HOUSE PLANNING HELP

Episode 73

How alterations to period properties affect performance

The show notes: www.houseplanninghelp.com/73

Intro: Let's get to today's interview. It's with Richard Oxley from Oxley Conservation. It's been a while since we've talked about period homes and how you can make them more energy efficient, so we're back on the case today and Richard has loads of experience, examples to share as well, so we'll get stuck in.

I began by asking Richard to tell me a bit about his background.

Richard: I started off as a chartered surveyor who was interested in old buildings, and from there that interest developed into actually studying for an RICS Diploma in Building Conservation. And from there I went to work with a historic building contractor locally for a couple of years and then decided to branch out in 1997 to form my own consultancy, and have been working here ever since.

Ben: I think I should mention as well that we're in a beautiful part of the UK, Henley-on-Thames, which I think gives you extra kudos in this realm that we're talking about today! So we've called this episode "How alterations to period properties affect performance." And I think what I'd like to do, although this might be quite basic, but before we get going on it is to just define a few of these terms, for example, what are we classing as an alteration?

Richard: Well if we're talking about improvements for say energy efficiency, it could be secondary glazing. Putting insulation in a roof space, insulating walls, either internally or externally or under floors, and there's many other things that could affect the overall performance of the building. So any alteration is something that could make a change to how that building is used or performs.

Ben: Before we got chatting here you were actually telling me about there's something very different between traditional and historic, those two things which to me I suppose I might group together. So what are we talking about when we think about period properties?

Richard: Well a period property is most likely to be traditional and some of them will be historic in terms of are they protected, so perhaps

putting a greater cultural importance on some of the buildings that are protected rather than just traditional. Irrespective of whether they're protected or not is how do the buildings perform, and most period properties are constructed with the ability to what's called breathe, so that is be vapour permeable, so the movement of moisture in and out of the building.

Ben: Performance, we've talked about this a lot in terms of thermal performance. Are we interested in other aspects of performance too when we're looking at historic and traditional buildings?

Richard: There's many degrees of performance so we're looking at how the building can cope with weather, climate, its orientation will affect its performance in term of how walls dry out. How the building is used, how much water vapour is produced within the building, the number of people using it, how many times they cook or bathe. So performance is very complicated, but it can be simplified into understanding what areas are under pressure. So in terms of say a kitchen or a bathroom, they would be areas of potential high risk where you would probably need more consideration in terms of the volumes of water vapour being produced.

Ben: Starting on a project, what is the first thing that we look at? I'm assuming it's understanding the building?

Richard: Correct, it's the fundamental principle because without understanding the building you will not know how to respond to that building. What's important about that building, so if it's a historic building that is formally protected, or even if it's unprotected, what's important culturally and of significance. What's an important feature, and actually making an alteration you could lose what you liked about the building in the first place. So standing back and perhaps looking and understanding your building, how it's constructed, how did it perform. Perhaps its performance has been changed by previous owners using the wrong materials, causing problems of damp or other problems. So it's important to understand the building, put together those jigsaw pieces of why you want the building and where you want it to go.

Ben: Does it matter who the occupant is in a building? Presumably over time that has changed but does how they live actually affect the building?

Richard: It has a massive impact because you can have people, say an elderly person with less needs and requirements, bathing less, cooking less and has a simple lifestyle compared to a full-on family

where there's constant cooking and constant bathing and use of hot water. So there's a great range within how buildings are used from low intensity to high intensity. And also which parts of the buildings are used more. If you've got a big house you may actually find that parts of the building like attic spaces or individual rooms may not be used very much, so perhaps you need to look at how those buildings are used and treat them differently from the rest of the building.

Ben: When we're thinking about making an alternation, most people will come into this wanting an addition, an extension, or with an idea in mind. So once we've understood the building what should be the next steps in how we go about this?

Richard: Well once you've understood the building and understand how it performs, what works are required to repair the building and put it in good order first, because a lot of people jump into actually coming to a pre-conceived idea of what they want to do with the building. And really you've got to understand is the building, the existing building, going to be in good condition? Are we going to spend money in actually getting it with a good roof? Making sure there's good rainwater management, because currently in the UK we're suffering from extremes of weather where we have large deluges of rainfall. Can the rainwater disposal system cope with that? Are we making sure that it's got good boots so that, you know, water is going away from the foot of the building. Making sure we're starting with a good foundation.

Then we look at the alterations and say right, how is that compatible with what we've got? How are we intending to use it because we could, if we haven't lived there perhaps for 6 months, 9 months, a year or more, it may take you a couple of years to get to know a building, is how can we make improvements that are actually beneficial and not a pre-conceived idea? Because sometimes you think you know the building and it's not until you've lived in it that you can actually come up with a firm idea of well I wish we'd done that, which is what you want to avoid. It's like we made the right decision.

Ben: How often are you undoing work then? It did sound in that response there that there are occasions where you just want to rewind before you go forwards?

Richard: A lot of our work is actually undoing work. No one intentionally goes to damage a building and a lot of the works we do are well intentioned repairs or alterations, mainly starting from the Victorian

period onwards where modern materials are being used in past repairs, such as cement based renders and pointings. And these cause long term damage to traditional buildings, buildings that rely on the movement of moisture and equilibrium in the walls to prevent deterioration of the masonry, so brickwork or stonework or decay of timbers.

So we find that we're trying to reinstate what was the intended performance. And there's good guidance on this. The Society for The Protection of Ancient Buildings has got a lot of information about the need for old buildings to breathe, which is a very good technical pamphlet. And these help you understand the basic requirements of understanding old buildings. So when you come to an old building, what are we trying to do? Do we need to reinstate the traditional performance? Is it causing a problem? One elevation may be exposed to the prevailing elements and there's been a history of failed attempts to address that exposure and actually cause more problems than it's tried to solve. So you may have to think right we need to change that building, and it may be external cladding to protect it, rather than using cement renders and such like. It may be actually providing a physical barrier. So there's lots of different ways of getting to understand how a building performs and undoing works may be necessary.

Ben: I'm not sure that I fully understand the intended performance and how this changes. So over time when they started out, let's say they were building 300 years ago, what did they want in terms of performance and how has that changed now out of what we might want and whether the two meet in the middle?

Richard: Okay, when they were building these buildings they used the materials available and there's a small selection of materials that were available. And there's only things like flint or granite that are really impervious. And most of the other materials like lime or earth which we used as the mortars and plasters, they're vapour permeable and allow moisture in and out. And as we've developed, and the development of things like cement, OPC (Ordinary Portland Cement) and such like, the ability of moisture to move in and out of the fabric has been reduced. And this causes problems for these older buildings. And the big danger of making alterations to the period properties now is that within insulation materials in particular we could be introducing impervious barriers such as vapour checks and such like where they're actually changing how the building performs and concealing problems that could build up and result in decay, damp patches, mould growth and such like.

So it's about understanding the materials, are they compatible with how the building was originally constructed or altered before the introduction of more modern materials? Now that's not to say all modern materials are bad. We're reinventing the wheel with lime and also using more earth plasters. So there are modern materials available that you can introduce that are not in conflict with the existing building.

Ben: I think what I find interesting about the work that you do is that you really are on a sliding scale of almost dealing with ruins, right up to some high performance upgrades. So I'm interested in, maybe if you could tell me or give me a few examples of some different projects that you've looked after and we'll include some photos in the show notes, and how you've improved them, and perhaps finishing on Woolley Firs.

Richard: Okay, well we look at a lot of things from reducing draughts is a simple one, looking at perhaps things like secondary glazing. And also using diagnostic tools of saying, right where are the problems? And a good one is an air pressure test, and not having preconceived ideas of what the problems are, because what we find is that some older buildings actually perform better than modern buildings, especially sort of 1960s, 1970s buildings which have very poor performance in terms of thermal performance, and also in terms of draughts. So air infiltration is an issue and how you solve that. So blocking up really big gaping holes in your building can help improve it and we've done that on a National Trust building, a cottage and making sure that was done.

The most effective improvements in terms of perhaps going for the big one is when taking the opportunity of perhaps say when a roof is stripped, in need of stripping, and that is when you can introduce a really well detailed insulation system, because trying to do it with the roof coverings on is a compromise most of the time and is very difficult to detail. So if there is an opportunity when you own a building to say right we need to build an extension, we need to alter it or there may have been a fire or you're reacting to some sort of event, then that's the time to think can we make an improvement in the thermal performance of the building because you can actually get to the building and get the detail in right.

For example, at Woolley Firs which was a redundant farm building, an agricultural building, and it was owned by a local wildlife trust and they wanted to convert it into an education centre so we did a full retrofit. So that was insulating the roof with a warm roof where the insulation goes over the rafters, and also the internal wall

insulation. We selected the materials to be as compatible as possible with the traditional breathing performance, and that was using wood fibre insulation, and using lime plasters internally. We also put in an underfloor heating system and looked at using limecrete and other things like that. So we chose the materials carefully and was monitored afterwards by UCL (University College London). They found that the performance was acceptable and that actually the walls were not at risk of causing serious problems of damp and decay.

So it was working in the right way. There's other benefits of using things like wood fibre because it adds thermal mass to roof structures so you don't get heat gain, and it's also good with sound. It's less tinny inside, so it helps deaden sound, especially if it's an education centre and you've got lots of children in there. So it's how the building is used, how it performs and getting all these compatible bits to go together so it's a complicated jigsaw.

Ben: With Woolley Firs, I know that because it had some of this research carried out that you could compare and contrast between the north and south facades. So maybe you could tell me what you discovered through doing that?

Richard: Yes, the research was interesting because before people were doing research like this on performance a lot of this was a gut feel for how these buildings performed. And the research showed that the south elevation was more subject to warming and cooling and the effect of the sun, where the north was more constant condition. And the performance was quite interesting in the sense that it illustrates that the aspect of the building: north, south, east, west, does affect how you insulate it. Perhaps approach it, protect it from the elements. So if you've got prevailing winds from the south west say, perhaps you have to look at how that is protected, so that the wall can actually perform and be kept warm in a way.

Understanding the building, again this is another thing about understanding the building we're on a steep learning curve, and there's a lot of research now starting in this field which will help us understand how to make good effective improvements. If we're going to alter a building I think one of the main messages we've got to take hold of is to say if you're going to make an improvement, make it an effective improvement so that it is actually beneficial to you as the user, but also that it has real gains in terms of energy loss or reduction rather, so that we're not just spending money to tick a box that we've actually done it. Let's make it a real improvement that benefits the building and again I think you as the

user and the environment, I think it's looking at those three elements, making sure that everyone wins in all those three terms.

Ben: Under what circumstances can things go wrong, and if you have any examples of other things you've seen that maybe these are projects that you've ended up having to deal with?

Richard: I think the things that you see go wrong are down to fundamental basic practices which is things like maintenance and repair, so not looking after your rainwater goods, making sure your rainwater gets away from the building.

Ben: Is moisture the big one? Because I do hear that mentioned a lot and moisture once it gets into a building is trouble.

Richard: Yes, and in particular if there's been introduction of materials that inhibit the evaporation of moisture. So once moisture gets in it can't get out, so it sits there and if moisture is there for a long time and timber is in contact with the wall, is subjected to prolonged levels of damp, they will be subject to decay, so fungal decay or insect attack. So really controlling moisture is fundamental.

So a lot of these systems you've got to be careful to make sure that they . . . If water can get in it can get out again, and a lot of the materials that are compatible with historic buildings will allow wicking of moisture away from problems. So you're not concentrating moisture problems where the use of modern materials that aren't vapour permeable or impervious, will help concentrate moisture and that can result in actual serious problems to the building. So really damp is a big problem, but really only if you haven't looked at the risks of timbers in those areas. Are there timbers at higher risk, if there are then how do we manage that risk? So really it's trying to make the building continue its original performance so it keeps the ability of moisture to escape, if it ever gets into the building.

Ben: In my mind I have this picture of a building that might have had 5 or 6 different alterations, and when you are doing your analysis of it how do you tell which bit is providing the poor performance, because you're not looking at the whole image? So how do you identify those specific parts of the building or is it as simple as just thinking that's a wet wall there?

Richard: Old buildings develop organically, and there's usually a reason why they put on an alteration. It could have been to show off, it could be to protect the building from the elements or part of the building from

the elements, so it's trying to understand why alterations were made is a good start. How it was constructed and is it in good condition? Does anything need to be done? And then perhaps looking at saying well in terms of its performance, what am I asking it to do? Is it working okay as it is because we seem to be insulating to stop a lot of heat loss and really perhaps what we should be doing is to stop heat gain and if you've got a big thick stone wall, is that a characteristic that you want to maintain, because it will help with the cooling of the building in the future?

So having to look at what is a building and what you're asking it to do and an air pressure test is a good way of finding where problems are in terms of heat loss and draughts, so a lot of heat can be lost just through the movement of air through a building. So if you can do that, it can be relatively effective. Perhaps 30% has been known to improve the thermal efficiency, just by good, considered, well-detailed draught proofing.

So understanding the building is paramount in everything we do; so its history, how it's used, and how it has been used, and the intention of use as well, because that will dictate what improvements are expected or are you trying to achieve a standard.

And perhaps standards are something that we've got to be wary of, because a target for a modern building may not be appropriate for an older building, and there's dangers with imposing arbitrary standards on very individual buildings because that can actually lead to conflict, and what we are trying to do is manage change, so we're trying to manage change in the best way for the building and the use, and of course the reason we're doing this to reduce the impact on the environment. So again it’s trying to have a holistic viewpoint and trying to balance that in all those three areas.

Ben: Airtightness testing, you've mentioned that a few moments ago. I'm intrigued as to what you can do. How will it change the airtightness or just some buildings that might be naturally airtight to begin with? What have you seen?

Richard: Well one case we did for the National Trust, we found that over 30% of the heat loss was actually through the roof. And so by doing an air pressure test and looking at that we used it as a diagnostic tool to where we concentrated resources. So there was some energy loss through the walls and windows but where we could make the biggest impact was on the roof, and the reason for that was because there was a need to repair the roof structure which had decayed because of water penetration. And then once we

repaired the roof frame we could then insulate the roof and re-clad it with tiles and it was fit to go. And by doing that we targeted an area that was in need of repair but where we could maximise the performance of the building and air pressure testing helped us identify that.

Ben: Is there any such thing as an improvement that actually you've wasted your money, or you've chosen poorly, of how you've added to a building?

Richard: I think a lot of these examples are probably with hindsight. I know from my own extension that we constructed, which was "an eco-extension", the timber floor was ventilated and although we put insulation in between the floor joists I think it sagged with time and I should go back and improve it. And we'll find that we will learn from our mistakes. We have to share our experiences so that everyone can learn and I think that we will see some nightmares where things go wrong. But I think it's important that things like the research is continued so that we get a better scientific understanding, more informed decisions can be made, and that way we can make sure that our improvements are better and more effective and do what we intend them to do.

Ben: Are there any other key points to this whole process that we should bring in here?

Richard: I think that the fundamental thing is to understand your building; understand how it was constructed, what materials were used, what materials were being used in past repairs and alterations. Are they compatible, are there conflicts in the performance, are there problems as a result of alterations? What works do you need to do to get the building to a good condition before you start altering it is, I think, a good idea because you can spend a lot of time and effort adding an improvement to a building when you actually need to put your resources in an existing problem. And then understanding how you're going to use it. Is it a good way of using that building and perhaps getting to know the building before making big improvements. So I think those are the fundamental things; is understand your building and understand what you want from it and is it achievable and is it going to be compatible or is it going to be in conflict with that building?

Ben: Richard, thank you very much.

Richard: Thank you.