Yangon Heritage Preservation & Economic Development Sept'18

Principal & Specialist Contractors in Restoration,
Conservation & New Build Masonry

Taukkyan War Memorial

Taukkyan War Memorial

The contractor's view!

Matthew Reuter – Stonewest HK
Nick Wilson – Stonewest UK

Wellington Arch	- Case Study
St Paul's Cathedral	- Case Study
Procurement Routes	- Various examples
Surveying	- Stonewest style
London Coliseum	- Stonewest Consultancy
Training	
Knowledge Share	- Kings Cross

Added value

Extensive knowledge & experience in dealing with Traditional built structures & New Build masonry across all sectors.

Structured **resource** enabling successful undertaking of small contracts together with major projects involving **multiple trades** to suit our Client's requirements.

Conceptual stage development of **budgets** & specifications together with **sourcing of materials** for approval.

Long established history of **actively supporting** project stakeholders to **improve communication** ultimately leading to **long term successful relationships**.

In-house design capability at **pre-contract stage** assists in **value engineering** out risk & improving the interface of materials & the built structure.

Committed investment in **Training** & **Development** ensures Clients receive the **best in class.**

A **'can do'**, **non adversarial** approach, committed to achieving the **best in quality & service.**

Our **success & belief** in our approach is substantiated by **30 heritage awards** received over the last decade.

Scope

- **Stone Cleaning**
- **Façade Surveys**
- **Conservation**
- **Restoration**
- **Structural Masonry Repair**

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Masonry Cleaning

Exemplar Cleaning - Samples

Traditional Nebulous Water	- Water and nylon bristle brushes
Hot Water /Steam	- DOFF
Neutral Non-Ionic Soap	- Vulpex
Jos	- Calcium Carbonate
Dry Abrasive	- Hodge Clemco – Olivine 80
Ammonium Carbonate Poultice	- ProSoCo/Neolith
Copper Stains	- ProSoCo/Neolith
Iron Stains	- ProSoCo/Neolith
Sulphate Skin	- Masons hand tools
Organic Growth	- Neolith/Cementone
Pigeon Droppings	- Cleaners and wooden spatulas
Pigeon Gel Removal	- Peelaway and Eeze Strip

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Masonry Cleaning
- Project Managers Instruction

ENGLISH HERITAGE

Major Projects
23 Savile Row, London, W1X 1AB

Project Manager's Instruction
(Condition 40 - GC/Works/1-1998)

WELLINGTON ARCH - Repair and Conservation Project — **PMI-No. 9**

Employer: The Historic Buildings and Monuments Commission of England also referred to as English Heritage, 23 Savile Row, London W1X 1AB.

Contractor: Mansell plc, Roman House, 263-269 City Road, London EC1V 1JX.

The Contractor is hereby instructed under Condition 40 as follows:

The following sample cleaning of stone is required:

1. The south west capital marked on drawing AB1/8 attached as 1 is to be cleaned with a fine nebulous spray on flexible arms to ensure good coverage of undercut detail. The spraying is to be in periods of 20 minutes followed by a rest period of 20 minutes in which brushing with small nylon brushes (ie domestic crockery washing) is to be carried out. This cycle is to be repeated until the capital is as clean as the capital marked A on the above plan which has been cleaned with the saturation hose spraying previously. The number of cycles is to be recorded.

2. The inner SW capital directly facing the above sample 1 is to be washed with the saturation washing as previously used by Stonewest until a level of cleanness as capital A. The duration of washing is to be recorded. if brushing was used and time spent in brushing.

3. A sample area 3 of the enriched frieze is to be cleaned with two systems; the JOS with Piccolo nozzle using calcium carbonate granulate. Next to this area is a sample of the dry abrasive clean as being used currently on site and adjacent this an area without cleaning undertaken. All as indicated on marked up drawing AB1/4 attached. Observation of this sample being produced will take place on the morning of 2nd Dec 1999.

4. A sample area of the soffit of the portico is to be cleaned with the DOFF steam system followed by nebulous spraying in 20 min. cycles with hand brushing on two sides of the coffer. Cleaning limited to three number 20 min. cycles and as indicated on drawing AB1/8 attached.

5. A sample coffer of the archway soffit is to be cleaned with DOFF to remove pigeon gel and surface growth followed by half of the coffer sprayed with the fine nebulous spray and brushing in twenty minute cycles. The number of cycles is to be recorded and as indicated on marked up drawing AB1/7 attached.

Note: the cleaned capital A will require further attention to clear gel residue with both DOFF and dry abrasive, but this work is to be carried out after the samples above have been inspected.

The large parapet stones as indicated on AB1/4 can be cleaned with the DOFF system and await approval by inspection.

It is understood that the above samples will be available for inspection on Thursday 2nd Nov at 10.30 onwards.

This Instruction is given in confirmation of an oral Instruction given under Condition 40 (2)(b),(d),(g) or (l) on 30th Nov 1999 to Stonewest Contractors agent.

This Instruction is not a Variation Instruction and will be valued in accordance with Condition 43 (Valuation of other Instructions).

ENGLISH HERITAGE

Major Projects
23 Savile Row, London, W1X 1AB

Project Manager's Instruction
(Condition 40 - GC/Works/1-1998)

WELLINGTON ARCH - Repair and Conservation Project — **PMI-No. 11**

Employer: The Historic Buildings and Monuments Commission of England also referred to as English Heritage, 23 Savile Row, London W1X 1AB.

Contractor: Mansell plc, Roman House, 263-269 City Road, London EC1V 1JX.

The Contractor is hereby instructed under Condition 40 as follows:

Following an inspection on 2-12-99 of sample cleans as set out in PMI -10 the following methods of stone cleaning are to be uses;
a. the heavily soiled stone capitals are to be cleaned with water washing using the hose nozzle, but splash boards are to be placed as a collar around the base of the column capitals and against the wall on pilaster capitals to limit the quantity of water running down the face of the stone below (as stated in specification C35 - 120). The capital can the be cleaned with a light application of dry abrasive to the robust carving below egg & dart detail. The egg & dart and small leaf carved area is fragile and should to be cleaned with the JOS piccolo system. DOFF steam is agreed for pigeon gel residue removal.
b. The coffers of the portico and archway may be cleaned with DOFF steam only.
c. The enriched frieze to the east portico is to be cleaned with the JOS piccolo system only. West frieze requires very limited JOS on the small areas of carbonation (say 10%).
d. It is understood that the level of cleaning is not intended to remove all carbonation. The sample cleaning of capital A as covered in PMI 9 establishes a level of cleaning which removes heavy encrustation of soot and salt. Resistant hard carbonation on the upper surfaces (which are not visible from the ground) and background need only be cleaned back to the agreed sample.
e. A sample clean of copper staining from the lightning conductor is to be undertaken in accordance with the tender documentation.
f. Al cornice level the egg & dart detail on the east portico is to be cleaned with dry abrasive and is accepted that the stone off this carving as deteriorated as a result of rainwater runoff from the roof over time. Loss of detail will be inevitable but to be minimised where possible.
g. The east and south cornice scroll and coffered area is to be cleaned with water washing to the standard achieved on the west and north, but with splash boards in place to prevent runoff water reaching the stone below.
h. The large parapet stones are to be cleaned with DOFF steam only.

It is also understood that a remeasurement of the cleaning process is required to reflect actual work against planned.

This Instruction is given in confirmation of an oral Instruction given under Condition 40 (2)(b),(d),(g) or (l) on 2nd December 1999 to the Contractors specialist sub-contractor.

This Instruction is a Variation Instruction, and will be valued in accordance with Condition 42 (Valuation of Variation Instructions).

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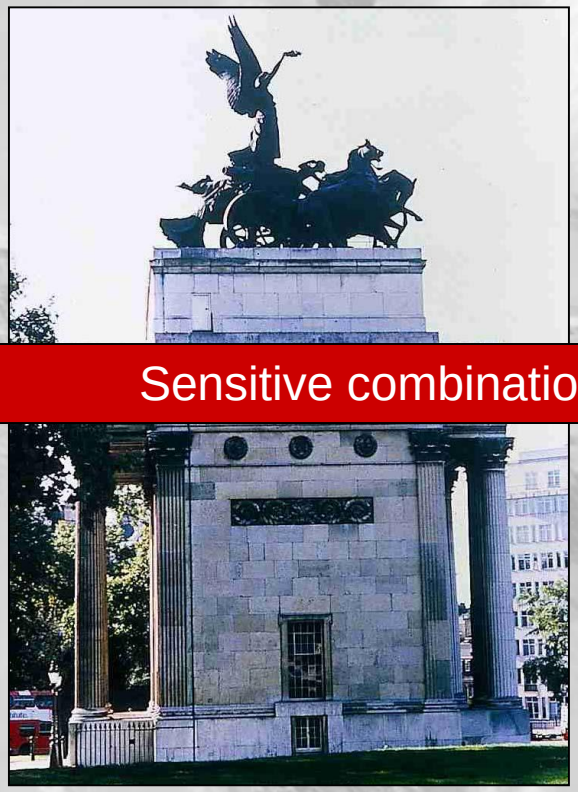
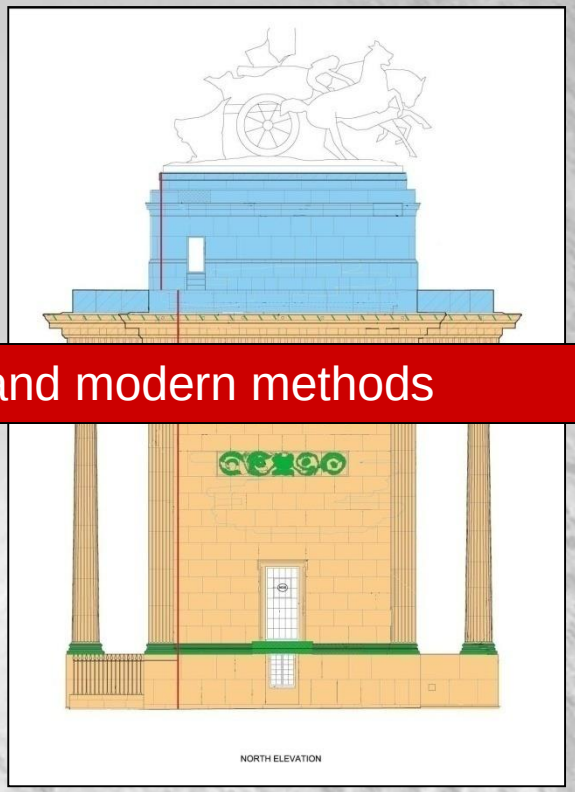
Masonry Cleaning

The Problem



The Solution



Sensitive combination of traditional and modern methods

- Traditional Nebulous Water Spray
- Jos
- DOFF
- Dry Abrasive
- Hand Tooling

STONEWEST LTD

Surveying

Stonewest Ltd

Structural Column Repair

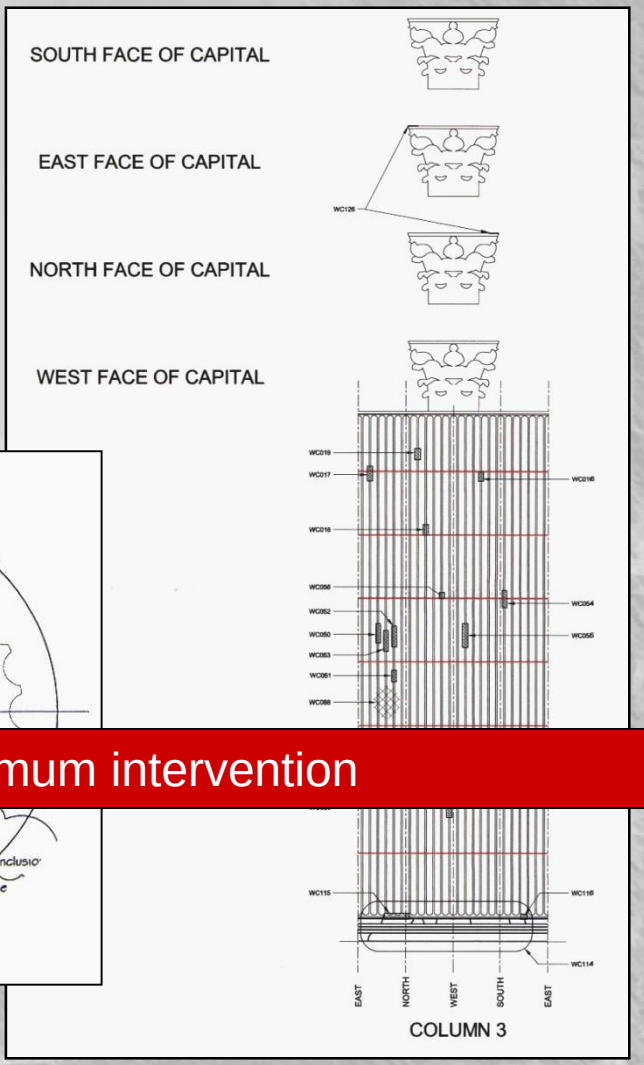
Chain saw to cut slots across fracture line

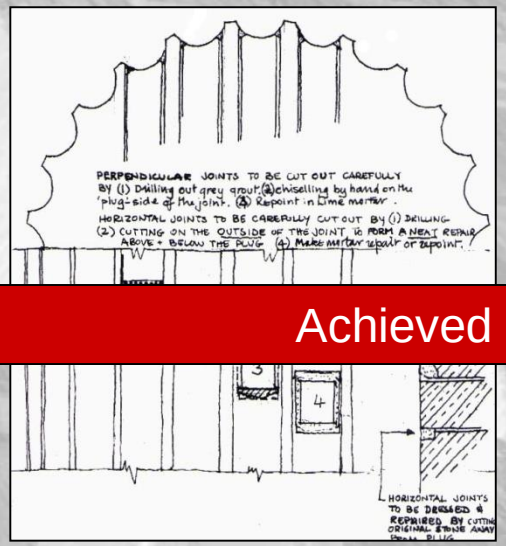
150-600mm deep slots

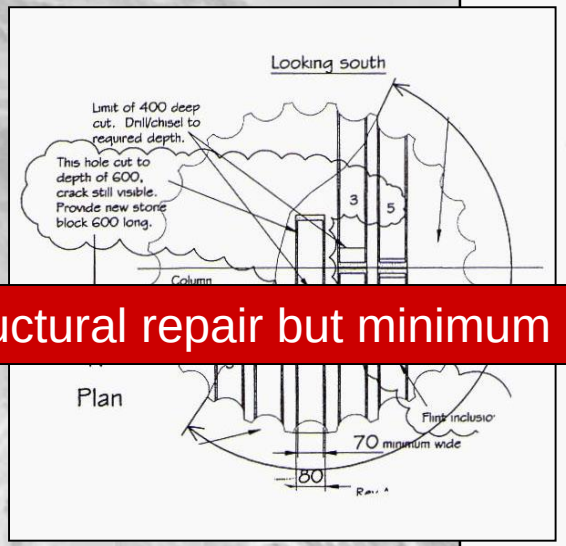
Proprietary grout fixing for new indents

Fix new Portland stone indent

After setting - mason working to flute profile







Achieved structural repair but minimum intervention

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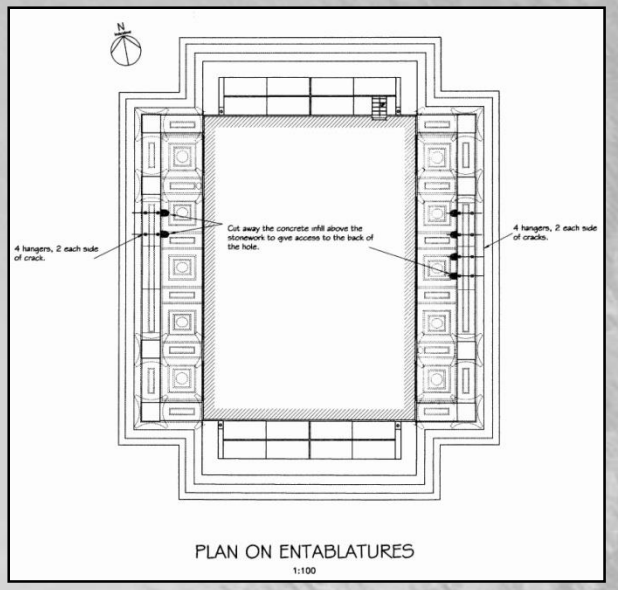
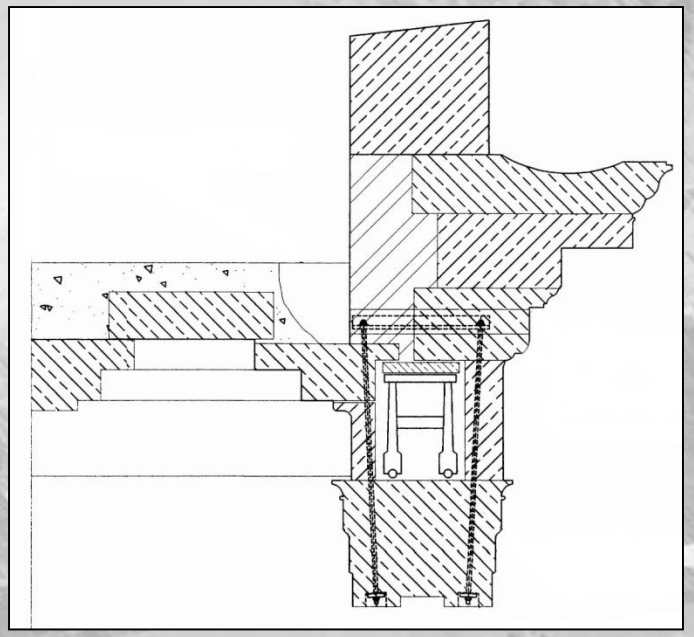
Entablature Structural Repair





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Lions Mask Research

Best original available

Modelling clay enhancement

English Heritage Artist

STONEWEST LTD

Recarving Lions Masks

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Conservation/Restoration

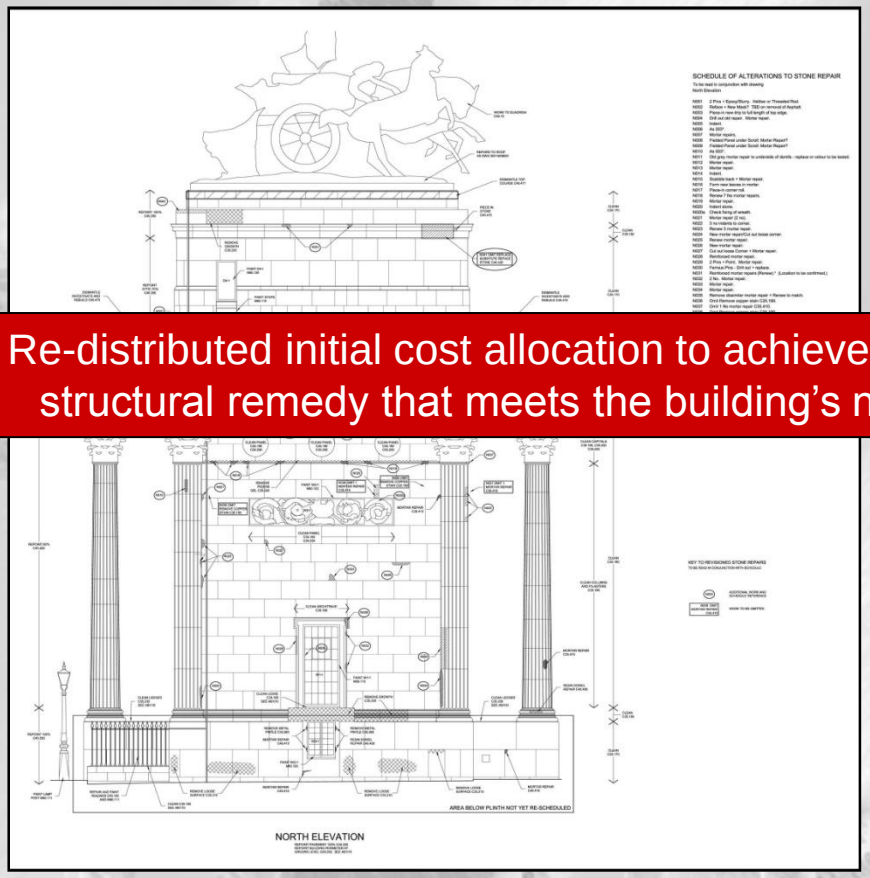
Re-carving capital

- 1.25 tonnes
- Selection problems - 4th block accepted by the carver
- 8 weeks to source
- 8 weeks to carve it
- Don’t forget the pomegranate!

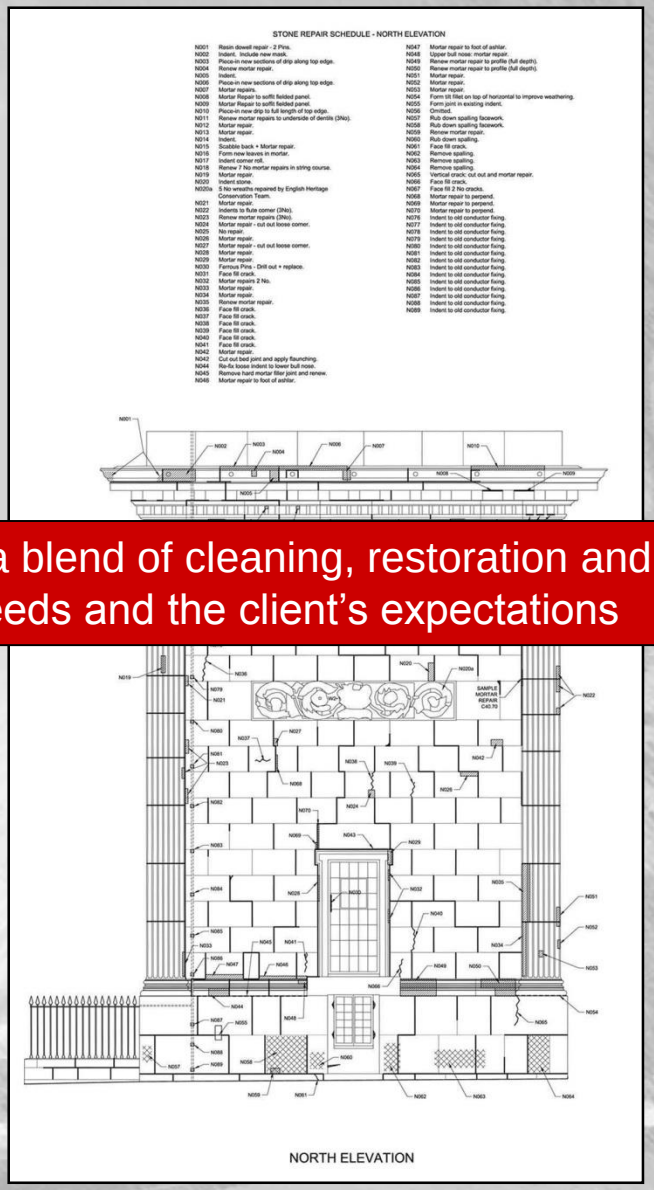
Stonewest Ltd

Repair Schedules

At Tender



As Built



Re-distributed initial cost allocation to achieve a blend of cleaning, restoration and structural remedy that meets the building's needs and the client's expectations

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Repointing

- Very narrow joints
- Varying widths
- Spalls from previous building
- Bastard Joints
- Hard cementitious grout
- Specification called for hack
- Stonewest angle grinder demonstration
- Concluded to use angle grinder for bed joints and middle of perpends. Hacksaw to finish each end.
- 3 Parts Stonewest sieved Portland mix; 1 Parts St Astier NHL3 lime

Achieved 25 mm depth and no damage

The People

STONEWEST LTD

Achievements

Cleaning	Sensitive combination of traditional and modern methods
Pointing	Achieved 25 mm depth and no damage
Carving	Discrete restoration of embellishments
Structural	Achieved structural repair but minimum intervention
Scheduling cleaning, and	Re-distributed initial cost allocation to achieve a blend of restoration and structural remedy that meets the building's needs the client's expectations

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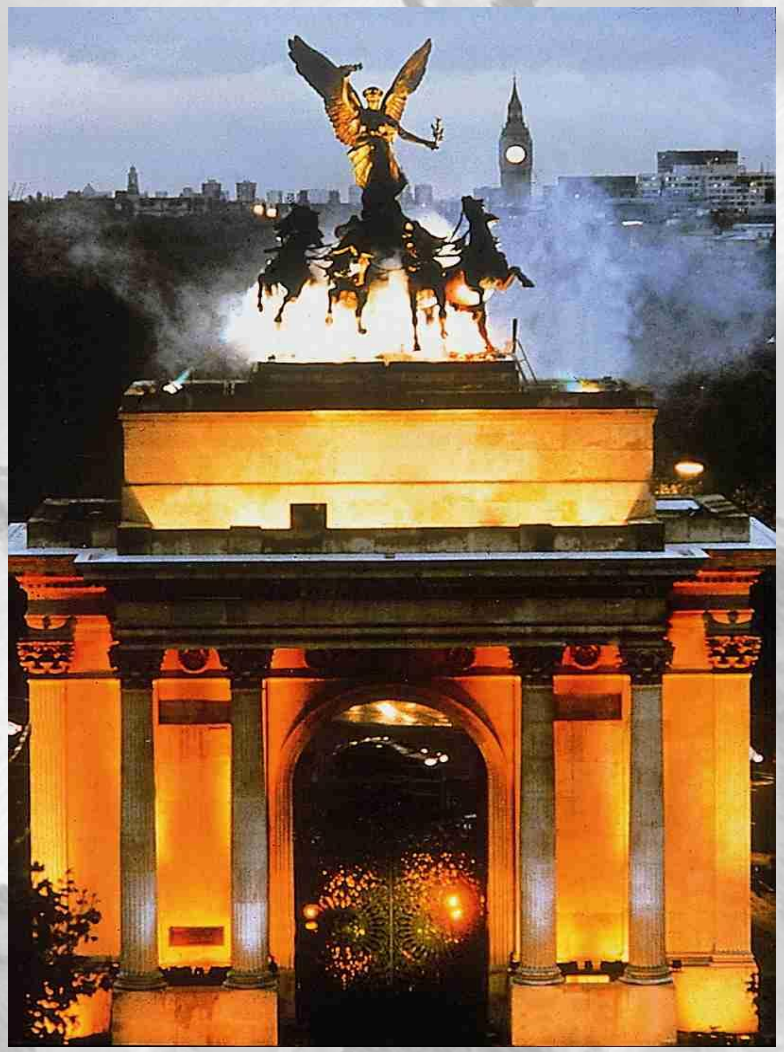

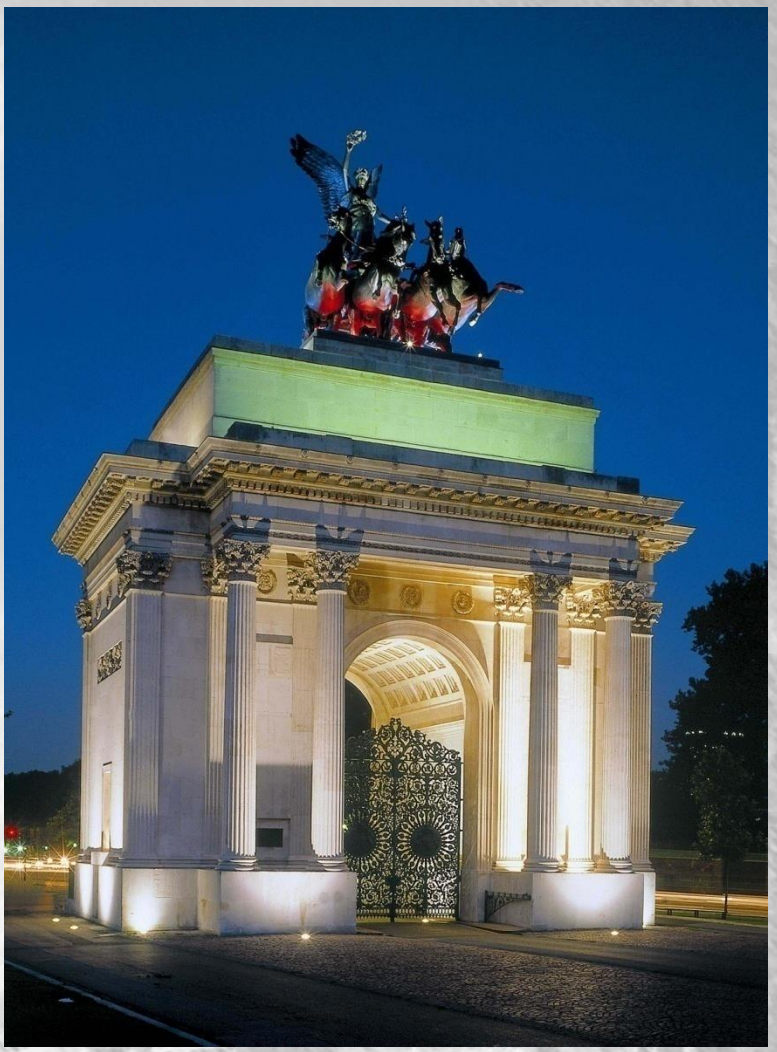

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We did the hat trick!

STONEWEST LTD

St Paul's Cathedral South Churchyard & Portico Steps

Client:
Dean & Chapter St Paul's Cathedral

Architect:
Purcell Miller Tritton LLP
incorporating Martin Stancliffe

Quantity Surveyor:
Bare Leaning Bare

Surveyor of Fabric:
Martin Stancliffe

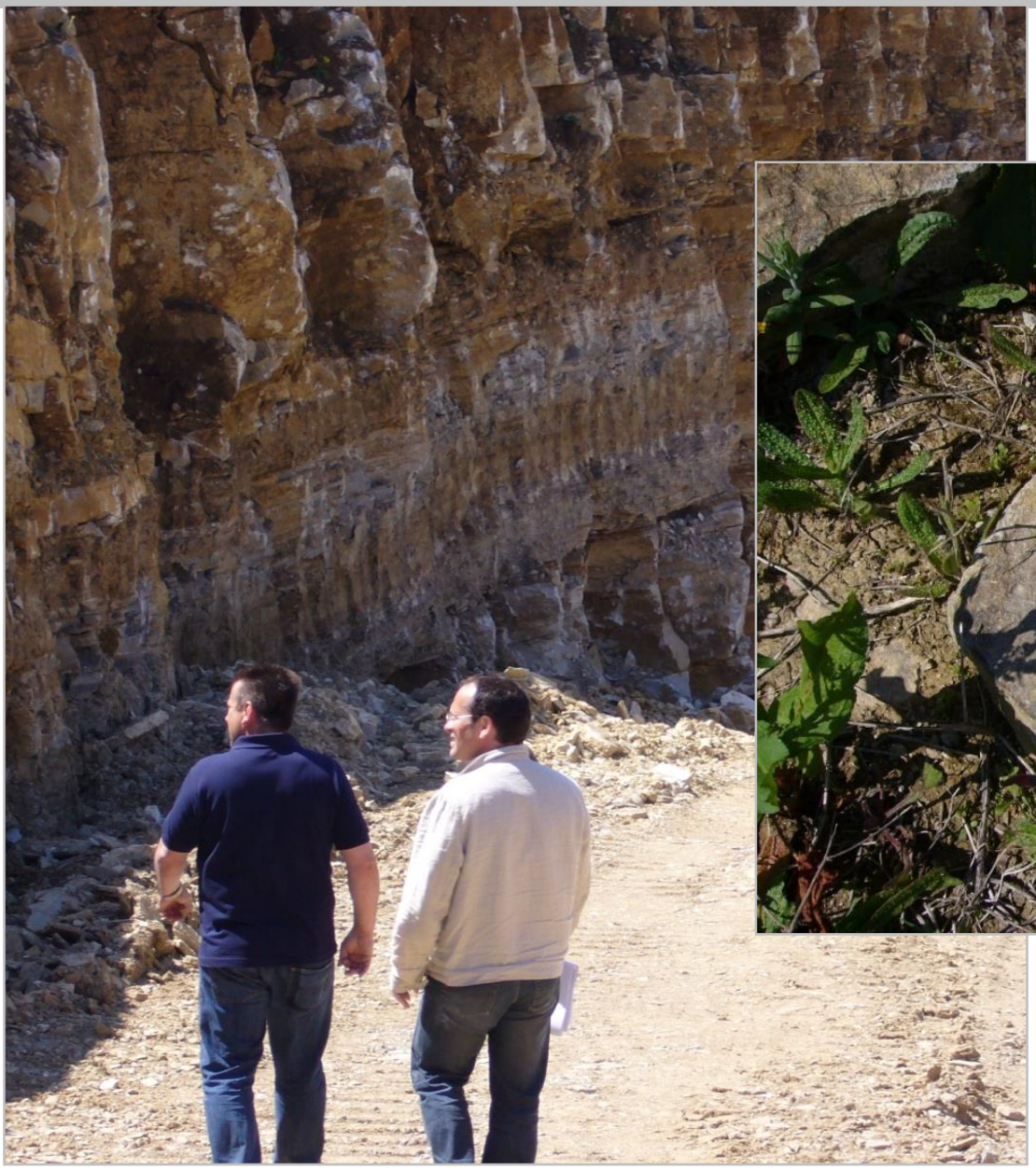
Engineer:
Alan Baxter Associates

Value: £1.1Million

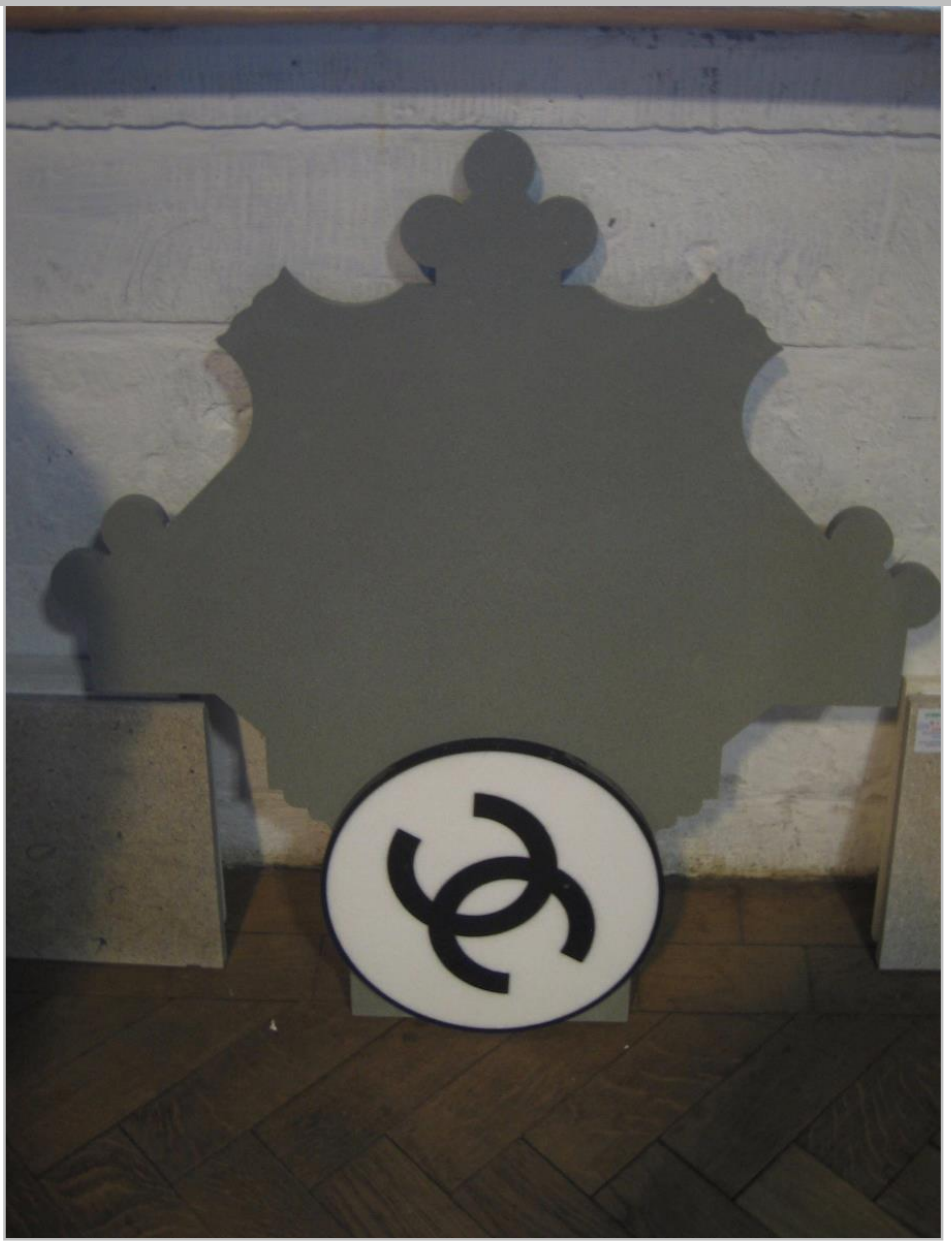
Date: 2006-2008

Description
Creation of new public space to South side of Cathedral with grassed areas, intricate inlaid paving & walls forming outline of previous Cathedral before The Great Fire of London.
A separate contract also took place to replace existing laminated South Portico Steps to provide safe access to the South side of the Cathedral.

Stone selection in Purbeck

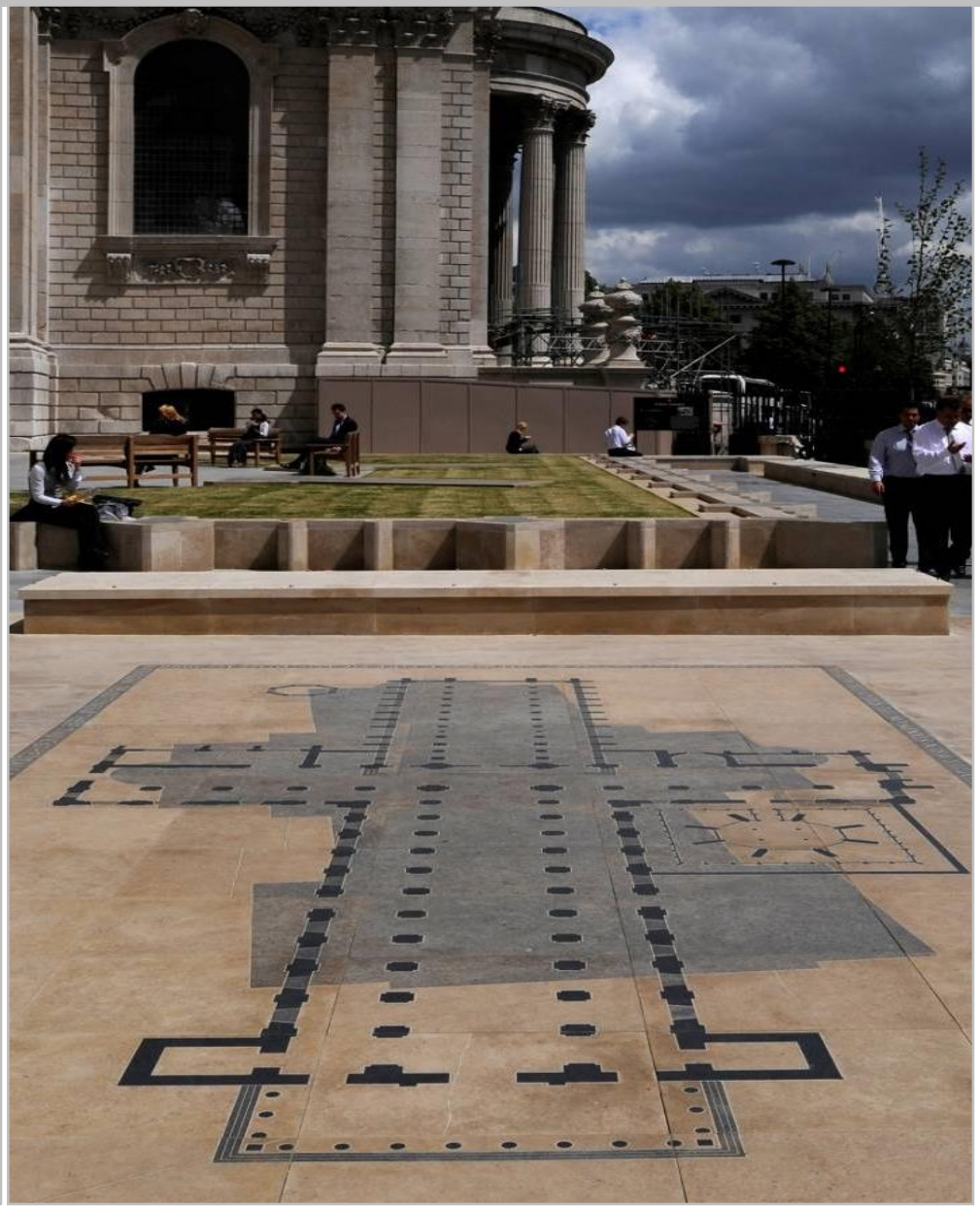


Machine and hand-worked exemplars



The transformation!

St Paul's Cathedral South Churchyard & Portico Steps

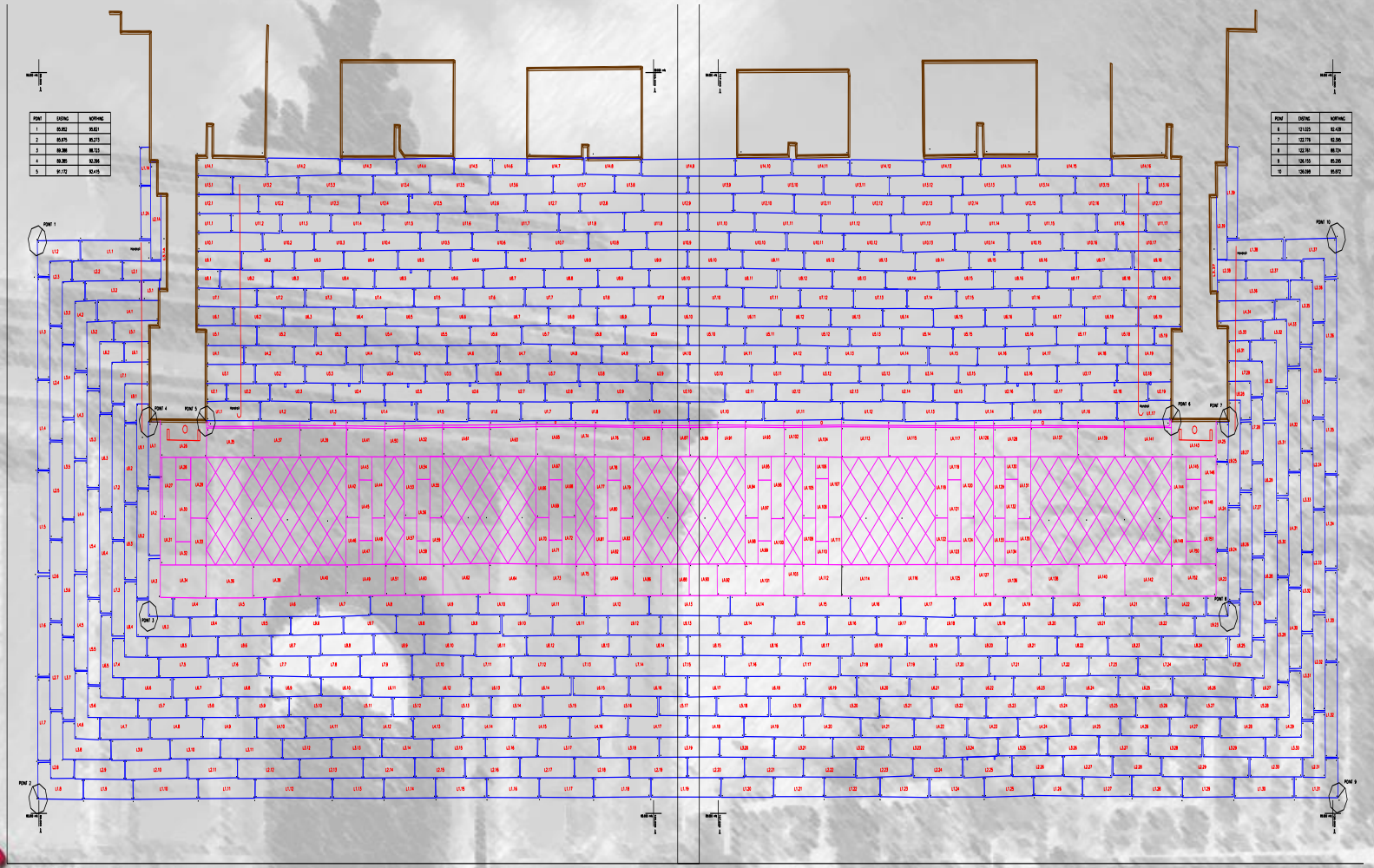


St Paul’s Cathedral South Portico Steps

St Paul’s Cathedral South Portico Steps

St Paul's Cathedral South Portico Steps

St Paul's Cathedral
West Front and Entrance Steps



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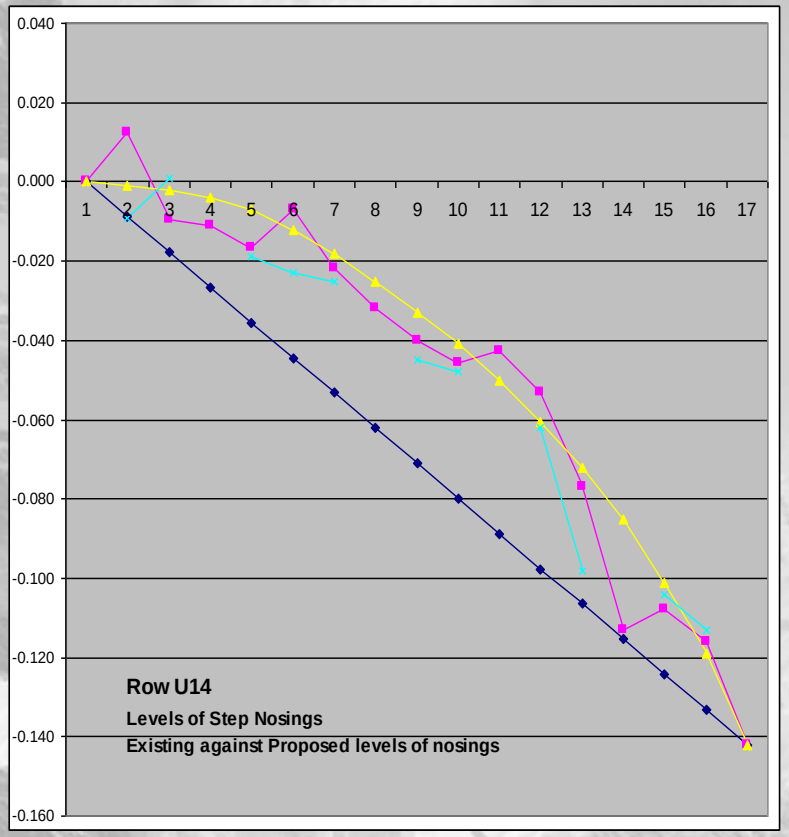
St Paul's Cathedral
West Front and Entrance Steps



Stonewest's graphic representation of the levels data

Key: Vertical axis – Vertical displacement (mts)

Horizontal axis – Stone joint number

Blue – Straight gradient between buttresses

Light Blue – Level at Cathedral entrances

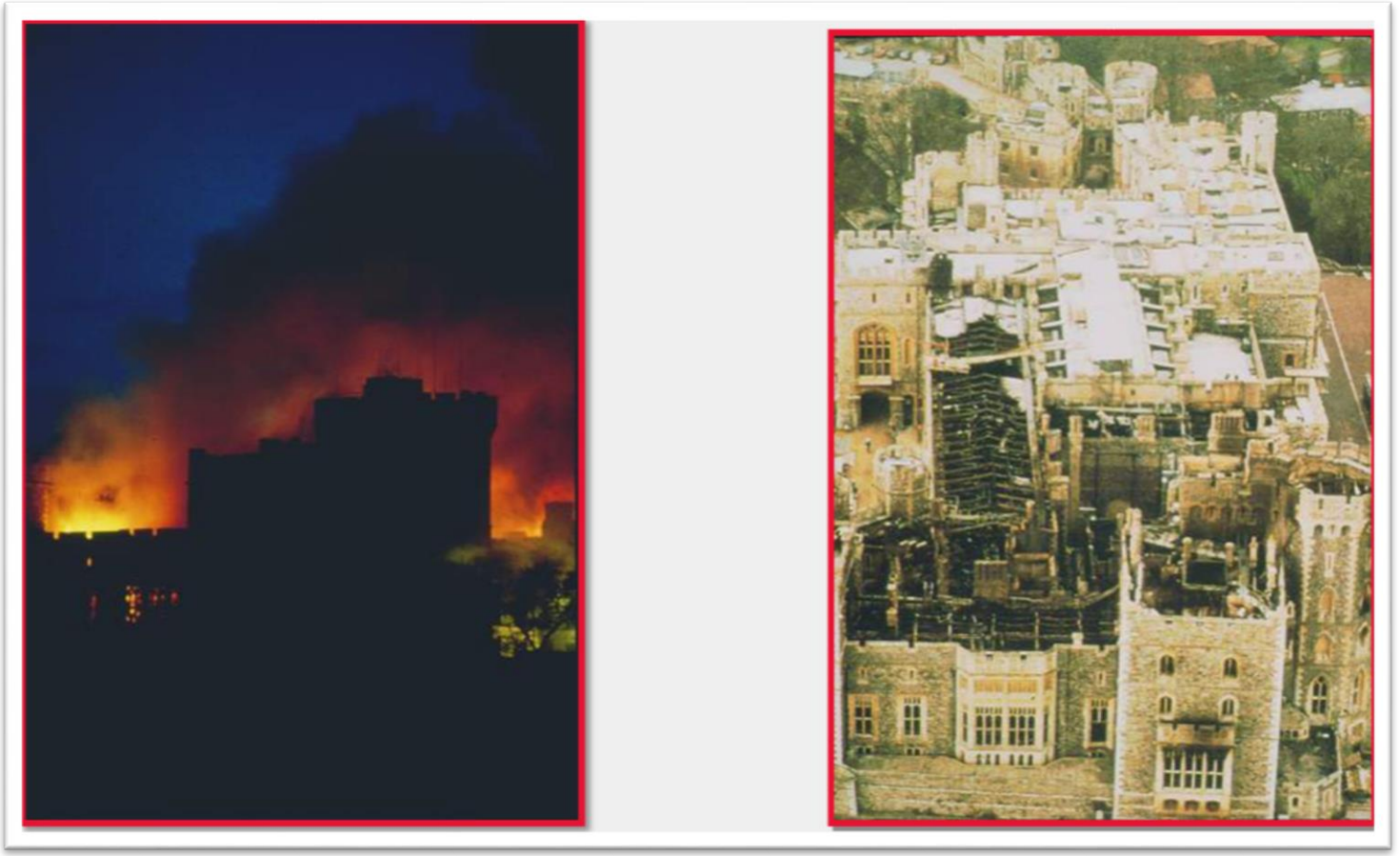
What we brought to the Project?

- **Material Procurement**
  - Timely quarrying – Purbeck bi-annual quarrying restrictions
  - Petrographic analysis
  - PR surrounding Chinese stone selection
  - Significant cost savings
- **Exemplars**
  - Water cut v hand-worked
- **Enlightened Client**
  - Embraced their knowledge, matching it with our experience
- **Supplemented the existing Cathedral workforce**
- **Award winning elements**
- **A significant contribution to their Tercentenary**

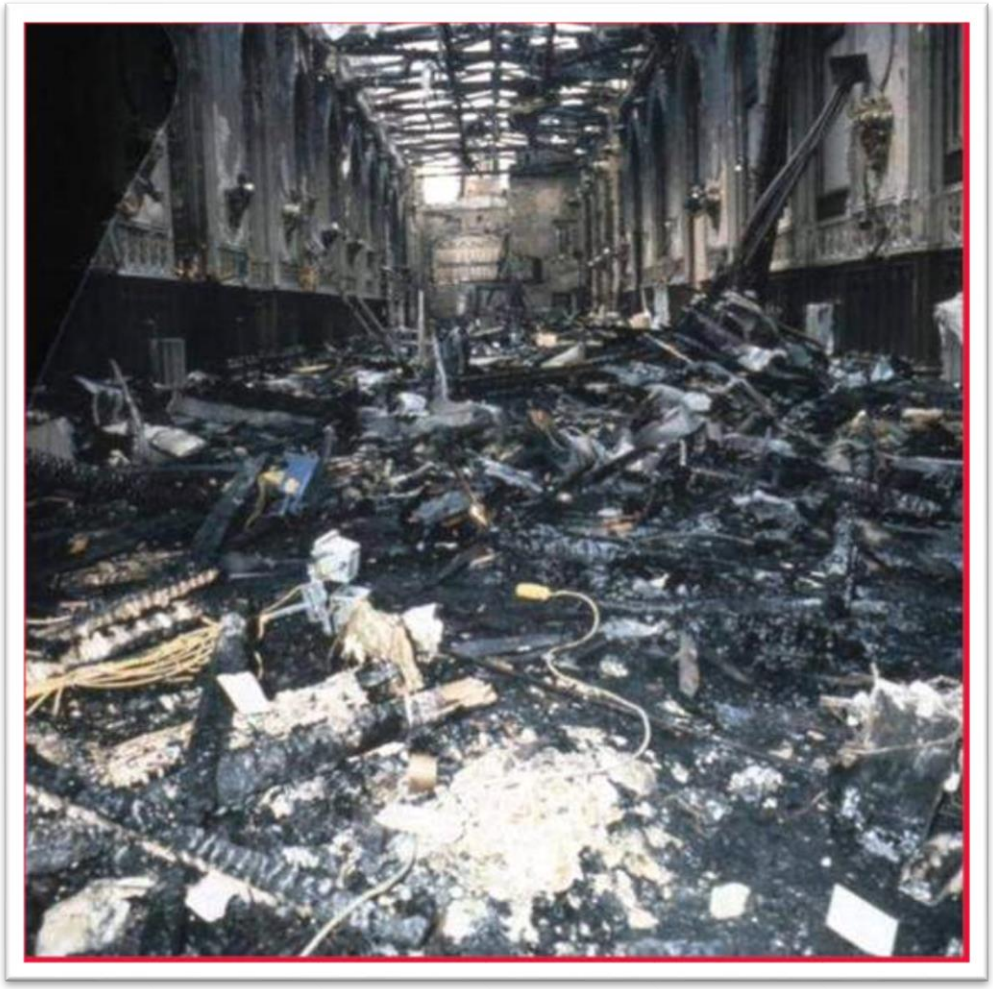
Procurement routes

- Trade Contract via Construction Manager
- Sealed bid/tender
- Domestically tendered - named list/’or similar’
- Negotiated – open book – select P Mgr/labour
- Whatever route you select there must be time to review scope/spec/prog/bgt

Windsor Castle - CM



Windsor Castle - CM



Windsor Castle - CM

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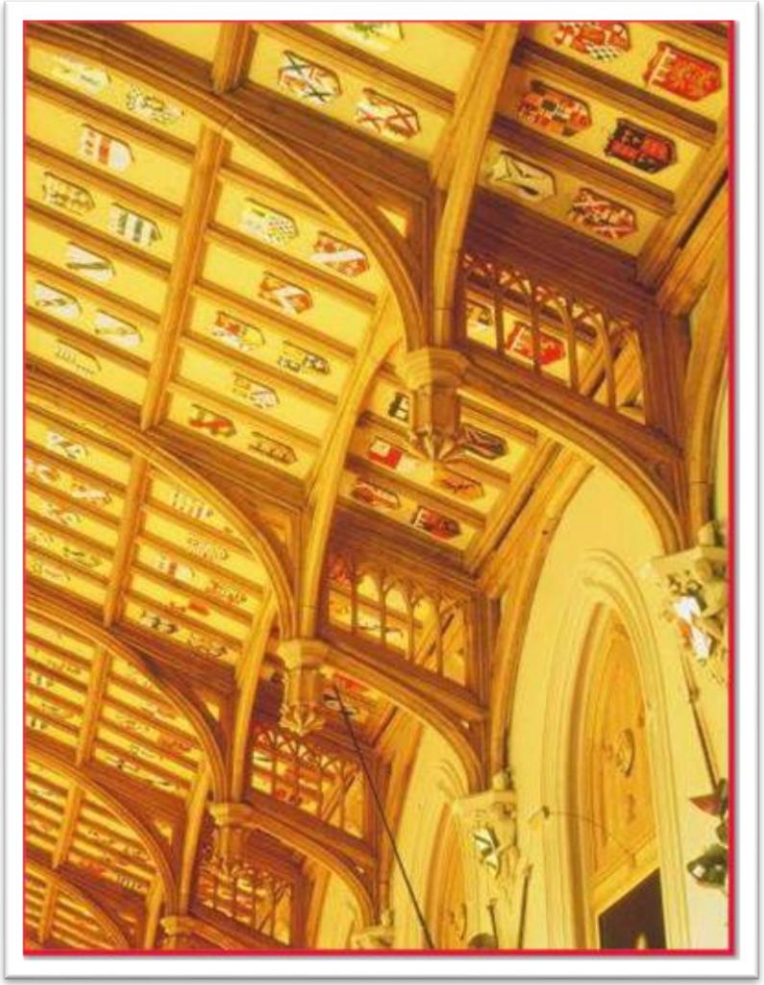


Hotel Russell – Single sourced

Hotel Russell – Single sourced

RUTG - Negotiated

Birmingham Town Hall – 2 stage

Birmingham Town Hall – 2 stage

Anglesey limestone/marble

London Business School – 2 stage

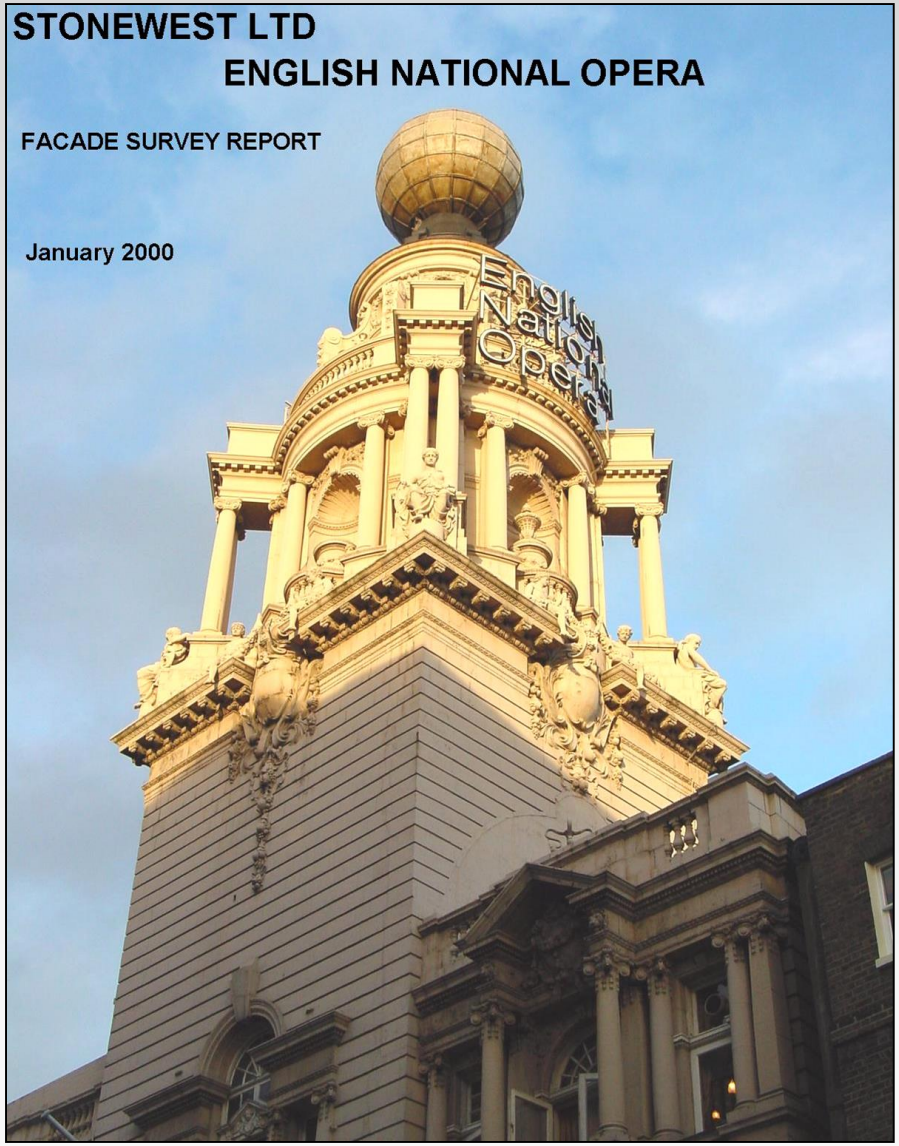
Surveying - Stonewest style

Surveying - Stonewest style

HERNE BAY - CLOCKTOWER - CONDITION SURVEY

JOB NO. TBA		R= Rotate 90' - 180'	CI = Carved Stone Indent		M:ID= Moulded Stone Indent			SC= Shelter Coat		
KEY TO WORK		RB =Take down & Re-build	MR= Lime Mortar Repair		RR= Rake & Repoint	DF-De frass (Tool off)		MB:ID= Moulded Brick Ind		
		DC= Doff Clean JC= Joss Clean	ID = Stone Indent		RF = Remove Fixings	PR= SS Pin & Resin Repair		B:ID= Brick Indent		
	CONDITION RATING:	R = REQUIRED (1-2YRS)	P= PREFERED (2-5YRS)	F = FUTURE: (5-10YRS)				HMR= Hard/Cement Mortar R		
ITEM	ELEVATION	DESCRIPTION OF WORK AREA	LENGTH	DEPTH	HEIGHT	PHOTO REF	REPAIR	RATING	NO.	UNIT
1	North	Open joints to dome	6Lm	25		1	RR	R	6	Lm
2	North	Doff clean to dome	2m2			2	Doff	R	2	m2
3	North	Ferrous fixings old cable light fittings (all sides)				3	Remove and re-point	P	40	no.
4	North	Previous ID loss of face open joints - MR	250	20	130	4	MR	P	1	no.
5	North	Open joints to cupola	5Lm	25		5	RR	R	5	Lm
6	North	Doff lichen to cupola pediment sky surface (all sides including faces)				6	Doff	P	20	m2
7	North	Remove cement based non-permable render/ re-render NHL internally to cupola	8m2	30		7	Remove and re-render	R	8	m2
8	North	Remove lead covering and flashing internally to cuploa - Replace including flashings (inc. provision new lead cover to hatch)	7m2			8	New lead coverings & Flashings and re-point in mastic and hatch cover in Lead (code 7+)	R	7	m2
9	North	Allow provisional sum to clean and maintain in weathering (possible new collar required)				9	Clean and maintain weather (new collar)	P	#####	
10	North	Ferrous fixings old cable light fittings (all sides)				10	Remove and re-point	R	30	no.
11	North	Doff to face around clock and plinth and cornice sky surface	15m2			11	Doff	R	15	m2
12	North	Remove previously repaired stone above clockface - spalling and corrosion. Re-fix c/w ss fixings including ID's 4 no. (200 x 50 x 200 = LBH)				12	Remove and re-fix & ID's 4 no. (200 x 50 x 200 = LBH)	R	1	item
13	North	Spalling stones (corrosion cramps related)	200	150	250	13	M:ID	R	1	no.
14	North	Open joints to area of clock	3Lm			14	RR	R	3	Lm
15	North	Clockface corroded and damaging stonework. Remove and treat to clean and re-paint metal sheild or similar. Re-fix and re-point in suitable mastic. (all sides) Allow provisional sum for associated glazing repairs - new glass (prov) : £350.00	1500		1500	15	Face corroded - remove, treat/ paint/ refix and re-point all sides (c/w SS or non ferrous fixings). Allow provisional sum for associated glazing repairs - new glass (prov) : £350.00	R	4	no.
16	North	Loose/ friable stone surface - tool off gently	0.25m2			16	DF-De frass (Tool off)	P	0.25	m2
17	North	Heavy algal growth to cornice and frieze (all sides including sky surface to capitals)	36m2			17	Doff (all elevations)	P	36	m2
18	North	Investigate large joint between x 4no. Columns. Evidence of ferrous shims packing to joint. Rake out/ remove/ replace and re-point, see engineer	16Lm	30	30		Removal and replacement (treat?) make good x 4no. Columns	Prov	#####	
19	North	Opening to column stone	300	10		19	RR 0.3lm & PR	P	1	no.
20	North	Evidence of corrosiion of dog cramp blown corner to stone to circular drum	150	100	150	20	Open up/ remove ferrous cramp/ replace with S/S fixing and indent (M:ID)	R	2	no.
21	North	Open joints to drum	3500	20		21	RR	R	3.5	Lm

The London Coliseum 2000-2004

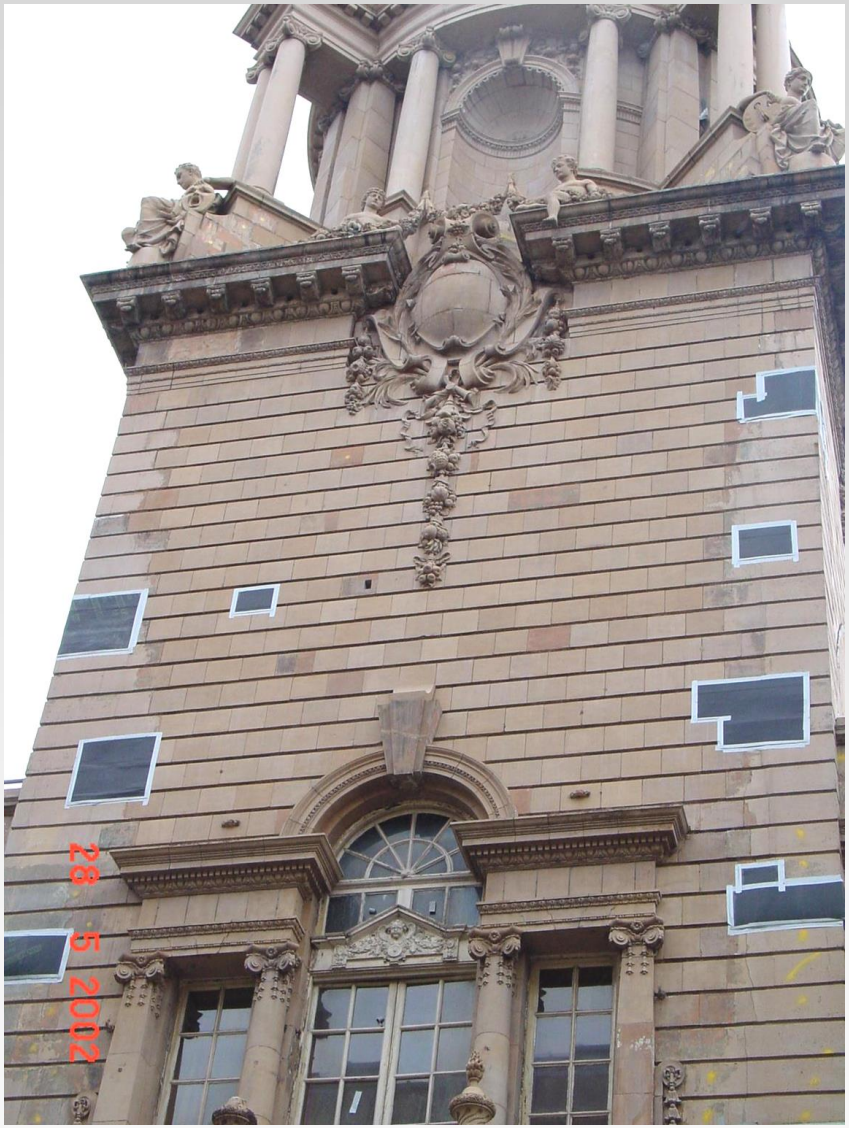


Problem Areas

- Structural steel corrosion
- Terracotta fracturing
- Replacement of terracotta with concrete & GRP
- Previously painted
- Missing details e.g. Statuary

Stonewest Ltd initially carried out a façade survey: appointed by Arts Team (RHWL) to assist in securing HLF funding

The London Coliseum – The Survey



- Erected scaffolding
- Detailed visual inspection
- Trial inspection works
- Paint stripping
- Detailed condition survey

The London Coliseum – The Report

Terracotta Manufacturing Process

1. Drawing of façade
2. Individual shop drawings for block
3. Model made (8-12% oversize to allow for shrinkage)
4. Mould cast off model
5. Clay, grog (old terracotta) and colourant mixed and ground dry
6. Water added together with de-flocculent (decreases viscosity and water-content)
7. Clay injected into mould
8. After resting, mould removed and block “finished” (combing, delicate detailing etc.)
9. Block dried (1-6 weeks depending on size)
10. Block fired in kiln

Terracotta Records – cont.

As shop drawings made (prior to manufacture) each block type was assigned a ‘stamp number’

983
Project number (London Coliseum)

P5
Phase number (refers to area of building)

3
Block type within Phase

This block’s reference:

P5/03

Stamp numbers were used to trace the progress of the block manufacture (more manageable than course-block IDs: many units repeat)

London Coliseum – Terracotta Records

Initially, building surveyed and terracotta condition recorded and referenced with course letter and block numbers

Area	Block No.		Stamp	Block Description	Takedown	Condition			Bill ref		Rate				Complete	Value
	Course	Block	No.		survey date	renew	remove & refix	repair	SWL	SoD	renew	remove & refix	repair	storage	%	
Pediment Balcony	S	1		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	2		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	3		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	4		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	5		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	6		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	7		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	8		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	9		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	10		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	11		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	12		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	13		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	14		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	15		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	16		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	17		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	18		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83
Pediment Balcony	S	19		blocking course	21-Oct-02	1	1		1/C/10/C	C/1/3/A/2	124	41.83				£ 165.83

Block types matched to items in bill and drawings marked up accordingly: these items sent to Shaws of Darwen for production

Statuary - continued

- Wax maquette of lion figure sculpted
- Full size model made in polystyrene and viewed from street level
- Maquette next to fixed terracotta

Statuary - continued

Lion figures formed from individual components

Assembled on site

The Completed Upper Tower

Training – Our People

- Directly employed staff – length of service
- Construction Apprenticeship Schemes 6no. 2009 -2010
- Training Centre
- NVQ’s
- CPD for staff
- PDR’s for all
- Group Seminars
- Consultants

Practical qualifications

Stone Federation:

Facade Preservation NVQ Level 2 (for Restorers and Cleaners)

Stonefixer NVQ Level 2

Occupational Work Supervisor NVQ Level 3

Construction Manager NVQ Level 6

Building Crafts College:

Stonemasonry NVQ Levels 2 & 3

Cowdray Ruins
The Problem

Cowdray Ruins
Conduit House

Cowdray Ruins
Access Walkways

Cowdray Ruins and bridge

Cowdray Ruins
Scaffold Comparisons

COWDRAY RUINS
Scaffolding comparisons

Area			Scaffolder A Quote	Scaffolder A To include	Scaffolder B Quote	Scaffolder B To include	Scaffolder C Quote	Scaffolder C To include
1	Internal North tower		4,625.00	4,625.00	2,950.00	2,950.00	4,032.00	4,032.00
	North Hall South of Tower		2,686.00	2,686.00	1,456.00	1,456.00	2,400.00	2,400.00
	Single lift to Cellar		597.00	597.00	448.00	448.00	885.00	885.00
	Chapel & North wall		17,722.00	17,722.00	9,000.00	9,000.00	13,606.00	13,606.00
	West façade		20,848.00	20,848.00	14,119.00	14,119.00	19,320.00	19,320.00
	External Tudor kitchen		17,975.00		10,080.00	-7,895.00	12,545.00	-5,430.00
	Birdcage Internal tower to Buttery		864.00	864.00	431.00	431.00	800.00	800.00
	East wing		45,217.00	45,217.00	29,448.00	29,448.00	37,304.00	37,304.00
	E O Debris netting		7,296.00		2,400.00		9,197.00	
	E O Monarflex		14,580.00	14,580.00	6,200.00	6,200.00	11,375.00	11,375.00
	Engineer's fees			0.00		0.00	2,000.00	2,000.00
	Tudor kitchen temp roof (Bill item)		11,806.00		11,795.00	-11.00	13,500.00	1,694.00
	Internal Tudor kitchen crash deck (Bill item)		2,910.00	2,910.00	3,532.00	3,532.00	2,200.00	2,200.00
	Rubbish Chute		1,146.00	1,146.00	1,411.00	1,411.00	1,528.00	1,528.00
1a	Gatehouse walls		13,781.00	13,781.00	8,424.00	8,424.00	11,170.00	11,170.00
	Internal turrets to gatehouse		3,113.00	3,113.00	1,545.00	1,545.00	805.00	805.00
	Walkway to compound		513.00	513.00	480.00	480.00	910.00	910.00
	E O Debris netting		1,027.00		993.00		1,560.00	
	E O Monarflex		2,001.00	2,001.00	1,563.00	1,563.00	1,690.00	1,690.00
2	Conduit house		5,919.00	5,919.00	3,072.00	3,072.00	4,160.00	4,160.00
	Heras fencing Conduit House		1,021.00	1,021.00	182.00	182.00	324.00	324.00
	Temporary roof		6,349.00	6,349.00	8,330.00	8,330.00	6,615.00	6,615.00
3	Stable block		3,852.00	3,852.00	2,112.00	2,112.00	2,810.00	2,810.00
4	Rother Bridge		3,551.00	3,551.00	1,584.00	1,584.00	2,000.00	2,000.00
	Causeway bridge		3,551.00	3,551.00	1,584.00	1,584.00	2,000.00	2,000.00
Hoists	Elephant - Gatehouse		2,984.00	2,984.00	2,984.00	2,984.00	3,400.00	3,400.00
	Elephant - Tudor kitchen (Bill item)		2,984.00		2,984.00	0.00	3,400.00	416.00
	Elephant - North wing		2,984.00	2,984.00	2,984.00	2,984.00	3,400.00	3,400.00
Other	Heras fencing		2,825.00		532.00	532.00	1,930.00	1,930.00
	Weekly inspections	53 153.00	8,109.00	8,109.00	85.00	4,505.00		incl
				168,923.00		100,970.00		133,344.00
	Adaptions							
			£204,513.00	£168,923.00	£129,315.00	£100,970.00	£166,109.00	£133,344.00

Castle Drogo

Castle Drogo
Scaffold Comparisons

Trade	**Scaffolding**		Sub Contractors quotes to compare			
Page	Item	Description	**Scaffolder A**	**Scaffolder B**	**Scaffolder C**	**Scaffolder D**
		Material Walkway (4 lifts)	£2,343.00	£3,120.00		Incl
		Roof Access Scaffold	£24,180.00	£52,000.00	Due Wed!!	£42,102.00
		Temp Roof Cover	£66,237.00	Incl		
		Stone Cutting Enclosure	£2,341.00	£1,080.00		£400.00
		Access Scaffold Belfry	£2,006.00	£1,005.00		£600.00
		Birdcage to Belfry	£1,162.00	£682.00		£600.00
		Hoist & LadderTower	£837.00	£805.00		£500.00
		Sheeting				£2,100.00
		Design (provisional)				£4,000.00
	Extra costs	Gutters/downpipes/flashing	£750.00	£750.00		£750.00
		earthing	£450.00	£450.00		£450.00
		maintenance 26wks	£2,600.00	£2,600.00		£2,600.00
		Total for comparison	**£102,906.00**	**£62,492.00**	**£0.00**	**£54,102.00**

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over the last 9 years


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South Entrance


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MARGARET THATCHER
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FIFTH FLOOR


Fire exit


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284

Numerous Awards for Health & Safety on site


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Environmental targets to halve landfill waste


STONEWEST

Yangon Heritage Preservation & Economic Development Sept'18

Principal & Specialist Contractors in Restoration,
Conservation & New Build Masonry

Principal & Specialist Contractors in Restoration,
Conservation & New Build Masonry

Stonewest

“A well known Department Store”

I hope I have made some suggestions as to how to avoid this...

St Pancras Station Re-Development

Client:
Union Railway (North Limited)

Project Manager:
Rail Link Engineering (RLE)

Structural Engineers:
Ove Arup & Partners

Heritage Consultant:
Ingram Consultancy

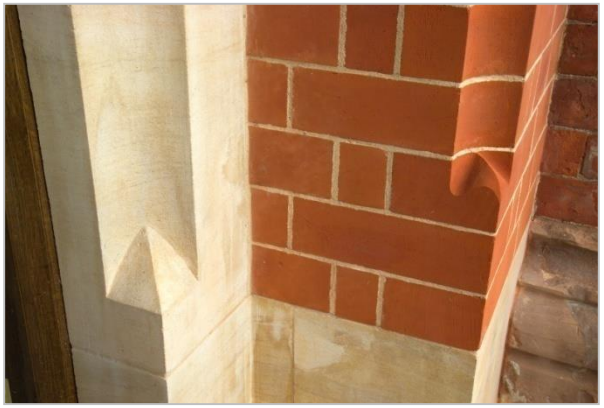
Value: £7Million

Date: 2005-2007

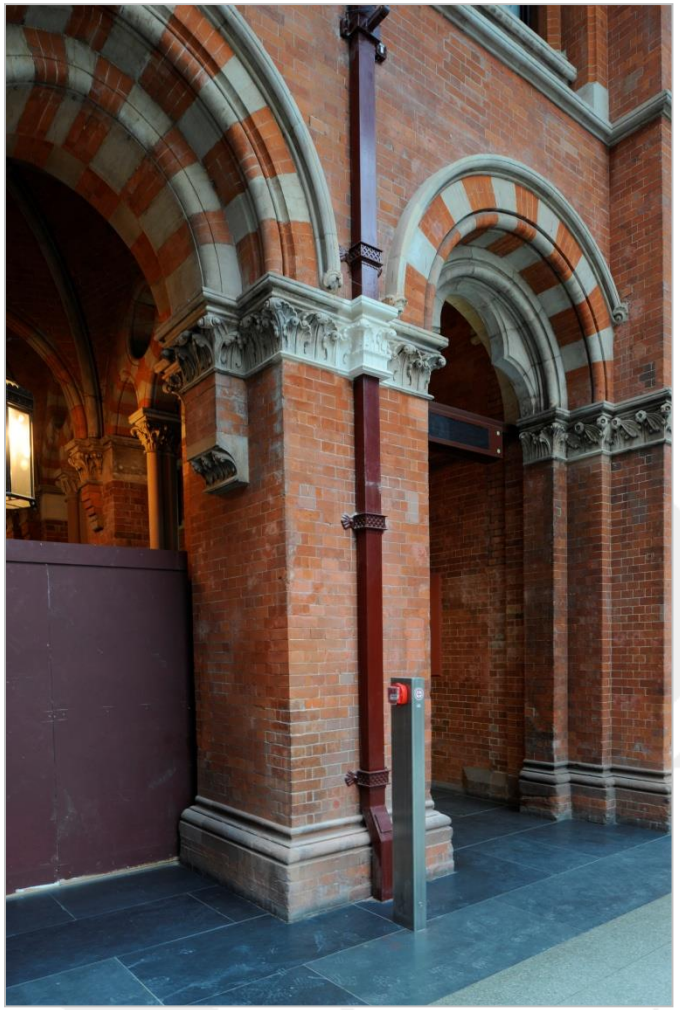
Description

The project involved the refurbishment of the Grade 1 Listed St Pancras Station buildings to facilitate Channel Tunnel Rail Link providing a high speed rail link between St Pancras Station and the Channel Tunnel portal near Folkestone in Kent.

St Pancras Station Re-Development



St Pancras International – South Wall



Kings Cross, Eastern Range

Client:
Network Rail

Architect:
John McAslan & Partners

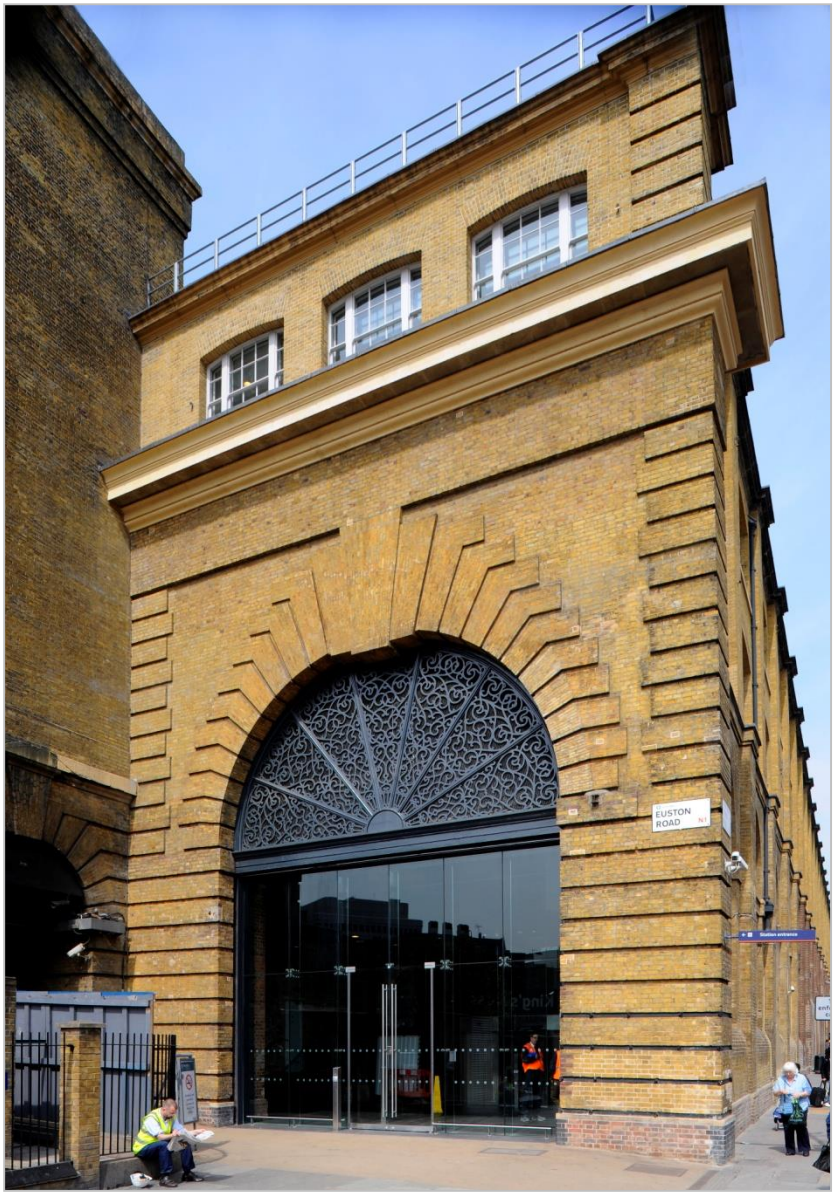
Value: £1.4Million

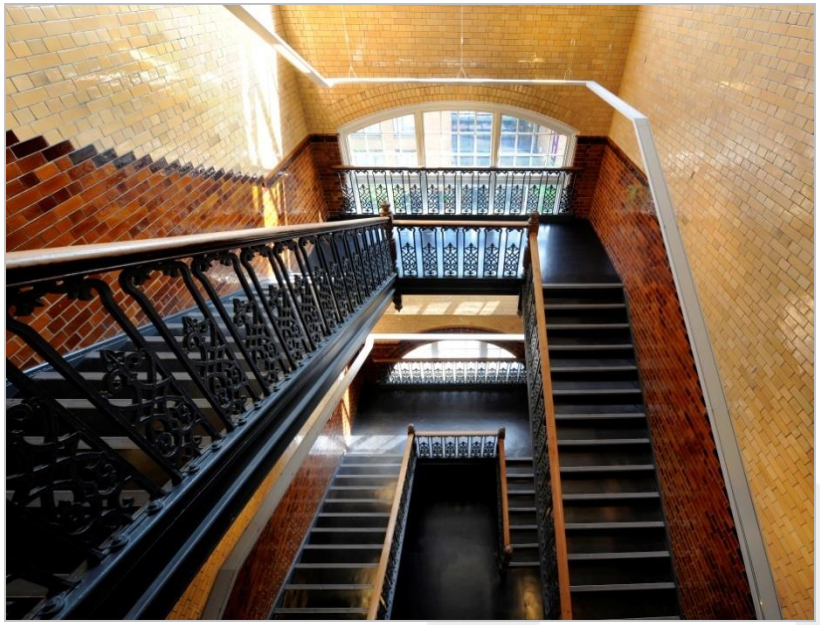
Date: 2007-2009

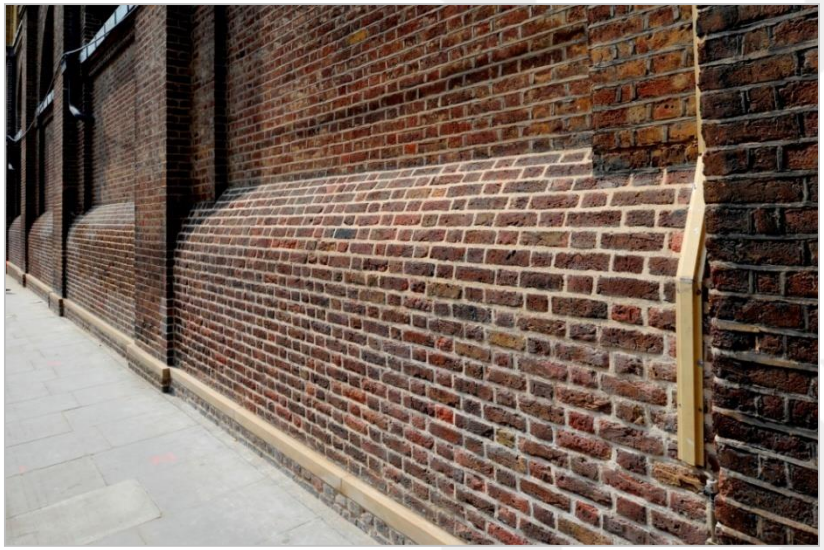
Description

The Eastern Range project is the first phase of a major refurbishment of Kings Cross Station, this includes the cleaning and repairs to the listed brick facades and the replacement of Crosland Hill Hard York stone sills and Blaxter Sandstone plinths. Exemplar cleaning and repair trials established the scope and specification for the project.

King’s Cross, Eastern Range







General Principles of Heritage Work

- Restoration or Conservation?
- Often the two are confused.
- How is it defined?
- How does our knowledge assist the client, architect from the early stages?
- Experience matters…..
- Knowledge of approaches paramount.
- Budget implications very important also.

Restoration or Conservation (or both?)

Restoration

- Replacement and or repair with traditional materials to match existing as closely as possible.
- Traditional techniques and knowledge required
- Reversion to original designs and original materials even if later repairs or changes carried out during life of building.
- Employment of new materials or salvaged.
- “Former Glory”….

Conservation

- Least invasive approach
- Retain as much original material as possible.
- All work done is reversible or at a minimum non damaging to historic fabric.
- Preserve previous work even where not original or historically in keeping.
- Holding strategies, sustain as found.
- Removal of potentially damaging material only.

Works at Kings Cross Include:

- Surveys – Drawings and Schedules of work
- Cleaning brick and stonework
- Brickwork replacement (using salvaged only)
- Brickwork restoration (traditional materials only)
- Pointing (Tuck, Recessed)
- Lime Mortar Mixes (designed for purpose: bespoke)

  (Naturally Moderately Hydraulic 3.5)
- Stucco Repair (Original Roman Cement) Natural Cement based. Now using Vicat “Prompt” cement mortar.
- New Build …….work in progress…

Surveys

- All elevations precisely surveyed by Stonewest, broad scope of repairs, Stonewest complete the survey and submit to main contractor.

- Once all schedules are issued we confirm we shall continue work within a set time period or await further instruction to continue. As programme and project dictates.

- The importance of carrying out schedules in good time is to highlight any considerable financial or logistical impact at the earliest stage in the programme.

- Only trained and experienced managers and operatives will be able to thoroughly survey a historic façade. Knowing the issues and understanding the building fabric and where there is cause for concern or not.

Working Schedules

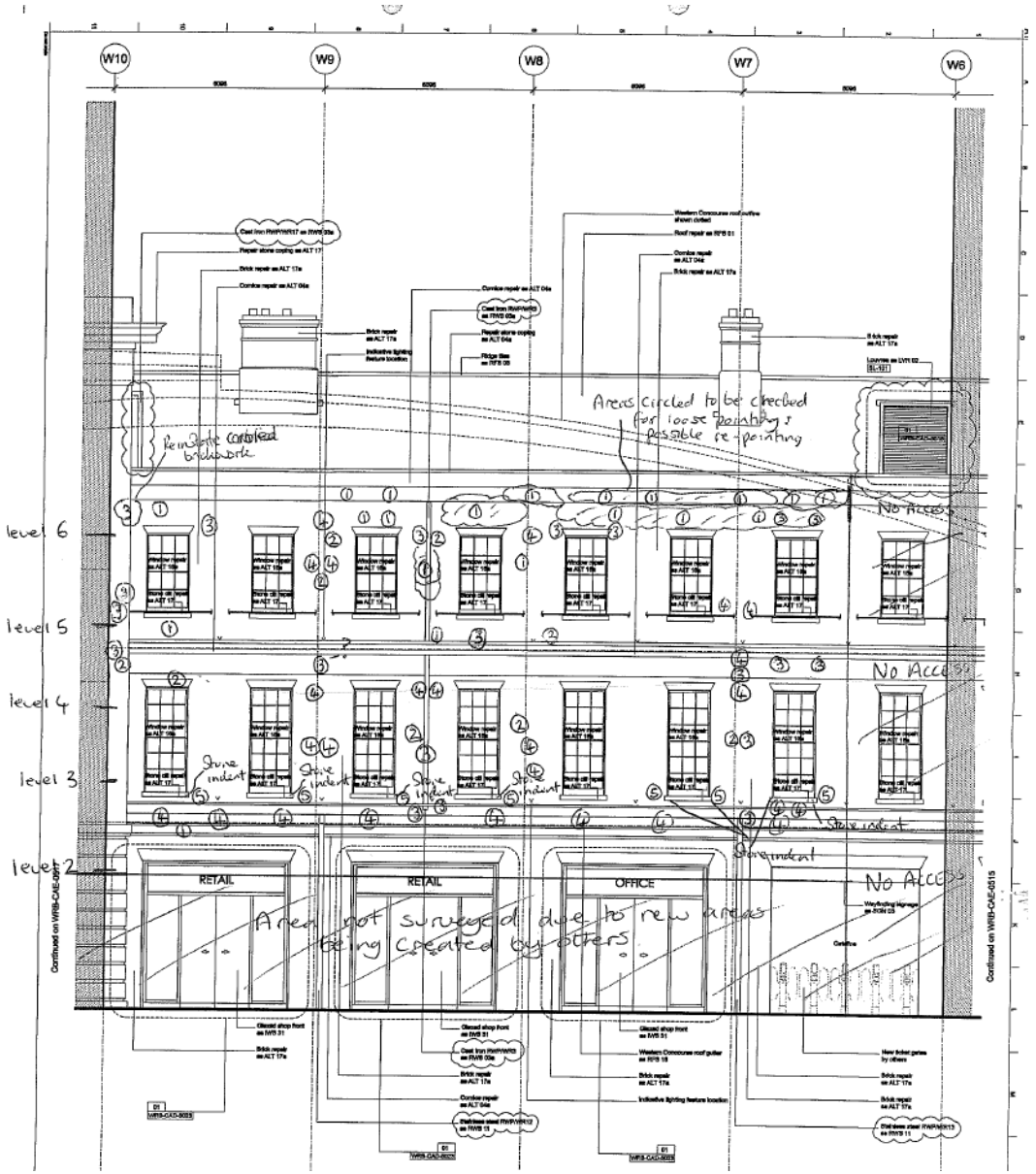
King's Cross Western Range Package 6 - 56346

Survey

Stonewest

	Dimension					Location			
Item	H	L	W	Description	No.	Elevation	Grid line	Level	Repair Type
				Grid Line 8 to 7					
1				Repoint brickwork above windows		Western Façade	8 to 7	6	Ref 1
2				Replace bricks on left and right of arch springer		Western Façade	8	6	Ref 3
3				Replace bricks above window		Western Façade	7	6	Ref 3
4				Mortar repair		Western Façade	7	6	Ref 2
5				Replace brick above cornice		Western Façade	8	5	Ref 3
6				Remove fixings		Western Façade	7	4	Ref 4
7				Replace bricks		Western Façade	7	4	Ref 3
8				Replace bricks above window		Western Façade	7	4	Ref 3
9				Mortar repair between window		Western Façade	7	3	Ref 2
10				Replace brick between windows		Western Façade	7	3	Ref 3
11				Store indents to left and right corners of cill		Western Façade	8 to 7	2	Ref 5
12				Store indents to left and right corners of cill		Western Façade	7 to 6	2	Ref 5
13				Remove fixings below and along corbel		Western Façade	8 to 7	2	Ref 4
14				Replace brick on corbel		Western Façade	7	2	Ref 3
						Western Façade			
				Grid Line 9 to 8		Western Façade			
						Western Façade			

Working Survey Drawings



Exemplar Facade Cleaning

- Jos Torque Vortex (Pressure, Water, Soft Aggregate Stone Cleaning) Calcium Carbonate
- Doff System (Steam Clean: Versatile pressure and temperature, cleaning brick work and stonework)
- Hodge Clemco (Versatile pressure, heavy aggregate cleaning brick work, stonework, metal work) Olivine
- Poultice Application (Natural and chemical, clay or latex based cleaning, stonework,)
- Traditional Nebulous Water
- Neutral Non-Ionic Soap
- Dry Abrasive
- Ammonium carbonate Poultice
- Copper Stains
- Iron Stains
- Sulphate Skin
- Organic Growth
- Pigeon Droppings
- Pigeon Gel Removal Water & nylon bristle brushes
- Vulpex Soap
- ProSoCo/Neolith
- Masons Hand Tools
- Neolith/Cementon
- Cleaners & wooden Spatulas
- Peelaway & Eeze Stip

Method chosen for cleaning at Kings Cross

• Chosen for suitability and understanding of the Architects requirements for the overall aesthetic impact of the finished building

- Doff System (Versatile pressure, versatile temperature, cleaning brick work and stonework)
- Non-aggressive
- Minimal loss of original fabric
- Cleaning samples carried out to agree a level of clean and no more.
- Experienced cleaners required to achieve this.

Brick Repairs

- Replacement of missing arch bricks.
- Reclaimed bricks from other similar areas of the site
- All bricks re-cut and hand finished on site for accuracy.
- Skill of the mason/ brick-worker paramount a this stage.
- Experience and understanding of traditional materials absolutely necessary.

Brick Repairs

- Newly cut re-claimed bricks propped on former and bedded with Lime putty (Non hydraulic “fat Lime” high in calcium carbonate) and a fine washed silver sand.

- Re-use of existing material was a Stonewest driven solution to the Network Rail vision for keeping and re-using materials across all trades for the project.

- <u>Benefits to the Project</u>
- Environmentally friendly approach
- Minimal transport
- Minimal new production
- Sustainable
- Minimal cost

Brick Repairs

- <u>Before and After</u>
- "Gauged or rubbed" brickwork is found in many high status buildings and is a particular challenge for brick-workers.
- Each brick must be set out and finished at a specific angle to achieve the overall fan shape of the voussoirs.
- No brick is exactly the same shape and width, however they must all bond in together with millimetre accuracy.
- The benefit of using fine sands and puttys is that the worker can achieve the desired 1-2 mm joint widths. Any larger aggregate would not allow this.

Brick Repairs

- Bricks are cleaned and laid out to give and balanced pattern in keeping with the surrounding brickwork. i.e. colour variation is set out so no one area has darker or lighter bricks.

- Mortars and joint widths and finish are carried out to match the surrounding work

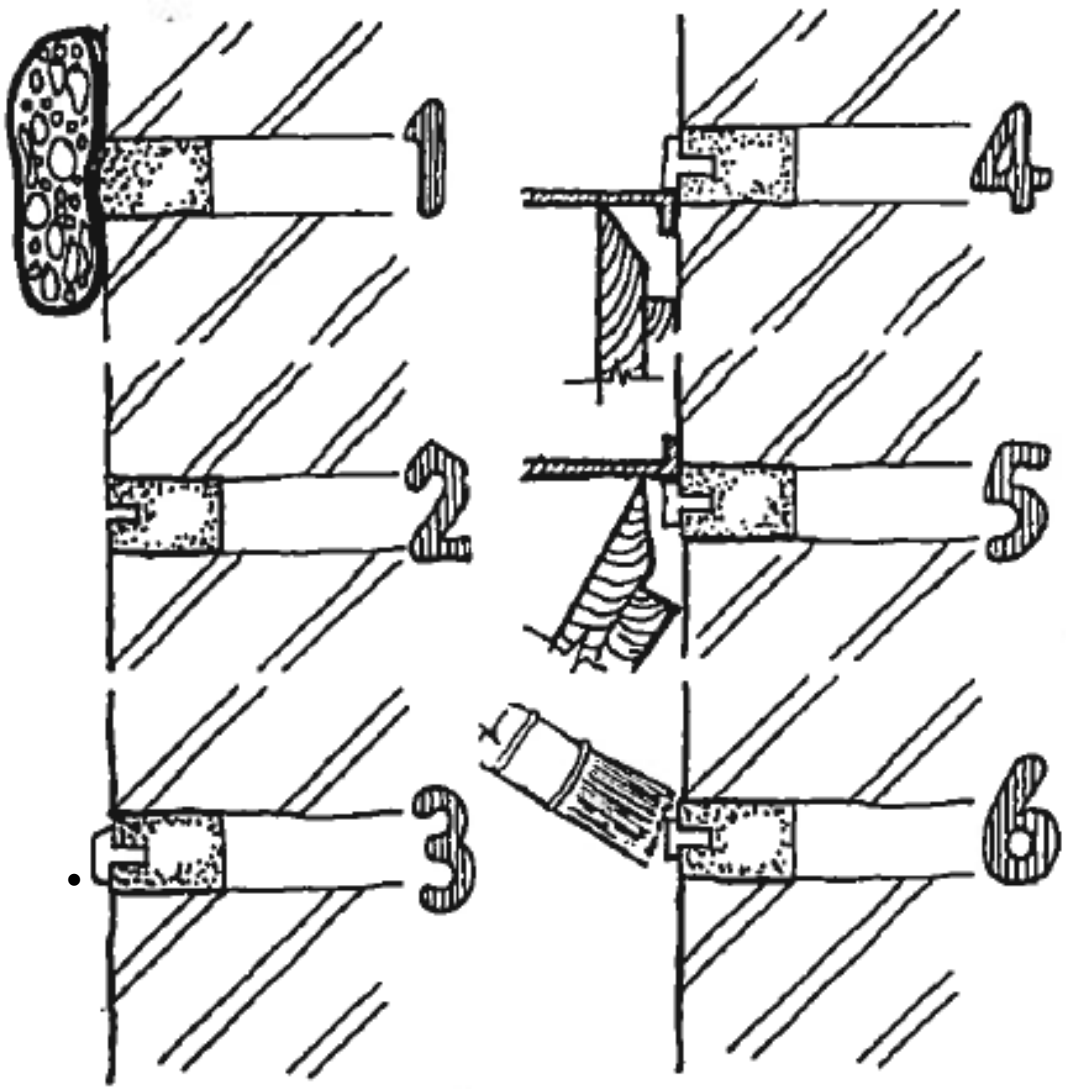
- Bedding and pointing mixes:

NHL 3.5 & Course Fine Washed Sands 1:2.5 by vol.

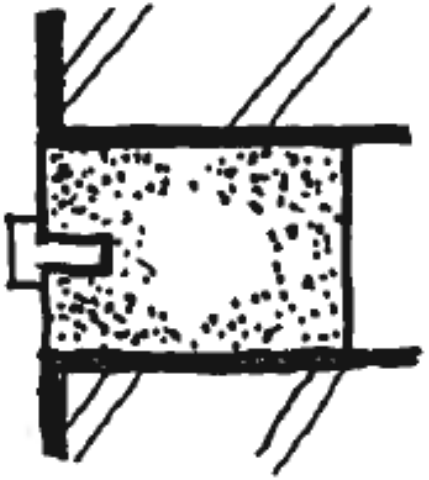
Brick Re-pointing

- Tuck pointing using Lime putty and silver sand.
- Tuck pointing was used to create the impression of fine or gauged brickwork within common or stock brickwork by the use of a ribbon of fine mortar set into the joint line to disguise the rough arrises of the brick.
- Backing mortar must be placed into the joint, coloured and textured to match the brickwork.
- Not used in modern construction and mainly found in historic settings
- Specific skills and understanding of materials required.

Tuck Re-pointing Detail



1. Flush joint
2. Groove 'stopping'
3. Tuck in the pointing 'ribbon'
4. Trim lower edge of ribbon
5. Trim upper edge of ribbon
6. Brush clean



Tucked joint

Stone Repairs

- Existing Portland stone sill profile re-worked to remove water traps due to weathering.
- Rather than renew completely, heavily weathered surfaces were taken back to sound clean surfaces.
- No new materials required
- Re-dressing giving circa.50 years extra life to stonework
- Re-worked using spinners and stooling worked by hand to corners.

Stone Repair

- Indent repair using re-claimed stone copings on southern bay roof (Dirt layers removed)
- Colour variation between old and new due to historical atmospheric pollution.
- Where old stone reclaimed, re-dressed and re-used the conservation officer approved and commended the approach.

Stone Repair

- Re-claimed York stone being re-worked.
- On site banker shops set up for working stone c/w full dust extraction.
- Safe / Controlled environment. Silica production controlled.
- Water sprays minimise dust production and blade usage (resources)
- Disposable PPE, Masks.

Stucco/Brickwork

- All Stucco: Limegreen Products. Suggested by Stonewest.
- Stucco: “Prompt Roman Cement” pre-batched and gauged for consistency.
- Initial setting time 25mins subject to temp. conditions.

- Originally Stucco formed in “Roman cement” “Parkers cement” a quick setting (15mins to 2 hrs initially) natural cement. Non breathable.
- Modern closest equivalent:
- “Prompt - Roman” Vicat Cement.

Stucco/Stone

- Rapid initial (25mins) set means the material is also good for the programme where planning is tight.
- Retarder required to slow set as necessary. (Citirc Acid)
- Colorants can be used in the finish coat if required. Stone dust, oxides, Natural Earth pigments.

- Economic and durable solution for façade restoration. Quick set and low shrinkage.
- Float coats can be up to 5cm in thickness.
- Full set at 28 days produces and mortar that has a hardness alike to stonework.

Stucco

- Expanded metal lath in stainless steel used as backing material armature to form the shape.
- Original bonded to Sandstone (poor adhesion and delaminating)
- English.Heritage discussion and approval given

- New stucco applied to this framework.

- Stucco Mixes: 4 coat work..

- Slurry/Bonding coat: Brush / Trowel
- Backing /Core coat: (1:2) Trowel
- Scratch coat: (1:2) Trowel
- Finish coat: (1: 2) Trowel / Floats

Lime Mortar Mixes

- NHL "Natural Hydraulic Lime" *Hydraulicity* is the ability of lime to set under water. Hydraulic lime:heating calcining limestone containing clay and other impurities.
- Calcium reacts in the kiln with the clay minerals to produce silicates that enable set without exposure to air.
- Hydraulic lime is used for providing a faster initial set than non-hydraulic lime in more extreme conditions (including under water).

- NOT BAG LIME / (Hydrated lime from non-hydraulic material) Well known.
- Bedding and Pointing mixes: Bespoke Specification for Kings Cross: "SW/XC/187 Medium, NHL 3.5"

Programme & Cost Considerations:

- Tendering (wetting in of new work) & Curing time needs to be given allowance
- Experience required to work with the material or failure can occur.
- Initial compressive set = 2 - 3 days (tendering process paramount in this period)
- **Full set = 6 months (consideration of heavy works/loadings in this period)**

Lime Mortar Mixes

- Hydraulic lime is a useful building material for the following reasons:
- It has a low modulus of elasticity.
- There is no need for expansion (movement) joints.
- It allows buildings to "breathe", and does not trap moisture in the walls.
- It has a lower firing temperature than Portland cement, and is thus less polluting.
- Stone and brickwork bonded with lime is easier to re-use.
- Lime acts sacrificially in that it is weaker and breaks down more readily than the masonry, thus saving weaker stone such as sandstone and limestone from the harmful effects of temperature expansion and mortar freeze.
- It is less dense than cement, thus less cold bridging.
- Lime re-absorbs the carbon dioxide (CO_2) emitted by its calcination (firing), thus partially offsetting the large amount emitted during its manufacture. The more hydraulic a lime, the less CO_2 is reabsorbed during set, for example, 50% of CO_2 is reabsorbed by NHL 3.5 during the set, compared to 100% of CO_2 being reabsorbed by pure calcium hydroxide (fat lime putty).

Taukkyan War Memorial

Taukkyan War Memorial

Taukkyan War Memorial

Taukkyan War Memorial

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Taukkyan War Memorial

Taukkyan War Memorial

Taukkyan War Memorial

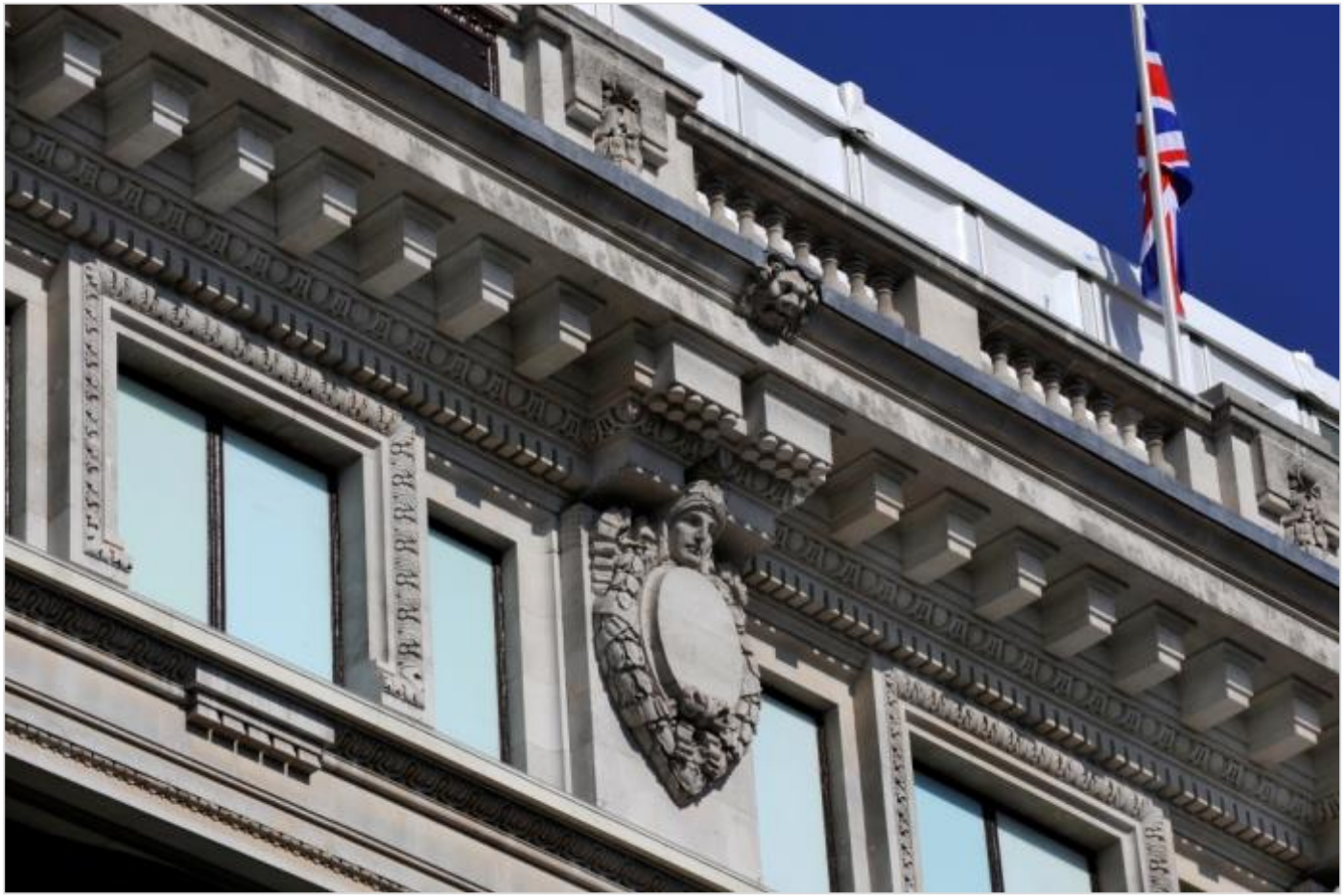
Selfridges, Oxford Street

Client:
Selfridges & Co

Structural Engineer:
AKS Ward/Lister Beare

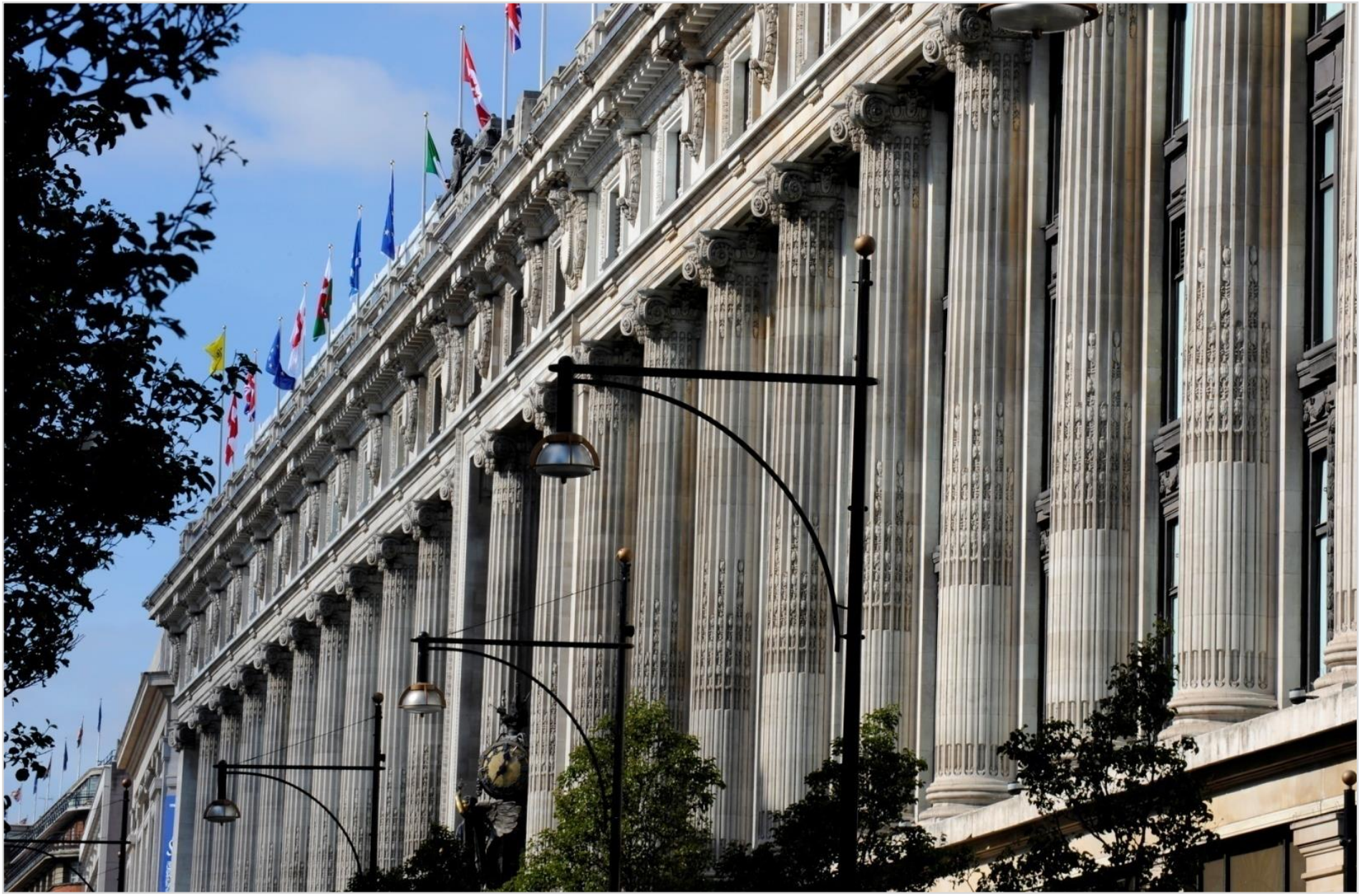
Value: £6.5million

Date: 2008-2009



Description
Loss of building fabric from high level leading to the development and erection of a bespoke designed scaffold. Stonework and steel work investigations , design of a bespoke extensive Cathodic Protection System. Design of fixings. General cleaning. Installation of new lighting scheme. Provision of new lead and asphalt.

Selfridges, Oxford Street



Selfridges, Oxford Street

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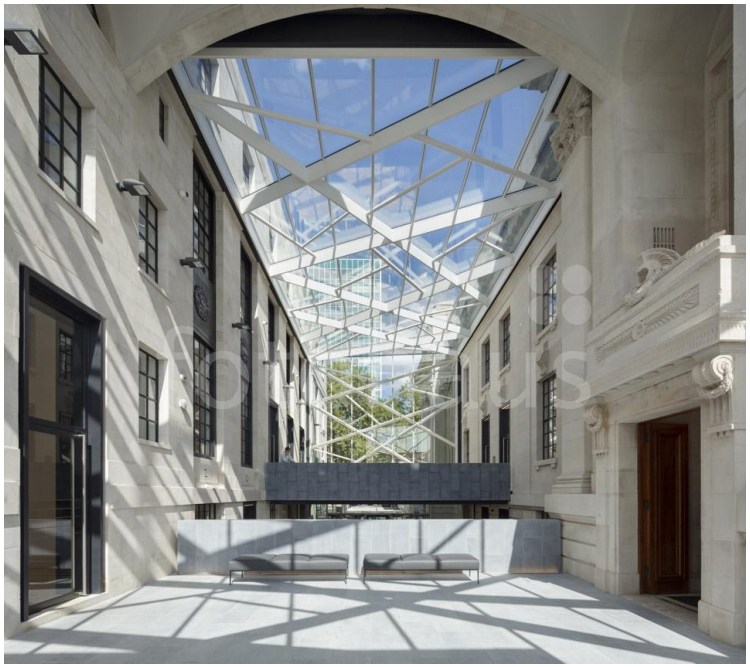
What we brought to the Project?

- **Fast Track access solution from an existing crash deck**
- **Significant Cost Savings**
  - Scaffold Solution
  - Retained cornice in place instead of dismantling
- **Kept concessionary windows un-obscured**
- **Blend of traditional structural knowledge with secondary solutions and modern techniques**

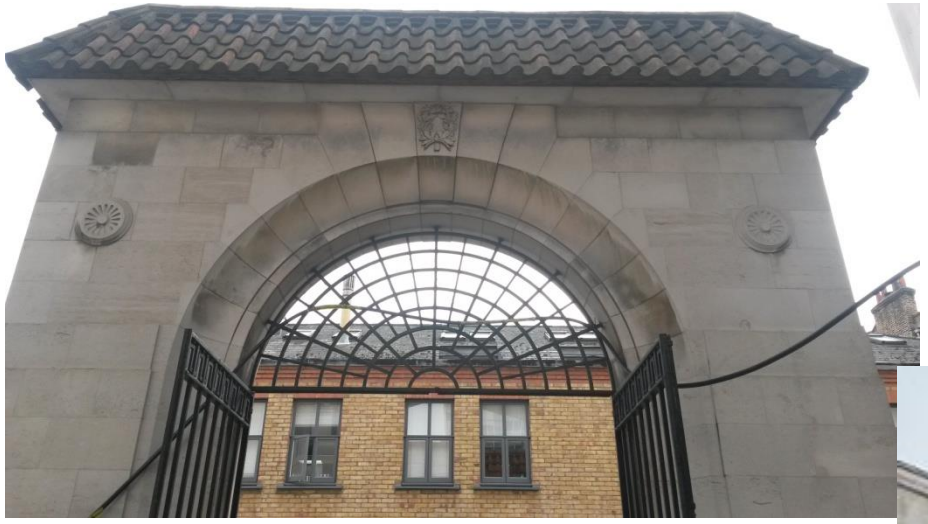
How our experience can help

- Knowledge of the working processes
  (Directors – Time served)
- Conceptual stage development of budgets & specifications together with sourcing of materials for approval.
- Heritage experienced Management with Head Office Support
- Skilled directly employed workforce
- Liaison with English Heritage/Historic England
- Listings – how each can be approached.
- How to identify stages & how Stonewest can help the process
- Early involvement

London Business School



London Business School



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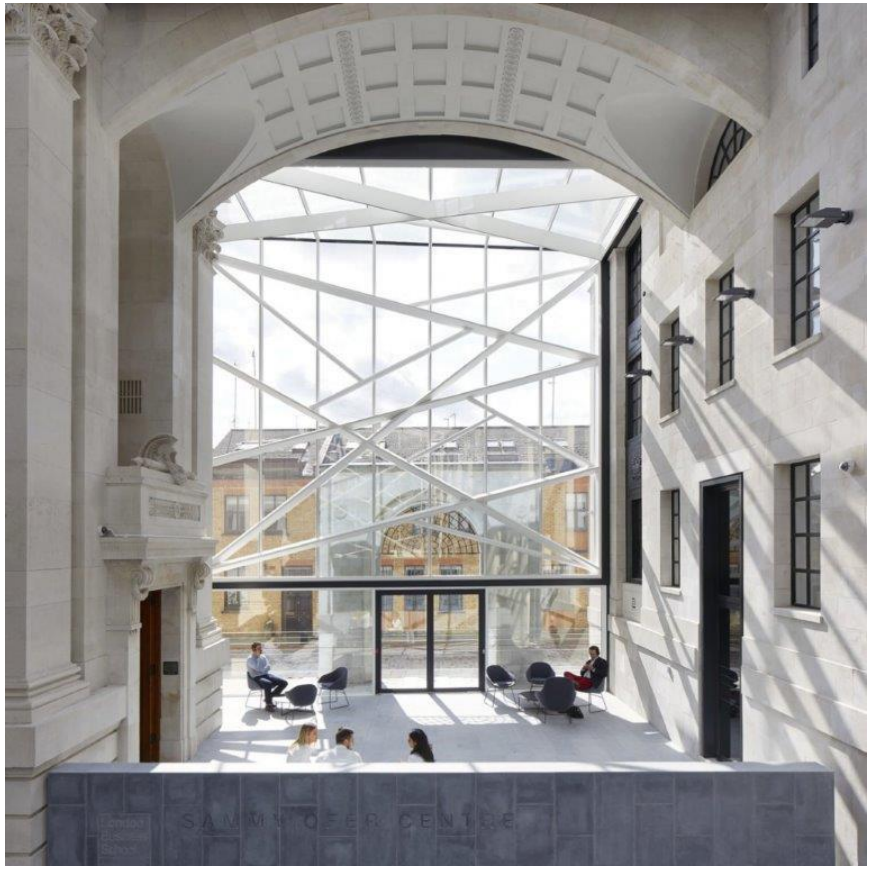


The London Coliseum - Statuary

1/8 size wax maquette for Architect's approval
8no. Atlas figures - to support globe

The Sample Process

Colour

- Colour variation on original building surveyed
- Range of 6 terracotta colours produced
- Three selected from range and produced in ratio to best match existing

Shape and texture

- Combed finish agreed to match existing
- Sample of lion's head black made - approved by Architect

Manufacturing - early stages

dried clay pellets (mainly Cornish)

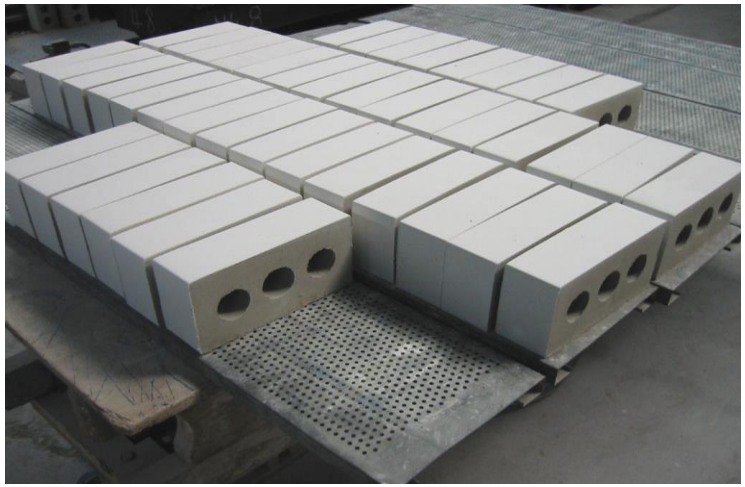
- Clay (mix of clay and grog - crushed terracotta) is ground
- Magnets remove iron oxide impurities
- Coloured pigments added

the mixing plant – dry

Sink & Extrusion Process

Slip-cast sinks before firing (pink)

Pink colour lost when fired



Extruded bricks fired and glazed separately: range of colours

Double-sided slip tiles – split after firing

Modelling Process

Column base plaster replica made using reverse template

Hand-finished moulded details of Cornice block model

Finished plaster replicas

Mould Manufacture

Multi-mould for cornice capital mould and original model

Mould-drying room: moulds disposed of when projects are completed due to space constraints

Slip Casting

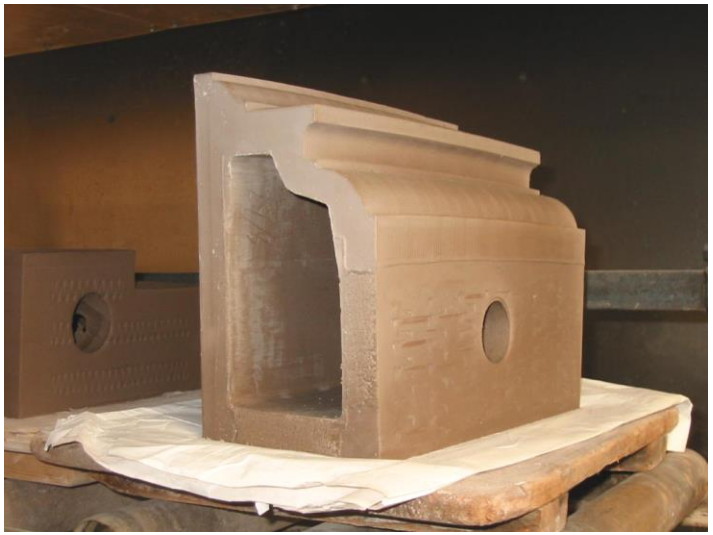
Clay and water mixed in large vessel

Discarded pouring sleeves

Vices holding moulds closed – filling sleeves attached

Partial removal of mould from cast

Drying Process

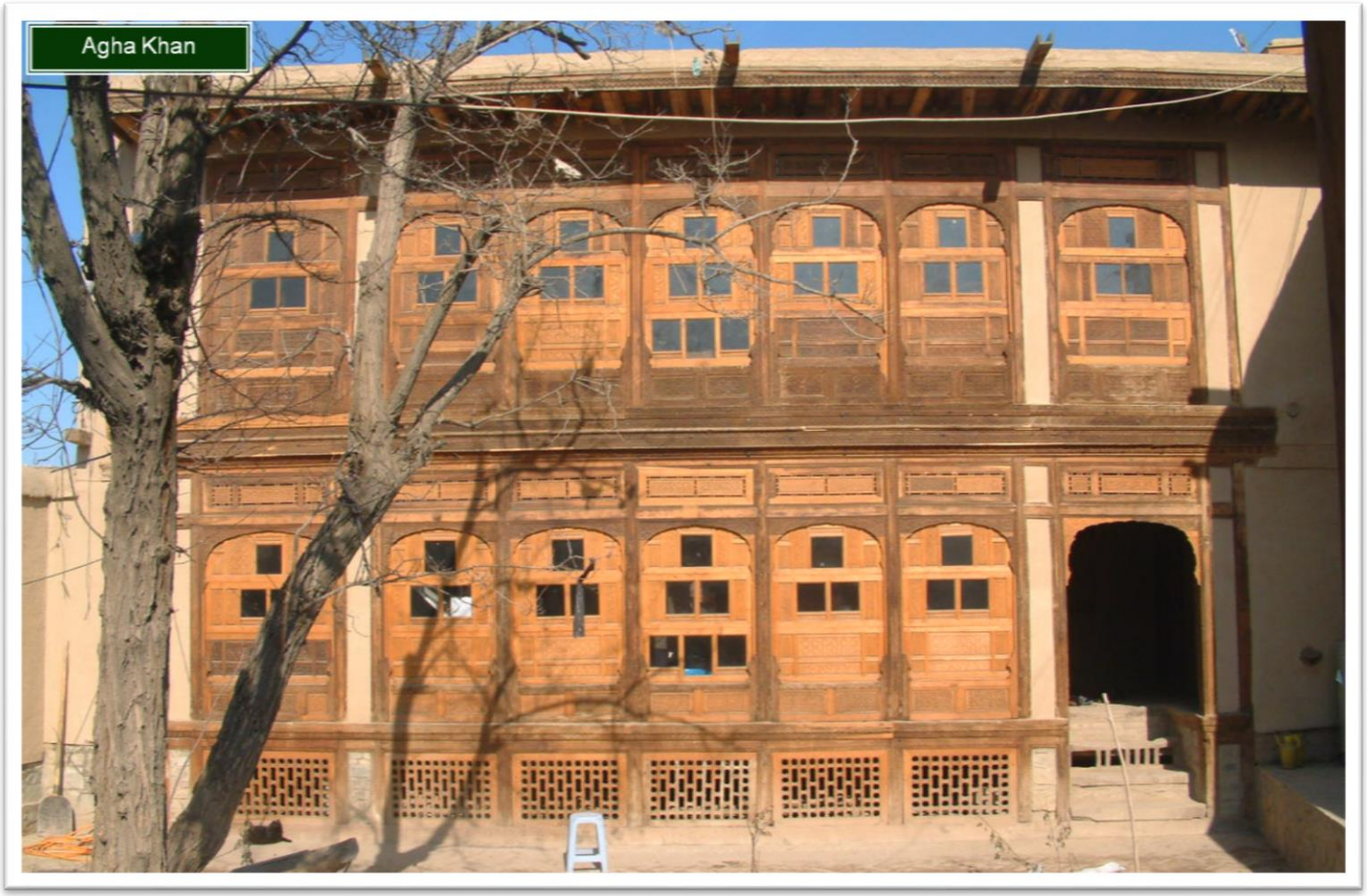


- Hessian sacks assist retention of moisture within terracotta whilst they await ‘finishing’
- Units left to dry slowly prior to firing

Terracotta Fired in Kiln

Paul Woods (Project Manager – London Coliseum) checking on newly-fired Cornice block in sink-filled kiln!

Afghanistan



Terracotta Fixing

Blocks delivered to site unfilled

Blocks moved to fixing location (as per stamp number)

Filled with light aggregate/cement mix

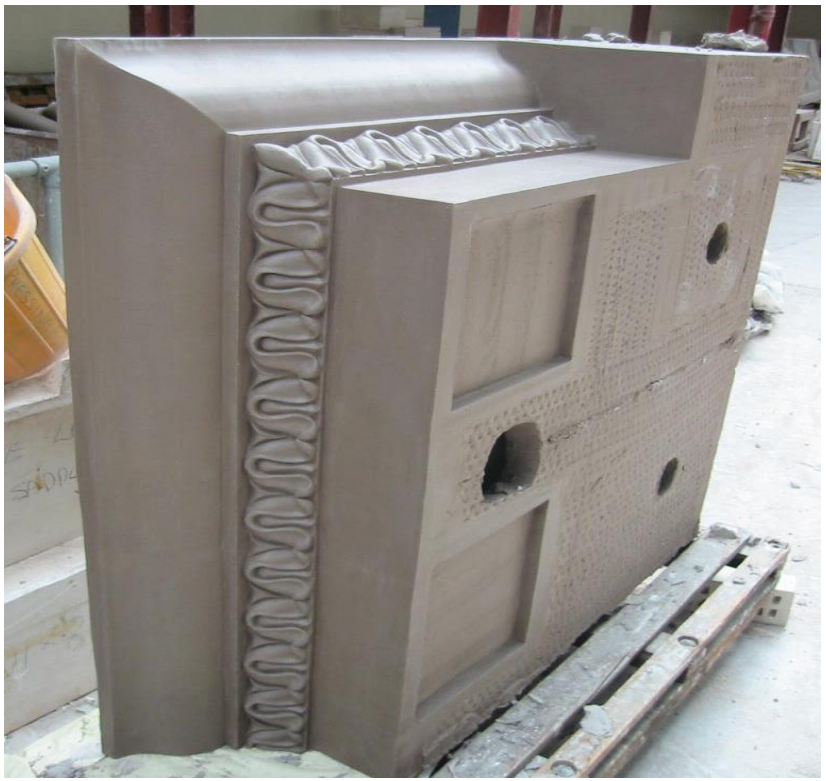
Fixed once fill has set – bedded and pointed with lime mortar

The Main Cornice

Internal reinforcement (additional ‘walls’) required

The largest blocks on the building – over a metre square

Drying time for blocks of up to 2 months



Main Cornice
New Secondary Steel Supports

Tower supported and lifted using a hydraulic jack

- Steel support structure for Main Cornice – Egg & Dart corbel course visible beneath
- Fixed back to structural fabric of reinforced truss at tower base
- Steels ‘slot’ into back of Cornice blocks

Treatment of Existing Structural Steel

Exposed

Reinforced/replaced

Cleaned of rust and treated with Hempel marine-grade paint

Terracotta Records – cont.

Terracotta taken down and stored off site at:

Shaws of Darwen – if required as reference for manufacture of new pieces

Secure storage yard – intact terracotta retained for use in rebuild

destination	Pallet	Description	Sketch/ Drawing no.	Block No	Stamp No	Block Description	Repair type
Shaws	1	north circular urn column		n5-1		circular block	fix
Shaws	1	north circular urn column		n5-2		circular block	fix
Shaws	1	north circular urn column		n9-2		circular block	fix
Shaws	1	north circular urn column		n7-3		circular block	fix
Shaws	1	north circular urn column		n6-2		circular block	fix
Shaws	1	north circular urn column		n6-1		circular block	fix
Shaws	1	north circular urn column		n3-2		enriched block	fix
Shaws	1	north circular urn column		n3-4		enriched block	new
Shaws	1	north circular urn column		n3-1		enriched block	new
Shaws	2	north circular urn column		n2-1		enriched block	fix
Shaws	2	north circular urn column		n2-2		enriched block	fix
Shaws	2	north circular urn column		n2-3		enriched block	fix
Shaws	2	north circular urn column		n2-4		enriched block	fix
Shaws	2	north circular urn column		n1-1		cherub string	new
Shaws	2	north circular urn column		n1-2		cherub string	new
Shaws	2	north circular urn column		n1-3		cherub string	fix

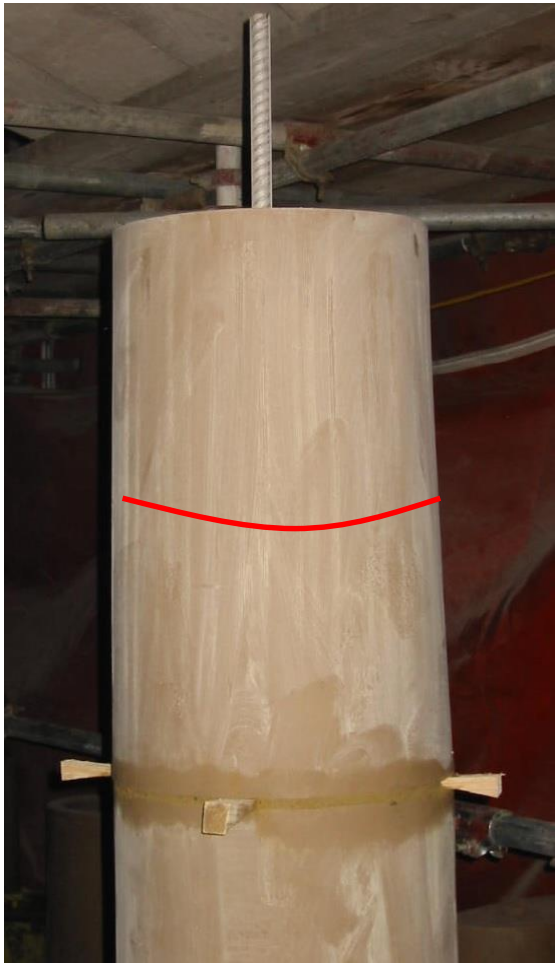
Colonnade – Terracotta Renewal

Replaced with GRP in 80's – new terracotta and reinforcement required

Colonnade - continued

T-16 structural support surrounding original steel

Encased in Terracotta and part-filled



Next unit added and remainder of previous block filled: units pointed

Entablature

The Entablature (above the colonnade) was reinforced and a waterproof render applied
This shows the area prior to these works

The T-16 reinforcement shown previously is just visible in the lower part of the photo