A METHOD OF FORMING CONCRETE

This invention relates to a method of forming concrete.

It is known to use concrete to build pavements, roads and parts of houses, amongst other structures.

According to an aspect of the invention there is provided a method of forming concrete comprising the steps of:

i) providing cement;

ii) providing water;

iii) mixing the cement and the water to form a cement-based mixture;

iv) after forming the cement-based mixture, applying the cement-based mixture to an aggregate laid on a surface to form the concrete,

wherein the method further includes the step of laying the aggregate onto the surface prior to the step of applying the cement-based mixture to the aggregate laid on the surface to form the concrete.

It will be understood that an aggregate is a material or structure formed from a mass of fragments or particles loosely compacted together. More particularly, an aggregate used to form cement can be a fine aggregate, which includes particles such as sand, or can be a coarse aggregate, which includes larger particles such as crushed stone.

It will also be understood that concrete can be formed by using a combination of both fine and coarse aggregate so as to control certain characteristics, such as porosity, of the resultant concrete.

After the cement-based mixture is applied to the aggregate laid on the surface to form the concrete, the concrete begins to cure and harden on the surface. Since formation of the concrete using the method according to the invention means that the cement-based mixture does not come into contact with any aggregate (i.e. the cement-based mixture at this stage is free of any aggregate) before it is applied to the aggregate laid on the surface, the method according to the invention provides greater control over the formation of the concrete to take place at a particular time and/or on a particular surface, thus providing flexibility when it comes to forming the concrete.

In contrast, if the cement, water and the aggregate are mixed to form concrete before the concrete is applied to the surface, there would be a short time limit in which the concrete would need to be applied to the surface before the concrete cures and hardens to become unworkable such that it is no longer possible to apply it to the surface. As such, mixing the cement, water and the aggregate to form concrete before applying the concrete to the surface may be restrictive when it comes to controlling the formation of the concrete to take place at a particular time and/or on a particular surface.

The method according to the invention also permits the application of the cement-based mixture to the aggregate laid on the surface to be subject to interruption, which may arise due to adverse weather conditions or workforce availability for example, while incurring minimal wastage. This is because, since the aggregate laid on the surface is kept separate from the cement-based mixture until the cement-based mixture is applied to the aggregate to form the concrete, the aggregate remains reusable in the event of a prolonged interruption to the application of the cement-based mixture to the aggregate laid on the surface.

Moreover, although the cement-based mixture hardens over time to form grout, the cement-based mixture can still be used for a certain period of time, e.g. up to twenty minutes, after it has been formed. Therefore, short interruptions to the application of the cement-based mixture to the aggregate laid on the surface results in zero or minimal wastage of the cement-based mixture and the aggregate.

In contrast, mixing the cement, water and the aggregate to form concrete before applying the concrete to the surface results in great difficulty in reusing any unused concrete at a later stage, since the concrete immediately begins to cure and harden upon its formation and rapidly becomes unworkable. Therefore, any interruption to the application of the concrete to the surface will result in wastage of the unused concrete (i.e. wastage of the cement, water and aggregate), thereby increasing the cost of the formation of the concrete on the surface.

Hence, the method according to the invention advantageously reduces the amount of wastage and increased cost that would have otherwise resulted from mixing the cement, water and the aggregate to form concrete before applying the concrete to the surface.

In addition to the foregoing, the method according to the invention permits positioning of the aggregate on the surface in any manner as desired so as to control the size and/or

shape of the resultant concrete. The aggregate can also be chosen to provide different properties of the resultant concrete.

The method according to the invention also not only obviates the high costs associated with transporting concrete from a concrete plant to a given location, but also minimises the high labour costs associated with handling the concrete and laying it onto a surface.

The concrete may be porous. Porous concrete allows liquids, such as water, to pass directly therethrough. As such porous concrete reduces surface runoff and permits groundwater recharge. In this way porous concrete can be used to alleviate flooding.

Optionally the cement-based mixture has a surface tension coefficient that permits suspension of the cement-based mixture on, around, through and/or over the aggregate.

The provision of a cement-based mixture with such a surface tension coefficient allows the cement-based mixture to spread evenly on, around, through and/or over the aggregate, thus resulting in evenly formed concrete. The surface tension coefficient of the cement-based mixture is dependent on the amounts and ratio of water and cement that are mixed with one another to form the cement-based mixture.

The aggregate can be laid on the surface at any time and by any person before the cement-based mixture is applied to the aggregate laid on the surface. This is because the properties of the aggregate laid on the surface will not change over time, even in varying weather conditions. Moreover, such a method permits separate transportation of the normally heavier aggregate by a specialised vehicle that is not necessarily required to transport the lighter cement.

Optionally the aggregate is a fine or coarse aggregate. Use of a coarse aggregate permits porous concrete to be formed upon application of the cement-based mixture to the aggregate laid on the surface since gaps, through which liquids can pass, are readily formed between coarse aggregate particles.

The aggregate may include aggregate particles, whereby each aggregate particle may have a largest dimension in the range of 2 mm and 6 mm. Such an aggregate particle size is optimal for forming porous concrete with high strength.

Preferably the aggregate is or includes granite, optionally washed granite.

CLAIMS

1. A method of forming concrete, the method comprising the steps of:

i) providing cement;

ii) providing water;

iii) mixing the cement and the water to form a cement-based mixture;

iv) after forming the cement-based mixture, applying the cement-based mixture to an aggregate laid on a surface to form the concrete,

wherein the method further includes the step of laying the aggregate onto the surface prior to the step of applying the cement-based mixture to the aggregate laid on the surface to form the concrete.

2. A method according to Claim 1 wherein the concrete is porous.

3. A method according to any preceding claim wherein the cement-based mixture has a surface tension coefficient that permits suspension of the cement-based mixture on, around, through and/or over the aggregate.

4. A method according to any preceding claim wherein the aggregate is a fine or coarse aggregate.

5. A method according to any preceding claim wherein the aggregate includes aggregate particles, each aggregate particle having a largest dimension in the range of 2 mm and 6 mm.

6. A method according to any preceding claim wherein the aggregate is or includes granite, optionally washed granite.

7. A method according to any preceding claim including the step of mixing the cement and the water to form the cement-based mixture at the locality of the surface.

8. A method according to any preceding claim wherein the step of applying the cement-based mixture to the aggregate laid on the surface includes spraying the cement-based mixture onto the aggregate laid on the surface.

9. A method according to any preceding claim further including the steps of:

providing at least one additive; and

mixing the cement, water and the or each additive to form the cement-based mixture.

10. A method according to Claim 9 including the step of mixing the cement, water and the or each additive simultaneously to form the cement-based mixture.

11. A method according to Claim 9 wherein the step of mixing the cement, water and the or each additive to form the cement-based mixture includes:

mixing the cement and the water with one another and then mixing the or each additive with the mixed cement and water; or

mixing the cement and the or each additive with one another and then mixing the water with the mixed cement and the or each additive; or

mixing the water and the or each additive with one another and then mixing the cement with the mixed water and the or each additive.

12. A method according to any one of Claims 9 to 11 further including the step of mixing the cement, the water and the or each additive to form the cement-based mixture at the locality of the surface.

13. A method according to any one of Claims 9 to 12 wherein the step of providing at least one additive includes providing at least one coloured pigment.