall. These may be surviving scaffolding supports used during the construction of the dome; since at this level it does not seem likely that they are stabilising struts like those that extend out from the ring beams higher up the structure. In the north western corner the access to the cellar bar from the long east-west running corridor (known today by the school as Plug Street because of the service pipes that run along it) passes through the oval foundation wall and the walls are painted, although not plastered (Plate 28).

6.3.17 The uppermost part of the foundation drum is made of six courses of red bricks bonded with lime mortar on which sits the timber structure of the dome. Correspondingly at this point the wall to the south is also of rubble stone with top courses of brick. This wall forms the back of the area supporting the South Portico, and although the steps themselves are vaulted, the area under the portico itself is filled with a sandy rubble containing substantial amounts of broken building material (context **34** and see §8).

6.3.18 The marble floor of the Saloon is supported by a series of brick groin vaults contained within the stone foundation drum and forming the wine cellars for the house and the school's cellar bar (Plate 29). They were not examined as part of the programme of investigation and recording.

6.3.19 **Tier II**, is at ground floor level where the interior of the hall and contains the niches, column bases and doors (Plate 30). The first element of the exterior structure is a substantial ring-beam, resting on the brick top of the foundation, consisting of lengths approximately 3.50m (11 ft 6 in) long, joined with a simple horizontal tenon joint. At each ring beam level above this the scarf joints are aligned vertically above one another. This, the tallest of all the tiers, has principal posts measuring 140 by 150 mm (5.5 in × 6 in) and common posts measuring 150 by 95 mm (6 × 4 in). They are all approximately 300 mm or 1ft apart and the tier is 4.08m (13 ft 4 in) high between the ring beams. The structure at this level has an irregular bay rhythm: principal posts are divided by two common posts, or a niche; there is one short bay between each niche with only a single common post between the principals (Figure 16). This structural spacing is dictated by the decorative spacing of the interior niches. There are no carpenter's marks on the posts at this level but the ring beams seem to have marks at each scarf joint, although very few are visible being

beneath posts. Between the posts at this level are a series of short spacer pieces, which provide some lateral support to prevent the posts from bending inwards.

6.3.20 The niches are constructed entirely of timber and plaster. Thick struts separate a series of semicircular boards, or planks; vertical laths are fixed to the boards. The tops of the niches are formed from radial planks supporting horizontal laths as opposed to the vertical laths on the rest of the niche backs. Heavy curved braces at the top of the niches, immediately below the ring beam, take the thrust and weight of the posts in the tier above away to the principal posts on either side of the niches. Planks resting on diagonal and vertical struts to the lowest tie-beam (Plate 31) form the bases of the niches. The rounded brick backs of the niches within the south portico are also visible at this level in the brick wall between the marble saloon and the south portico; they extend up to the level of the relief panels in the Marble Hall. The structure of the columns and their bases is not integrated with the main structure.

6.3.21 The walls on the east, west and northern sides of the dome are reduced in width at floor level of Tier II from the wide stone foundations to a slightly narrower brick wall. On the east and western sides the ends of the tall floor joists of the Temple Room and State Music Room are visible where they are built into the wall. The brick wall to the south of the dome abuts those to the east and west, suggesting a later phase of construction. The accounts certainly suggest that the east and west roofs were erected first, then the south Portico and then the Dome. Running down the northern side of the southern wall is a series of supports, possibly for a drain pipe. Planks rest on short lengths of wood set into the wall (Plate 32). The support slopes down from east to west; it no longer survives on the western side and there is no clear indication of where the pipe led to although the run may have continued along the western wall descending finally in the north western corner.

6.3.22 **Tier III** on the interior contains the rectangular panels of sculpted relief showing arms and trophies, with the imperial eagle and triumphal wreath taken from Trajan's Forum at Rome over the doors. These panels are clearly visible in the exterior structure where horizontal members break the common posts and form the support for smaller vertical studs holding the lath and plaster. The tier is 3.90m (12 ft 9 in) high. The irregular division of principal and common posts, started in Tier I, continues at this level, mirroring the continuing rhythm of the interior space. At the top of Tier III straight diagonal struts (Plate 33) between the two principals on either side of the relief panels spread the load from the ring beam above to the posts on either side of the panels, just as curved struts did in Tier II over the niches. In the south west void, resting over the top piece of one of the panels' structure is a strut to the exterior wall; this is repeated in the other corner voids and is the only place where a strut to the walls is not supported on the ring-beams. At this level also, set into the south wall and projecting on a diagonal line to the north-west, is a large round timber (Plate 34), apparently sawn off. Although no other function is clear, it is really too large to be the remains of scaffolding used to erect the dome structure. Another is visible in a corresponding location in the south-east void.

6.3.23 Tier III also contains the lower frieze of alternating satyr's masks, triglyphs and roundels immediately above the column capitals. In the exterior structure

the level of the top of the columns is clearly indicated by radial horizontal members nailed to the sides of every post, forming a deep ledge (Figures 19 and 17). The slight coffers visible in the soffits between the columns are not visible on the exterior and are probably simply thicker plaster over batons, or a similar construction to the coffers of the dome. Spanning Tiers II and III inside the hall are the large Roman Doric scagliola columns. They are constructed separately from the main hall and their construction is not visible in any way from the exterior. The accounts show that the columns are built up of separate pieces of timber and then the scagliola applied (see §6.3.4) as with the primary structure.

6.3.24 **Tier IV** inside the hall begins at the top of the projecting cornice and contains the high relief plaster frieze of a Roman triumphal procession. It begins over the north entrance door and moves around both sides of the hall to end over the southern entrance to the garden front (Plate 35). It also includes the small projecting secondary cornice above the frieze, which from the floor of the hall is hardly perceptible as a projection at all. A hatch in the top of the deep cornice in the north western corner of the hall allowed close examination and recording of this area.

6.3.25 The superstructure at this point, above the third ring-beam, shows a change in the spacing of principal and common posts, becoming a regular division of three common posts (70 by 140 mm) between principal posts (120 by 140 mm). This reflects the change on the interior to a continuous decorative scheme with no large features like niches requiring specific structural solutions. The spacing and division of the coffers is not determined by the spacing of the rafters.

6.3.26 The structure supporting the frieze and cornice is most clearly understood with reference to Figure 19. The shaped boards for supporting the cornice and frieze are approximately 300mm or 1ft apart, the same interval as the main structural posts (Plate 36). They are fixed to vertical and horizontal pieces nailed to the primary timber frame. Diagonal braces further reinforce the structure, passing across the wider gap between plaster and the primary super-structure. Above the frieze the smaller secondary cornice is again formed on vertical boards roughly shaped into the cornice's profile.

6.3.27 The plaster of the cornice and general walls was laid in a standard three coats, coarse, medium and a fine top coat. The moulded profile of the cornice was run over each coat with a 'horse' and final decorative elements were separately bench-moulded and applied.

6.3.28 The frieze has been conserved by Cliveden Conservation (September 2004) and they have discovered several details of the construction of this distinctive element of the room. It appears that the basic design of the frieze was cast or moulded in individual panels, approximately 2-3 m long, and then lifted into position, fixed over the base coat of plaster that is visible on the exterior from the corner voids. The figures' arms, heads and other extremities and accessories are constructed over metal, and in some cases, armatures, visible in some places where figures have been broken. Different plasters have been used to construct the figures, particularly their arms and hands. In some places, where fingers have broken off, a square cross-section of a whiter material is visible within the final plaster coat. Cliveden suggest that this

material was a strip of more plastic or malleable plaster that could more easily be moulded into shape around the wooden and metal armatures without fracturing. Individual items, such as spears, urns or wreaths were crafted separately and added later, and several using different materials. Real ribbon and chain is used in some places; wood makes up spear, or standard shafts; wires forms the base for several items. On the plain strip immediately above the frieze several pencil sketches were revealed during the cleaning, as well as some initials. These sketches are mainly hidden behind a coat of white distemper. They are predominantly small studies of individual elements of the frieze nearby or below the sketch. So for example there is a sketch of the way an arm and hand are arranged on a soldier, and a sketch of the folds in a skirt of one figure. A sketch of the missing wreath held by the female charioteer at the east end of the hall allowed its restoration. Two standards held by soldiers were also reconstructed on the basis of sketches. As well as these sketches there are initials and names (unfortunately not clear enough to read) on the borders of some of the coffers on the upper part of the dome. These can only have been written by the craftsmen working on the coffers.

6.3.29 There had been comparatively little repair to the frieze. One panel on the north east side of the dome was completely replaced in a slightly different type of plaster, and the style of its carving is different. Other than that, Cliveden noted no substantial mends or alterations. Several more modern items were found such as coins, keys and small toys and figures. These were almost certainly thrown up onto the cornice and frieze by members of the school; tradition suggests some may have been placed in a dare to crawl around the cornice from the access hatch in the north western corner. On the north side of the hall between two figures to the west of the temple over the north door three names are scratched into the plaster of the frieze's background: A Batchelor, G Chambers and Ted Hawkins 1937. Ted Hawkins' name also appears a little to the right of this, dated 1977. These names may be of School staff who worked on the frieze, they are too far away from the access hatch to have been carved by someone crawling along the top of the cornice.

6.3.30 Up to the main cornice and frieze, the plaster keyed to the laths between the posts and visible from the exterior is the first, coarse coat of plaster for the Marble Hall's interior; the studs supporting the laths have a direct relationship to the interior design as discussed above. However, from the top of the frieze the plaster visible on the exterior is a primary coat fixed to a series of studs that bear no relation to the coffered design on the interior of the dome. Once the main structure was erected this coarse plaster coat was put up and then the framework and structure of the coffers was nailed to it rather than directly to the studs. At the level of the secondary cornice, from just below the fourth ring-beam, this primary coat of plaster is visible coming down the vertical studs to a series of horizontal planks fixed to the main posts. Above this point the smaller exterior studs are curved and nailed to the main structure in comparatively few places. They are also aligned differently from the main structure, being squarely over the central part of the dome and radially at either end of the oval (see Figure 218).

6.3.31 **Tier V** contains the first and second tiers of coffers on the interior, and these form the base of the domed ceiling. Each of the coffered panels in the dome's interior has a slightly different shape, and each has a slightly different form of ornamentation. They are formed over a series of boards, furring strips and

laths nailed onto a coarse plaster layer visible from the exterior of the dome. Their construction is dealt with specifically in § 6.3.40. This Tier is the first one with raking rafters above the vertical barrel framework (Plate 37); and these rafters converge at their tops as the diameter of the ring beams is reduced over the dome. This tier also contains the gutters around the dome, draining from the northern into the southern corners.

6.3.32 The lower ring beam of this tier supports the most substantial set of radial struts out to the brick walls. There is one at each principal rafter and they measure approximately 200 by 150 mm (8 × 6 in), as opposed to the much smaller 100 by 120 mm of those struts lower down the structure. These large struts support two near-vertical posts up to a secondary strut, which is tenoned into the principal rafter. This supports two ring beams that form the base of the gutters around the base of the dome and which collect the water from almost all areas of the roofs at Stowe. In the south-east and south-west corners at this level lead-lined channels bring water from the east and west roofs and the south portico into the dome's space and collect it in large hoppers (Plate 38). From there it is carried down into the basement and then out underneath the building through brick lined culverts. Water is also drained into the dome space from the north roof. Although it is thought that the rainwater was collected at this point for use as drinking water for the house it is not clear where the water was stored. There is a large tank in the north east corner, possibly inserted by the third duke in the 19th century. The hoppers do not drain into it and there is no clear sign of how it was filled. Because of access difficulties this tank was not examined.

6.3.33 The voids in the corners are roofed with grey slate and each corner had a small access door covered with lead. In the south east corner on the framework of the access door there was a painted patch and a series of notes about different dates when the occulus had been painted (Plate 39); one recorded that it was blacked out in 1941 during World War II.

6.3.34 At this level the timbers display a large number of carpenter's marks, far more than elsewhere on the structure. The sequence is not immediately apparent although the numbers in the south west corner go up from east to west. Numbers appear on principal and common rafters, ties to the wall, ring-beams at the scarf joints and the struts up to the guttering supports. Each common rafter is assigned to a corner; those in the south-west corner are identified with three crescent chisel cuts. In the north-east corner each common rafter has a single chisel cut, in the south-east two and in the north-western corner four. These identifying marks only appear to be at this level.

6.3.35 **Tier VI** contains the third and fourth tiers of coffers on the interior. At this point outside, the dome is fully above the level of the guttering. The radial rafters have a discontinuous series of narrow diagonal braces running across them, sunk flush with the top of the rafters (Plate 40) to stop sideways racking, a function which the broad covering boards, and indeed the copper or lead roof surface, would also have fulfilled. There is still no iron-work further bracing or securing the timber other than long 6-in nails and broad-headed nails attaching the lead to the boards. There is no clear evidence of a slate covering. Slates would presumably have hung on battons fixed to the rafters, and these must have been removed when the roof covering was changed.

6.3.36 At this level the construction changes to one of all common rafters, there are no larger principal rafters and the bay division visible lower down in the structure is not present. Carpenter's marks are also reduced again to the scarf joints in the ring-beams. The alignment of the smaller studs supporting the primary plaster coat is now very clear, although these studs seem to be fixed to the main structure in surprisingly few places and are only secured with nails. In a few places a second stud spans the gap between rafters and studs and is nailed to both, suspending the plaster studs from the rafters.

6.3.37 **Tier VII** is the uppermost level containing the fifth tier of coffered panels inside and a broad band (Plate 41), elongated at the east and west ends, with plaster scroll work. It is split around roundels (Plate 42) supported by female mermaid figures holding at the western end the arms of Earl Temple, who started the work on the marble saloon; and at the east end the arms of the Marquis of Buckingham who saw the room completed. Above them is a vertical ring of fluted plasterwork and a slight ledge before the iron-framed oculus, which rests unfixed on the upper ring-beam.

6.3.38 On the exterior this tier contains the final ring of raking rafters. The reduced diameter requires that at the narrower east and west ends of the oval several of the rafters are joined together with long diagonal cuts and meet the central ring-beams in one place (see Figure 18). These rafters stretch to the middle of the three upper most ring-beams that form the vertical section supporting the oculus. The curve of the upper part of the dome is expressed by curved firring pieces nailed to the upper surface of the rafters. The lowest ring-beam is separated from the middle ring-beam with a series of small studs (Plate 43), which may have been added later. The lowest ring beam is braced to the raked rafters and fixed with large nails. The top ring-beam sits directly on the middle ring-beam and is fixed with nails. The ring-beams are joined with single tenon scarf joints and a single peg. The oculus is not fixed in any way to the beams, simply sitting on top of the structure and relying on its weight and the sheet lead that overlapped its edge to hold it in place.

6.3.39 This upper section appears somewhat unusual structurally: since the lowest ring beam cannot be greatly supported by the raking braces to the rafters, and it is likely that it is simply held up by the weight of all the rafters pressing inwards. However, some of the downward force exerted by the weight of the oculus must be transmitted out to the rafters through the bracing.

6.3.40 The small studs which take the first coat of plaster here have boards nailed directly to them. It seems that the preliminary coat of plaster did not cover this upper part, and the boards directly support the broader band and roundels at the top of the dome. Perhaps this is to accommodate the heavier weight of the sculpted roundels, figures and arms.

6.3.41 *Detailed Fabric Description - The decorative plasterwork*
Two small areas of the outer lath-and-plaster were opened up to investigate the structure that makes the coffered decoration on the interior (Figure 20). One (Area 1) was on the upper north-west side of the dome (Plate 45), and within the fourth tier of coffers. The second (Area 2)(Plates 46 and 47), Area 2, was on the south side just to the east of the centre, and within the third tier of coffers. The two openings revealed the way in which the coffered panels were built up and how the studs on the exterior supported them. Although they were

only small areas the pattern of cracks within the dome and the work of Hirst Conservation, which involved passing steel screws through the plaster to secure it, revealed no areas with different construction.

6.3.42 As below the primary coat of plaster was marked up with a series of incised lines and a series of reddish-brown chalk lines (see Plate 25). It is thought that these marked out firstly the location of the studs on the exterior, and, secondly, the final design of the coffers and decorative elements, although it is not clear which set of lines fulfilled which purpose. On the basis of incised lines marking out the interior of the coffers the chalk marks may have been indicating the location of the studs on the exterior. Using these guidelines a series of vertical and horizontal boards were nailed through the plaster into the studs, in several places nails that missed the studs are visible on the exterior (Plate 48). Using the final decoration as a guide, the horizontal boards are as long as a single coffer; and the butted joint between these boards is situated at the top and bottom point of each diamond interior coffer. The cracks in the decorative plaster bands are at these points and would correspond with these joints, suggesting some shrinkage of the framework (Plate 49). The vertical boards run between the tiers of horizontal ones and these two sets of boards form the outline of the bands of oak leaves dividing each coffer. In the corners formed by the vertical and horizontal boards, other boards are nailed diagonally into place forming the outline of the sides of the diamond coffers.

6.3.43 These boards partially build up the level of the divisions between coffers. Plaster would not key directly to boards though and firring strips were nailed to the boards aligned horizontally; this created the level of the slightly recessed panel in each corner of the coffer (see Figure 20). A second layer of laths was then added, perpendicular to the firring strips, in order to build up the higher level of the oak-leaf strips and the diagonal borders of the coffers. These borders were then plastered, probably drawn with some form of 'horse' although running the mould around the angled corners would have been considerably awkward. Any messy edges or corners are, however, concealed by separate bench-moulded elements. It was not clear whether the raised narrow edges along the oak-leaf borders were run in situ or are comprised of separate bench-moulded strips. The former is probable as it would have been difficult to allow for the curvature of the ceiling in bench-moulding unless the elements were applied while still damp and slightly malleable. When the final coat of fine gypsum plaster was run over the borders it was also added to the still visible primary plaster coat in the centre of the coffers. Onto this surface the bench-moulded gypsum plaster floral centres were finally fixed completing the decorative scheme (see Plate 49). During conservation pencil marks and incised circles and radial lines were seen within several of the coffer centres, marking out the location of individual leaf and flower moulded elements. The female figures are almost certainly formed around metal armatures and may have been partially made first and then fixed into place. The coats of arms within each roundel are formed differently; that on the east side is original and was carved in situ using several individually moulded elements; that on the western side has been repaired, cast in one piece and replaced.

6.4 THE SOUTH PORTICO

6.4.1 *Introduction*

The south portico dominates the centre of the south front of Stowe House. It projects beyond the main line of the central pavilion approximately 4.5 m (14 ft 9 in), supported on six large Corinthian columns along the top of the south steps. It has an empty triangular pediment with the same cornice and profile as that which continues around the whole south front. This section is concerned solely with the roof and the construction of the decorative plaster ceiling and cornice. More detailed discussion of the construction of the walls and stonework of the portico and pediment structure will follow in Section 7: The Masonry and Walls.

6.4.2 *History and Phasing*

The south portico was built between 1771 and 1779 as part of the grand redesigning of the whole south front by Earl Temple (Richard Grenville). The portico's walls feature a frieze of Bacchic scenes (Plate 50) by James Lovell carved in 1776; this and the ceiling's pattern of storks was inspired by Stuart and Revette's *Antiquities of Athens* published in 1762. A detailed account of the construction of the south front and the portico can be found in Bevington (1993).

6.4.3 The portico, and indeed the whole south front, uses a wide variety of stone to emphasise individual elements; these include Boycott stone found in the pediment, Taynton stone for the columns and capitals, deep orange stone from Glympton in Oxfordshire for the Bacchic frieze, entablature and modillions; and Helmdon stone from Northamptonshire for the portico's paving.

6.4.4 There are records of the construction of the south in the Huntington Library archive. Between 3 June and 1 July 1775 Thomas Banerd and a team of four men were paid for three periods of 14 days for '*framing of roof for portico*' or '*framing of pediment roof*' a total of approximately 210 person days. On 8 June, James Bull was paid for raising the brick wall of the portico by six and a half rods (or 32.68 m - this is a measurement of area rather than height). On 15 July James Cowley and a team of seven men, which included Thomas Banerd's team, were paid for 14 days taken to raise the roof over the portico, half as much time as it took to frame the roof.[20]

6.4.5 The style of coved ceiling, supported on curved brackets hung from the ceiling joists, can be paralleled at Mansion House in London (Figure 21: Jeffery 1993, 76 Fig. 55A). In this case, however, the ceiling is within the house and has rooms above it rather than being supported directly by the roof trusses.

6.4.6 The roof was re-leaded in 1865 and this date was stamped onto the western slope of the roof. Reused timbers with empty sockets were used as some of the upper common purlins, suggesting that the timbers were partially renewed at this time as well as the surface lead.

6.4.7 *General fabric description*

The south portico roof measures approximately 19 m by 8.3 m (*c.* 62 ft 4 in × 27 ft 3 in)(interior measurements) and is hipped on its north side, with the blank pediment to the south. Its northern half is set back beyond the line of the

[20] HL STG Accounts, Box 114 (1766-1796), Bundle 2: 1775.

south front, into a recess formed by the east and west roofs and resting on these and the southern wall of the Marble Hall. The pediment is local Boycott stone resting on massive carved Corinthian capitals in creamy Taynton stone. In the interior of the roof the back of the pediment is a roughly coursed rubble stone wall with occasional brick areas and the upper courses of the wall are laid along the slope of the pediment rather than horizontally. The other walls of the roof, between the portico and the east and west roofs and the dome, are brick.

6.4.8 *Roof covering and drainage*
The roof lead was supported on narrow sawn softwood boards with rolls over wooden dowels approximately every 1 m/3 ft (Plate 51) to draw rain-water into channels that run diagonally back into the interior of the pavilion. These took the water into the gutters of the east and west roofs and thence into the pipes and culverts within the spaces at the corners of the dome (Plate 52). The boards were nailed onto common purlins on the east and west slopes that run north-south; they lie on the north face, over rafters tenoned into a single series of purlins between the principal rafters at the end of each of the trusses.

6.4.9 Above the roof, in line with the front of the building, the parapet walls have been extended over the roof. These extensions to the parapet are solid ashlar without a rubble core, and are later additions indicated by the straight joint between them and the rest of the balustrade. They have probably been added in order to conceal the Marble Hall's dome from the south front, and to make the line of the top of the house uninterrupted. In order to reinforce the roof at this point extra timbers have been bolted to the principal rafters, doubling their width at the point where the wall extends over the roof. At the apex of the roof a second set of rafters has also been added. The actual structural effect of these additions is not clear. .

6.4.10 *Roof structure*
The roof structure itself is complex with trussing action distributing the weight and thrust of the roof in several directions. It is principally divided into five bays formed by four trusses running north to south (Figures 22 and 24). These trusses are all asymmetrical queen-post trusses, of two different heights, with square joggles and cross or diagonal bracing (Figure 23). In addition, extra trussing action is supplied in an east to west direction with four long trusses running across the roof. The principal rafters thrust against sloped joggles at the heads of the posts of Trusses 2 and 3; they are notched over Trusses 1 and 4. Between Trusses 2 and 3 small king post trusses are formed over beams between the posts at the apex of the roof. Although these trusses are composed of separate parts, not framed individually like the others, they certainly provide structural support. As with other roofs at Stowe, the trusses are reinforced with a variety of iron straps and bolts.

6.4.11 *Ceiling structure*
The lath and plaster of the portico ceiling is fixed directly to the common joists that are aligned north to south with six to seven within each bay of the roof. They are fixed to the principal joists with single tenons at one end and with tenons into chased mortices at the other, as on the east, west and north roofs. The principal joists are fixed with timber forelock joints (see Figure 9) secured with a tapered square peg passing through the tenon against the tie-beam; the principal joists are staggered between the bays so that the tenons

can extend beyond the tie-beams. This treatment of the principal joists is different to the standard tenon and chased tenon fixing of principal joists in the other roofs at Stowe.

6.4.12 The decorative plaster cornice (Plate 53) and the coving around the portico ceiling are formed from a series of single boards that are cut into the shape of the main projecting part of the cornice and the coved section (Figure 25). These are fixed to timber batons on the walls of the portico and pediment, and hung from horizontal batons fixed to the underside of the ceiling joists. These boards are spaced approximately 300 mm or 1 ft apart and are the basic structure of the plaster cornice. Separate bench-moulded decorative elements in fine gypsum plaster were fixed to this base. A full discussion of the conservation history and successive decorative schemes of the south portico ceiling can be found in Cliveden Conservation's report (2005).

6.4.13 *Carpenter's marks.*
The carpenter's marks on the trusses run upward along the trusses from south to north with numbers on the tie-beams and post bases, cross braces and the heads of the posts. A second series of numbers runs along the northern edge of the roof at the junction of tie-beams and principal rafters. The principal joists are also numbered I –V from south to north at their junction with the tie-beams, and the purlin sequence on the north side of the roof is also numbered from east to west.

6.4.14 *Detailed Fabric Description – truss forms*
Trusses 1 and 4 (See Figures 22 and 23) are low queen-post, cross-braced trusses half way under the east and west sides of the roof (Plate 54). They are 1.47 m (4 ft 10 in) tall (from ceiling plaster to the top of the strainer beam) having five posts with square joggles at the heads and feet to take the cross bracing. The shafts of the posts are 140 mm × 160 mm (5.5 × 6 in) in size with heads and feet of 140 mm × 240 mm (5.5 × 9.5 in). The posts are tenoned and pegged into the tie-beams and the beams above. The cross-braces between posts are halved over each other and secured with an iron bolt; the southernmost two posts are only braced with a single diagonal strut. Above the posts is a single beam, forming the top of the truss. At the southern end this beam is built into the rubble wall behind the pediment; it was seen when the upper stone of the pediment cornice was removed.

6.4.15 At the feet of the three central posts of both trusses are iron pins passing through the tie-beam. The pin's are flattened on the other side of the tie-beams and fixed to the principal joists with bolts. The northernmost posts are also secured with a stirrup strap: this passes underneath the tie-beam and is bolted through both the post and the plank on the outer sides of these posts; it also supports the hip beam (Plate 55). These planks indicate the order of construction for the south portico roof. The principal trusses were raised first. Then, these planks were put in place to support the hip beams, then the iron reinforcement was added to the roof. A non-jointed solution to supporting the hip pieces was presumably acceptable as the hips are not major load bearing elements.

6.4.16 **Trusses 2 and 3** are the taller trusses in the centre of the roof. They are *c.*2.5 m (8 ft 2 in) high from ceiling plaster to the roof's boards (Plate 56). Each truss has four main posts (210 mm × 210 mm) and one smaller post

underneath the northern hipped side (210 mm × 160 mm). These posts also have square joggles and braces (the smaller posts have a single sloped joggle at their heads). Between the two middle posts the bracing is crossed, and to either side of this single braces reach up towards the middle posts. These trusses do not have a continuous strainer-beam.

6.4.17 The south portico roof also has a series of four trusses running east-west, using the posts of the north-south trusses (see Figures 23 and2 4). These take the form of long and tall queen-post trusses with a strainer-beam between the queen posts (the posts of Trusses 2 and 3). In addition the strainer beams are supported by a central post with diagonal bracing out to the main posts (plate 57); the strainer beam also forms the lowest member of four small king-post Trusses in the apex of the roof (Plate 58). The principal rafters of these east and west running trusses are notched over the strainer-beams of Trusses 1 and 4, and thrust against diagonal rising joggles at the heads of the posts in Trusses 2 and 3. The common purlins forming the east and west slopes of the roof are cut over these principal-rafters, and are spaced approximately 300 mm or 1 ft apart. They extend beyond the line of the southernmost posts and are built into the rubblestone walling or the pediment back (see §.7.3.34).

6.4.18 The tie-beams of Trusses 1 - 4 rest on wall plates. To the south the wall plate is set within the wall of the pediment. To the north the wall plate rests on a brick shelf formed by the top of the south portico's wall which extends up to form a low partition wall between the south portico and the marble hall's dome. Along the east and west sides the principal rafters are tenoned into the principal joists acting as tie-beams, which rest on wall plates. The walls supporting the rear, northern half of the portico roof are red stock-brick, and are the continuation of the structural brick walls of the portico. The northern wall, shared with the dome, is not particularly thick, approximately 300 mm wide; the walls to the east and west were not fully visible for investigation although they appear to be somewhat thicker. The construction of the pediment is fully discussed in §7.3.35.

6.4.19 *Joists and Ceiling support*
Timber forelock joints hold the principal joists (150 × 300 mm/6 in × 1 ft) to the tie-beams (see Figure 9). The end of each principal joist is extended into a long tenon that passes through the tie-beam. This is secured on the other side of the joist with a substantial square peg. The principal joists are closely staggered so that the projecting tenons of each joist abut the main part of the joist in the next bay. The common joists (70 × 100 mm/3 ×4 in) are fixed with chased mortices at one end, and a fixed mortice and tenon at the other. Fixed to the underside of these is the lath for the plaster ceiling and, around the perimeter, the batons that support the coving for the ceiling discussed below §6.4.23.

6.4.20 *Purlins and Rafters*
On the northern hipped side of the south portico there is a single series of purlins (150 × 170 mm/*c.* 6× 7 in) that are tenoned and slightly housed in the principal rafters in a similar manner to those in the east and west roofs. There are three common rafters to each bay (75 × 100 mm/3 × 4 in) and they are tenoned into the purlins and fixed with a single peg. At the base of the roof they rest on a board that runs between each principal rafter resting on short lengths of timber that raise it above the wall plate. Several of the common

purlins contain empty sockets or other traces of being reused. It is assumed that they were replaced when the roof was re-leaded in 1865; there is nothing to suggest that the east and west slopes of the roof were not supported on common purlins originally.

6.4.21 The east and western sides use common purlins instead of rafters. These are slightly halved over each principal rafter. At the point where the balustrade walls are extended over the south portico roof the principal rafters beneath the common purlins have been doubled up and the two timbers bolted together (Plate 59). There are also two extra rafters at the apex of the roof, although they are not formed as another truss as with the others in the apex of the roof. The secondary principal-rafters are tenoned into short lengths of timber bolted to the principal joists, here acting as tie-beams. These extra timbers were probably added as reinforcement when the balustrade walls were extended, presumably only a short while after the rest of the roof was completed.

6.4.22 *Ceiling structure*
The lath and plaster ceiling with its ornamental borders of storks and green-man faces and cornice is hung from the common joists by a series of batons fixed to both the joists and the brick and stone walls of the roof (see Figure 25). It is comprised of linear elements run in situ with a 'horse' mould over a standard three layers of plaster, and separately bench-moulded gypsum elements fixed up with nails. The whole has received various decorative treatments and in later years some areas of repair. These are fully detailed in Cliveden Conservation's report (2005) on the condition and conservation of the south portico.

6.4.23 The upper surface of the ceiling's coved edges is visible around all four sides of the roof space (Plate 60). Batons are nailed to the undersides of the joists approximately 0.5 to 0.6 m away from the wall-plates. Vertical batons are also fixed to the walls, nailed to the wall plates at the top, and directly to the brick walls lower down. Nailed to these batons are pieces of board or plank, approximately 25 mm thick, which are sawn into the basic shape of the projecting cornice and the coving. The boards are at approximately 300 mm to 500 mm intervals and the laths are nailed to them. Cracks in the ceiling's plaster have formed at the points were the boards are located. The rest of the cornice is formed from other boards or brackets, nailed to the vertical studs fixed to the walls. The lath is then fixed to these and the basic profile of the cornice run using a horse. The upper surface of the deep cornice top is boarded, not lathed, as is the top of the smaller projection underneath the scallop frieze.

6.4.24 The bench-moulded elements are cast from white gypsum plaster in sections varying from 180-300 mm or 7 in to 12 in. They are fixed, with the exception of the broad scalloped run, with nails and then plastered over. Each moulded section has more or fewer nails depending on the size of the decorative piece; the small bead and real moulds are fixed only with plaster. The exception to this is the broad band of tall scallop moulds which are cast in sections of 30 mm or 12 in and which are secured straight onto a coarse plaster layer without any nails (Plate 61).

6.4.25 In the south portico ceiling, the border's straight bands were originally run in situ. The large guilloche boarder forming the roundels was also run in situ,

although several areas of later repair are created from separately cast elements. Within this is a smaller guilloche band made of separately cast curved elements fixed through the plaster to the ceiling lath (Plate 62). The roundels are also individually cast, the storks being made of identical body elements with different heads (Plate 63). The roundels have slightly bevelled edges, and are partially supported by the surrounding plaster, although this support can only have minimal structural benefit. The stork elements were fixed up first, and then the surrounding areas within the guilloche roundel received the final coat of plaster, over the edges of the stork panel elements.

6.4.26 There are recent repairs in the area around the rooftop access door. These comprise steel strips screwed into the top of the joists; from these are wires passing through the ceiling and holding washers that support the plaster where it has started to separate from the laths. This work was undertaken by the school in 1992 (Bevington 2000, 26) after atmospheric damp loosened the plaster. The conservation teams working on the ceilings during the current phase have used similar techniques (Plate 64).

6.5 THE NORTH ROOF

6.5.1 *Introduction*

The north roof extends for the full width of the central pavilion spanning the east, west and dome areas and covering the extended and raised stair bays on either side of the house (see Figure 5 & Plate 67). It was constructed in the latter half of the 18th century (between 1773 and 1800) at broadly the same time as the remodelling of the south front of the house. Although the principal roof structure is all of the same period several individual elements of the interior structure and earlier layout of the house can be discerned within it (Figure 26). The towers, which were built at the corners of the house in the 1720s and 1730s are visible in outline, as are the new stair bays which were added to the ends of the building in the 1740s. There are also chimney stacks and cross walls, which may be on the alignment of features in the original 17th-century house.

6.5.2 Despite the restrictions of the earlier structure and the later adjustments the roof structure is consistent in its construction and materials. It has clearly been designed to cover the space already altered during earlier phases, rather than being a composite roof including material from those phases.

6.5.3 The work done in the 1960s, erecting a mono-pitched roof with large skylights and rearranging the drainage systems on the roof, removed some and covered all of the historic fabric (Plate 65). The current restoration works removed unsympathetic fabric and restored the form of the original 1770s roof, including its lead finish. The restoration works were undertaken by removing as little historic fabric as possible; this meant that several areas of the roof were not accessible for examination being continuously covered by boards.

6.5.4 *History*

A part of the earliest house on this site, begun in 1676, remains within the northern half of the present building. The current southern limit of the north roof runs along the line of an east to west internal division of the 1676 house. It is also probable that the now visible chimney stacks spanning the roof, although unlikely to be directly above their fireplaces, originally served fires

in the 1670s house. In 1688 a cupola was added to the lead flat roof, but lasted only 30 years.

6.5.5 In the early part of the 18th century (c.1720-35) the house was altered with the four corner bays of the house being raised to form towers of three storeys (Figures 27 and 28). The outlines of the two northern towers are visible in the existing roof where the framing is distinct. The timbers here may be somewhat earlier than the majority of the roof, being partial survivals from the 1720s. The Seeley view (1750) also shows tall chimney stacks against the inner corners of the towers, corresponding with the stacks investigated and recorded by OA. Although the chimneys have clearly been raised hiding the towers from view, along with the rest of the roof, pale rendered surfaces are just visible behind the later brickwork indicating the appearance of the early chimney and tower walls. This render backs up the documentary evidence that the house was given a coating of render after the towers were constructed; on 5 July 1748, Marchioness Grey wrote in a letter *...the House which has now the longest front (they tell you) in England, and being Whited Over has a very good effect*... (Clarke 1990, 183).

6.5.6 In the 1730s there was an extension to each side of the central pavilion in order to accommodate new cantilevered staircases at the end of the passages through the centre of the house, filling in the original deep recesses in the sides of the house. The Seeley view of 1750 shows these as only being two storeys in height. The evidence of changes in the brickwork and possible remains of platt bands or stone cornices (discussed in §7.2) on the façades of the house indicate the changes of the 1770s when these bays were raised to the same height as the rest of the roof.

6.5.7 By 1780 the central part of the house had been heightened to bring the walls up the same level as the new south façade. Bevington (2002, 32) suggests that this was proposed by Valdré in order to screen the new roofs of the south front that would now have been visible from the north. The chimneys and cross walls were also raised, building them up against the earlier rendered faces of the chimneys and towers. The exact dates of this work are not known. In 1772 Earl Temple wrote to Earl Chatham, his brother in law, that '*the north side is charming*', which Bevington (1993, 14) takes as meaning the north side was substantially finished, including the raised balustrade with its urns. However, the brickwork and cornice work of the raised stair-bays abuts the new ashlar of the taller southern half of the building, suggesting that the raising of the northern half was not undertaken until the southern half was finished, and this was not until the mid 1770s (Bevington 1993b, 18). Throughout the first half of 1779 the archives record Ed. Masters as being paid for mason's work on the north side, although it does not specifically say where.[21] Work was going on across the north side throughout the 1770s; in 1776 Thomas Burgess was paid for 14 days work bracketing and preparing for stucco cornices on the north side,[22] this is taken as being exterior works, interior works are usually referred to as being 'in' rooms, or as plastering rather than stucco work.

6.5.8 In the inventory of the house for the year 1839 'Observatory' is listed in the section for the centre pavilion, although no contents was been transcribed (Bevington 2002, 94). Bevington (*ibid.*) records that two observatory rooms

21 HL STG Accounts, Box 114, Bundle 6a: 1979
22 HL STG Accounts, Box 114, Bundle 7: 1775-9

were added to the roof containing a five-foot Equatorial Telescope by Dolland. Early lath and plaster visible on the sides of the present access stair from the top floor shows that this was the 19th-century access to the roof as well, not a 20th century intrusion. In 1898 the clock was inserted into the north portico's pediment and its bells, since removed, were hung under a canopy on the roof, hidden behind the parapet.

6.5.9 The 20th- century alterations took place in 1968 and 1969. In this period the whole of the roof was covered with a softwood framed roof. The corner tower areas were covered with areas of flat roof, and on the western side an access door was inserted. The roof trusses in the south-east and south-west corners were completely removed and replaced with a flat roof (Plate 66). Several bays on the south side of the roof had all their common rafters removed to insert skylights, including the areas immediately south of the three existing 18th century roof lights. The chimney flues within the walls running north-south across the north roof were all capped although the fireplaces may have gone out of use much earlier. The date of this work is corroborated by workmen's documents found in the roof and a date scratched into the cement capping on one chimney.

6.5.10 *General Fabric Description*
The north roof is constructed mainly of oak members with regular dimensions and sawn sides occasionally evinced by saw marks. There are apparently no reused pieces, a few timbers show some axe tooling or slightly waney edges; there are also few signs of repairs, reused or replaced timbers. All the timbers are a dark brown in colour which in many places seems to be general age and water staining, but they may have been treated at some time as some small pieces show a very even staining in cross section.

6.5.11 The roof is divided into 16 bays defined by the position of the queen-posts, with carpenter's marks running from west to east; however, the bay division is not simple, and the truss form and arrangement varies across the roof. The principal trusses are all of the same shallow queen-post form with a central post to support the strainer beams (Figure 29). The queen-posts have been numbered 1 to 15 from west to east, apart from Truss 8, which is on a different alignment. There are also several smaller king-post trusses, over Bays 1 and 16 on the east and west sides of the pavilion. The trusses vary in length and alignment to accommodate the differing width of the roof and features like chimney stacks and skylight openings. They are set within irregular openings in the brick walls and rest on wall plates set into the walls. The purlins around the roof are all slotted on to free tenons through each principal rafter, and the common rafters are tenoned in short lengths into the purlins.

6.5.12 *Covering*
The roof is covered with wide boards running east-west along the roof; they are between 200-300 mm wide and supported the lead cover. They are nailed into place and, on the top flatter section, have a shallow 'v' groove cut along the centre line to take the wooden core for a lead roll over a dowel. The rolls run along the edges of the upper flats and down the slopes of the roof guiding rain water into the gutters. Around the perimeter of the roof the 18th century gutter work and boards have been removed, presumably when the 1960s roof was erected.

6.5.13 *Iron reinforcement*
The roof has a different form of iron reinforcement from that used in the east, west or south portico roofs (see Figure 12, C). Each principal queen or king-post is reinforced from below with a concealed coach-bolt that passes through the tie-beam and into the posts. In some cases, such as under the hipped ends of the east and western stair bay roofs, or the large east-west truss in the central roof, the same method is used horizontally to reinforce principal rafters. Bridle straps are also used over the principal rafters. As well as these bolted forms, iron wedges are found knocked into the gap between the strainer beams and the queen posts, in order to tighten the join between them. In the centre of the roof, behind the octagonal skylight iron straps are also used to secure principal joists on either side of T8 (see Figure 30).

6.5.14 The caged coach bolts are a more active method of reinforcing a timber truss structure. In the method seen elsewhere at Stowe the iron work, the bridle and stirrup straps, rely on the deflection of the timber, that is, the truss must shrink or warp before the reinforcement becomes active. In the north roof, the coach bolts are tightened into place, and the strainer beams are also tightened by the knocking in of the iron wedges, giving active reinforcement from the moment of construction. This method of reinforcement appears in 19th-century manuals and was a cheaper alternative to a system using cotters and wedges (Yeomans 1992, 170-171). It is not clear why the iron reinforcements in the north roof are of this different type. It is a more effective structural solution for strengthening the trusses, and would have benefited the other roofs. Its appearance may suggest a different team of carpenters working on this roof, with a different spread of structural knowledge - or if the master carpenter or architect knew of these structural improvements he may have specified the use of this type of ironwork. As yet no clear reference to the framing and construction of the north roof has been found in the archives.

6.5.15 *Ceiling and walls*
The ceiling is uniformly lath and plaster fixed beneath the common joists, which are set into the principal joists by means of chased mortices and tenons. In several places, particularly the east wall, and on the east side of the eastern chimney and cross wall, the gap between external and internal walls is quite considerable with vertical studs supported on the boards at the side of the roof to take the wall's lath and plaster.

6.5.16 The surrounding external walls are brick, topped with the stone balustrade and the internal cross walls and chimneys are also brick with later cement repairs and capping to the chimneys. The bricks at this level all appear to be 18th century, red stock bricks with some later repairs which by the cement pointing suggest work of the 1960s although the bricks seem to be reused earlier ones.

6.5.17 *Detailed Fabric Description - later fabric*
In the later 1960s a soft-wood mono-pitched roof was constructed over the entire northern roof. During this the 18th-century guttering was also removed as were the southern sections of the roofs over the stair bays on the east and western sides of the roof. The roof over the main part of the 18th-century fabric simply rested on the older roof, and had hatches allowing access into the space between the two. Skylights inserted on the southern side and a single one on the northern side cut through the earlier fabric, sometimes leaving timbers unsupported (see Figure 32). Over the east and west stair-bays the

upper part of the roof trusses, rafters and posts, have been removed and a flat platform put over the areas. Apart from these areas the majority of the roof still has its 18th-century fabric, including the wide board covering. The stair-bay trusses have now been reinstated in their original form (see Plate 71)

6.5.18 *Historic Truss Forms*
The north roof's trusses (Figure 29) are primarily a low queen-post form (Plate 68) with some slight variations to accommodate the differing spans across the roof. The tie-beams (300 × 200 mm/8 in × 1 ft) rest in rough, irregular openings in the side walls approximately 0.60 m below the base of the balustrade. They rest on a series of wall-plates or bearer beams although these were not clearly visible for investigation being below the level of ceiling plaster. The principal rafters have short struts beneath them adding further reinforcement and iron wedges at the raking joggle between principal rafter and queen-post. Between the queen-posts are substantial strainer beams, also with iron wedges where they meet the queen-posts, and with a single post beneath the centre of the strainer beam.

6.5.19 Trusses 4 and 11 differ slightly in order to accommodate the wider span of the roof at these points (see Figure 29). Here, the tie-beams have a single 2.96m long splayed scarf joint (Plate 69) with vertical edge abutments and three screw-threaded bolts at the middle of their length.[23] There are raking struts between the queen-posts and the two posts beneath the strainer-beam. Trusses 3 and 12 are, however, shorter where they meet the chimneys at the inner corners of what were the corner towers of the house in the early 18th century. Here the pitch of the roof is maintained by extra pieces of wood resting on the back of the principal rafter, which is much steeper due to the closeness of the queen-post to the chimney wall. The tie-beam of these trusses rests on a brick ledge on the stack. All the queen-posts are fixed to the tie-beams with caged coach-bolts, and the principal rafters are reinforced with bridle-straps where they meet the tie-beams.

6.5.20 At the extreme east and west sides of the north roof, over the extended stair-bays 1 and 16, the roof is formed of four small king-post trusses aligned east to west (Plates 70 and 71). The two northernmost of these trusses support strainer beams that are tenoned into the heads of the queen posts of the adjacent Trusses 1 and 15. These strainer-beams extend the flat section of the main roof to the ridge line of the king-posts. The southern ends of the stair-bay areas are hipped. The king-posts have the same style of iron reinforcement as elsewhere in the north roof, namely hidden coach bolts (Figure 12, C). In the northern half of these areas the tie-beams are fixed with mortice and tenon joints to the adjacent Trusses 1 and 15. The southern king-post truss supports a single, central principal joist – or tie – which in turn supports a principal rafter forming the hipped end. The corner hip rafters are supported on diagonal members across the corners of these roof areas.

6.5.21 The areas of the corner towers (spanning bays 2 and 3 and bays 14 and 15) are roofed with very low pitched roofs (Plate 72) with common rafters resting on a single north-south ridge supported by a large tie-beam. Between the chimneys and the east and western walls, two large timbers have been bolted together to form a wide tie-beam; on this rest the queen-post trusses of the main roof to

23 Terminology from Alcock et al 1996, Fig. 29.

the south and the tie-beam for the supports for the roof over the tower area (Plate 73). It is not clear whether these are part of the roofs of the earlier towers. It may be that they were inserted at the time the rest of the roof was raised in order to give adequate support to the large trusses. In the south west corner of the eastern tower area and the south-east corner of the other, several common joists lie beneath a later diagonal beam. These joists may be remains from the uppermost room of the tower's ceilings, suggesting that the towers are preserved within the fabric of the present house, and that only the form of the roof has changed.

6.5.22 Although the low roof of common rafters appears to be a later alteration to this tower area, it does not seem to be contemporary with the main part of the north roof. Its tie-beam has been cut to insert the larger truss to the south; its simpler construction of common rafters resting on a ridge between two short posts, with no trussing or iron bracing, is not consistent with the construction techniques used elsewhere. It may however be that the low roof constructed over these areas was merely a convenient way to cover these areas as the chimneys prevented the main trusses from carrying on this far.

6.5.23 In the central part of the north roof, directly north of the dome's area, the arrangement differs considerably (see Figure 30). Truss 8 is aligned east to west and is fixed between the standard Trusses 7 and 9. The large octagonal skylight means that the flat central section of the roof is reduced to a pitched roof, with the ridge above T8. The shorter beams to either side of the skylight, and the corresponding ones to the north of T8, are fixed with iron straps passing through T8's tie-beam (Figure 12, D); thus principal rafters thrust against the queen-posts form small king-posts trusses aligned north-south at these points. It is not clear why the roof is formed asymmetrically in this area. There seems no reason why the bay division between the two chimneys and cross walls could not have been equal, or that the skylight could not have been placed centrally. It is a possibility that the skylight is derived in some way from the cupola added in 1688 but there is little to support or refute this hypothesis; certainly the construction of the skylight appears to be contemporary with the surrounding roof.

6.5.24 *Purlins and rafters*
Around the roof there is a single series of slotted purlins (120 × 170 mm/*c.* 5 × 7 in) fixed with free tenons and pegs to the principal rafters (Plate 74). These continue all the way around the roof, apart from the two tower areas, discussed above. In the areas of two of the rectangular skylights, on the southern side of the roof, it appears that although the framing of the skylights seems contemporary with the rest of the roof, the purlins and principal joists, continued across the space. This suggests that the skylights originally only interrupted the upper portion of the roof slopes. During the alterations of the 1960s they were removed and areas of flat roof constructed to the south of the skylights.

6.5.25 The common rafters are slightly housed in the bearer beams at the top of the roof; they are jointed into the purlins, and notched over the joists adjacent to the walls. The common rafters form the principal support for the guttering of the roof, which was almost totally removed by the alterations in the 1960s. The water was channelled off the roof by lead rolls into the gutters which are stepped to bring the water to the southern side of the roof and through drain

channels in the walls into the east and west roof spaces. From there it was collected in the large hoppers in the voids of the dome. In this way there was no need to have rain water goods visible on the north front of the building, just as with the south front.

6.5.26 *Joists and ceiling arrangements.*
The principal joists (120 × 200 mm/5 × 8 in) are fixed to the tie-beams with tenons and pegs, and the ends are slightly housed within the tie-beams. They are spaced at varying intervals, the narrowest being just over 1 m, and the largest gap being 2.15 m wide. For the majority of the roof the joists are staggered to either side of the tie-beams so that those members are not weakened by the removal of timber at the points of the joists. To the north of the octagonal skylight, over three bays, the joists are in line. Here, however, the tie-beams are only half the width of the roof due to the different truss arrangement here (See Figure 30).

6.5.27 The common joists are fixed to the principals with fixed mortice and tenons at one point and chased mortices at the other, as elsewhere at Stowe. They are spaced at roughly 300 mm or 1 ft intervals and there are four to seven per bay. To the east of the central octagonal skylight is a narrow bay with only common joists. The roof arrangement here is irregular, but is not a later alteration.

6.5.28 *Iron reinforcement*
The north roof also has iron reinforcement to the timber structure; however, it is of a different form from that seen on the east west and south portico roofs (see Figure 12, C and D). The ends of the principal rafters are secured to the principal joists with bridle straps as elsewhere but the posts of the trusses are reinforced with hidden coach bolts, evinced by plugged holes on the sides of the posts where the bolts were inserted (Plate 75). Holes are drilled into the bases of the posts and in a corresponding location through the tie-beam. Within the post a socket was carved at the end of the drilled hole, and a square bolt set into this hole. Then the threaded screw was inserted through the tie-beam and screwed into the bolt. The bolt was then hidden with a small plug of wood. This method of reinforcement was also used horizontally at the ends of the principal joists under the hipped ends of the roofs over the stair bays, and into the ends of T8, north of the octagonal skylight.

6.5.29 The strainer beams at the top of the queen-post trusses are also tightened with iron wedges knocked between the beam and the post heads (Plate 76). In the centre of the roof, to the north of the octagonal skylight, the principal joists to either side of the east-west running T8 are set into the tie-beam of T8 with mortice and tenon joints; they are also reinforced with iron straps bolted to either side of the opposing joists, passing through the tie-beam (Plate 77 & Figure 30).

6.5.30 *Carpenter's marks*
The north roof shows both assembly marks and carpenter's numbering sequences. They appear at the junctions between posts and tie-beams, principal joists and rafters and the tie-beams and in some bays the common rafters are also numbered. The assembly marks are incised, usually across the whole width of the timbers. They mark out not only the shape of expanded heads of the posts but also the location of the principal joists and purlins.

There are also measuring marks of six incised lines forming stars, the centre of which would be the measuring point. The carpenter's numbers are also cut in two ways. One set is neatly done with single chisel cuts and straight lines only. Another is more roughly cut with longer cuts, and these also include circular compass marks. Because of the restricted access it was not possible to establish whether one set of marks was exclusive to one area of the roof, suggesting one team of carpenters; however, the first set of neater marks were seen more in the east side and the latter to the west.

6.5.31 The numbering sequence was impossible to establish exactly as the roof was not fully exposed, but it does seem that the numbers rise from the east to the west. There seems to be no logic as to whether the numbers on each truss runs from north to south, or which side of the truss the numbers are to be found. With the common rafters, in some bays all the numbers are the same, matching that on a purlin or principal, in others each common rafter has its own number both above and below the purlins. In some bays in the east side of the roof a number on a wall purlin between two common rafters is matched by the rafters on either side, so a bay with six common rafters will have three numbers.

6.5.32 *Window arrangements*
The north roof contains three skylights that are original to the 18th century construction, the off centre octagonal skylight and two rectangular lights to the north of the east and west roofs. All three are fixed between two principal joists. The octagonal skylight is at the edge of the roof (Plate 78), adjacent to the dome's wall; the roof slopes down and drains around the skylight's frame. The rectangular skylight in bay 4 appears to have been recessed into the slope of the roof, as sockets for the purlin tenons show that the purlins carried on over the bay (Plates 79 and 80). If this was the case there is no surviving evidence for how water would have drained away from around the window. In Bay 14, the roof to the south of this window was always flat as indicated by the lack of mortices for a purlin, although there are mortices for joists.

6.5.33 The work of the 1960s to enlarge these windows removed the roofs to the south of these skylights and the guttering arrangements. A further skylight was also inserted in the 1960s in Bay 2, cutting through the Observatory structure and leaving several timbers unsupported, and in Bay 15 further removing the roof's timbers. The northern part of Bay 7 was also altered at this time with the insertion of a skylight.

6.5.34 *Chimneys and partition walls*
Due to the limited amount of opening up within the north roof only small areas of the partition walls were available for investigation. There are four sets of chimney stacks emerging within the north roof. More stacks are contained within the walls to the south between the north roof and the dome and east and west roof spaces. Two sets form right angles at the inner corners of the corner tower areas, each with at least four flues. Two more sets form the brick cross walls reaching between the wall with the dome and the north front between Bays 6 and 7 and 11 and 12. All of the flues were capped with before being covered by the softwood roof in the 1960s. The areas examined most closely were the chimney at the east corner tower and the east side of the partition wall between Bays 11 and 12.

6.5.35 At the eastern corner tower external render survives on the northern face of the chimney and on the western face of the return wall running north to the parapet (Plate 82). This wall is the external wall of the early 18th-century corner tower, probably approximately at eaves height. This render is now almost completely covered by later brickwork that widens this return wall to the same thickness as the chimney, and supports the timbers for the current north roof.

6.5.36 On the southern side of the eastern corner tower two large timbers are bolted together. The northern of these is likely to be an original timber from the roof of the tower, but no brick wall survives below this timber. There is a similar arrangement on the western side, but no external render was visible here due to the build up of later material.

6.5.37 Between Bays 11 and 12 there is a void between the internal plaster wall and the spine wall containing three of four flues, now capped with cement. The void allowed measurement of the heights of several steps in the brickwork (Figure 31). No external render is visible on these chimney flues. However, Seeley's 1750 view of the house (see Figure 28) shows a chimney on the eastern side of the house in approximately the correct position. Interestingly, this view shows the chimneys symmetrically arranged to either side of the north portico, not reflecting the asymmetrical position of the western chimney and cross wall. The brickwork of the cross wall is stepped in to support the principal joists and the purlins. The upper part of the roof is supported directly on the brickwork of these walls (Plate 83). Below the level of the ceiling a series of three substantial stepped brick ledges is visible, the lowest of which is 1.95 m below the level of the ceiling plaster. Below this, 3.11 m below ceiling level, is a layer of debris obstructing the view. These three steps are likely to represent the approximate roof line of Stowe House before the north roof was raised to bring it up to the level of the tower roofs. All the chimneys were capped with concrete in 1968 (Plate 81) and this date is inscribed in the chimney between Bays 6 and 7.

6.5.38 Internal partitions are visible in some places within the roof as horizontal timbers fixed to the undersides of the joists or where vertical posts are fixed to the joists and the gap between the two plastered wall faces is visible from above. These internal walls are in most places approximately 100-150 mm away from the main structural walls and are supported on vertical studs.

6.5.39 *The bell canopy*

Over Bays 10 and 11 is an open canopy structure, which rests on the roof's boards and on the parapet and is associated with the bells to the clock in the north portico (Plate 84). The clock dates from 1898 and is a memorial to Major Morgan-Grenville from his wife. Supposedly the canopy is for the bells although they would have been quite exposed.

6.5.40 Two large timbers are built into the stone work of one of the solid panels within the balustrade, and their other ends are nailed to the beams at the top of the roof's slope. These support a flat roof of 150 mm wide boards sloping downward into the roof space and resting on the top of the balustrade. No mechanism survives, but a single timber beam hung beneath the cover may have supported some. Beneath the canopy, in Bay 11, a timber lined rectangular hole passes through the ceiling plaster, and supported on the

underside of Truss 9 is another piece of wood between two joists presumably supporting another piece of mechanism. The clock mechanism is housed in a small room above the eastern side of the north portico; it was not examined.

6.5.41 *The roof-top observatory*
When the western side of the roof was revealed by the removal of the 1960s roof, the remains of an inserted room were seen occupying Bays 2 and 3, just to the south of the access door to the top floor of the house (Plate 85). This structure is the remains of an observatory room built on the roof in the early 19th century by the first Duke to contain a five-foot equatorial telescope by Dolland. The telescope was sold in 1921. The structure has had all the walls and roof removed, presumably when the 1960s roof was constructed, and it has been truncated on its southern edge by an inserted skylight.

6.5.42 The observatory room only survives in part (Figure 32). There are the remains of part of the southern part of the floor, the lower part of studs for the walls with the marks of lath and plaster, and a single piece of skirting board. There are also areas of original plaster on the access stair that still leads to the upper floor of the house. The structure's timbers are primarily softwood but several timbers are reused, and some of these are oak.

6.5.43 The upper half of the southern principal rafter and southern queen-post of T2 has been removed as have the beams between the southern queen-posts of Trusses 1, 2 and 3. These removals created a space into which a floor was inserted approximately 0.7 m above the ceiling plaster. The floor is supported on a series of joists that rest on two east-west aligned beams fixed to the queen-posts and on struts to the common joists. At the southern edge the floor joists rest on the purlin over Bay 3; in Bay 2 they have been truncated by the later skylight (Plate 88).

6.5.44 Part of the floor has now been removed (Plate 86) and the roof above it reinstated with short boards (Plate 87). This area could have been the second observatory room; however, although the joists do appear to have extended back to the line of the northern queen-posts of Trusses 2 and 3, there are no signs of laths or plaster or uprights to support a wall at this line. They may have been completely removed when the rooms went out of use but the repair to the central flat roof section and the cuts through the floor joists are not as new as those for the 1960s skylight alterations. The reinstatement of the flat roof section suggests that the roof observatory had only one room facing south, or that the second room was removed sometime before the whole area was altered in the 1960s.

6.5.45 On the western side of the area, parallel to Truss 2, a series of reused timbers provides the support for the wall studs that show nails and the marks of a lath and plaster wall surface. On the eastern side are more studs that rest on the beams supported by the queen-posts; these also show signs of lath and plaster (Plate 90) and are fixed to the beams with small caged coach-bolts, the same as those reinforcing the main roof's structure.

6.5.46 There are no contemporary surviving stairs leading up to the rooftop observatory above the level of the current ceiling plaster. The present roof access is 20th century with the plaster supported on expanded steel mesh and covered with plywood. However, below the level of the roof, the side walls of

the stairs are much older lath and plaster (Plate 89) on timber struts. The plaster extends further south than the sloped end of the modern stairs suggesting that the 19th century stairs' door was perhaps further to the south, or there may have been a half landing and a turn bringing the door into the upper rooms facing south.

6.5.47 No sign of decoration or internal appearance survives as all the walls have been removed. A small piece of black-painted plank remains fixed to one of the south-facing uprights on the floor boards. This seems likely to be skirting board and might indicate that the rooms were painted in dark colours to make night-time observation easier. The rest of the evidence only confirms that the room was plastered, and the boards appear to have been bare.

6.5.48 The 20th-century alterations to the north roof have truncated much of the structure of the observatory room, particularly along its southern edge. It is certain that the flooring of the room extended fully between Trusses 1 and 3; its southern edge at present aligns with the purlin and no evidence survives of a southern wall or supports for a limit to the floor further to the south. This room was possibly open on its southern edge.

6.6 FURTHER QUESTIONS ARISING FOR THE ROOFS

6.6.1 Although much has been learnt about the roof structures through this phase of the restoration there are still areas that could benefit from either more research into the fabric of the building, or a more detailed examination of the archives.

6.6.2 The relationship of features on the roof relate to rooms and features within the building needs to be more fully established, particularly the suspended partitions in the east and west roofs. The partitions themselves may be trussed in some way further to become self-supporting as discussed by Yeomans (1992, 135). Their date is also not entirely clear, although they appear to be contemporary with the rest of the roof structures it may be that they date from alterations undertaken to convert the upper floors to dormitories. In the north roof, investigating the locations of the fireplaces served by blocked chimneys on the roof are could usefully contribute to the understanding of internal layout of the house at that time.

6.6.3 In terms of documentary research, differences seen in the fabric - in the use of differing forms of ironwork or timber jointing styles - may be related to different teams of workmen not yet fully identified within the archive. At present the roofs most clearly discussed are the south portico roof, the east and west roofs and that of the dome. The north roof is less clearly identified, it is here that the substantially different form of iron work is found. Thomas Banerd and his team framed the roof in the south portico, although James Cowley (who framed up the east and west roofs) helped to rear it. The dome has a different method of construction, in many ways simpler than those roofs around it, with far fewer carpentry joints as such. The dome's construction seems to have been overseen by James Cowley. Equally interesting within the fabric are those sections of reused rafter and purlin with similar joints found in the east roof (and also in the eastern stair bay and disabled lift area) that could be from earlier roofs. A continuation of structural tradition seems clear, the archives could contain specific information about local craftsmen continuing family as well as local structural traditions.

6.6.4 The archive also hints in its bills and receipts to the sources of the timber and iron. The timber used at Stowe appears to be Baltic timber brought in from Riga and Memel. Not only are these clues interesting in relation to Stowe, but could also contribute to wider discussions of trade and imports into England at this time.

6.6.5 The unusual nature of the Dome's structure makes it a fascinating object of study. The close examination of domed ceilings and rooms elsewhere may well reveal similar timber-framed structures. Only comparison with other buildings may shed some light on this.

6.6.6 The evidence for the way that the roofs were erected has not become very clear. Although we have sequences of carpenter's marks and some evidence in the archives for the amount of time taken and the order in which walls and roofs were erected, matters such as the methods of lifting for example are not clearly evinced within the fabric or the accounts. Again comparative work into construction of this period would certainly expand our knowledge of these subjects. The consistent quality of construction is however clear. The conservation teams working to restore the roofs commented several times on the degree to which the roofs were still plumb and level, attesting to the quality of work by the 18th-century craftsmen.

7 THE MASONRY AND BRICKWORK WALLS

7.1 INTRODUCTION

7.1.1 Phase II of the conservation work at Stowe included work on four areas of wall on the central pavilion (see Figure 5). Firstly, 20th-century cement render was removed from the two protruding stair bays on the east and west side revealing brickwork underneath. Secondly, there were repairs to spalling or collapsed stone work on the south front. And thirdly, the interior wall behind the curved northern side of the Marble Saloon was made accessible by works to the dome. Finally, a subsidiary area of internal wall was exposed during the construction of a disabled lift in the north western corner of the Temple Room; discussion of this area will follow at the end of the section.

7.1.2 These works allowed investigation of several hitherto inaccessible aspects of Stowe. The removal of render from the stair bays revealed evidence of the period when the roof level of the central pavilion was raised to its present height; work on the ashlar south front allowed investigation of 1770s wall construction and fabric where stones were removed for replacement. The north wall of the Marble Saloon is important because it is a standing interior wall of the original 17th century house and as such preserves features from this house not visible elsewhere through the later alterations. The area exposed during the construction of the lift also contains fabric that may belong to the first period of the house's construction.

7.2 THE EAST AND WEST STAIR BAY FAÇADES

7.2.1 *Introduction*

The east and west stair bays project to each side of the central pavilion. They are directly to the north of the long galleries containing the state dining room and library, which join the central pavilion to its east and west counterparts. From the north side, they are partially hidden behind the colonnades and they are not clearly seen from either front of the house.

7.2.2 Each of the stair bays is one bay in length, east to west, and three bays north to south. They each enclose an open stone cantilever staircase that rise from the passages, which lead from the north hall behind the state rooms of the south front to the galleries on either side. Both also have a smaller stair case on the southern side of the main stairs.

7.2.3 *History and Phasing*

The stair bays were originally built some time in the 1730s after the corner towers were raised and the north hall was enlarged following the building of the north portico (Bevington 2002, 42). They are not shown in Rigaud's engraving of 1739 based on a 1733 drawing, but a remark by John Lovegood in 1735 that '*the rooms above the stairs are beautifying*' suggests that they were fully built by then. The stairs are large stone cantilever flights that occupy the entire ends of the extended passages leading from the north hall. The Seeley view of 1750 shows the projecting stair bays two storeys high with hipped roofs and a parapet slightly lower than the eaves on the north front.

7.2.4 The stair bays were raised to their present height in the early 1770s, presumably at the same time as rest of north front, and alongside the works to

the south. On their northern sides, which were recorded during the Phase I conservation works (Heward 2004, 91), each stair bay contained a single window, which had been blocked by the curved colonnades of 1769-70. These windows are of the same size as windows investigated on the north front, and as those on the east and west faces of the stair bays. The smaller windows above were added as the pavilion was raised. At this point the deep cornice from the south front was continued along the south sides of the stair bays meeting at the south corners the reduced cornice continued from the north front. Instead of stone, the cornice work around the stair bays is plaster over a timber framework, the framework of which remains although the plaster work was replaced with modern cement.

7.2.5 In the 1940s the stair-bays, along with the rest of the central pavilion, were re-rendered with cement render. The cornices were also repaired at this time but re-using the apparently original timber form-work. This concrete render contributed to the structural problems encountered during the restoration and the walls have been recovered with a more sympathetic lime-based render.

7.2.6 *General Fabric Description*
Beneath the modern cement render both stair bays are red brick bonded with white lime mortar. Both stair-bays show changes in the bonding of the brickwork indicating the point at which the stair bays were raised in the work of the 1770s. There are stone quoins remaining on the southern corners from their early 18th century form when the stair bays were only two storeys in height; they are hidden behind rendered pilasters. The western stair bay also has some blocks of cut back ashlar that may be remains from a platt band, cornice or eaves line of the earlier lower stairs.

7.2.7 The cornice around the stair bays is in two parts, reflecting the position of the stair-bays between the two principal façades of the house. To the north is a reduced cornice to match that on the north front. On the south sides of the stair bays there is a full Corinthian cornice with modillions and dentil course to match and continue the south front's cornice. The two meet at the southern corners of the stair bays where the larger cornice is terminated above a shallow pilaster. Both full and reduced cornices here are made of render and plaster over a timber framework rather than stone (Plate 91 & Figure 33).

7.2.8 These cornices were constructed after the south façade stone cornices had been completed, as the render cornices completely cover the stone mouldings and modillions. Although the frame and brackets appear to be original 18th-century work there are isolated sections of later timber repair and the render itself is almost all 20th century in date, keyed to expanded steel mesh. The cornices were only examined after the external surfaces had been removed, leaving the timber brackets exposed.

7.2.9 The windows in the earlier, lower parts have iron-stone surrounds while the smaller upper windows have brick surrounds with soldier arches. All the windows, including the central sections of the large round-headed windows into the stairs, have a sash mechanism. The dates of the window frames are not known although they are probably 20th century school period. The lower openings are original to the stair bay construction while those on the upper floors belong to the 1770s raising of the bays. There is some failing and cracking of the brickwork around the upper windows.

7.2.10 Both stair bays have several modern fittings including iron bolt and angle supports for a fire escape ladder on the northern side of the stair bays and drain pipes to the south of the central window. There is also localised patch repair of the brickwork using hard cement mortar.

7.2.11 *Detailed Fabric Description*
The lower portion of both stair bays, dating from the 1730s, are brick in Flemish bond, with bricks measuring on average 230 × 70 × 110mm. On the west stair bay some original struck pointing has been preserved behind the later cement pilaster construction on the south corner (Plate 92) but the majority of the pointing's finish has been lost with the removal of the render, as has much of the surfacing of the bricks.

7.2.12 At the southern corners of both stair bays are limestone quoins with chamfered edges: the western side has five; on the eastern side the upper two have been removed and the spaces filled with brick. They measure between 550mm and 60mm long by 170mm deep (or 2 ft × 1 ft). These have been covered by the 20th-century cement render keyed onto steel mesh over softwood studs to form shallow pilasters (see Figure 33). On the western stair-bay's southern facade the quoins have not been cut back and are finished with even vertical tooling. On the eastern side the south side of the quoins have been cut back flush to the brickwork before being rendered and the eastern face masked with render over a timber and mesh frame.

7.2.13 The windows in the lower parts of the stair bays, lighting the stairs, have iron-stone architraves, which are badly spalled with timber lintels behind. There are two tall 15-pane sash windows, one either side of the tall round headed window which lights the cantilever stairs and passages. These large central windows have alternating tall and short voussoirs and a secondary brick arch over the uppermost voussoirs. The regular coursed brickwork is cut diagonally to fit around the arch (Plate 93).

7.2.14 On the west façade, four courses above the round-headed window's brick arch is a single course of headers and a wide mortar joint marking the top of the first phase of the stair bay. Three blocks of limestone above this mortar joint, cut back flush with the brickwork (Figure 34 & Plate 93), may represent part of the cornice for the 1730s house. They are certainly at the same height as the lower cornice on the north front, at the level of the pediment base and below the raised 1770s top storey. The quoins at the southern corner stop just below the change in brickwork, the cornice level of the early 18th century walls. On the eastern side of the house there were no blocks of stone, but the brick coursing changes from Flemish to Sussex bond and the quoins on the outer corner are at the same level.

7.2.15 Below the quoins on the south face of the west stair bay is a concave area where the brickwork slopes back to the north (Plate 94). This coving continues for the full width of the stair bay. It is not clear whether this feature is original to the building of the stairs or whether the wall has been cut back for some reason. It is not mirrored on the eastern side.

7.2.16 John Heward's investigation during Phase I discovered scars and brick piers where stone architraves around the windows on the north front had been

removed in the 1770s, and also quoins cut back on the front (Heward 2004, 91-2). There was no evidence to suggest that the iron stone architraves of the principal windows on the stair bays are later alterations, and it seems reasonable to assume they are original and would have matched the earlier form of those on the northern front. The quoins also fit with the appearance of the north front uncovered during Phase I. The quoin's dimensions fit with those recorded on the north front by Heward, and by the dimensions given by Cleere in 1676.[24] This implies that when the stair bays were first extended in the 1720s, the house was still not plastered and the stair bays included the quoins to fit with the brick and stone appearance. When the stair bays were raised in the 1770s the quoins were partially cut back and pilasters created to obscure them on the southern corners.

7.2.17 The upper, and later, parts of the stair bay's walls are bonded with Sussex bond. The bricks here measure on average 220 × 65 × 110 mm. On both stair bays, but particularly obvious in the eastern façade, the upper ten courses have wider mortar gaps and less tidy coursing. This is the area covered by the reduced cornice of the 1770s, which continued and joined with the cornice along the north front (Plate 95). The cornice work was cement at the time of removal but probably replaced an earlier one of the 1770s. The framework was fixed to timber blocks that were set into the wall at roughly 300 mm or 1 ft intervals.

7.2.18 Both east and west stair bays have three windows in the upper part. The windows are six pane (2 × 3) sash windows with wooden frames and glazing bars. They have brick surrounds with flat brick soldier arches over them; behind these arches are timber lintels. On the eastern façade the removal of one of the soldier arches over the southern window revealed the timber lintel behind the arch. In this case the lintel was a reused piece of timber, 1.70m (5 ft 7 in) long, with a socket in the middle of its length, accompanying carpenter's mark - 'III' - and peg from top to bottom. Although the socket was filled with mortar it is the same shape and size as those in the length of principal rafter reused in the east roof as a partition support truss (see §6.2.26 and Fig. 10) (Plate 96). It seems probable that these timbers have been rescued from one of the early roofs of Stowe although at present there is no more precise indication of which one. All the roofs on the central pavilion of the house today date from the 1770s.

7.2.19 In the south face of the eastern stair bay a chimney is clearly visible within the wall's fabric (Figure 33). In the lower portion of the wall it is visible in irregular brick coursing between two straight joints. Above the join between the primary build and the 1770s rebuilding the chimney continues but here it is recognisable by bricks laid on edge. One of these bricks was missing revealing that the chimney wall here is only a single brick's thickness with a plaster lining on the inside of the chimney. The chimney flue has a slight dog-leg to the east between the main and reduced cornices and emerges at the corner of the balustrade.

7.2.20 In the south wall of the eastern stair bay, 0.70m above the level of the flat roof, and 0.60m from the inner corner are two modern interventions. Six

[24] The Building Contract, HL STT Manorial Overisze Box 3, folder 6, cited in Heward 2004, 42.

perforated bricks have been inserted into the wall in two vertical lines of three bricks. They have been cut into the brickwork and mortared into place with grey cement mortar. It is not clear what purpose they serve.

7.2.21 *The cornice construction*
Both the full and reduced cornices around the stair bays were constructed of three elements. Firstly, a timber framework of vertical brackets was cut into the basic form of the cornice; these were fixed to timber plugs set into the brick wall. Secondly, the lath and plaster or render was run in situ with a 'horse' mould, which was mounted on a temporary timber run to ensure that the mould remained vertical and perpendicular to the wall. And finally, individual moulded elements, such as the dentils, modillions or the floriate pieces within the coffered soffits, were fixed up onto the cornice using nails (Plate 98).

7.2.22 The brackets are formed from single pieces of board cut approximately into the shape of the cornice (see Figure 33). The brackets are nailed to boards, which are then nailed into timber plugs set at intervals into the brickwork. Lateral support is provided by the boards on the upper surface of the cornice, and by a board fixed to the brackets at the level of the dentil course and above the modillions. These boards allowed the individually moulded elements to be secured with nails; the repair work in the 1960s also used a resin to adhere these elements. It is not clear whether a similar resin, plaster or other adhesive was used in the work of the 1770s. At two or three locations along the length of cornice an iron tie secures the timber brackets back into the brickwork. There is no sign that iron work continues through to the roof spaces over the stair-bays, as it does in the east and west roofs, however, this cornice would not have needed such reinforcement being considerably lighter than the stone one to the south.

7.3 THE SOUTH FRONT AND PORTICO

7.3.1 *Introduction*
The south façade of Stowe is one of the longest and most impressive 18th-century fronts in England. This section covers not only the south facing façade but also the areas of ashlar walling on the east and west sides of the central pavilion, extending back to the stair bays, discussed above §7.2. The opportunity to examine the construction of the façade was enabled by the removal and replacement of individual stones during the restoration process. Although no large expanse was ever visible the general character and construction techniques were discernable. The ashlar and stonework is from a variety of sources, many local, and the façade's design clearly expresses the layout and grandeur of the state rooms that lie behind it.

7.3.2 Throughout this section, reference should also be made to Cliveden Conservation's report (2005) on the conservation of the south portico stonework and plaster ceiling. They carried out analysis on surface finishes, the history of previous repairs and an impulse radar and metal detection survey of the surfaces to look for ferrous cramps.

7.3.3 *History*
This grand façade is the result of the major re-ordering of the southern front in the last quarter of the 18th century. No less than five plans for the reordering of the front were submitted between 1752 and the early 1770s, by

Giambattista Borra in 1752, George-François Blondel in 1765, Robert Adam's (first design) in 1770 and Robert Adam's second of 1771 with help from his brother James. The final plan chosen was an adaptation of Adam's second design by Thomas Pitt and his brother William, relatives of Earl Temple who himself had an active hand in some elements of the front, particularly the projecting south portico and central flight of steps.

7.3.4 The Latin inscription in the centre panels of the balustrade on the east and west pavilions record Earl Temple as the builder, and the date 1775. The actual building began in 1770 when foundations were laid out and partially dug; however, at this time the design was not finalised and by May and June of 1771 these foundations were being re-dug and changed to the newly approved design from Thomas Pitt. The southern half of the central pavilion was demolished in 1772. The east and west pavilions were completed first, by 1773, as they received only a face-lift rather than a complete reconstruction. Also in 1773 the basement levels of the central pavilion were constructed, presumably including the massive oval stone foundation for the Marble Hall.

7.3.5 In 1774 the new central pavilion was constructed with the columns of the south portico being raised in 1775, and the pediment of the portico being finished in August.[25] The arches that support the steps up to the portico were built in November of that year and the winter was spent carving the steps themselves. By 1776 the exterior was largely complete apart from the paving of the south portico in 1777 and the rustication of the ground floor added in 1778.

7.3.6 The accounts record several payments over the course of 1775, for the construction of the south portico.[26] In March Miss Wheates was paid for Glympton stone, both free-stone blocks and ashlar; this was presumably the stone which went to make up the Bacchic frieze. On 8th June James Bull was paid *'for raising the brick wall of the portico, to raising to top of the back wall of the portico 6 1/2 rods'*. These measurements are of area rather than of height (approximately 33 square meters). Later, on 1 July, Ed Masters, Richard Stanley and five others were paid for between two and ten days of cutting down the brick walls, this may be a reference to the trimming back of the face of the north wall. On 15th July 1775 Edward Batchelor and a team of six men were paid 17 shillings 71/2 pence '*to put up the medalions in the center of the House*',[27] presumably recording the date of insertion for the two Portland stone medallions carved by James Lovell.

7.3.7 Also in the archive, on 12 August 1775, James Bull was paid 9 shillings for four and a half days work '*altring the nechus' House*'.[28] This record backs up the visible evidence of the west niche (§7.3.3) where brick piers were added to accommodate and support the stone niche that was narrower than the original brick arch behind. It is not clear from the accounts whether this discrepancy was due to a change in design or a mistake on the part of the craftsmen.

25 HL STG Accounts Box 114, Bundle 2: 1775

26 *ibid.*

27 *ibid.*

28 *ibid.*

7.3.8 *General Fabric Description*
The majority of the ashlar walling is the oolitic limestone from Helmdon around seven miles away in Northamptonshire. Details like the roundels are in the much paler Portland stone and the carved Bacchic frieze within the portico is of an almost bronze coloured stone from Glympton in Oxfordshire. The columns and Corinthian capitals are from Taynton, nearly 30 miles from Stowe, and whiter stone from Bladon, also in Oxfordshire, forms the parapet. As Bevington states (1993, 18), the variety of stone used gives the front a vigour and variety, carefully emphasising key points and features, although the individual properties of each type of stone relating to carving or weathering may also have played a key role in their choice.

7.3.9 *Wall core construction*
The removal of individual stones from across the south front of the central pavilion allowed a key hole examination of small areas of the supporting material and construction of the wall's core. It also allowed an assessment of the structural elements such as lintels over windows, the large portico pediment and the east and west niches within the portico. With the exception of the interior walls of the south portico, the majority of the façade's ashlar clads a core of rough limestone rubble bonded loosely with lime mortar (Plate 99). It appears that the ashlar front was built up and then the rubble core added behind it course by course. It seems likely that the back face of the wall is brick. Although this was not determined during the course of our work, any work on the interior of the house could quickly establish this.

7.3.10 Soft red brick forms the backing for the interior of the south portico and also behind the two roundels above the windows for the State Music and Drawing rooms (Figure 36). In both of these cases there is a clear void between the decorative stone facing and the wall's core construction behind. In these places, iron cramps have been used to secure the roundels and the ashlar of the south portico back into the brick. In both cases the cramps are relatively small in size (*c.* 100-150 × 20 × 5 mm) and are wedged between the bricks with timber wedges securing them, rather than the cramps hooking over the backs of the bricks. Brick is also used around window openings. Interestingly the bricks of the north wall of the portico appear to have been cut back, removing the brick's faces; although cutting back of bricks is referred to in the accounts, no reason is given.

7.3.11 Pieces of Westmorland slate or in some cases wooden wedges have been used as spacers or for levelling between many of the stones, but iron reinforcement does not seem to have been used to reinforce the majority of the vertical walling. The slate spacers were necessary because of the way that ashlar was worked and erected to achieve the very fine joints necessary for a smooth and uninterrupted face. To achieve these very fine joints the masons would carve the individual blocks to be slightly wedge shaped, with the planes running back from the façade being at slightly less than 90 degrees. In order to ensure that the façade remained plumb, spacers would have to be used while the mortar set between the stones. At Stowe, wood and slate have been seen, and elsewhere oyster-shells could also be used (Ayres 1998, 86).

7.3.12 *Ashlar*
The ashlar stones used in the south portico are in some cases very thin (stones of only 20 mm in width were removed over the eastern niche), just wide

enough to take the sockets for the iron cramps holding the stones back to the brickwork (Plate 100). This may have been the economic as far as buying the stone was concerned but its structural effectiveness would, even then, have been quite poor. Due to the thinness of the stone several of the iron cramps have fractured the back of the stonework as they have corroded and expanded. This has contributed to the structural problems within the portico and it is perhaps surprising that they did not manifest themselves earlier.

7.3.13 Between the ashlar and the brick backing in the south portico is a void of varied depth. The void is maintained, particularly above and around the niches by mortar pads, occasionally including Westmorland slate spacers. It has been suggested that the purpose of the void was to enable the masons to construct the ashlar facing vertically, using the mortar pads and slate spacers to keep the ashlar plumb over the irregular brick face. Because of the small areas opened up, it was impossible to test this hypothesis. A further suggestion was that the gap allows air to circulate behind the stonework (*pers. comm.* Cliveden Conservation), this would also perhaps fit with the voids found behind the Portland medallions above the state room windows.

7.3.14 *The Pediment*

The pediment over the south portico is massively constructed of a combination of large ashlar stones, timbers, rubble stone fill and iron-work. The exact construction remains somewhat unclear, particularly the way in which the lower part of the pediment is supported over the capitals. The small areas uncovered suggest that all of the lowest pediment stones, above the capitals, are supported with a 'secret keystone' system. This is a method by which each of the lintel stones is cut so that it acts like a voussoir within an arch. The voussoir shape is hidden inside the pediment's thickness by vertical joints between the stones on the front façade, these vertical joints are only cut into the front 100 mm of the stone. The pediment in Mansion House in London is recorded as having flat stone relieving arches built between the capitals to support the weight (Jeffery 1993, 68). This does not seem to have been the case at Stowe although only small areas of the pediment stonework were removed during the conservation. Certainly the external appearance of the portico columns and pediment at Mansion House is comparable to that at Stowe, although the Mansion House portico is an addition to the front of the house and is open on all sides.

7.3.15 *Detailed Fabric Description - The south façade*

The ashlar stonework for the majority of the south façade and the returning walls to the east and west is approximately 100-230 mm (4 to 9 in) thick. The stones' rear faces are sometimes roughly squared and chiselled but there are also stones that have no apparent tooling on their rear face. Behind the stones was a core of limestone rubble (Plate 99) with occasional pieces of brick or tile, sometimes loosely coursed, while in one opening there was a roughly squared piece of wood. This rubble core is bonded with a pale creamy coloured lime mortar, irregularly mixed with the rubble; in some places there appeared to be hardly any mortar, in others there was almost more mortar than stone. The impressions of the backs of the ashlar blocks was in some places clearly visible in this mortar indicating that the ashlar was built up first, course by course, along with the internal, presumably brick walls, and the rubble core was then poured coarsely into the void before the next courses of brick and ashlar were built up.

7.3.16 *The cornice*
The stone entablature conforms to the standard Corinthian order as outlined in various books and directories on architecture (for example Gwilt, 19th C, p 869). The cornice has large modillions with square coffered soffits between and a dentil band. There is a plain frieze and simple architrave with three plain fascias above the capitals of the portico. The heavy stones of the soffits and the modillions are tied back into the walls and to the roof structures as discussed in §6.2.31. This system is not used within the portico and the cramping here was not fully exposed or examined.

7.3.17 Removal of several of the stones on the eastern side revealed both mason's marks and assembly marks cut into the coffered soffit stones of the cornice. Arabic numerals on the soffits of the coffered stones run from 1-8 from the south eastern corner back to the junction with the eastern stair-bay (Plate 101). Masons marks can also be seen (Plate 102) and the eastern cornice was marked with a five pointed star. In addition one modillion showed what seems to be a practice section where the mason or an apprentice tried out the leaf design for the modillion's curve on the side of the block (Plate 103), which was then hidden within the wall.

7.3.18 The lead cover on the western cornice has been renewed. A new groove to fold in the lead covering is seen approximately 100 mm above the tops of the cornice stones, and remnants of the original lead is preserved beneath the stones of the parapet (Plate 104). Later repairs are seen in various places; most obvious are cement repairs to the fronts of the stones of the cornice (Plate 105).

7.3.19 *The Roundels*
In contrast to the rubble backing of the majority of the south façade, the round Portland medallions depicting Spring and Summer on the west side and Autumn and Winter to the east, are over areas of coursed brickwork, and tied back with iron cramps (Figure 36). The carved panels are approximately 70 mm thick and stand slightly proud of the wall surface. They are formed from six main pieces, a central panel that has the figures carved in deep relief, with two smaller pieces on either side (Plate 106). These smaller sections are of a poorer quality stone than the central panel and may be later repairs, certainly one of these sections on the eastern roundel has fractured in the past and been repaired with an iron cramp tying the two pieces together.

7.3.20 The façade's ashlar blocks have been cut back around the perimeter of the medallion; the area between them behind the panels has been built in coursed red brick bonded with a pale creamy lime mortar (see Figure 36). It may be that the stones were built up around the brickwork in the approximate location of the medallions; once their exact size was known, the ashlar was cut back flush with the brickwork in the desired circle, rather than being pre-cut. The panels are sunk into the cut ashlar stones by approximately 10-30 mm and between the back of the panels and the brickwork there is a void of approximately 80 mm. The stone panels are tied back into the brickwork with iron cramps secured with wooden wedges (Plate 107). Two kinds of iron cramps were used. One is a straight cramp with a right angle bend in opposite directions at either end. The other type is only bent at one end, where it fits into a socket within the stone; at the other end it is tapered to fit between the

brickwork. This type has a twist within the shaft so that the flat end is perpendicular to the bent end (see Figure 36).

7.3.21 The lintels over the windows into the state music and drawing rooms are constructed in a similar way to the lintel stones of the portico's pediment (see §7.3.34). An opening joint over the western window revealed a raked joggled joint with poured lead between two of the stones (Plate 108). Although not very clear it seems possible that a second joggle might be found near to the rear of the stone, and as with the portico pediment, there may be iron cramps across the upper face of the stones. Cliveden's metal survey revealed that the Ionic column's capitals are further secured to the lintel stones with iron dowels (2003, Fig 1). The gap has been filled in recent years with hard cement.

7.3.22 *The south portico*

The south portico is fundamentally constructed as a brick box open on its southern side. This is in contrast to the rubble wall construction of the majority of the south façade. The stronger brick construction allowed the walls to be narrower, particularly the north wall forming the boundary with the Marble Hall. The brick walling forms the enclosed northern half of the portico. The brickwork, from the small areas available for examination, is laid in standard English bond, and the bricks are rich red stock bricks measuring between 230 × 105 × 65 mm and 245 ×120 × 70 mm. The north wall, although only revealed in a very small area, only appears to have been mortared along the horizontal joints leaving the vertical joints empty. The brickwork also appears to have been cut back on this face, removing the faces of the brick (Plate 109) although it is not clear how far this had been carried out across the wall.

7.3.23 The ashlar facing within the south portico is, in some places, very thin. This is in marked contrast to the ashlar on the rest of the south façade. Some stones are only 30 mm thick, just over 1 in; one just above the east niche was at its centre only 25 mm thick. In the curved stones of the niches that were removed for conservation it appears that the thinnest possible flat slab of stone was used, into which the required curve was carved onto one face. In this way as little stone as possible would have been wasted; however the resulting thickness of some stones is barely enough for the sockets to take the cramps. Those stones forming the voussoirs and central stone of the niche were more substantial (Plate 110), and carved from more rectangular blocks.

7.3.24 Between the brick walls and the ashlar facing there is a gap of varied width, although the lower part of the wall was not examined. On the northern wall above the Bacchic frieze the gap is narrowest at 15-20 mm wide. Above the arches of the niches the gap had widened slightly more through collapse but its original dimension is indicated by the pads of lime mortar still in situ; it must have been 40-50 mm (Plates 111 and 112). The mortar forming these pads contains a lot of hair and in some places, clearly shown above the western arch, Westmorland slates have also been inserted as spacers. The pads are not found behind every ashlar slab, and their edges seem approximately square, as if put up during the erection of the ashlar facing.

7.3.25 *Metal reinforcement*

A metal detection survey carried out by Cliveden Conservation (2003, 7 and Figure 1) detected a large number of iron cramps used to hold back many, although not all, of the stones. The cramps used to hold the ashlar within the south portico are iron, approximately 150-170 mm (6 in) long, with a short 20 mm turn down in opposite directions at either end. The cramps are approximately 15 mm wide and 7 mm thick (see Figure 36). They are set into small sockets within the top edge of the stones and back into a gap between two courses of brick where they are secured with short wooden wedges. These cramps can be set into either the horizontal or vertical brick joints. The cramps are not long enough to reach over the thickness of a brick as well as the void between the ashlar and the back wall, and therefore rely almost totally on the timber wedges to secure them. Because of the thinness of the ashlar stones, several cramps have fractured and popped out the front or back faces of the stones; concrete repairs to this kind of fracture have been made in several places in the portico. The uppermost stones of the door pediment are also secured with iron cramps between the stones and tied back into the thickness of the wall.

7.3.26 Cliveden's report discusses in full the conservation history of the south portico, the different mortars used and the variety of surface treatments applied to the ashlar, as well as repairs undertaken in the past. In brief, the majority of the ashlar had received a coating of copperas as well as several previous limewash coatings. The carved stonework and sculptural frieze had several distinct limewash finishes of an earlier date. The restoration work of 2004-05 included applying a limewash coating to the entire south portico, walls, door cases and frieze. This was instead of a further copperas coating, which, due to the different porosity of the variety of stones used within the portico, would have resulted in an uneven appearance (*pers. com.* Mark Hammond, PMT, July 05).

7.3.27 *The niches*

The south portico has six niches, which originally contained a series of antique statues. The two niches facing each other on the east and west sides of the portico were suffering most from collapse and stone displacement. The conservation of these niches involved the complete removal of the displaced arch stones and some surrounding ashlar, particularly on the western niche. The niches, as with the rest of the portico stonework, are thin ashlar pieces over a brick backing. Although the stone was not removed for the full height of the niches it seems reasonable to assume this construction continues throughout; this may differ in the pedestals at the base of the niches where larger stone blocks were almost certainly used.

7.3.28 The brick niche heads are constructed in two parts, and were altered before reaching their present form. Firstly a round arch was built of alternating two headers and single stretcher bricks (Plate 111). This appears to be a single brick deep although it may continue as a broader arch within the fabric of the wall. This arch is neatly pointed and finished on the outside face. Extending back from the irregular lower edge of this arch is a brick coved niche head. The mortar is very loosely pressed in between the bricks from the reverse indicating that the arch was built over a timber centring. The niche heads are constructed mainly from brick headers, although some three quarter length

bricks and some smaller pieces are used in places. The walling around the niche arch meets the arch with diagonally cut bricks.

7.3.29 The curved stone niche voussoirs are cut from flat pieces of stone and show tooling marks from claw chisels and narrow bladed flat chisels. Those pieces that form the edge of the niche are the most substantial stones, cut from rectangular or square blocks rather than flat slabs. As well as containing sockets for the iron cramps holding the stones back to the brickwork, several stones have small square holes to take dowels securing one stone to that above or below it (Plate 113). On the western niche a series of linear marks were seen on the first coved layer of stones. In the top edge running around the niche from south to north incised lines run across the joints between one stone and the next; they are simple straight incised chisel marks (Plate 113). I is missing, II is only on the northern stone, III is not clear, and possibly obscured by mortar. IIII and IIIII cross two stones, IIIIII is only on the northern stone. These appear to be assembly marks; they were not seen on the eastern niche.

7.3.30 Later fixings or attempts further to secure the stones include nails driven through the western niche's keystone into the brickwork and then capped with cement. In the eastern niche, a wire was put through the keystone with a washer to hold the stone and then secured into the brickwork with a large quantity of very hard grey cement. These techniques are coarse and have more than likely contributed to the structural problems now being addressed.

7.3.31 *Alterations to the niches*
On both niches there is quite a considerable gap between ashlar and brick. On the western niche where the southern side of the niche was taken down to below the springer stone, it became clear that this was not simply the continuation of the gap found over the rest of the portico. On the southern side of the niche is an inserted brick pier (Plate 114), abutting the original side of the niche. It is 170 mm wide with a further 50-60 mm gap with mortar pads to the ashlar of the arch. It does not continue up into the arched section and it was not clear how far around the back of the niche was filled out in this way, although it does appear that a similar gap is present on the northern side of the niche.

7.3.32 This evidence suggests that the niches were originally built to be wider, although only the western one was revealed to this extent. The width of the current stone niches is 2.52 m or just under 100 in. If the gap on the northern side of the niche is similar to that on the southern side, the brick arch beneath the ashlar is approximately 2.98 m or just under 10 ft. The gap at the back of the niche is much less, only 40 mm, than that at the edge. It may be that as well as becoming narrower they also became more rounded and deeper, closer to a true semicircle, although without further removal of stones this is hard to confirm. It is impossible to say, without consulting original building plans or design briefs, whether this discrepancy is the result of a mistake by either the bricklayers or stonemasons, or a change in design to narrower niches after the brick backing had already been built. The archives do however record that James Bull was paid to alter the niches in 1775, although they do not specify why (§7.3.7).[29]

[29] HL STG Account, Box114 (1766-1796), Bundle 2: 1775

7.3.33 *The Bacchic Frieze*
The Bacchic frieze is carved on irregularly shaped panels of stone fitted together so neatly that regular lines between stones do not detract from the impression of the frieze as a whole. There are several patches of cementitious repair to the Bacchic frieze; Cliveden Conservation's report should be referred to for fuller details.

7.3.34 *The south portico pediment*
The removal of several stones at the base of the pediment revealed several clues to the way in which the pediment is supported, and the way in which the stonework relates to the timber structure of the portico roof behind the pediment, discussed in §6.4.

7.3.35 The south portico pediment is a substantial rubble-stone wall that, including the ashlar facing, is approximately 1 m thick. Inside the roof space the upper courses of the rubble wall are laid with the slope of the roof, not horizontally (Plate 115). Built into the top of the wall are the long strainer-beams at the top of Trusses 1 and 4. The lowest of the common purlins are slightly larger than the rest and they also extend and are embedded in the stonework of the pediment. These beams extend into the second course of cornice stones. Each of these cornice stones has a large iron cramp set into its top, extending back into the thickness of the wall (Plate 116). Iron cramps also reach back into the roof from the corners of the pediment; these were partially visible when the springer stones were removed (Plate 117). At the apex of the pediment, the upper profile of the cornice and the upper part of the wall have been repaired using brick and cement.

7.3.36 Lower down the wall, on the inside of the roof, the tie-beams rest on wall plates set into the thickness of the walls, approximately at ceiling level. The replacement and repair of several stones within the portico's pediment revealed a system of timber, iron and lead reinforcement supporting and suspending the pediment's structure. This area of wall was only available for investigation in small areas and so its construction is not yet fully understood. The large lintel stones immediately above the capitals are joggled together and further fixed with large cramps across their tops with lead poured into the joints (Plate 118). Above these lintels, visible through an opening in the western side of the portico, appears to be a series of beams with iron stirrups passing underneath them and extending up into the wall (Plate 119); lead has also been poured into sockets in the stones here. In this way it appears that as well as there being some arch like qualities in the lintel stones – provided by the joggles between the stones – there is also some elements of suspension of the stone although there was no opportunity to examine this structure closely.

7.4 THE DOME WALLS

7.4.1 *Introduction*
The oval timber frame forming the Marble Hall walls sits within a rectangular brick space formed partly by new walls built in the 1770s to contain the marble hall and the state rooms of the *piano nobile*, and partly by pre-existing walls of the 1676 house. Mainly this is the main east-west axis wall through the centre of the house. The removal of the roofing boards and the opening up of the voids between walls and timber frame allowed some examination of these walls. The opportunity to examine these walls, particularly the northern

earlier one, was significant given the potential information contained within it about the earliest house's layout and construction.

7.4.2 *Restrictions to access*

Although during the conservation programme the walls around the dome were more exposed than at any previous time, access to them was still extremely restricted, and later alterations to the corner voids further impeded the visibility of the north wall. This was particularly so in the north east corner void where a later brick partition inserted to contain and support a large water tank and various services prevented almost any examination of the earlier wall. Access to the north western corner was provided by a series of platforms, inserted by the school, again containing service pipes. These platforms were enclosed and the space plastered and there were only small openings through which to examine the earlier wall. There was no safe access to the lowest level of the corner at ground floor level. On the southern side, access to the corner voids was provided by a series of scaffold platforms inserted by Linfords at the request of SHPT. In the south-west corner access was possible from roof to the basement level. In the south-east, access was possible down to ground floor level.

7.4.3 Due to these restrictions the elevation of the dome's north wall, the 17th-century internal wall, (Figure 37) is not a completely accurate measured record. However, reference to John Heward's work on the accounts and contracts for the building work in 1676 confirms much of the evidence observed in its surface. Measurements that were possible were made mainly from the level of the dome's gutters and were taken with an electronic distance measurer. This enables measurements to be taken remotely by reflecting a laser onto the point to be measured. A level line at the top of the wall was taken as a vertical measuring point, the distance to ledges in the brickwork or timbers extending out from the wall visible within the gap could be measured. Horizontal measurements were taken from the side walls.

7.4.4 *History*

The contract to build the first mansion house, which is partially preserved within the northern half of the current house, was drawn up in 1676. It was stated that the whole mansion house "*shall bee completed and finished well and Workeman like in all Part[ic]ulars according to this agreem't one or before the Feast day of St Michaell: the Archangell w'ch shall b in the yeare of our Lord God 1678*".[30] The contract was between the carpenter John Heynes, the Bricklayer Thomas Miller and Sir Richard Temple.

7.4.5 No detailed plans of the layout have yet been discovered in the archive and all details about the internal room organisation are currently reconstructed on the basis of the written description found in the account and the physical remains of the building. John Heward (2004, pp24-54) has given a detailed summary of this account and some of the ways in which the design changed in the process of building.

7.4.6 Certain details of the specified heights for the main floors in the original contract have been approximately confirmed by the evidence for floor levels that was visible within the north wall.[31] The contract states that the basement

30 HL STG Archive, STTM Oversize Box 3, Folder 3
31 *ibid.*

will be 11 ft (3.35 m) high. The rooms on the main ground floor were to be 15 ft (4.6 m) and those on the first floor were to be 13 ft (3.96 m) high. The current basement vaults are 3.2 m high at their highest point; it is possible that the floor has been raised, as highlighted by Heward (2004, 27). The approximate measurements possible from the interior corners of the void give a height of 4.4 m (14.43 ft) for the main ground floor, and of 4 m (13.12 ft) for the first floor. In both these cases the measurements vary only slightly from those stipulated in the contract, and the problems with measuring these heights may account for some, if not all, of the discrepancy. The stepping in of the walls, also specified in the contract, is also visible in the northern wall of the dome's space.

7.4.7 *General Fabric Description*
The walls forming the rectangular enclosure around the Marble Hall are all made of red stock bricks. The total dimension of the space at roof level is 19 m by 13.5 m (*c.*57 ft by 40.5 ft). The walls of the pavilion, at basement level, are coursed limestone rubble. As well as the rectangular surrounding walls, there is a large oval stone wall, with upper courses of brick, which forms the foundation for the timber-framed structure of the Marble Hall itself. This oval wall is keyed in to the rectangular walls at the centre of each of the four sides. Within the oval wall, there are brick vaults that support the floor.

7.4.8 The south east and west walls are all of brick and were not observed to contain any features such as blocked windows, doors or fireplaces. This supports the history of a single new building episode for the *piano nobile* floor of the house. These features would be most likely to be preserved in the northern halves of the east and west walls where internal north-south walls from the 1676 house were possibly reused. However, the restrictions of access made close examination difficult, and no such features were clearly observable, nor were any joins between older and newer rebuilt walls seen.

7.4.9 On the north wall, however, several features were visible on the western side (Figure 37). Sawn off timber joists and beams projecting part way from the wall indicate floor levels (Plates 120 and 121) as do surviving areas of plaster. These allow the approximate establishment of the position and heights of the 17th-century ground, first and attic floors; the basement is still in use. A stub of projecting wall containing two plaster-lined chimney flues indicates at least one substantial internal division on the first floor. A blocked door with its lintel and brick relieving arch suggests access between this room and the gallery around the entrance hall that occupied the centre of the northern half of the house based on archive records and Heward's work in Phase I of the restoration (Plate 122).

7.4.10 On the second floor level, the attic storey, more plaster surviving in several patches suggests floor and ceiling levels; gaps in this plaster and the remains of a wall stub again locate internal partitions. No clear sign of original roof timbers, or the line of the roof survived; it is likely that this evidence vanished when the northern half of the house was raised to give it a full attic storey and a level balustrade, with the new construction of the 1770s.

7.4.11 *Detailed fabric description – the northern wall*
Throughout this section reference should be made to Figure 37. In the north east corner of the dome a large lead tank was inserted just below the line of

the guttering around the dome. It is supported on large beams set into the walls to the north and west and into a rounded wall (**031**), which has been built around the line of the dome's structure, abutting the north wall approximately 4 m from the north eastern corner. Health and safety restrictions on access prevented more detailed examination of this corner.

7.4.12 At this point, and at a corresponding point on the western side are chimney flues (**013** and **014**), which were truncated with the insertion of the iron tanks resting on these walls in the late 19th or early 20th century. Both project approximately 430 mm from the north wall and both are 500 mm wide. They abut the northern wall. They are of a single construction and continue right down to the ground floor. These chimneys belong to fireplaces inserted into the house, perhaps during the 1770s, rather than to the original 1676 house; however, it is not known where the fireplaces are that are served by these chimneys.

7.4.13 The basement walls are all plastered and or painted and the fabric was not available for examination. On this side of the dome there was no access to ground floor level. No blocked features were visible from the platform higher up but there were three empty, rough voids (**015**) aligned diagonally going down from west to east, just west of the projecting chimney flue. The ceiling of the cellar was covered with a substantial amount of rubble so it was not possible to see any evidence for the floor.

7.4.14 At first floor level, more evidence of the 1676 house was visible. The wall steps in approximately 200 mm; three tall joists (**016**), sawn off, were still in situ spaced approximately 0.80 m apart and set into the wall above the ledge formed by the step in; no floor boards survived. The ceiling height of this floor is indicated by two large timbers (**017**), 330 ×270 mm in size, set into the wall, roughly 2.24 m apart. They are sawn off but seem appropriately sized for principal floor joists. The eastern one is directly over the wall stub **018** discussed below (§7.4.15), the western beam rests on a short bearer-beam, and is below a possible projecting wall on the second floor (**026**). Approximately 5 m from the dome's western wall is the stub of a brick wall (**018**) that would have extended southwards. It is approximately 400 mm wide and contains two plaster lined flues, one above the other and each approximately 240 mm wide. The lower flue (**021**) seems to continue up vertically within the wall while the upper one (**020**) has a dogleg to the west.

7.4.15 Approximately 250 mm west of the wall stub (**018**) is a vertical straight joint (**019**) in the brickwork that extends from ground floor level up *c*.2.16 m into a horizontal timber within the wall. This could represent one side of a blocked door, although neither the other side of a door, a lintel nor relieving arch were seen. However, plaster (**022**) covers the area above the straight joint and the timber that could represent the door head. This plaster continues up to *c*.0.6 m below the large sawn joists (**017**) and ends in a neat horizontal line. The gap could represent the height of a cornice around the room, although no structural evidence for a cornice was seen, for example timber plugs within the brickwork.

7.4.16 To the east of **018** is a blocked doorway (**023**). The doorway is approximately 2.20 m tall and 0.80 m wide with a narrow rounded relieving arch over a timber lintel. The blocking (**024**) is also red brick. The height of this door

matches the height of **019**. It would have led from the first floor rooms of the south front to the open gallery around the north hall of the original house.

7.4.17 The second floor is represented within the northern wall of the dome by slightly more ephemeral evidence. The floor level of this storey can be established by the large joists **017**. No similar timbers were seen that could represent the ceiling level of this floor and it is possible that they were removed when the wall was raised in the 1770s. There are several patches of plaster remaining on the wall (**027**, **028**, and **029**), all ending at a similar level that suggest that the second floor was approximately 3 m high.

7.4.18 Room divisions are also less clear at this level. There is a possible wall stub projecting 2.77 m from the west wall (**026**). It is obscured however by the plastering of the stairway within the north western corner void, and by the chimney flue **013**. Plaster patch **027** begins approximately 7.20 m from the west wall and continues for roughly 2.60 m but there are no clear signs that the limit of this patch represents an actual room division. A clearer room division is visible on the southern side of chimney flue **030** where plaster patches **028** and **029** are divided by a narrow gap 0.15 m wide with a projecting timber mid way up. The chimney **030** projects approximately 0.3 m from the line of the northern wall and continues up to 1.1m below the present wall top. It has no capping and most likely belongs to fireplaces within the 1676 house, possibly on the southern side, although it was not possible to see any fireplace openings.

7.4.19 No traces were seen of any roof structure from the earlier house. The ceiling level of the present attic storey is only approximately 1 m above the possible ceiling level indicated by the plaster patches. Although it is certain that the upper portion of the wall has been rebuilt, it was not possible to see, due to the oblique angle of examination, any joint between the older brickwork and the new work of the 1770s. In the western half of the wall, a section between chimney **013** and plaster patch **027** projects a small way beyond the wall line with an irregular join between the two. This is in an approximately symmetrical location to chimney **030**, but does not project as far.

7.5 DISABLED LIFT AREA

7.5.1 *Introduction*

In the space behind the apsidal alcove at the north end of the Temple Room or the State Drawing Room, and in the corresponding area in the basement below, a cupboard and store room have been altered in order to insert a disabled lift between these two floors (Figure 38). The space was accessible from the corridor running from the north hall to the western staircase but the works of 2004-05 have changed this access to open into the western gallery thus requiring an archway opening through the wall between the cupboard and the corridor at the rear of the western gallery.

7.5.2 *History*

The Temple Room was built in 1774 as part of the re-ordering of the south front. The construction of the timber framed apse in its north end created two spaces behind, in which the lift was inserted in the western.

7.5.3 In the original 1677 house the space would have been within a dressing room, part of a guest suite of three rooms, a bedroom with a dressing room to each side. The 1677 house had one of these three-roomed suites at each corner of the house. The first house is also recorded as having basement windows, which accounts for the reveal found in the basement area.[32]

7.5.4 From 1766 onwards for seven years the rooms became, from west to east, a waiting room, a private dining room and a small drawing room (Figure 39). The latter was absorbed into the new Marble Hall as the waiting room and private dining room became the Temple Room. W Fairchild's plan of the principal floor of the house shows an opening in this area (reproduced in Inskip and Jenkins 1999, p 37).

7.5.5 It is possible that the north eastern and western walls preserved behind the apse are remnants of these earlier rooms. A plan dating from the time of the first Marquis of Buckingham (1779-1813)(Inskip and Jenkins 1999, 38) shows the area in question with an opening directly into the corridor of the west gallery as does the plan featuring in the 1848 Christie's Sale Catalogue produced by H R Forster (Inskip and Jenkins 1999, 40).

7.5.6 *General Fabric Description*
The removal of plaster at the lower level revealed a blocked window with a broad reveal; the northern reveal had been cut back during the process of opening the blocking. Visible above this blocked window and below the floor boards of the ground floor were two beams and the remains of a lath and plaster ceiling. Below this and in the adjacent space to the west was a brick vault. It was impossible to examine this structure in any detail; however, it appears that in constructing this vault the structural support for the brick wall of the area was removed.

7.5.7 At ground floor level the wall between the stucco corridor and the Temple Room was composed of two distinct brick layers. The first is the westernmost wall, which had a square headed opening with a timber plank lintel. Later this wall was abutted with another wall on the eastern side. This wall has a square opening with a rounded relieving arch. This opening was later reduced in width and the lintel replaced with a length of reused principal rafter (similar to those seen in the east roof, §6.2.27, and over a window on the eastern stair-bay, §7.2.18) and became a recessed set of shelves.

7.5.8 *Detailed Fabric Description*
In the basement area the rubble stone walling of the western wall was reduced during the 2004-05 works exposing the southern reveal to a basement window (Plate 123). The reveal started 1.22 m/4 ft up from the floor level and was at least 0.56m deep. The corresponding northern reveal for the opening had been cut back during the opening of the area but it was at least 1.20m wide. This window belongs to the first phase of the building and is shown on the basement plan in the Huntington Library (Figure 39).[33]

7.5.9 On the ground floor the plaster removed from the western wall revealed two separate brick walls, both with openings within them (Plate 124). The earliest wall is the outer, western one. It has a square opening with a timber plank

32 HL STG Maps and Plans Box 10, (18)a
33 HL STG Stowe Maps and Plans, Box 10 (18)a

lintel, which at the north end abuts the wall to the corridor, and is supported on a large rectangular post, which shows traces of lath and plaster. At the southern end the lintel is built into the wall and continues south, beyond the area that was available for inspection. On the wall's eastern face, now inside the thickness of the double wall, this lintel has a vertical smaller timber plank nailed to it.

7.5.10 Further opening up of the floor area revealed that this wall is, at this point, only supported by a very narrow margin of floor boarding along the wall's western edge. Approximately 300mm beneath the floor is a lath and plaster ceiling. Beneath this a brick vault was revealed, forming the ceiling to a small cupboard leading off from the basement level corridor (known as Plug Street because of the many service pipes running along its length). It is possible that in the construction of this vault the supporting fabric or beams for the wall was removed without realising that the wall was above, due to the presence of the lath and plaster ceiling which would have hidden it from view.

7.5.11 The western wall was pointed with lime mortar and, on the eastern side at least, this was struck. The west face of the wall has been re-pointed more recently with cement-based mortar. The pointing of this area of wall is confusing. The finished pointing on the eastern side of the western wall suggests that this is the earlier wall, however, the character of the brickwork and relieving arch in the eastern wall suggests that this wall is the earlier. If the western wall was built later, but before the larger opening in the eastern wall was filled in, it would have had finished pointing on both sides, making it appear, in this small area, to be the earlier of the two walls.

7.5.12 Abutting this wall was the second wall (Plate 124). It contains a broad round relieving arch that would cover an opening 1.80m wide. At a later date the opening has been reduced and blocked using a shorter lintel of reused timber. The recess formed by the two openings formed a shelved recess in recent years although at an earlier date they were the openings through to the western corridor. The brick pier, which supports the northern end of the lintel, abuts the northern wall.

7.5.13 This lintel was a reused section of principal rafter with the mortice for a slotted purlin (Plate 125), and the sawn off free tenon still in situ. Other lengths of this type of reused timber have been found elsewhere in the building, reused as a window lintel on an upper window in the eastern stair bay, and, in the east roof, as a support for a partition wall alongside a length of purlin which showed the corresponding joint on one end.

7.5.14 Both of these walls abut the wall to the north that separates the space from the western corridor from the northern entrance hall to the western main stair. On the eastern side, this wall has been widened by a brick's thickness, covering the butted joint.

7.6 FURTHER QUESTIONS ARISING FOR THE WALLS

7.6.1 Again the opportunity to study the fabric of the south façade of Stowe has both confirmed the historical sequence for the development of the house and filled in our understanding about the specific details of some elements, at the

same time as raising issues where further research could benefit our understanding.

7.6.2 The way that the south portico walls are constructed with its thin facing ashlar is interesting. Further research into the accounts may cast light on the reasons for this, perhaps whether the project was becoming too expensive at that time. The built fabric suggests either the evidence for a change in design of the niches, or an error by the craftsmen is also interesting to see reflected in the fabric. If the width of the niches was changed in terms of design alterations it would be interesting to know if it was the influence of Earl Temple or the overseeing architect. It is known that the Earl did take a direct interest in matters of design.

7.6.3 Research into constructional parallels, particularly in the construction of the large south portico pediment will not only contribute to the specific understanding of Stowe, but could also add to the wider understanding of techniques of this period.

7.6.4 The poor access to the wall preserved along the north side of the dome means that by necessity our conclusions in this section are approximate. Although it appears that plaster survives, possibly in the space where rooms were lost, the evidence for returning walls was hard to assess and no real degree of accuracy of measurement was possible. The evidence seen for approximate floor levels and heights do corroborate the heights specified within the original contract. The position of the wall on the western side of the northern half, without a corresponding wall at basement level, is curious though. How was it supported? How does it relate to the basement plan in the Huntington Library? Any opportunity to investigate the fabric of this wall, from either side, should be taken if possible.

8 DESCRIPTION - THE SURFACES

8.1 THE SOUTH STEPS

8.1.1 *Introduction*
The south steps form the main entrance into the house from the garden front (Plate 126). They lead up to the large loggia with its enormous Corinthian columns, Bacchic frieze and coved plaster ceiling decorated with plaster herons. To either side of the steps are enclosed formal gardens surrounded by wrought iron balustrades and (at one time) copper urns.

8.1.2 The steps were being conserved as many of the treads had cracked and the whole flight has shifted downwards to the south. Linfords' lifting of the steps allowed archaeological investigation of their construction and the evidence for the the original 18th-century flight that the current steps replaced.

8.1.3 *History*
The steps are a central focal point in the south front. The south front's design changed many times between 1770 when Robert Adam was commissioned and submitted his first plan, to the final executed version. The latter is thought to be an adaptation, by Thomas Pitt, of Adam's second plan with the direct involvement of Earl Temple evident in the projecting south loggia that he suggested to Adam, and possibly also in the central flight of steps, which was not in either of Adam's plans.[34]

8.1.4 Records show that the southern half of the central pavilion was reconstructed in 1774 with specific reference to James Bull '*building the arches walls & Buttments for carrying the steps in the garden front*' in the accounts of November 1775.[35] James Lovell carved the steps over the winter of 1776, and James Bull was still laying them in September 1777, with the portico paving and plaster ceiling being worked on through October of that year.

8.1.5 Earl Temple's increasing desire for classical accuracy led to him adopt high flanking walls and balusters in the 1780s. However, these were removed and reduced to their present height by the later Marquis in 1805 (Bevington 2002, 30) to improve the view along the side of the house from the side state rooms such as the Gothic Library and the flanking walls were put back to the low sloping level shown in the 1773 Seeley engraving. At this point it is likely that the slightly projecting plinth was added (§8.1.24).

8.1.6 The lions at the foot of the flight were lead copies of the marble lions at the Villa Medici in Rome, and were installed in the 1770s. These were sold in 1922 and replaced with Coade Stone lions, eventually replaced with the present concrete lions sculpted by Bickerdyke. The lead lions are now at Stanley Park in Liverpool.

8.1.7 At a later date, probably in the twentieth century, the steps were re-laid at a higher level, and, it appears, at a steeper pitch than the original flight.

---

34 The changing plans and designs for the south front are detailed in Bevington *Templa Quam Dilecta - The South Front* (1993) pages 12-16.

35 HL STG Accounts, Box 114, Bundle 7:1775-9

8.1.8 Repairs to the south front in general, however, were beginning at a much earlier date, the third Duke replaced the portico paving with Portland stone in 1842, and the third Duke replaced the lead of the portico in 1865.

8.1.9 *General Fabric Description*
The 33 steps removed in 2004-05 were made of Blue Hornton stone laid in two flights divided by a flat concrete platform. On either side of the upper flight of steps are low, broad parapet walls with wide coping stones. The lower half of the steps is flanked with two concrete lions by Bickerdyke (replacing both the original lead and the 1927 coade stone replacements) on large stone plinths with no other ornamentation.

8.1.10 *Parapet walls*
These are hollow, formed of two stone and brick outer walls with a void between them, spanned by the coping stones. The walls contain at least two phases of material within them: the earlier phase is probably original 18th century work; the later work, mainly brick and re-pointing work, is probably twentieth century repair and rebuilding. It may, however, belong to an intermediate phase when the steps' pitch was altered. In the west parapet, the bulk of the inner wall and the lower part of the outer wall are original. In the inner western wall the upper part is a later brick rebuilding, and the lower sections are all rubble stone. Within this lower part are projecting areas showing the position of the arch piers (context **007**) supporting the steps, these were built first and then the rest of the parapet walls built around them. These have very rough open ends and may have been larger at one time, acting like buttresses. The outer wall is more substantially rebuilt in brick. The parapet walls abut the limestone rubble wall beneath the Portico's columns. On the outer side, the ashlar facing of the western parapet also shows two phases. At the northern side the slightly projecting plinth and moulded band is fixed over an earlier ashlar face (**009**) that has been cut back to insert the moulded band. This earlier ashlar seems to line up with the upper part of the wall, suggesting that only the lower part of the wall has been refaced at this end. The earlier ashlar was only seen at the northern end of the parapet wall, and no further south than the line of the columns, to the south, the whole ashlar facing seems contemporary. This hidden ashlar could be representative of an earlier phase of the stairs, and is perhaps associated with the Marquis' remodelling of the stairs in 1805, when he removed the high flanking walls replacing them with the low parapets there today.

8.1.11 *Step supports*
The steps, particularly the upper flight, are individually supported by a series of brick and stone piers (**002**)(Plate 12 & Figure 40), packed around with rubble and earth and roughly bonded with a generally hard mortar although in places it had degraded and become crumbly. These plinths were not arranged in any regular pattern and were laid pragmatically from the base of the flight up when they were needed to support each stone tread as it was put into position. The piers are primarily restricted to the upper 4-5m of the stairs. Below the mid-flight concrete flat, the steps seem to have been laid directly on the arches, or at least on looser rubble supports. In the lower part of the stairs there were only isolated cases where the piers were clearly defined. The lowest three or four steps were supported solely by loose material – mortar, earth, brick and rubble stone. The large quantity of grey roofing slate found in the rubble overlying the arches suggests that slate was also used as support, as

well as spacers or levelling for the steps. Certainly, some slates were observed still fixed to the parapet walls where they had acted as spacers between the tread stones and the walls.

8.1.12 *Vaults*

The general primary support for the steps is formed by a series of six brick barrel vaults (**006**). The round arches run for the full width of the stairs and are supported on piers of limestone rubble (007), the ends of which are visible within the hollow parapet walls. At the top of the stairs the final vault is a half arch abutting the limestone wall beneath the columns of the south portico. The vaults were built a full brick's length in thickness but at least two have been reduced to half thickness by trimming the bricks reducing the structural integrity of the vaults. No dating evidence for this work was found, but it is likely to be when the pitch of the steps was reduced.

8.1.13 It appears that the later steps, with their underlying plinths, are at a slightly steeper pitch than the originals, which may have lain directly on the brick vaults although no trace of them remained. The rendered sides of the parapet walls seems to be contemporary with the later steps as the render is over brick courses bonded with hard cement based mortar; any trace of the line of the earlier steps has gone. The pitch of the vaults is shallower than that of the later steps.

8.1.14 *Detailed Fabric Description*

The individual stair treads (**001**) measure between 0.70m and 1.08m long ($2^{1/4}$ to $3^{1/2}$ feet). They have a tread depth of 360mm with a rebate at the back of the step of between 30-50mm into which the rise of the next step fitted. The steps have a full height of 240mm with a rise of 230mm. The steps have a rounded nose with a single square bead moulding beneath that. On the ends of each step are two square sockets (20mm x 20mm), 280mm apart, with 'V' profile channels running between them and the top and bottom of the step; lead poured into these channels and sockets keyed the steps together. Many fragments of this poured lead were observed within the rubble after the steps were removed.

8.1.15 Where the steps met the side walls of the stairs they abutted the walls with spacers of grey slate. They were not mortared in or recessed into the walls in any way; neither did it appear that any lead was poured into this join. Heavy frost fracturing has left a substantial amount of fractured stone across the whole area of the stairs. Although the steps were lifted before the time of OA's investigation, it seems that pieces of slate were also used as spacers between the steps in some cases.

8.1.16 *Step Supports*

The piers (**002**) supporting the step treads on the upper half of the flight are between 230-40mm wide and 40-70mm long (Plate 127). They are constructed mainly of bricks (230 × 70 × 110mm) which are predominantly machine made with no frog or stamps and few inclusions or air pockets. However, other piers are made of stone and some include reused pieces of steps (Plate 128) with the same profile and size as the present stairs. In the lower part of the flight, the steps seem to have been laid directly on the vaults or on single bricks; there are certainly far fewer visible piers. The piers are not keyed in to the fabric of

the vaults and are only patchily bonded with mortar; mostly a hard cement based mortar.

8.1.17 Between and around the piers is a loose mix of broken limestone, earth, sandy mortar, brick fragments and pieces of the lead, which was used to join the steps together. It is loosely and unevenly mixed, in some places being much more packed than in others. Much of this debris has probably come from the process of lifting the steps but most of it was clearly already underneath the layer of frost-fractured stone from the bottom of the steps. Pieces of modern plastic and paper rubbish were mixed in with the rubble, which, along with the modern bricks, indicate a relatively recent date for the relaying of these steps, most likely within the twentieth century.

8.1.18 Beneath the piers and rubble fill are traces of the original bonding and support for the steps of the 18th century. A thin skim of soft orange lime mortar is to be found directly overlying the bricks of the vaults, and particularly in any cracks between them. Also, on the flattened top of the second vault (see Figure 41) there is a much thicker section of this mortar **(005)** (Plate 129) with a flat upper surface covered with fragments of slate. This has been cut back along the length of the vault and the later brick piers inserted against it and packed around with rubble and earth. This seems to be original 18th century mortar and levelling used to fill the step between the curved vaults and set the treads on. If this surface was a base for the original flight of steps, the later replacements, or relaying, are at either a steeper pitch, or higher level than the original flight.

8.1.19 Lower down, the steps are primarily laid directly or nearly on the vaults themselves, rather than on piers. At the very lowest part of the stairs there is no vault but a slope of roughly formed limestone steps leading down from a brick surface. It is not clear whether this is a very low brick arch or simply a brick platform.

8.1.20 *Brick supporting arches*
The vaults are constructed with limestone piers **(007)** and brick arches **(006)**(Plates 130 and 131 & Figure 41). They are as thick as a single stretcher (220mm) and are constructed of stretchers and half bats. On the lower part of the flight the steps are supported by a series of rough limestone steps abutting the lowest vault (Plate 131). In total there are six brick arches. A variety of methods have been used to fill in the gaps between the arches and even out the slope of the steps. At the northern side the vaults abut a solid limestone rubble wall beneath the columns of the south portico.

8.1.21 One of the lower arches has been cut back (Plate133), perhaps when the pitch of the steps was altered. This weakened the structure and the arch has now been filled with a solid core.

8.1.22 *Parapet Walls*
The parapet walls are formed of two walls with a void between them (Plate 134). The outer wall is ashlar faced and mainly brick on the inside and has been rebuilt apart from the lowest part of the wall where it is limestone. The inner wall is primarily rubble limestone with raked brick coursing immediately beneath the coping stones. Within the fabric of this inner wall horizontal stubs of timber are preserved. These may be members from the scaffolding and

centring for the construction of the supporting vaults which were left in situ as the wall was built up and then sawn off. Rough stubs of walls in line with the vault pier walls are also visible at the base of this wall; they may have been buttresses at one time which were reduced when the outer wall was rebuilt (Plate 135).

8.1.23 During the repair of ashlar blocks on the western parapet, an area of primary smooth ashlar (**009**) was revealed beneath the ashlar of the projecting plinth (**012**)(Figure 42). Its face is aligned with the ashlar face of the upper part of the wall, and is probably of the same build, suggesting that an earlier incarnation of the steps may not have had the moulded band and plinth. The ashlar has been cut back in order to insert the moulded band. This early face was only seen in the northern part of the western parapet wall; to the south of the area, approximately in line with the edge of the south portico, was a series of bricks forming a corner to the mortar and stone backing to the ashlar. From this point on, the material behind the ashlar above the moulded band is brick, as is visible within the hollow parapet, below the band the backing to the ashlar is rubble and mortar.

8.1.24 *The South portico surface*
The south portico floor is paved with large stone paving slabs. When these were lifted in order to replace and level them after the scaffolding was dismantled they were shown to rest directly upon a rubble deposit of building material, gravel and sand (**034**). This deposit fills the entire area of the loggia and presumably continues uninterrupted to the ground. Within this fill, approximately 34 m/11 ft from the front columns and 2.55 m from the western wall of the portico was a square brick footing (**032**)(0.72 × 0.72 m). Another was found in a symmetrical position on the eastern side of the portico. It is thought that these are supports for statues standing within the portico, although there is no evidence - documentary or pictorial - known of at this time to confirm this theory.

8.2 FURTHER QUESTIONS ARISING FOR THE SURFACES

8.2.1 The surfaces around the south portico steps are relatively well understood in terms of their history documented in the archives and the evidence within the fabric. Any future excavations in the areas adjacent to the steps however should be studied to relate these steps to the wider setting of the south façade, some work already carried out (OA 2003a) revealed the foundation plinths for the steps but the exposed area was small. Any evidence for the arrangement of the southern side of the 1670s house has most likely been destroyed during the 1770s reordering; however, the possibility of evidence for that early house should be borne in mind if any further excavations are carried out in this area.

9 CONCLUDING DISCUSSION

9.1.1 The programme of archaeological analysis and recording at Stowe house was carried out in response to and alongside the second phase of restoration to the house, commissioned by Stowe House Preservation Trust. The restoration, and archaeological work, focused on the central pavilion of the house: the roofs, east, south and west façades, and the south steps. In addition a small area of the interior was examined in advance of the disabled lift being installed. Later in the programme its coverage was extended to include the interior of the Marble Saloon, the central state room of the pavilion. While some areas were only available for keyhole examination (for example the vaults of the south steps or the stonework of the southern façade) the works enabled a detailed study of many areas not previously seen.

9.1.2 The history of Stowe's development is comparatively well known, and no substantial new historical research was undertaken. Existing historical sources were used, most usefully Michael Bevington's work on the school (1993a and 1993b, 2002) and John Heward's work (2004) during the first phase of restoration on the north front and colonnades of the central pavilion. The archives and accounts for Stowe are held in the Huntington Library in California. Cathy Fisher's (2001-03) transcriptions of selective Stowe materials in these archives were briefly examined and evidence was found to provide historical background to many of the features and phases seen within the fabric examined. More detailed examination of the archives will undoubtedly prove useful at a later date. The evidence examined during our work has not contradicted the historical development already established; it has added detail that fills out the picture of Stowe House.

9.1.3 *The 1676 house.*
Much is known from historical sources about the first house built on this site in 1676 for Sir Richard Temple. Two areas covered by this phase of work provided evidence relating to this early phase of the house's development.

9.1.4 The first is the inner brick wall to the north of the Marble Saloon, accessible from ladders and platforms in the north western corner void. Despite the difficulty of access the wall retains evidence of the earliest house. The comparative heights of the different floors was established, and shown to be approximately correct when compared to specified heights given in the building contract. No features were visible at basement level (still in use) or ground floor levels but at the first floor a wall stub and blocked door were seen. This door would have led from the gallery around the north hall, presumably into a suite of rooms in the south western corner of the first floor. Plaster lined flues within the wall stub indicate at least two fireplaces within this wall, possibly one facing to either side, but not where within the wall. Also it suggests that the door through this wall into the suite of rooms was further along, not directly adjacent to the northern wall. Although this wall was brick there does not seem to have been a wall directly below it, no matching stub wall was seen at ground floor level to assist with taking the weight. At second floor level, there were several patches of plaster with vertical edges suggestive of narrow timber-framed partitions between a series of smaller rooms. The upper part of the wall had been raised during the 1770s work to the south front and no traces of the original roof structures were preserved. Some may still survive on the other side of this wall.

9.1.5 The second area covering this phase of Stowe's development was the basement area of the disabled lift, beneath the north west corner of the State Drawing Room. Within the wall of this area was a blocked window. This correlates with the widow shown on the plan in the Huntington Library thought to be of the basement level of the original house. On the ground floor, the door openings seen related to a later period of development, once the galleries were added by Lord Cobham to each side of the house at the end of the 17th century (shown in Seeley's 1753 plan).

9.1.6 *The 1720s - Corner Towers*

Evidence of this period of development is preserved within the fabric of the north roof. Although the north roof was raised to its present level during the large reordering of the south front during the 1770s, and the majority of its fabric also survives from this period, the outline of the corner towers survive. The towers were raised between 1715 and 1730 for Lord Cobham, and based on Seeley's view of 1750 were brick without the stone quoins found lower down in the building. Also based on this drawing they had low pyramidal roofs. The roofs at present over these areas are low and poorly constructed in comparison to the rest of the roofs. They have a single tie beam running north-south and these do not appear to relate to the tower roofs, unless their form was very different to those depicted in the historic pictures. Running along the southern edges of the areas are, however, substantial beams that may be part of the original roof structure, although now altered and bolted to the larger 1770s roofs to the south. On the eastern tower, the brickwork of the towers western wall still survives although now built over by the extended chimney and partition wall. It retains its pale rendered surface.

9.1.7 *The 1740s - Extended stair bays*

These were most likely built at some point before 1750, and after 1733 and Rigaud's view of the house in that year. They were raised to the same height as the rest of the pavilion during the 1770s. The evidence examined once the render had been removed confirmed John Heward's work. The stair bays were brick, but probably rendered although none survived under the later cement render. They had quoins at their corners, which survive on the southern corners although cut back flush with the wall on the eastern bay and later covered with rendered pilasters. On the western stair bay some blocks of stone surviving at the point where the bays were raised are probably remnants of the cornice of the stair bays, aligned with the base of the parapet along the north front before the walls were raised in the 1770s. The southern face of the western stair bay has been cut back where it meets the roof over the gallery, the reason for this is still not clear.

9.1.8 *The 1770s reordering of the south front*

This phase of development was one of the largest undertakings at Stowe and the form it gave the house is substantially the one we see today. Despite Seeley's view of 1773 showing a completed south front the evidence of the archives suggest that this is somewhat pre-emptive and that the south front was not finished until much later, 1780 in its entirety. The archives suggest that the east and west roofs were raised first in 1774, with some delay caused by the accidental collapse of much of the western cornice. The south portico roof was framed up over June and raised in July 1775. The domed Marble Hall appears to have been the last completed with the dome being slated in 1776 and with work on the interior continuing through 1779. The raising of the

northern half of the house is less clearly accounted for. Throughout the archives for 1771 and 1772 there are references to the colonnades and Edward Batchelor is carving '*varses for the north front*' in August 1772,[36] but as late as 1776 there are records for work being carried out on the north front of the house. More close examination of the archives is needed to perhaps give a closer date for this specific area of work.

9.1.9 The quality of the 18th-century carpentry of the roof structures is good, and relates to what is generally known of polite 18th-century structural carpentry (Yeomans 1992). The variety seen in the forms of the roofs appear to be related to the different teams working on the different roofs, particularly between the south portico and the east and west roofs. The carpenters on the restoration of the roofs commented at how level and plumb the roofs are even today a testament to the quality of the work done in the 1770s.

9.1.10 The façades of the 1770s work are ashlar over a rubble core, in most places the ashlar is of a substantial depth. The only place that this differs is within the south portico where the ashlar facing is incredibly thin, in some places barely thick enough to take a mortice for an iron cramp to tie the stones back to the brick lining walls. Whether this is due to economising and cost-cutting shortcuts will only be confirmed by more research.

9.1.11 *The Marble Hall*
The oval Marble Hall is the central focus of the enfilade of fine state rooms along the southern front of the building, designed for the spectacular entertainment of guests at Stowe. Domes were usually designed to be seen from outside, providing distinct skylines. However, at Stowe the domed structure was never intended to be seen from the exterior, as it would have disrupted the classical lines of the long fronts, but was intended to be a full, and impressive, dome on the interior.

9.1.12 The examination of the dome was one of the most useful opportunities presented by the building works, since little was understood of its structure. Other domes constructed either of a solid mass or with a trussed construction require a considerable amount of space between interior and exterior. Examples of trussed domes using queen-posts can be seen at the Radcliffe Camera, Oxford, designed by James Gibbs and at the Greenwich Hospital by Hawksmoor. Equally, many stately homes feature rooms with large coved niches, some of which can be quite substantial such as the entrance hall at Holkham Hall in Norfolk.

9.1.13 The Marble Hall was designed as a plainly constructed timber-framed drum capped by a dome, set inside a brick box and with a separate layer of elaborate decoration applied to the inside. At Stowe, to provide the maximum amount of interior space for the hall with an invisible exterior form the carpenters employed a system of radial rafters for the dome – much like the niche construction in other houses, and indeed cornice construction at Stowe. The structure is only 0.4-0.5 m thick at its narrowest point half way up the dome's side. The radial rafter system extends down to rest on the timber-framed walls of the dome; a large 'barrel' set within the brick walls of the rooms and south portico. The close set rafters and posts also provide a regularly spaced support

36 HL STG Accounts, Box 113 (1767-1777), Bundle 8: 1772

for the decorative plasterwork of the interior. The scagliola columns are essentially free standing having no structural relationship to the larger superstructure. Around the barrel of the hall the posts are close enough together to support the lath and plaster directly while the coffered decoration is supported on the smaller system of curved studs forming the dome's interior. The dome's timber structure does not feature any iron reinforcement as in the other roofs. Its structural integrity is supplied by the support given by the brick walls surrounding the dome and at roof level. The original roof covering is indicated in the archives as being Stonesfield Slate, although both lead and copper (used for the new covering) seem also to have been used at some time. No parallels for the Marble Hall's construction have yet been found. In a period when the structural benefits of trussed construction were widely appreciated, the construction used here is interesting. However, the application of trussed members to an oval dome may not have been as easy as it was to a symmetrical round room. Also, the dome at Stowe was created to be seen from the inside and not from the outside where it was hidden by the balustrades and south portico pediment. The structure was possibly chosen for its practicality to this end, rather than structural efficiency as with domes built for their outside appearance such as at Greenwich or the Radcliffe Camera in Oxford (Yeomans 1992, 125).

9.1.14 Although not specifically a focus of this phase of work, the opportunity to study in such detail a large 18th-century stately home and its archive, however briefly, has also provided the basic information for the wider study of 18th century construction in general. The use of ironwork in reinforcing the roofs and walls of Stowe is suggestive of the changing awareness of the structural properties of this material; some roofs have reinforcement that is, structurally speaking, not particularly active or useful. Other types, in the northern roof, are more structurally active and look forward to the 19th century when iron became a principal material in the construction of large buildings. In wider terms the archives record the sources for the stone and for much of the timber as well as payments for ironwork and lead. Study of this information in a wider context can undoubtedly contribute to a wider understanding of the 18th-century construction trade.

9.1.15 Oxford Archaeology has welcomed the opportunity to work on the central pavilion at Stowe House. Although this phase of the restoration has only covered one specific part of the house's development and structure the evidence examined has undoubtedly added to the understanding of the house as a whole. In some cases the work has highlighted the more personal details and stories of the craftsmen, women, architects and owners of this important 18th-century stately home. The archaeology of the English country house is an area of study that is still in its infancy, but is proving very productive of new information (Ayers 1998), as the work at Stowe bears out.

Oxford Archaeology
2005

10 SELECT GLOSSARY

Bench-moulded: decorative pieces of plaster that have been moulded individually away from their final location and which are fixed up separately. Bench-moulded elements are combined to form a continuous effect, for example on the cornice of the south portico, or within the coffers of the marble hall.

Bracket: Although this term is used for a variety of bracing timbers, in this report it is primarily used to refer to a piece of board used within the construction of plastered or rendered cornices. The boards were cut into the approximate shape of the cornice profile and fixed vertically to the wall. Then laths were fixed to the boards and the basic form of the cornice run using a HORSE.

Carpenter's Marks: A series of marks placed on timbers at key points, such as joints between members, by the carpenters as they framed up a roof's principal structure away from the site. The marks allow the roof to be dismantled and reassembled in the right order.

'Common' rafter/post/joist: Smaller timbers in between the PRINCIPAL structures of a roof or ceiling, and, at Stowe, the dome walls. While not providing the primary structural support, they support the majority of roof, ceiling or wall coverings.

Copperas: A coating of a solution of ferrous sulphate applied to ashlar across the south façade.

Firring pieces: Small pieces or wood and timber used to build up the form of an object, on the dome roof they create the curve at the dome top, within the hall, firring strips are used to build up the coffer construction.

Hipped roof: A roof where all sides of a roof are sloped, as opposed to ending in vertical gable ends. The south portico roof at Stowe is asymmetrically hipped, with the north east and west sides being sloped; the southern side is the pediment of the portico.

Horse mould: The 'horse' was actually the support or base for a metal (usually copper) running mould, which allowed long lengths of cornice profile to be run in situ. The horse rests on a batten running below the cornice and allows the mould to be drawn smoothly along the length of the cornice. The cornice can then be ornamented with BENCH-MOULDED elements. The repairs of 2004-05 were carried out in this way.

Joggles: Sloped or straight ledges at the heads and feet of posts within a roof truss that support additional braces and struts. They are usually combined with mortice and tenon joints. See Campbell 2000 for a full discussion of vocabulary for post medieval roofs.

Modillion: Projecting stone corbel regularly spaced within Corinthian and composite cornices, in the middle of the entablature above the frieze. They are often formed as scrolled leafs although in the composite order are much simpler.

Pavilion: At Stowe this word is used to refer to the main central block of the house, and also the blocks at the east and west ends of the galleries on the south front. This is in contrast to its usual use to describe an open sided roofed structure.

***Piano nobile*:** The principal floor in 18th-century great houses, containing the main state rooms used for entertainment.

'Principal' rafter/post/joist: The primary timber structural members in a roof truss, ceiling or wall. They are larger than the 'common' members and bear and transmit the principal forces through the structure into the walls.

Roll: A timber dowel over which lead is rolled. They are used running down the slopes of roofs to channel rain-water into the gutters around the roof perimeters.

Scagliola: A mixture of cements and coloured plaster mixed to imitate marble. On columns, such as those in the marble hall, it is laid thinly over a base coat of plaster on a timber framework.

Soffit: The underside of a timber or stone lintel or cornice. The soffit of the cornices at Stowe have square recesses or coffers, in between the MODILLIONS, these are decorated with individually moulded elements.

Truss: The main structural element of the roof constructions at Stowe. The difference between earlier roofs and those emerging in the 17th and 18th centuries is that the later roofs are true trusses - that is the posts are not all in compression but actively 'lift' tie-beams and transmit the forces evenly through the timbers. David Yeoman's work (1992) gives a complete summary of the development of the truss.

11 BIBLIOGRAPHY AND REFERENCES

11.1 PUBLISHED WORKS

Alcock, N, Barley, M W, Dixon, PW and Meeson, RA (1996) *Recording Timber Framed Buildings: An Illustrated Glossary*. Practical Handbook in Archaeology 5. CBA

Ayres, J (1998) *Building the Georgian City*. Yale University Press: New Haven and London.

Beard, G (1981) *Craftsmen and Interior Decoration in England 1660-1820*, Blomesbury Books: London.

Bevington, M (1993a) *Templa Quam Dilecta IV: The Equestrian Statue of King George I and the North Front*. Capability Books: Buckingham

Bevington, M (1993b) *Templa Quam Dilecta XI: The South Front*. Capability Books: Buckingham

Bevington, M (2002) *Stowe House*, Paul Hoberton Publishing: London.

Buckingham and Chandos (1848) *The Stowe Catalogue: Priced and annotated by Henry Rumsey Forster.* De Boges: London.

Campbell, JWP (2000) 'Naming the parts of post-medieval roof structures', *Vernacular Architecture* **31**: 45-51.

Clarke, G B (ed.) (1990) 'Descriptions of Lord Cobham's Gardens at Stowe 1700-1750', *Buckinghamshire Record Society* **26**.

Clarke G, Inskip P and Wheeler R (1992) *English Arcadia: The Landscape and Buildings of Stowe*, California: Huntington Library and Art Gallery.

Colvin, H (1978) *A Biographical Dictionary of British Architects 1600-1840* Butler and Tanner: London.

Jeffery, S (1993) *The Mansion House*. Philimore: Chichester.

Neve, R (1726) *The City and Country Purchaser and Builder's Dictionary*, Reprinted 1969, David and Charles Reprints: Newton Abbot, Devon.

Robinson, John Martin (1990) *Temples of Delight: Stowe Landscape Gardens*. National Trust, Jarrold Publishing: Andover, Hampshire.

John Woolfe and James Gandon, *Vitruvius Brittanicus: or the British Architect* (2 vols. 1767-71; reissued New York, 1967)

Yeomans, DT (1992) *The Trussed Roof: its history and development*, Cambridge: Cambridge University Press.

11.2 UNPUBLISHED COMMISSIONED REPORTS

Cliveden Conservation with Purcell Miller Tritton and Hirst Conservation (2003, issue 3) *Stowe House Restoration Phase 2: Schedule of Conservation Work.*

Cliveden Conservation Workshop Ltd. (2005) *Stowe House; Conservation Report.* (contents discussed with Spencer Hall of Cliveden, but the report had not been seen by OA at the time of production of this report)

Fisher, C (2001-3) *Stowe Archival Research & Documentation.* For Purcell Miller Tritton Architects.

Heward, J (2004) *The Restoration of the North Front of Stowe House: An Assessment of Archaeological Evidence Revealed through the Works.* Historic Building Surveys Ltd.

Hirst Conservation (2003) *Assessment of the Domed Ceiling in the Marble Saloon, Stowe School: Condition Survey and Recommendations for Conservation,* Version 3.

Hirst Conservation (September 2004) *Stowe School - Phase II; Report on the treatment of the saloon coffered ceiling.*

Hunn, A (1995) A Report on Aspects of the North Front of Stowe House.

Inskip P. and Jenkins P. Architects Ltd. (1999) *Stowe: Framework Conservation Plan. Part A: Stowe House.* 1 Newbury Street London EC1A 7 HU

Linford-Bridgeman Ltd. (19 April 2005) *Stowe House Restoration Phase 2: Monitoring and quality control - Sand particle analysis.*

Morton Partnership (December 2003) *Structural Repairs to Marble Saloon Dome.*

Oxford Archaeology (2003a) *Stowe House, Stowe, Buckinghamshire; Archaeological Excavation and Watching Brief Report.*

Oxford Archaeology (2003b) *Cuttle Brook Restoration Project, Stowe Buckinghamshire: Archaeological Investigations.*

Sandberg Consulting Engineers (25 March 2004) *Stowe House Phase 2: Analysis of Timber Samples*

11.3 INTERNET SITES

http://en.wikipedia.org/wiki/Riga
http://en.wikipedia.org/wiki/Klaip%C4%97da

11.4 ILLUSTRATIONS

Adam's second plan of 1771: Sir John Soane Museum; Adam vol. 28, 56.

Battista Borra's 1752 plan is held in the Huntington Library, Stowe Maps and Plans, 9/4.

Blondel's plan of 1765: R.C.H.M. BB55/6

Fairchild, W (1753) Plan of the Principal Floor at Stowe House, published by Seeley. Stowe School Archives.

Rigaud, JC (1733) 'View of the House from the Parterre' published by S Bridgeman (1739) as Plate 14 in *Stowe Gardens in Buckinghamshire*. Copy held in the Stowe School Photographic Archives.

Seeley, Benton 'The south, or Garden Front of the House' published in 1750 in *The Stowe Guidebook.*

12 LISTS OF FIGURES AND PLATES, (VOLUME II)

12.1 FIGURES BY REPORT SECTION

Introduction (sections 1-5)

1. Location map showing house, grounds and locality, Buckingham etc.
2. Plan of Stowe House, indicating the central pavilion.
3. Floor plan of the *piano nobile* giving names of rooms.
4. Phased plan of the central pavilion ground floor
5. Figure identifying the areas of investigation during Phase II conservation programme

East and west roofs:

6. Plan of west roof including hipped end and single bay of rafter construction
7. Sections 1 and 2 of king and queen-post trusses, based on drawings from east roof
8. Section 3 through hipped ends
9. Roof carpentry joint details
10. Sections 4 and 5, partition supports.
11. East roof - Elevation 1, along a section of the eastern wall.
12. Figure of ironwork details
13. Arrangement of timbers and iron bracing within the side walls

Dome:

14. Domed room from Kedlestone Hall (Vitruvius Brittanicus, Pl 51)
15. Domed room from Thoresby Lodge (Vitruvius Brittanicus, Pl 13)
16. Plan of dome at ground level
17. Section and elevation through the south-western corner of the marble hall
18. Dome's upper structure of radial rafters and studs beneath supporting the plaster
19. Detail of cornice and frieze within marble hall
20. Construction of the coffers within the hall

South Portico:

21. Coved roof in Mansion House, London (Jeffrey 1993, Pl ?)
22. Plan of south portico divisions
23. Sections through trusses and long section
24. Partial isometric of the south portico roof showing the principal construction and the relationship between trusses.
25. Detail of cornice construction

North Roof:

26. Plan of the north roof
27. Bridgeman's view of Stowe House showing corner towers (Stowe School picture archive)
28. Seeley's view of Stowe House showing corner towers (Stowe School picture archive)
29. North roof sections
30. Arrangement of trusses in the central section of the roof, to the north of the octagonal skylight
31. Elevation of the east face of the eastern cross-wall and chimneys showing ledges, probably indicating the original roof levels
32. Roof-top observatory details

Walls and masonry:

33. South facing elevation of the eastern stair-bay, shows the construction of the cornices and residual quoins
34. Western stair bay, showing possible remnants of stone cornice and the point at which the stair-bays were extended
35. Construction of the niches within the south portico
36. The western roundel, the construction is the same for the eastern one
37. South facing elevation of the north wall of the dome, interior wall of the 17th century house
38. Openings discovered in the disabled lift area, behind the Temple Room.
39. Historic maps of Stowe showing first floor apartments and lift area

Surfaces:

40. Plan of the south steps
41. Section of the south steps
42. Section and elevation of the western parapet wall of the south portico steps showing later added plinth.

12.2 PLATES BY REPORT SECTION

(Numbers refer to film number/negative number or digital shot.)

Introduction:

1. Stowe House general shot from the south
2. Stowe House's northern front and colonnades
3. The Marble Hall, including ceiling shot
4. Composite photograph of the roofs

East and west roofs:

5. West roof general shot looking south-east (26/2)
6. King-post trusses in the west roof/east roof (2/34 b/w or 26/9)
7. Queen-post truss (2/28 b/w)
8. Slotted purlin parallel to roof pitch, at southern hipped end (1/23)
9. Horizontal slotted purlin, southern hipped end (1/26)
10. Common rafters resting on plank at the northern end of the west roof (26/26)
11. Partition support trusses within the west roof (26/10)
12. principal rafter reused as partition support within the east roof (digi)
13. purlin reused as partition support within the east roof (digi)
14. Side roof construction in the east roof (1/9)
15. Common rafter tops against the exterior walls (1/17)
16. Drainage channel through the west roof (26/15)
17. Detail of the support structure for drainage channels through the roofs (26/16)
18. Bridle strap over principal rafter and tie-beam (26/19)
19. Stirrup strap at foot of one of the king-posts (26/21)
20. Large bar-chain strap in west roof (26/36)
21. Cramps from roof holding back the cornice stones (25/30)

Dome:

22. Plate of dome interior
23. Tanks around dome's perimeter (digi)
24. Tanks around dome's perimeter (digi)
25. Pieces of the initial plaster coat of the dome showing chalk and incised marks (25/18)

26. Boards covering the southern side of the dome, several are removed at this stage to allow examination of the structure (3/7)
27. Detail of the joints between boards at the narrow ends of the dome (3/15)
28. Door through oval foundation wall from south-west corner into cellar bar (30/5)
29. Cellar bar beneath marble hall (30/3)
30. Interior of marble hall during survey, showing doors, niches and columns. (digi)
31. The timber construction of the Marble Hall niches, and the bump of the brick south portico's niches (23/7)
32. Series of planks against the south wall, support for a drain pipe possible (23/15)
33. Diagonal struts to spread load over panels in tier 3 (digi)
34. Round timber - possibly scaffolding - in the south wall (23/5)
35. Interior of the dome during the works showing the frieze just above the scaffold deck (24/06)
36. The back of the cornice at the third ring-beam, horizontal members extend to form the support for the cornice below the frieze (digi)
37. First tier of raking rafters in Tier 5, just below the gutter (23/16)
38. Drain hopper in the south-west corner void of the dome (23/19)
39. Writing on access door for the south-east corner void, recording dates the oculus was worked on (18/12)
40. North side of the dome with diagonal bracing (3/2)
41. Upper band of the dome within the marble hall (24/7)
42. Shot showing the roundel at the east and west extremes of the dome covered for restoration (digi)
43. Upper tier of the dome's structure with rafters joining around the narrow east and west ends (3/28)
44. Upper structure of the dome after conservation with curved upper pieces and lower braces to the ring-beams.
45. Area opened up to investigate coffer structure on north-west side of dome. The back of the centre lower edge of a coffer(25/17)
46. Area opened up to investigate coffer structure on south east side. Corner section and edge of central panel (25/4)
47. Area opened up to investigate coffer structure on the south east side. Back of oak leaf border (25/8)
48. Nails visible through the exterior plaster that missed the supporting studs (25/23)
49. Coffer detail, cracks at the top and bottom corresponding to the joins in the board superstructure (24/9)

South Portico:

50. Bacchic frieze within the south portico (33/7)
51. Western slope of portico roof with the lead partially removed (8/9)
52. Drainage channel on the western side of the portico (2/17) b/w or digi
53. South portico cornice (22/6)
54. Queen-post truss (6/22)
55. Foot of post under the hip with iron cramp over the plank supporting the hip beam (digi)
56. Queen-post Truss 2 from the north (6/21)
57. Central posts between Trusses 2 and 3 (7/18)
58. Small king-post trusses in the apex of the roof (7/10)
59. Doubled rafters beneath the parapet wall on the western side (digi)
60. Coving at the northern edge of the south portico, curved brackets are fixed to the joist and batons on the wall-plate (7/27)
61. Scalloped band within the south portico cornice (22/8)

62. Guilloche band with empty roundel showing area of repair and individual smaller moulded guilloche moulded elements (22/17)
63. Stork from the south portico ceiling (digi)
64. Conservation of the south portico ceiling, strips securing the back of one of the stork roundel in the north-eastern corner (digi)

North Roof:

65. General shot of the north roof, looking east (12/22)
66. Modern soft-wood and aluminium roof over the north roof's 18th century fabric (8/29)
67. Areas of the north roof removed during the 1960s and replaced with flat roof section, part of which is shown here (17/21)
68. Queen-post truss within the north roof (12/18)
69. Scarf joint in the longer trusses where the roof widens to the north of the east and west roofs (21/22)
70. King-post truss over the eastern and western parts of the roof (10/23)
71. Reinstated king-post truss replacing those removed in the 1960s (19/20)
72. Low pitched roof over the eastern corner tower area (13/7)
73. Doubled up joist between the eastern tower area and the rest of the north roof, Bay 14-15 (13/29)
74. Close up detail of slotted purlin joint (digi)
75. Queen post with slot for caged coach-bolt in its base, also the end of one of the bolts laid horizontally securing the western end of T8 (12/8)
76. Wedge at the head of queen-post (12/7)
77. Straps securing joists mid-roof, not also the socket for the plug to conceal the coach-bolt (12/35)
78. Octagonal skylight, slightly off-centre of the north roof (12/29)
79. Rectangular skylight on the western side of the roof showing sockets of removed purlin (17/16)
80. Rectangular original skylight on the south eastern side of the north roof (14/6)
81. Eastern most chimney at the south west corner of the corner–tower roof, beneath the beam the brick wall is rendered (13/32)
82. Brick cross-walls of the chimneys supporting the roof timbers, purlins and joists (12/19)
83. Concrete capping of the chimneys, dated with the 1960's work dates (12/3)
84. The bell canopy, from the south (12/30)
85. The bell canopy's western side (12/33)
86. General shot of the area of the rooftop observatory, looking north-east (17/29)
87. Sawn structural timbers from the insertion of the skylight (18/2)
88. Remains of lath and plaster adhering to the post bases in the eastern corner of the observatory (17/33)
89. original plaster indicating that the access point for the observatory has not changed, although it has been modernised (18/8)
90. Joists beneath the replaced flat roof section (18/20)
91. Replaced boards (18/15)

Walls and masonry:

92. Cornice on the western façade showing 20th century render over earlier timber brackets (11/25)
93. struck pointing preserved beneath the later pilaster on the west stair-bay (digi)
94. Brick arch over the top of the large window lighting the western stair (16/8)
95. Brickwork cut back into a concave surface on the south face of the western stair-bay (28/16)

96. Upper courses of brick on the eastern stair-bay, the planks supported the reduced cornice continuing around the north façade and are fixed to timber plugs within the brickwork (14/35)
97. Principal rafter reused as a lintel above one of the upper windows in the east façade (digi)
98. Rubble fill visible behind the ashlar of the south façade, the stones here are removed from a pilaster west of the portico)30/36)
99. Thin ashlar to the south of the south portico's eastern niche, also visible are two sockets that took iron cramps and the lime mortar pads separating ashlar from brickwork (20/11)
100. Carved assembly number on the soffit of the uppermost cornice stone in the eastern side of the south façade (30/28)
101. Iron cramp within and mason's mark on top of the coffer stone between the modillions on the south-eastern cornice (30/18)
102. Carved foliage on the side of one of the modillions within the south-eastern cornice (30/21)
103. Opening in the western cornice showing groove where the lead flashing has been replaced (digi)
104. Cement repairs to the fronts of the cornice stones on the south façade (30/27)
105. General shot of the western roundel depicting spring and summer (28/7)
106. Cramp holding stones of the roundel back into the brickwork (28/12)
107. Joggled joint between lintel stones over the window into the western Music Room (??) (28/33)
108. Cut-back brickwork of the northern wall of the south portico (19/32)
109. Central voussoir of the eastern niche (27/12)
110. Iron cramps set into the tops of the niche stones (27/9)
111. Western arch within the south portico (29/08)
112. Assembly marks in western niche stones (digi)
113. Brick pier altering the width of the western niche (29/4)
114. Rubble stone wall at the back of the pediment, note the sloped courses at the top of the wall (7/19)
115. Iron cramps in the stones of the pediment, also note the end of the strainer beam of Truss 4 (21/20)
116. Iron cramp at the corners of the portico's pediment (9/30)
117. Joggled lintel stones within the south portico pediment (28/19)
118. Beam and iron stirrup strap on the western side of the south portico (digi)
119. Joists at ground floor level (digi)
120. Large beam at the head of wall stub, indicates first floor level (digi)
121. Stub of projecting wall containing chimney flues, plaster and blocked door within the north wall of the dome (digi)
122. Blocked window reveal in the basement lift area (21/15)
123. Openings within the lift area at piano nobile level (digi)
124. Length of principal rafter reused as a lintel over the arch in the lift area at piano nobile level (22/06)

Surfaces

125. General shot of the south steps during the conservation works and after the removal of the steps (20/20)
126. Area of plinths examined, shows general layout and mixed nature (9/8)
127. Close up of several plinths, some reusing broken fragments of steps (9/21)
128. Section of original mortar cut back to relay the steps (9/30)
129. Upper brick arched vaults with brick fragment and mortar levelling between the arches (10/12)

130. Lower brick arched vaults with brick and brick fragment and mortar levelling (10/5)
131. Interior of the fourth (?) vault showing limestone pier walls and brick arch (digi)
132. Opening in the third (?) vault showing the reduced thickness of this vault (digi)
133. Western parapet wall to the south steps showing two walls spanned by the lintel capping stones (digi)
134. Space within the western parapet wall, looking north to where the steps abut the limestone wall beneath the portico's columns (16/18)

13 APPENDIX 1 SUMMARY OF SITE DETAILS AND ARCHIVE

Site name: Stowe House, Buckinghamshire
Site code: STHOU03
Type of evaluation: Building Analysis and Recording
Date and duration of project: 2003-5
Summary of results: The project investigated the roofs and walls of the central pavilion of Stowe House, Buckinghamshire during the second phase of restoration there. The investigation recorded details of 18th-century construction techniques and confirmed and contributed to the understanding of the historical development of the house.
Location of archive: The archive is currently held at OA, Janus House, Osney Mead, Oxford, OX2 0ES.

13.1 STOWE HOUSE - CONTEXT REGISTER

Context Number	Description	Area
001	Stair treads	S steps
002	Brick plinths supporting the south steps	S steps
003	Hard mortar, brick and stone rubble leveling over the brick vaults	S Steps
004	Cut through the primary mortar support for the steps.	S steps
005	Primary lime mortar support for steps.	S steps
006	Brick arch vaults supporting south steps	S Steps
007	Roughly coursed limestone rubble walls supporting the brick arch vaults 006	S steps
008	Rubble fill	S steps parapet
009	Primary ashlar of parapet walls	S Steps parapet
010	Cut into 009 for later plinth	S steps parapet
011	Rubble fill	S steps parapet
012	Later ashlar plinth	S Steps parapet
013	Chimney flue, western	Dome N Wall
014	Chimney flue, eastern	Dome N Wall
015	Voids at ground floor level,	Dome N Wall
016	Floor joists, first floor	Dome N Wall
017	Large timbers in first floor ceiling	Dome N Wall
018	Wall stub	Dome N Wall

019	Straight joint west of 018	Dome N Wall
020	Upper flue within 018	Dome N Wall
021	Lower flue within 018	Dome N Wall
022	Plaster above 019	Dome N Wall
023	Doorway east of 018	Dome N Wall
024	Blocking of 023	Dome N Wall
025	VOID	
026	Possible wall stub, western side, second floor	Dome N Wall
027	Patch of plaster, second floor	Dome N Wall
028	Plaster patch, second floor	Dome N Wall
029	Plaster patch, second floor	Dome N Wall
030	Truncated chimney flue.	Dome N Wall
031	Later brick wall enclosing eastern side and tank	Dome N Wall
032	Brick footing - possibly statue base.	South Portico
033	VOID	
034	Sand and gravel fill beneath the south portico.	South portico paving

13.2 STOWE HOUSE - PLAN REGISTER

Plan Number	Area/Description	Scale	Date	Other References
1	East roof, Southern section	1:20	23/24.10.03	
2	East roof, Bay 3 rafter plans	1:20		
3	Dome	1:50		
4	Joists in South portico	1:50	27.1103	
5	South portico (rafter overlay)	1:50		
6	Eastern part of upper flight	1:20		
7	North east roof area above stairbay	1:20	20.01.04	
8	North East facade	1:20	28.01.04	Section 18
9	North East roof	1:20		

10	North roof central area	1:20	03.01.04	Plans 7, 9, 11
11	North east roof	1:20		
12	North east roof skylight	1:20		
13	North roof octagonal skylights and south details	1:20		
14	North West roof	1:20	10.03.04	Plans 9-15 and overlay plan 16
15	North roof, Western area	1:20	08.03.04	Plans 9-16
16	North west roof, overlay of viewing platform	1:20		
17	South West corner of dome	1:20	16.04.03	
18	South portico, west springer and pediment	1:20	Sept 04	Section 26
19	Disabled Lift area	1:20	15.5.04	Elevation 13

13.3 STOWE HOUSE - SECTION REGISTER

Section Number	Area/Description	Scale	Date	Other References
1	Truss 3	1:20		
2	Truss 1	1:20		
3	South flipped end, West facing	1:20	16.03.04	
4	Suspension truss for wall partitions	1:20	20.01.04	Ref. Plan 9
5	Suspension truss in bay 3	1:20		Joist plan
6	Radial rafter on North side of dome	1:20		
7	South portico, NS section through trusses 2+3	1:20		
8	South portico, NS section through trusses 1+4	1:20		
9	South portico, EW section	1:20		
10	South portico, detail of pediment	1:20		

11	South portico, detail at common rafter	1:20		Section 7
12	South steps, along East balustrade	1:20	07.01.04	
13	South steps, detail through 18C mortar	1:20	07.01.04	See also S12, P
14	North East roof truss (area 2)	1:20	20.01.04	
15	North East roof, east facing truss 3	1:20	08.03.04	Plans 9-16
16	North East roof, Detail at chimney, Shortened truss	1:20		
17	North roof truss, Detail of longer truss	1:20		
18	East facade cornice	1:10	28.01.04	Plan 8
19	East facing section through platform in North West roof	1:20		Plan 15
20	South facing new wall, lath and plaster wall of platform	1:20		Plan 15
21	Dome North West corner (West facing)	1:20		
22	Section through dome North East	1:20	19.04.04	
23	Dome South West corner	1:20	20.04.04	Continuation of 22
24	South portico, through North cornice plasterwork	1:10		
25	Dome, through coffer and cornice in South West corner	1:10	28.04.04	
26	South portico, West springer of pediment	1:20	Sept 04	Plan 18
27	South steps, earlier ashlar on West face	1:20		

13.4 STOWE HOUSE - ELEVATION REGISTER

Elevation Number	Area/Description	Scale	Date	Other References
1	East roof, eastern wall ironwork and timbers	1:20	Sept 03	Has overlay
2		1:20		

3	South facing facade of Eastern stair bay	1:20		
4	Detail of East facade, Right window brickwork	1:20	05.02.04	
5	East facade	1:50	05.02.04	
6	3 Bays of Dome in South West corner	1:20	16.03.04	
7	Dome South West corner	1:20	20.04.03	Continuation of elevation 6
8	Dome North West side, area of removed plaster	1:10	13.05.04	
9	Dome South East side, area of removed plaster	1:10	13.05.04	
10	Brick wall on North side of Dome, 1770s house	1:50	Aug 04	
11	South steps, hidden ashlar on West side	1:20		Section 27
12	Western niche in South portico	1:20	12.07.04	

13.5 STOWE HOUSE - PHOTOGRAPHIC FILM REGISTER

Film Number	Summary description of contents	Date
1	Tanks and dome wall, East roof	06.11.03
2	B+W only, East roof	06.11.03
3	Dome	20.11.03
4	South steps before rubble removal	21.11.03
5	East roof (failed film)	
6	South wall of North roof and South portico	28.11.05
7	South portico	04.12.03
8	South portico and various others	12.12.03
9	South steps - brick piers	07.01.04
10	South steps vaults cleared and North East roof	16.01.04
11	Void in vault and East facade cornice formwork	27.01.04
12	North roof - Central area	11.02.04
13	North roof - East area	11.02.04
14	North roof - East area and East facade	11.02.04
15	West facade	11.02.04
16	West facade and West parapet wall of steps	24.02.04
17	North West roof	09.03.04
18	North West roof	10.03.04
19	General shots, South steps, roof, South facade	31.03.04
20	South facade, general North front	31.03.04
21	Interior lift area and various (short film)	15.04.04
22	South portico ceiling	27.04.04
23	Dome space	28.04.04
24	Dome interior	
25	Exterior coffer construction	13.05.04
26	West roof	07.06.04

27	South portico	07.06.04
28	Various south facade and South portico pediment	01.07.04
29	South portico niches	
30	Cellar bar, South portico and cornices	31.08.04
31	South front, steps, parapet, new roof, capital construction	24.01.05
32	Marble hall, graffiti	01.03.05

14 APPENDIX II - SUMMARY OF WATCHING BRIEF RESULTS

14.1 INTRODUCTION

14.1.1 In 2003 OA carried out a combined excavation and archaeological watching brief within four trenches on the south front in preparation for the construction of anchor pits for the scaffolding over the house required for the Phase II restoration works. There were also four excavation trenches on the north front. At the end of the Phase II works a small amount of excavation was required to remove the concrete scaffold bases, OA carried out a watching brief in order to record any extra information or extension of features seen in the 2003 programme. This work was carried out in June 2005.

14.2 SUMMARY OF THE 2003 RESULTS

14.2.1 On the north front six trenches were excavated, three on either side of the steps up to the north portico. All trenches on the northern side showed modern disturbance within the top 0.4 m, associated with the relaying of the forecourt area. A modern brick culvert was seen in Trenches 5, 6 and 7 and an older 19th-century stone capped culvert was seen beneath this one within Trench 5. These culverts run parallel with the house's front, and it appears that the more modern one may have replaced the earlier on seen in Trench 5. Within Trenches 9 and 10 three truncated stone plinths were seen in each trench on approximately the same alignment as the present balustrade porte cochere walls. These may be survivals from the alterations to the basement and north porch in the 1720s. The present porte cochere walls perhaps date to alterations to the Egyptian Hall in the early 19th century.

14.2.2 On the south front the four trenches were excavated, two to either side of the steps. They contained mostly made ground and tips associated with the construction of the south front in the 1770s. The upper parts of the trenches contained some evidence of garden features, paths and beds, although none appeared particularly old. The two northern trenches, 1 and 2, contained brick and stone foundation plinths for the steps. These were built over more deposits of made ground. There was also a clay-lined feature within the northern side of Trench 3. This predated the levelling of the area for garden deposits and may also have been associated with the construction of the south front.

14.3 RESULTS

14.3.1 The recent watching brief was to record any possible extension of the above features seen as the scaffold base pits were extended in order to remove the concrete bases. The pits were extended only by a single narrow bucket's width (*c.* 0.6 m) in order to create enough space to re-excavate the concrete. They were not excavated to full depth.

14.3.2 Apart from the later garden deposits no further archaeological remains were seen in the trench sides. Nor were any of the features identified during the previous work seen to extend. Digital photographs of the extended trenches were taken but no further paper records were created.

Oxford Archaeology

Janus House
Osney Mead
Oxford OX2 0ES

t: (0044) 01865 263800
f: (0044) 01865 793496
e: info@oxfordarch.co.uk
w:www.oxfordarch.co.uk

Oxford Archaeology North

Storey Institute
Meeting House Lane
Lancaster LA1 1TF

t: (0044) 01524 541000
f: (0044) 01524 848606
e: lancinfo@oxfordarch.co.uk
w:www.oxfordarch.co.uk

Director: David Jennings, BA MIFA FSA

Oxford Archaeological Unit is a
Private Limited Company, N°: 1618597
and a Registered Charity, N°: 285627

Registered Office:
Oxford Archaeological Unit
Janus House, Osney Mead, Oxford OX2 0ES