RESULTS AND DISCUSSION

3.1 Effect of USCB Groove Patterns on Bedding Sand

The effect of 13 USCBs with different groove patterns on the bedding sand is as shown in Figure 4. These results were compared to that of the control block. Generally, the settlements at USCB pavements were higher than that of control block, and the settlement increased with every increment of groove depth. Additionally, the settlement pattern is typical for all patterns where the 35 mm and 15 mm groove types are associated with higher and lesser settlement, respectively.

It can also be induced from Figure 4 that differences in groove depth, size, and pattern have significant effects on the settlement of bedding sand. Compaction effort during the initial test is crucial as it will influence the degree of settlement where an adequate compaction will fully-fill the groove with sand. Higher groove depth provides good interaction between USCB and bedding sand as well [17].

3.2 Relationship Between USCB Weight, Groove Volume, and Settlement

Relationship between USCB weight, groove volume (i.e., size), and settlement is as shown in Figure 5. In this study, the USCBs were lighter than the control block, and this lighter weight had resulted in higher settlement of bedding sand. On the contrary, increasing the groove size had led to increased settlement of bedding sand. It is postulated that this occurred as the lighter USCBs can be compacted more easily than heavier blocks. According to Azman, et.al [18], at the same time the settlement of bedding sand is also dependent on the groove volume; when the groove volume increases, it becomes easier for the sand to fill into the gaps and thus, settlement will increase. In other words, when the blocks are lighter and the groove sizes are bigger, the sand can fill into the gaps more easily once it is compacted and this will increase the overall settlement of the bedding sand layer.

3.3 Relationship Between Settlement and Groove Depth

The relationship between settlement and groove depth is illustrated in Figure 6. From the figure, two settlement trends can be observed, i.e., linear and concave trends. The linear trend is for Shell-R and TG-3R USCBs and has shown a gradual increment of settlement with every increment of groove depth. Meanwhile, the concave trend for TG-T and TG-2R USCBs has shown that increment of USCB settlement happened up to 25 mm to 30 mm groove depth and there was no further settlement after that. The smaller USCB settlement is attributed to the filling up of groove depths with bedding sand during the compaction process. From the result, the 15 mm groove depth was able to settle less than the higher groove depth. The overall trend showed that the rate of settlement is strongly influenced by the groove type and pattern. Nevertheless, it should be emphasized that there was no settlement for a groove depth of up to 30 mm groove depth for TG-T and TG-2R USCBs.