

BOF 49; 17 May 2016 Action 15, Acoustic Monitoring Scour Detection

Having suggested acoustic imaging as a possible tool, I was asked to investigate further, and have consulted with both our current term contractor for underwater inspections, and the previous one who carried out some such imaging for us. Provision for this imaging is included in our current contract.

The issue was whether acoustic imaging could be carried out safely and successfully while the river is in flood condition, and when diving is generally unsafe, rather than waiting until the flood goes down, by which time scour holes may have wholly or partially backfilled, obscuring their depth and covering over any damage to the structure: also, whether useful information could be obtained by this means.

It is accepted that an indication of scour depth can be obtained after the flood recedes by probing through the normally softer deposited material to the normally firmer material below, but clearly, this is time consuming and live time information during the flood would be preferable, occasionally critical.

One of the virtues of acoustic imaging is that it can provide clear images despite sediment or other colour in the water which would obscure normal photography rendering it at best blurred, or worse, useless. This can be significant during a flood when there is a greater than usual level of colouring and suspended solids in the water.

Having consulted, it transpires that not only can this technology be used to provide useful information, it has been done. Some years ago, images were taken for British Rail at a number of bridges in the Windsor area when concern was raised during a severe flood. On that occasion, to avoid the need to work from the railway lines above with the necessitated track possession, it was possible and indeed much easier to work from an adequately powerful boat.

The essential requirements for mounting the “camera” are that it is steady enough to avoid it vibrating in the flow, and that it is deep enough in the water to avoid bubbles being generated around it which would obscure the image. Various means can be considered to achieve this including:

1. From a boat, as above, or;
2. For a road bridge, on a boom or pole mounted on a rubber wheeled hydraulic excavator, or;
3. For a more permanent situation, on a traveller winched down a pole fixed to the bridge.

There are various systems of acoustic imaging available, and it is a matter of consultation with the supplier to decide which is most suitable in the particular circumstance. However, by this means, live information can be obtained on the condition of the river bed and its’ level relative to the bridge foundation, and hence any exposure or undermining of the foundation. Also, while minor cracking of the structure is unlikely to show, major cracking or other damage compromising the safety of the structure should be visible.

Clearly, widespread or continuous use of this technology would rarely be economic or justifiable, but it does appear to provide a means of timely checking during the flood situation of structures which may be deemed to be vulnerable, or of monitoring over a specific period.

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