

# CONSERVATION ENGINEERING - A COLLECTION of CASEWORK

P J STOW BSc(Hons) MICE CEng

## *Extracts from Section 1 - Introduction*

### **ABOUT THE AUTHOR:**

Patrick Stow BSc(Hons) MICE CEng is a Chartered Engineer with over twenty years continuous experience in the investigation, assessment, diagnosis and design of conservation engineering structural repair schemes for historic buildings. Three decades ago Patrick was first introduced to this field of work and subsequently has developed this interest and speciality in the sensitive approach to repairs to historical structures. Patrick frequently lectures on behalf of the **Society for the Protection of Ancient Buildings**, the **National Trust** and the **Chartered Institute of Building** amongst others at courses either for homeowners or for industry professionals.

Drawing on early career experiences with sailing and boat building, and with an inquisitive mind that tries to employ lateral thinking, Patrick's style of repair design or strengthening measures employed, often contains little nods to the major benefits offered by modern marine technology. His parallel interests encompass the work that the **Carpenters' Fellowship** undertake in timber framing to both modern and ancient structures, including some spectacular repairs. Also credit must be given to the **SPAB Mills Section** where the influence of mechanical engineering creeps into the use and development of old mill buildings and can be extended to other types of construction.

### **AUTHOR'S NOTE ABOUT THE BOOK:**

The idea of writing a book about what one enjoys doing for a living has been a tempting notion for a number of years, especially when receiving very positive feedback to the delivery of a lecture on the repair aspects of old buildings. An early attempt at writing a book foundered, as they often do quite rightly, and all would have been well, best forgotten until one day I was trying to find some photographs to aid the compilation of a report when.....

Instead of writing a turgid tome full of text with occasional diagrams, the inspiration came that the compilation of a set of concise case histories in summary form with short explanation, photographs of the problem, comments and diagrams of the solution(s) and where available, photographs of the completed result would form a useful broad and detailed guide to the vagaries, subtleties and nuances that make up the character of old building repairs.

SUMMARY OF CONTENTS PAGES

SECTION 1 INTRODUCTION:  
A brief description of the Author and an outline of the general intentions of this book.

SECTION 2 ROOFS:  
A set of cases relating specifically to the type of roof structure indicated in the pictogram in the Contents page of that Section. The arrows on individual casework Title pages indicate the exact areas of interest in this particular case.

SECTION 3 WALLS:  
Only repairs or supplements to existing walls have no content relating to exclusively masonry retaining walls.

SECTION 4 FLOORS:  
Many of the floor beams require repair at all levels however they are all very different in their nature and have to be treated singly on its merits. The fascinating and continually challenging.

SECTION 5 CHIMNEYS:  
A varied collection of individual cases, the nature of which are subject to adverse conditions.

SECTION 6 FOUNDATIONS:  
The areas of work for this section are given improvements for additions or alterations to existing structures.

SECTION 7 PROPPING:  
The essential steps of inserting a temporary structure whilst further action or final repairs are being carried out.

SECTION 8 PROJECTS:  
A disparate group of individual projects on interesting and very different types of repair work which would otherwise make it unmanageable to use.

SECTION 9 CURIOSITIES:  
A collection of odd or otherwise indefinable special items of the same idiosyncratic and interesting field of repair to historic buildings.

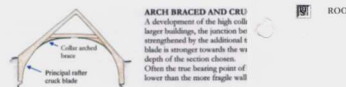
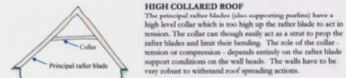
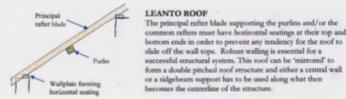
SECTION 10 APPENDICES:  
The areas where specific details or extracts are given the case as to where the general principles apply.

INDEX  
CHRONOLOGICAL:  
The complete list of Case Numbers which, with the destinations Sections shows, all as

Contents Overview showing topic sections eg Roofs

GLOSSARY OF TERMS

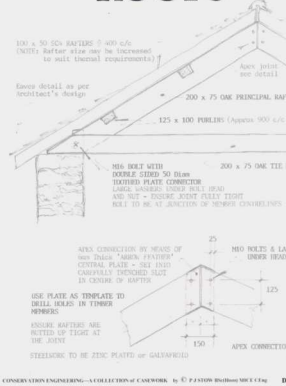
TYPICAL TECHNICAL TERMS - ROOFS



Glossary of Terms applicable to the various cases. eg Roof structural types

Section Divider Page

SECTION 2 ROOFS



Pictogram Contents Case Number by Structural type

CONTENTS BY CATEGORY

SECTION 2 - ROOFS

97,655 RAISED COLLAR ROOF TRUSS ANNEKE CONVERSION

98,733 THATCHED COTTAGE PRINCIPAL ROOF FRAME EMERGENCY STRENGTHENING

99,790 FARMHOUSE REAR WING ROOF RE-MODELLING TO FORM STUDIO SPACE

99,775 BARN ROOFS REBUILT AFTER MAJOR FIRE DAMAGE

35,311 RAISED COLLAR ROOF TRUSS RAFTER REPAIRS

96,606 OUTBUILDING ALTERED TO FORM A WIDE GARAGE

98,668 TIED PRINCIPAL RAFTERS ANNEKE CONVERSION

96,623 A BARN CONVERSION WITH INSERTED TWO STOREY TIMBER FRAME

SECTION 2 - ROOFS PRINCIPAL RAFTERS

HIGH COLLARED 'A' FRAME TRUSS BLADES COMBINED TIMBER SCARP & FELT/FLY PLATE REPAIRS

CASE 35,311a

RAISED COLLAR ROOF TRUSS RAFTER REPAIRS TO MODERN COTTAGE DOVE PITCHED & DORMER ROOF COMBINED TIMBER SCARP & STEEL FELT/FLY PLATE REPAIRS TO PRINCIPAL RAFTER

PROBLEM and DIAGNOSIS:  
Possible roof spread historically and suspected weakness at the feet of principal rafter blades where they are embedded in the solid masonry waling. Investigations by long spike (Dycal) spike drill indicated Appendix drilling revealed areas of weakness in feet of rafter blades coupled with obvious slight cracking and distress in the plaster at the bearings. This suggested that a rounding off of the rafter blade feet was occurring leading to the tendency for the walls to be pushed out at the top. The loads from the thatch covering of this modest roof are not very onerous as the thatch itself is in good condition, however, if allowed to deteriorate then this becomes a wholly different loading scenario.....

STRUCTURAL SOLUTION:  
Designed solution was for simple inverted 'T' shaped finch plates with concealed fix replacement foot for the rafter blade. In practice, the condition of the existing timber a larger area than expected to new ends were scarfed onto the rafters, the finch plate

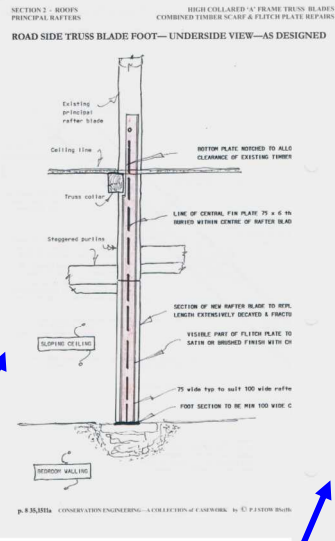
COMMENTS:  
A very well executed set of repairs undertaken by a thoughtful carpenter employed experienced contractor. The stability of the structure means the repairs blend in to rather than distort from the roofline. The conditions for future success is 'How are these plates fixed and exactly what Hence the need for good records to be kept with the property.

Case Number Title page with Pictogram

Casework Front page and text description

Typical working diagram

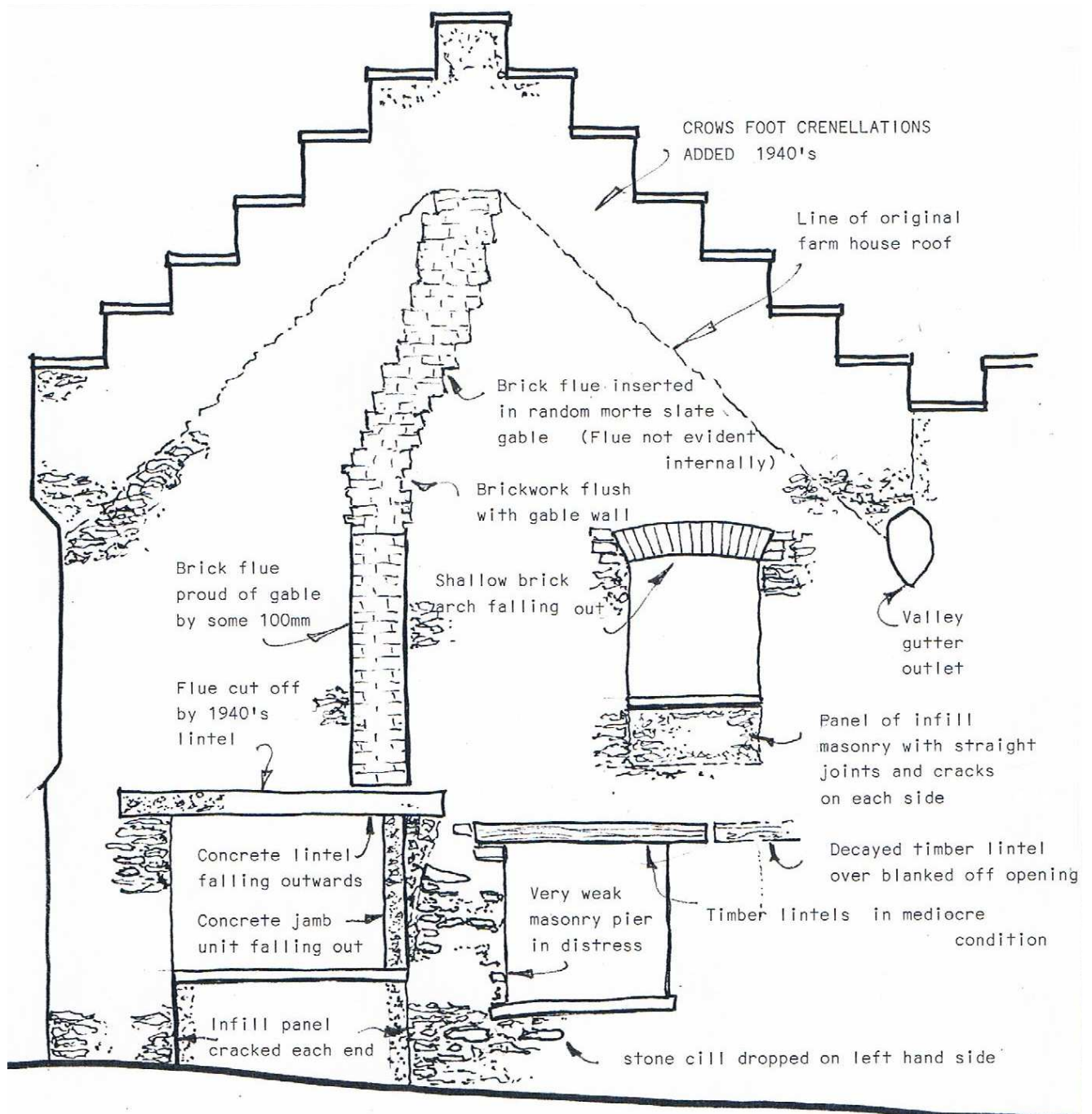
Typical photograph of completed repair



**SAMPLE FULL PAGE SKETCH DRAWING**

**COMMENT:** *This is a sample of the typical hand drawn detail used for assessing the extent and type of repairs required. Extract from Section 3 - Walls - Case Number 98,705a page 10*

- 1) The overall repair strategy is to consolidate the weak areas on the right hand side of the gable wall, then proceed with securing and propping the existing ground floor lintels whilst the central pier is removed and rebuilt. Thereafter the two ground floor window lintels can be replaced individually. The rebuilt pier may incorporate tothing ready to accept the rear wall of the proposed loggia reinstatement.
- 2) Note that in the event of unforeseen further complications or hidden defects within the existing structure then significantly larger areas of the gable wall construction may have to be taken down and rebuilt.






OTHER SAMPLE PAGES

**IMPORTANT NOTE:**

*The pages that have been scanned in for this synopsis are in draft and there are gaps in the Contents and Indices which will get filled as the number of cases that are written up increases. So as the book development progresses the total number of available cases and therefore the content of these sections is likely to increase very significantly.*

 INDEX	
INDEX for the 'THOUGHTS ABOUT....' series of articles	
<b>'THOUGHTS ABOUT'..... TOPIC TITLE</b>	<b>LOCATION ... SECTION, CASE or ARTICLE</b>
DRAWING METHODS AND STYLES (An article in 6 parts)	SECTION 2 - Roofs 96,606 Page 8 for Part 1 SECTION 2 - Roofs 98,668 Page 6 for Part 2 SECTION 2 - Roofs for Part 3 SECTION 2 - Roofs for Part 4 SECTION 2 - Roofs for Part 5 SECTION 2 - Roofs for Part 6
STANDARD DRAWING NOTES	SECTION 4 - FLOORS 99,735 Page 4
NO-FINES CONCRETE	SECTION 6 - FOUNDATIONS - 99,775 Page 6
THE USE OF VOCABULARY	SECTION 9 - CURIOSITIES Group 9A Page 12
THE SPAB MANIFESTO APPLIED IN CONSERVATION ENGINEERING	SECTION 10 - APPENDICES - Appendix 1
A WALK THROUGH THE PARK	SECTION 10 - APPENDICES - Appendix 2
TIMBER TEST DRILLING	SECTION 10 - APPENDICES - Appendix 3
PASSIVE DE-HUMIDIFICATION	SECTION 10 - APPENDICES - Appendix 4
SIGNAGE	SECTION 10 - APPENDICES - Appendix 8
CASE NUMBERS	INDEX page 1.

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**Quote:-**

**“Historic Buildings are not just physical objects but they have a fourth dimension - it is a feel thing.”**

Nicholas Cooper FSA FR HistSoc  
Grosvenor Gardens London 14 December 2017

For further details, register an interest or to download a free PDF version of this synopsis contact:

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**PREFACE**

Welcome dear reader to **Conservation Engineering - A Collection of Casework**. Please enjoy the read, or the dipping in and out of it, as and when the mood strikes.

The somewhat personal viewpoint inevitably adopted by the Author is perhaps a major dimension that should be added to the carefully chosen four word descriptive book title. This work is possibly something of a 'Marmite' subject in that it is written on the basis of the understanding and widespread adoption of Conservation Principles and all that surrounds this approach. There are some who will simply 'not get the concept' of the Conservation of Historic Buildings and cannot understand what the fuss and bother is all about. This book seeks to get under your skin and show that there are great advantages to keeping, and adapting our historic buildings and landscape features now very much in the forefront of modern living yet continuing to preserve historic fabric for the benefit and enjoyment of future generations.

A truism is of course is that 'once it has gone it has gone forever' and this includes the original craftsmanship, patina, character, design intentions and actual component parts or finishes of old buildings. There are many aspects of early craftsmanship that we have lost over the years, perhaps without even knowing that they existed in the first place, and it is difficult or sometimes impossible to retrieve these obscure elements of knowledge.

The purpose of writing this book or rather providing a collection of condensed casework from the author's own workload over many years, is to present one person's view on how the approach to the analysis, design, discussion and implementation of repair solutions to structural problems was undertaken with buildings and monuments.

There is a risk that you might disagree with the approach or advice given for some or even all of these projects, that is of course your prerogative, but I humbly suggest that these cases were well received, warts and all, by a number of clients, local authorities and specialist groups who did appreciate the thought and care that went into the end result.

What follows then is an opinion, a crusade if you like, championing the need to look at solutions which retain as much historic fabric as possible, provide the least intervention, are easily reversible, use sympathetic materials in the course of the works, are elegant, neat, unobtrusive, easily read, honest, simple, effective, durable and economical to implement.

The content of this book can be assessed against the criteria described above and you will be the judge of how well it stands up to scrutiny. We all have to learn over time, consequently knowledge is gained, and this book is the opportunity to pass on what has been experienced.

**Patrick Stow**

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 SECTION 10 - APPENDIX 2

THOUGHTS ABOUT ...  
A WALK THROUGH THE PARK

**EXAMPLES OF TYPICAL TIMBER FAILURE MODES**

There follows the result of a walk through a small woodland and describes by means of photographs the various ways a timber beam - in this case standing upright as a tree - can fail or be made to fail. In the pictures the timber beam is standing vertically as a tree or a branch protruding from the trunk, both are acting as a cantilever in that the structural member is anchored at one end and totally free at the other end.

The act of looking around at the various problems starts to open ones eyes not only visually but mentally. It is amazing what one can divine by simply looking and really seeing what you are actually looking at.....!

Artists have a head start on the rest of us in terms of observational and interpretational skills and we do well to learn this skill and apply it to the issues of problem solving, this is especially relevant in the field of Conservation Engineering.



A delightful woodland setting with the path leading one on to a trail of discovery perhaps.

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