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Anglia Ruskin – Energy Efficiency in Historic Buildings

Presentation Notes:
SLIDE 1

Introduction Dayle Bayliss:
Chartered Building Surveyor, BSc and MSc at ARU
Partner in Dayle Bayliss Associates – Surveying Project Management and Architectural Design Firm.
MSc studies looked at roof insulation in historic buildings and started interest in energy efficiency.
Building Control Surveyor
Consultancy
Project Manager for Grade I Building for Client
Contractor

Introduction from group Members

Aims and objectives:
Areas of Improving Efficiency
How to Improve Efficiency
Principles to Consider
Legislation
Case Studies
Renewable Energy

SLIDE 5
U Value is the thermal transmittance of a materials measure of how much heat will pass through 1m2 of a structure when the air temperature changes by 1 degree on either side.
U-value w/m2K
Resaearch into performance and U-Values key area for EH and SPAB – Videos
http://www.youtube.com/watch?v=4NNK2EteodA - CADW Heritage Cottage
http://www.youtube.com/watch?v=2trqe3c3DBY – SPAB Old Buildings and Energy Efficiency

SLIDE 7

Character and Significance

The extent that change can be accommodated –
This varies between the building and is an individual assessment – statement of significance
Examples – width of dormer checks
Window types – secondary glazing
Existing fabric and make up – insulation.

Regard should be given to –
Minimise the disturbance to existing fabric
Reversible
Importance of buildings and features

Significance includes the architectural elements but isn't limited to this, includes less tangible elements, for example historic people, events, technological innovation, social history, links with the setting and other buildings.

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Derived from the English Heritage Conservation Principles, policies and guidance – key areas for consideration:
Assessment of significance
Size and detail – relevant to the proposals
Identify key elements
Understand the building, its construction and its significance

Questions to ask?
Use knowledge and experience to determine the level of change
What is the impact of the change
Not to materially harm the value of the place – where possibly reinforce or reveal
Long term consequences of the change - is another risk introduced, will the change eliminate the risk?

Principles or repair, pioneered by SPAB:
Respect the age and character
Physical evidence of its history
Preserve original fabric in the repair process
Materials and repair techniques as close to the original as possible
New work subservient to old – practically and sympathetically
Repairs not to preclude later repairs where necessary

In summary
Minimum intervention
Compatibility
Reversibility
Authenticity

SLIDE 8

Thermal elements need to breathe
If prevent this or introduce a barrier will migrate elsewhere
Liquid and water vapour can impact on this severely
Condensation
Sources of moisture – external and internal

Need to understand the permeability within the construction of the building

Introduction of a moisture barrier affects this performance. Any introduction may divert problem elsewhere, difficult to introduce a fully internal vapour barrier.

Cold spots introduce risk areas, build up of condensation – weak spots in the structure.

Material Compatibility

Natural finishes for insulation allow transpiration of moisture through the air spaces, releasing moisture by evaporations, balanced across the insulation. Avoids the moisture being forced into the timbers.

SLIDE 9

Establishing the existing performance:

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Air pressure tests
Infrared
Dampness measurement
In situ u-values measurement
Borescope
Monitoring energy consumption
Data logging temperature, relative humidity, surface temperature, gives a more detailed analysis

SLIDE 10

Differences between modern heating and historic methods –
Heating only the rooms that are needed rather than the whole house
Continual occupation rather than peaks in evenings and weekends
Thermal mass, eg chimney stack to store heat and slowly release
Shutters and heavy curtains
Wearing more clothes indoors in the winter.

SLIDE 11

Introduction of insulation affects dew points - dew point is the point where vapour condenses to moisture , if this happens in the frame can to lead to damage in the structure.

Figure 4 shows a typical psychometric chart taken from BRE, 2002, pg 54. The point A represents an internal temperature/humidity profile of 20°C and 50% relative humidity (RH). Condensation will

EXAMPLES PRESENTATION

Draught proofing
Effective draught proofing to a sash window can reduce air infiltration by 86%. Heat loss through thick curtains by 41%. Secondary glazing and shutters combined result in heat reduction of 62%.
occur when the RH reaches 100%, i.e. point B, when the temperature falls to 9°C, either the room or the surface temperature.

Roof insulation Comparison
Celotex – 50mm, achieves a uvalue of 0.44w/m2k. Non vapour and moisture permeable, therefore vapour barrier required. £5.50 per m2, labour intensive to install
Themaflece – 75mm thermafleece and 25mm air gap, achieves 0.49w/m2k, vapour permeable, £7-8 per m2, less labour intensive to install.
Mineral wool, Rockwool – slightly improved u value over thermafleece, non vapour permeable, £4.50 per m2.
Aerogel – available in 3, 8 and 9mm, 30mm achieves a u-value of 0.20w/m2k, £20 per m2 for 9mm sheets, min 3 sheets required. Less permeable than Rockwool.
Actis multifoil – equivalent to 210mm multifoil, air gap above and below, needs vapour barrier or tape joints, difficult with ceilings, £8.50 per/m2