

EU UrbanFlood project
21st Century Monitoring of Flood Defence Performance
Workshop at Boston, Lincolnshire, UK
Wednesday 14th September 2011

The EU UrbanFlood project (www.urbanflood.eu) is creating an Early Warning System framework that can be used to link sensors via the Internet to predictive models and emergency warning systems. The data collected from the sensors will be interpreted to assess the condition and likelihood of failure; different models will be used to predict the failure mode and subsequent potential inundation in near real time. Through the Internet, additional computer resources required by the framework are made available on demand. The project includes a number of European pilot sites to apply and validate at full scale the technology being developed in the project, one of which is near Grand Sluice Boston, Lincolnshire UK.

Boston has a long history of floods. More than 50% of homes (i.e. more than 15,000 homes) are at significant risk of flooding from a combination of high tide and storm surge in the North Sea. The main area of the town is a little inland from the coast but is affected by tidal rivers in which the spring tide range is about 6m. Levees have been constructed on superficial alluvial deposits of sand and clay beneath over glacial boulder clay. A mixture of different levees exist, but for this project a simple embankment was selected at a location with a history of instability on the riverward face.

During the spring of this year, the project installed a number of automatic sensor devices in the Environment Agency (EA) embankment near Grand Sluice at Boston. The embankment was selected because previous failures are evident and therefore there was a possibility that there would be some further movement to detect. There is also a significant hydraulic signal with the 6m spring tidal range. The instrumentation was selected on the basis of previous experimentation and comparison of instruments installed in full scale dike failure tests in the Netherlands (IjkDijk). Installed in CPT holes were

- Dutch developed MEMS modules (GeoBeads) able to detect local tilt, pore pressure and temperature, the latter as a proxy method for detecting water flow
- Two types of US-Canada developed Shape Acceleration Arrays able to measure three-directional soil deformation profile and one type also able to detect pore pressure

In addition, sensor enabled-geotextile strips (GeoDetect by TenCate) based on fibre optic sensing technology, able to detect soil strain by distributed light back-scattering, have been installed along 300m of the crest and front slope of the embankment. This technology allows longer stretches of embankment to be monitored at relatively low cost. Data is being streamed from the site on a continuous basis using the EA broadband connection at Grand Sluice and the project is also picking up on the EA water level monitoring.

The gathered data is being used to detect anomalies, supported by an Artificial Intelligence system. If an anomaly is detected, this then triggers assessment of the likelihood of levee breach. If this exceeds a certain threshold ability, an assessment of the behaviour of the embankments and the consequences of failure in real time via on-demand computing capacity in the Web/Cloud. This IT element is the next generation of tool that has the potential to be used by emergency managers. Results can be interrogated via a multi-touch interrogation facility which will be demonstrated at the workshop..

The workshop presentations will describe the work carried out to date. It will be of interest to those involved in both asset management and emergency management as well as those involved in the investigation and instrumentation of assets and the gathering and manipulation of data. As well as a demonstration of the IT facilities there will be an opportunity to visit the site being monitored which is close to the workshop venue.

Workshop programme

09:30	Registration and refreshments	
10:00	Introduction to the day	Chair, Jonathan Simm, HR Wallingford
10:10	About UrbanFlood: monitoring and ICT systems for flood defence	Prof Robert Meijer, University of Amsterdam
10:30	Flooding and flood defence in Boston	Leila Farhan, Environment Agency/ Steve Lumb, Boston Borough Council
10:50	Understanding flood defence performance using monitoring systems	Jonathan Simm, HR Wallingford
11:20	Modelling consequences of defence breach	Julien Lhomme, HR Wallingford
11:40	Discussion	
11:50	Demonstration of UrbanFlood technology	Jeroen Broekhuijsen, TNO
12:15	Lunch (Part 1)	Opportunity for 'hands-on' evaluation of UrbanFlood technology
13:00	Visit to UrbanFlood monitoring near Grand Sluice	
14:30	Lunch (Part 2)	Further opportunity for 'hands-on' evaluation of UrbanFlood technology
15:10	Boston Barrier proposals – aims and strategy	Nic Rowlinson, Environment Agency. Project Manager, Boston Barrier
15:30	Boston Barrier proposals – design considerations	Speaker from Halcrow-Jacobs Alliance
15:50	Discussion	
16:00	Close of meeting	

Registration

Although there is no charge for attending the event, please register your attendance by replying with your contact details to Maria Brunsten, HR Wallingford, Howbery Park, Wallingford, Oxfordshire OX10 8BA (fax +44 (0)1491 835381, email training@hrwallingford.com).