CONSIDERATIONS ON THE CHOICE OF CONCRETE BLOCK PAVING

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SUMMARY

Before choosing a pavement in concrete blocks one should compare advantages and disadvantages of this and other possible solutions. It is suggested to do so step by step, first summing up the requirements then evaluating the extent to which these requirements are complied with in each alternative solution for the pavement.
As the application of concrete blocks is one of the alternatives for each pavement, the requirements arise from the qualifications of concrete blocks in addition to the general criteria for the pavement. Supplementary to the various requirements also the qualities of concrete blocks have been added in this article. By adding up the degree in which each requirement is complied with, one determines the extent of the compliance to the requirements. This leads to a total score for each alternative solution. The highest score then appoints the best solution.

Introduction

When the application of concrete blocks as pavement material is considered, the following three main characteristics are important:

a. they are made of concrete
b. they are relatively small
c. they can be taken out again.

In the various circumstances these three characteristics lead to specific conditions of the pavement and subsequently all the requirements may be enumerated. For the process that leads to the choice of the pavement material, it is necessary to sum up all the requirements first of all.
Subsequently the degree in which each requirement is complied with is to be determined. The requirements stem from the utilisation, the making and the maintenance of the pavement. In each case the score for each requirement should be valued preferably in terms of measurable quantities, but sometimes only a qualitative judgement can be made.

The Three Characteristics

a. concrete blocks are made of concrete.
This material is unique in itself and, because of the way the concrete is made, it gives the pavement-blocks its own qualities and applicability when and where required.

1. broad experience.
   The making and fabrication of concrete is well-known everywhere while the raw materials for concrete are widely available. The process is readily standardized, can be controlled through standard-practices and is made in an industrial way. This leads to the possibility that the concrete blocks are made available as and when required at competitive prices.
2. strength, durability.
   The strength and durability of concrete is beyond doubt and that is also true for the concrete blocks. Since concrete ordinarily does not desintegrate, concrete blocks keep their value and applicability. Also, for the same reasons the possibility of taking them up for a subsequent application can be fully utilized.
3. size-standard.
   The sizes of concrete blocks are fully predeterminable and enable an even and firm-set pattern of pavement. They may even be made by mechanical means. The size-standard enables easy repairs and replacings.
4. friction, wear-resistance.
   Both qualities have a high score with concrete blocks and make the pavement very useful even after years of usage.
5. form-freedom.
   Since concrete can be poured in any form, the optimal sizes can be obtained in all the standardisation wanted. One should refrain from using this quality for too many forms and sizes. Yet the special added forms have made the applicability of concrete blocks more widely spread.
6. colours.
   Also coloured concrete and thus pavement blocks are possible and make a colourful pavement possible when wanted, with restrictions however.
7. light-reflection.
   Because of the surface and the texture, the light-reflecting qualities are very good. The occurrence of a waterfilm is non-existent for concrete block pavements and this upgrades the safety.
8. price.
   Since concrete has almost no geographical limitations the price of concrete blocks is moderate and through the other qualities a competative application is feasible.
9. weather.
   Adverse weather-conditions and special detriments for concrete sometimes lead to scaling. But what material would resist such conditions better?

b. they are relatively small.

1. industrial fabrication.

The small size enables a production on a mass-scale-basis leading to the possibility of fabrication, storage and handling with the most modern means.

2. limited weight.
   Every piece weighing not more than 4 to 6 kg enables handling by hand as well as by more modern techniques.
3. patterns.
   Through the individually small size any pattern or change of patterns and/or colours can be made by hand as and where required.
4. sundries.
   Also other elements as gutters, tiles etc. related to the pavements can be made from the same concrete. The application on other than flat surfaces and straight lines is possible to a limited extent. The small elements and the porosity of the joints between them allow subsurface gases to disperse and surface-water to disappear. For trees and other growths, an open-air contact for the subsoil is not frustrated through a pavement of concrete blocks.
5. problems.
   Since concrete blocks are small, labour forms a relatively large portion of the cost of paving. Therefore a strive for mechanisation is still obvious and the first hopeful signs come into vision. The porosity of the joints is sometimes detrimental, when, under frost-conditions, the groundwater in the subbase is affected. The joints also sometimes lead to a higher traffic-noise-level than compared to a closed-surface-monolith-pavement. The range of application-possibilities for concrete block pavements is not justifiable, unless special measures are taken, for main traffic roads as the speed and traffic load could require a cohesive surface-material there.

c. they can be taken out again.
With the individual small-sized concrete blocks it is possible to take them out without damage. This might be required when circumstances necessitate it or make it desirable.

1. settlement and its deviations.
   When the subbase leads to uneven settlements a pavement of blocks can follow without breaking of the surface-material. In case the surface is too uneven, corrections through relaying are possible in all sized portions. This is even more the case when the subbase is insufficiently consolidated.
2. subbase-traffic.
   The laying of cables, pipes and drains remains possible by taking out the paved concrete blocks. Also the relaying of the blocks even over and over again is possible when the subsoil settles too adversely.
3. repair, maintenance.
   Because of the small size of the individual blocks repair and maintenance remain always possible without breaking the pavement-material. This can be done in all the required portions thus limiting the extent of the repairs and the cost.
4. rest-value.
   As stated above, concrete blocks keep their value for subsequent applications. This facilitates the application of it when the pavement is only temporarily required. This might be the case when a pavement is needed during the construction period of houses and buildings. Also this quality is valuable when the consolidation period of the subsoil is too long to wait for the surface-layer. The traffic that is then possible speeds up the consolidation.

Considerations when making the choice

The requirements stem from the making, the usage and the maintenance of the pavement under consideration. The evaluation refers to the supply and the demand balance of the individual requirements in each of these three categories.

a. the making.
The requirements for the making boil down to the two factors: time and money. Both are to be minimalized or, in case they are controversial, optimalized. There is no obvious limitation towards the time of making a pavement of concrete blocks as production-factors may simply be multiplied.
The question of money is more complicated as the term considered could be short as well as long. Since minimal costs for making pavements could in some cases lead to higher costs when the pavement is in use, both factors should be taken into consideration. The sum of all the financial consequences, short-term consequences as well as long-term consequences, should therefore be taken into account.

b. the usage.
The requirements in respect of the usage are determined by the purpose of the pavement. The strength is to be related to the bearing-capacity-demand. The subbase and the traffic-load form the determinating factors in this respect. Besides other physical criteria there is the friction- and plain-factor of influence. Other factors as the possibilities for changes and repairs should be taken into consideration. These factors could normally be determined in terms of quantity. But there are more factors in respect of usage which can only be determined in quality terms: safety, comfort for the users and colour and texture of the pavement. Even more difficult to determine are the elements of a concrete block pavement which are related to the environment and the energy-balance. Yet the evaluation of all the factors is necessary for weighing the choice.

c. the maintenance.
This subject is also determined mainly by factors such as time and money, both of which are favourable for concrete blocks as a concrete block is small in size and it can easily be manufactured and replaced.

Conclusion

When all the above factors are quantified and the balance is made up for a type of pavement, the comparison between the alternative

solutions can be made. Such a comparison mainly concerns bricks, concrete blocks, quarry stones cut to size, asphalt or other material. Such considerations very often come up when the infrastructure and other conditions are to be improved. Such an improvement may contribute to the proper working of society.