











measured. Figs. 8 and 9 show the plot of maximum crack width (measured in mm) against drying time in days for sets one and two respectively. The maximum crack width for S2 (4 lbs/yd<sup>3</sup>) of set 2 can be seen to be unusually high as compared to that of set 1, however this can be accounted for as a deviation in the mix that caused very high shrinkage strain as shown in fig. 7. Considering that, it can now be deduced from these results that specimens S1 and S2, although both couldn't control cracks to within acceptable limits, behaved similarly indicating comparable performance. Specimens S3 and S4 with fiber volume fractions of 3.0 and 3.6 kg/m<sup>3</sup> (5 and 6 lbs/yd<sup>3</sup>) respectively also behaved similarly, however, considering the total openings as in fig. 10 confirms S4, with the higher fiber volume fraction, is superior. These results indicate that an increase in fiber volume fraction affects a decrease in average crack width and also that WWF and macro synthetic fibers in accordance with the minimum allowed reinforcement by the ANSI/SDI – C 2011 perform equally and can be used interchangeably.

## 6 Conclusion

In this experiment three dosages of fibers and a steel mesh were used in 4 restrained slab specimens cast on corrugated steel decks and exposed to normal laboratory drying conditions in order to evaluate the performance of each reinforcement option in controlling shrinkage cracks. The specimens were monitored for a period of up to 450 days and all appearing cracks were measured. Also separate standard prisms were cast and tested according to ASTM C-157 to determine free shrinkage strain for each concrete mix.

Considering that the WWF used in S1 (6" x 6"-W1.4 x W1.4) is the minimum secondary reinforcement allowed by the ANSI/SDI –C 2011 if WWF is to be used and the dosage used in S2 (2.4 kg/m<sup>3</sup> / 4 lbs/yd<sup>3</sup>) is the minimum secondary reinforcement allowed by the same standard if

macro synthetic fibers are to be used, then the results confirm that they can be used interchangeably with the fibers. The experimental program also confirms that an increase in fiber volume fraction provides better crack control causes a decrease in average crack width.

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