

ALTERATIONS TO EXISTING BUILDINGS

Existing buildings go through many generations of change throughout their lifetime, and many of these changes require the services of a structural engineer. In these cases, the engineer is generally only engaged to provide services limited to the alterations currently proposed and will not necessarily check the entire building for structural adequacy unless there is an obvious issue, or has specific instructions otherwise.

This is an important consideration for the client and the engineer - clearly defining scope to a specific area helps to reduce the "grey" areas which have the potential to cause disputes.

Many buildings do not comply with modern building codes and standards. Generally the older the building the less likely that it will comply, and the more likely that it will have age related issues. Mostly this results in a higher level of maintenance than a modern building requires, and most owners of ageing buildings accept that this is part of owning such a building.

Of greater concern than ongoing maintenance is that in contrast to a new building, older buildings do not reveal their secrets easily. Problems can be concealed behind wall claddings and linings, in roof and sub floor cavities. Modern buildings are supervised to a higher level during construction, and records exist in the form of drawings, specifications and inspection records. This makes the task of the structural engineer much easier in understanding how the building was designed, and how to go about designing the necessary changes to accommodate the proposed alterations. For example, designing changes to a concrete slab with unknown reinforcement is not possible unless some destructive investigation or an existing drawing can be found. Even then, there is a chance that the reinforcement exposed is not representative of the entire slab, or that the existing drawing is not correct.

All of these factors result in a higher level of risk for all concerned, which can result in construction, contract and fee variations when demolition reveals a previously unknown problem which needs addressing. It also results in a more conservative design approach by the engineer to reflect the fact that the solution needs to overcome all of the unknowns to a satisfactory level of safety.

Some common problems with existing buildings that are either difficult to detect, costly to remedy or generally do not meet current standards include the following:

- Footing movement and subsequent cracking of brittle wall linings (due to founding on reactive clay soils)
- Rising damp due to lack of effective damp proof course or bridging of the damp proof course
- Bouncy floors due to inadequate timber sizes
- Warping and shrinkage of timber elements due to the use of green timber
- Inadequate subfloor ventilation and weatherproofing (leaking roofs, balconies etc.)
- Rotting timber
- Spalling concrete due to poor concrete compaction and inadequate cover to reinforcement
- Inadequate or non-existent bracing, roof tiedowns and roof sheeting fixings

Of course not all of these issues are a problem, provided that adequate maintenance is carried out. There are many older buildings with non-existent roof tiedowns, whose roofs have never blown away for example.

When engaging a structural engineer, it is reasonable to expect them to understand the implications of the proposed alterations, but bear in mind that they cannot know the unknowable, and will only address those issues that are immediately relevant. In the example above, an engineer is not likely to be concerned with roof tie down in an existing building if they are only engaged to design a new opening in a floor slab, and there has never been an issue with the roof in the past. The same engineer should however be concerned if a tile or slate roof is to be reclad in steel sheeting. Although resheeting a roof is not usually a structural issue, clearly less weight in the roof increases the chances that the existing tiedowns (if any) will not be adequate to resist uplift wind pressures in the future. This is an issue which the engineer should consider.