Tales from the Trenches

Lessons Learned from Calibration Flow Testing in Anchorage, Alaska

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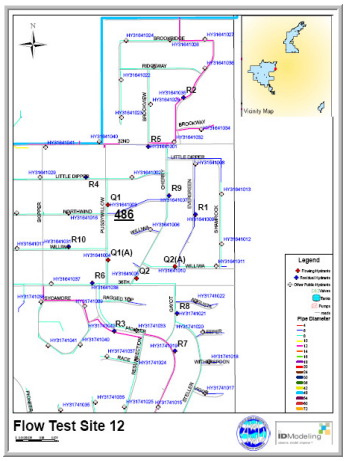
IDModeling provides field services to plan and coordinate the gathering of information necessary for calibrating water system models. The planning includes proposing test sites, creating maps of each test site, and involving the utility with all facets of the planning of the tests. Field coordination involves training of personnel in methods of testing, timing of tests, and orchestrating the personnel necessary to get good results.



Typical Test Map

The Anchorage testing involved thirty test sites, ten college interns, and about twelve Anchorage operators, engineers, and SCADA operators. The client, Anchorage Water and Wastewater Utility (AWWU) wanted ten residual pressure points for each test and as many as three simultaneously flowing hydrants. The utility is spread out over the greater Anchorage area and handles system operations as far as forty miles from the center of town. Daily plans were worked up to minimize drive time. Because of the distance between some tests, the testing was performed over a four day period, with six to nine tests performed a day.

Summer college interns were utilized to monitor pressures at the residual hydrants. Their first day was a Monday, and involved normal employment training until the afternoon when they were assigned to the flow testing task. An "all-hands" meeting was held that Monday afternoon to coordinate the field staff, engineers, and interns on the week's activities. Because the students would be operating dry barrel hydrants, they were field trained to make sure they were comfortable with the proper method of operating the hydrants and the proper way to utilize the pressure gauge/logger assembly.

Training of interns in hydrant operation

Common Issues

Turbidity/T&O: One of the more common issues in testing of a system in such a way is turbidity and taste and odor problems. In trying to avoid this occurrence, attempts are made to slow down the opening and closing of the hydrants during the test, which may (but not always) reduce the stirring up of silt in the system. This procedure also helps prevent water hammer. Proper coordination with office staff is important in this case because calls from consumers will be received by the office. Once a customer was aware of the nature of the test, most were satisfied with the explanation.

Water Hammer: More unforgiving, is water hammer. Any time a hydrant is opened, care has to be taken to slowly close the hydrant. IDModeling calls for staged shut down of the hydrants where flow is reduced to roughly half before another hydrant has its flow reduced. One particular zone being tested had some uniqueness that caused a surge in pressure during shut-down, which in turn, caused a main break. Fortunately, since several field operators were there performing the test, the leak was isolated relatively quickly.

Drainage: Because of the high flows generated by testing, care should be taken in identifying problem drainage at the flowing hydrant sites. The use of swivel diffusers to direct the diffused flow to safe drainage was very useful in Anchorage. Some residential areas were without curb and gutter and could have presented problems with localized flooding of home sites. Having an experienced test coordinator allows field modifications of the maps in case it is impossible to flow a particular hydrant. A few tests were modified in this way, and viable information was gathered in spite of the field changes.

Use of swivel diffuser to direct flow away from property

Low Pressures: A key point of flow testing is to draw the pressure down, but not too far. Most tests require more than one hydrant to be opened, but if one is enough, it could be dangerous to open a second. As one hydrant is being opened, pressures are monitored at the residual hydrants; personnel at residual hydrants are polled quickly during the flow to determine if adequate pressure remains for a second hydrant to be opened. In one test, pressures at two hydrants dipped well below 20 psi with only one hydrant opened. The test was immediately terminated to prevent possible collapse or backflow conditions.

System Performance: Another feature of performing tests is demonstrating system performance. If a pump serving a pressure zone does not respond rapidly enough to counteract a fire flow demand, a severe drawdown of the pressure can occur. On the other hand, one of the tests performed demonstrated the proper performance of a Pressure Reducing / Sustaining Valve. Two zones were being tested simultaneously with one flowing hydrant in each zone. Between the zones was a pressure reducing / pressure sustaining valve. After the first hydrant was opened and pressures stabilized in the upper zone, the hydrant in the lower zone was opened. Flow to the lower zone was limited by the sustaining valve to prevent the starving of the upper zone, so the second hydrant was turned off and a single hydrant flow was used for that test.

Unique Issues

Wildlife: Anchorage is situated near wilderness area, so wildlife can become an issue. Imagine the surprise when radioing the personnel at the residual hydrants to see if they are ready for the test, only to hear: "I can't get to the right hydrant, there's a moose standing there". Moose can be dangerous when approached, and in that particular case the person that was supposed to be at the hydrant was one of the coed interns. The moose finally wandered away only delaying the test a few minutes.

Moose are not an unusual sight in Anchorage neighborhoods

Communication: Because it is important to gather static and dynamic pressures simultaneously, radios are the preferred method of communication between the personnel performing the tests. Radios provide a measure of safety as well, as in the case of the moose, we were able to immediately dispatch one of the other more experienced operators to the site and make sure the moose moved away. Radios are also very useful in monitoring the pressures as the test proceeds. A single call to all the residual hydrants asking for a "quick read" resulted in a quick rundown of the pressures at all ten hydrants, and allowed on-the-spot decisions to be made. The test time can be shortened too by the use of radios because of rapid confirmation that steady pressures have been achieved during the flow test.

Data Loggers: AWWU elected to acquire pressure data loggers for the residual hydrants. These devices can record pressures as often as every second, then can be downloaded to a computer for analysis. The logger assemblies were also equipped with an analog gauge as a back-up. In the course of the testing, a few data loggers failed, making the analog gauge the primary means of recording data. Having people at each hydrant made the testing smoother, more reliable, and safer.

Monitoring flow tests and pressures

Conclusion

Overall, the testing at Anchorage Water and Wastewater Utility went extremely well. Having a person at each residual hydrant, while not absolutely necessary with pressure data loggers, turned out to be worth the effort. Having an experienced person at the test sites can expedite testing as well as provide uniform collection of the valuable information.