Coimisiún na Scrúduithe Stáit
State Examinations Commission

Scéimeanna Marcála	Scrúduithe Ardteistiméireachta, 2007
Staidéar Foirgníochta	**Ardleibhéal**

Marking Scheme	Leaving Certificate Examination, 2007
Construction Studies	**Higher Level**

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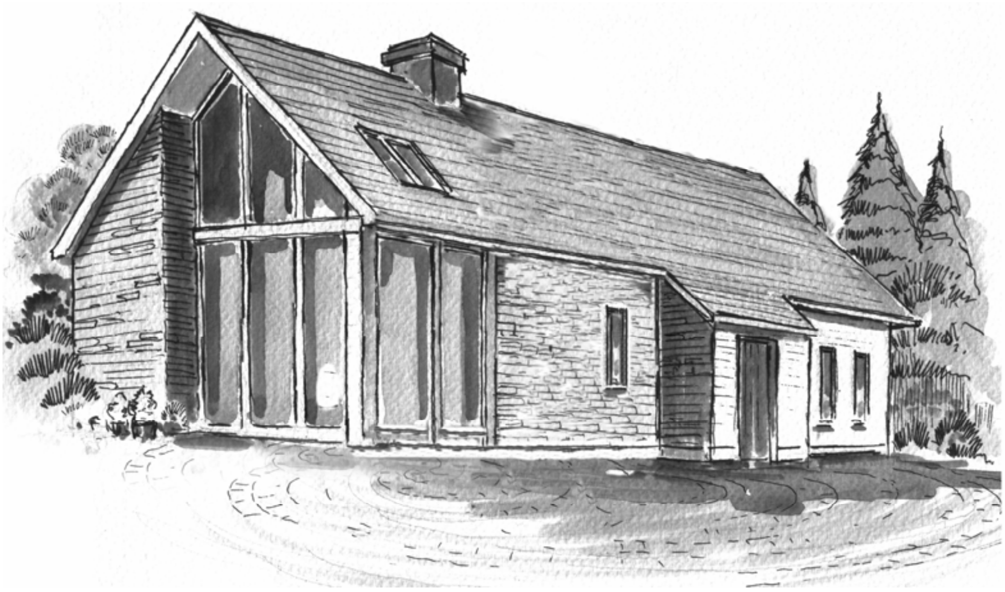
Scrúdú Ardteistiméireachta 2007

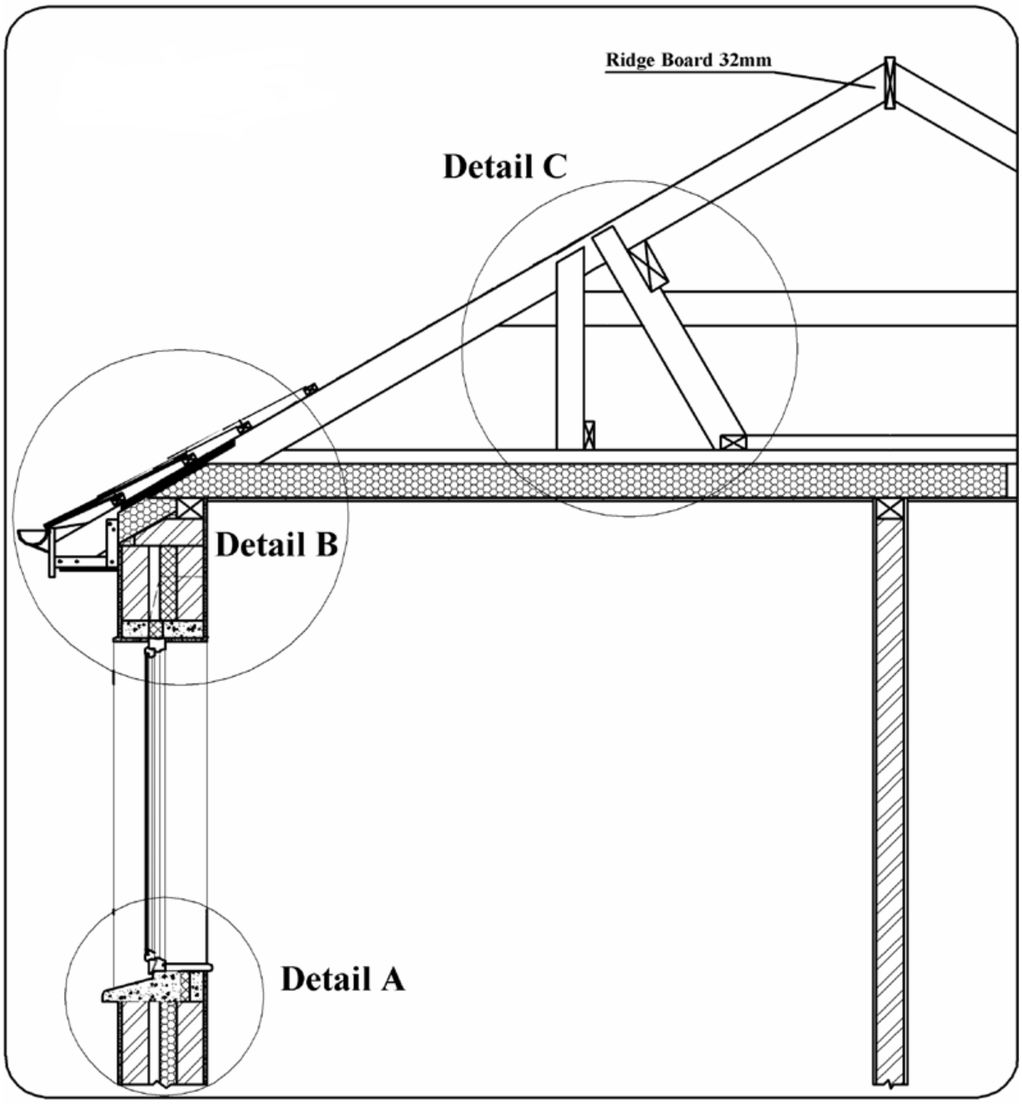
Staidéar Foirgníochta
Teoiric – Ardleibhéal

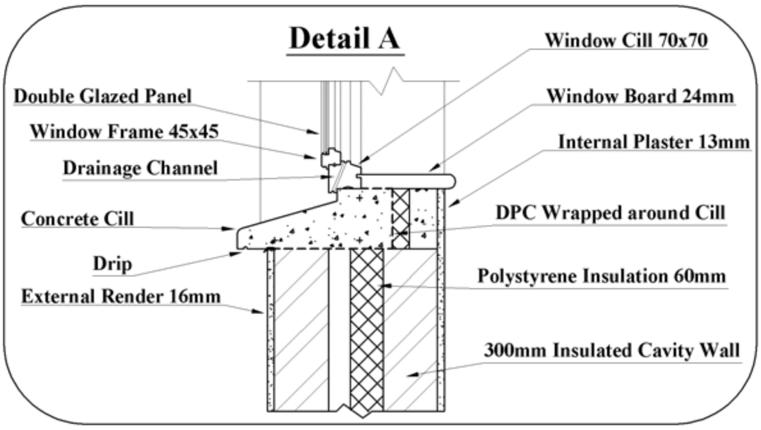


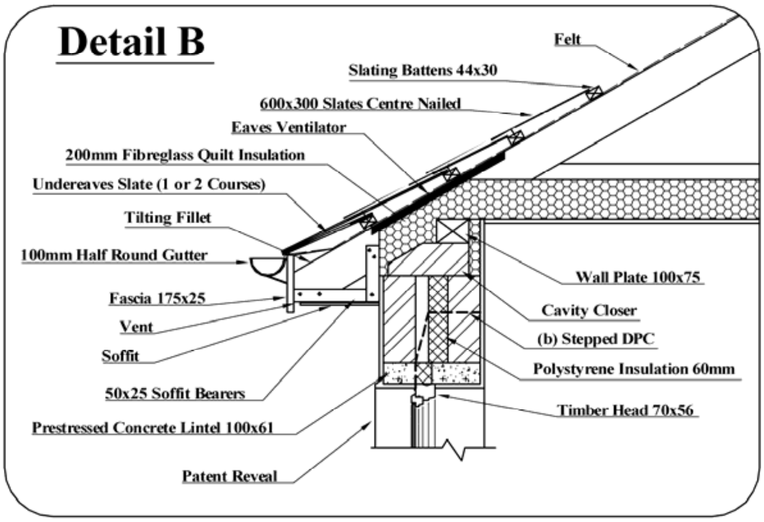
Construction Studies
Theory – Higher Level

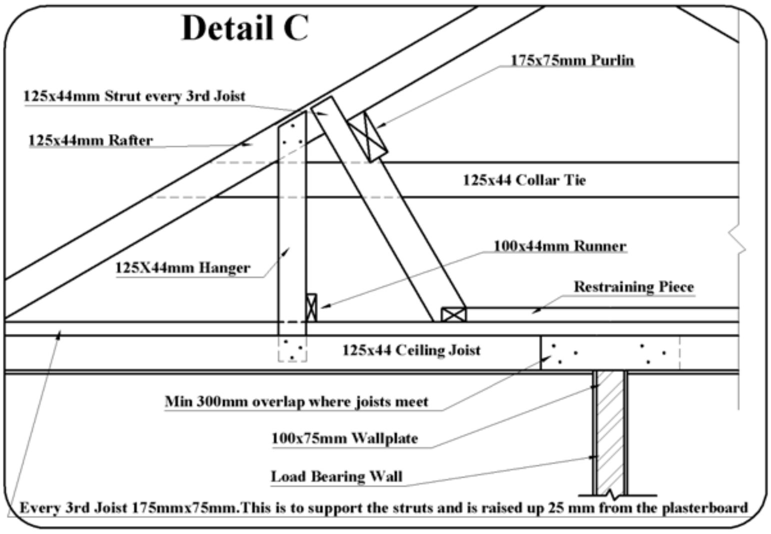
SOLUTIONS

Ceist 1 (a)


Ridge Board 32mm
Detail C
Detail B
Detail A


Detail A
Window Cill 70x70
Double Glazed Panel
Window Board 24mm
Window Frame 45x45
Internal Plaster 13mm
Drainage Channel
DPC Wrapped around Cill
Concrete Cill
Drip
Polystyrene Insulation 60mm
External Render 16mm
300mm Insulated Cavity Wall





Ceist 2 (a)

Two Possible safety risks associated with slating a steeply pitched roof:

- Risk of falling from a height and personal injury
- Risk of items falling - such as tools or loose slates causing injury to persons below
- Working in adverse weather conditions - such as frost or rain increases the risk of falling
- Risk of slipping on a wet or dirty roof surface
- Risk of falling through roof structure.

(ii) Working around a stairwell prior to having the stairs fitted:

- Risk of falling into the stairwell opening
- Building debris or tools being knocked into the opening
- Risk of falling if unguarded

(iii) Placing a ladder against a scaffold:

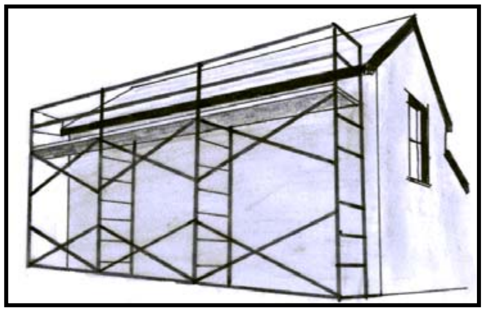
- Ladders placed on uneven surfaces may slip or move while being used
- Ladders may slip while resting on scaffolding poles as there is very little frictional resistance between the ladder and the scaffold
- Placing ladder at incorrect slope can cause the ladder to slip

- Ladders not long enough to clear scaffold by one metre.
- Ladder not capable of carrying load
- Wire reinforcement
- Metal on metal
- ***Any other relevant information***

(b)

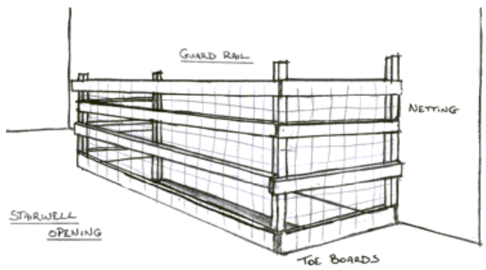
(i) Slating a steeply pitched roof of a two storey house:

- Properly secured platform at eaves to provide easy access to the roof. Toe boards and netting to be used to reduce the risk of tools / slates falling on those below
- A safety harness that is securely tied off
- Rubber-soled shoes should be worn as they provide better traction and grip
- Proper roofing ladders and crawling boards must be used to access the roof



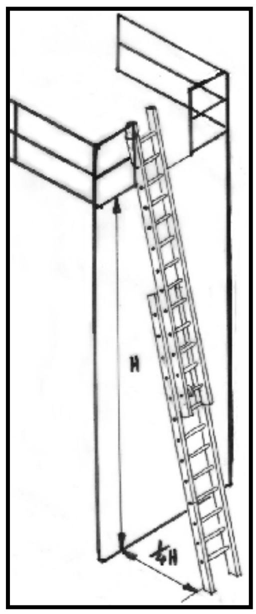
(ii) ***Working around a stairwell prior to having the stairs fitted:***

- Use guard rails to prevent accidental falls
- Use of toe boards and netting around the opening to prevent items accidentally being knocked into the stairwell
- Warning signs to be placed in prominent places

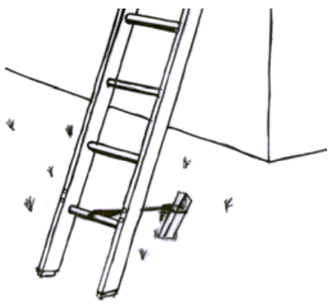


(iii) ***Placing a ladder against a scaffold:***

- Ensure that the ladder is securely held/tied at both ends
- Should extend at least 1.0 metres above platform
- The distance of the foot of the ladder from the wall should be ¼ the height of the wall. 74° is the recommended angle.
- Ensure the ladder structurally sound and designed to carry required loads



Any other relevant points



(c)
Building sites - potential hazards such as:
- Working at heights
- Falling materials
- Deep excavations
- Dangerous materials such as solvents, asbestos, adhesives etc.
- Electrical injury
- Vehicles
- High levels of noise
- Lifting heavy weights causing injury
- Out-of-door work – rain, wind, frost, snow etc.

Any other relevant points

(i) Working at heights / falling materials
Roof work causes one in five deaths in construction. Falling from a height could be avoided by:-
- A roof structure should always be inspected before being walked on to ensure that there is no danger of collapse
- Proper safety equipment such as a safety harness should be used on steeper roofs. Scaffold platforms along the edge of the roof should be provided to reduce the risk of falls
- Collective protection such as nets should be used to prevent items falling on to persons below

(ii) Excavations
- Risk of collapse of the excavation leading to the crushing of those inside
- Risk of contact with buried services such as gas and electricity
- Excavations may undermine other structures nearby which could result in collapse
- Risk of workers falling into excavations.

(iii) Dangerous materials
- Nails in timbering should be removed to prevent injury
- Asbestos and other hazardous material should be removed by trained personnel
- Manufacturer's instructions should be following when dealing with solvents and adhesives Working in an unsafe, dusty environment could lead to lung damage. Work should only be carried out in well ventilated areas with the appropriate safety equipment.

(iv) Electrical injury
- Risk of injury due to faulty/damaged equipment. Leads should be checked regularly
- 110 Volt transformers should be used on site to reduce the risk of electrocution
- The location of wires should be clearly marked - special coloured warning tape - to avoid accidental drilling of wires etc.
- Use of portable power tools if possible is a safer option
- Contact electrical authorities.

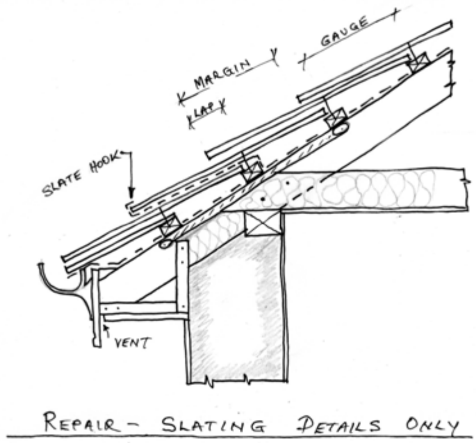
(v) Vehicles
- Accidents occur when vehicles are not used for their intended purpose, or are overloaded.
- Care must be taken around power lines. Posts and wire with bunting should be erected to clearly mark out overhead power line. This wire should be earthed.

Any other relevant points

Ceist 3 (a)

(i) Roof

- Remove enough natural slates to allow access to the ends of the rafters affected by wet rot
- Remove any existing rafters, ceiling joists, facia and soffit timbers, affected by wet rot
- Replace with new preservative treated softwood timbers consistent with the original section and moulding
- The concrete / sand cement coping to the verge may need to be partially removed to allow for the fitting of slates. Replace following slating.
- Re-fit underlay felt – and slating battens – retaining the original gauge.
- All replacement slates may be secured using clout nails except the uppermost row which must be "hung" (see sketch)
- Cast iron rain water gutters and downpipes identical to those used originally should be used.

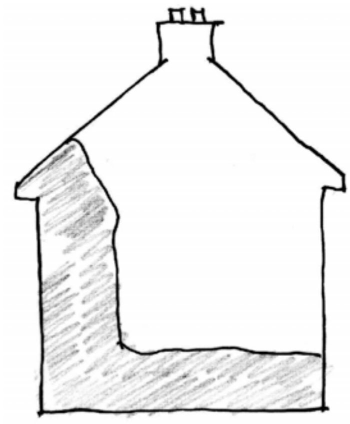


(ii) Windows

- Repair existing windows where at all possible
- Remove the original windows if necessary
- If windows beyond repair, replace with new sash windows identical to the original
- Prime, undercoat and gloss the window as original.
- Sash Cords may also require replacing – access to the sash weights are via pockets in the window frame.
- Alternatively the window may be sent to a specialist Conservation contractor and draught proofed using contemporary rubber type seals.
- Note:- see sketch of sash window in 3(b)ii

(iii) Wall – Lime Rendering

- Remove loose lime render in shaded area and retain any "sound" historic rendering
- Apply two coats of lime render @ 2:5 (Lime putty – sand mix)
- Patch work lime render repairs were common practice historically. It is therefore not advisable or necessary to remove perfectly "sound" historic lime rendering.
- Remove only loose or boast rendering
- All loose pointing should also be raked out and repaired prior to rendering
- Brush off all loose particles and just prior to rendering thoroughly dampen the area
- A mix of 2:5 is normally sufficient. Where two parts of a hydraulic or non-hydraulic lime putty (eg.NHL 3.5) is mixed with 5 parts of a coarse, well graded sharp sand – free of all organic impurities.



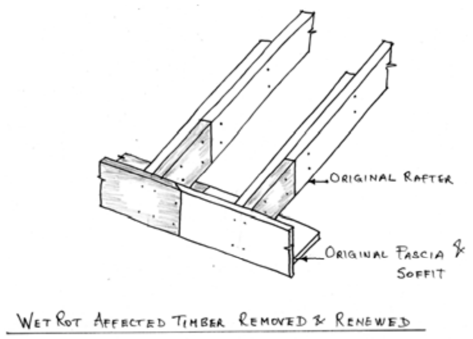
- The depth of the existing lime render will determine the number of coats required in the repairs. Normally two coats will suffice each approx. 6-8mm. in depth.
- The first coat is scratched to provide a "key" for the second coat
- The second coat is applied when the first coat is "Green Hard" – can tap without falling off

- If the lime rendering is subjected to wind or sun following application it should be protected by covering with a layer of Hessian sacking – well dampened down so as to prevent rapid drying out
- Lime rendering should not be applied if frost is likely
  Note: The work as described to the roof, windows and external walls will help retain the character of this 100 year old vernacular building.

Q3(b)

(i) Roof

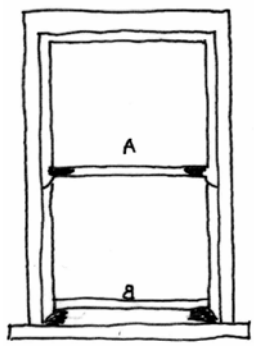
- Cut off ends of rafters affected by wet rot and fix preservative treated softwood timbers to the remaining sound timber on the end of each original rafter
- Cut off any section of the fascia and soffit also affected by wet rot and replace with preservative treated timbers having the same moulding as the original timbers. Prime, undercoat and gloss fascia & soffit



- Source natural slates identical to those on the roof from another derelict building or an architectural salvage company coupled with the retention of the original rafters, facia and soffit timbers ie only replacing the parts affected by wet rot minimises waste
- Take slates from rear and place on front - to keep main elevation in sympathy

(ii) Sash Windows

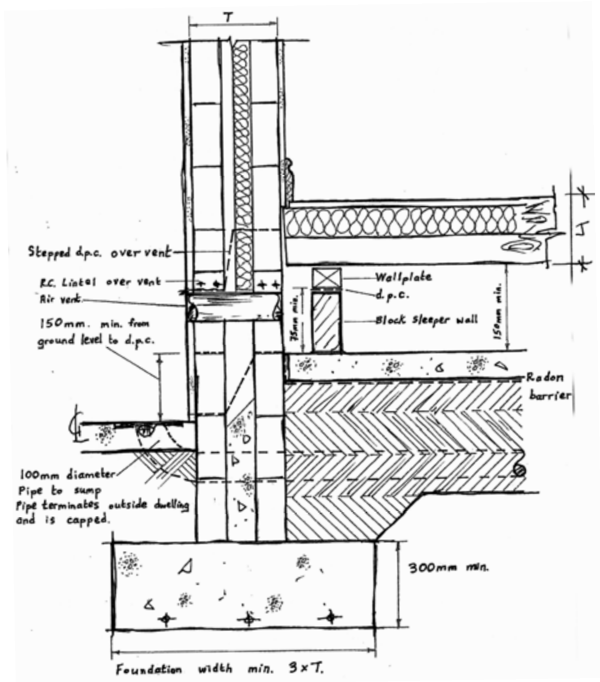
- The repair of the sash windows rather than their replacement minimises waste as does
- the reuse of the original glass where possible
- Horizontal members (rails) of the sashes or window frame are likely to suffer wet rot damage e.g. at A & B
- Carefully remove both sashes ensuring that the original glass is retained
- Repair or replace the horizontal timbers with preservative treated softwood
- Re-fit the original glass and re-seal using linseed oil based putty.
- Leave putty for 2-4 weeks prior to painting
- Double glaze if not possible to retain original glass
- Prime, undercoat and gloss the window
- Sash cords may also require replacing – access to the sash weights is via pockets in the window frame
- Possible wet rot @ A & B; repair using treated softwood.



Ceist 4 (a)

Suspended timber ground floor

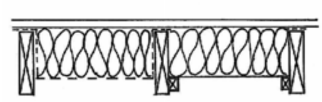
- Joists to be sized in accordance with IS 444.
- Top surface of concrete sub - floor (min. 100mm thick) must not be below the highest level of the surface of the ground adjacent to the external wall
- Required insulation thickness for suspended timber floors varies with floor shape and area, conductivity of insulation, thermal resistance of the structural deck
- Air vent sleeved across cavity.
- Suspended timber floor supported by sleeper walls, built off the sub - floor, is only acceptable where the depth of fill does exceed 900mm. Where the depth of fill exceeds 900mm the suspended floor joists should be fully spanning (i.e. perimeter wall to perimeter wall, intermediate support provided, e.g. steel beam or rising wall built from foundation)
- Netting to be used to support insulation quilt
- Battens fixed to joists may be used to support rigid insulation
- Example of a fully spanning suspended timber floor, used where the depth of fill exceeds 900mm
- Where steel is used, it must be designed by a structural engineer.



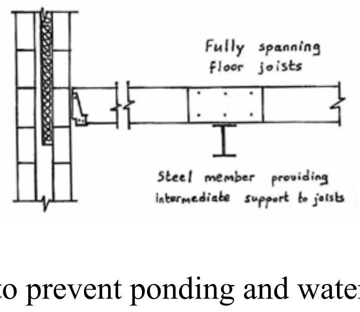
CEIST 4(b)

Functional requirements – to include:

- Resistant to the passage of dampness. Dampness from the ground underneath the floor due to capillary action, prevented by placing a continuous layer of impervious material, a Damp Proof Membrane (DPM) in the floor
- Prevent the ingress of gasses to protect the health of the inhabitants. Insert a radon barrier in areas of high radon emission as designated by the Radiological Protection Institute of Ireland (RPII) – if in doubt insert radon barrier



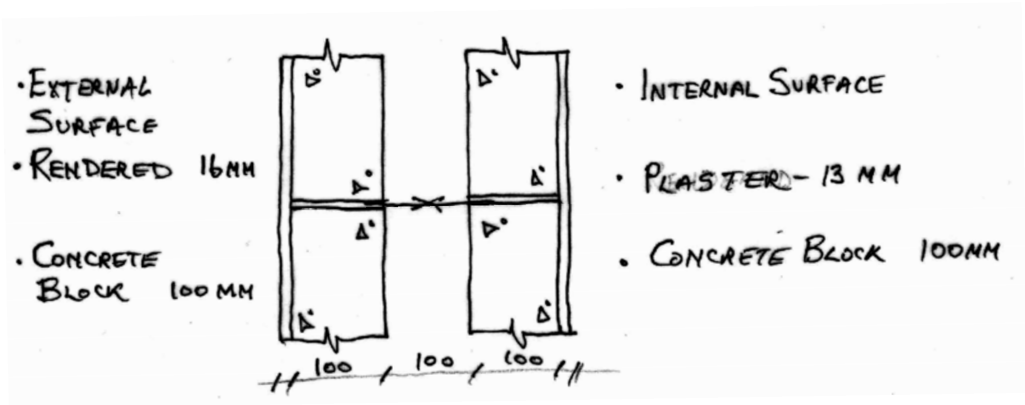
- Provide thermal insulation and thermal comfort; Heat may flow through the floor, the introduction of an insulation material underneath the whole floor area will reduce the heat loss through the floor
- Provide suitable wearing surfaces
- Structural strength: Joists sized to IS444 standard and placed at suitable intervals and bridged accordingly to carry live and dead loads
- Aerated; provide vent to outside walls to ensure continuous air movement and prevent the build up of dampness and stale air causing timbers to decay.



- Top of sub - floor to be higher than the outside ground level to prevent ponding and water flowing from outside through the wall structure
- Ecologically sustainable and be economical in terms of materials, especially aggregate, cement, wood, therefore a light ecological footprint in that there is no over specifying of materials

Question 5(a)

Sketch showing wall section – un-insulated



Material Element	conductivity k	resistivity r	Thickness metres - t	Resistance R
Ext. Surface	____	____	____	0.048
Ext. Render	0.430	____	0.016	0.037
Ext. Block	1.440	____	0.100	0.069
Cavity	____	____	____	0.170
Int. Block	1.440	____	0.100	0.069
Int. Plaster	0.430	____	0.013	0.030
Int. Surface	____	____	____	0.122
				0.545 Total R

U = 1/RT = 1/0.545 = 1.828 W/M^2 degrees C.

U Value = 1.828 W/M^2 degrees C.

Question 5(b)

Formula: U Value x Area x Temp. Diff. = Heat Loss

→ 1.828 x 145 x 13 = 3445.78 Watts

3445.78 Watts = 3445.78 Joules / sec

Heating Period (secs) = 60 x 60 x 10 x 7 x 42

$$\frac{3445.78 \times 60 \times 60 \times 10 \times 7 \times 42}{1000} = 36470135.52 \text{ K Joules}$$

Note: Calorific Value of 1 Litre Oil = 37350 K.J.

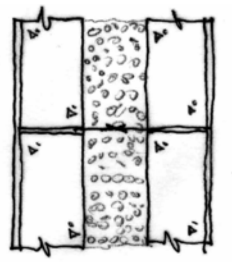
$$\frac{36470135.52}{37350} = 976.44 \text{ Litres Oil}$$

1 Litre Oil costs 0.68c

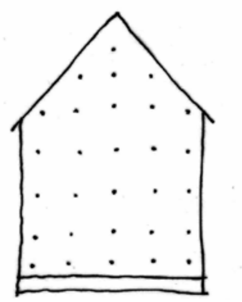
Cost of Heat Lost per Year = 976.44 x 0.68 = €663.98

Question 5 (c)

(i) Cavity Injected Insulation

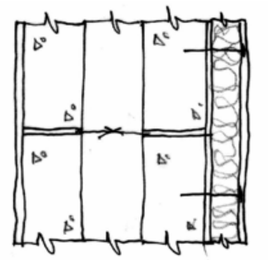


- Cavity filled with insulation – blown or injected through holes drilled in external wall at regular spacings
- Choice of Insulation Materials: Glass or Rockwool Fibre; Polystyrene Bead; Foams – including Phenolic, Polyurethane or Polyisocyanurate
- All Insulation Materials are Water Repellent, Rot Proof and some are non-combustible



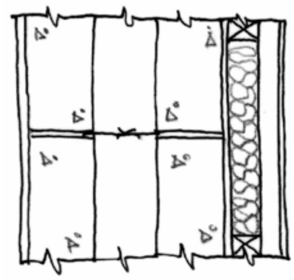
(ii) Rigid Board Insulation

- Composite – Plasterboard and Rigid Phenolic Foam with Integral Vapour Barrier fixed to Internal Leaf
- Cavity may also be filled as shown in 5 c (i)



Question 5 (c)

(iii) Timber Battens & Rigid Insulation



- Battens fixed to Internal Leaf @ 400mm. centres – rigid or other insulation fitted between Battens
- Composite Plasterboards as in 5 c (ii) fitted over Batten

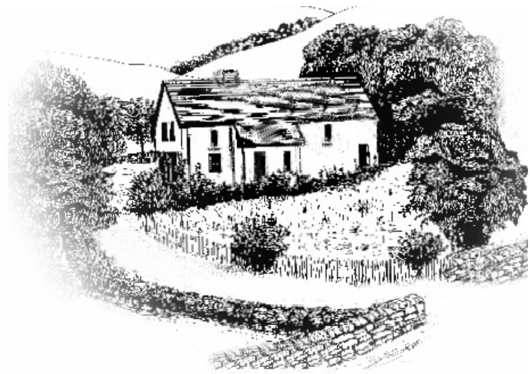
Ceist 6(a) Three planning guidelines

Reading the landscape

- Houses should be neither hidden nor obtrusive; they are part of the landscape and should be linked to it.
- Determine whether landscape is predominantly inland or near sea; flat low - lying or hilly
- Read existing settlement features such as existing walls, planting patterns, shelter.
- Read existing building traditions – dispersed, clustered, existing building styles and scale
- A contoured landscape is better for siting a house in a fold. In a flat landscape houses sit on the landscape.

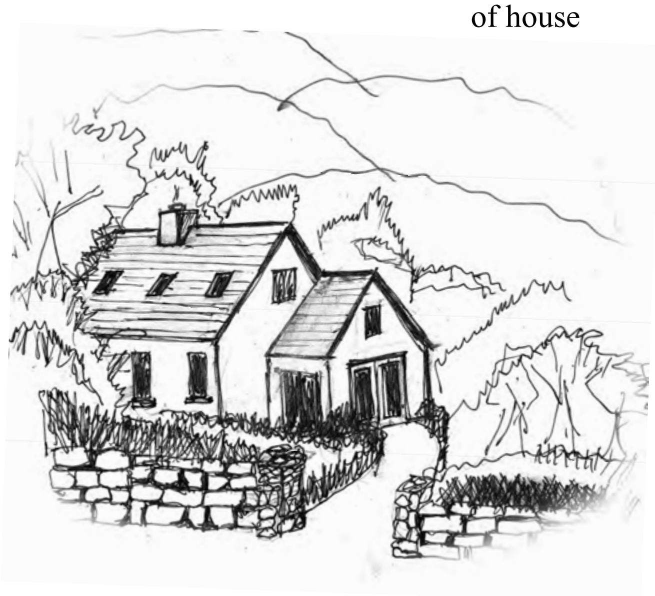
Maintain existing features

- Respect and retain the existing local landscape - hedgerows, stone walling; use at least two existing natural boundaries to integrate the house - sensitive siting respects existing traditions
- Plant indigenous trees and shrubs at building stage, deciduous shelterbelt to disperse wind
- Choose a gentle fold or slope in landscape, avoid exposure and prominence
- House not to break the skyline or the waterline – avoid obtrusion



Design and form

- Restrained simple forms are best, simple lines of house not to compete with surrounding topography - well proportioned designs of human scale.
- Use local building materials e.g. sandstone in sandstone area, limestone in limestone area and use restricted range of materials.
- Use indigenous house forms as inspiration for new contemporary designs.
- Build houses of solid, simple construction

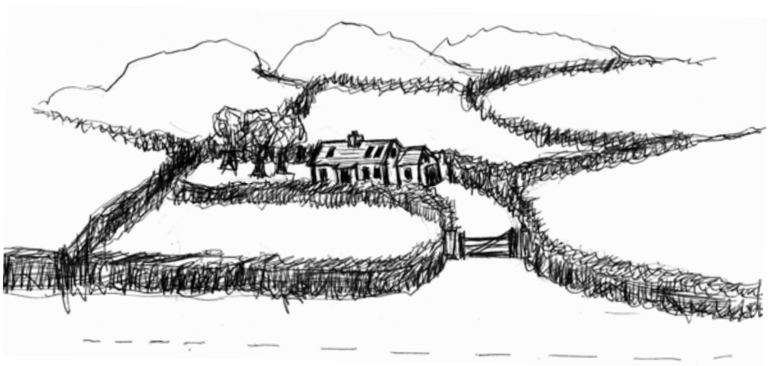


Ecological design and orientation

- Ecological design takes into account prevailing wind direction, path of sun, passive solar design and shelter planting – seek shelter and integration to create privacy

Road boundaries and access

- Discreet and safe access from public road - simple entrance to announce the building – avoid siege architecture of high walls, alarmed gates

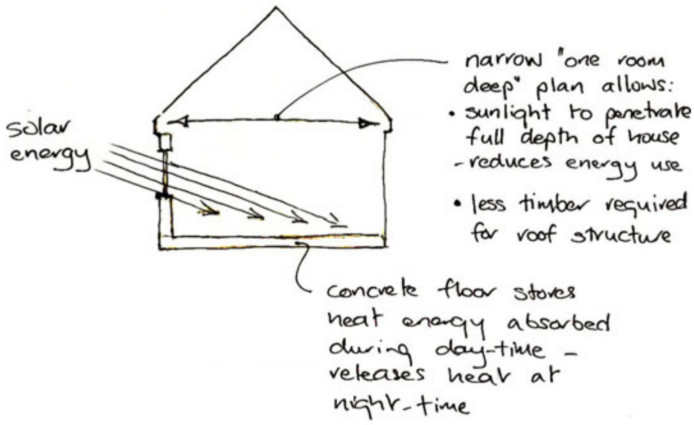


- Roadside boundary to complement and extend existing road boundaries
- Entrance roadway to respect natural contour of the landscape – road not an ugly gash – gravel or shale driveway kinder in visual and ecological terms than tarmacadam
- Use two existing field boundaries to integrate house with existing landscape
- Ensure the scale of the house is in sympathy with the scale of the site and with other buildings – not bulky or dominant – building sensitively.

6 (b) A house of low environmental impact - two features

Embodied Energy

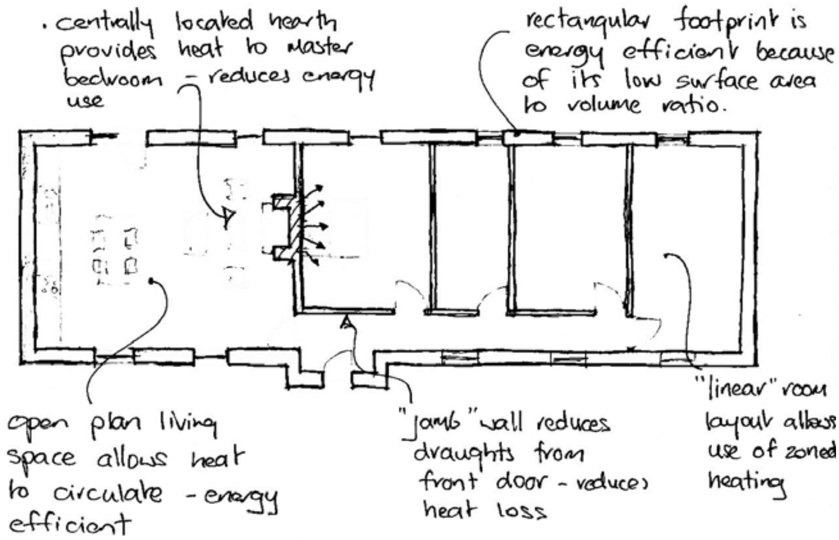
- The embodied energy of a house is the energy which it takes to build it. This includes the energy used for the extraction, processing, manufacture and transportation of the raw materials as well as the energy used to prepare the site and install the essential services and to construct the house. The embodied energy of a house can be equivalent to the energy required to heat an average house for thirty years. Purposeful design of a house to have low environmental impact takes factors such as the following into consideration at the design stage of the house:



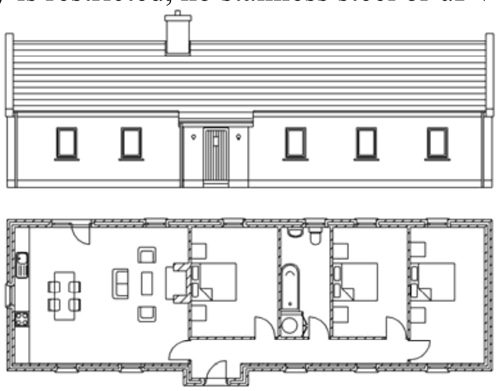
- Efficient use of resources to satisfy human needs - ensuring a light ecological footprint
- Equity between generations – using as little energy and resources as possible so as to leave more for future generations
- Equity between countries and regions – in Ireland carbon emissions are more than 10 tonnes per person, a100 times greater than the carbon emissions of the average person in Ethiopia or Uganda.
- Careful choice of building materials – linked to their embodied energy value.
- Imported materials consume energy in transportation – use local materials where possible.
- Energy and materials required for that maintenance of the house during its life cycle.
- Energy required to heat and light the house during its life cycle – use passive solar design.
- Size and scale of building – large buildings consume more energy.
- Flexibility of design to accommodate life cycle changes of family.
- Potential for reuse/recycling of materials at end of useful life.

Features that reflect a traditional cottage and ensure low environmental impact:

- Size of house – modest scale to meet the needs of the inhabitants.
- Multi purpose rooms – one room serves as a sitting, dining and kitchen space. This is the room which also contains fireplace, thus one fire heats the room for three activities, resulting in the economical use of dwindling fossil fuels and reduced CO2 emissions
- Fireplace on internal wall, chimney as heat sink and heat loss into the bedroom and living room, not to outside
- House designed to have a shallow plan of one room width, which takes maximum advantage of passive solar energy – the sun's rays can penetrate all rooms - reducing the heating requirements and dependence on fossil fuels.
- Restrained range of building materials to reflect traditional cottage – block walls, slate roof and wooden windows. All such materials may be sourced locally or nearby – low transportation energy.

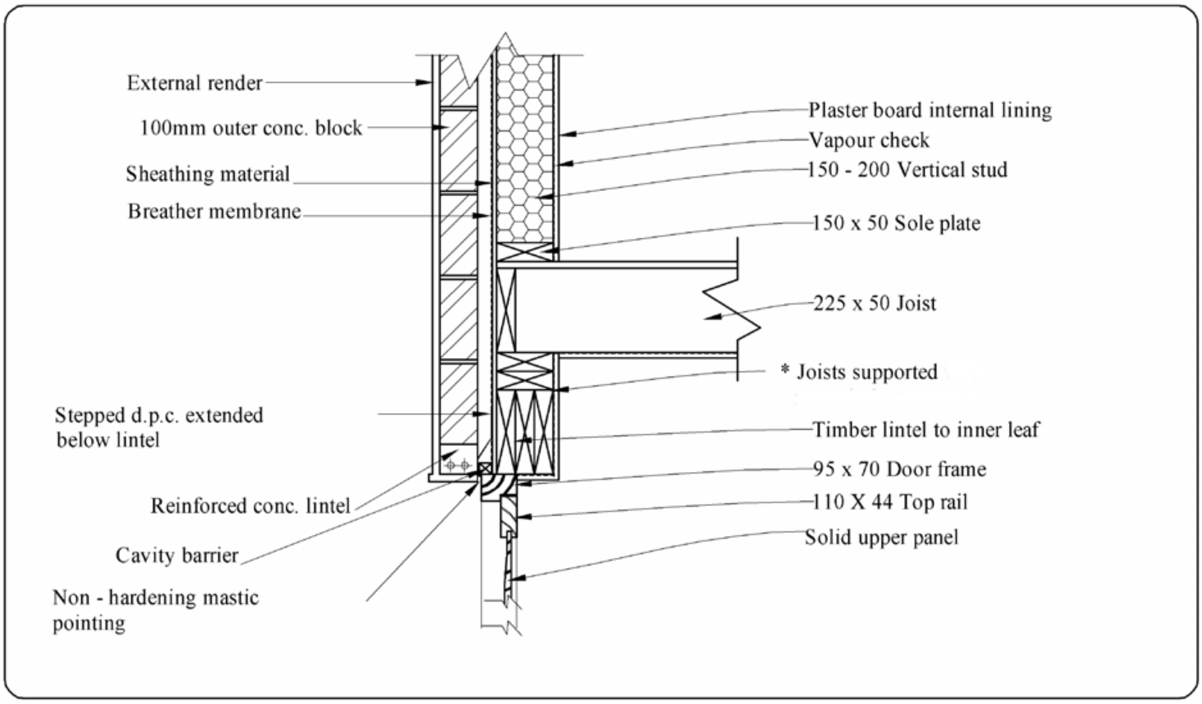


- All rooms designed and sized with a purpose – no unused or excess space or rooms. This purposeful design requires less materials and thus less energy to construct and heat
- As all rooms have windows to the outside, the lighting requirements are reduced as daylight can penetrate all rooms, reducing the need for artificial lighting and thus conserve energy *see sketch*
- Use of materials with a high embodied energy is restricted, no stainless steel or uPVC is used and blockwork and plaster are kept to a minimum. The narrow plan means that the foundation can be standard strip foundation, obviating the need for large amounts of concrete and reinforced steel as is required in a raft foundation. This results in a reduced carbon footprint and low environmental impact
- Mass of internal walls and floors as heat sink, maximizing heat gain and storage
- Narrow plan facilitates economy of roof members – no large spans, rafters and joists of minimum section



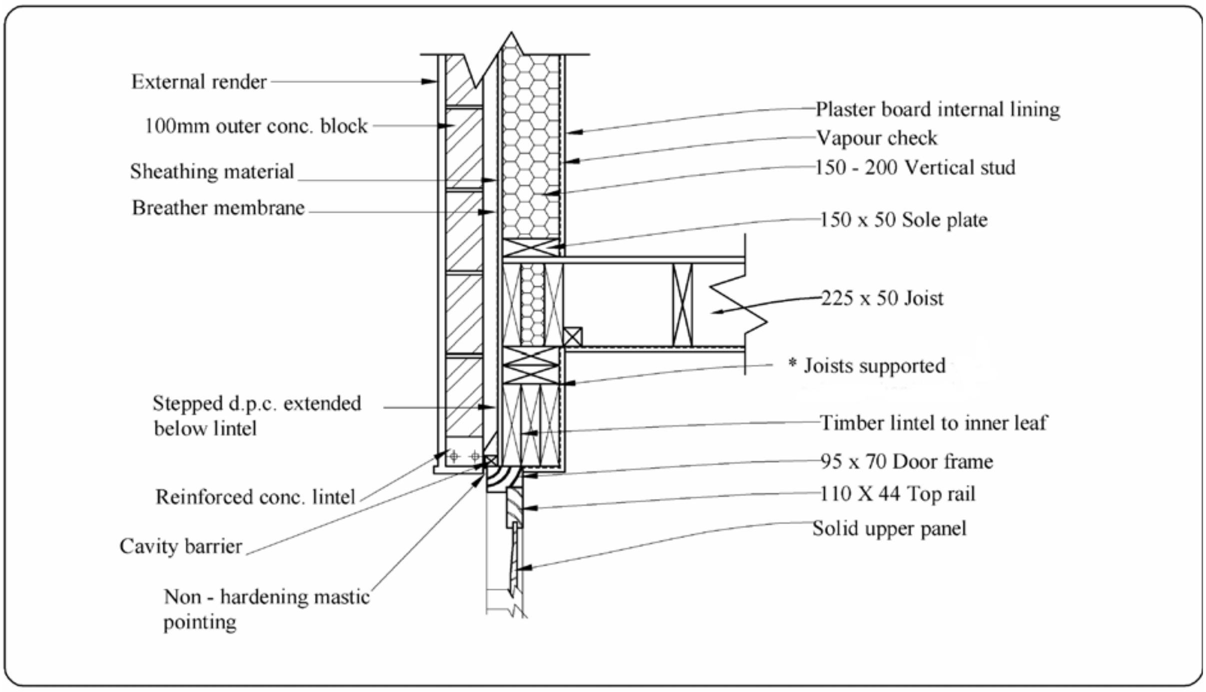
- Maintenance over the lifetime of the house is minimal – pitched roof for quick discharge of rainwater, robust long life insulated cavity wall construction, windows of appropriate scale all reduce the requirement for continued maintenance and thus reduce energy requirements.

Ceist 7 (a) Typical details – timber frame



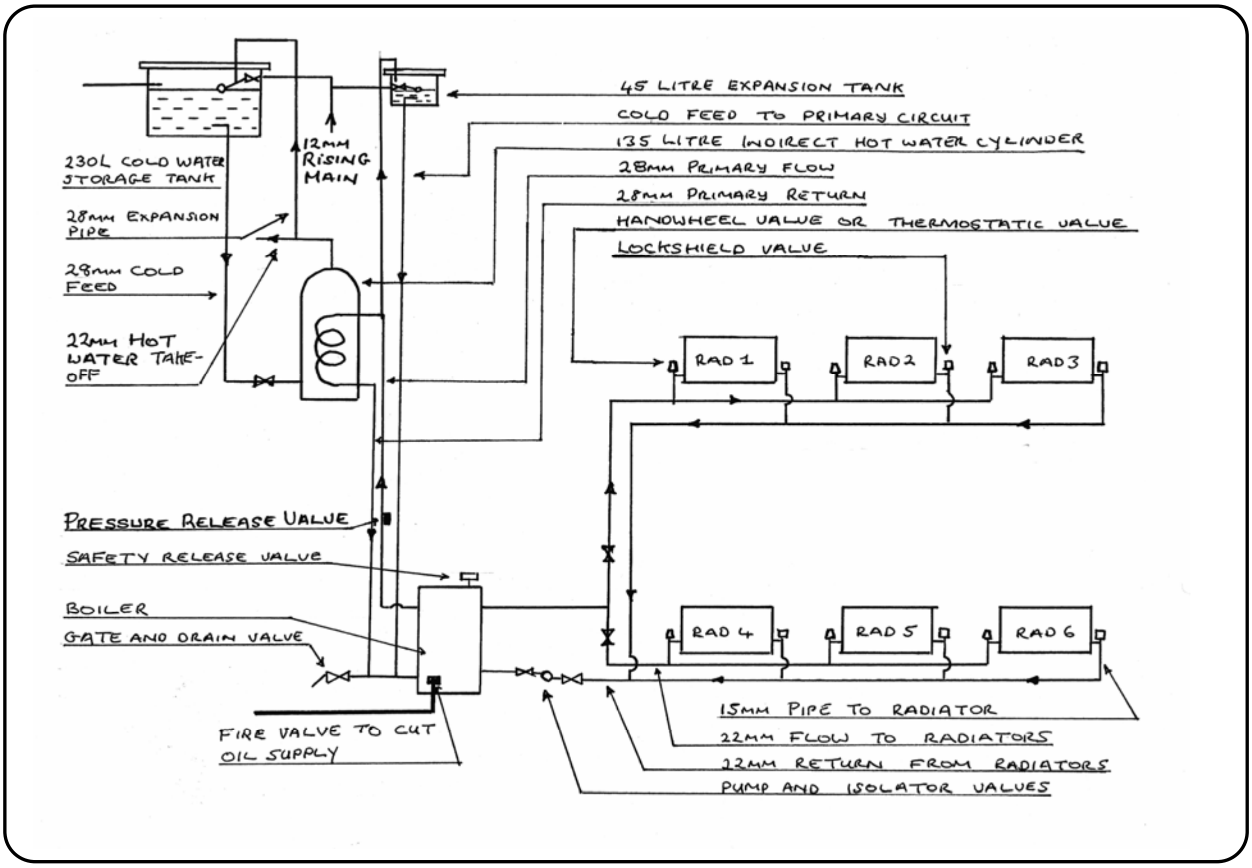
Alternative detail

7 (b) Indicated with asterisk

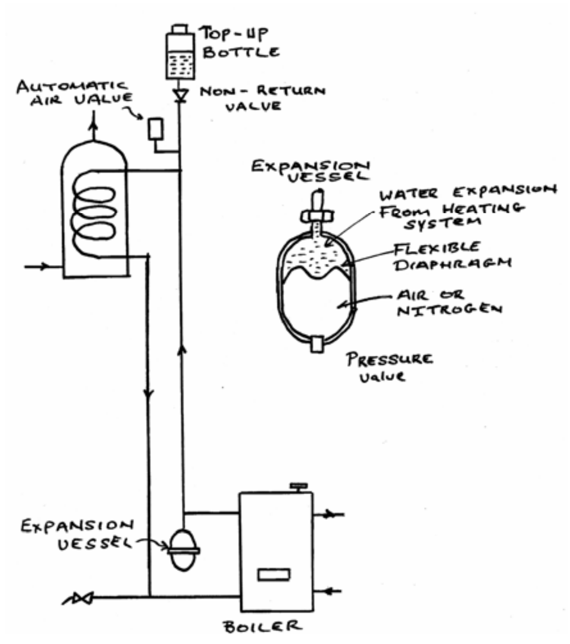


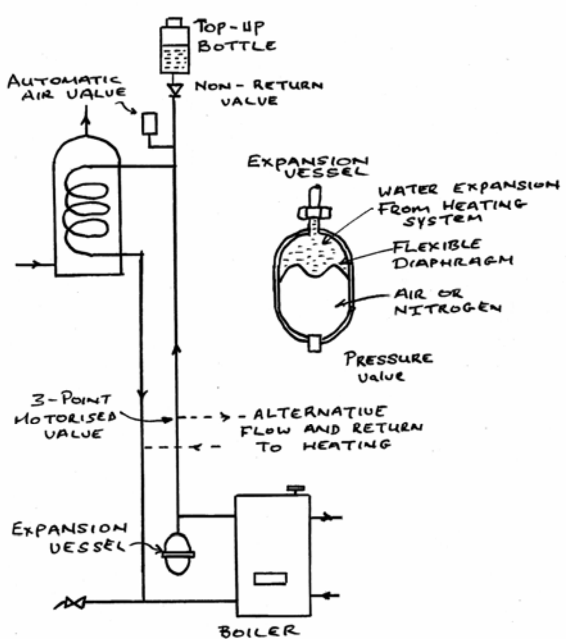
Ceist 8(a)

Sketches of typical oil-fired heating and hot water system – open vent system



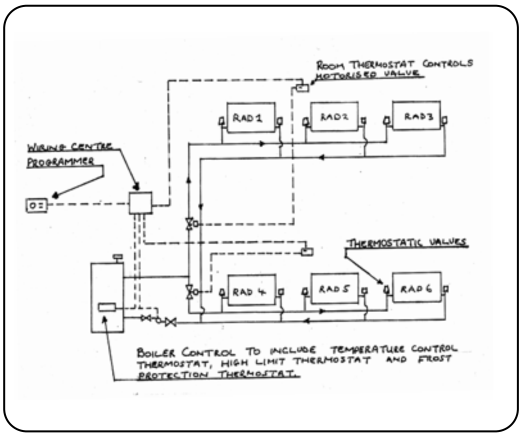
Alternative closed system with expansion vessel





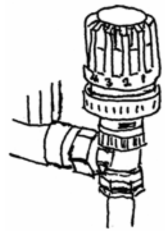
(b) Safety features

- Pressure Release Valve
- Boiler High Limit Thermostat
- Output Control Thermostat
- Boiler Control Timer Switch
- Vent Valve to Boiler
- Fire Valve on Fuel Supply
- Frost Thermostat
- Venting pipes.



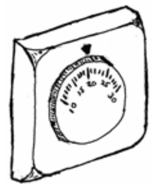
(c) Economical use of oil

Design mechanisms can control space heat emissions to zones, rooms an individual emitters.



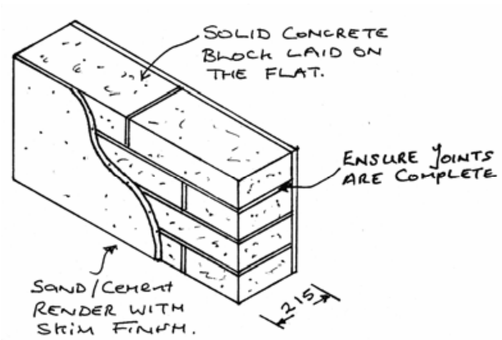
- Zoned heating: Motorised valves operated by time-switches or room thermostats control the flow of hot water to radiators in zones.
- A heating programmer controls the switching on/off of the system and also provides time control.

- Room thermostats control individual room temperatures should be controlled using valves or equivalent forms of devices.
- Thermostatic radiator valves shut off the heat to specific radiators at set room temperatures.
- Handwheel valves isolate and control individual radiators
- Design for short pipe runs to prevent excessive heat loss
- Insulate all hot pipes
- Design to ensure that the boiler and hot water storage cylinder are located close together
- Fit a time switch and a temperature control device to immersion.



Ceist 9

(a) Acoustic insulation



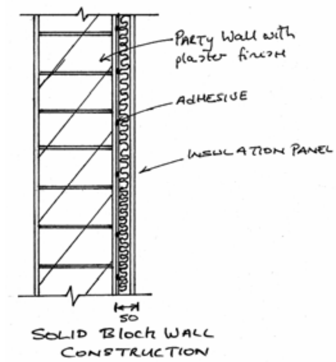
Solid Concrete Block Wall

- This employs the Mass Law to achieve a minimum mass of 415 Kg/m^2 for party walls. A typical concrete block laid on the flat (215mm wide) with a sand/cement render and skin finish on both sides will achieve the required mass.

- In an existing dwelling, adding plasterboard increases the mass of the wall. This method has a limited effect. An insulated board may be fixed on both sides of the wall. A parallel partition is a further possibility.

- Mortar should be uniform and well filled to leave no gaps in the structure.

- Joists should not bear on the party wall but run parallel to the party wall. This is achieved in houses with a maximum span of 6.0 m. Where the span is greater than 6.0 m specific detailing by a structural engineer may be required.

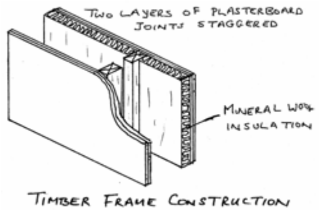


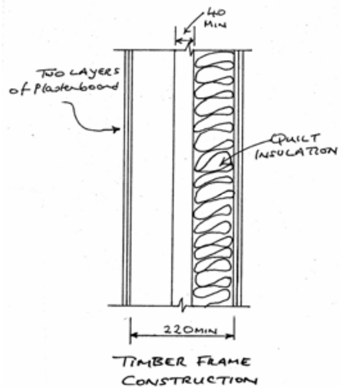
Cavity wall construction

- A cavity wall with two leaves of 100mm concrete blocks and 100mm cavity, sand/cement rendered and skimmed on both sides uses the principle of mass and isolation to achieve the required sound standard. Widening either leaf will achieve greater mass.

Timber frame construction

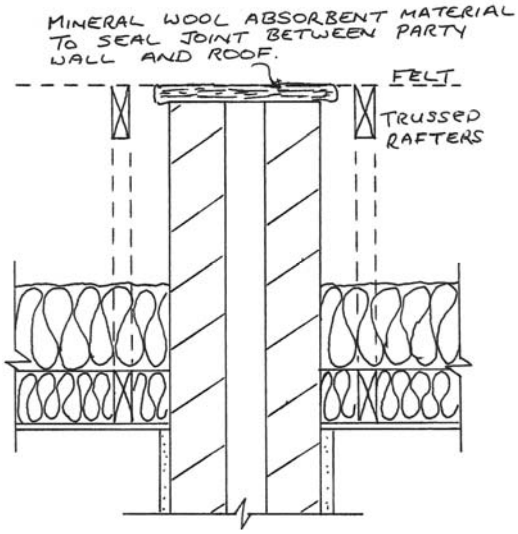
- A cavity to isolate the sound and the inclusion of quilt insulation in one leaf of the wall will absorb the sound
- Two layers of plasterboard achieve greater mass. Completeness is achieved by staggering and taping the joints in the plasterboard, and by sealing all joints to other walls.
- Do not bridge the cavity
- Electrical fittings must be tightly placed and sealed and offset electrical boxes by 400mm min from boxes on the opposite side of the wall.





General

- Party walls that are correctly detailed may fail to meet the sound performance standard if the flanking junctions to external walls are poorly constructed.
- Avoid plumbing installations in the party wall.
- Party walls should extend to the roof in the attic space and be sealed with an absorbent material at roof level.

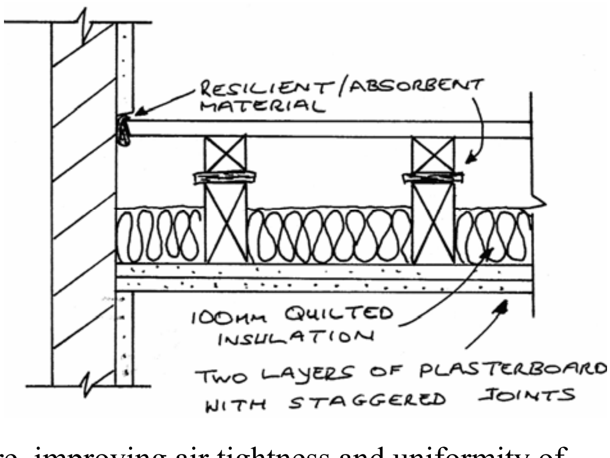


Principles of Sound Insulation

Heaviness: Relates to the Mass Law, which states that the sound insulation of a wall is proportional to its mass per unit area. Thus an increase the mass will improve the sound insulation properties of a wall.

Flexibility: Flexible materials are good at absorbing sound. The use of an absorbent quilt /resilient layer reduces the transmission of sound.

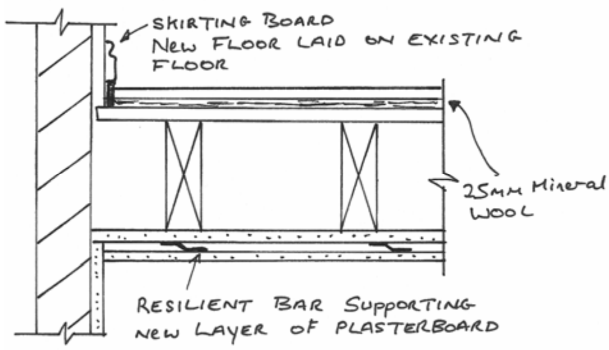
Isolation: Requires the mechanical separation of opposite surfaces of a wall so that there is a discontinuity of construction.



Completeness: Eliminating small gaps in the structure, improving air tightness and uniformity of insulation improves overall acoustic properties.

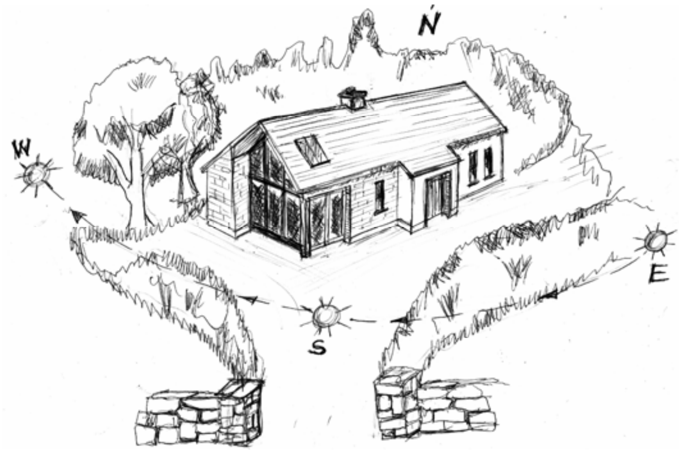
(b)

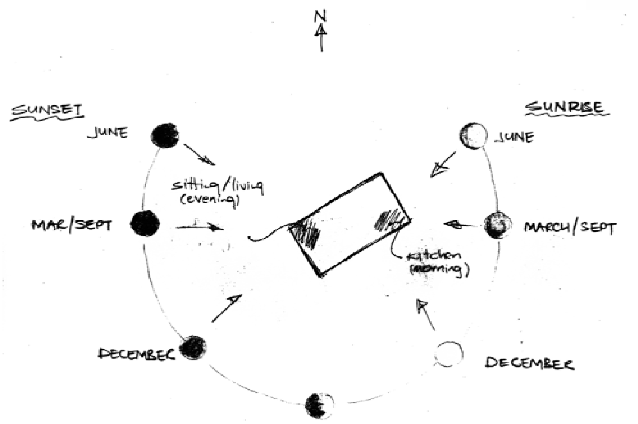
- Soundproofing is improved by the creation of a 'floating floor'.
- Extra layers of plasterboard increase the mass of the floor.
- Insulation between joists absorbs sound
- A suspended ceiling increases isolation
- An absorption resilient layer between old and new floors increases sound insulation
- Resilient material should always insulate the ends of the floorboards from the wall.
- Plaster and skirting should be kept 3mm above the floorboards to prevent flanking transmission and acoustic flanking strip included.

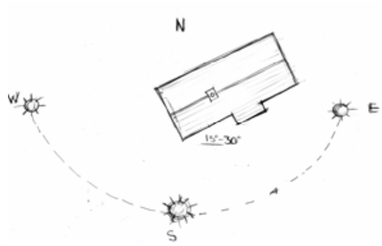


Ceist 10 (a) – Passive solar house - preferred orientation

- Long axis of house running east/west
- Orientate the house so that the sunspace faces south or at ± 30° to due south
- No shading to south and west
- Glazed gable facing west maximises solar gain
- Correct orientation and correct design can achieve 30% saving of fossil fuels.



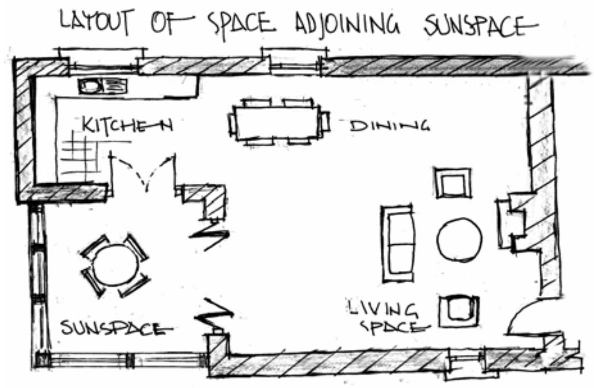




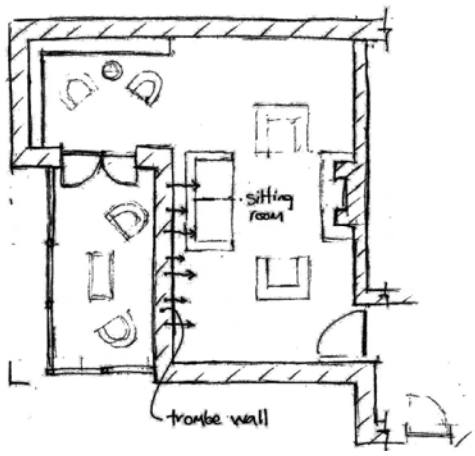
Location and orientation of house relative to path of the sun.

(b) Suggested layout of rooms adjoining sunspace to maximise solar gain

- Most frequently used living areas should directly adjoin sun space to maximise solar gain
- Ensure direct access from living areas to sunspace
- Multi function space (open plan) as distinct from discreet rooms for kitchen, dining and living



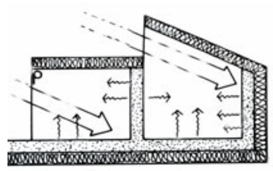
Alternative arrangement of rooms to maximise solar gain

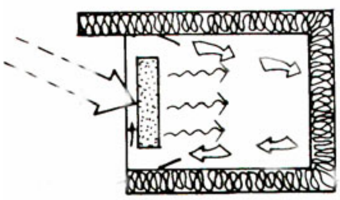


- Less used rooms to north of building, i.e. hallways, bathrooms, utility rooms, storage
- Allow sun space to be isolated from main rooms to prevent heat loss.
- Doors help retain heat gain. Heavy curtains, mass of walls, blinds, shutters reduce heat loss through glazing at night time.

(c) Two design details of building fabric to store heat and reduce heat loss

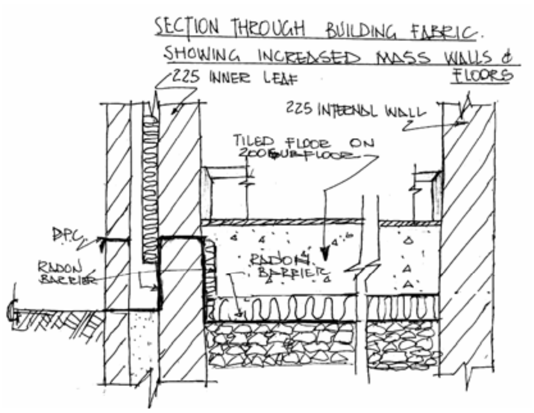
Walls

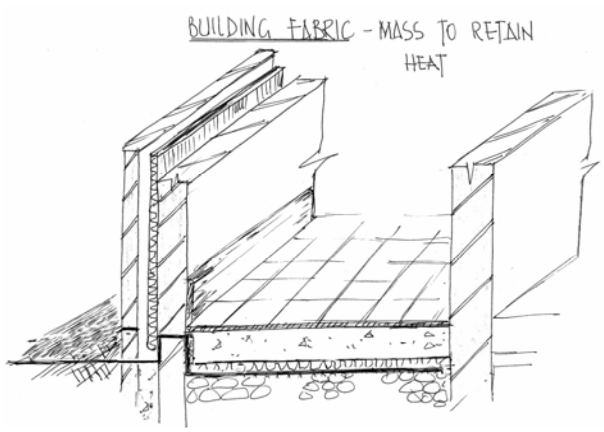




- Provide thermal mass using dense and heavy materials in walls to act as heat sink. Concrete, stone and masonry are effective heat sinks, especially if painted a flat, dark colour.
- Internal walls adjoining the sunspace to be min 225 mm thick to store heat.
- Use Trombe wall to collect, store and distribute heat throughout house. *See sketch*
- Cavity to be insulated
- Thermal mass of walls adjoining sunspace to store and release heat
- Use vents and ducting to transfer warm air from sunspace to other rooms. *(as shown by arrows).*

Floors

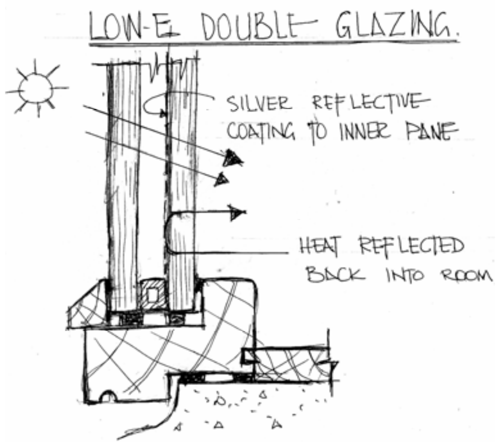




- Provide thermal mass in floors
- Insulate the floor slab to prevent heat loss into ground
- Finish floor materials to have thermal mass, such as quarry tiles, terra cotta tiles etc.
- Use dark colours where appropriate.

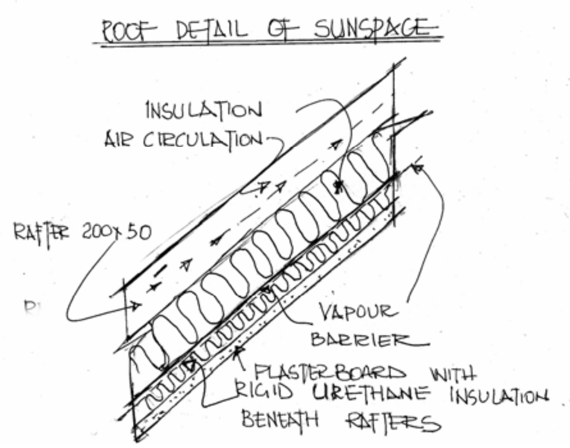
Windows and glazing

- Windows should be appropriately sized - larger to south and small to north
- Provide shutters, blinds, curtains that can be closed as an insulation layer
- Provide isolating doors between sun space and adjoining rooms to retain heat gain
- Use high performance glazing such as double/triple glazing
- Low-emissivity (low-e) double or triple glazing retains heat gained during the day.



Roof

- Super insulated roof fabric to prevent heat loss.
- 50mm air circulation space over insulation.
- 150mm min insulation quilt or rigid urethane between rafters.
- Vapour barrier on warm side of quilt.
- 25mm urethane board bonded to 12mm plasterboard and fixed to underside of rafters using proprietary screws.



Ceist 10 (b)

Points may include:
Sustainable neighbourhoods

- Sustainability development: using the earth's resources in a moral and ethical way, so as not to jeopardise the needs of future generations to meet their needs. This requires a changed mindset to reduce energy needs and carbon emissions through the careful use of the finite resources of the planet
- A neighbourhood plan is required to plan so that all the activities of living be contained in a compact, secure and well designed neighbourhood
- These dimensions include the economic, community and social activities and must be planned for through a sustainability lens
- Sustainable neighbourhoods consists of mixed use development, with work locations, leisure areas and recreational space being integrated and sited in close proximity to living areas so as to minimise energy use
- Sustainable neighbourhood have good infrastructure, public transport – road, bus and rail if possible to reduce dependency on private car.

Integration of economic, community and social objectives – to include

- Planning for the human desire to belong to a place, to work, to play and to socialise together as a local community
- Workplaces, technology parks, offices etc located close to residential areas to avoid long distance travel to workplace – wasteful of time and energy and fractures family life
- Multi-use buildings is important to sustainable development - the family living over the business maintains vibrant communities and an integrated way of life
- Community sustainability: In a model of sustainable community development the local school is near so that children and parents can walk safely to schools – obviating dependence on private car use; safe routes, green routes or pedestrian routes provided so that children /adults can walk safely to and from school.
- Social sustainability: where the community socialises; playgrounds, active open spaces , parks, church, library, community centres etc are planned in proximity and can be easily reached
- Sustainable neighbourhood share facilities and public spaces such as playgrounds, libraries leading to the development of a community spirit
- A new model of urban development is required – not the existing one of suburban housing estates removed from the residential areas, requiring long travel periods to get to work
- Out-of-town shopping malls force people to use the car to do basic shopping - leading to congestion on the roads and an unnecessary waste of a depleting resources – need to plan street layout, shopping centres etc in an integrated way at design stage
- An effective public transport systems need population density, dispersed suburban development does not provide this critical mass – higher densities are necessary

Three recommendations - supported by cogent argument such as;

A sustainable neighbourhood plan take issues such as the following into account

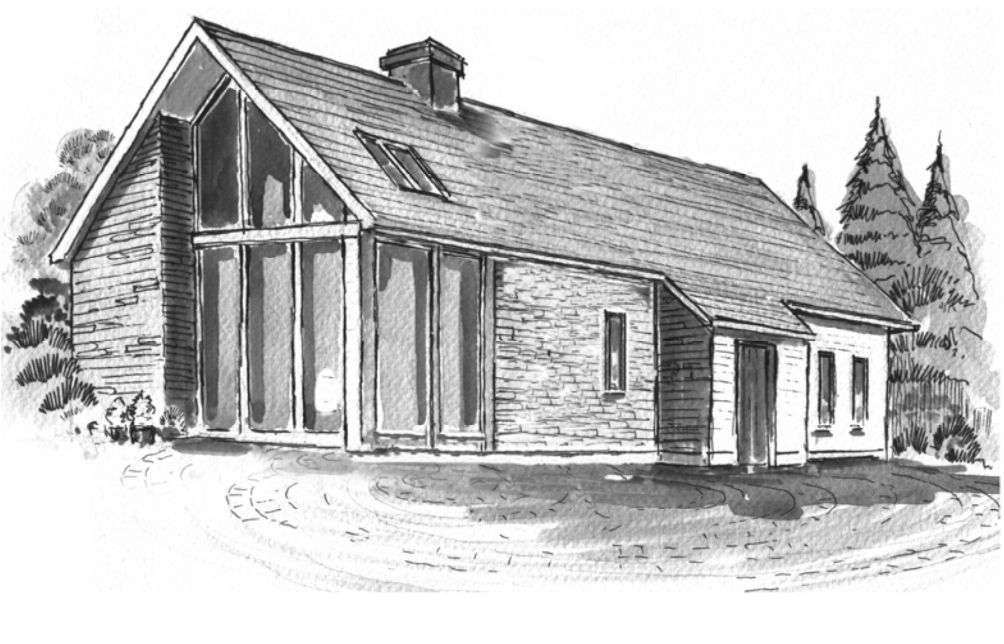
- Provide integrated walking and cycle lanes to encourage safe walking and cycling and to reduce car dependency
- Provide active social areas as central community areas - such as dedicated safe play areas for children and leisure facilities for teenagers and adults
- Provide social areas such as parks and open green areas where older people can walk, talk and sit
- Plan so that people live in connectedness not in isolation, with amenities central to the neighbourhood plan
- Encourage the provision of mixed building use - ground floor trading and work spaces, residential accommodation over so that home and work are in close proximity
- Provide apartments of sufficient size to allow occupants life time use
- Promote and plan for more intentional lifestyles, close to amenities such as schools, churches, libraries, leisure centres, playing fields and save the fossil fuels
- Provide incentives to promote the use of community cars, as is done in some purpose planned sustainable urban communities, so that every person does not need to own a car
- Plan mixed dwellings in town and city centres for old, middle age and young,
- Provide for smaller trading outlets, family businesses, mixed living and trading
- Develop model urban areas, where new models of urban living can be observed and appreciated
- Provide mixed type housing and low rise high density apartments to high design specification.

Any other relevant recommendations supported by cogent argument and development.

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Scrúdú Ardteistiméireachta 2007

Staidéar Foirgníochta
Teoiric – Ardleibhéal



Construction Studies
Theory – Higher Level

Scéim Mharcála
Marking Scheme

Ceist 1

PERFORMANCE CRITERIA	MAXIMUM MARK
Window Detail: *Any 4 points x 4 marks (3 for drawing 1 for annotation)*	
300 mm Cavity wall and render/plaster Concrete cill Wrap around DPC and insulation Wall insulation Window frame:- Cill and head Lintels Stepped DPC and insulation	4 4 4 4
Eaves Detail: *Any 4 points @ 4 marks (3 for drawing 1 for annotation)*	
Gutter Cavity closer Wallplate Eaves ventilator and vent Slating battens and felt Fascia and soffit Three courses of slate Insulation	4 4 4 4
Roof Detail:: *Any 4 points @ 4 marks (3 for drawing 1 for annotation)*	
Ceiling joist Rafter Strut Purlin Collar tie Hanger / Runner / Spacer /Restraining piece Ridge Internal load bearing wall	4 4 4 4
Scale & Drafting	6
(b) ***Correct identification of design detail***	6
TOTAL	**60**

CEIST 2

PERFORMANCE CRITERIA	MAXIMUM MARK
(a) ***Two*** *possible risks to personal safety associated with*	
Slating a steeply pitched roof	4 4
Working around a stairwell prior to having the stairs fitted	4 4
Placing a ladder against a scaffold	4 4
(b) ***Two safety*** *precautions to eliminate each risk at (a)*	
Steeply pitched roof Notes Sketch	4 4
Open stairwell Notes Sketch	4 4
Placing a ladder against a scaffold Notes Sketch	4 4
(c) ***Three reasons*** *that make a construction site a high risk area for accidents*	
Discussion of risk number 1 Discussion of risk number 2 Discussion of risk number 3	4 4 4
TOTAL	**60**

CEIST 3

PERFORMANCE CRITERIA		MAXIMUM MARK
(a) ***Three sections (3 x 12 marks each)***		
Roof	Notes	**6**
	Sketch	**6**
Window	Notes	**6**
	Sketch	**6**
Walls	Notes	**6**
	Sketch	**6**
(b)Two sections ***(2 x 6 marks)***		
Roof	Notes	**6**
	Sketch	**6**
Windows	Notes	**6**
	Sketch	**6**
TOTAL		**60**

CEIST 4

PERFORMANCE CRITERIA	MAXIMUM MARK
(a) Any 8 points ***(6 marks each – 5 marks for sketch 1 mark for annotation)***	
Foundation	**6**
Hardcore	**6**
Radon barrier	**6**
Subfloor (100mm min.)	**6**
Sleeper/dwarf wall	**6**
D.P.C. and wall plate	**6**
Joists and flooring	**6**
Insulation	**6**
Sleeved vent	
300mm cavity wall	
Stepped d.p.c.	
Lintel over vent	
(b) Two functional requirements ***(6 marks each)***	
Functional requirement 1	**6**
Functional requirement 2	**6**
TOTAL	**60**

CEIST 5

PERFORMANCE CRITERIA	MAXIMUM MARK
(a) *Ten* *points* ***(3 marks for each point)***	
Correct Tabulation	3
External Surface	3
External Render	3
External Block	3
Cavity	3
Internal Block	3
Internal Plaster	3
Internal Surface	3
Total Resistance	3
U-Value - Formula and calculation	3
(b) Six points *(3 marks for each point)*	
Heat loss formula and calculation	6
Heating duration for one year	3
k/joules calculation for one year	3
litres of oil for one year	3
Annual cost of heat lost	3
(c) **1 detail @ 12 marks**	
Sketch Notes	6 6
TOTAL	**60**

CEIST 6

PERFORMANCE CRITERIA	MAXIMUM MARK
(a) Any 3 planning guidelines *(3 x10 marks)*	
Guideline 1	**5**
Sketch	**5**
Guideline 2	**5**
Sketch	**5**
Guideline 3	**5**
Sketch	**5**
(b) Two Features for low environmental impact *(2x15 marks)*	
Feature 1	**8**
Sketch	**7**
Feature 2	**8**
Sketch	**7**
TOTAL	**60**

CEIST 7

PERFORMANCE CRITERIA	MAXIMUM MARK
Scale and drafting	**4**
(a) ***4 details @ 4 marks each***	
Door + Outer Leaf Door frame Top rail Upper panel Reinforced concrete lintel Outer leaf + render Cavity barrier Stepped d.p.c.	**4** **4** **4** **4**
5 details @ 4 marks each	
Timber frame Solid timber lintel Vertical stud Insulation Joists Sheathing material and breather membrane Plasterslab and vapour check Double header	**4** **4** **4** **4** **4**
Structural members ***(4 x 2 marks)***	**8**
(b) Double header /vertical studs Joist support/ end bearing/ joist hanger	**6** **6**
Total	**60**

CEIST 8

PERFORMANCE CRITERIA	MAXIMUM MARK
(a) Any 12 x 3 marks (2 marks for detail and one mark for annotation)	
Rising main + ballcock	**3**
Cold water storage tank, cold feed and overflow	**3**
Indirect cylinder + expansion pipe	**3**
Primary flow	**3**
Primary return	**3**
Gate and drain valve	**3**
Hot water take-off	**3**
Boiler	**3**
First and second floor radiators	**3**
Header or expansion tank	**3**
Flow pipes to radiators	**3**
Return pipes from radiators	**3**
Regulating (thermostatic) valve or Lockshield valve	
Valves (3)	
Sizes of pipework *(any three)*	
(b) *Two safety features of heating system* ***(2 x 4 marks each)***	
Safety feature 1	**4**
Safety feature 2	**4**
(c) *Two Design features of heating system* ***(2 x 8 marks each)***	
Design detail 1: Notes	**4**
Design detail 1: Sketch	**4**
Design detail 2: Notes	**4**
Design detail 2: Sketch	**4**
TOTAL	**60**

CEIST 9

PERFORMANCE CRITERIA	MAXIMUM MARK
(a) 2 design details including principles @ 15 marks each	
Design detail 1:	
Notes	**8**
Sketch	**7**
Design detail 2:	
Notes	**8**
Sketch	**7**
(b) 2 design details @ 15 marks each	
Design detail 1:	
Notes	**8**
Sketch	**7**
Design detail 2:	
Notes	**8**
Sketch	**7**
TOTAL	**60**

Ceist 10

PERFORMANCE CRITERIA	MAXIMUM MARK
(a) ***Preferred orientation (2 x10 marks)***	
Note	**10**
Sketch	**10**
(b) ***Layout (2 x 10marks)***	
Note	**10**
Sketch	**10**
(c) ***2 design details to maximise thermal gain (2 x 10 marks)***	
Design Detail 1 Notes Sketch	**5** **5**
Design Detail 2 Notes Sketch	**5** **5**
TOTAL	**60**

Ceist 10 ***(alternative)***

PERFORMANCE CRITERIA	MAXIMUM MARK
Discussion of main statement – major point 1 Discussion of main statement – major point 2 Discussion of main statement – major point 2	**10** **10** **10**
Recommendation 1 to planning authority Recommendation 1 supported by discussion	**10**
Recommendation 2 to planning authority Recommendation 2 supported by discussion	**10**
Recommendation 3 to planning authority Recommendation 3 supported by discussion	**10**
TOTAL	**60**

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2007

Construction Studies

Ordinary Level and Higher Level

Marking Scheme

Practical Coursework

(150 marks)

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Form A

Leaving Certificate Examination 2007

Construction Studies

School Assessment of Candidates' Practical Coursework

Name of Candidate:……………………………………………….. *Examination Number:* ☐

Type of Project:

❑ Practical Craft ❑ Building Science

❑ Written/Drawn with Scale Model ❑ Composite

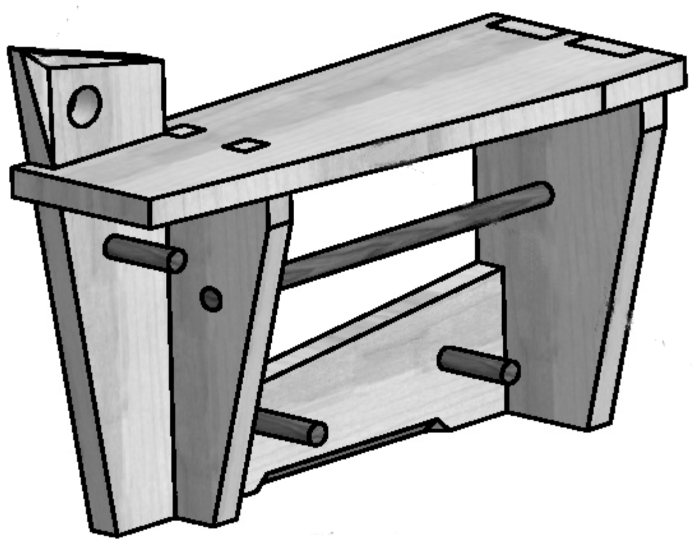
	Marking Scheme		Maximum Marks	Marks Awarded
A	**Planning of Project** • Ability to design an appropriate plan of procedure • Evidence of research • Preparation of working drawings/use of models as graphic aids			
		Subtotal	**30**	
B	**Report Writing** • Design folio detailing planning, execution and evaluation of project • Critical appraisal of project for quality, function and finish • Conclusions from practical experience of project work			
		Subtotal	**30**	
C	**Manipulative Skills** • Skills in preparation and finishing of materials • Safe use of tools and machines - Hand /Power/CNC • Skills in assembly of materials			
		Subtotal	**30**	
D	**Presentation of Project** • Task completed to acceptable standard • Appropriate use of materials • Satisfactory knowledge of construction technology			
		Subtotal	**30**	
E	**Experiments** • Evidence of ability to plan and carry out **three** experiments *Experiments should be related to the project work or selected from the suggested experiments outlined in the syllabus for Construction Studies.*	Experiment **1** Experiment **2** Experiment **3**		
		Subtotal	**30**	
		TOTAL:	**150**	

Signature of Teacher: ………………………………………………… *Date:* ………………………

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Scrúdú Ardteistiméireachta 2007
Leaving Certificate Examination 2007

Scéim Mharcála
Marking Scheme
(150 marc)



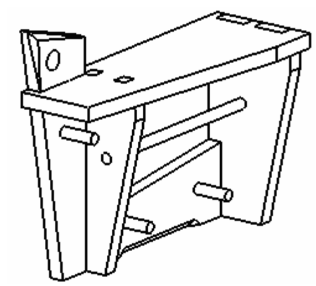
Staidéar Foirgníochta
Triail Phraticiúil

Construction Studies
Practical Test

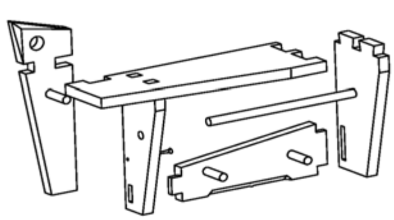
Construction Studies 2007 Marking Scheme – Practical Test

Note:

The artifact is to be hand produced by candidates without the assistance of machinery. However the use of a battery powered screwdriver is allowed. Where there is evidence of the use of machinery for a particular procedure a penalty applies.
Component is marked out of 50% of the marks available for that procedure.

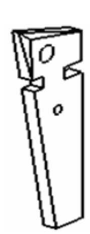


A	OVERALL ASSEMBLY	MARKS
1	Overall quality of assembled artifact	**8**
2	Four dowels located and fitted correctly *(4 x 2 marks)*	**8**
3	Edge of top (i) design (ii) shaping *(2 x 3 marks)*	**6**
	Total	**22**

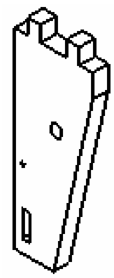


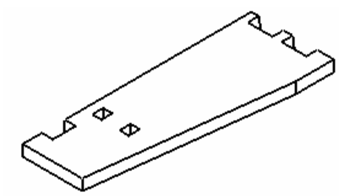
B	MARKING OUT	Marks
1	Vertical back left - • slopes, chamfers & hole ***(5x 1 marks)*** • two trenches *(2 x 2 marks)*	 **5** **4**
2	Left side -vertical • joints *(3 x 2 marks)* • slope and shank hole *(2 x 1 marks)*	 **6** **2**
3	Top • joints *(5 x 2 marks)* • slope *(1 mark)*	 **10** **1**
4	Right side - vertical • joints *(3 x 2 marks)* • slope *(1 mark)*	 **6** **1**
5	Bottom **-** horizontal • joints *(2 x 2 marks)* • chamfer and slope *(3 + 1 marks)*	 **4** **4**
	Total	**43**

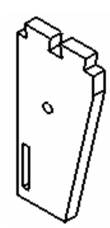
BACK LEFT

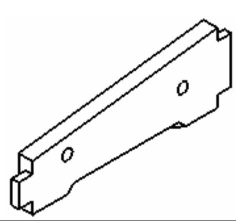


C	PROCESSING	Marks
1	Shaping sloped edges *(2 x 2 mark)*	**4**
2	Forming two chamfers *(2 x 2 marks)*	**4**
3	Drilling hole *(2 marks)*	**2**
4	Two trenches *(2 x 3 marks)*	**6**
	Total	**16**

LEFT SIDE	D	PROCESSING	Marks
	1	Two tenons ***(2 x 4 marks)*** One mortice ***(4 marks)***	**8** **4**
	2	Shaping sloped edge ***(2 marks)***	**2**
	3	Drilling and countersinking ***(2 marks)***	**2**
		Total	**16**

TOP	E	PROCESSING	Marks
	1	Two mortices ***(2 x 4 marks)***	**8**
	2	Two dovetails pins- • vertical sawing ***(4 x 1 marks)*** • cutting across grain ***(2 x 2 marks)***	**8**
	3	Trench ***(3 marks)***	**3**
	4	Shaping of sloped edge ***(2 marks)***	**2**
		Total	**21**

RIGHT SIDE	F	PROCESSING	Marks
	1	Two dovetails ***(2 x 5 marks)***	**10**
	2	Mortice ***(4 marks)***	**4**
	3	Shaping of sloped edge ***(2 marks)***	**2**
		Total	**16**

BOTTOM	G	PROCESSING	Marks
	1	Two tenons ***(2 x 5 marks)***	**10**
	2	Shaping stopped chamfer ***(4 marks)***	**4**
	3	Shaping of sloped edge ***(2 marks)***	**2**
		Total	**16**