

West Thames Navigation Projects

repairing and/or improving three locks on River Thames

by
Mark Reed

The Environment Agency manage the freshwater (non-tidal) River Thames, which extends for 135 miles from Cricklade, Gloucestershire in the West to Teddington, Middlesex in the East. The Agency own and operate 45 locks on the River Thames (one of which is at the junction of the River Thames & River Kennet). It has a statutory obligation under the Thames Conservancy Act 1932 to *maintain the River Thames Locks and associated structures and make a contribution towards ‘creating a better’ place and vision in the Thames Waterway Plan. Annual Agency inspections of the River Thames provide an opportunity to identify sections of the waterway which require repair or improvement.*



Pinkhill Lock Reopened to boaters after £690k refurbishment

photo courtesy Halcrow Ltd

Locations identified

Several locations have been identified requiring capital works, and the following article discusses three of the West Thames Navigation Projects for delivery 2007/08.

The value of the three projects is £1.4Million, against a total Programme budget of £4.8M.

Sponsored and funded by the Environment Agency's Thames Region Waterways the works fall under the Environment Agency's National Capital Programme Management Service (NCPMS). The three Projects discussed in this article are project managed by *EC Harris LLP*. All capital works are procured through established Environment Agency Frameworks.

Pinkhill Lock Refurbishment - Project Value £690k

The manual beam pound Pinkhill Lock is the 39th lock on the River Thames Navigation, located in Oxfordshire, several miles west of Oxford City. It was built in 1791. Pleasure boats are the main craft to use this part of the Thames, approximately 6,520 boats pass through the lock each year. The lock chamber has a published length of 34.59m, 4.9m width and depth of 3.3m.

The last time substantial repairs were undertaken on the lock was in 1931. The annual waterways inspection identified over a number of years that the lock required repairs and significant Health and Safety improvements. The proposed scope of works include new lock ingress steps with lower walkway widening, removal of existing concrete render to lock chamber walls and re-apply new sprayed concrete (gunnite), including new vertical and horizontal timber fenders. The lock gates were repaired several years earlier under a separate contract.

Halcrow Group Ltd completed the detailed design Summer 2007 and following a full competitive tender the contract was awarded to *Morrison Construction Ltd*. Construction commenced November 2007 under a planned full lock closure.

The lock chamber had to be temporarily dewatered to allow access inside the chamber to facilitate the work. Steel 'stop logs' were used to seal the lock following the installation of new stop log groves within the lock bullnose structures, both at head and tail of the lock. Prior to dewatering the lock a fish rescue was undertaken and 6500 fish were effectively rescued and released within the river. Once dewatered, a specialist sub-contractor removed the existing concrete render from the chamber walls by hydro demolition. Producing 2500bar of water pressure made light work of the render removal. This method was also used to form recesses for the new vertical and horizontal timbers and in part to cutout the existing concrete structure for the new ingress steps.

New timber fenders were machined from FSC tropical timber, Red Angelim which possesses excellent properties suited in a wetting and drying environment. The Environment Agency purchased the timber and free issued to Morrison Construction Ltd.

Due to the rural location of the lock modern plastic fenders were discounted. New ingress steps were constructed insitu with reinforced concrete and the new timber fenders installed prior to the concrete gunnite being sprayed back onto the chamber walls. Prior to gunnite spraying, stainless steel mesh reinforcement was fixed to the walls and sprayed to a nominal thickness of 75mm.

Upon completion of gunnite spraying new grab chains and repainted bollards were installed. The lock lower walkways were resurfaced in tarmac and non-slip coatings applied to the ingress steps. The lock was reopened for navigation Friday March 7th 2008 as per the published public lock closure dates.

St John's Lock Tail Bank Protection: Project Value £354k Revenue Moorings & Charging Point Wall

St John's Lock is the 45th and final lock in the River Thames Navigation situated on the Gloucestershire/Oxfordshire county boundary several miles from Lechlade.

The annual waterways inspection identified that the existing charging point retaining wall was failing with extensive cracking observed in the wall and adjacent footpath. Investigations found that inadequate drainage behind the wall; increased water levels in Winter increased the water pressure in soil retained by the wall. The footpath sub-base was found to be voided with evidence that fines from sub-base materials washed out through pile handling holes, again contributing towards wall movement and cracking.

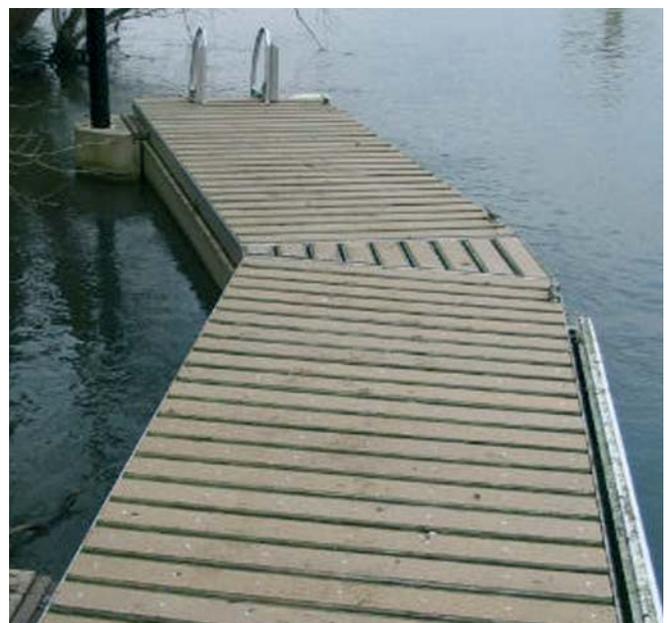
Considerably undercutting of the existing lock bullnose tail bank required further investigation and the existing floating revenue moorings' piles were identified as being inadequate to resist potential boat collisions.

Following detailed design from *Halcrow Group Ltd*, the contract was awarded to **Jackson Civil Engineering**. Construction commenced early November 2007 under a planned lock closure. The existing reconstituted stone charging point wall was demolished, including the removal footpath sub-base. Piles handling holes were plate welded and new compacted sub-base with reinforced concrete footpath constructed. A new dry stone wall was constructed using locally sourced natural Cotswold stone by a specialist local dry-stone walling company, *Ernest Joynes*.

Specialist sub-contractor, *Haven Ports Marine*, installed PU12 steel sheet piles 4.5m to protect the failing bank downstream of the lock. New PEFC Oak timber fender and capping was fixed to the piles with localised landscaping. Both steel piles and timber was procured by the Environment Agency and free issued to Jackson.

The existing piles for the revenue moorings were replaced with new 5.8m long steel tubes driven 4.3m. New non-slip strips were fixed to the existing revenue mooring deck boards to improve underfoot grip at the walkways.

All construction work was completed by Friday 21st December and the lock fully opened.



St John's Lock - revenue moorings, new anchorage piles, non slip surface



St John's New Dry Stone Wall

photo courtesy EC Harris LLP



Eynsham - Piles driven and being prepared for timber capping and dry stone wall partially built

photo courtesy EC Harris LLP



Pinkhill - this picture shows Refurb substantially complete prior to Lock opening (see photo on page 205)

photo courtesy Halcrow Group Ltd

Eynsham Tall Bank Protection - Project Value £291k -

Eynsham Lock is the 38th lock on the River Thames Navigation, situated in Oxfordshire, several miles to the west of Oxford City.

The annual waterways inspection identified that the existing left downstream bank is in poor condition with appreciable undercutting of the existing bank due to aggressive flows from the nearby Eynsham Weir. Failure of the bank put at risk the existing lock tail, nearby telemetry/weir building and existing trees.

Following detailed design from *Halcrow Group Ltd*, the contract was awarded to *Morrison Construction Ltd*. Construction commenced early November 2007 under a planned lock closure. The solution involved 28m of new PU12 steel piles, 6.5m long (locally longer to create pile bridge over existing service crossings) driven 4.8m into the existing river bed by a vibro hammer. The piling work was sub-contracted to *Commercial Marine Piling*.

The piles are clad and capped with PEFC Oak timber, new landscape planting with native species was undertaken, a new dry stone wall was constructed by Ernest Joynes dry stone wall builders and new steel guard pile replaced the existing damaged timber pile. Fish brushes were also installed within the pile in-pans. The piles and timber were purchased by Environment Agency and free-issued to *Morrison*.

Significant rainfall during January 2008 caused delays of up to 4 weeks when river levels during March with construction work sporadically undertaken in between low river level periods.

The piles have been clad and capped with the Oak timber and native planting behind the capping to the base of the wall. The guard pile timber fenders have been installed and the construction completed 4 April 2008.

Conclusion

The Agency's Framework Agreements have proven to work well in delivering quality products on time and on budget. Lessons learnt from Projects delivered 2007/08 have been incorporated into future projects to ensure continual improvement during project design and construction.

A Programme of Navigation capital projects have been identified for construction 2008/09 at various locations along the river Thames, including several full lock refurbishment projects, bank protection projects and new canoe portages.

Note: The Editor & Publisher wishes to thank Mark Reed, Project Manager EC Harris LLP, (seconded to Environment Agency) for, producing the above article for publication. ■