HAMBLEDEN LOCK

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LOCK FAST

A race has been in progress to complete the rebuilding of a lock on the River Thames in time for the start of the holiday season. Dave Parker reports.

Frantic activity has been taking place over the last few weeks at Hambledon Lock, on the River Thames downstream of Henley. Main contractor J Murphy & Sons is racing to re-open the lock for Easter holiday weekend following a rebuilding project which promises to remove a notorious bottleneck for some of the 25,000 pleasure boats that cruise on the Thames each year.

National Rivers Authority new works manager Nick Lyness says the project arose out of consultations with boating organisations and other interested groups. "We identified five locks where there was serious crowding every summer. Hambledon was given top priority because it was the narrowest below Oxford, and because it was in urgent need of major maintenance."

The original structure was built in the 1870s. A pound lock – the modern type with upper and lower gates – is known to have existed on the same site since 1773, and there is evidence of a single-gated flash lock at Hambledon in the 14th century. NRA has taken the opportunity this time to update the basic design of the lock, speeding the operating cycle and simplifying maintenance.

The basic principles of pound locks are centuries old. Boats from the low level move into the lock when water levels inside and outside are the same and the lower gates have been opened. The gates are shut and the top sluices opened, allowing water from the higher level to flow into the lock chamber.

Once the level in the chamber has risen to match the higher water level, the top gates can be opened. Boats heading upstream move out, those going downstream move in, and the gates are shut. Top sluices are closed, bottom sluices opened and the level in the chamber falls until it matches that of the lower level.

Traditional locks – like most of those on the UK canal system – are little more than simple channels lined with concrete, stone, or even turf. Gates are usually made of oak, and carry the sluice gates and their operating mechanism. More recent locks on the Thames have used underfloor filling systems with some sluices moved from the gates to the chamber walls.

At Hambledon the NRA has gone for a full underfloor system, with independent sluice gates to simplify maintenance. Lyness explains: "It's the first full bullnose system – all the inlets and outlets have been moved away from the gates to bullnoses top and bottom. These are linked by four 825mm diameter concrete pipes, which are connected to the lock chamber by a total of 36 300mm diameter nozzles, angled out towards the chamber walls.

"It may sound like a giant jacuzzi, but it means we can move 679,000 litres of water into or out of the lock in 3.5 minutes without excessive turbulence, which is far more than would be possible with gate sluices. And the gates are much simpler and cheaper."

Overall dimensions were increased by almost 50% – chamber length went from 41.5m to 61m, width from 5.4m to 7.7m – which meant the NRA had to purchase a 3m wide strip of land to the south. And NRA designers added an underslab drainage system of 150mm diameter porous concrete pipes to minimise hydraulic uplift.

Work on the project is only possible during winter. Construction was therefore split into two phases over consecutive winters.

The first winter's £184,000 piling contract, programmed for a 13 week closure, went to P Trant. Between January and March 1993 more than 400 14m long Larssen piles were driven through 13m of gravel and chalk on each side of the existing lock and within 4m of its walls. "We designed the cofferdam to be propped at one point 1m above existing ground level only," Lyness says.

Piling was completed in 10 weeks, then the original lock was left to function for the 1993 boating season. In the meantime, the NRA accepted the £842,000 tender from Murphy for completion of the cofferdam, demolition of the existing structure and construction of the new, larger lock.

Work started on 1 October 1993 with only 27 weeks before the Easter 1994 opening. When demolition began the poor state of the existing structure became all too obvious. "It just fell over", says NRA project manager Colin Platt.

The NRA team put a lot of thought into the detail design of the concrete chamber structure. Basic design was to the water-retaining structure code BS 8007, but to further reduce risk of cracking a low-heat 30:70 blend of Ordinary Portland Cement and ground granulated blastfurnace slag was specified for the C35 concrete.

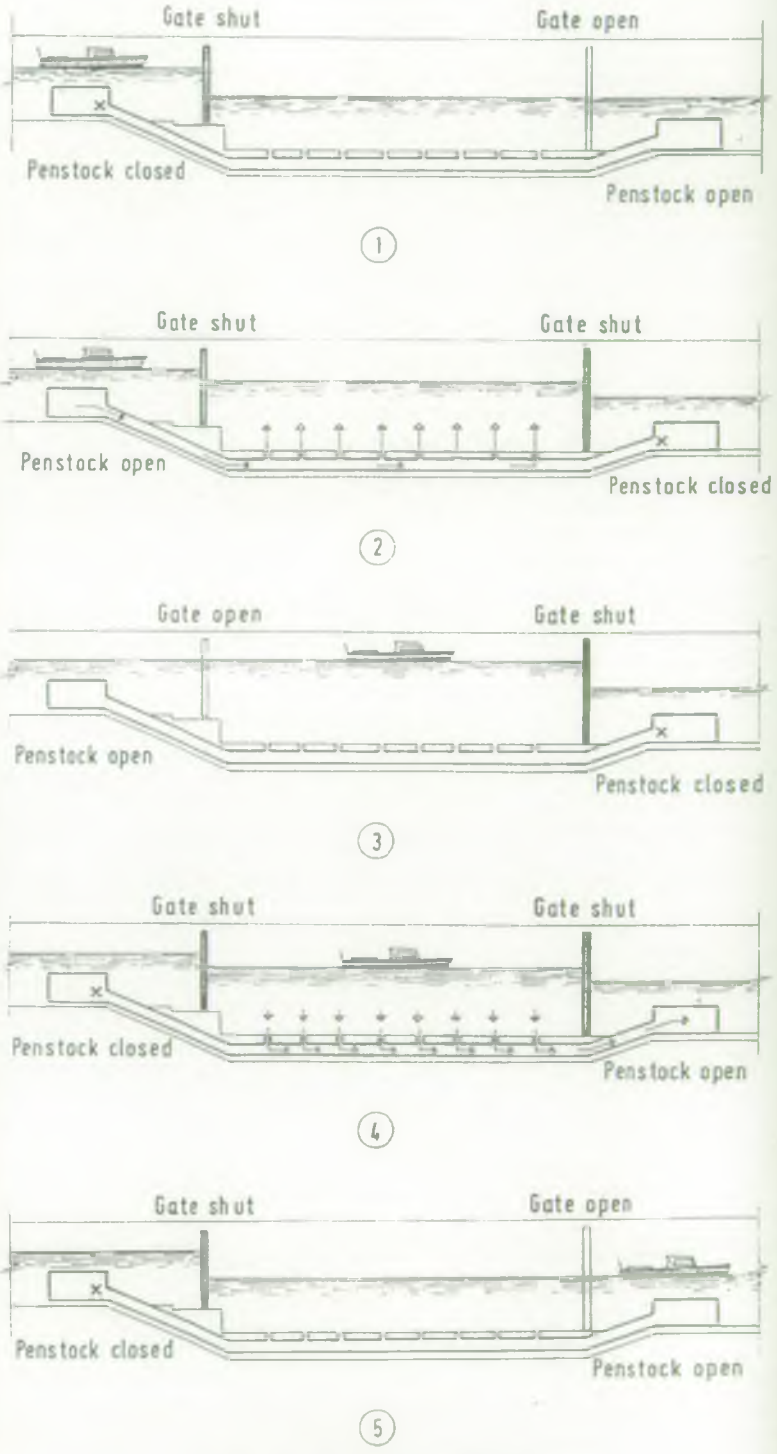
"And to improve surface hardness and durability on the lock walls we decided to use controlled permeability formwork", says Platt.

Pours of the base slab went smoothly, but the first wall pours were more of a challenge. Controlled permeability formwork was produced by stretching porous Zemdrain material over plywood shutters, and this took up to

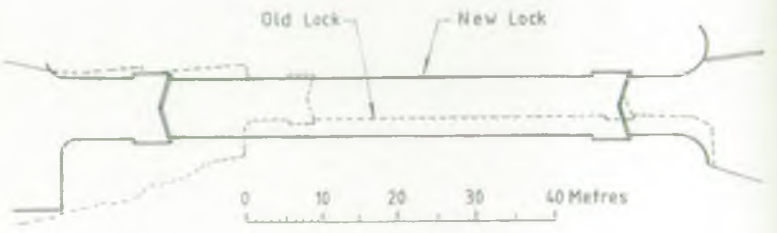
The site viewed from downstream.

six hours per shutter to get right at first Platt says. But the benefits were obvious when the shutters were struck. "There was a complete absence of blowholes and no need for any rubbing up," Platt says.

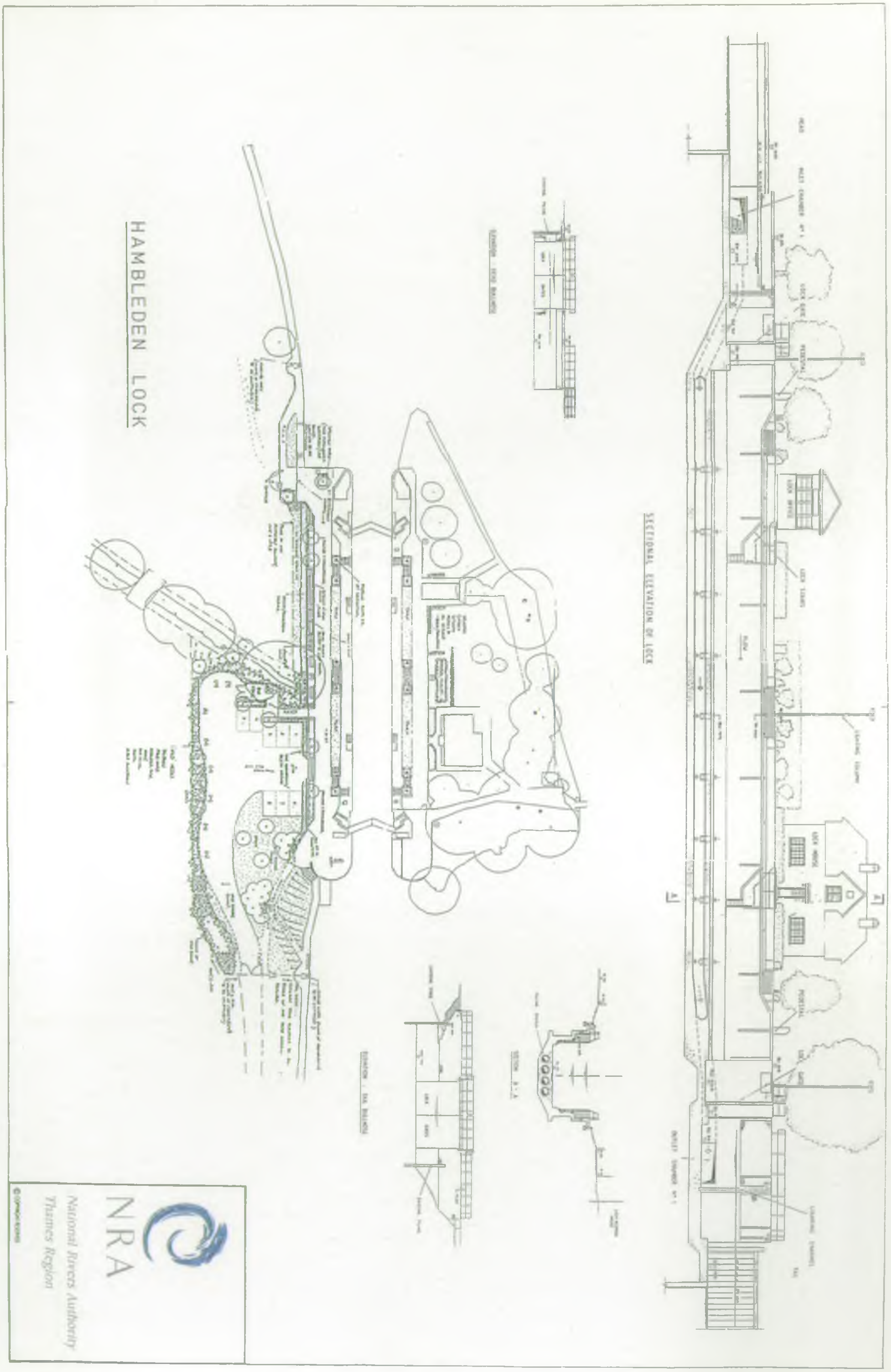
The first set of steel chamber gates were fitted in the second week in March, and the first of the eight inlet and outlet penstocks a week later. When the lock first re-opens only manual operation by the lock-keeper will be possible, but by May the hydraulic rams on the sluices and gates will be under electronic control.



LOCK FILLING SYSTEM



NEW AND OLD LOCKS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