A NEW AND MORE COST-EFFECTIVE DRAINAGE SYSTEM FOR TURF: A COMPARATIVE TRIAL IN A RACETRACK

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ABSTRACT

Early results showed the greater performance of the Capiphon systems compared to the standard Ag Pipe method. The Capiphon drains started flowing at the first significant rain event, whereas the Ag Pipe drains did not flow until next event. The outflow from the Capiphon drains was approximately four times that of the Ag Pipe drains. Even more significant was that the installation costs, as reported by the independent contractor who installed the systems, were much lower than the standard system. When all costs were included, the installed cost of Capiphon drainage was 30-40% less than the standard drainage.

Keywords: Subsurface Drainage; Flood Management, Racecourse, turf management

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Introduction

A major performance issue for racetrack owners is poor drainage and, sometimes, flooding after heavy rain events. This affects both turf health and the performance of the horses. In addition, many punters refrain from betting which leads to a reduction in returns to the club. There have been many techniques developed to overcome this problem, including sand slitting and narrow sand filled trenching amongst others.

Capiphon™ is a relatively new drainage technology that has been shown in many different situations to have superior performance compared to slotted PVC pipe (Ag Pipe). There was an opportunity to test out these claims at the Tweed River Jockey Club track at Murwillumbah, NSW, with a section of the track, 150 metres long, prone to frequent flooding and often scored as “Heavy 10” which is the worst rating. Capiphon was tested against the standard Ag Pipe system in a controlled environment.

Method

Two different configurations of Capiphon were tested against the standard Ag Pipe system specified by Racing NSW, making three treatments in total.

1. The standard Ag Pipe system of 50mm slotted poly drainage pipe (Ag Pipe) placed in a 70mm wide trench, 350mm deep, and backfilled with approximately 5-7mm gravel then coarse sand to the surface.
2. Capiphon belt wrapped around one metre lengths of 40mm DWV PVC pipe joined together through an especially designed Collector/Connector. These Collector/Connectors transfer water from the grooves on the outside of one section of pipe into the next section. The resultant pipe was placed on a shallow bed of coarse sand in the bottom of the trench before backfilling with coarse sand.
3. 50mm Capiphon belt placed directly into the trench and backfilled with coarse sand. Capiphon Belt is usually inserted with a 10cm drop into a collector pipe. This enhances the syphon effect created by the 2% slope. In this case, the small degree of fall on the track resulted in a much smaller drop than usually applied.

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The three treatments alternated at 3-metre spacing. The final number of each treatment trench was:

1. Ag Pipe: 15.
2. Capiphon Belt: 14.
3. Capiphon Pipe: 7.

The trenches were approximately 10 metres long, running across the track and joining the separate outlet pipes running down the side of the track to a sump pit.

Given the minimal fall on the track, and the lack of a suitable site for the flow gauges, a sump pit was constructed at a depth below ground level at the edge of the track where the outflows were measured in three separate tipping bucket flow gauges (40ml buckets)..

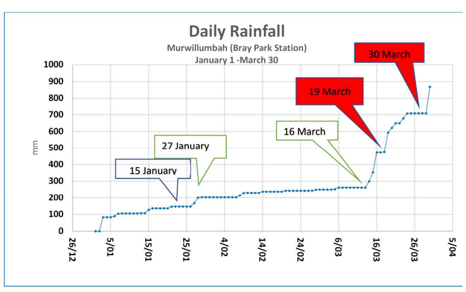


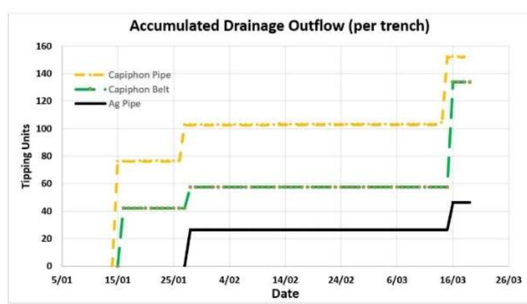
A bilge pump with float-valve switch was installed at the base of the pit to remove water to the Council drain outside the track. The pit was then covered with a metal grate, plastic sheeting, and geotextile cloth to protect the gauges. Lastly, the pit was covered with soil and the turf left to regenerate.

Outflow from each of the three different treatments was divided by the number of trenches for each. Unfortunately, the trial was seriously disrupted by exceptionally heavy rainfall and a major flooding event which led the entire track, including the trial area, to be some 1-2 metres underwater.

Results

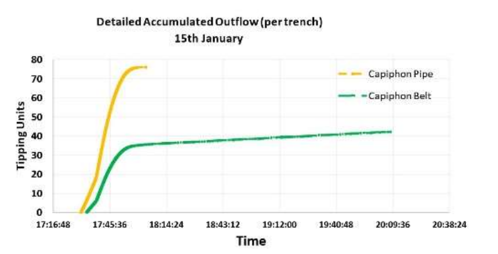
Approximately 100mm of rain fell immediately prior to flow gauges being installed on 13 January. A further 20mm fell in the next two days, after which outflow began.

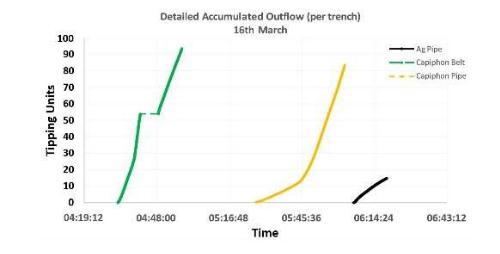




- **15 January** - First outflow recorded. Both Capiphon Pipe and Belt flowed, Capiphon Pipe flowed first and with greater volume. **Ag Pipe did not flow at all.**
- **27 January** - Second outflow. All three installations flowed with similar volumes
- **16 March** - Third outflow. Flow from both Capiphon Pipe and Belt exceed that from Ag Pipe.
- **19 March** – Flow gauges ceased to operate (possibly because the ground water level had risen to the extent that water seeped into through the gap between the pit proper and the extension. The battery would have been covered and the pump stopped)
- **30 March** – The Tweed River backed up the drains, flooding the sump pit and disabling the flow gauges.

Detailed Outflows





Track Condition

Evidence from ground staff mowing the track before the floods is that the whole trial area was greatly improved compared to the adjacent non-drained area. (Staff were not told where the individual treatments were located). It is hoped that some comparisons between treatment areas can be made in the future, when the track has returned to normal.

Installation Costs

The independent contractor engaged to undertake the installation stated that the cost of installing the Capiphon treatments was 30-40% less than the standard Ag Pipe. One of the principal reasons was that the single back-fill with washed coarse sand was significantly easier to handle than two back-fill operations with gravel followed by sand. Further, that the sand did not require time-consuming clean-up after the installation.

Discussion

These detailed field observations are in agreement with tank tests previously reported in which the Capiphon Pipe flowed first, followed soon after by the Capiphon Belt, and Ag Pipe flowed quite some time later (Fenn 2012).

In this trial, the Capiphon Pipe and Belt commenced flowing after the first rainfall event. In contrast, the Ag Pipe system did not flow at all. In the second rainfall event, Capiphon Belt flowed approximately one hour before the Capiphon Pipe. Ag Pipe started flowing some 30 minutes later.

In earlier trials the total outflow from Capiphon Belts has been usually greater than that of the Capiphon Belt. The situation was reversed in this trial, however, possibly due to the smaller syphon head than is usual for the Belt (see above).

The outflows in all cases ceased abruptly leading to the trial being abandoned. Further trials are needed to confirm the results and to look at the comparative performance of Capiphon and Ag Pipe over a much longer period.

REFERENCES

Fenn, G.R. 2012. Drainage Characteristics of Capiphon Belt and Capiphon Pipe – Some Comparisons with slotted pipe with Sock 1/12 ICID Working Groupon Drainage 24 June 2012