Contrasts and Parallels

Two Conservation Case Studies: Greenhill and Thorpe Hall

by

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This article describes the conservation approach to the rehabilitation of two important and virtually ruinous buildings, one at Wirksworth in Derbyshire and the other just outside Norwich. For the first the architects were Derek Latham and Associates of Derby; the author acted as project architect for this and as architect for the second. The work at Greenhill, completed in 1983, received a craftsmanship award from the local society of architects and the building is part of a group which received a Civic Trust award in 1986. The work at Thorpe Hall was completed in the summer of 1987.

Less than a decade ago numbers 1-3 Greenhill at Wirksworth in Derbyshire and Thorpe Hall on the eastern outskirts of Norwich were both decaying shells. Greenhill was mostly a dramatic roofless ruin; the roof and floors over three quarters of it had collapsed some twenty five years before and the dangerously unstable front gables were subsequently pushed in. Thorpe Hall had been disused for a number of years and various attempts had been made to demolish it for redevelopment culminating in a public inquiry in January 1983; part of the roof of the main building had collapsed taking the floors with it, the west wing was a total ruin and the whole was seriously vandalized and very much at risk.

Today both buildings are in good repair and occupied. They are living examples of how it is possible to give a further long lease of life to historic structures regarded by many as beyond recall. The Civic Trust Awards assessors said of Greenhill in 1986 that it was an example that deserved to be repeated nationally; at Thorpe Hall it has been repeated. Both buildings demonstrate forcefully that the only point of no return is demolition and that if a building survives, even in a state of virtually total dereliction, there is always hope. Once demolition has taken place there is no hope.

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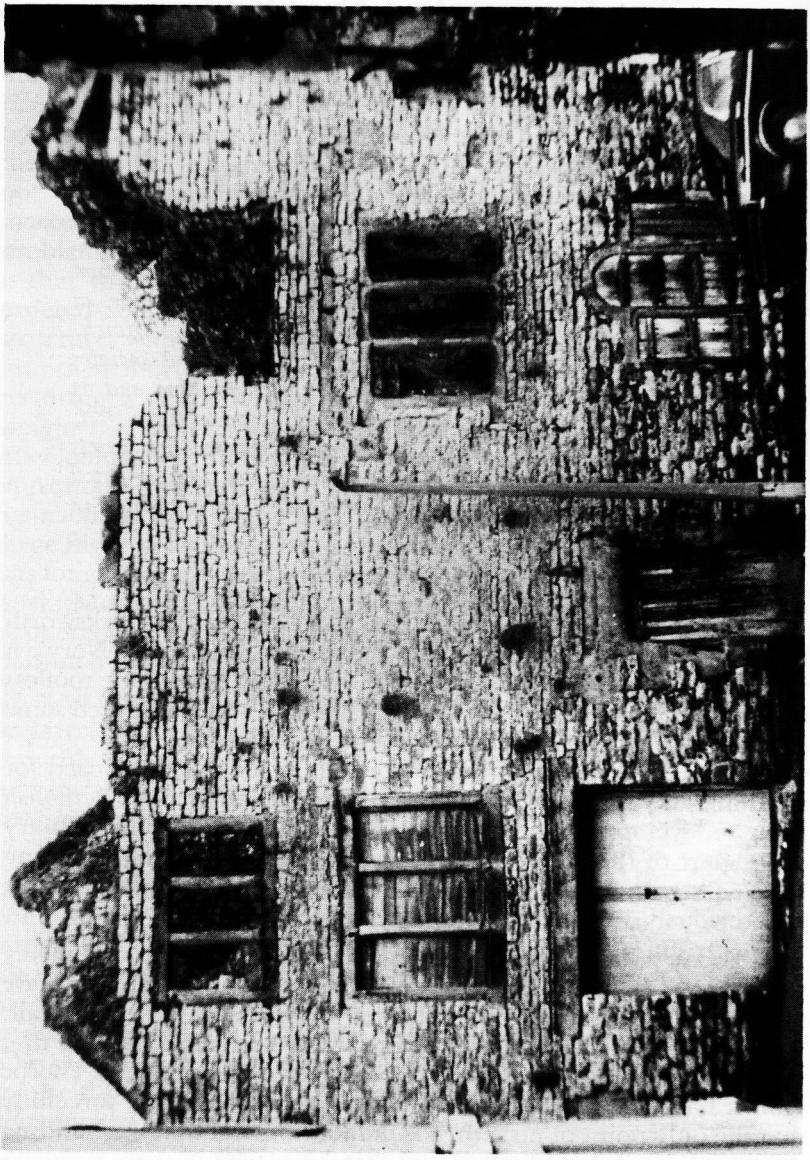


Fig. 1
a) 1–3 Greenhill, Wirksworth in 1980 when the building had been a ruin for more than twenty five years.
b) 1–3 Greenhill, Wirksworth in 1984 following rehabilitation by the Derbyshire Historic Buildings Trust. Minimum repair and reconstruction was undertaken and the variation in the treatment of openings arises from a deliberate acceptance of the alterations that the building has undergone during its 450-year history.

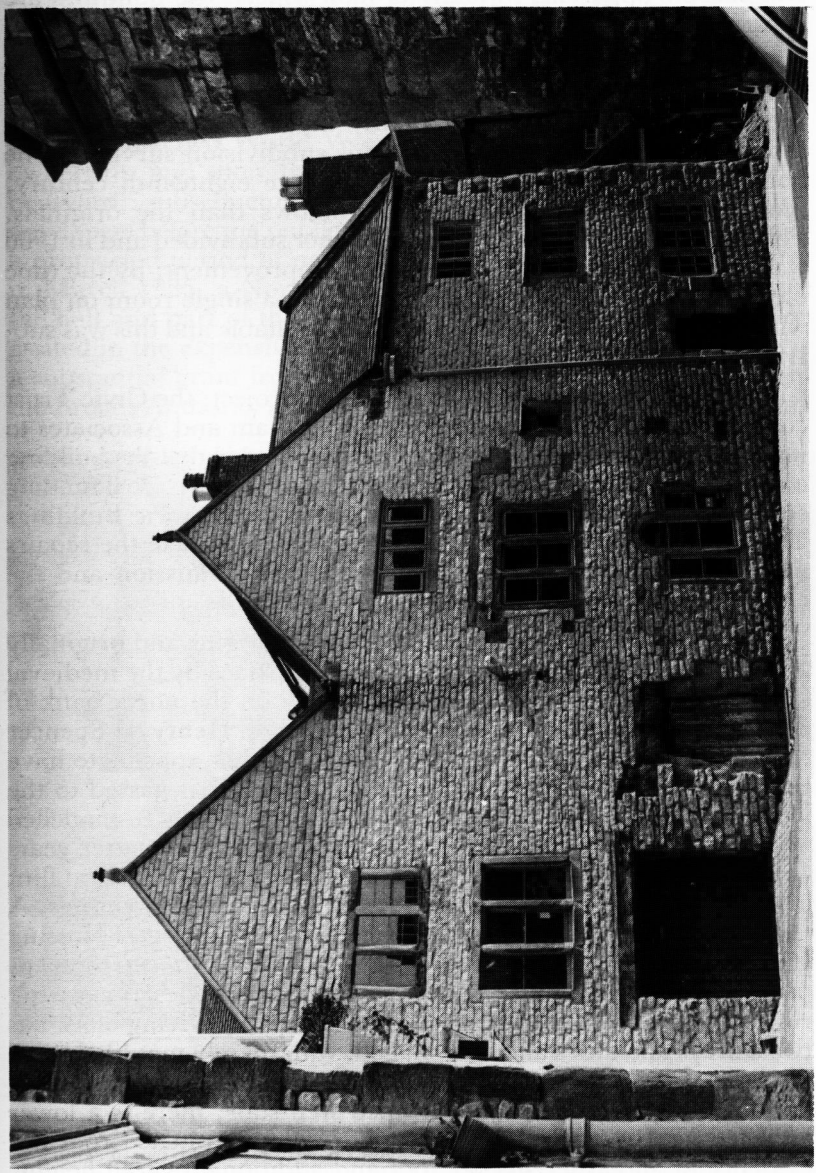


Fig. 1(b)

The parallel between the two buildings and their case histories largely ends here, although there are other points of similarity which will become apparent; in many of their aspects the buildings are contrasting.

Greenhill (Fig. 1) is a solid stone town house on a sloping site, built probably in 1631 by a wealthy local lead merchant, William Hopkinson. It was subdivided early in its life—before 1666 in fact—and a staircase dating from this subdivision survives. The house was largely re-windowed in the late eighteenth century, mostly with smaller and simpler windows than the originals. Following this the building became further subdivided and in 1906 was considered incapable of economic improvement; by the time of the collapse in 1954 only the south end, a single room on plan with three floors and an attic, remained habitable and this was sub-standard.

In 1980, as part of their Wirksworth Project, the Civic Trust commissioned Derby architects Derek Latham and Associates to undertake a feasibility study which recommended that the building could be economically repaired and converted to office use if funding could be found; subsequently the Derbyshire Historic Buildings Trust was able to acquire the building and undertake the repairs with funding shared by the Development Commission and the Derbyshire County Council.

Thorpe Hall (Fig. 2) has much earlier origins and originally a rural site, having been built as a summer palace by the medieval bishops of Norwich to the east of the City on the north bank of the River Yare; the fourteenth-century Bishop Henry de Spencer is thought to have been the main builder of what appears to have been a quadrangular house. At the Reformation it passed to the well known Norfolk Family of Paston and was heavily re-modelled and probably partly re-built by Edward Paston in the latter years of the sixteenth century. The walls are a mixture of brick and flint and some are certainly medieval with inserted later openings. A chapel survived into the present century and the largest existing ground floor room was probably originally the hall, with a screens passage and side fireplace and a now demolished service wing running south towards the river. The principal surviving block has two storeys and attics and is L-shaped, with mainly moulded brick mullioned-and-transomed windows, timber framed and wattle-and-daub partitions and a timber framed well stair; there is a lower attached west wing with a more modern lower pitched roof but evidence of an earlier steeper roof and additional overall height.

Some re-modelling took place in the late seventeenth century after the building passed out of Paston ownership. There was then a major renovation about 1840 by Harriot Blakiston, the daughter of John Harvey a prominent local banker. Various alterations and small additions were made and much evidence of earlier periods covered over; further small service rooms and a secondary staircase were added to the west face in the arm of the 'L' later in the century. Between the two World Wars the house came into commercial ownership and after the World War II served as offices for a boatyard, subsequently passing through the hands of several developers before the public inquiry of January 1983; there followed a protracted period of negotiation and further vandalism before, in March 1985, a Norwich business couple were able to acquire the hall and part of the site for their own home. They have been assited in the expensive and uneconomic task of rehabilitation by a substantial grant from English Heritage and smaller ones from the Broads Authority and the Broadland District Council, including

Fig. 2
a) Thorpe Hall, Norwich from the south east in 1983, as a vandalized and partly collapsed shell;
b) Norfolk County Council, Thorpe Hall, Norwich in October 1987, nearing completion as a rehabilitated dwelling. Originally there was a lower service wing running south from the gable but the surviving building had only two large late openings with insufficient evidence to allow an accurate re-construction; the enclosing two storey bay, clearly unhistorical but designed to blend with building, is a solution to this problem. Generally the late sixteenth-century pattern of the east front has been restored but a later cornice has cut the first-floor pediments; the south first floor window head has a Victorian stone repair and the steep roof and gable of the porch is also a nineteenth-century alteration.

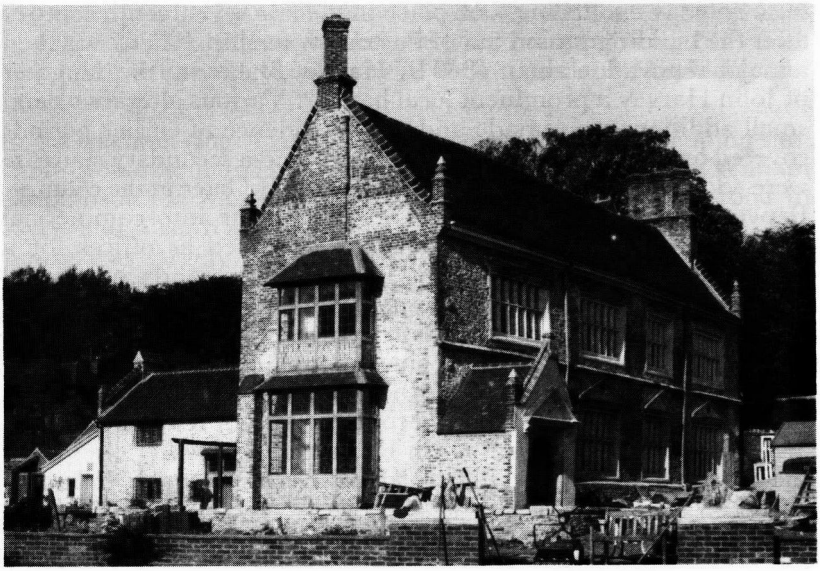


Fig. 2(b)

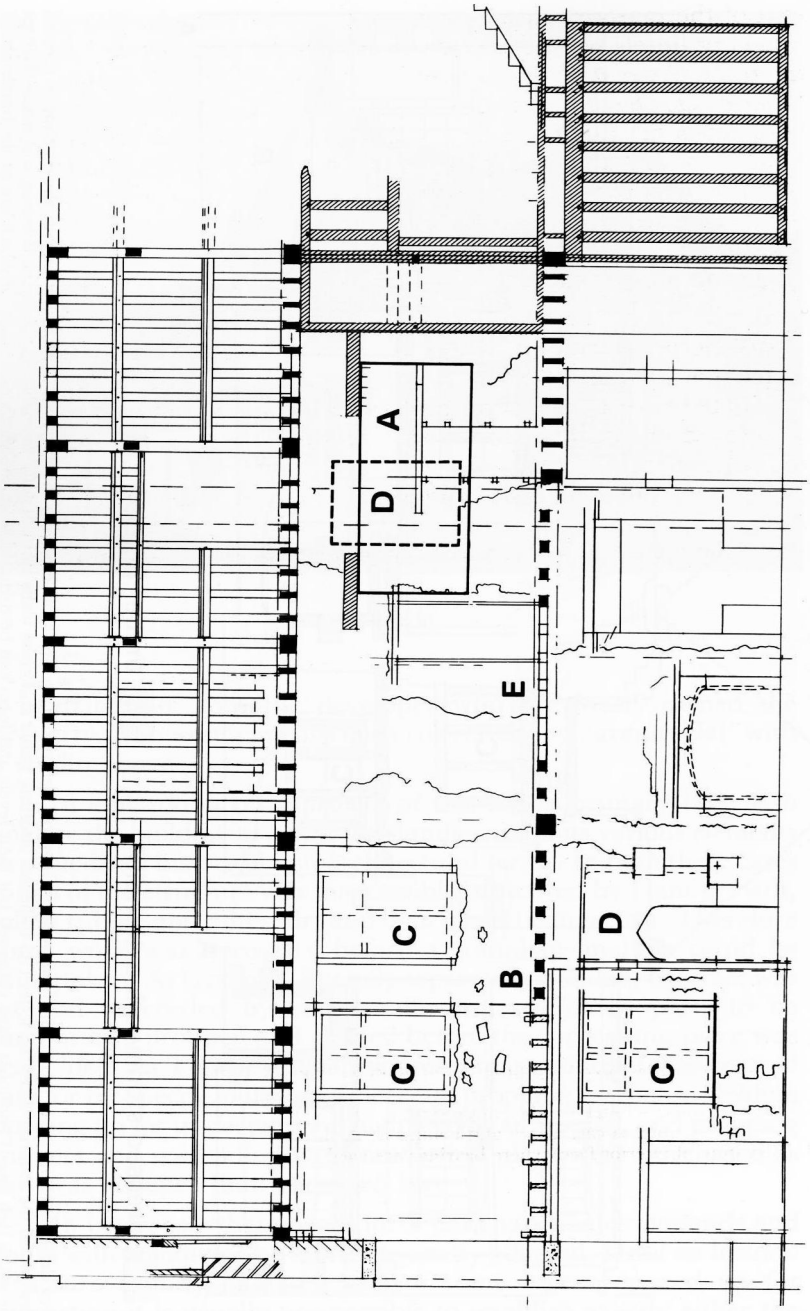
a contribution from the developer who previously owned the property. The west wing has been converted to a 'granny flat' with a studio above.

In embarking on a project of this sort a primary task is to analyse the building to assess the significance of its various elements in structural, historical and architectural terms. In both these cases much of the structure was inaccessible, obscured by plant growth, fallen rubble and other dirt and debris, and dangerous. Therefore some work was necessary before a complete analysis could be undertaken. At Greenhill a totally separate scaffolding contract was let and proceeded by stages, allowing scaffolded parts to be temporarily propped and cleared before the succeeding piece was scaffolded. At Thorpe a separate preliminary contract was entered into for the specific purpose of clearing, propping, partial scaffolding opening up for inspection and high level examination, and propping timbers and scaffolding and some other plant were purchased as this was cheaper than extended hire.

In both cases these procedures paid handsome dividends and could with advantage be more frequently adopted. Until an historic structure is fully analysed and to some extent opened up for inspection it is usually not possible to establish exactly either the scope or technique of repair, and once a main contract has been

Fig. 3

Survey drawing of the inner face of the front wall of Greenhill before repair. The cross hatching shows timber lintels and the tone the position of dressed stonework on the exterior face; the letter (A) indicates abutting gable and cross walls still not fully investigated when the drawing was made. Except at the south (left hand) endfloors have collapsed but their levels and form can be deduced from the joist holes many of which are in the lintels above the openings. The gables, indicated by the broken lines, have collapsed but two kneelers remain. The dotted line denotes the exterior ground level and when the drawing was done the ground floor areas were still partially filled with rubble (B) and some openings blocked or inaccessible. The letter (C) indicated three large original openings reduced in size in the late eighteenth century; others have been further altered in the nineteenth and twentieth centuries and most have later joinery. At (D) is a surviving fragment of an unglazed timber window frame, subsequently reinstated.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let any delay to allow further analysis before deciding what should be done will cost money, with the consequent temptation to make hasty decisions that are less fully informed than they should be.

Opening up an investigation must itself be undertaken with caution. Lack of care when a structure is in an unstable condition may lead to local collapse or worse, and wholesale removal of finishes or of the infill panels between timber framing can result in loss of valuable historic artefacts which might have been saved and repaired and, especially if adequate records have not been made, also in the loss of vital evidence having a bearing on later decisions. At Thorpe one fragment of Elizabethan external rendering survived and was found when a Victorian wall was removed; it provided the only non-conjectural clue as to how window surrounds should be treated later and could easily have been removed along with the later wall. Even the best of contractors cannot be expected to possess archaeological knowledge and it is necessary to give very clear instructions as to what should not be removed, as well as what should.

For both buildings very full measured survey drawings were prepared but could never be regarded as totally complete or accurate because discoveries were being made throughout the period of rehabilitation, while deformations of walls and irregularity of plan forms made piecemeal survey work subject to approximations and assumptions. The most valuable information in both cases was obtained from surveys of the internal faces of walls (Figs 3 and 4) on which it was possible to depict alterations to openings and structural deformations together with sectional information as to roof and floor construction, loads on walls and changes of level. Internal wall elevations are far more informative than external elevations, plans or pure sections although obviously these are also essential. Plans also need to be analytical and structural, showing the structural framing of the floors beneath one's feet (where there are any!) and not simply the layout of the rooms; where floors or

Fig. 4 (opposite)
This elevation of the inside face of the west wall of the south wing of Thorpe Hall shows a whole series of alterations extending over some four centuries; as a result there is multiple cracking and local overloading. The value of an internal elevation in showing sections through floors and roofs, and the way they bear on the walls, is well illustrated.
The solid outline rectangle at (A) indicates a late sixteenth-century opening of which the lintel ends and one reveal survive; moulded bricks from a similar opening are built into the wall at (B). The rectangular openings at (C) and (Ð) date from a remodelling of the elevation probably carried out about 1700; those at (D) have been further overlaid by nineteenth-century alterations. The interruption of the first floor structure at (E) is due to the floor being trimmed across the face of the chimney stack.

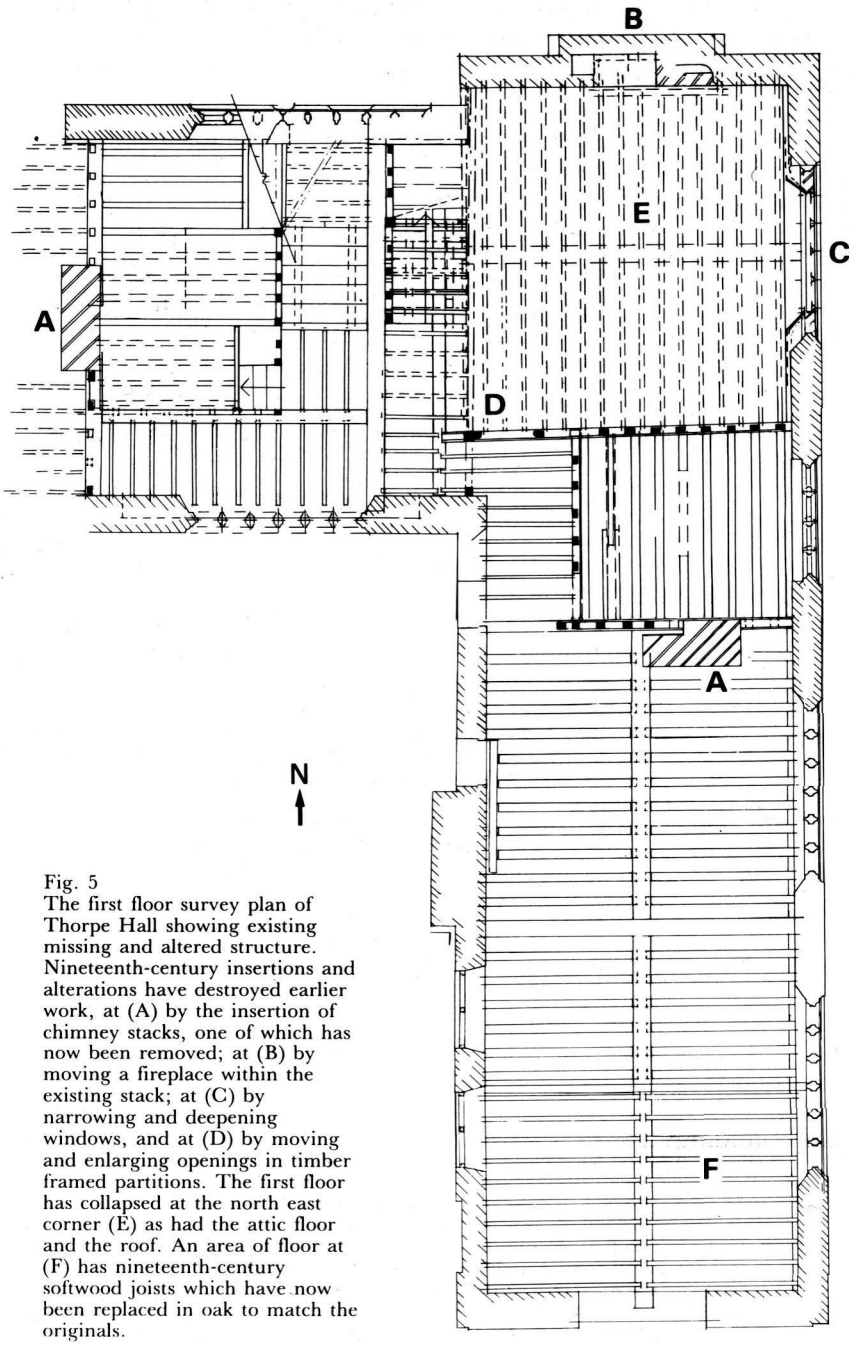


Fig. 5
The first floor survey plan of Thorpe Hall showing existing missing and altered structure. Nineteenth-century insertions and alterations have destroyed earlier work, at (A) by the insertion of chimney stacks, one of which has now been removed; at (B) by moving a fireplace within the existing stack; at (C) by narrowing and deepening windows, and at (D) by moving and enlarging openings in timber framed partitions. The first floor has collapsed at the north east corner (E) as had the attic floor and the roof. An area of floor at (F) has nineteenth-century softwood joists which have now been replaced in oak to match the originals.

other elements have collapsed the deduced layout as shown by beam and joist holes, and mortices in standing timbers, should be included as an aid to analysis and understanding of the way the structure was put together and intended by its builders to work (Fig. 5).

Failure to understand how the original builders intended the structure to perform leads to ill-informed and incorrect decisions on repair and to further defects later. In an old and much altered building it is almost always the case that a large number of the defects present is due to previous injudicious alteration which has caused local settlement and overloading. In serious cases this may lead to structural failure; more frequently it causes movement which subsequently re-stablizes and can be largely disregarded, but it is important to know the difference. Apparently serious movement liable to cause failure may also be found to have a specific cause and be quite localized; at Thorpe there was serious cracking in the west side of the main south gable which was thought to be in danger of causing a collapse but which when opened up was found to be caused by the insertion of a later flue leaving only a thin external wall; any collapse would probably have been local and would have presented little risk to the main structure, and repair was relatively straightforward.

In neglected and ruined structures the other main cause of structural failure is decay, the main agent of which is damp which allows fungal and insect attack. On the whole it is easier to detect decay in a totally derelict structure than in a complete building where its agents can operate unseen and unsuspected. Paradoxically also after a certain stage of dereliction is reached the spread of decay is slowed because of improved ventilation, but it tends to continue working away beneath piles of debris and at Thorpe stair treads that were thought to be sound, and had been unconcernedly walked over, were found to be quite badly rotted when the debris that covered them was removed. By contrast, at Greenhill, growths of ivy, generally regarded as an arch villain in relation to ruined buildings, had clearly protected much of the structure; when it was removed the newly exposed wall surfaces did not even need re-pointing although on both buildings it was a different story where vegetation, including young trees, had acquired such a hold that the roots had grown well into the masonry. Parts of the walls of both buildings had to be re-built solely from this cause, the main offender being Buddleia.

The primary objective in both of these projects was the bringing back into use of derelict buildings—re-cycling. There was however an equally important secondary objective—the preservation of interesting historic structures and artefacts without which the primary aim would have lost much of its point—at Thorpe in fact virtually all of its point since the re-development value of the site

exceeded that of the building and the repair was a long way from being financially viable. Because of the condition of the building it was necessary to arrive in each case at a fundamental decision about the repair philosophy to be followed, by which all detailed decisions would be guided and to which they would be subservient.

At Greenhill this fundamental decision was virtually the acceptance of the *status quo;* economics and the proposed use of the building to some extent dictated that new internal structures should be of simple modern design but that the materials of the external envelope would be appropriate to the building and its setting, and of good quality. There was however to be a minimum of replacement, the acceptance of alterations to openings made in former periods and simplicity in the detailing of new journey; in the reconstructed parts exposed concrete lintels were used where no other evidence existed and were frankly expressed with the aggregate exposed. There was generally no attempt to 'put back the clock' or restore original features but some later alterations, especially to fireplaces, were removed because their repair would have proved uneconomic and their removal allowed intact original features which had been wholly or partly obscured to be seen and appreciated with less expenditure.

The situation at Thorpe was less clear cut. The later alterations were of less interest and in many places had been done with little respect for much of the earlier work, cutting new openings, altering shapes of windows, obscuring timber-framed partitions and applying Roman cement and other hard renderings over interesting earlier stonework details and brick and flint facings. Over the years of neglect all of this later work became so badly vandalized that repair would have been very expensive to contemplate even if justified on other grounds; in fact because the decay of the building had revealed the earlier work once again, and in a substantially complete state, the more recent alterations were regarded as expendable.

In effect in both cases a hierarchy was established whereby original or early structure was to be sacrosanct, interfered with only where absolutely necessary to allow adequate repair, while later structure was to be of secondary importance and its removal or alteration allowed for good economic, aesthetic or planning reasons.

At Greenhill most surviving later work did not in fact need removal. Nineteenth-century joinery which had been exposed to the elements for a quarter of a century proved in many cases to require no more than re-glazing and painting (in striking contrast to modern replacement joinery which is so frequently found to have rotted after about ten years) and badly weathered stonework was only replaced if it could no longer fulfil its structural function; if

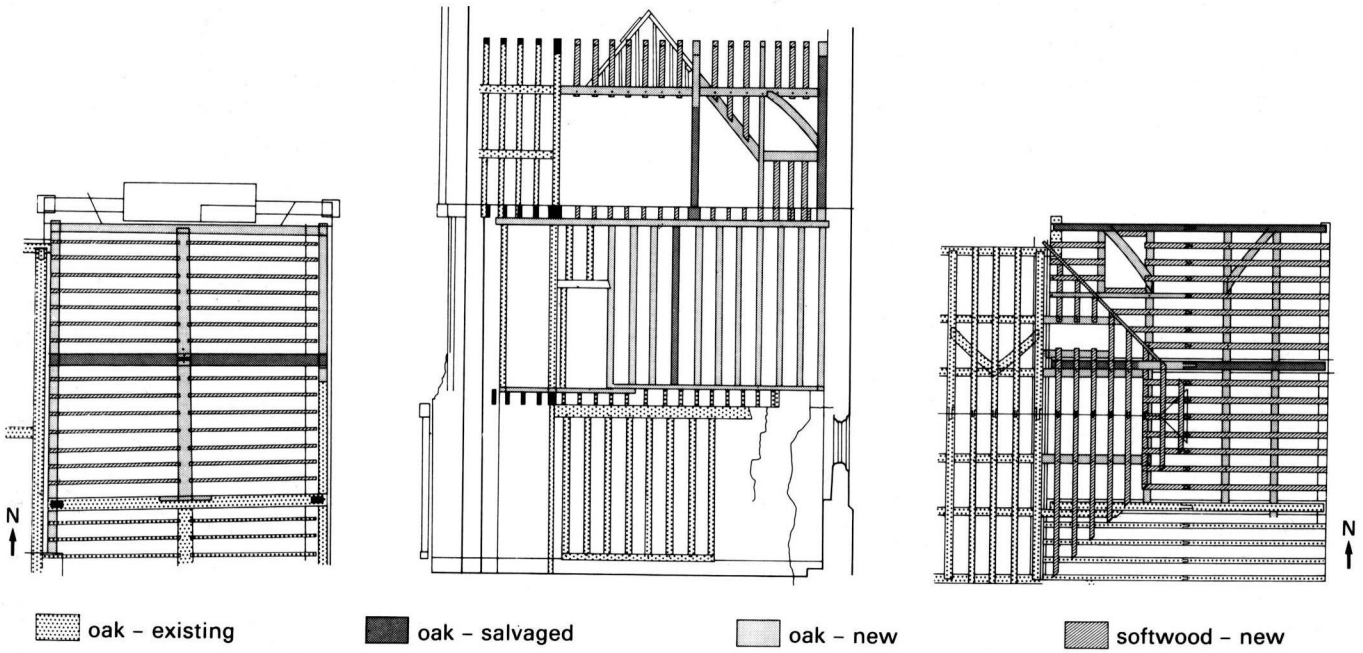


Fig. 6
Plans and sections showing the reconstruction of part of the roof (right), attic floor (left) and a first floor partition at Thorpe Hall. Some of the timbers are shown *in situ* and some salvaged from heaps of collapsed material; others are new oak, where architecturally significant, of softwood where not seen. English oak was used throughout for repairing the old structure but softwood was considered acceptable for re-construction of collapsed areas where it would be invisible in the finished building.

it was simply a case of uneven profiles new window sub-frames were scribed to fit. In the still roofed section old wall plaster was matched into and even old faded paintwork left in place.

Considerable re-construction was of course necessary in both buildings. At Thorpe the collapsed remains of the floor, partitions and roof at the north-east corner were found piled up in the ground floor of the building and were hauled out by crane. In a number of cases the old timbers were sound enough to re-use and their correct location could be identified from carpenters' marks and mortices, and from beam and joist holes in walls. New timbers were used where the old timbers were unsound or could not be found or identified, following the form of the original and using oak where they would be exposed on completion but softwood where they would be covered (Fig. 6). One attic floor beam which was re-used proved in fact to have insufficient strength and was found later to have cracked after being placed in position so that it had to be strengthened with steel.

At Greenhill new floor and roof structures were designed to be inserted into the surviving repaired shell, with only minor modifications from the form of the original. In a smaller structural compartment at the north end of the building a new staircase had to be inserted, and needed to relate to a number of different levels; to achieve this it was necessary in one place to move an opening in a stone wall and at one level to change the direction of span of the floor joists, while over a basement area the floor was required to be incombustible and concrete was used. In the main central compartment of the building the floors were reconstructed to follow exactly the pattern shown by the structural evidence but a central timber partition for which evidence was found, and which must have contributed to the support of the floors, was omitted and steel columns and beams substituted to allow more open planning. The original floor joists and beams had been of oak but for the re-construction softwood and steel respectively were used; the steel was cased as one-hour fire resistance was required but it was possible to leave the timber joists exposed by coating them with intumescent material to give a fire resistance of half-an-hour. Headrooms in some areas were low but to alter the levels would have upset the relationships with fireplace hearths and window and door openings. As at Thorpe floor beams were found in the rubble but they were generally too decayed to be of use.

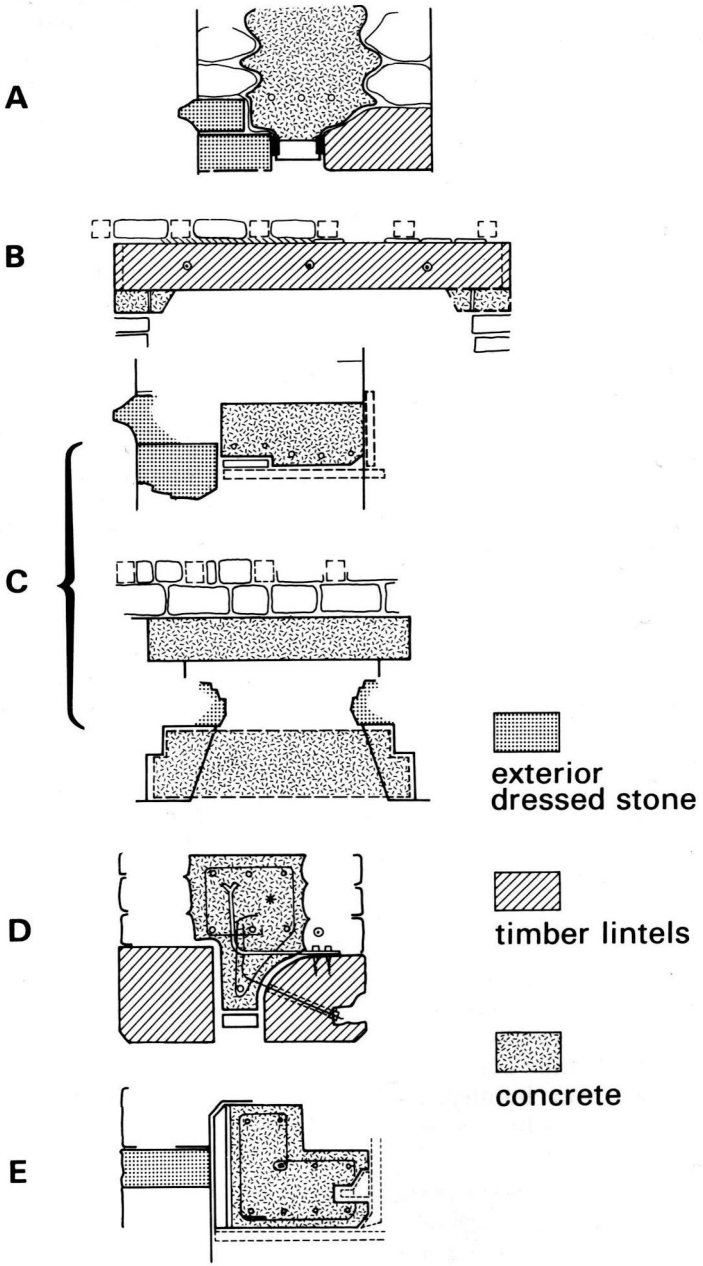
Re-construction following the original form is important because it means that the structure will behave in the way its builders intended. All new structures and newly loaded ground are subject to settlements and movements; over the years initial movements can largely be expected to stabilize though some seasonal temperature and earth movement may remain. Old buildings are

generally flexible enough to accommodate these unless there are special factors, the most frequent of which are decay (often due to neglect) and bad repair or alteration. The latter may include the use of inappropriate materials but changes in loading patterns as a result of cutting structural members and forming new openings are a frequent cause of distress or failure. Repair and re-construction should wherever possible respect the status quo and be preceded by careful analysis to show that this is understood.

Failure as a result of bad building or simply wearing out is much less common. At Thorpe the main east wall was badly deformed at first floor level, more on its external than its internal face; it seemed that it had been pushed by some movement of the roof and had deformed under eccentric loading due partly to a lack of cross partitions to tie it and partly to a weak core which allowed the wall to split internally. One cannot be certain however that even this failure was the result of original bad building because it may be a medieval wall into which much larger openings were inserted in the late sixteenth century, leaving it in a weakened state. In repairing the south end of the building a supplementary first floor supported on diagonally braced steelwork has been provided above the earlier joists to act as a stiffening diaphragm, and a continuous concrete beam inserted into the wall at first floor level. Such modern insertions are of course much less flexible than the old work and can set up undesirable stresses; the best repair policy is to ensure a state of equilibrium in each of the constituent parts of a structure and not to rely too heavily on one part being restrained by another. A modern engineering approach is by no means appropriate in most cases.

At Greenhill most of the problems with the old unroofed structure were related to openings, mainly because of decayed timber lintels (Fig. 7). It is normal for timber to decay where it is least ventilated; consequently the parts of lintels at risk are the bearings and the concealed rear faces. In many cases the bearings had decayed while the remaining parts remained relatively sound but the rear faces were also generally suspect, aggravated by the fact that, as is normal practice, the timbers had originally been built in with their heart side exposed to the internal face, leaving the sap and wane concealed in the wall. Generally the lower face edges were stop chamfered and in a number of cases window lintels doubled as floor beams, with shouldered mortices for the missing joists.

During repair most lintels were exposed on their concealed faces or taken out completely to allow concealed decay to be removed and hidden surfaces treated; almost all however were replaced in their original positions. In most cases the weakened lintels could not be relied upon to bear much more than their own weight and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exterior
dressed stone
timber lintels
concrete

that of the masonry immediately over them. Concealed concrete relieving lintels were therefore built into the walls above, taking the place of the rubble core and being cast between the inner and outer faces. In some cases, especially where they had to carry new floor joists or supported intersecting beams, the old lintels were in addition bolted up to the relieving lintels by means of cranked stainless steel rods with threaded ends. Where beams intersected the lintels, which occurred only in that part of the building still retaining its original floors, the joints were suspect and concealed steel channels and joists were used to transfer the loads of the beam ends to the walls and relieve the lintels of most of the weight.

Where the lintel bearings were so decayed as to be totally unreliable concrete corbels were cast beneath them to produce adequate bearings on sound timber and where entire lintels were so decayed that they had to be removed completely their forms were reproduced in concrete; this was also done where lintels were missing but where their size and form were clearly identifiable from the bearing sockets. There were a few cases where the masonry above the openings had collapsed leaving no evidence and here new concrete lintels were used. The concrete, which was vibrated, was of course much denser than the original wall structure and precautions were taken to ensure that rain driving into the walls and finding its way to the tops of the lintels, whether concealed or exposed, would drain outwards rather than inwards. Existing timber lintels were in many cases used as permanent shutters for the concrete and separating membranes provided firstly to protect the timber from saturation when the concrete was poured and secondly to ensure that timber and concrete did not bond and were free to move independently. Permanent shuttering in the form of woodwool slabs was also widely used; this is relatively easily cut

Fig. 7 (opposite)
A composite drawing to show methods of lintel repair at Greenhill, using concrete. These are typical but in fact every opening in the building required individual assessment and a slightly different solution.
A. (Section) where a lintel is sufficiently strong to bear its own weight, a concealed concrete lintel is cast above and behind it, in the core of the wall.
B. (Elevation of interior face) where bearings are weak, concrete corbels are cast beneath them to extend the bearing area.
C. (Section, internal elevation and plan) using the evidence of bearings a concrete lintel simulating timber is cast where the original has disappeared or is too decayed to save. Concrete lintels are also cast where no evidence existed, but with an exposed aggregate face to show that there was no historical basis for their form.
D. (Section) where an old lintel also carries floor joists it is additionally bolted or strapped back to the concealed concrete member.
E. (Section) a simulated concrete linel cast complete with joist holes into which new joist ends were later fitted.

to shape, is inert, forms a good bond with the concrete, has an acceptable finished appearance and saves the trouble of making and removing temporary shuttering; it is wise however to caulk the joints to prevent leakage of liquid concrete. The bearings of relieving lintels were in all cases carried beyond the timber lintel bearings to ensure distribution of the loads direct to masonry.

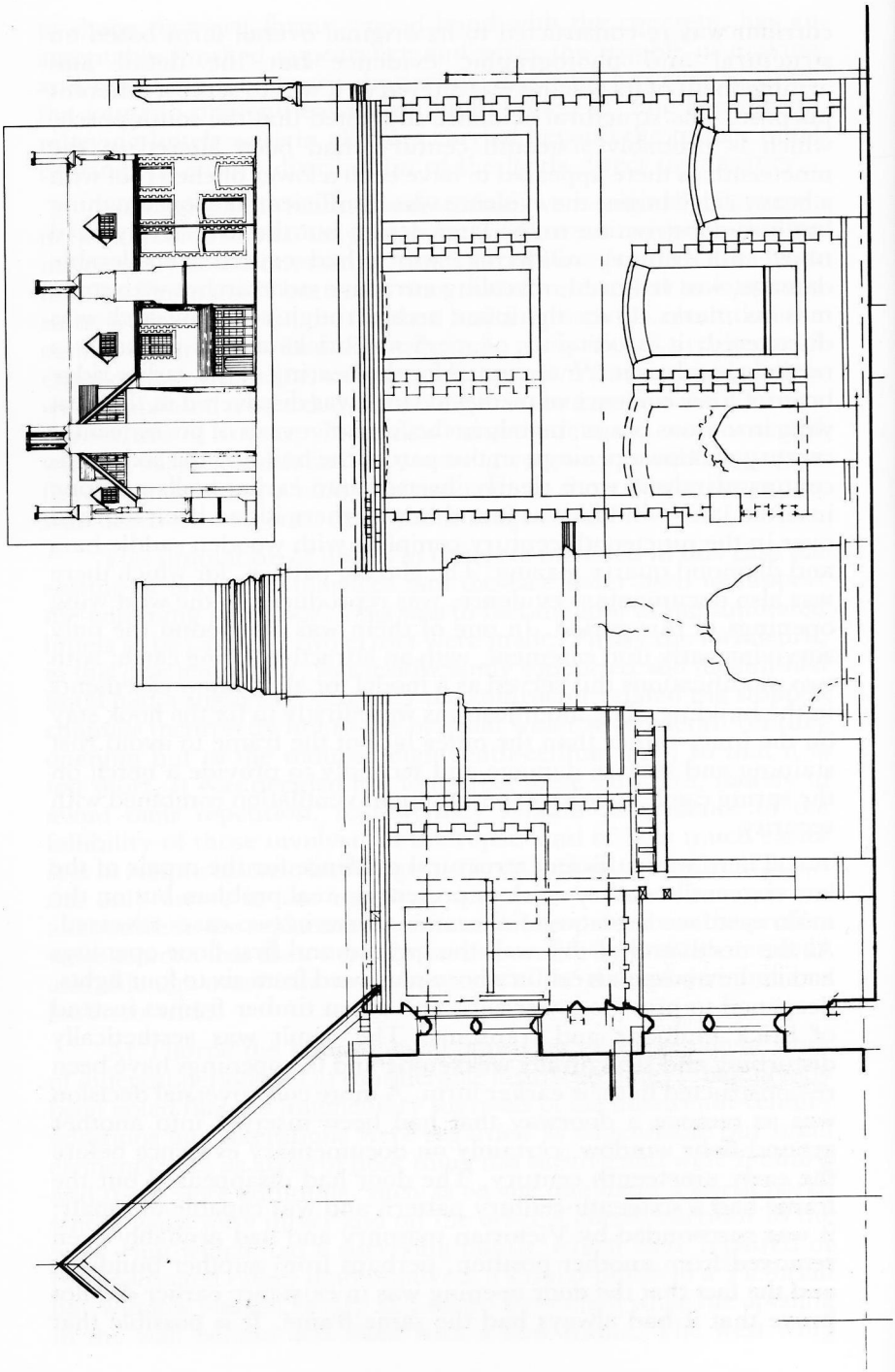
Although all the internal wall surfaces were originally plastered, in the unroofed section only fragments of plaster survived, including incidentally some interesting small decorative features cast from moulds like pats of butter; it was therefore decided to leave the stone walls exposed in the finished building with the result that the concrete work described above became a significant architectural element and was deliberately treated as such. Where missing lintels were simulated a boarded shuttering was used to give the concrete the texture of timber; where new concrete features were inserted without historic evidence they were given an exposed aggregate finish, establishing a kind of visual code to show where the repair was based on evidence and where conjectural.

The simulation of lintels in concrete included in one case the casting of floor joist mortices into the face, later used to support the adjoining new floor. This was in fact the first of the simulated lintels to be case and two errors were made. Firstly the formwork, in this case temporary, was insufficiently supported and the finished lintel had a slight sag; secondly the contractor related the stopped chamfer incorrectly not to the original wider seventeenth-century opening but to the reduced eighteenth-century one, so that it is too short. It was decided not to correct these mistakes, merely to avoid their repetition, so that they remain as evidence of the fallibility of those involved in the repair and of how much easier it is to restore historic buildings incorrectly than correctly. It is not the only error; in the relatively few cases where there was no alternative to the replacement of stone window members the profiles were so worn that they were almost impossible to establish correctly and although every care was taken some of the new splayed mullions look too wide.

At Thorpe the philosophical approach to the repair of work of different periods led to considerable heartsearching. It has already been noted that the fragmentary survivals of the nineteenth-century additions and alterations were regarded as expendable but small elements such as areas of floor tiling did survive and were retained and there were additions, such as on the one hand a north porch whose walls were intact and on the other a glazed corridor to the west wing which had a surviving plinth, which were repaired or re-constructed rather than removed; a similar plinth to a Victorian bay window was left simply as a raised flower bed while the opening in the wall behind was filled with a new frame. The west wing

corridor was re-constructed to its original overall form based on structural and photographic evidence but the detail and arrangement of its glazing was altered as it was to serve a different purpose. The structural evidence suggested that the south porch, which is probably sixteenth century, had been altered in the nineteenth as there appeared to have been a lower pitched roof with a heavy ridge beam; the evidence was insufficient to allow anything but a re-construction to the later design but the excessively hard nineteenth century rendering, which had caused considerable damage, was removed, revealing attractive stone arches with some masons marks. Over the inner arch a rough relieving arch was discovered; it is certainly of medieval bricks and is probably a medieval arch as it is interrupted for the bearing of the earlier ridge beam. Other evidence of medieval work was discovered in the west wing in various places, mainly in the form of reveals of pre sixteenth-century window openings; in this part of the building the sixteenth-century windows were clearly inserted into earlier walls and one inserted later window was found intact where it had been blocked over in the nineteenth century complete with wooden saddle bars and diamond quarry glazing. The glazing pattern, for which there was also documentary evidence, was reproduced in the west wing openings of this period. In one of them was also found the only surviving early iron casement, with an attractive spring catch; with two modifications this served as a model for all the new casements in the building. The modifications were firstly to fix the hook stay on the inner rather than the outer face of the frame to avoid rust staining and surface damage and secondly to provide a notch on the spring catch in order to permit night ventilation combined with security.

There was sufficient structural evidence for the repair of the late sixteenth-century work to present no real problem but on the main east face subsequent alterations were in two cases reversed. At the north end of this wall the ground-and first-floor openings had in the nineteenth century been narrowed from six to four lights, deepened to provide lower sills, and given timber frames instead of brick mullions and transoms. The result was aesthetically disturbing and structurally weakening and the openings have been re-constructed in their earlier form. A more controversial decision was to remove a doorway that had been inserted into another ground-floor window, certainly on documentary evidence before the early nineteenth century. The door had disappeared but the frame had a sixteenth-century pattern and was capable of repair; it was surrounded by Victorian masonry and had probably been removed from another position, perhaps from another building, and the fact that the door opening was in existence earlier did not prove that it had always had the same frame. It is possible that



the doorway was inserted when the west façade was re-modelled, at which time the Hall was probably let as a working farm. It was not required as part of the present owners' plans and so this earlier window opening too has been re-instated; the door frame has been re-sited in the west wing where photographic evidence recorded the previous existence of a similar frame (dated 1608) that disappeared while the building was in its decayed state. Except in the west wing the glazing pattern adopted is of larger, rectangular panes; this is the earliest for which there is either structural or firm documentary evidence but it seems unlikely to be the original.

The previously mentioned remodelling of the west façade of the main part of the building took the form of rectangular quoined and arched openings some of which seem to have been built as blanks while others had mullion and transom windows. Fragments of such windows survived but whether they were contemporary with the remodelling is hard to say. The entire façade had been altered again when the Victorians added service facilities and a back staircase. Around the rectangular openings pieces of brick windows similar to those in the east wall opposite had been built in and in one place evidence of a reveal and two cut ends of a lintel survived so that it was clear that the west facing windows had previously matched those on the east.

Once the Victorian additions were removed the scars that remained were simply disfiguring and the inserted openings had also weakened the wall. There was insufficient evidence to allow anything other than a very conjectural restoration of the sixteenth-century window pattern and it was decided to re-construct to the pattern of the intermediate period. In one place however even this was missing and there was just a pair of large nineteenth-century openings separated by a rather weak pier of sixteenth-century (or possibly earlier?) masonry (Fig. 8).

Fig. 8 (opposite)

The west elevation of the south wing at Thorpe Hall (see also Fig. 4). The work is a mixture of periods with a possibly medieval chimney stack and evidence of large sixteenth-century window openings. This elevation was heavily remodelled about 1700 but there are also later alterations overlaying the remodelling. It was decided to repair the elevation by reconstructing the pattern of the *c.* 1700 remodelling as there was insufficient evidence of earlier work and the later insertions made no architectural sense, having been related to additions that have now been removed.

At the left-hand end of the ground floor however there was no surviving evidence at all; the late openings were therefore accepted and a totally new structure in the form of an oak-framed half-glazed bay was added externally. The inset shows the finished pattern, including reconstruction of the top of the chimney to a form related to but not matching the missing chimneys shown in old photographs, and new dormer windows placed where they would not interfere with early roof structure.

The philosophy adopted throughout was that repair and any re-construction which proved necessary would only be undertaken on clear evidence consistent with historical function and so the treatment of these holes, accompanied by complete lack of evidence, posed a considerable problem. The only answer seemed to be, as William Morris would have expressed it, to leave history in the gap, but what sort of history? A totally twentieth-century solution, with plate glass and anodised aluminium, or some sort of *pastiche*? The same problem presented itself elsewhere, in the south wall of the west wing where not only had the Victorian bay been demolished but part of the wall to the west of it had collapsed, and in the south gable where following the removal of the original service wing modern window openings of inferior design had been inserted leaving no evidence of what was previously there, except that, since there had been a service wing, there clearly had not been windows.

What was decided upon in all these cases was to add oak-framed screens, in two of the three cases in the form of a bay hung on the exterior face of the building, that on the south gable being two storeyed. The infill of the frames, part window and part brick spandrels and in two places with old door frames incorporated, and the roofing of the bays, matches the materials and it is hoped the general feeling of the main building while appearing clearly different. It is *pastiche,* and has been referred to rather disparagingly as neo-Edwardian but it was felt that in this case the character and texture of the original, and the domestic use of the building, made it appropriate (Fig. 2).

A difficult decision at Thorpe, historically, aesthetically and technically, was whether or not to render the exterior. In the late sixteenth-century re-construction the majority of the external surfaces had obviously been rendered and in the nineteenth century had largely been re-rendered with a most unpleasant hard material. Much of this had to be removed in order to repair the structure behind adequately and to remove vegetation. What was revealed was, to modern eyes, a most attractive mixture of old brick and flint, with some stone, which was nevertheless largely random built and which an Elizabethan eye would not have wished to see exposed. A decision to re-render with a soft limewashed stucco was not however straightforward; the west chimney, possibly medieval, appeared never to have been rendered, nor did the remodelled section of the west elevation, while the medieval south façade of the west wing was built of knapped flint and surely intended originally to be seen. There were also attractive stone arches, complete with masons' marks, in the south-east porch. Whichever decision was taken therefore had to be at least partly incorrect historically; even the main east façade, almost entirely Elizabethan, was not unaltered. Some of the masonry may be medieval and there

is a post-Elizabethan eaves cornice of uncertain date whose construction, it was discovered, had been accompanied by the cutting away of all the Elizabethan first-floor window pediments on this face of the building. The principal technical factor was that in view of the random construction a soft rendering would obviously protect the masonry from the weather.

A decision not to render had more or less been taken when an unanticipated problem arose; the delivery of the special moulded bricks required for the repair and re-construction of most of the windows became so delayed (due to drying and kiln problems disrupting production during the previous winter) that the entire repair programme was threatened and emergency action had to be taken. The result is that all the Elizabethan windows are now rendered, on the evidence of the one surviving piece of early rendering, but the walls are not—and beneath the rendering, instead of moulded brick, many of the windows are built of simulated concrete bricks cast on the site. Only the smaller, slightly earlier, windows of the west wing, clearly inserted in medieval walls, have been left in exposed brick.

The question of what history to leave in the gap posed if anything a greater challenge at Greenhill due to the demolition of the exterior gables. First, the correct roof form had to be established. There was clear structural and photographic evidence that the main central part of the building had had twin gables to both front and rear elevations but the form of the roof which covered these was uncertain. When the initial feasibility study was done the assumption was made that there had been a continuous main ridge with subsidiary ridges running out to each of the four gables but when a detailed structural survey of the ruins was made the writer was far from convinced about this; the structural evidence appeared to indicate a valley between the pairs of gables but this and available photographs were insufficient to prove the case. The point continued to be a matter of uncertainty and debate until a member of the Derbyshire County Council's conservation team was able to obtain an aerial view of Wirksworth taken by the Royal Air Force before the roof collapsed. An enlargement from the photograph proved that the valley had in fact run through and the ridge was discontinuous, which confounded most of the expert opinion on the subject and aptly illustrates the need to base decisions about repair on firm evidence and not on conjecture or precedent, however well informed.

With the form of the roof settled it was still necessary to decide on the treatment of the re-constructed gables and there was a time when it was felt that an infilling of glazing within a timber or metal frame, leaving the irregular outline of the ruined stonework below

it, would have been a more honest expression of what had been done. It was however abandoned in favour of a more conservative re-construction in matching stone externally, although the rebuilt parts can still be identified internally by a string course of exposed textured concrete supporting concrete block walling. The exposed concrete marks the position of a continuous beam at eaves level, inserted between the inner and outer faces of the old walls before the gables were re-built in order to strengthen them, particularly a section of the front wall which had developed a considerable inward lean and from which the new gables had to be built vertically; the beams are returned for some distance into the cross walls. Exactly matching local limestone for the gables was not obtainable; what has been used is a relatively close match from further afield and the re-building line is visible not only as a result of this but due to the new stone being saw cut and more regular. In order not to emphasize the regularity the new work was built to random depth courses and the edges were knocked off the front edges of the stones as they were laid. The new and old stonework of the entire street façade was then re-pointed in one operation with mortar of the same colour and texture. The slightly visible change in the character of the walling is not unpleasant, and is just sufficient to allow the modern repair to be evident and not to deceive (Fig. 1).

The modern gables are of cavity construction and the roof valley was raised and widened to give better headroom in the top floor office space and allow easier roof maintenance in the future. Soon after completion some trouble was experienced with water penetration at a level roughly coinciding with the bases of the new gables but in places a considerable distance away from them. The diagnosis of this problem proved extremely puzzling until a consulting structural engineer who was also a member of the Derbyshire Historic Buildings Trust suggested that water could be finding its way into the cavities. On investigation it was found that although great care had been taken to design the upper surfaces of the eaves-level beams so that water would drain outwards, and to provide damp-proof courses above them, inadequate provision for the actual drainage of water had been made. The amount of water entering the cavities through the stone external leaves of the west gables in the driving rain of Wirksworth was unbelievable, and on each occasion quite large quantities of water ran along the top of the concealed beam, round its return ends, and came out well inside the building. At the engineer's suggestion additional weep holes were provided through the external leaves of both west gables and an instant cure resulted. It is a salutary example of the unforeseen difficulties that may occur and the precautions which must be taken when new techniques and construction are introduced into an old fabric; a more modern and larger scale parallel with the introduction of new wine into old skins perhaps.

Re-pointing was briefly referred to above; this and rendering are both critical and, at the vernacular level at least, often unappreciated factors in the technical performance and aesthetic character of old masonry. Technically the most important aspects, which are well documented, are adequacy of key, weakness of mix and porosity so that the natural cycle of absorption and evaporation in the wall is not inhibited; hard mixes also cause considerable physical damage to softer masonry when they are removed and there is plenty of evidence of this at Thorpe Hall. On the aesthetic side, it is important to examine closely the old mortar and to experiment with trial samples. Lime and sand mixes gauged with a little ordinary Portland cement proved too grey at Thorpe but when white cement was used instead a good match was achieved. At Greenhill the old joints had something of a sparkle and a good proportion of black flecks, possibly from particles of ash in the original lime; to reproduce this half of the normal sand aggregate was replaced by a ground limestone spar normally supplied for industrial use, and a little crushed charcoal was added to each batch of mortar.

The texture of the finished joint and the position of its face in relation to that of the brick or stone are equally important. Traditionally joints were probably re-pointed with a flush face and a smooth finish but if this is repeated on old weathered surfaces the result is that the joints are far too prominent visually and feather edges which trap water are produced; mortar must be kept back sufficiently not to encroach on weathered edges and to allow the units of masonry rather than the joints to predominate. Because this is to some extent an unnatural situation, reproducing a pre-weathered effect it is also appropriate to produce a weathered surface on the mortar itself. Frequently it is done by brushing or stippling but this almost always results in undesirable brush or stick marks and the best effects are undoubtedly achieved by spraying with water. It is not possible to generalize about the appropriate texture. On the rubble masonry of Greenhill all the joints were finished with a gentle spray from a hose to expose the aggregate and match the sparkle and black fleck of the original while at Thorpe there is a variety of finishes depending on the date and character of the original wall and whether it is predominantly of brick, rubble flint or knapped flint. Some was sprayed, but one of the most successful techniques, suggested by one of the bricklayers, was just to flick the face of the joint with water from a grass brush after the work was finished. A golden rule in all cases is never to undertake more re-pointing than is necessary; frequently money is seen to be wasted on the entire re-pointing of a building which is badly carried out and where aesthetically and technically it would have been better not to have done it at all.

Never undertaking more of anything than is necessary is *the* golden rule of all repair of old buildings: alteration is always accompanied by destruction and even relatively conservative repair can destroy subtle and fragile evidence of past history.

Sometimes of course a balance has to be struck and value judgements made. At Thorpe it was necessary to light an attic bedroom against a gable and the choice lay between piercing the gable or inserting a dormer window. Several dormers were in fact provided but in every case in positions where the existing roof timbers had already been repaired, or had collapsed; in this case the provision of a dormer would have been aesthetically questionable and would have disturbed intact early roof timbers. Lighting through the gable meant disturbing early studwork but the studs were simply cleated and nailed in position and not properly framed, so that this was considered less damaging. This particular gable wall, overlooking the lower roof of the west wing, is in fact completely timber framed except where cut by an inserted nineteenth-century chimney stack, and was once internal; the glazing was therefore designed to echo the general pattern of the framing. Another inserted stack which had cut into timber-framed partitioning was removed and the partitioning repaired. In other cases inserted concrete ties, which always destroy something of the structure into which they are inserted, were positioned to avoid the disturbance of archaeological evidence such as joist holes, even where these features were redundant. Archaeological features which are unseen are no less important than those which are. One important discovery at Thorpe was a straight joint and a change of plinth level where two early walls joined at right angles, positive proof that one wall was built before the other. It is covered in the finished work, but it will be there for future archaeologists to see if it is ever uncovered again, as will evidence of window alterations and many other items.

Finding a suitable owner for an important historic building is rather like arranging a marriage. There must be compatibility, sensitivity and give and take. Far too many owners embark on the exercise with a view either to imposing their life styles on the building or to restoring the original, whatever that may mean, whereas they should be prepared to adjust their requirements to suit the character of the building itself, and accept its historical development. The nineteenth-century alterations at Thorpe are examples of the damage that can result from the former attitude. Such alterations are irreversible and are still frequently undertaken; wherever possible any alteration should be both non-destructive and reversible.

Reversibility and flexibility should also be the keynotes to alterations required to comply with building and fire regulations.

These regulations and those who administer them are often blamed for damaging and insensitive alterations to historic buildings but ingenious planning can frequently prevent this. Fire screens at Greenhill, for example, were positioned where they did not produce a conflict with old door frames, and the retention of exposed floor joists by demonstrating that a half-hour fire resistance would suffice has already been mentioned. In the writer's experience there are very few building control or fire prevention officers who are not prepared to listen to reasoned argument and be helpful and flexible in their interpretation of regulations. In both the cases described here the repair of the existing fabric was done in consultation with the building control officers concerned but without formal submissions or calculations, which were only required for the new structure that was inserted.

In both buildings discretion was permitted over such matters as damp-proofing and for the most part walls have not been damproofed at all. With walls of the age and thickness encountered here it is doubtful if such things as chemical injection, whose length of life is in any case open to question, would have been effective. At Greenhill the lowest floor at the north end is completely below ground and water from further up the hill was running in through the walls; instead of trying to stop it a double skin tanked wall was constructed independently with a cavity behind and the water drained out of the cavity by channelling it into the drainage system. At Thorpe independent walls with cavities behind have been built just where vulnerable items like kitchen fittings or skirting heating needed to be positioned and elsewhere ground-floor skirtings or other timber in contact with external walls at ground level have been generally avoided.

Modern fittings and services are of course not always easy to mix in historic buildings and in particular central heating can wreak havoc with old timbers. At Thorpe however it is most noticeable that it is the new timber and not the old which has failed to withstand the drying out. The old timber, despite the fact that it must have become thoroughly saturated when the building was derelict, shows little sign of distress after a first winter of occupation but shrinkage of new timber is most marked. It is mostly air-dried English oak, sometimes in very large sections which had to be taken from the log and which would take years to dry naturally to a moisture content compatible with modern heating standards.

Finally flexibility and open-mindedness are needed on the part of the architect because again and again decisions based on initial observation and survey must be altered when further detailed exploration from scaffolding is done, and plans made and details drawn must be discarded and revised. Virtually every decision

concerning structural repair on both these buildings involved no less than six stages: opening up for detailed inspection; preparation of preliminary proposals; discussion on site; preparation of modified proposals; and execution, involving modification in the light of site circumstances.

As well as six stages there are usually five aspects of any decision affecting an historic building: structural justification; archaeological awareness; philosophy; aesthetics; and economics.

When beginning a project of this kind it is valuable to set out a statement of objectives. In the case of Greenhill a questionnaire was compiled by the author at the outset for discussion with the working party representing the Derbyshire Historic Buildings Trust while at Thorpe an outline schedule was submitted with the grant and listed building applications, not attempting to say precisely what course would be followed in every case but showing how decisions would be guided and what the approach to repair would be. Such documents are a useful means of clarifying the architect's own mind, establishing a rapport with the grant making and planning authorities and informing owners of what to expect.

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