15 May 1996

Conservation Record

ROCHESTER CATHEDRAL: CRYPT

1996 WALL PAINTING CONSERVATION PROGRAMME

Contents

Mark Perry 15.05.96.

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Summary

The work carried out to the paintings at the eastern end of the renamed St Ithamar's Chapel formed the second and final phase of a conservation programme begun in 1987, when the painted plaster of segment (d) of the vault in Bay E12 (see attached plan) was detached and replaced, and partial cleaning of another segment (c, north) was also carried out. During the 1996 phase Bays C12, C13, D11, D12, D13, E12 & E13 were treated; minor repairs were carried out to D10 and advice on the limewash and plaster finish, including samples, were supplied to the stone conservators and builders. One segment of Bay D11 was painted with a new design, as a test area for a proposed redecoration of the entire bay.

The conservation work was begun on 12 February 1996 and completed on 24/4/96 April 1996. The Perry Lithgow Partnership was assisted by Peter Martindale and Jane Spooner.

Description of the paintings

This area of the crypt dates from the early part of the 13th century; however, the painted decoration dates from the early 14th century and yet appears to be the original scheme of decoration, suggesting that until this point the plastered surfaces had remained blank. The painted decoration consists of a red ochre single-line masonry pattern throughout the six bays principally treated in this phase: C12 & 13, D12 & 13, E12 & 13. This pattern is only faintly discernible in several areas and in Bay E13 it was covered with limewash in the 1950's. Certain areas were further embellished with more elaborate decoration e.g. Bay C12 has a star-shape floral motif with stems springing from the corner of each painted block; a black scrollwork design is just discernible in the spandrels of C13; and D13 has a double-line masonry pattern. Most obviously E12 has a very elaborate design of 2 roundels in each segment of vault, originally containing figurative subjects, although these are so badly deteriorated that only one figure can be presently seen (segment d, east), although this is of exceptionally high quality and is reminiscent of Westminster court painting. The spandrels were decorated with scrollwork and the whole undoubtedly originally resembled, both in date and design, the painted decoration in Bay B8, partially conserved in 1984-5. It seems likely that the areas of more elaborate decoration signified the site of altars. Although the masonry pattern appears beneath the roundel

design, there is no separating limewash coat which suggests that the schemes were more or less contemporary.

An interesting anomaly occurs in Bay C13 (photographs 36,39) which shows that the masonry pattern has been deliberately scratched off the plaster. This is possibly to avoid confusing the black scrollwork design which can just be discerned in the lower part of the spandrel.

Further evidence of the original decorative scheme can be seen in Bay D11. Two early retaining walls were removed 20 years ago, beneath which was found a white masonry pattern on the joints of the ribs (photographs 121,122,123). There was no sign of a red masonry pattern on the original limewash surface of the vaults: the vertical red lines presently visible are simply staining from the edge of the retaining wall. The lack of limewash on these or any of the painted surfaces suggests that they were never limewashed out, as was so typical from the Reformation period onwards.

The ribs of the vaults, at least in the more elaborately decorated bays, were also enhanced with decorative motifs: one small section of a black foliate scroll remains in Bay C12 on the rib dividing segments a & b (photograph 24); and a wavy line pattern can be seen on the rib dividing segments c & d in Bay E12 (photograph 99).

These decorative features and the assumption that a similar palette to that used in Bay B8 was employed in the now badly deteriorated Bay E12, changes the perception of the original appearance of this part of the crypt, with great use made of vermilion, greens, black and white and a variety of decorative motifs, and a particularly high quality of craftsmanship.

Technique

The vault plaster support is built up of three layers: firstly, a very thick levelling coat over the rubble infill (photographs 60,95,96); secondly, a much more lime-rich plaster skim, finished off with a limewash ground on which the painting took place. The roundels and designs such as the arcading feature in E12, segment b were incised into the limewash (photographs 100,101).
Analysis carried out during previous phases of work indicated that there was no oil present in the binding medium, leading to the assumption that protein, in the form of egg or glue size was used as the binder. However, the use of a synthetic copper green, in place of the more expensive green pigments such as malachite, suggests that oil may have been used locally (photograph 101).
A sample of the limewash ground from D12 was analysed by UCL Paintings Analysis Ltd. to attempt to identify what appeared to be a yellowish coating over the whole area. No organic material was identified, only the presence of Calcium sulphate. This suggests that the sample was taken from an area that was not particularly dirty when the gypsum crust was forming: in other areas, especially around E12, the gypsum has trapped a layer of soot (as identified by S Bradley in 1985) causing severe darkening of the surface. Further discussion of the gypsum crust continues below under 'Condition prior to treatment'.

Appendix 3

The star-shape floral motifs in Bay C12 (photograph 22) were undoubtedly painted in a mixture of vermilion and red lead as were the rosettes in Bay A4; the present darkening of the pigment being partly an adverse reaction to light, but also the effects of the immovable darkened sulphate crust. Similar results can be seen in E12.

Condition prior to treatment

The principal cause for concern was the extreme distortion of the painted plaster, leading to a continuing process of delamination and loss. The fragile paint layer was the first victim of this deterioration and Bay E12 illustrates the extensive losses of the paint surface and the alarming distortion of the plaster skim coat (photographs 87-90,93).
The plaster support has also suffered, resulting in a lack of adhesion between the substrate and the skim coat, causing extensive delamination - with voids of up to 4cm in places - and many areas of loss (photographs 9,11,13,77,83).
The cause of this deterioration is related to earlier water incursions and related continuous cycles of salt crystallisation. The earlier presence of coal-burning boilers (and a suggested use as a foundry) would have created dilute sulphuric acid which would dissolve the calcium carbonate of the plaster and, in turn, create a calcium sulphate crust to form, trapping the existing dirt beneath a very hard surface. Gypsum and soot were found in all the samples analysed in 1987 by Jo Darrah. The dramatic darkening in the area of Bay E12 may indicate the site of the boiler and forge.
The pink tinge to some of the stone and plaster in this area of the crypt may be further evidence of extreme heat, as would be generated by a boiler or forge. There is some debate about whether the stone has been fire-damaged, but the plaster certainly shows variations in colour that one would attribute to heat. For example photograph 125 shows a detail of C12 with the plaster ranging from a very pink colour on one side, to the natural grey colour on the other side. In Bay D11 when the repair plaster and limewash was removed from the area abutting the original plaster (photographs 108,124) the original plaster beneath was burnt pink; however, when a small repair was removed from the original surface a few centimetres to the right of the red stain (124) the plaster beneath was grey. This suggests that the retaining wall had protected the original work from the extreme heat that occurred at some later stage.

A certain amount of structural damage has affected the painted plaster, though much of it happened at a very early stage. Most noticeable is the complete loss of original plaster in the segments surrounding the column at the junction of bays D11 & E12 (photographs 42,58). The fairly neat line of loss following the apex of each vault indicates that some deliberate removal has also taken place, perhaps during the repair stage. It is likely that this damage is related to either a structural failure or alterations carried out over the crypt.
Extensive crazing of the plaster surface has occurred most noticeably in Bay C12 (photographs 15,16,17,18) and this has been emphasised by seepage through the cracks from above, causing indelible staining of the surface.
Some minor movement may have been the cause of the damage to the apices along half the width of the crypt and following the lines of the ribs (photographs 32,33,34,50). Strangely though, there is no obvious movement of the rib stones. These failures occurred before the paintings had been applied, as the decoration appears on top of the repairs (photograph 33); indeed, the damage may have provided

the motivation for the scheme of decoration. Some areas, most noticeably segment a, north (photographs 7,8) and areas of repair, had another, very thin coat of limewash applied over certain sections, onto which the design was painted. In many cases this has lost its adhesion and was flaking badly (photograph 23).
In general, however, the pigments were very stable, (with the obvious exception of Bay E12), with severe fading of the colours and surface disruption being the main problems.

Unsuitable materials have caused substantial damage to the painted plaster: the use of limestone that has not been properly burnt and slaked has caused extensive pitting of the surface in Bay D12 (photograph 59) and D13, with some losses of plaster the size of 5 pence pieces.
Cement has been used in the past to fill losses, particularly along the lines of the ribs (photograph 50) and at the abutments of the windows (photographs 68,69) and, being far too hard for the much softer lime plaster, has incurred even more damage to the surface. A very hard grey mortar had been used to fill the large loss to the apex of Bay C12 (photographs 31,32), which also included hair, charcoal and brick. A large stone had been inserted to fill some of the void but this did not fit properly and protrudes through the plaster.
Early clumsy attempts at grouting, using a very hard grey grout - perhaps a thin cement or gypsum - appear to have taken place in Bay D12 which have simply resulted in immovable surface staining (photograph 59). It is possible also that this may be the result of seepage from above.

Conservation treatment

Limewash removal:

The 1950's limewash obscuring the painted plaster in Bay E13 was removed with scalpels, revealing a substantial amount of the original masonry pattern (photographs 102-105).

Surface cleaning:

This was achieved using Tri-ammonium citrate in varying solutions, applied either by brush through Japanese tissue, or in a poultice with fine grade Arbocel paper pulp and cellulose (photographs 63,69), and rinsed thoroughly to remove any residue.
The success of this process was mixed: in some areas the surface dirt was removed with dramatic results (photographs 13,14,25-27,29,66,67,97,98) while in others, particularly E12, it was not possible to achieve a complete clean. This is because the tri-ammonium citrate does not break down the hard gypsum crust, which leaves a certain amount of dirt trapped beneath. Tests with solutions of EDTA had met with some success in dissolving the gypsum crust during previous phases of conservation, but current concerns regarding the potential damage to the substrate and paint layer, through the formation of silica and alumina gels, do not warrant proceeding any further with this method at this stage.
It was found to be impossible to clean some localised areas of extremely fragile paint e.g. in Bay C12 since the very thin limewash had to be consolidated before cleaning could take place. However, the use of consolidants such as Paraloid B72 or Primal

AC33 would effectively trap the dirt; whereas the use of lime would not allow any cleaning process more vigorous than a simple light spraying to remove surface accretions. The latter method was chosen in line with a policy of minor intervention and the most visually intrusive areas were toned down using a very thin and reversible colourwash (photographs 7,8).

Consolidation of the plaster support:

After pre-wetting with Industrial Methylated Spirits and water a grout consisting of a 1:1 mix of slaked lime putty and Trass - a pozzolanic material - was injected into the numerous voids under pressure. Where necessary presses were applied for support during setting (photograph 92). Because of the extreme fragility of many areas a facing of Japanese tissue and cellulose was applied prior to grouting (photograph 91). Areas where the skim coat was delaminating from the support were injected with a lime slurry only (photograph 38).
While it was not always possible to level out the serious distortions, since the plaster surface had either expanded to a bigger surface area or was too brittle and distorted to ease back into position, it was possible to achieve a satisfactory aesthetic compromise using a combination of grout and mortar (photographs 9,10,64,65,76,77,93,94).
After consolidation the remaining cleaning could take place, during which any residues of cellulose or grout were removed.

Consolidation of the limewash ground and paint layer:

This was achieved using a very thin lime milk, applied through tissue and pushed back with a damp sponge. Some localised spot-fixing of the green pigment in bay E12 was carried out using a 5% solution of Primal AC33, as the darkened sulphate crust was irremovable and therefore already visually compromising the appearance of the bay.

Repairs:

All areas of loss were raked out to a solid base, with the larger losses e.g. the 4 segments in Bays D12 and E12 being gradually built up in a number of coats, using a mix of 1 slaked lime putty to 3 washed local sand, graded through a 10's sieve (photographs 29,60,61). The final coat, consisting of 1 lime to 2 local sand (20's sieved) and a half measure of a very fine sand from Kings Lynn, was cut back to achieve a suitable surface texture. These mortars and finishes were used throughout the repairs to the paintings. A mortar using only fine sand and lime was employed for filling cracks etc.
During the removal of the plaster from segment d, west in Bay D12, a piece of painted stone was found embedded in the plaster (photographs 61,62) having been used as infill material like the pieces previously discovered in Bay B8. It was decided to leave it in situ because of the problems involved in its removal.
The large repair to the apex of Bay C12 was only partially removed because of the potential structural problems associated with the inserted stone etc. A skim of new mortar was applied with the protruding stone left unavoidably proud of the surface.

Limewash ground repairs:

Visually intrusive areas of new plaster were toned-down first with coloured limewashes and then, where necessary, colour washes using only powder pigments in water, to give a visually coherent appearance e.g. photographs 58,72,76,84.
The repairs to the segment partially conserved in 1987 were treated similarly (85,86).

Bay D11

As this vault had never contained any original painted plaster and was now the site of the main crypt altar, it was proposed that this bay would be redecorated with a new wall painting. It was suggested that a test area be produced by us to illustrate a design proposal. To this end the vault had been repaired by Nimbus (photographs 107-110) but the work was found to be of insufficient quality on which to paint and the whole vault area had to be treated again by us. This involved the removal of all non-original surfaces back to a solid base and the gradual building up of new plaster as detailed above (photographs 111-114). A detailed record was kept of all periods of repairwork and this appears in the appendix.
When the plaster was dry two coats of suitably toned limewash were applied, onto which was pounced and painted the proposed design (photographs 115-119). The design was based on a contemporary vault decoration in Christchurch Cathedral, Oxford. After much consultation it was decided by the Dean and Chapter not to proceed with the decoration and the painting was covered with limewash (photograph 120).
The strips of original plaster were cleaned and repaired as above (122,123).

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1996 WALL PAINTING CONSERVATION PROGRAMME

LIST OF ACCOMPANYING PHOTOGRAPHS AND TRANSPARENCIES

1.	C12:	Looking east - before conservation
2.		As 1. - after conservation (slide n/a)
3.		Looking west - before conservation
4.		As 3. - after conservation (slide n/a)
5.		Vault - before conservation
6.		As 5. - after conservation
7.		Segment a, north - before conservation - showing delamination & loss
8.		As 7.- after conservation
9.		Segment b, west - before conservation - showing surface distortion
10.		As 9. - after conservation
11.		Segment b, east - before conservation
12.		As 11. - after conservation
13.		Segment c, north - before conservation-showing plaster loss & staining
14.		As 13. - after conservation
15.		Segment c, south -before conservation- showing surface crazing
16.		As 15. - after conservation
17.		Segment d, east - before conservation (with cleaning test)
18.		As 17. - after conservation
19.		Segment d, west - before conservation- showing cement repair to rib edge & apex damage
20.		As 19. - after conservation
21.		Segment a, south - before conservation
22.		As 21. - after conservation
23.		Detail of surface damage
24.		Remains of original rib decoration
25.,26,27		During cleaning
28.		During grouting
29.		During cleaning and repair
30.		Painted plaster consolidation by Nimbus on window embrasure
31.		During repair, showing earlier grey plaster and protruding stone
32.		As 31.
33.		Detail of apex showing original painting on top of repair
34.		Detail of original painting on top of rib edge repair
35.	C13:	Vault - before conservation
36.		As 35. - after conservation
37.		As 35. - during repairs
38.		Detail during consolidation of plaster skim
39.		Detail showing deliberate defacement of masonry pattern. The black scrollwork is just visible in lower spandrel.

40. D12: Vault - before conservation
41. As 40. - after conservation
42. Looking west - before conservation, showing extensive plaster loss
43. Looking east
44. Segment a, north - before conservation
45. As 44. - after conservation
46. Segment b, west - before conservation
47. As 46. - after conservation
48. Segment b, east - before conservation
49. As 48. - after conservation
50. Segment c, north - before conservation, showing cement repairs
51. As 50. - after conservation
52. Segment c, south - before conservation, showing residual staining, possibly from earlier treatments
53. As 52. - after conservation
54. Segment d, east - before conservation
55. As 54. - after conservation
56.&57. Segments d, west & a, south- before conservation, showing extensive plaster loss
58. As 56 & 57. - after conservation and colour-adjusted repairs
59. Detail of surface pitting caused by 'blowing' lime particles
60. Detail during repair, showing removal to solid base plaster
61. Detail during build-up of repair
62. As 61. showing position of painted stone used as infill
63. During cleaning with poultice
64. Segment d, east showing seriously delaminating painted plaster
65. As 64. - after conservation
66. During cleaning with poultices
67. During cleaning
68. D13: Before conservation
69. During cleaning, also showing cement fillet and double-line masonry pattern
70. After conservation
71. E12: Vault - before conservation
72. After conservation
73. Looking east - before conservation
74. Looking west - before conservation
75. Segment a, south - before conservation
76. As 75. - after conservation
77. As 75. - before conservation showing extreme surface distortion
78. Segment a, north - before conservation, showing extensive plaster loss
79. Segment b, west - before conservation, showing extensive plaster loss
80. Segment b, east - after conservation, showing incised roundel and scrollwork in spandrel
81. Segment c, north - before conservation
82. As 81. - after conservation, showing incised roundel
83. Segment c, south - before conservation
84. As 83. - after conservation
85.&86. After colour adjustment to repairs carried out in 1987

87,88,89,90		Details of distortion and delamination
91.		Application of facing prior to grouting
92.		During grouting
93.		Detail of extreme distortion, before conservation
94.		As 93. - after conservation
95.&96.		During removal of earlier repair plaster, showing structure of vault
97.&98.		During cleaning
99.		Segment c, south- after conservation, showing original rib decoration
100.		Segment b, east- showing incised roundel & arcading feature
101.		Segment c, north- showing green pigment
102.	E13:	Before conservation, showing covering limewash
103.		During limewash removal
104.		During conservation, showing revealed masonry pattern
105.		After conservation
106.-110.		
	D11:	Details of vault after Nimbus repairs
111.-114.		During plaster removal, showing different periods of repairwork
115.		During preparation of new decoration
116.		Detail showing 'pouncing' of design
117, 118,119		Completed area of decoration
120.		After limewashing out test area
121.		Detail showing original white masonry pattern on rib joints
122.&123.		After conservation, showing original plaster surfaces reclaimed from behind retaining walls
124.		Detail during conservation, showing pink (burnt?) plaster to left and grey (unburnt?) plaster beneath original surface
125.		C12, segment b, east - showing original pink and grey plaster

1996 WALL PAINTING CONSERVATION RECORD

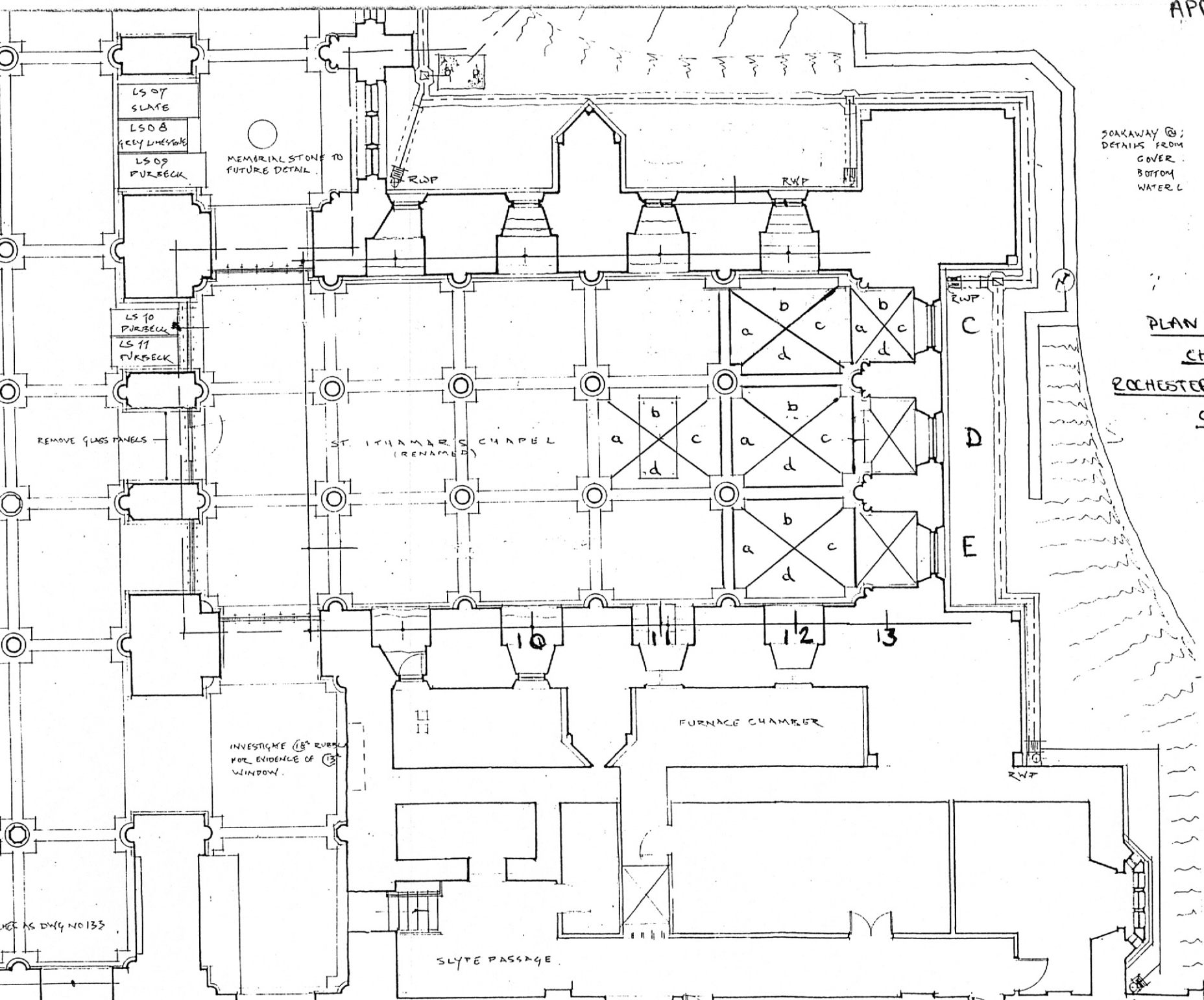
APPENDICES

1. **Ground Plan of St Ithamar's Chapel, Rochester Cathedral Crypt**

2. **Diagram of Bay D11**

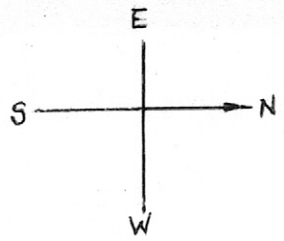
3. **UCL Painting Analysis Ltd.** – ~~Sample analysis~~

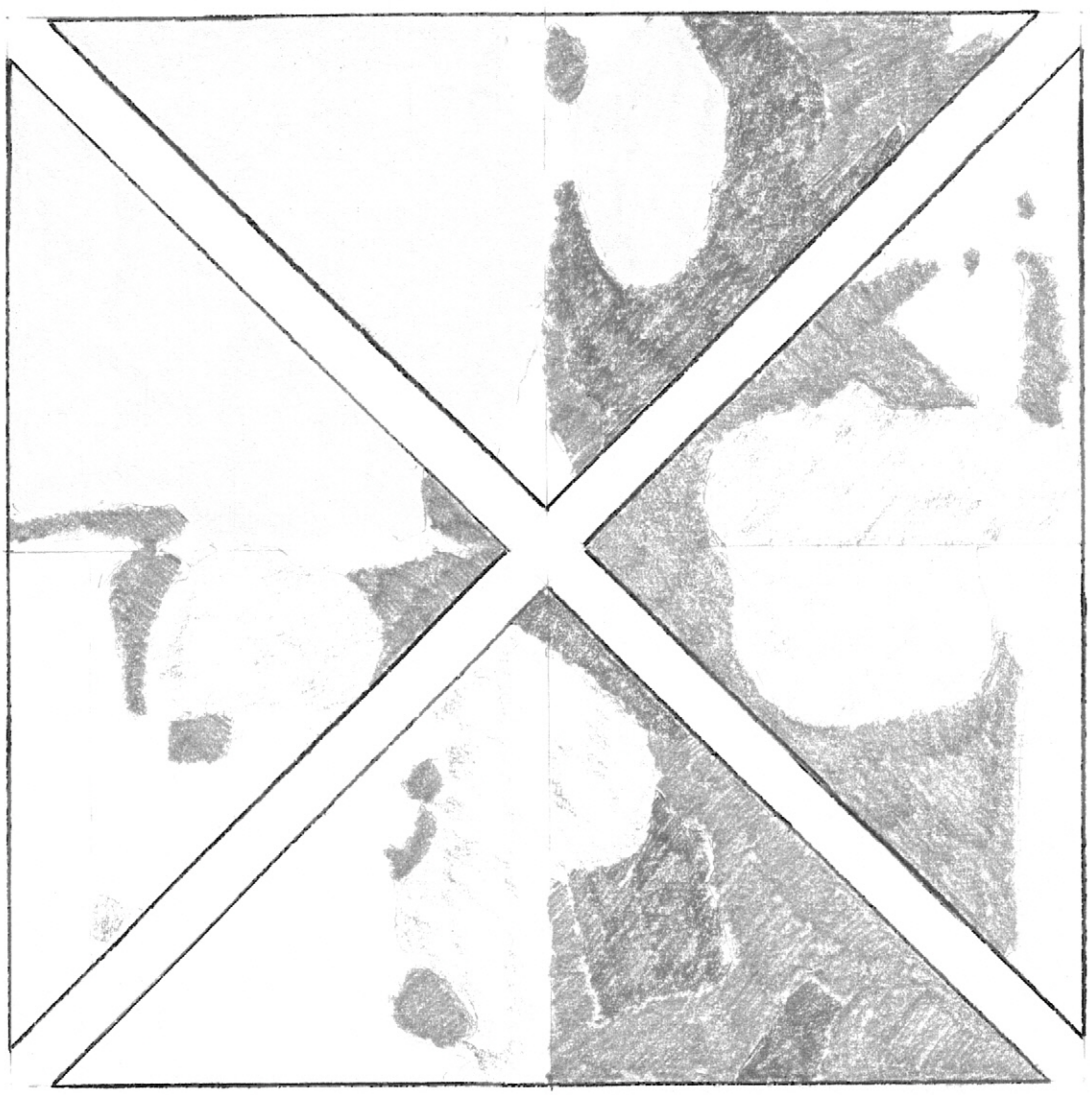
APPENDIX 1



PLAN OF ST ITHAMAR'S CHAPEL ROCHESTER CATHEDRAL CRYPT

APPENDIX 2





ROCHESTER CATHEDRAL CRYPT · BAY D11 · VIEW LOOKING UP

DIAGRAM SHOWING BACKING PLASTER BEFORE APPLICATION OF PERRY-LITHGOW SKIM COAT

ORIGINAL BACKING PLASTER

ORIGINAL TOP COAT OF PLASTER

HAIR PLASTER REPAIRS TO ORIGINAL BACKING PLASTER

'NIMBUS' PLASTER REPAIRS TO ORIGINAL BACKING PLASTER

PERRY-LITHGOW PARTNERSHIP REPAIRS TO ORIGINAL BACKING PLASTER