Project Profile

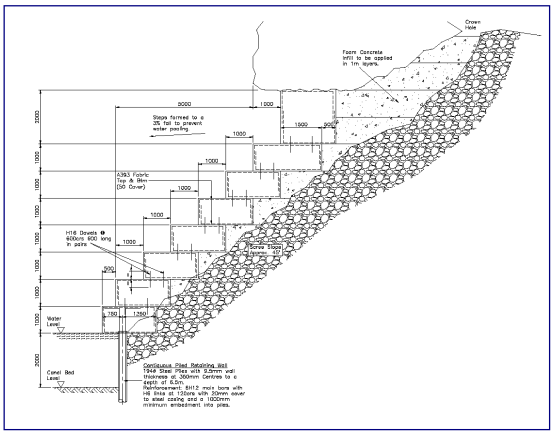
Forkers Ltd

Castle Mill Canal Basin Rock Face Stabilisation

Client: Dudley Metropolitan Borough Council
Designers: Geo-design & ASC Consultants
Date: May to August 2011
Value: £330k

The canal basin at Castle Mill which was once part of an underground limestone mine gallery which has subsequently collapsed, is the junction of 4 canal tunnels and today forms part of the Dudley Canal Trust tourist canal trip through the Dudley limestone mine caverns. A partially filled mine gallery in the Lower Wenlock Limestone, once accessed by the canal system, also remains on one side of the basin. The unsupported and degrading rock roof at the mouth of the gallery together with the unstable scree pile at the gallery entrance caused as a result of crown hole development in the gallery roof had both been assessed as dangerous by Dudley's Mines Manager and requiring urgent remedial support works.

We were approached by Dudley MBC to look at solutions to the problem, in particular the difficult location, access restrictions and safety issues during the work. We worked closely with Dudley Council Geotechnical Engineers, consultants Geo-Design and the Mines Manager to develop a robust support solution and working methods which did not involve draining the canal or disturbance of the scree pile and also allowed sufficient space to be retained for the canal boat trips to continue operating during the work.



The design was based on constructing a stepped retaining wall structure formed from reinforced cement grout which was dowelled in to the rock face at the edges and crown of the gallery mouth. The retaining structure was supported on steel piles drilled by mini-rig into the bedrock at the edge of the canal from a narrow stone berm that was installed as a permanent feature and also used as a working platform so that the first step of the retaining wall was above canal water level. On completion of the retaining wall, the scree pile behind the wall was also pressure grouted to improve its stability and load bearing capacity.

Civil & Ground Engineering Contractors

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The canal basin is only accessible by canal boat from the Tipton Portal of the canal, adjacent to the Black Country Museum, passing through Lord Wards Tunnel and Shirts Mill Basin before reaching the worksite and therefore all plant and materials had to be transported on canal work boats through these small tunnels. The plant chosen was sized to suit this restriction including the use of a mini-excavator and mini-drilling rig.

The cement based grout used to construct the retaining wall was mixed in the site compound adjacent to the canal tunnel portal and pumped approx 400m through the Lord Wards tunnel to Castle Mill basin. The 75mm HDPE grout was anchored to the timber rubbing board in the tunnel to ensure it could be monitored continuously during pumping. Extreme care was taken to ensure the grout delivery line was pressure tested and inspected before each use to ensure there was no grout spillage into the canal. Each lift of the wall required up to 25m^3 of grout.

During the work we worked closely with Dudley Canal Trust to ensure that our operations did not interfere with the tourist canal trips as well as making use of their work boats and operators.

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