6.4 Refurbishment of Masonry Building

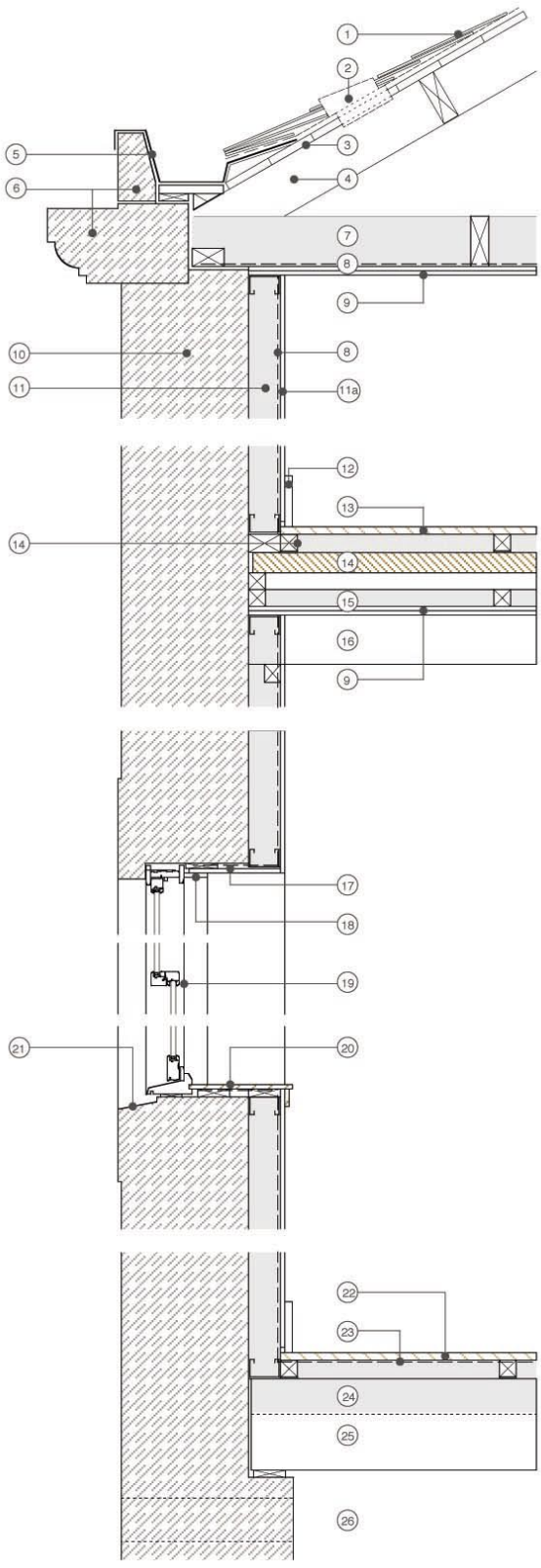
Common form of construction

Typical Specification

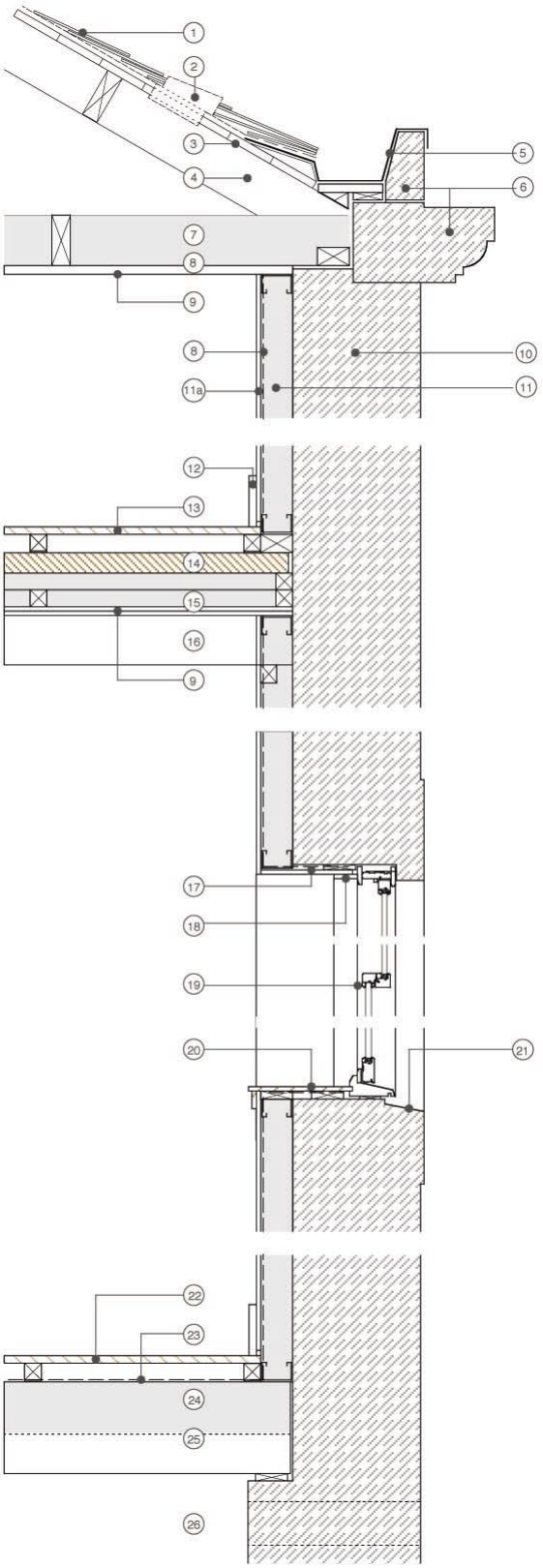
1. Existing slates taken up and replaced, nailed through breather membrane with stainless steel nails.
2. New slate vent and flashing to ventilate attic space
3. Existing 100x20mm softwood sarking on
4. Existing 165x75mm softwood rafters.
5. New lead sheet gutter laid on marine ply sole and dressed under breather membrane
6. Ashlar facing stone naturally bedded.
7. 150mm mineral wool insulation within existing 150mm ceiling joists.
8. Vapour Control layer
9. 2 layers of 12.5mm t&f plasterboard nailed to underside of existing ceiling joists (lath and plaster removed) 2 coat satin emulsion finish
10. Existing Stone External Wall.
11. 100mm mineral wool between 95mm proprietary metal studs fixed to existing external wall

11a. 1 layer of 12.5mm t+f plasterboard screwed to metal studs thru' vapour control layer (existing lath and plaster removed)

12. MDF skirting glued to plasterboard, 3 coat gloss finish
13. Raised 22mm type III chipboard floor screwed to cushioned timber battens 50x50mm at 400 centres, 50mm mineral wool infill.
14. Existing 60mm thick floor boards.
15. 50mm mineral wool insulation within 50x50 softwood battens nailed to joists, with dwangs, to form ceiling between joists
16. Existing softwood joists, lower section exposed, 2 coat varnish.
17. Plasterboard returned to form soffit, vapour control layer continuous over treated softwood or ply packers
18. MDF Soffit lining tacked and glued to window frame and plasterboard, silicon sealed with 3 coat gloss finish.
19. Double glazed replacement timber sash and case window. Silicon sealant all around externally.
20. MDF cill into frame groove and over vapour control layer and packers, silicon sealed and with 3 coat gloss finish.
21. Existing shaped stone cill.
22. Raised 22mm type III chipboard floor screwed to cushioned timber battens 50x50mm at 400 centres, 50mm mineral wool infill, resting on existing floor joists. (existing floor boards removed)
23. Vapour barrier
24. 100mm mineral wool insulation within existing joists, supported by netting.
25. Existing softwood joists, resting on packers.



26. Existing ventilated solum.



Alternative Specification

1. Existing slates taken up and replaced, nailed through breather membrane with stainless steel nails.
2. New slate vent and flashing to ventilate attic space.
3. Existing 100x20mm softwood sarking on
4. Existing 165x75mm softwood rafters.
5. New lead sheet gutter laid on marine ply sole and dressed under breather membrane
6. Ashlar facing stone naturally bedded.
7. 150mm natural, hygroscopic batt (a) insulation within existing 150mm ceiling joists.
8. No vapour Control layer to ceiling (b) [calculation required] Vapour control layer still required in wall
9. Existing Lath and Plaster ceiling finish (b) against existing ceiling joists, 2 coat biodegradable (a) paint finish
10. Existing Stone External Wall.
11. 100mm mineral wool between 95mm proprietary metal studs fixed to existing external wall

11a. 1 layer of 12.5mm t+f plasterboard (j*) screwed to metal studs thru' vapour control layer (existing lath and plaster removed)

12. 19mm softwood (c) skirting board with 2 coats biodegradable (c) paint finish screwed (d) through board to studs
13. Raised 22mm easy access timber (e) floor screwed to cushioned timber battens 50x50mm at 400 centres, 50mm service void beneath. (f)
14. Existing 60mm thick floor boards.
15. 100mm Natural, biodegradable (a) insulation above and within 50x50 softwood battens nailed to joists, with dwangs, to form ceiling between joists
16. Existing softwood joists, lower section exposed, 2 coat biodegradable (g) oil/wax finish
17. Plasterboard (j*) returned to form soffit, vapour control layer continuous over treated softwood or ply packers
18. Timber (c) Soffit lining tacked not glued (h) to window frame and plasterboard, gasket (i) sealed with 2 coats biodegradable (c) paint finish
19. Double glazed replacement timber sash and case window. Dry Gasket sealed (i) all around externally.
20. Timber (c) Cill into frame groove and over vapour control layer and packers, gasket (i) sealed with 2 coats biodegradable (c) paint finish
21. Existing shaped stone cill.
22. Raised 22mm easy access timber (e) floor screwed to cushioned timber battens 50x50mm at 400 centres, 50mm service void beneath. (f) over existing floor joists. (existing floor boards removed)
23. Vapour barrier
24. 150mm Natural, biodegradable (a) insulation within existing joists, supported by netting.
25. Existing softwood joists, resting on packers.
26. Existing ventilated solum.

Explanation

Ultimately, the complete re-use of a building, as described in the above details, is almost always the most effective form of waste reduction, though sometimes it is not practical or cost effective.

Nonetheless, such refurbishment projects can sometimes still produce vast quantities of waste as internal finishes and defunct services are stripped out. The aim of the alternative detail is to show how further refurbishments may be made with minimal waste arisings, and in some parts to indicate ways of reducing waste from the initial refurbishment process itself.

The most important priority, because it addresses the long term use and workings of the building, is the combined use of the easy access timber floor and the service void beneath. This detail allows for simple and therefore cheap alterations in the most likely areas (services provision) and has the potential to reduce by a considerable sum the waste arisings to emanate from the building over the next few generations. The disadvantages of using timber in new build situations are removed and it is also worth noting that at the end of their service life, the boards may be safely composted if they have not been coated in toxic, non-biodegradable coatings.

The use of natural insulation is shown as a high priority because of the relatively high volumes involved. Similarly the retention of the existing lath and plaster, if acceptable, again reduces the likely landfill associated with the initial refurbishment.

The other medium and low priority measures are as such because of the relatively low volumes involved.

HIGH PRIORITY

Easy Access Timber Flooring (e)

This particular detail, in conjunction with the service void beneath, enables very easy access to services during the building's life.

Chipboard is unlikely ever to be re-used and the resin bond is not readily biodegradable. Easy access screw fixed timber flooring is re-usable and is completely biodegradable at the end of its life.

Service Void (f)

This allows for flexibility of services arrangements in the long term without disruption or risk of damage to other components

This measure is likely to reduce major fabric disruption and waste arisings from service re-routing / upgrading - one of the most common reasons for demolition and waste.

Natural Insulation (a)

Some mineral fibres may soon become notifiable waste and so may represent additional cost at the time of disposal.

Natural Insulants are biodegradable and hygroscopic so they can be safely composted – zero waste – and help manage moisture in the building which can be useful in certain cases.

MEDIUM PRIORITY

Keep Existing Lath and Plaster (b)

Keeping the Existing Lath and Plaster reduces the volume of waste destined for landfill.

Hygroscopic insulation materials must be used in the loft if no vapour control layer is to be applied.

Timber with 'Natural' Paint (c)

Neither MDF or conventional paints are biodegradable whereas untreated timber with 'natural' paints can be safely composted.

Timber is also likely to sustain repeated removal and replacement better than MDF.

MEDIUM PRIORITY

Gasket Fixings (i)

Dry gasket fixings allow for complete and easy separation and removal of components.

Silicone and other mastic-type sealants can make meaningful re-use and even recycling of components difficult, costly and sometimes even impossible.

No Glue (h)

Glued connections make subsequent removal, for maintenance or replacement much more difficult, costly and potentially damaging to the component itself and those to which it is glued.

The alternative is simply to ensure that the fixing is made adequately without the need for glue.

Screw Fixing (d)

Causes less damage and allows for greater re-use of materials than nailing or gluing.

Where components may be moved during their service life, screw fixing makes such removal and replacement easy and less disruptive.

LOW PRIORITY

Biodegradable Oil/Wax Finish (g)

Timber components may be safely composted if no re-use can be found, but this may be compromised by chemical treatment or subsequent coatings that render the finished element at least partly toxic and non-biodegradable.

Costs

Replacing the chipboard floor with the easy access timber flooring and service void beneath adds around 25% to the cost of the flooring (although some of that cost is offset to the additional insulation needed in the ceiling beneath) This relatively minor cost increase, together with the major benefits in use make it the most important measure to take.

Substituting natural insulation for the mineral wool in the ceiling adds vastly to the cost, but if the plaster can be retained and touched up as described then the savings from not removing, adding a vapour check, two layers of plasterboard and decoration actually match the cost increases of the natural insulation thus achieving a zero cost increase overall.

With no change in detail to offset the costs of the natural insulation in the ground floor, the increase in cost of the alternative detail is around 300%.

Altering the mdf skirtings, and other linings, along with natural decorations adds approximately 25% to the costs. Sealing the windows with dry gaskets rather than silicon adds only nominally to the costs of installation.

Defects Liability / Insurance Issues

No additional issues have been raised regarding the alternative details.

However, on both details confirmation would be required regarding the risk of summer condensation on the vapour control layer and the need for a ventilated cavity, also the risks associated with cold bridging at the openings where the reveals are left uninsulated.

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(a) **Natural, Biodegradable and Hygroscopic Insulation** (Specification Item 7, 9, 15, 24)
In the case of the first instance of this use of natural insulants, in the loft, it is the hygroscopic nature of the natural insulations which is paramount, since it is this quality which is likely to enable the designer to avoid the vapour control layer.
Natural, biodegradable insulants offer a safe and zero waste alternative to man-made alternatives which, in some cases, may become notifiable waste and so represent a potential hidden cost - and waste - at the time of eventual disposal. Note that we have not suggested the use of a biodegradable insulant within the wall linings as there is no ventilation and some risk of decay.
Contact: eg. Second nature Thermafleece (01768 486 285 / www.secondnatureuk.com), Construction Resources: (0207 450 2211 / www.constructionresources.com/), Excel Industries: (01685 845 200 / www.excelfibre.com/building), NBT: (01844 338338 / naturalbuildingproductscouk.ntitemp.com/)

(b) **Keep Existing Lath and Plaster** (Specification Item 8, 9)
Though this option is not practicable where additional insulation must be installed and there is no other way to do so except by removing the lath and plaster, this is not the case in the loft space. Although no vapour control layer can be easily installed if the existing lath and plaster is kept, it is likely that a natural, hygroscopic insulant, combined with the loft ventilation could overcome concerns about interstitial condensation.
Contact: n/a

(c) **Timber with 'Natural' Paint Finish** (Specification Item 12, 18, 20)
This could help reduce ultimate demolition and disposal costs. At the end of the life of the component, the component cannot be disposed of without a degree of pollution to the ground and groundwater and so should be treated as a separate waste. A 'natural' paint finish which is non-toxic and biodegradable on untreated timber can be safely composted at the end of its life and so represent a zero waste option in the long term. Timber is also likely to sustain repeated removal and replacement better than MDF and so remain in use for longer.
Contact: eg. Natural Building and Decorating: 01546 886341, NBT Paints: 01844 338338, Construction Resources: 0207 450 2211, OS Colour: 01296 481220

(d) **Screw Fixing** (Specification Item 12)
Screws enable components to be more readily removed without damage either to the component being removed, or the component to which it was fixed, a double benefit which enhances the possibility of components being able to be re-used, rather than recycled or even dumped. Several screw systems are now available where pre-drilling is not required, which reduces the cost and time differential between this and conventional nailed or glued fixings.
Contact: n/a

(e) **Easy Access Screw fixed Timber Floor Boards** (Specification Item 13, 22)
The "Easy Access" part of this section refers to a particular type of floor detail pioneered in Scotland by Gaia Architects at the Glencoe Visitor Centre. The floor boards themselves are short, (for example 1200 mm lengths) tongue and grooved along their length but rebated at their ends. They are held down with timber strips which cover the rebated end of one line, and the rebated ends of the next, and it is only these strips which are screwed down to the battens beneath. The floor boards themselves are held merely by their tongue and grooved sides, and the strips along each end. When access is required to the service void beneath, a few screws only need be removed along the strips and the boards themselves can be removed without any damage to any component. All components can be independently repaired, tightened or replaced, and the whole can be readily re-used.
To optimise this detail, the timber should be of reasonable quality (worth re-using), and a natural oil or wax finish should be applied which does not need to be sanded off before subsequent application of finishes.
In addition, the difficulties sometimes associated with using timber floors in new build (refer 6.2) do not present themselves in this situation.
Contact: n/a

(f) **Service Void** (Specification Item 13, 22)
Services, Fittings and Fixtures are the elements of a building that are most likely to be altered or upgraded. Making it easy for Clients to alter these elements makes long term running of the building cheaper and reduces waste because removed elements often cause damage to other parts of a

building, simply because of the layering of the construction. A service void in this case, with the use of the easy access timber flooring makes even better sense because of the ease with which it may be used.
Contact: n/a

(g) **Biodegradable Oil / Wax Finish** (Specification Item 16)
A biodegradable oil or wax finish on the other hand renders the timber component completely safe to compost at the end of its working life.
Contact: Contact: eg. Natural Building and Decorating: 01546 886341, NBT Paints: 01844 338338, Construction Resources: 0207 450 2211, OS Colour: 01296 481220

(h) **No glue** (Specification Item 18)
The alternative is simply to ensure that the tacked fixing is adequate on its own, and if not, to use screws, or a larger trim, to make fixing easier.
Contact: n/a

(i) **Dry Gaskets to avoid Silicone type Sealants** (Specification Item 18, 19, 20)
Where there is a need to seal components against air infiltration, and to maintain a tidy edge or corner detail, it is possible to use, for example, rubber gaskets to achieve this. They have the advantage of being easily removed as part of any replacement or maintenance works without damage to adjacent components and can be re-used.
Contact: eg. Exitex Ltd. (00 353 42 93 71 221 / www.exitex.net)

(j*) **Alternatives to Plasterboard** (Specification Item 11a, 17)
Plasterboard is ubiquitous and immensely useful, but it is difficult to fix in such a way as to enable complete re-use, and it is not necessarily safe to go to landfill.
Most uses of plasterboard involved either a complete skim coat, or a partial skim, both of which prevent any realistic re-use of the board once removed.
Since plasterboard (technically, 'gypsum based board') is normally painted, or coated in some other way, such as with wall paper, it may represent partially toxic waste.

Caveat

It is important to emphasise the scope and purpose of the following drawings and specifications.

They are included solely to show practitioners the sort of alterations that can be made in order to enable buildings to be repaired, altered and disassembled without undue damage to adjacent elements or the elements themselves, to afford as much re-use as possible and to increase the ease and cost effectiveness of re-use and recycling in construction generally.

Their purpose is not to offer approved details in any sense, but to illustrate the *difference* between details and specifications which do not address deconstruction issues, and those that do. It is the *differences* between the originals and alternatives which is intended to be illustrative, not necessarily the alternatives themselves.

The original details have been taken from conventional details and specifications we believe to be broadly representative of their construction types. We hope the principles shown, and the specific references made will assist designers in making similar changes in their own work, but it goes without saying that SEDA cannot take responsibility for any work undertaken as a result of the use of these details.

Specifically, these details are not intended to show best practice in any sense, nor are they even intended to be up to date. We have striven in the preparation of these details and specifications to keep as close to the original as possible. We have done this in order to show that some quite fundamental alterations – in terms of deconstruction - may be made with the minimum of visual or functional impact on the original. Where these original details and specifications do not meet current standards or aspirations, the alternatives given are likely to be similarly wanting. To re-iterate, the purpose is not to produce approved details, but to illustrate the process of improvement – in terms of deconstruction only – that may be made.