Acoustic Design Consultants

Our Ref: ADC/6086/02/GJT
By Fax (01252 541 760) & Post

For the attention of Mr SJ Springer

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Dear Mr Springer,

16 Shute End, Wokingham

26 July 2004

Further to our recent meeting at the above site, I write to provide our comments and observations in respect of your proposed material change of use. I understand that the project falls under the remit of Approved Document E (2003 ed.) to The Building Regulations 2000 (ADE 2003) and that the property has Historic Building status as defined within the Approved Document.

From our discussions, you and your client indicated that you require our assistance for the specification within the original parts of the building where the construction generally comprises timber joist floors and both lath & plaster and also brickwork partitions. I gather that you do not currently require advice in respect of the concrete floors.

Limitations

We gather that the Conservation Officer has placed restrictions on the works that you are able to undertake as a result of the building's status which are summarised below:

1. Existing lath & plaster ceilings and associated cornices/coving to remain in place/untouched.
2. Existing skirting boards to remain in-situ and preferably visible.
3. Existing lath & plaster partitions to remain.
4. Existing windows, frames and secondary sashes (ground floor only) to remain.

Clearly, the restrictions summarised above may limit the effectiveness of any treatment/works aimed at satisfying the performance targets in ADE 2003. ADE 2003 recognises this point, however, exemptions should only be permitted once all that is practicable has been undertaken to improve the sound insulation levels. In the event of a failed test a notice should be fixed within the properties affected, subject to Building Control approval.

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ADE 2003 provides the following on-site performance targets for separating elements between dwellings formed by a material change of use:

Separating Element	Airborne $D_{nT,w} + C_{tr}$, dB	Impact $L'_{nT,w}$, dB
Walls	43	N/A
Floors and Stairs	43	64

In respect of newly formed internal partitions within dwellings they should be able to achieve an R_w of not less than 40 dB. R_w is a laboratory measurement of sound insulation and as a result the constructions used should have lab test data to support their uses. This requirement does not apply to existing/retained partitions.

Separating Floors

The existing intermediate floor construction is understood to comprise lath & plaster ceilings(believed to be nominally 20 mm deep) directly fixed to the underside of 7-8 " timber joists overlaid with existing floorboards nominally 20 mm). In some areas the floorboards have been replaced with plywood/chipboard.

Proposed Option 1 – Independent Ceiling

Given that the existing ceiling must remain in-situ it may be acceptable to install an independent ceiling from below. Whilst this will hide the existing ceiling, the works should not damage the construction and this route should be discussed with the Conservation Officer.

This form of treatment has a good track record for improving the sound insulation of properties undergoing a material change of use and is listed as Floor Treatment 1 in ADE 2003. The treatment comprises the addition of an independent ceiling with the lining set 125 mm below the existing ceiling. The Approved Document recommends that the ceiling should have a mass of no less than 20 kg/m^2, which may be achieved using:

- 19 mm plasterboard plank + 12.5 mm sound rated plasterboard; or
- two layers of 12.5 mm fire/sound rated plasterboard; or
- two layers of 15 mm standard wallboard

The ceiling should be supported on a fully independent frame/ceiling joists fixed only to the surrounding walls, a clearance gap of at least 25 mm is recommended between the existing ceiling and the new joists and mineral fibre insulation of at least 100 mm should be included within the secondary cavity.

ADE 2003 recommends that the existing ceiling be upgraded to a mass of at least 20 kg/m^2, however, in this instance this is not possible due to the restrictions placed. As a result, if this treatment is used, we would recommend that additional mineral fibre insulation (100 mm) be included within the primary cavity, the existing floorboards are made good/replaced with 22 mm chipboard. A small perimeter gap should be left and fully filled using a gunned sealant that does not shrink or crack back over time.

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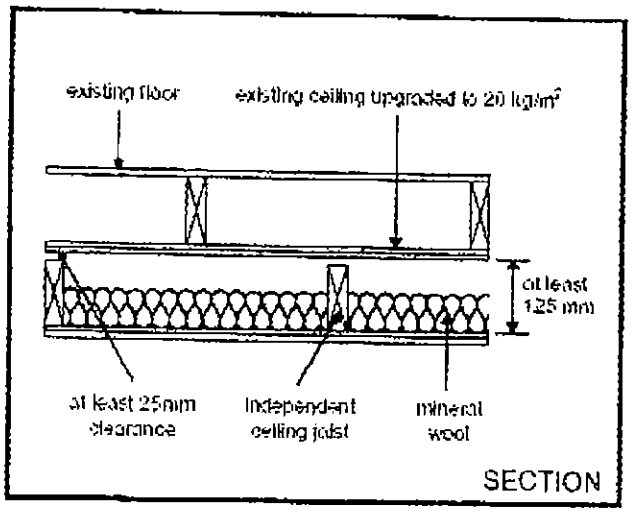
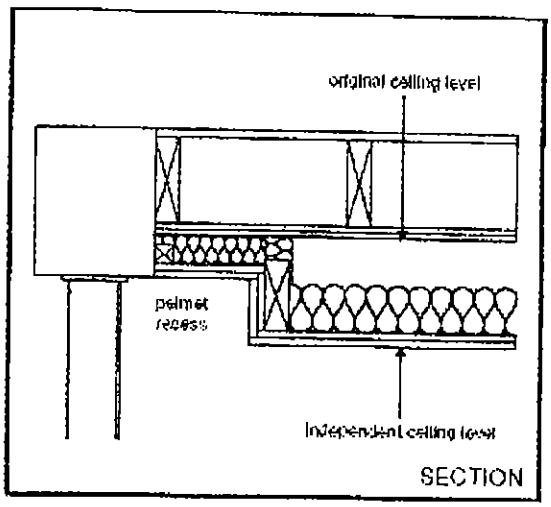
In order for this type of treatment to realise it's full potential in terms of sound insulation the finished structure should be airtight and the isolation between the existing ceiling and new ceiling must be maintained. There must be no mechanical connection between the two ceilings and care must be taken not to overly compress the mineral fibre.

During the course of my recent visit you indicated that this form of treatment may not be acceptable due to window head height and the requirement to retain the existing cornices etc. If it is possible to accommodate this form of treatment, the following detail is provided within ADE 2003 at high window heads. For completeness we have also included the sectional drawings from ADE 2003:





Proposed Option 2 – Floating Floor Treatment

If it is not possible to install a secondary ceiling below the existing ceilings or to apply treatment from below, the next option involves the installation of a floating floor system.

This form of treatment is described as Floor Treatment 2 within ADE 2003. The treatment comprises laying 100 mm (minimum) mineral fibre between the joists, again upgrading the exiting ceilling to 20 kg/m^2, making good the existing floor (or replacement with minimum 18 mm chipboard), overlaying the floor with 25 mm mineral fibre insulation (60-100 kg/m^3) and forming a floating layer of not less than 25 kg/m^2 from two board materials. Typically, the floating floor comprises 19 mm plasterboard plank and 18 mm chipboard. Again, given that the existing ceiling cannot be upgraded we would suggest that the floating layer be modified by using 22 mm chipboard and that the insulation between the joists be increased to a depth of 150 mm.

For this type of system to achieve it's full potential in terms of sound insulation the floating layer must not bridge to or contact the surrounding walls. In practice this is usually achieved by turning the resilient layer up at the edges and trimming off the excess once complete. An nominally 3-5 mm perimeter gap should be left to the skirting boards and fully filled with a mastic that does not shrink or crack back over time.

The relevant sectional sketch from ADE 2003 is included overleaf for information.

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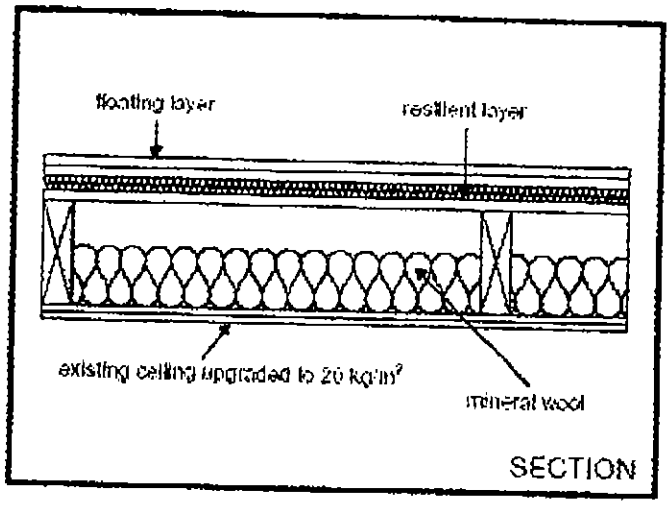

From our conversations on-site, I understand that installing this form of floating floor treatment is likely to significantly impact on the existing door frames, skirting boards and other period features in the property which may not be acceptable to the conservation department.

If it is not possible to accommodate this depth of system (typically + 60 mm) then we would recommend that proprietary products are considered. These systems often offer a space saving alternative, at the cost of a more expensive system. I understand that you would be reluctant to increase the floor height by significantly more than + 25-30 mm over the existing level. If the floorboards are removed this should accommodate a 45 mm system if laid directly onto the joists, and I am reminded that ADE 2003 does not accept a soft floor finish (impact mats etc) as a suitable treatment solution for timber floors.

The table below outlines a selection of manufacturers, the anticipated increase in floor level, along with their recommended systems for this application and takes into consideration the restrictions placed on the project:

Manufacturer	System	Anticipated Height Increase	Telephone Number
British Gypsum	Gyproc GypFloor Silent	Marginal 0-5 mm	08705 456 123
Hodgson & Hodgson Group	Foundation 35	15 mm	01664 821810
Monarflex	Tri-deck	15 mm	01727 830116
Proctor Group	Refurb Deck	25 mm	01250 872261

The manufacturers given above generally recommend that the systems are used in conjunction with an isolated/resiliently-supported ceiling or that the ceiling is overboarded. Given that neither of these routes is possible in this instance, an enhanced

level of sound insulation would be afforded by overboarding the floating floor with spot bonded timber sheeting (e.g. 10 mm chipboard, MDF, cement particle board etc). The additional sheets should be spot bonded rather than screw fixed as mechanical fixings may bridge the isolation provided by the floating floor to the underlying joists. We would also suggest that the floor cavity include 100-150 mm mineral fibre insulation slabs, which may need to be retained within a wire mesh for fire/loading purposes.

In respect of the Gyproc system, the performance of the floor is likely to to marginal for both airborne and impact sound insulation. To enhance the system further we would recommend that additional impact resistance be provided by laying a resilient layer over the floor (e.g. Isorubber, Acousticel etc) which is overboarded with an additional 18 mm chipboard floor.

The manufacturers of the systems should provide perimeter and other details, which must be strictly followed to ensure that the optimum performance improvement is achieved. Once you have selected a suitable system, ADC would be happy to vet/amend/check the specification provided or to provide possible enhancements and to advise on points to watch.

Please note that the list provided above is not exhaustive, should you become aware of other systems ADC would be happy to appraise their effectiveness.

Separating Walls

The existing walls fall into two principle types namely lath & plaster on studs and solid masonry.

Solid Masonry Separating Walls

Where the solid masonry walls are to become separating walls, ADE 2003 recommends that they be upgraded using independent wall panels to one side only, where the thickness exceeds 100 mm. The independent panel usually comprises linings of not less than 20 kg/m^2(see previous section for makeup) supported independently of the base wall on a framework (timber/metal). A clearance of 10 mm is required from the frame to the base wall, 35 mm from the linings to the base wall and nominally 50 mm mineral fibre should be included within the cavity.

Free standing, independent panel are available from manufacturers (e.g. British Gypsum, InstaGroup etc) for this application. If this a route that you wish to consider, please let us know.

Where the existing masonry walls exceed an overall thickness of 230 mm, including plaster/render finish, additional treatment should not be required to achieve the required levels of sound insulation. This assessment is made on the basis that the walls are either solid brickwork or dense concrete blockwork and that the existing openings will be blocked up with materials of equivalent density (bricks/dense blocks). The completed wall must be sealed airtight, attention to detail and good workmanship is of paramount importance.

Lath and Plaster Base – Separating walls

Where existing lath & plaster partitions will form the base for separating walls a similar treatment should be applied as described for masonry partitions, however the treatment should be extended to both sides of the wall. It may be possible to only line one side of the walls only, however the results are likely to very marginal with a strong possibility of failure. If it is necessary to only line one side of the wall the system cavity should be made as large as possible, preferably no less than 150-200 mm. Furthermore, the insulation within the cavity should be increased to at least 100 mm in depth. These modifications should significantly increase the level of sound insulation achieved. Whilst this system would not allow the existing walls/skirting to be on show, they would be protected.

Internal Partitions

Where existing partitions are retained, ADE 2003 does not require additional treatment. Where new internal partitions are created/formed they should be capable of achieving the lab value of sound insulation previously identified. Within this project you have identified that loading was of critical importance and as a result we would recommend that you utilise a stud partition type system. You expressed preference toward metal frame to keep loading as low as possible and we would confirm that one of the following constructions should suffice:

1. 10 kg/m^2 linings - 15 mm plasterboard or 12.5 mm sound/fire rated plasterboard each side of a 45 mm metal frame, with 25 mm mineral fibre insulation between(10kg/m^3)
2. 20 kg/m^2 linings – 2 x 15 mm plasterboard or 2 x 12.5 mm sound/fire rated plasterboard each side, no mineral fibre required.

Both of these constructions are listed in ADE 2003 as achieving the requisite level of sound insulation. The lining mass, cavity depth and insulation thickness' are given as minimum.

Other Issues

ADE 2003 has an additional requirement to control reverberation in common spaces. Once the layout and finishes have been established in greater detail ADC would be happy to provide various options to satisfy this requirement. This is usually done through the addition of absorptive finishes to the ceilings/walls. Given the level of restriction on this project, it may be necessary to seek dispensation on this aspect.

Aspects that can significantly undermine the performance of the systems described above include junction details, perimeter details, flanking transmission, penetrations and poor workmanship. More detailed advice on controlling these limiting factors will be provided once the selected systems are finalised, however, general guidance is available in ADE 2003.

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Manufacturers' recommendations should be followed when installing the products that are suggested, and it is essential that a good level of workmanship and site supervision be maintained to prevent the possible introduction of flanking paths.

ADC should be made aware of any perceived conflict between the advice given in this specification and other regulatory requirements outside of our area of expertise e.g. thermal, fire etc prior to any alterations being made to the proposed works.

I trust that this meets with your requirements for now, however should you require any further information please do not hesitate to call.

Yours sincerely,

Gary J Timmins BEng MIOA
Senior Consultant