BEST PRACTICE GUIDES

SECTION 2
SUBSTRUCTURE AND DRAINAGE

NHBC

PRIDE IN THE JOB AWARDS

BEST PRACTICE GUIDES

Our series of Best Practice Guides will take you through what the Pride in the Job judges look for at each stage of construction and when considering the site manager's overall organisation and management skills.

The Pride in the Job marking sheet used by our judges has 44 marking lines split across 9 sections. The judges will give a score for each line – where there is no work to mark, that line will be left blank and no mark given. A mark of 4 indicates compliance with NHBC Standards and with Building Regulations. A mark of 5 indicates extra attention to detail over and above compliance standards. A mark of 6 would indicate that much of what the judges have seen cannot be improved upon. A mark less than 4 would indicate varying issues relating to workmanship and non-compliance with NHBC's Standards – the greater the issue or number of the same issue, the lower the mark. The final score will be all the marks awarded expressed as a percentage.

These Guides set out what the judges are looking for with clear hints and tips on the sort of practice that will lead to higher marks.

Clearly it is impossible in these short guides to cover every single point of construction – we try here to cover the main issues that are taken into account when considering a mark for each score line.

When looking at the photographs, consider each on in the context of the score line heading – don't be distracted by something else that isn't as good – that will be marked accordingly elsewhere.

SECTION 2
SUBSTRUCTURE AND DRAINAGE

Section 1 of this series covered the importance of creating a solid foundation upon which to build a home. Section 2 takes this further and considers the substructure build – the part of the home that connects the structure above ground to the foundations. This includes walls, services, drains and the main ground floor – and all associated protection needed to prevent damp rising from the ground into the habitable area of the home.

WALLS & COLUMNS
WATERPROOFING & VENTILATION
SUB-FLOOR SERVICES & SERVICE ENTRIES
GROUND FLOOR
DRAINAGE (INTERNAL AND EXTERNAL)
GAS PRECAUTIONS

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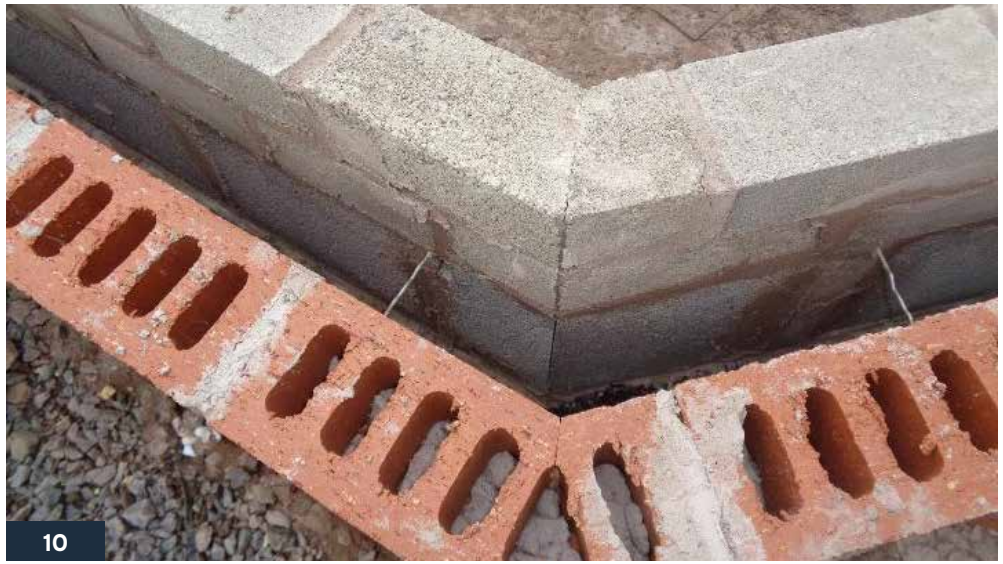
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WALLS AND COLUMNS

Images 1 and 2: The masonry work is expected to be treated with the same attention to detail that it would be above ground; namely full joints in blockwork and brickwork, accurate cutting particularly on splayed bay work, square corners, full bonding wherever possible and clean cavities.

In image 1, one might query the spacing of the plastic vents – are they spaced at the right centres for example – and is there sufficient cross flow of ventilation. However, in this score line we are just looking at the masonry – issues with ventilation would be marked under score line Waterproofing and Ventilation.

Images 3 and 4: Continuing the theme of substructure walls and columns, the judges will look for consistent, neat and accurate service holes that take account of imposed loads from above, which means adequate bearing of any built-in lintels or core-drilled blocks. Any in-situ reinforced concrete needs care taken with the placement of steel reinforcement with clean shuttering, especially in situations where the finished substructure walls will be unclad. Adequate vibration poker work will be evident on the finished surfaces of these walls. Image 3 would be improved by the bricks being laid frog up and the frogs filled. Consider how neat the work is in image 4.

Images 5, 6 and 7: What marks would you give the work in these pictures? Although they are generally a solid build and would perform for the life of the building, the work lacks the finesse of the previous four photographs. Image 5, in our opinion, although containing neat and clean work, lacks thought in relation to bonding, which has resulted in too many straight joints and would lose marks accordingly. Images 6 and 7 contain what we would consider to be 'industry average' work and probably would only achieve a mark of 4 at best. The blocked air vents in image 7 would be marked down under Waterproofing and Ventilation.

The contrast in the workmanship shown in the images in this section illustrates the meaning of Pride and the close attention to detail that is required of winning site managers.

Images 8 and 9: The work in these images would obviously not score well for Pride in the Job and indeed would warrant a mark of 3 or even 2 as they are well below 'industry' average with serious remedial and re-build works required. Witnessing workmanship like this would raise a query as to the presence of a quality control system on site and the potential need for training or tool box talks.

Images 10 and 11: Splayed bays are one area in substructure walls where opportunities to score additional points are regularly missed. It is recognised by our judges that this is a difficult element to build in the best way possible, as it requires angle cutting of blockwork. If effort can be witnessed in this area, then the attention to detail and the effort will be rewarded.

Image 10 is an obvious demonstration of the use of pre-cut and stuck corners on both leaves of masonry and this represents the ideal, aside from this standard of cutting actually being achieved on site. Clearly the frogs here have yet to be filled. Image 11 is a good, above-average example.

Images 12, 13 and 14: These show a range of differing build standards with a range of issues in several of the examples – such as poor cuts, poor jointing, missing DPM and insufficient wall ties; none of this work would be scored highly by the judges.


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WATERPROOFING AND VENTILATION

Images 15, 16 and 17: A very important part of any build is the prevention of moisture ingress into the building from the ground. Damp proof courses should be continuous and over the full width of the brick or block and must be located at the correct levels. A common fault is to sit the DPC back in the joint, which then allows rising damp to bypass it and show in the masonry above DPC. Any tanking must be applied and installed in accordance with the manufacturers recommendations with particular attention paid to laps corners and fillets.

Judges will look at the adequacy of sub-floor ventilation and achieving a good cross-flow to ensure minimal build-up of moisture in the floor void, in addition to allowing the free ventilation of any other gases that may build-up beneath the building.

Telescopic ventilators are the most common form of sub-floor ventilation used, and it's important they are well jointed to ensure it's the sub-floor that's ventilated and not the base of the cavity. NHBC Standards Chapter 5.2 quotes that in the case of timbers floors ventilators should be spaced at 2m centres and for other floor systems at 1500mm^2 per metre run of external wall or 500mm^2 per m^2 of floor area, whichever gives the greater opening area. In these two images not only is the telescopic ventilator work very neat but the standards in relation to substructure brick work and blockwork, plus the cleanliness of cavities and edge DPM lap are also good.

Penetrations through tanking or any other membrane should be correctly designed and formed as moisture ingress problems can be very expensive to remediate. Damp Proof Membranes can also be considered in this section, as well as the section in relation to ground floors, with the interface between DPCs and DPMs particularly important for first course of internal blockwork. The attention to detail in the work in image 15 or 16 is particularly impressive and would probably score a 5 or 6. Image 16 shows a good way of taking an air vent through a gas membrane; the judges here would like to know that the tape being used to seal the joints is the correct one, and then probably award a 6.

Images 18 and 19: It's highly important that any sleeper walls in the substructure are provided with voids to allow full cross-flow ventilation, a provision that is often missed.

A minimum void of 150mm should be provided below suspended floors though this will be greater depending on the volume change potential of the soil below. Image 19 fully illustrates this, in addition to good positioning of DPC beneath beams, plus accurate and symmetrical laying of subfloor services and early insulation of water feed pipes. Note also the little 'added extra' of damp protection treatment to the end of the concrete beams. The demonstration of Pride will be judged by how well and how neatly these elements are installed.

Image 20: Unfortunately there are occasionally instances when even basic building practices are not achieved, though work of the standard seen in this image is very rare. This is very poor indeed and if consistently bad around the plot would merit a score of just 1.


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SUB-FLOOR SERVICES & SERVICE ENTRIES

The judges will be looking for subfloor services to be correctly positioned, appropriately insulated and properly supported, especially where there is likelihood for settlement in the sub-soil.

Images 21 and 22: There is always a good debate around the best way to support rest bends and whether these should be completely encapsulated with concrete. The general rule of thumb is to support from beneath to ensure that any subsequent settlement of the ground from beneath the concrete cannot pull apart socketed joints, which could happen if concrete is surrounding the rest bend. Image 21 looks superb – but can you spot the air vent blocked by a waste pipe (right hand side in the corner of a cross wall). Perhaps also there should be greater allowance for cross flow ventilation. There appears to be little that could be improved upon in image 22, so that could merit a score of 6

Images 23 and 24: The standards seen in image 23 would be difficult to beat. Image 24 still shows good work, but is it as good as the work shown in image 23?. In image 24, the judges might query what appears to a water service conduit located outside the footprint of the property – which would not be the correct placement for it.

Images 25 and 26: Consideration should also be given to the requirements of NHBC Standards Chapter 5.3.14 in relation to pipes passing through substructure walls. Temporary end protection caps should be provided to prevent future blockages. Items where Pride can be demonstrated are in relation to the consideration of finished levels for correct depth of services installation, suitable falls where appropriate and proper long-term support. There is little that could be improved upon in image 25, so the judges could well award that a 6. As mentioned above, In image 26 the judges might query what appears to be a water service duct outside the footprint of the property – and mark it down accordingly.

Images 27 and 28: A couple of examples where end protection caps were not used, despite the very good work in core-drilling blocks for the pipes to pass through image 27 shows a potential non-compliance on the 150mm maximum length of pipe to centre of first socket as per NHBC Standards Chapter 5.3.14. Identifying a non-compliance would be grounds to mark a build element a '3'. There is also a query over the closeness of the gas entry pipe to a sub floor vent, which is probably not good practice.

Image 29: Early insulation of water feed pipes is recommended. The best time to do this is when the ground floor is being laid, ensuring it extends as far down as possible to the bend. Leaving it till later in the build runs the risk of it being missed. This would probably score a 3.


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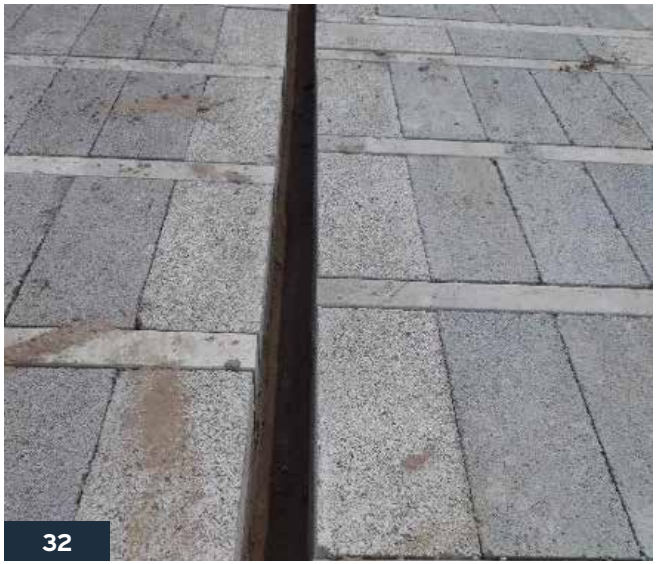
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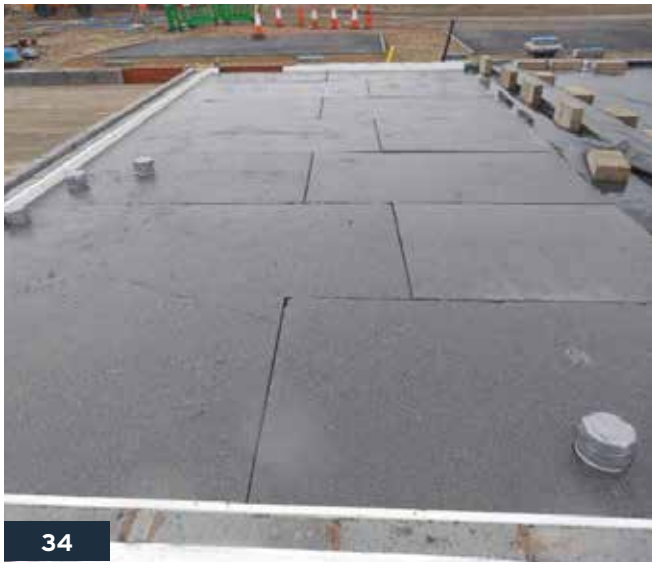
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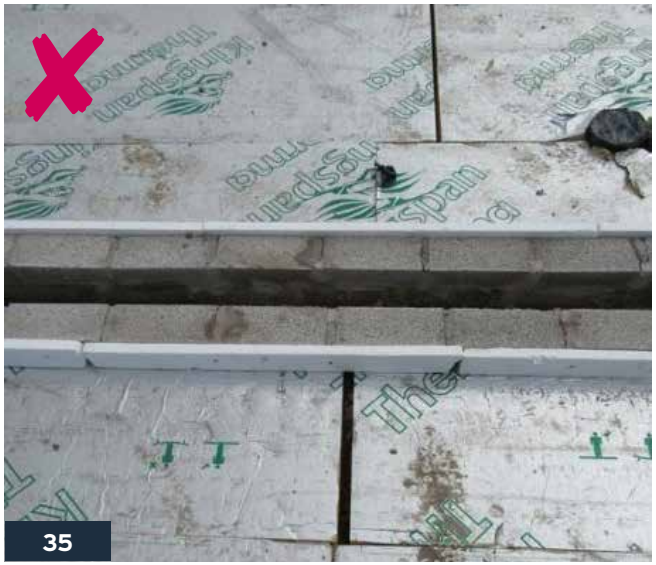
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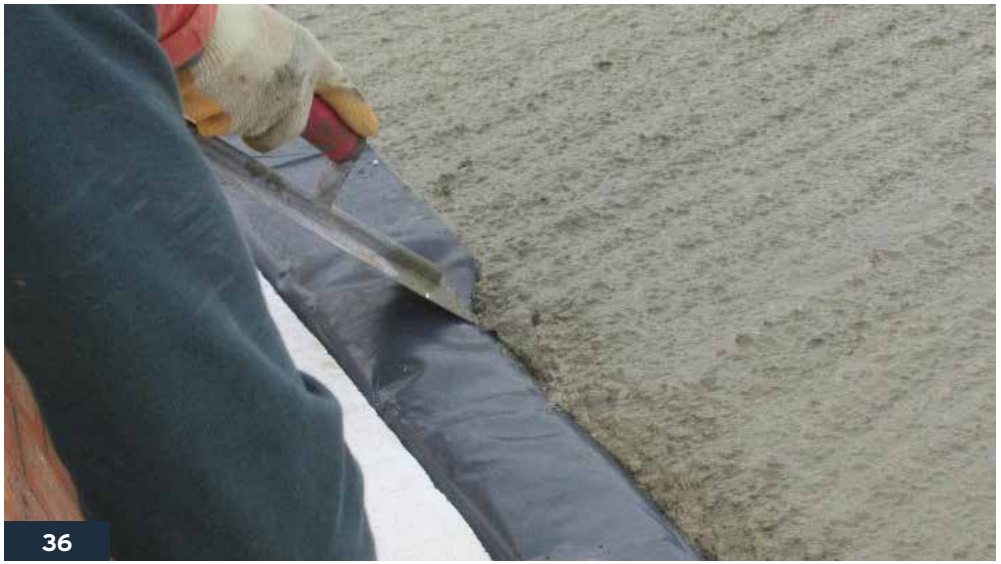
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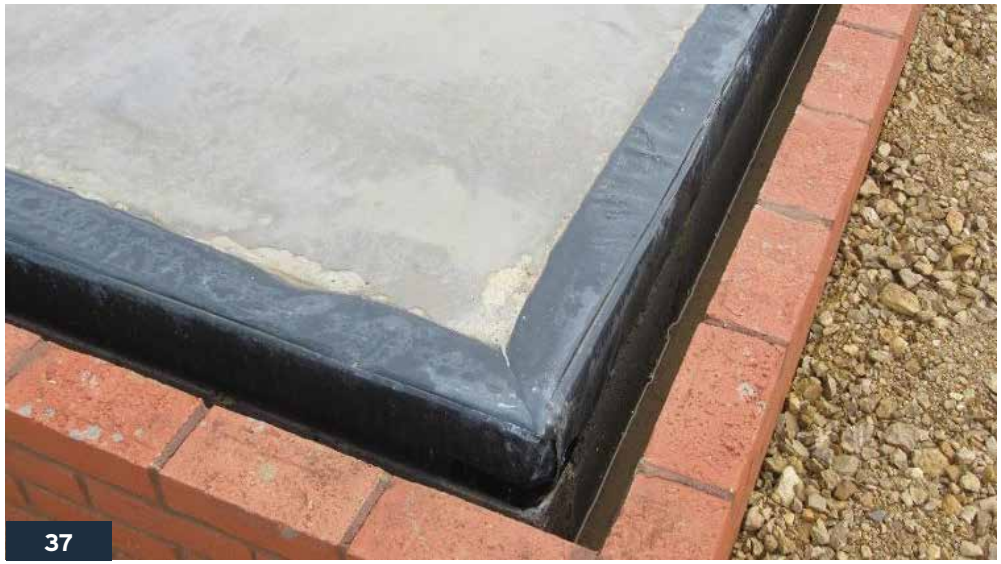
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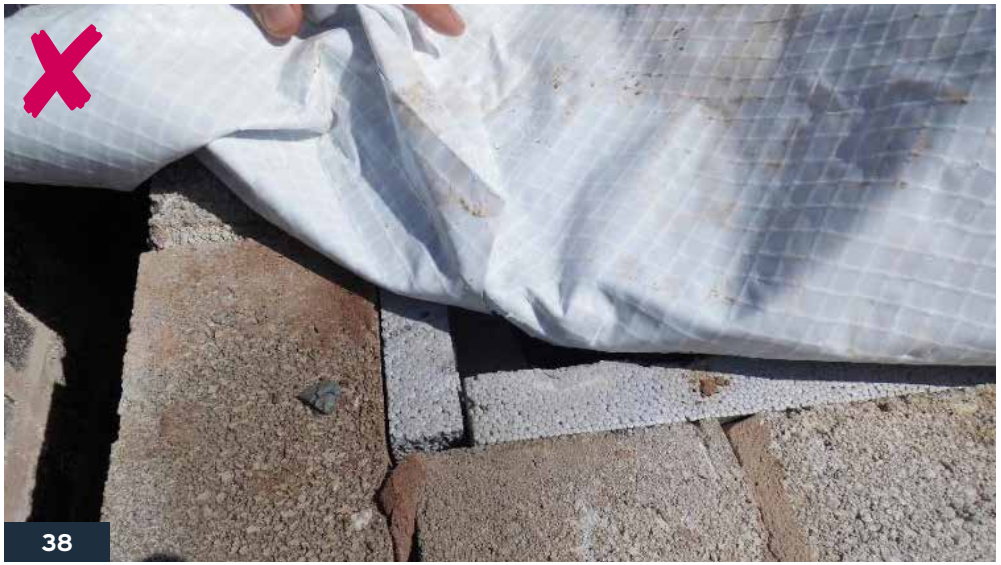
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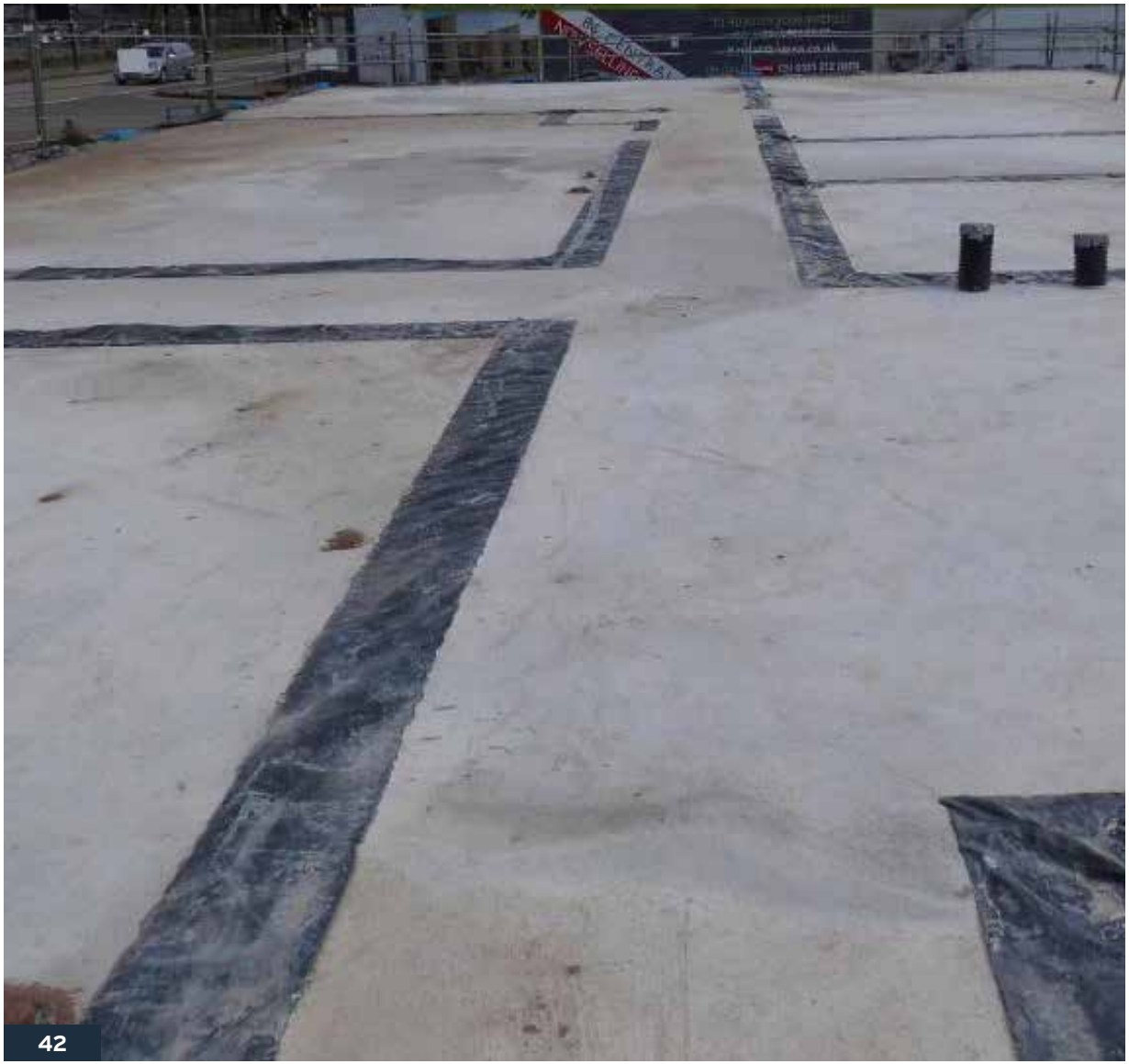

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GROUND FLOOR

Images 30, 31 and 32: The most common forms of ground floor we see now are concrete suspended, in-situ suspended and rafts.

Where a beam and block floor is installed, any grouting should be tight, filling all voids to prevent movement of the blocks. Grouting should be carried out as soon as practically possible, and certainly before any loading from pallets of bricks and blocks takes place. Where the system is one of insulation between and surrounding the beams, the judges will look at the quality and accuracy of the insulation, especially as this will be providing the formwork for the slab, plus the insulant value for the floor as a whole.

Images 33, 34, 35: Whatever suspended system is used, focus will be on the quality of the fitting of the insulation, along with care taken on cut-outs for service penetrations. Consider the standard of work seen here, in particular the contrast of image 35. In image 34, one might question the level of the waste pipes – if too low, they will be covered by the subsequent screeding work.

Images 36, 37 and 38: Our judges will also consider how well floor DPMs are finished and protected, and how well these are dressed into corners to prevent voids and thinning of slabs and screeds at the edges. In images 36 and 37 look at the attention to detail and how neat the finished slab is. Compare and contrast with image 38 and consider how this would be marked.... is there a non-compliance here? The positioning of the DPM certainly appears to have caused thinning of the floor slab into the corner – very poor practice, which would attract a low mark from the judges.

Image 39: Reinforcement of slabs will be considered, especially where it is of the jet-floor type. Thermal breaks at door openings are also important considerations as is the continuation of DPMs at these points to ensure robust thermal and damp ingress protection.

Suspended slabs must be fully supported at the bearings and the quality of the overall floor slab finish will be considered at this point. Particular care should be taken at floor to wall interfaces and the associated tanking and DPM details.

Images 40, 41 and 42: Some good examples here of well finished and presented slabs ready for the following trades.


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DRAINAGE (INTERNAL AND EXTERNAL)

Images 43 and 44: Some very good examples here as all the underground drainage, the support, line, levels, terminals and access chambers will be assessed as part of the judging. The bedding must be of the correct size and type for the pipes being laid, and all access points should have openings sealed during the construction process to avoid damage and entry of materials.

Note in these images how the setting out of the access chambers is being carried out with fine precision, and the pipe runs parallel and encased in full correct bedding material. Taking extra care with the setting out at this stage will reap benefits at the final stages of landscaping with manholes being more aesthetically placed within paths and drives (see Section Hard Landscaping).

Images 45 and 46: Excessively tight bends should be avoided, and all the requirements of NHBC Standards Chapter 5.3 must be complied with for relevant situations.

Image 45 shows that a different system has been used for closing the gaps around the substructure service penetrations. Consideration should always be given in relation to the rigid material used as to its resistance to vermin entry and this is a question our judges are likely to ask. Image 46 shows very neat set-up to the works. Pride is definitely demonstrated in both of these images.

Images 47 and 48: Setting out considerations for manholes so as not to create awkward landscape or footpath details will be taken into consideration for marking. These images show great attention to detail, plus excellent execution of the works and the protection given to the lids of manhole and other access points.

The fundamental consideration with drainage should be for long-term performance without the need for repair, as future problems with drainage elements can be very expensive and disruptive to fix.

GAS PRECAUTION

Normally the installation of gas membranes is carried out and signed-off by third-party contractors, but the site management team must always make themselves aware of the important items to inspect for a quality install.

The usual gases to be dealt with are methane and radon which are invisible and odourless, so the sealing of laps is imperative. At DPC level, a cavity tray is often involved in the laps, so this too must be sealed to the gas membrane.

Service entry points through a gas membrane are now normally provided for by proprietary sections and mouldings which has been a huge step for forward to aid quality. However they still need to be installed correctly, so additional focus is required here.

It goes without saying that gas membranes are installed early on in the build and at a point where damage is highly likely if not protected. The judges will be looking for evidence of this with credit given where a robust protection regime is being employed.

GOOD LUCK!

We hope you have found this best practice guide useful in gaining a better understanding of what the judges are looking for at each stage of construction.

Remember, the six characteristics the judges are looking for in a site manager are:

- consistency
- attention to detail
- technical expertise
- leadership
- interpretation
- health and safety.

We wish you all the very best in the Pride in the Job competition as you strive for your very first win or to repeat or even improve on your performance in previous years.

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