Scaffolding and temporary works for historic buildings

ENGLISH HERITAGE

Introduction
Scaffolding and temporary works are a fundamental necessity of any building project and when they are erected in or around an historic building it is vital that they do not cause damage.

The basics of scaffolding and temporary works in historic environments are not greatly different from the basics of scaffolding and temporary works to any existing building. However this leaflet attempts to highlight some important points which need special attention if damage to historic fabric is to be avoided.

In the non-historic situation, damage caused by improperly erected scaffolding and temporary works, while being tiresome and causing unnecessary expenditure, can often be repaired without serious detriment to the building. Where historic fabric is concerned any damage is permanent; significant detail may be lost or an important facade scarred for ever.

All badly erected scaffolding and temporary works, whether to an historically important building or not, has the potential to allow the collapse of either the scaffolding itself or of the building, with disastrous and possibly fatal consequences. Experience indicates that when things go wrong it is usually owing to lack of attention to seemingly minor details.

Scaffolding and temporary works must be capable of being constructed without the need for major intervention into historic fabric.

Access scaffolds
'Independent tied' scaffolds will normally be provided to gain access to historic building facades for painting, maintenance, or other work. They consist of two rows of standards (the vertical supports) connected by ledgers and transoms (the horizontal elements). They are termed 'independent' because this type of scaffold derives no vertical support from the building and 'tied' because they must be tied to the building for horizontal stability. Because of the need to avoid damage to the facade of historic buildings can present difficult problems. Longitudinal bracing must be used.

Shoring or support scaffolding
These are temporary works erected either because there is a danger of collapse or because it is necessary to remove some vital supporting member for renewal or alteration. Obviously the loads to be carried by shoring can be very great and failure can be disastrous causing major damage to historic fabric.

Neither access scaffolding nor support scaffolding should be expected to carry out the function of the other unless it has been specifically designed so to do.

Responsibility
The failure of a single telescopic prop supporting a major element of a building under repair could have serious consequences. Therefore, as the dangers do not necessarily relate to the size of the project, the architect or engineer should examine the contractors proposals for all scaffolding and shoring. It must be ensured that schemes are erected so as to conform to those proposals. Care must be exercised to ensure that the contractors responsibility for temporary works is eroded as little as possible.

All elements of the permanent works are covered by specification clauses that are often extensive. The same situation is rarely true of scaffolding and temporary works,
Opening the window would have avoided smashing old glass

The correct construction of which is equally important. As damage to historic fabric is permanent and must be avoided at all costs, all contract documentation for works to historic buildings should include a section concerning scaffolding and temporary works.

Statutory inspections

It is a statutory requirement that all working scaffolds are inspected weekly by a suitably qualified person and that the results of these inspections are recorded in the scaffold register.

Necessary features and common problems

The following are some of the features that can make scaffolding dangerous, unsuitable for its purpose or damaging to historic fabric.

Foundations

The soil should be well rammed to ensure that there are no cavities and timber sole plates at least 230mm x 40mm should be used. Where the ground is not firm or where the length of time that the scaffolding is to remain erected exceeds six months, railway sleepers or similar sized timbers are more suitable.

Foundations should always be level and should never be undermined. The foundation and the standard or prop set on it should be concentric to avoid inducing bending moments or eccentric forces.

Typical faults include rotten or missing sole plates, foundations dangerously out of level, eccentric or undermined props, and scaffold should be staggered and made with sleeve couplers. Transoms should be fixed to ledgers with right-angle couplers or, if not adjacent to a standard, with pushpin clips and be at not more than 1.2m centres where required to support boarding. In each bay, one transom should be not more than 300mm from a standard. All transoms should have plastic caps to avoid damage to historic facades. (See also below).

Ties

Badly fixed, incorrectly positioned, and an insufficient number of ties are frequent problems. Any tie taken out to enable work to proceed must be replaced as soon as possible. Through ties (which 'hook' back to the inside face of the wall) must have protective coverings where they touch the inside face of the wall, but such ties may not be suitable where there is paneling to the inside face.

Through ties are simple to use with sash windows. The sash can be raised to allow the tube to pass through, the resulting gap sealed temporarily with plastic sheeting or hardboard, and the sashes screwed to each other to prevent unauthorized entry. Casement windows are more difficult. If they carry leaded lights it may be possible to remove one small pane but casements with a single glazed sheet may need to be taken off their hinges and stored safely.

Regrettably, some scaffolders just smash a window to get their fixings. This is particularly likely in a derelict building.

Reveal ties (which use screw jacks to grip against the reveals of a window) must also be given good protection to ensure that they do not damage the building facade. Sheeted scaffolds will need extra ties.

Fixtures to masonry

Where fixtures are made to stone or brickwork it must be ascertained that the masonry is adequate for this purpose. Such a fixing to a facade could dislodge a stone or an area of brick, thus endangering the safety of the scaffold. All fixings made to the wall of an historic structure must be of stainless steel for two reasons: firstly because ordinary mild steel fixings will corrode and cause rust stains, and
exposed for a long time and have become slippery or damaged should be discarded. Boards should oversail their last support by at least 50mm but by less than 150mm. Boards oversailing more than 150mm become dangerous trap boards, which tip when walked on; conversely those less than 50mm from the transom on which they sit are in danger of slipping off.

Precautions should be taken to hold boards down in high winds. Excessive loading on platforms should be avoided unless the scaffolding has been specifically designed to carry heavy loads.

Guard rails, toe boards, and ladders
Guard rails should be between 914mm and 1143mm above the platform and toe boards must not be less than 150mm high. Ladders must be sound, securely fixed, and set at an angle of 4:1. To prevent unauthorised access by vandals or children, lockable ladder boards should be used when the site is unattended. Alternatively the bottom ladder should be removed. Brick guards are required where there is risk of tools or materials falling from scaffolding.

Scaffolding to building interfaces
Scaffolding, however well constructed, is always likely to move slightly and a tube end rubbing on a wall face can easily cause permanent scarring. All tube ends that either touch a wall or are within 25mm of it should have plastic end caps. All other points of contact or near contact between scaffolding and historic buildings should be protected in some way. All standards should sit on timber sole plates to spread the load and floors beneath should be protected with polythene sheet, old carpet, or similar materials to prevent damage.

Sheeting
Sheeting provided for the protection of the building and/or workforce must be strong enough to avoid tearing in high winds, must not flap excessively and annoy neighbours, and, very importantly, must be fireproof. Rapid spread of fire across a sheeted scaffold is a risk which must be avoided.
Shoring
Shoring must be designed by a competent person and account must be taken of wind, dead and superimposed loads, slenderness ratio of members, slenderness ratio of structure, bracing, foundations, fixing to permanent structure, permissible stresses of materials, safety factors, and any other relevant considerations. The main difficulty with shoring historic buildings is to ensure that temporary works do not cause damage in the process of being installed.

Telescopic props
These may need bracing if they are over 2m high or if they carry heavy loads. They must be plumbed and must be properly founded. It is common to find a missing support pin being replaced by a short piece of reinforcing bar or something even less satisfactory, such as a big nail. Only the manufacturers high tensile steel pin should be used.

Temporary roofs and temporary buildings
Such structures are often erected to protect historic buildings after a fire or other disaster or during roof repairs. In relation to their area or volume they are, by nature, light structures. As a consequence their need for lateral stability and resistance to wind uplift is a major, but often ignored, requirement. It is usually advisable to seek the help of a structural engineer in the erection of such structures. The contractor should always be required to provide a drawing of his proposals and, in any but the smallest of cases, supporting calculations.

Earthling
All scaffolding structures that are at risk from lightning strikes should be properly earthed.

Access to the building
Historic buildings often have important interiors and these must be well protected. Carrying a 7m length of steel scaffold tube into a building is not easy and major damage can be caused by a scaffold inadvertently hitting a single telescopic prop is proposed it is important that some proper estimate of the weight to be carried is made and reference made to literature to ensure that the proposed prop can carry the weight safely.

Architects and engineers involved in historic buildings work (or any other building work for that matter) should have a clear understanding of the requirements of scaffolding and temporary works and be aware of the consequences if something goes wrong. The safety and success of scaffolding and temporary works in the historic building field relies heavily on two things: forethought and attention to detail.

With an historic building there will be no second chance.

Bibliography and further reading

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Compiled by Ian Hume, Chief Engineer, Conservation Engineering Branch, English Heritage, June 1995