Hutton + Rostron
Environmental Investigations Limited

Kidderpore Avenue: Plaster condition investigation at the Chapel

Site note 8 for 28 June 2016, job no. 143.95

CONTENTS

Distribution:

Marco Liberace - Design & Build Co-ordinator, Mount Anvil
Gordon Alford – Quantity Surveyor, Mount Anvil

File: 143.95

1 INTRODUCTION

1.1 AUTHORITY AND REFERENCES

Hutton + Rostron Environmental Investigations Limited carried out a site visit to Kidderpore Avenue on 28 June 2016 in accordance with instructions received from Mr Gordon Alford by email and letter dated 20 May 2015 on behalf of Mount Anvil. Drawings provided by King's College London Directorate of Estates and Facilities for the identification of structures. For the purpose of orientation in this report, the Chapel was taken as facing east towards the lawn

1.2 AIM

The aim of this survey was to investigate internal plaster finishes to determine construction and condition. An assessment of probable remaining service life and suitability for retention is made in conjunction with recommended considerations for the proposed refurbishment

1.3 LIMITATIONS

This survey was confined to the accessible structures. The condition of concealed structures may be deduced from the general condition and moisture content of the adjacent structure. Only demolition or exposure work can enable the condition of materials to be determined with certainty, and this destroys what it is intended to preserve. Specialist investigative techniques are therefore employed as aids to the surveyor. No such technique can be 100 per cent reliable, but their use allows deductions to be made about the most probable condition of materials at the time of examination. Structures were not examined in detail except as described in this report, and no liability can be accepted for defects that may exist in other parts of the building. We have not inspected other parts of the structure which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the property is free from defect or in the event that such part of the property is not free from defect it will not contaminate and/or affect any other part of the property

2 STAFF ON SITE AND CONTACTS

2.1 H+R STAFF ON SITE

Tim Jordan

2.2 PERSONNEL CONTACTED

Site Security - Mount Anvil

3 OBSERVATIONS AND RECOMMENDATIONS

3.1 HISTORY

The chapel was constructed circa 1920. The method of building was relatively modern (engineering brick and steel frame roof) but with decorative detailing and finishes (internal plaster and external render) provided to give the illusion of an older classical building

The proposed refurbishment is understood to be for a change of use. It was understood that the approach will be to repair and/or replicate the existing plaster finishes

3.2 CONSTRUCTION

3.2.1 Arrangement

The chapel was unconventional in that the chancel was at the west end of the floor plan rather than the east. The structure comprised an entrance lobby, nave and chancel. These spaces were highly decorated in plaster to give the effect of pilasters and fielded panels. See photographs at Attachment A

3.2.2 Materials

On original construction, plaster for walls and ceilings was plaster-of-paris (POP) with hessian and timber reinforcement but no coarse aggregate. Over time, repair and replacement has been made using modern gypsum and plasterboard materials. Most recently, damaged plaster has been clad in MDF board for temporary protection

On refurbishment, it is assumed that the original aesthetic will be restored but that the use of like-for-like materials may not be necessary

3.2.3 Build-up

1 Walls: Plaster of paris is assumed to have been pre-cast in sections on workshop benches. Panels would then be fixed up onto battens on-site using skew-nails or screws. The fixing holes would be patched in plaster. The plaster shows an overall thickness of 7-12mm. Plaster has been reinforced using approximately 2 layers of hessian mesh (incorporated within the multiple layers of plaster poured onto the cast). Further reinforcement is provided by fine softwood laths, 3 x 30mm and spines, 10 x 45mm. Localised inspection suggested fixing battens were used to secure the plaster to the wall. Battens, 55 x 55mm at 600mm centres were installed horizontally

2 Repairs: Modern gypsum plaster has been used in re-skimming damaged areas. More heavily damaged areas have been replaced in plasterboard or clad in MDF

3 Ceiling: Again, plaster-of-paris is thought to have been pre-cast. The plaster is approximately 20mm thick with hessian and timber lath reinforcement. The finish is fixed to the underside of the timber roof structure onto ceiling joists, approximately 100 x 50mm in section

3.3 CONDITION

See detailed schedule at Attachment C and plans at Attachment B

Note that the POP construction was inherently fragile. Due to the recent history of use for ball games and general vandalism by occupants, the wall plaster has been comprehensively damaged beyond repair. This related to impact damage. Ceiling plaster had remained in relatively better condition but had collapsed locally due to water penetration from the roof. In general, the ceiling was in a repairable state but it may be justified to remove the finish for the purposes of enabling investigation/repair/re-detailing the roof structure

It was assessed by H+R that it will not be practical to repair the existing plaster finishes in-situ, on refurbishment. This is on the basis of widespread and comprehensive damage in addition to the need for exposing the underlying structures for investigation/repair/re-detailing (so as to ensure the long term sustainability of The Chapel). H+R recommend that the remaining parts of the existing decorative plaster scheme are dimensionally recorded, removed and replicated using new materials. Use of plasterboard would still be in-keeping with the original ethos of using common materials to give a highly decorative appearance and would also be a much more durable finish. However, provisional allowances should be made for reinstating plaster-of-paris finishes like-for-like

4 H+R WORK ON SITE

4.1 H+R inspected all accessible plaster finishes by tap testing, pressure testing and interrogation of pre-existing hatches, as necessary, so as to determine construction and condition

4.2 H+R took samples from representative materials to determine plaster mix composition

5 PROPOSED ACTION BY H+R

5.1 H+R will advise on conservation of original fabric with regard to damp, decay and salt damage, as necessary

5.2 H+R will review proposed remedial details as these become available

5.3 H+R will return to site to inspect sample remedial details when instructed

5.4 H+R will liaise with conservation and historic building authorities, if instructed, so as to ensure the cost effective conservation of original fabric

5.5 H+R will liaise with building guarantors, as necessary, so as to ensure the issuing of collateral warranties and building guarantees at practical completion, if required

6 INFORMATION REQUIRED BY H+R

6.1 H+R require copies of up-to-date copies of project programmes, as these become available

6.2 H+R require copies of up-to-date lists of project personnel and contact lists as these become available

6.3 H+R require copies of proposed remedial details for comment as these become available

6.4 H+R should be informed as a matter of urgency if further significant water penetration occurs onto site; so that advice can be given on cost-effective remedial measures, to minimise the risk of cost or programme overruns and so as to minimise the risk of damp or decay problems during the latent defect period

7 ADMINISTRATION REQUIREMENTS

7.1 H+R require formal instructions for further investigations and consultancy on this project

7.2 H+R require confirmation of distribution of digital and printed copies of reports and site notes

Attachment A

Fig 1:

Entrance; showing doorway reveals of gypsum plaster applied on the hard. Note widespread cracking and water damage

Fig 2:

Entrance lobby; showing plaster of paris linings applied to battens. Note damage and loss of material

Kidderpore Avenue, Chapel
Photographs
28 June 2016
Not to scale

Hutton + Rostron Environmental Investigations Ltd, Netley House, Gomshall, Surrey, GU5 9QA
Tel: 01483 203221 Fax: 01483202911 email: ei@handr.co.uk

Fig 3:

Entrance lobby; showing plaster of paris linings applied to battens. Note failed gypsum skim repair

Fig 4:

Entrance lobby; showing plaster of paris ceiling still in-tact

Kidderpore Avenue, Chapel
Photographs
28 June 2016
Not to scale

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Fig 5:

Nave; showing plaster of paris wall linings applied to battens. Note severe and widespread damage and loss of material (especially where disguised by MDF cladding)

Fig 6:

Nave; showing plaster of paris wall linings applied to battens. Note damage disguised by MDF cladding

Kidderpore Avenue, Chapel
Photographs
28 June 2016
Not to scale

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Fig 7:

Nave; showing plaster of paris ceiling mostly in-tact but removed for void access or water damaged locally

Fig 8:

Chancel; showing plaster of paris linings applied to battens. Note severe and widespread damage and loss of material (especially where disguised by MDF cladding). Also note water damage and collapse affecting ceiling

Kidderpore Avenue, Chapel
Photographs
28 June 2016
Not to scale

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Fig 9:

Vestry; showing plasterboard soffit subject to localised damage. Also note gypsum wall plaster applied on the hard and heavily water damaged

Fig 10:

Plaster of paris; showing fragile material relying upon hessian reinforcement

Kidderpore Avenue, Chapel
Photographs
28 June 2016
Not to scale

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Fig 11:

Plaster of paris; showing failed gypsum skim repair

Fig 12:

Plaster of paris; showing typical impact damage sustained by ball games and vandalism

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Fig 13:

Plaster of paris; showing wall linings fixed to battens

Fig 14:

Plaster of paris; showing typical impact damage sustained by ball games and vandalism

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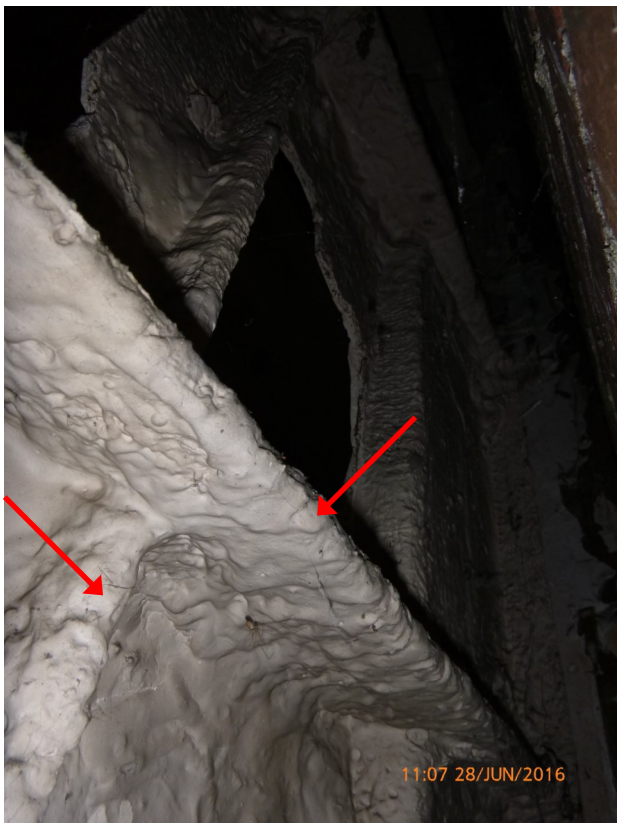

Fig 15:

Plaster of paris; showing laths and spines providing support of wall panels. Note plaster poured over in layers (indicating pre-casting on a workshop bench)

Fig 16:

Plaster of paris; showing large hatch removed for enabling inspection/ access by others. Note support from softwood joists. Also note condensation soiling to paint finishes due to inadequate heating/insulation/ ventilation

Kidderpore Avenue, Chapel
Photographs
28 June 2016
Not to scale

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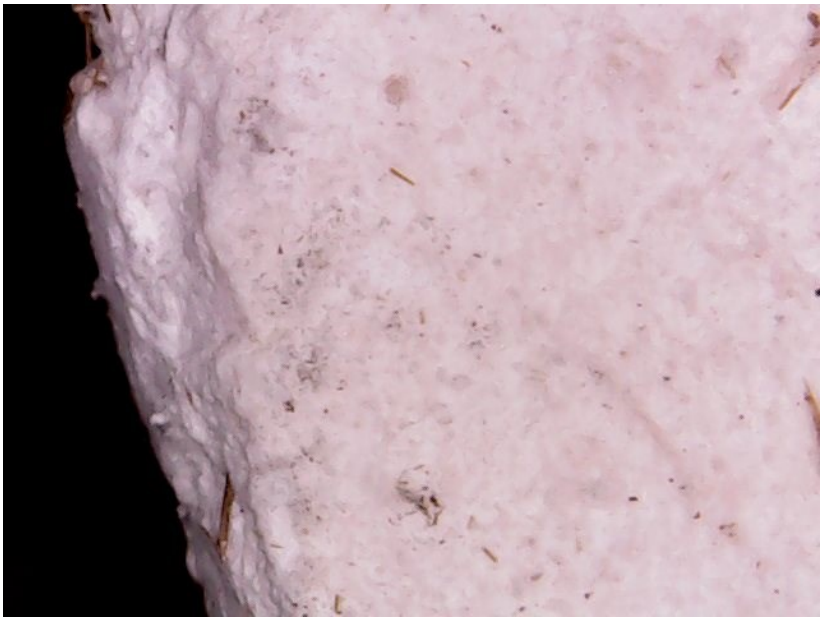

Fig 17:

Plaster of paris; showing microscopic view. Note fine and homogenous mix which was inherently fragile (especially in thin panels)

Fig 18:

Plaster of paris; showing microscopic view. Note hessian strand from reinforcement mesh. Also note chronology of paint layers indicating the original colour to have been a cream-brown tone

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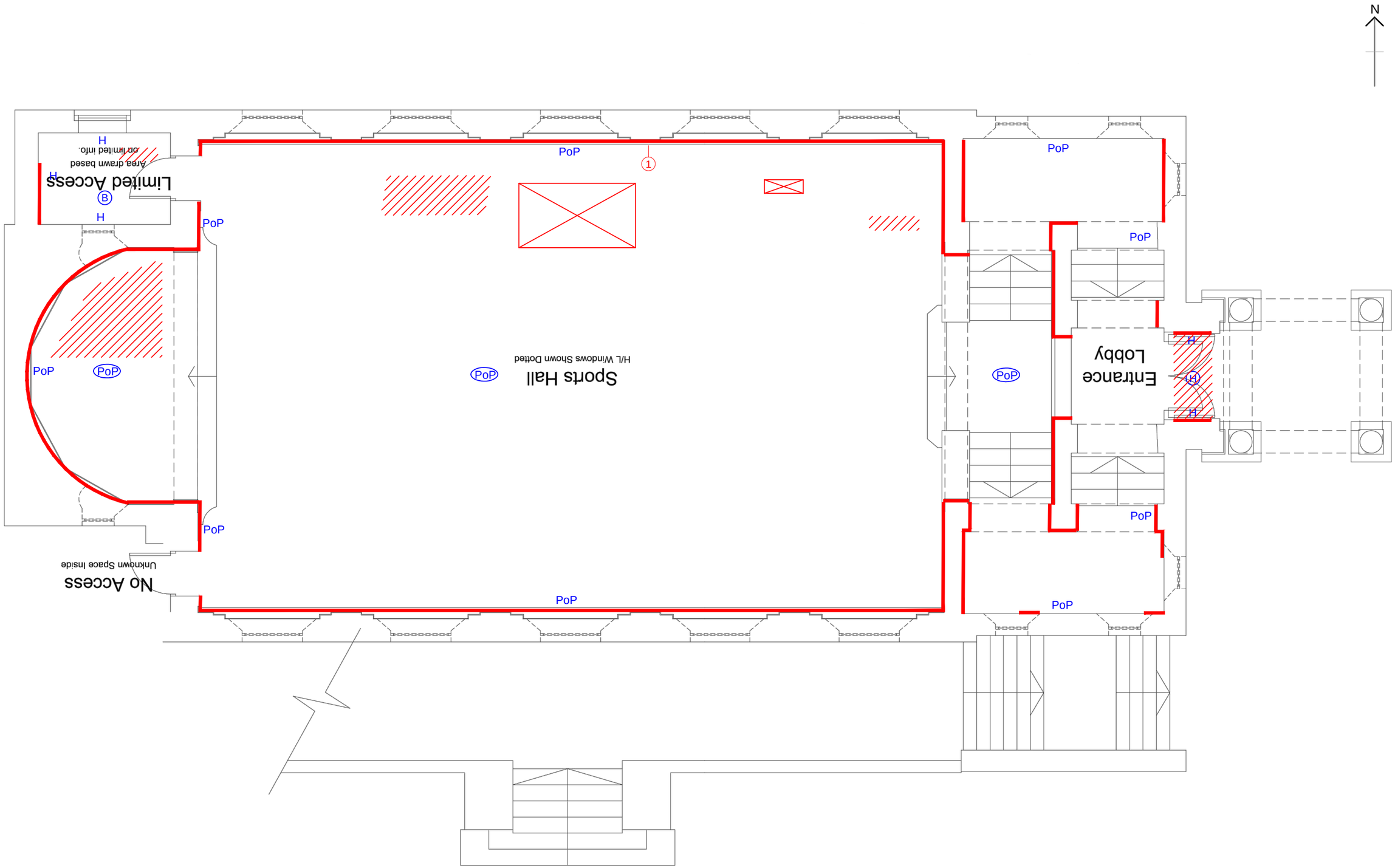
Attachment B



Kidderpore Avenue, Chapel
Plaster condition investigation
28 June 2016

Hutton + Rostron Environmental Investigations Ltd
Netley House, Gomshall, Surrey, GU5 9QA Tel: 01483 203221 Fax: 01483 202911
143-95 Site Note 8 -Not to scale-

Key:

- Defective soffit plaster
- Defective wall plaster
- Hatch cut into soffit by others
- 1 Material sample location
- (H) Hard plaster soffit
- (PoP) Plaster of paris soffit
- (B) Plasterboard soffit
- H Hard plaster wall
- PoP Plaster of paris wall

Attachment C

ELEMENT	DESCRIPTION	CONDITION	RECOMMENDATION
Entrance door - reveals	Gypsum plaster, brickwork	Water/salt damage has compromised the plaster and will hinder future repair and re-decoration	Remove plaster using hand tools, taking care not to damage adjacent stonemasonry. Re-finish using render skim on cement board (isolate from the damp brickwork behind using studded plastic membrane to prevent recurrent water/salt damage)
Entrance lobby - walls	Plaster of paris, hessian and timber lath reinforcement, softwood battens, brickwork	Impact damage has heavily damaged over 75 per cent of wall finishes	Allow for dimensional recording the existing decorative plaster scheme prior to removal. Replacement should be made in new materials such as plasterboard
Entrance lobby - ceiling	Plaster of paris, hessian and timber lath reinforcement, softwood ceiling joists, roof structure	Minimal significant damage. General soiling from condensation	Due to the requirement for inspection, repair and re-detailing of the structure above, provisionally allow for replacing the ceiling. Allow for dimensional recording the existing decorative plaster scheme prior to removal
Nave – walls	Plaster of paris, hessian and timber lath reinforcement, softwood battens, brickwork	Impact damage has heavily damaged over 75 per cent of wall finishes	Allow for dimensional recording the existing decorative plaster scheme prior to removal. Replacement should be made in new materials such as plasterboard
Nave - ceiling	Plaster of paris, hessian and timber lath reinforcement, softwood ceiling joists, roof structure	Minimal significant damage but multiple hatches created by others for void access. General soiling from condensation	Due to the requirement for inspection, repair and re-detailing of the structure above, provisionally allow for replacing the ceiling. Allow for dimensional recording the existing decorative plaster scheme prior to removal

ELEMENT	DESCRIPTION	CONDITION	RECOMMENDATION
Chancel – walls	Plaster of paris, hessian and timber lath reinforcement, softwood battens, brickwork	Impact damage has heavily damaged over 75 per cent of wall finishes	Allow for dimensional recording the existing decorative plaster scheme prior to removal. Replacement should be made in new materials such as plasterboard
Chancel - ceiling	Plaster of paris, hessian and timber lath reinforcement, softwood ceiling joists, roof structure	Water ingress has heavily damaged over 50 per cent of ceiling finishes	Allow for replacing the ceiling. Allow for dimensional recording the existing decorative plaster scheme prior to removal
Vestry – walls	Gypsum plaster, brickwork	Water damage has affected 25 per cent of wall finishes	Remove plaster. Re-finish using plasterboard (isolate from the damp brickwork behind using studded plastic membrane to prevent recurrent water/salt damage)
Vestry – ceiling	Plasterboard, softwood roof structure	Localised impact damage	Due to the requirement for inspection, repair and re-detailing of the structure above, allow for replacing the ceiling

Attachment D

SANDBERG
CONSULTING ENGINEERS
INVESTIGATION INSPECTION
TESTING MATERIALS

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web: www.sandberg.co.uk

REPORT 57497/C

KIDD HALL

ANALYSIS OF A PLASTER SAMPLES

Reference: Letter of instruction from Mr Tim Jordan of Hutton and Rostron.

1. INTRODUCTION

Four plaster samples, taken by yourselves, were received in our laboratories on 12 July 2016. We were asked to carry out analysis to determine the mix composition and proportions of the samples.

2. SAMPLE DETAILS

Sandberg Reference	Client Reference	Sample Details	Weight of sample received, g
C89236	Ceiling Base	White plaster, variable hardness, compact up to 30mm, contained fibres	213
C89237	Ceiling Finish	White plaster and pieces and powder, up to 5mm thick, compact, soft, lightweight	103
C89238	Cornice	White plaster, compact, variable hardness, moderate to lightweight, painted outer surface	203
C89239	Chapel	White plaster, compact, variable hardness, painted outer surface, fibres	109

3. ANALYSIS METHOD AND RESULTS

The samples were prepared and analysed using documented in-house methods based on BS 4551:2005 + A2:2013 "Methods of test for mortar".

As examination of the analysis data in conjunction with the appearance, tactile properties and available background information for the samples suggested that the mixes consisted of either gypsum and sand or gypsum, lime and sand, the mix proportions were calculated on these assumptions, following documented in-house methods.

The gypsum contents were calculated from the acid soluble sulphate contents making the assumptions shown in the analysis Tables. The approximate volume proportions were calculated using typical bulk densities for the constituents as indicated in the analysis Tables.

The lime contents were calculated from the acid soluble calcium contents making the assumptions shown in the analysis Tables. The approximate volume proportions were calculated using typical bulk densities for the constituents as indicated in the analysis Tables.

Details of the analyses are given in Table 1 of this report, including details of the assumptions made in the calculations. The mix proportions are summarized below:

Sandberg Reference	Client Reference	Mix Type	Mix proportions by volume
C89236	Ceiling Base	Gypsum : lime : sand	1 : 2.5 : 2.5
C89237	Ceiling Finish	Gypsum : lime : sand	1 : 1.8 : 0.1
C89238	Cornice	Gypsum : lime : sand	1 : 2.1 : 0.6
C89239	Chapel	Gypsum : sand	1 : 0.1

4. **REMARKS**

It is not always possible by chemical analysis alone to distinguish with certainty between Portland cement and lime binders or between hydraulic and non-hydraulic limes.

Microscopical examination can usually ascertain the presence or otherwise of Portland cement in the mortar and of calcareous material in the aggregate. In the absence of such confirmatory work, interpretation of the analytical results is made on the basis of consideration of the analysis in conjunction with the appearance and any available background information for the mortar.

The mix proportions given are based on the chemical analysis results and examination of the hand specimens in the light of our experience with historic mortar samples.

Samples C89236 (Ceiling Base), C89237 (Ceiling Finish) & C89238 (Cornice) were found to comprise gypsum, lime and sand mixes.

Sample C89239 (Chapel) was found to comprise a rich gypsum and sand mix.

Hutton and Rostron
Netley House
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GU5 9QW

for Sandberg LLP

D Kinnersley

D Kinnersley
Associate, Senior Chemist
8 August 2016

For the attention of Mr Tim Jordan

SANDBERG

UKAS TESTING
0262

57497/C

Table/Sheet
1/1 of 2

Date of Test
04-05/08/16

MORTAR - CHEMICAL ANALYSIS
DETERMINATION OF MIX PROPORTIONS

Documented In-house Methods 34.1(*) and BS 4551:2005+A2:2013

Sandberg Reference	C89236	C89237	C89238	
Client Reference	Ceiling Base	Ceiling Finish	Cornice	
Details	plaster	plaster	plaster	
CHEMICAL ANALYSIS		% by mass		
Insoluble Residue	51.67	2.97	22.57	
Soluble Silica, SiO_2*	-	-	-	
Acid soluble Alumina, Al_2O_3*	-	-	-	
Acid soluble Iron, Fe_2O_3*	-	-	-	
Acid soluble Calcium, CaO	22.13	46.02	36.01	
Acid soluble Magnesium, MgO	-	-	-	
Acid soluble Sulphate, SO_3	7.53	19.84	13.59	
Loss on Ignition	15.39	30.18	25.79	
Total	96.72	99.01	97.96	

Calculated Mix Proportions				
Composition to nearest 0.5%	% by mass of dry mass			
Gypsum : lime : sand				
Gypsum	15.0	43.5	29.0	
Lime, dry $Ca(OH)_2$	24.5	51.5	41.5	
Sand	60.5	5.0	29.5	
Calculated volume	1 : 2.5 : 2.5	1 : 1.8 : 0.1	1 : 2.1 : 0.6	
Remarks	-	-	-	

Assumptions used in calculations	SO_3 %	SiO_2 %	CaO %	bulk density	material type
Sand	0.0	0.2	0.0	1675	siliceous
Gypsum	55.2	0.0	38.6	860	gypsum
Lime, hydrated	0.0	0.0	72.7	575	

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UKAS TESTING
0262

57497/C

Table/Sheet
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Date of Test
04-05/08/16

MORTAR - CHEMICAL ANALYSIS
DETERMINATION OF MIX PROPORTIONS
Documented In-house Methods 34.1(*) and BS 4551:2005+A2:2013

Sandberg Reference	**C89239**			
Client Reference	**Chapel**			
Details	**Plaster**			
CHEMICAL ANALYSIS	**% by mass**			
Insoluble Residue	**3.36**			
Soluble Silica, SiO_2*	**-**			
Acid soluble Alumina, Al_2O_3*	**-**			
Acid soluble Iron, Fe_2O_3*	**-**			
Acid soluble Calcium, CaO	**35.09**			
Acid soluble Magnesium, MgO	**-**			
Acid soluble Sulphate, SO_3	**43.06**			
Loss on Ignition	**16.23**			
Total	**97.74**			

Calculated Mix Proportions				
Composition to nearest 0.5%	**% by mass of dry mass**			
Gypsum : lime : sand				
Gypsum	**84.5**			
Sand	**15.5**			
Calculated volume	**1 : 0.1**			
Remarks	**-**			

Assumptions used in calculations	SO_3 %	SiO_2 %	CaO %	bulk density	material type
Sand	0.0	0.2	0.0	1675	siliceous
Gypsum	55.2	0.0	38.6	860	gypsum