Holme Pierrepont Canoe Slalom Course Upgrade Proposals

Non Technical Summary

BACKGROUND TO THE SCHEME

Holme Pierrepont Canoe Slalom Course (HPP) has a long and storied history as the flagship venue for the British Canoe Union. Since its creation in 1986 this course has served as the national training center for the highly successful British Whitewater junior, national, and Olympic teams. It has also served as a recreational and rafting attraction and has hosted numerous national and international level whitewater competitions in a variety of differing events including both slalom and freestyle. Commercial activity also takes place on the course through rafting and rescue service training.

As time has passed the channel, which was once state of the art, has begun to suffer in utility as newer and more advanced and efficient channels are constructed around the world and as the boats used and activities pursued have also evolved.

The upgrade proposals are designed to enhance the current desirable and very popular features whilst improving other areas of the course that currently are underutilised.

Several user groups have been established in the past as minor changes have been undertaken on the course with the current modification proposals being developed for several years. Funding opportunities became available in Summer 08 and an initial public meeting took place in early September to outline the proposals.

PROPOSED MODIFICATIONS

The proposed changes to the course include:

• The widening of the course in portions of the run between Pools A and B (Pyramid Pool).

• The moving of the feature "Jaws" downstream such that it pours into Pool B (Pyramid Pool).

• The infilling of the lower portion of Pool B (Pyramid Pool).

• The widening, to the true left of the run section downstream of Pool B and Upstream of Pool C (Looping Pool).

• The infilling of the lower portion of Pool C (Looping Pool).

• The walling off of the region between the Upper Island and the Lower Island such that the main channel continues directly through Pool D (Magic Roundabout Area) without joining the junction with the upper recirculation channel and without separating away to the lower recirculation channel (note that there is still a recirculation route that now consists of a single channel from the Muncher down to the Bottom Stopper).

• The trimming of the lower island such that flows are more direct from the Muncher to the Bottom Stopper.

• The infilling of the lower portion of Pool D

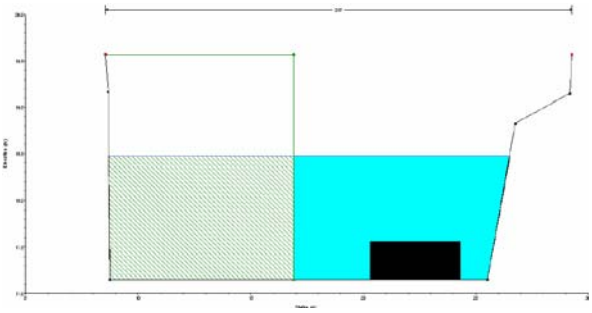
In addition, the Omniflot system of movable obstacles is proposed for several sections of the course to "tune" whitewater features to their optimum configuration.

ASSESSMENT OF THE PROPOSED CHANGES

BASELINE MODEL

In order to evaluate the differences between the existing channel system and the proposed channel system a baseline model was created using HEC-RAS (a hydraulic modeling package). The existing model was created using both as-built drawings from archive and more recently surveyed points (used for the purposes of calibration) to create over a hundred cross sections within the selected reach. The model consists of a baseline geometry garnered from the actual concrete bed of the channel.

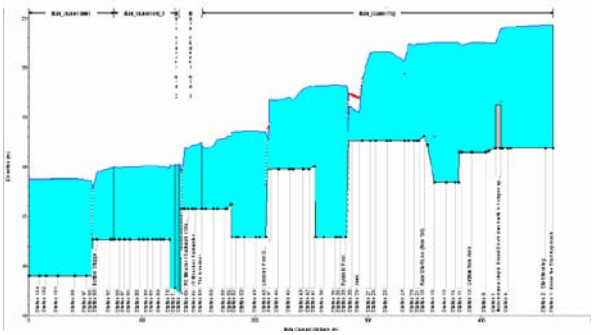
Obstacles such as concrete blocks and Omniflots were modeled within the software as obstacles placed on top of this concrete surface. The model was further refined to include ineffective flow areas in the large eddies and pools located throughout the course. An example cross-section taken at a familiar cross section that includes the Muncher, is shown below. (The hatched green area is determined as ineffective flow area and the black area is the concrete obstacle that forms the Muncher).



The preliminary baseline model was then compared to surveyed water surface elevations (WSE) within the channel in order

to calibrate the model. The calibration required several steps as the flow in the HPP channel on the day of the survey heretofore assumed was also a variable in the study.

Certain sections on the course were then used to empirically determine the flow in the course, this found a flow of 17.5 cumecs. The predicted water surface elevation down the course was then predicted by the model at 17.5 cumecs and compared to the actual WSE as measured on the course. This matched very well across points taken over the whole reach, for example, at the area of the old gauge section on the course had a predicted water surface elevation of 20.48m compared to a measured elevation 20.47m.



Modelled water surface profile – existing course.

EVALUATION OF THE PROPOSED CHANGES

Key design parameters were established with the user group and compromises were made regarding each groups aspirations for the course. The works as listed were put forward for evaluation in the model.

A fundamental issue for all users was the increase in flow down the course from the current 17.5 cumecs up to a desired target flow of 24 cumecs.

The proposed changes were examined in the model in a staged and logical manner to allow careful assessment. Initially all the infill areas, plus the wall between the islands and the widening of the channels was investigated at 17.5 cumecs and then at 24 cumecs. The Omniflot bases were then added along with the proposed accompanying concrete groynes and their effects established at both 17.5 and 20 cumecs.

MODELLING CONCLUSIONS

Parameters such as water surface elevation and velocity were examined to ensure that areas such as the Looping Pool, Muncher Section and Bottom Stopper will not be adversely affected.

The study concluded that:

- The infilling of the various pools does increase flow velocities across these pools within the HPP channel.
- The widened channel areas between Pools A and C will allow for flows of 24 cumecs through the head gate and do have sufficient latitude for a high degree of adjustability.
- That the portion of the course that was straightened between the Muncher and the Bottom Stopper will pass boats more quickly through this typically slow section but will not result in increased velocities over and above those caused by the infilling of Pool D.
- That the proposed changes, taken in sum, do not affect the flow characteristics in the Muncher section of the course.

MODELLING LIMITATIONS

The modelling package is lacking at local effects ie if a stopper is “grabby” or “loose” or if part channel width hydraulics exist but it is good at establishing parameters and predicting effects of enlarging or infilling the channel itself. A good baseline model with a high degree of accuracy gives confidence in terms of the modifications made and their potential impact on unchanged sections of the course, ie the Muncher section and the Looping Pool.

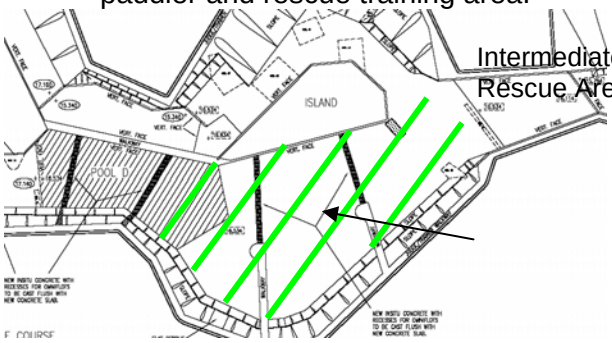
Omniflot system allows the flexibility of then placing obstacles to produce the local desired

effects suitable for canoeing/ kayaking and rafting.

World class modeller and paddler Scott Shipley competed the modelling work and is very experienced having accurately modelled the Charlotte course in the USA using HEC-RAS he is fully aware of its limitations and how to use it to its full computational potential.

BENEFITS OF THE PROPOSED CHANGES

- Increased flows and water depths in the channel with a target of 24cumecs for the revised course thus increased flows to HPP favourites such as the Muncher section, the Looping Pool and the Bottom Stopper.
- Development of new intermediate paddler and rescue training area.



- New concrete platforms to be constructed to provide launch /rescue points. Also large climbing holds to be placed at potential channel swimmer exit points.
- A relocated "Jaws" will provide a much improved feature with depth and good eddy access from both sides. This will benefit all user groups.
- Slightly increased flow velocities across the downstream ends of the in-filled pools.
- Considerably increased flexibility in course configuration and the tuning of features.
- Widened channel areas, thus allowing high flows at the same time as developing eddy features.
- Involvement from all disciplines, through the user group, in the commissioning process and thus the development of ideal features.
- Separate back channel area allowing rental of main course or back channel areas.

CONSULTATION

Throughout the modelling and recent design process a HPP User Group has been fully involved in the process. This group consists of the following people:

- Chris Hawkesworth - BCU Facilities Manager
- Pete Orton - Valley Kayaks
- Daniel Scott - Desperate Measures
- Dawn and Ian Scott - Holme Pierrepont Canoe Club
- Richard Chrimes - Freestyle
- Keith Hampton - Safety and Rescue
- John Handyside - Wild Water Racing
- David Leathborough - Whitewater Rafting
- Andy Maddock - World Class Slalom
- Ian Bebbington - Nottinghamshire County Council
- Matt Chadder - Recreational Playboating
- Pete Cornes - Squirt Boating

- Andy Laird – EPD Ltd, Design Consultant

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