

CENTAUR Laboratory Testing Experimental Setup

The laboratory facility consists of a 30 m long “sewer” pipe, 0.2 m in diameter with four manholes. Each manhole is 1.5 m high and 1 m in diameter. Water is pumped into the system by two submersible pumps capable of a combined output flow of 50 l/s, with the flow rate controlled by butterfly valves after each pump. A further butterfly valve, at the downstream end of the 0.2 m diameter “sewer” pipe controls the water depth in the pipe. The butterfly valves are controlled by a LabVIEW programme. MH1 is fitted with a device to minimise any vortices/flow irregularities caused by the pump or upstream pipework. A weir in MH2, with 0.3 m crest width, was constructed 1.3 m above the manhole invert level to replicate additional upstream storage (i.e. represented as flow spilling over the weir). A flow control device (FCD) (Steinhardt HydroStyx Electric) with 0.2 m gate diameter is installed in the MH3 and controlled by a Fuzzy Logic control algorithm developed by the CENTAUR partners. The gradient of the pipe is 1 in 500 to ensure adequate drainage.

Figure 1 shows the layout of the laboratory setup. The facility is instrumented with pressure transducers measuring water depths in the third (control) manhole upstream of the FCD and the fourth (flood location) manhole. Water level data is collected at 0.1 Hz and the FCD control algorithm runs every 60 seconds. A variety of different downstream valve closure profiles and flow rates have been tested and the results have been used to refine the control algorithm.

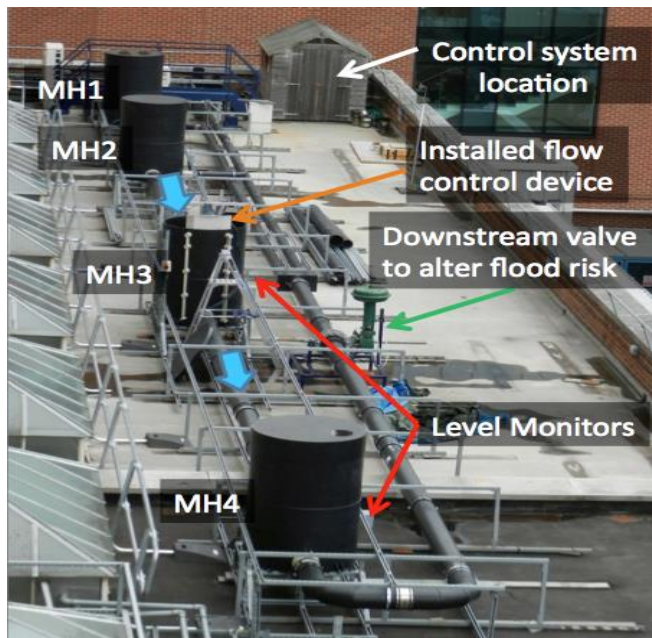


Figure 1: Laboratory setup, MH stands for manhole.