BLEEDING IN CONCRETE

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ABSTRACT

Bleeding in concrete may be considered as the physical migration of water towards the top surface. It is not always favorable as it increases finishing time, produces laitance at the surface, decreases strength, wear resistance and bond strength and causes poor bonds between successive lifts. However, bleeding is also a necessary part of the life of the concrete. It replaces water lost by evaporation and prevents concrete surface from drying out too quickly before it has attained sufficient tensile strength to resist cracking. This paper presents the brief survey of bleeding in concrete.

Keywords: Bleeding, Segregation

1. INTRODUCTION

Bleeding in concrete is sometimes referred as water gain. It is a particular form of segregation, in which some of the water from the concrete comes out to the surface of the concrete, being of the lowest specific gravity among all the ingredients of concrete. Bleeding is predominantly observed in a highly wet mix, badly proportioned and insufficiently mixed concrete.

Water being the lightest ingredient of all the other materials in concrete, bleeding i.e. upward movement of water when concrete settle downwards, is natural in concrete. The bleeding water, in certain situations emerge at the surface and in some other situations may not come up to the surface. But bleeding does takes place.

The bleeding water gets trapped by flat or flaky pieces of aggregates and also by reinforcement and gets accumulated below such aggregates and reinforcement. This is known as internal bleeding. In addition, to internal bleeding, the water may further emerge out and accumulate on the top surface of concrete.

Firstly, the internal bleeding water trapped below flat pieces of aggregate and reinforcement affect the bond between hardened cement paste, (hcp) and aggregates or reinforcement on account of local higher W/C ratio. The interface is easily prone to the
microcracking due to shrinkage stresses caused on dissipation of heat of hydration and drying shrinkage. The interface becomes a weak link in concrete. On loading, the micro cracks propagate further, making the concrete susceptible to degradation by environmental agencies. The bleeding water, emerged at the top surface of the concrete, when evaporates make the top surface porous, having very little abrasion resistances. Often, masons float the concrete when bleeding water is still standing on the surface. Too much working of the top surface presses the coarse aggregate down and brings up fine particles of cement and water. Such top surface made up of too fine materials with excess water develops cracks and craziness, affecting durability of concrete.

The bleeding is not harmful if the rate of evaporation of water from the surface is equal to the rate of bleeding. Removal of water, after it had played its role in workability, from the body of concrete by the way of bleeding will do good to the concrete. Early bleeding when the concrete mass is fully plastic, may not cause much harm, because concrete being in a fully plastic condition at that stage, will get subsided and compacted. It is the delayed bleeding, when the concrete has lost its plasticity that causes undue harm to the concrete. In the pavement construction finishing is done by texturing or brooming. Bleeding water delays the texturing and application of curing compounds.

II. EFFECTS OF INGREDIENTS ON BLEEDING

Every ingredients and their amount have a major effect on the bleeding of the concrete. Some of the common ingredients and their proportions are listed below:

a. Water Content and Water Cement ratio: Any increase in the amount of water or water-to-cementitious material ratio results in more available water for bleeding. A one-fifth increase in water content of a normal concrete mixture can increase bleeding rate more than two and a half times.

b. Cement: the type, content and fineness of cement can effect bleeding. As the fineness of the cement increases, the amount of bleeding decreases. Increases in cement content, reduces the water-cement ratio, and also reduces bleeding.

c. Supplementary Cementing Materials: Fly ash, slag, silica fume, rice husk ash and natural pozzolans can reduce bleeding by their inherent properties and by increasing the amount of cementitious materials in a mixture.

d. Aggregate: Aggregate that contain a high amount of silt, clay or other material passing the 75 µm sieve can have a significant effect in reducing bleeding, although there may be other adverse effects on the concrete, like increased water requirement and shrinkage.

e. Chemical Admixture: Air-entraining agents have been used largely because the air bubbles appear to keep the solid particles in suspension. Water reducers also reduce the amount of bleeding because they release trapped water in mixture.

III. TEST METHODS FOR ACCESSING BLEEDING

ASTM C 232 / AASHTO T 158 include two test methods for assessing bleeding. This test method provides procedures to be used for determining the effect of variables of composition, treatment, environment, or other factors in the bleeding of concrete. It is also permitted to be used to determine the conformance of a product or treatment with a requirement relating to its effect on bleeding of concrete.
Method A: For a sample consolidated by rodding only and tested without further disturbance, thus simulating conditions in which the concrete, after placement, is not subjected to intermittent vibration.

Method B: For a sample consolidated by vibration and tested with further intermittent periods of vibration, thus simulating conditions in which concrete, after being placed, is subjected to intermittent vibration.

These test methods cover the determination of the relative quantity of mixing water that will bleed from a sample of freshly mixed concrete. Two test methods that differ primarily in the degree of vibration to which the concrete sample is subjected are included.

IV. WAYS TO REDUCE THE BLEEDING OF CONCRETE

The ways we can reduce bleeding are:

a. proper proportioning of concrete
b. A complete and uniform mixing of concrete
c. If we can increase the traveling length of water to be bleded, the bleeding can be reduced considerably. For this purpose we can use finely divided pozzolanic materials.
d. An introduction of air-entrainment by using air entraining agent can reduce bleeding.
e. The use of finer cement.
f. Application of cement of alkali-content.
g. By using of a rich mix rather than lean mix.
h. Controlled vibration can reduce bleeding. When bleeding is appeared in the fresh and plastic concrete, revibration of concrete in controlled way can overcome detrimental impact of bleeding.

V. CONCLUSION

Bleeding is the basis for the concrete. So, by understanding the factors influencing the bleeding, it can easily be controlled by taking preventive measures so that it should not hinder the concrete construction or influence its strength and durability.

REFERENCES