



**NATIONWIDE
DIAMOND GROUP**

18 Essential Considerations

FOR THE PERFECT CONCRETE FLOOR



1. Ground conditions

If you are about to construct an internal or external concrete floor slab, one of the most important points to consider is the current condition of the existing ground conditions. On so many occasions this can be easily overlooked, especially if the ground looks acceptable on first viewing. The larger the areas of concreting required the more of a consideration this should be. To carry out ground investigation tests and surveys may seem expensive in the short term but extremely cost effective in the long term. With adequate information and detail on ground conditions concrete floor slab engineers can usually respond with advice quickly and accurately dependant on how bad or good the ground actually is. At all times please remember, the floor slab is only as good as the foundation it is sat on.

2. Subgrade

There are a number of different forms of sub grade types such as imported fill or stabilized grounds. Basic principles need to be adopted when looking at the sub grade, if its too soft either take it out or do something about, do not ignore. When looking at the suitability of sub grades a thorough ground investigation report becomes most important.

3. Sub base

The purpose of the sub base is to transmit the floor loadings to the sub grade, improve the quality of support from the sub grade, create a level platform for which the floor slab is to be laid upon and provide a safe working platform for construction traffic. Location of the construction project can play a large part in the type of sub base selected. For example if in Manchester, Birmingham or other large cities, quarried stone is usually harder to come by and hence recycled crushed concrete material is more common. In more rural areas where demolition of large buildings is less frequent, naturally formed stone quarries are usually a more cost effective option. The grading of the stone material supplied for the final trimming layer of sub base is dictated by the depth needed to reach the underside of floor level. For example if only 40 – 60mm is required in order to meet underside of the floor slab, the supply of 75mm stone will not work properly as the depth is not adequate. The grading analysis of the stone material used is also important. If the material is too fine it will disturb too easily under construction traffic and if too coarse it will not bind together successfully and potentially leave small voids at the surface of the compacted stone, especially at the perimeter. At Nationwide Diamond Group we use a specifically designed sub base compact leveler which is capable of laying and compacting a well graded stone to the incredible tolerances of +/-5mm from overall datum which provides the most consistent and accurate working platform available in today's concrete flooring market.

4. Floor slab design

The design of any concrete floor slab can only take place properly if all the other necessary information has been concluded in terms of what is underneath the floor, what is going on top of the floor and how it is to be constructed and for what use. In designing concrete floor slabs we also have to consider other aspects, such as cost plans, programme implications, design lifespan, ongoing maintenance and recycling suitability in the long term.

5. Reinforcement types

There are numerous different types of polypropylene fibres, steel fibres, macro synthetic fibres and more traditional steel mesh. At Nationwide Concrete Flooring we always try to consider the best solution for the end user, the most cost effective solution for the contractor or client and the more maintenance free floor slab for the long term benefit of all parties concerned. We construct concrete floor slabs designed either by the clients structural engineer or our own “in house” engineers.

Regardless of who designs the floor slabs, we as the concrete flooring contractor always have some form of design input in order to ensure the best long term solution possible is constructed to provide a quality end product.

6. Floor usage

Another important question when selecting options for constructing and designing a concrete floor slab is what the most common use of the floor will actually entail. From food factories to waste recycling facilities and high bay racking with narrow aisle warehouses we have experience in both constructing and maintaining the concrete floor slabs. A full appreciation of what the tenant and end users require needs to be ascertained in order to provide the best solution to suit the needs and requirements. It is therefore vitally important everybody concerned within the company from group chairman to warehouse manager is involved.

7. Floor coatings/toppings

Warehouse concrete floor slabs and external hardstandings can be subject to incredibly tough environments and there are options available to prolong the life of the concrete floor slab surface. Dry shake toppings have been on the market place for sometime now and are predominantly used for their aesthetic appeal in terms of colour. The dry shake toppings can also vastly enhance the abrasion resistance at the surface of the concrete floor slab. Some dry shakes contain elements of alloy which create an extremely tough, dense and abrasive surface to the powerfloated concrete floor. We at Nationwide Concrete Flooring discuss these potential options with the end users in order that they may appreciate other options, rather than floor coatings or resins. Floor coatings and floor paints applied once the concrete floor has been handed over to the client are at first excellent in terms of appearance but can start to deteriorate quite quickly with regards to colour and surface wear. A coloured dry shake topping might be the perfect long term solution to improve the aesthetics of a concrete floor slab and the abrasion resistance and with virtually no chance of ever wearing off from the surface of the floor slab. The only negative with a coloured dry shake topping are the lack of uniformity of the colours especially in the first year of the floor's life. Once this is appreciated by the client the long term benefits then start to become more apparent. It is also impossible to colour match a dry shake topping if casting to adjacent concrete floors laid previously, despite using the same coloured topping, same concrete and same flooring contractors. Again the colours do blend in more consistently over a period of time. Another feature of a dry shake floor is also the fact that the colours become more pronounced if regularly cleaned and then trafficked. A lot of large modern day DIY warehouses use coloured dry shake toppings for this reason to improve the light in the buildings and feel good factor, but also increase longevity of the floor from impact damage, spillages etc. Foot traffic on the floors, followed by every day cleaning and scrubbing also makes the colours more pronounced which is the opposite to floor paints and resin toppings.

8. Floor loadings and mechanical handling equipment

The basic principle of the heavier the load, the deeper the floor should be adopted. Floor slab designers though look at precisely what the floor loads are in terms of racking leg loads and base plate sizes and spacings, fork lifts, mezzanines and anything else which may have an impact on the varied loadings on the concrete floor slab. If floor slab depths can have a large impact on the amount of material removed or imported to site or the quantity of piles required to support the floor then reinforcement types are selected to improve either build ability, cost and other important factors. People often make the mistake of thinking that an extremely heavy load such as a mechanical press creates heavy load on the floor. Due to base plate sizes and or the fact the machine is heavy but spreads over a large surface area, this is frequently not the deciding factor in terms of floor slab design in comparison to racking leg loads on small base plates. The press machines or similar a more of a problem in terms of vibration to the floor which could and often does subsequently cause the floors to crack if not isolated properly.

9. Floor surface regularity

Warehouse and factory concrete floor slabs are used by many different manufactures and distributors throughout the United Kingdom. Careful planning must take place prior to the agreement of the required flatness tolerances within the new building. If the warehouse is to receive high bay racking with wire guided fork lifts then a defined movement tolerance should be selected as the fork lift only travels on the same wheel path. If a floor has wide aisle racking without wire guided trucks, then a free movement tolerance is more suitable. Food factories usually have drainage installed within the concrete floor and hence falls within the floor are required to allow liquids to fall into the drains and gulleys. External hardstandings are also usually laid to falls to minimize standing water following heavy rain. The basic principles need to be considered that if the falls are only slight the water will not usually fall on its own and other methods will need to be considered in order to help move standing water. If the falls are too great, then it may cause difficulties when loading wagons or trailers on steep inclines. These conversations should be discussed and agreed with the end user and flooring contractor prior to any concrete being laid, as once the floor is complete it is almost impossible to rectify successfully.

10. Slip resistance

Once concrete floors have been powerfloated the surface of the concrete is usually left smooth and densified with a good resistance to abrasion. The negative side to the powerfloated concrete floor is how slippery the floor becomes when wet. If this is a potential problem to the end user considerations need to be taken with regards to the type of tyres used on the forklifts and footwear used by pedestrian traffic. Nationwide Concrete Flooring have solutions for new cast in situ concrete floors and or existing concrete floor slabs such as chemical ageing or grooving of the concrete surface. The most common problem appears to be at the roller shutter doorway interface between internal and external doorways. As the fork lift collects water on the tyres into the warehouse from outside, the floor can become quite dangerous this causing damage and health and safety hazards. For external concrete floor slabs, there are other anti slip solutions available which will create a textured surface finish to the concrete without having to leave a tamped like surface as used in previous years.

11. Client expectations

The problem with concrete is that fact that it cracks. The other problem is the fact that it usually cracks very quickly in the early stages of the drying process. Numerous amounts of documentation and research is available to learn about how and why concrete cracking is caused. Without going into the cause of cracks within concrete floor slabs we would recommend that discussions are taken place with regards to how to deal with cracking once it has occurred and more importantly how to minimize the potential cracking prior to the concrete pours. At all times and like most things “the devil is in the detail”.

12. Concrete mixes

There are hundreds of different concrete mixes available in today’s modern marketplace. Contractors must give thought to many different considerations when selecting a concrete mix and readymix supplier. Factors such as the weather, the concrete volume required, the distance from the plant to the site, the methods of laying and finishing the concrete and the type of plant and equipment being used. The most important point to consider however, is the long term use of the concrete itself. All of the above considerations can be dealt with, but if the concrete itself will not be fit for purpose in the long term then problems will occur further down the line. Concrete flooring contractors need to be aware of the long term performance requirements for the concrete in its hardened state especially in aggressive environments such as waste recycling facilities or warehouses storing liquids. Technical back up from readymix suppliers is also important as they are the manufacturers of the material themselves and hence need to be aware of the requirements of all parties. It always best to discuss the project with a technical supervisor or persons who have a full understanding of both the clients and contractors requirements. Every concreting job is different and so there is no subject for experience and knowledge.

13. Scope of works

In order for a concrete flooring contractor to understand what the end user requires, the building user themselves must consider what they are wanting to achieve in the first place. During these discussions it is possible to develop the design of every relevant interface detail as well as just the floor slab in order that the building will be as suitable as possible, both in the short and long term. Positives and negatives discussing and explaining every scenario can often result on the client changing their minds regularly. Albeit this can prove time consuming as long as the completed floor slab does as expected the discussions always prove worthwhile and beneficial rather than trying to remedy after the event as with concrete this can prove quite difficult. The designs also have to stack up structurally as well and so design input either from the flooring contractors engineer or clients engineer proves dividend.

14. Selecting a flooring contractor

The question often arises as to how one should choose or select a suitable concrete flooring contractor from a list of tendering contractors. Simply looking at pretty pictures on websites or pushy sales people offering extremely competitive prices is not often the best solution. Whether the contractor is the oldest or the largest or the cheapest or the busiest flooring contractor does not mean they are the best choice for your project. References are advisable but do not always guarantee success if the project you are requiring is totally different to from the job detail in the references. The references should ideally be relevant and as recent as possible. Site visits during works on other projects can be beneficial to clients to allow them the opportunity to view the various processes, competency of staff and appearance of the finished product. It is common for other ideas to derive from site visits as well, which also help to improve the successfulness of the proposed flooring project. Albeit image is not everything, it can be important when considering the right contractor, especially in terms of plant and equipment. Everything relating to concrete is expensive from the equipment itself right through to the product. Ensure that the flooring contractor has the correct resources in place along with flexibility in case things go wrong. For example laser screed machines and powerfloats etc should be either new or regularly serviced. Staff should be trained and knowledgeable in each of their individual skill sets and capable of operating the machinery to its full potential. Clients should be encouraged to procure the best deal for the long term and not necessarily take what appears the cheapest option.

15. Expectations of end product –Concrete is an absolutely marvelous product with many benefits and useful features. The only unfortunate problem with the product is the tendency to crack, especially in the early life of the floor slab and sometimes not were expected. Providing clients are aware of this as well as other potential issues then complaints are less likely. An understanding of shrinkage and movement can also prove beneficial so that full knowledge of what the floor will look like and perform is learned. An agreed list of snagging items on completion of the floor slab and the best time to conduct these snags should be sensibly agreed between all parties. Concrete is laid wet, and like anything that contains water, it shrinks. This shrinkage can take place over many years with the bulk of the shrinkage taking place during the first 6 months. With this in mind it is sometimes better to carry out snagging items such as sealing perimeter joints or repairing small cracks, following a period of approximately 12 months, to allow for the movement of the floor slab from caused by shrinkage.

16. Planned maintenance – Building occupiers must understand that housekeeping and general maintenance of their concrete floor is of paramount importance to minimise expensive repair costs. Regular floor cleaning, rather than driving grime and debris into the floor slab, helps far more than most end users realise. Floor joints should be inspected and monitored by a reputable contractor with surveys kept on record in order to manage the costs and spend money wisely on an annual basis. Once the maintenance management system is put into practice and expenditure controlled consistently, long term costs and downtime to the logistic operations is drastically reduced. In comparison if a car is regularly serviced and maintained, the chances of breakdowns reduce and a concrete floor is no different. Cracks are more difficult to monitor and hence the need for an experienced concrete flooring contractor. Albeit cracks may be visible, repair might not be required if the floor remains serviceable and movement stable. Once a full understanding of the floor has been appraised, sensible solutions should be proposed and agreed.

17. Joints and joint types

Concrete floor joints and the various types available can cost building owners and occupiers a lot of money if either positioned incorrectly or the wrong type used. Joints in narrow aisle warehouses for example take a constant pounding on a daily basis in exactly the same location. When discussing joint types with your flooring contractor ensure that you are getting the best solution enabling as smooth a transition as possible. If the floor has been laid correctly with the right reinforcement, the only place it can really start to fail or cost money is at the joints. It should also be noted that using high dosages of steel fibre reinforcement or heavy steel bar, jointless floor slab designs are possible. The term jointless means there are no saw cut induced contraction joints required. This sounds fantastic in principle but clients should be aware that the slabs shrink far more at the main construction joints and also perimeter. This can cause quite large cracks to appear if the floor is loaded quite early or raking installed which pins the slab and restrains shrinkage. If floor loading can be left for a few months the jointless floors crack far less and are a great solution. More commonly seen in the UK, especially with ground bearing floor slabs are steel fabric designed floors with traditional saw cut joints. Joints should be positioned underneath racking and not within aisles to minimize trafficking and avoid breakdown. The saw cut joints should be sealed to help protect the edges of the joint and minimise spalling. There are innovative joint sealants on the market such as Instant Seal 101 and 102. The Instant Seal 101 immediately seals the saw cut joint once the joint has been installed within the floor. Instant Seal 102 is a wider sealant strip for saw cut joints which have been carried out previously but now require sealing either for the first time or following increased movement. In the past construction joints also known as day joints were and still are constructed using timber or steel road forms with dowel bars installed at anything from 300mm to 600mm centres. Technical advancements over the years has seen the introduction of steel profile permanent floor joints. These joints provide armoured protection to thearris edge of the floor joint along with full load transfer under trafficking. The joints have proven to be cost effective in the long term for the building owners. Joints can also be manufactured in stainless steel which is ideal especially in food factories or for hygiene reasons or instances when the floor becomes wet near doorways or from washing down areas. The location of these joints becomes more critical though due to the fact they are a permanent feature of the floor. If the joint is positioned incorrectly such as in an aisle or main traffic route it will eventually start to breakdown and repairs can be extremely expensive. A plan showing joint locations and positions for all relevant parties to comment on and review, should be provided to eliminate any problems once the floor has been cast.

18. Surface finishes

Most internal warehouses and distribution centres have a fully powerfloated and polished surface finish to the concrete floor slab. Innovative concrete flooring companies however, have developed different types of power floated surface finish to cater for building users requirements where perhaps more traction might be required or the floor needs to be less slippery when wet. Other instances are waste recycling facilities or bulk stores where large loading shovels are require a more textured finish to stop wheels spinning and increase traction. These textured anti slip concrete floor surface finishes are still created by using powerfloats, but without the more common full polish. The textured concrete finish can also prove useful if the floor is to receive a resin coating, which it bonds far more easily to, compared to a full polished powerfloat.