



WENTWORTH PARK TRACK REVIEW

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WENTWORTH PARK TRACK REVIEW

BACKGROUND

The injury rate on the first turn at Wentworth Park is high.

A study was conducted to compare the existing surface grade configuration with an alternative surface grade configuration for the Wentworth Park track.

RECOMMENDATIONS

It is recommended that the following actions are taken:

- The cross-fall grade on both bends is reconfigured so that it is a constant;
- The cross-fall across track sections along the track width is also made constant;
- The surface grade transitions into and out of the bends be made within the straight sections of the track;
- The surface grade transitions into the bend are a minimum of 20 m in length;
- The surface grade transitions out of the bend are a minimum of 10 m in length; and
- That the width of the first bend is increased from the finish line to approximately the first light pole on the bend as shown in Figure 4.

CURRENT TRACK CONFIGURATION

The existing track was most recently surveyed on 08/02/2017. UTS was advised that no major changes have been made to the track since this survey.

In the current track configuration, the cross-fall of surface grade increases gradually from the start of the bend to a peak near the catching pen as shown in Figure 1. It then drops off again to a minimum at the end of the bend. This surface grade configuration places a constantly changing centrifugal force on the galloping greyhounds. This constantly changing force increases the difficulty that the greyhounds face while navigating their way around the bend. This in turn increases the probability of an injury occurring.

The survey data of 8/02/2017 also shows a variable cross-fall across the width of the track where the region which is farther away from the rail has a higher cross-

fall. Figure 2 depicting the cross-falls at mid-point around the first turn. In section A-A, Region 7 has a cross-fall of approximately 9.2% whereas Region 1 has a cross-fall of approximately 7.2%. This configuration also increases the probability of an injury occurring.

Currently, due to an inadequate camber on the bend there is an increased probability that greyhounds will try to take a wider turn or reduce their speeds. This inadequate camber at the entrance to the bend applies an immediate and large centrifugal force upon the greyhounds. This increases the probability of a cascading effect, that when it occurs, leads to all kinds of complications such as a sudden significant deviation of a greyhound from its own path at the bend, creating conflicts with other greyhounds' navigation path by occupying, and obstructing the galloping of other neighbouring greyhounds. An example of these complications can be seen in the following race video where the white #3 greyhound takes a wider turn changing its navigation path resulting in conflict with green #6 and black #7 greyhounds:

<https://drive.google.com/open?id=1-Ns1kAlrwwHVRndVMTH0pruP5iDw5NnK>

The lack of support to oppose the centrifugal force contributed to the incident as shown in this video.

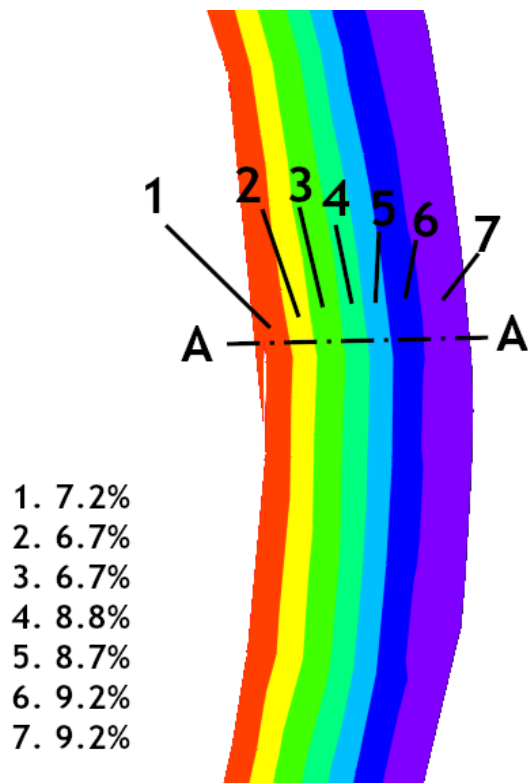


Figure 2: Wentworth Park Section A-A within Figure 1 depicting the cross-fall at the mid-point around the first turn (using survey data 8/02/2017).

IMPROVED TRACK CONFIGURATION

Figure 3 shows an improved track surface grade configuration based on race observations and greyhound dynamics findings and assumptions.

The improved track surface grade configuration incorporates a constant 10% grade for the entire bend (at both ends of the track). This provides greater and constant centrifugal force support for greyhounds.

In the improved surface grade configuration, the transition to 10% grade commences 20 m before the bend (as shown in Figure 4). This 20 m surface grade transition was chosen after considering 1 second greyhound galloping phase as well as injury location probability as found from race videos and the injury data. A 1 second galloping phase for greyhounds transitioning to higher grades was a compromise nevertheless a viable option as further reduction of grade transition length would increase vertical acceleration above 4 m/s^2 per stride. Furthermore, it was found from the calculations and data that greyhounds' acceleration phase from the boxes lasts between 6 to 8 seconds. However, as the Wentworth Park

track has a shorter straight most greyhounds cross the finish line and enter the bend by 6 seconds while still accelerating forward. This leads to more hazardous conditions for greyhounds as acceleration of greyhounds in the bend entrance would put additional strain to greyhounds. To counter this on top of improved surface grade at the bend the track has also been widened at the bend entrance to a width of 6.5 m. Likewise, observations showed greyhounds remain leaned for a while approximately 0.2 seconds after they come out of the bend. As leaning requires supporting from the track in the improved surface grade configuration a surface grade gradient is provided on the back and home straights over a 10 m distance.

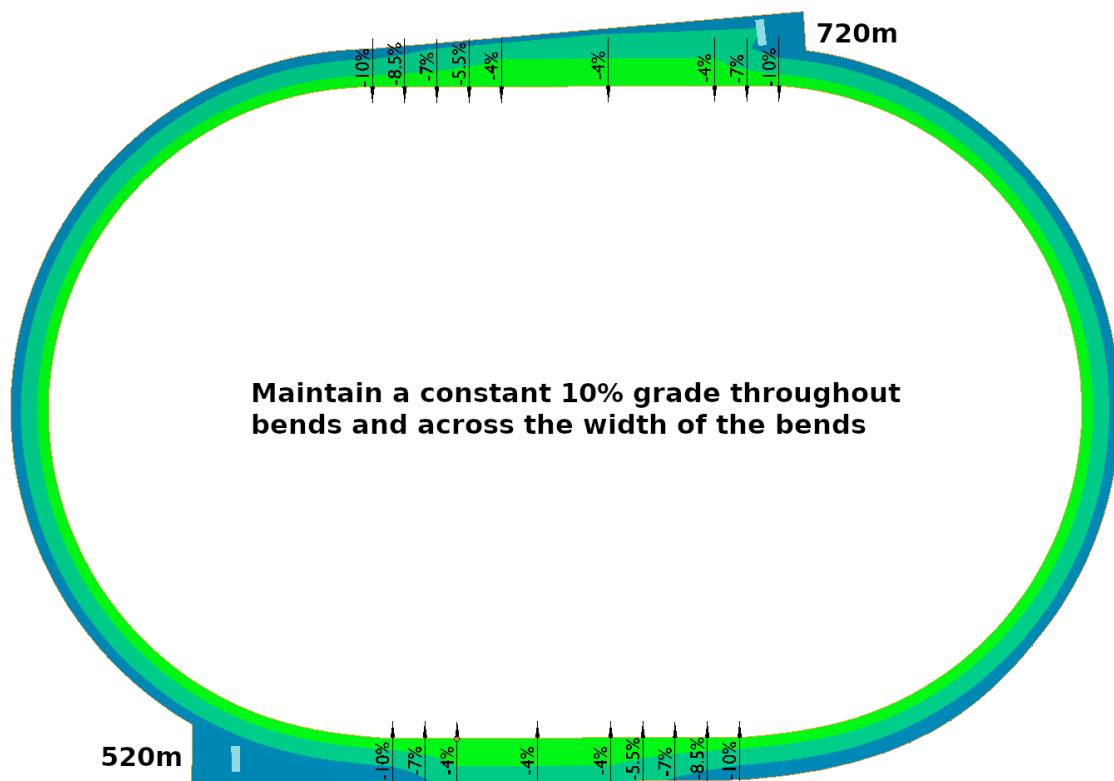


Figure 3: Wentworth Park improved surface grade configuration.

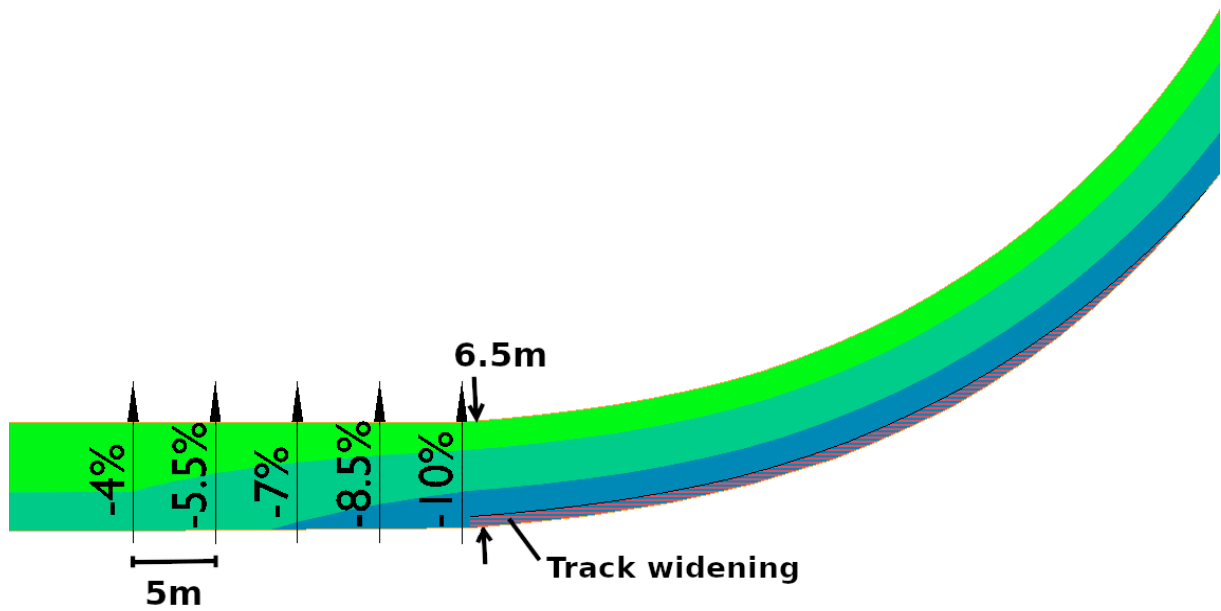


Figure 4: Wentworth Park exploded view of the first bend of the improved surface grade configuration depicting the transition and track widening.

The improved track surface grade configuration theoretically provides approximately 25% improvement in the greyhound dynamics.

Appendix A contains simulations of greyhound racing on the existing and the improved tracks.

APPENDIX A - RACE SIMULATIONS

Wentworth Park 520 m start simulations for the existing track

Front view:

<https://drive.google.com/open?id=1lAMK7GbsTI-o-Ma6sH9MQcFF8cwVoAuj>

<https://drive.google.com/open?id=1Xqxf2CVWC92VjCFDsWQzqNsWCY-8ubeW>

https://drive.google.com/open?id=1qe8HYL_VtpMJxpFLShY0hSsE4adPn30F

Dog view:

<https://drive.google.com/open?id=1GCRQvPTi-vSD5nT-LC7fmAUpsbuOSJSw>

<https://drive.google.com/open?id=1-sTD8uSADYsdyp6n5pt4FD5DYOrSIG8c>

<https://drive.google.com/open?id=1GWADQJWnx9anHl5VWWUYjKjP1xqmiy3X>

Plan view:

<https://drive.google.com/open?id=1Nli1MF2YwBKlrJIXVvW5ThJygmXJJDFP>

https://drive.google.com/open?id=1qhvngx7hGsq5P3Bg7cGk_DBoDIm2WFH0

<https://drive.google.com/open?id=1vOhMZXj2-vcotiPA-g0vnLPkAyK40WKb>

Wentworth Park 520 m start simulations for the improved track

Front view:

<https://drive.google.com/open?id=1YiLYsdWEbwCykEJav79cSavJwTgpUpXM>

<https://drive.google.com/open?id=1LXP7ssgx3nO5MujFDJcLRK0tVSKSyL3->

<https://drive.google.com/open?id=1p2r1q-5CFiGoyrKh1lvOr5LzM87C2cL3>

Dog view:

<https://drive.google.com/open?id=1zBiQajyfn9Pb5lrARR3BhV-tEUFkUfPt>

<https://drive.google.com/open?id=10m93SJ1pQFwx0ltojkPKs0auFFHKlnvm>

<https://drive.google.com/open?id=1SMlpYGu2DYjjPxxwCQZlymb4qZ7ZoNHRH>

Plan view:

https://drive.google.com/open?id=1OCrt0FtwmyYkTtk3wl5M8ck7D8z_ktAt

https://drive.google.com/open?id=1S9_961IUJFS1apXQFJ2XOEyNBAj5YS-x

<https://drive.google.com/open?id=1Xe6vx78rndHDw5ATal-UC2vlq6fCSbVx>