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Summary and Conclusions

Summary

This thesis investigated the structural behavior of fabric formed concrete. At the beginning comparison tests on small cylinders revealed that fabric formwork cast normal concrete can gain 13 to 17% strength, while flyash concrete gained 13 to 16% at 28 days. These strength gains had no effect on the ultimate strength observed in full size column tests.

As you increase diameter, area will grow much faster than the circumference will (Figure 69). The larger the diameter of the column, the less effect circumferential bleeding will proportionally have on the structural area of the column. Figure 70 shows the comparison between the affected perimeter concrete areas due to fabric formwork to the total sectional area in specimens with different diameters.

Since the depth effect of fabric formwork on concrete quality is not dependent on the diameter, the ratio of the affected area to the whole sectional area of the specimen is a definitive factor. As seen in the Figure 70, the larger the area of the member, the smaller the ratio of perimeter over area is. The smaller this ratio is the less effect the fabric formwork has on a member’s concrete strength. This has been confirmed by cylinder and column tests in this thesis.

The smaller 101 by 203 mm (4 by 8 in.) fabric formed cylinders proved to gain an average of 15% extra compressive strength comparing to the conventionally molded control samples while some preliminary tests showed that 152 by 305mm (6 by 12 in.) cylinders gain an average of 10.3% extra compressive strength. The 254 mm (10 in.) diameter fabric formed flyash concrete column gained an extra 5% compressive strength compared to cardboard formed flyash column. In case of columns FF-NC-2 and CT-NC-2, the strength of fabric formed normal concrete column was decreased by 2% compared to cardboard tube formed column. A comparison of the test results shows that the growth in overall compressive strength in a concrete column due to fabric formwork diminishes as the diameter of the column increases.

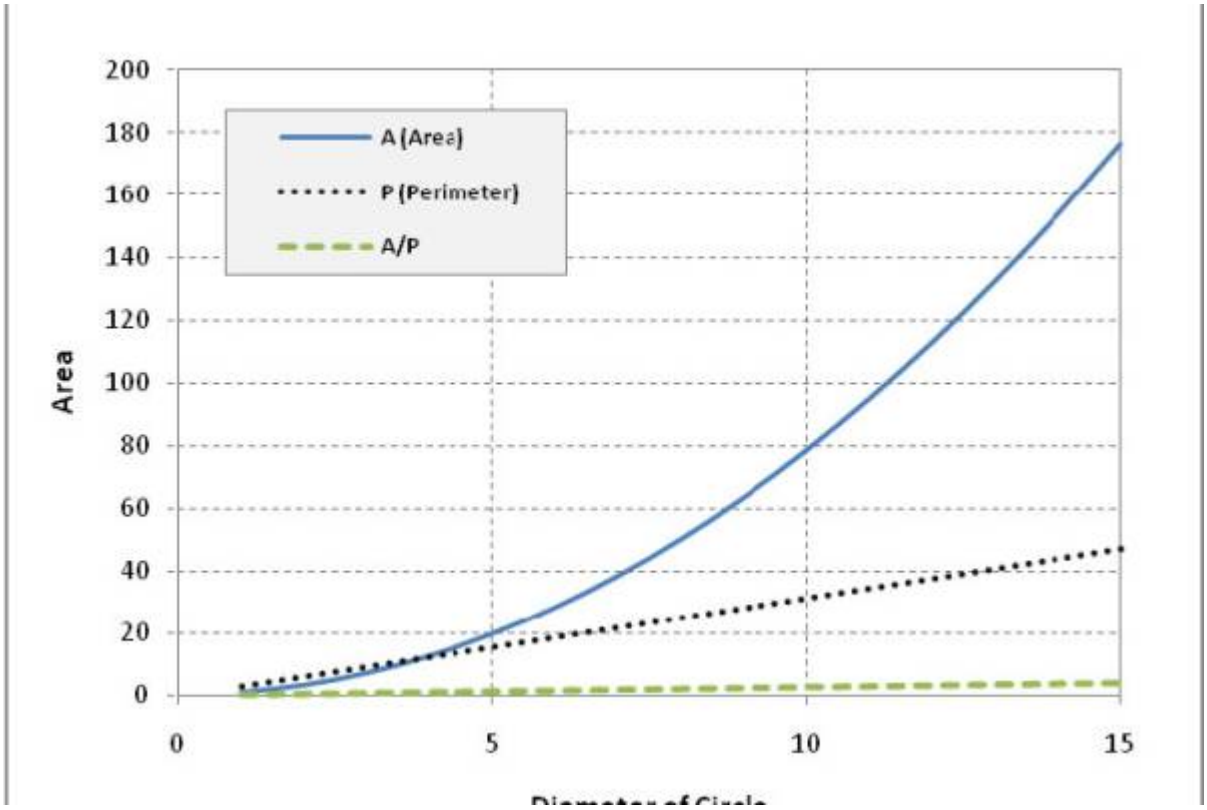

Figure 69: Relationship between area, perimeter and, diameter of a circle.

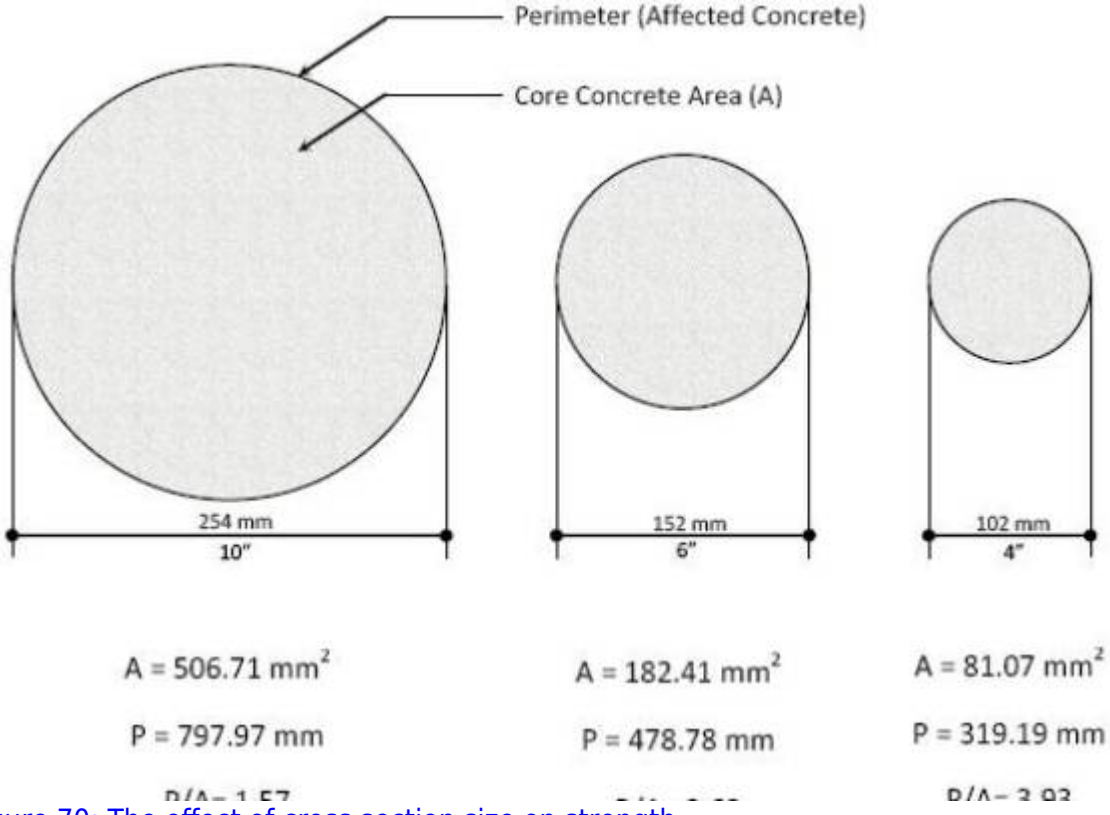

Figure 70: The effect of cross section size on strength.

Conclusions

The research presented in this thesis supports the following conclusions:

1. As shown by Schmidt hammer test results, permeable fabric formwork for con-crete can enhance the quality and the hardness of the surface zone of the concrete.
2. Based on results of this research study, geotextile fabrics such as Geotex 315ST are suitable for forming fresh concrete. Mechanical properties and the optimal bleeding ratio, availability, price, as well as the fabric texture/imprint produced, make these products viable for use as concrete formwork.
3. Concrete texture produced by fabric formwork is without bug holes or honeycombs sometimes seen in conventionally formed concrete. No color variation was observed on the surface of the fabric formed columns. Very few imperfections or appearance of large aggregate was seen when fabric formwork was used. Such concrete could be used as the surface for exposed structural member with no or minimum additional work.
4. Even though fabric formed cylinder tests showed an average of 15% increase in compressive strength of the fabric formed reinforced columns did not change appreciably when compared to the companion cardboard formed control columns. The reason would be the fact that the ratio of the affected concrete area due to fabric formwork, reduces as the diameter of the specimen increases. Therefore, fabric formwork does not increase the overall compressive strength of a large/thick concrete member. Furthermore, compression failure in columns occurs at the top, where bleeding effect and strength advantage are minimum due to minimal hydrostatic pressure. Ultimately, it can be concluded that fabric formwork is structurally safe alternative for forming reinforced concrete columns.

Suggestions for Future Studies

1. Permeable fabric formworks may require special handling during curing because their permeability can allow surface water evaporation unless protected, for example, by being wrapped in plastic sheeting. For this reason, there is a possibility that improper curing practices during construction may have an especially detrimental effect on concrete cast in permeable molds. Tests are needed on specimens cured in field conditions to study the susceptibility of concrete cast in permeable molds to strength loss due to improper curing practices.
2. This study did not use plasticizing admixtures. The effect of bleeding on plasticized concrete should be studied to gauge the effect of fluid loss in concretes with lower W/C rations. If fabric formwork helps bleed extra water and air bubbles out, it will also bleed the admixtures and chemicals added to the concrete mix, a phenomenon that may or may not affect the efficacy of the admixtures used in the mix design.
3. Due to the differences in W/C ratios and concrete strength in FF concrete, differences in qualities such as permeability and fire resistance of reinforced fabric-formed concrete members need to be studied.

See Also

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