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MEMORANDUM

TO: Bridget Nash, P.E.

FROM: Anna Culcasi, P.E., CFM
Jeff Wickenkamp, P.E., CFM, D. WRE.

DATE: July 23, 2025

RE: Evanston Level Meter Monitoring

PROJECT NO. 23-0283

Purpose

This memorandum will outline recommendations for the City of Evanston to deploy level meters as part of the maintenance and monitoring of their sewer system. The City currently has two level meters available for monitoring.

By pairing rainfall data with the level meter data from significant storm events as they occur, the City can monitor how the system is performing. The rainfall data gathered from City rain gauges can be loaded into the model, the model can then be compared to the elevations at the level meters and reported flooding observations. The City can then determine if additional model adjustments are warranted. Monitoring the system and incorporating those results along with making updates for new project data are the main tasks of model maintenance.

Monitoring Locations

The City can deploy level meters as part of overall model maintenance, to investigate reported flooding, or as part of project development. When investigating reported flooding, a single level meter could be installed to corroborate the complaint. When the goal of level metering is to understand a large problem for a capital improvement project or special study area, it is recommended to install at least three meters: one at the location of interest, and one each upstream and downstream to provide context to the problem area.

In 2025, the area of interest to the City is along Church St. from McDaniel Ave. to Pitner Ave. where there is an upcoming watermain project. The 2025 Program Review for stormwater opportunities identified this location as having combined sewer surcharge risk and surface flooding risk, and listed a potential improvement as extending and increasing the storm sewer at the McDaniel Ave. intersection along Church St.

It is recommended that the City deploy their two level meters along Church St. to inform the upcoming watermain project and determine if it is possible to relieve surface flooding along Church St. There is a storm sewer system on the west side of the project area and the remainder of the project area is serviced by combined sewer and relief sewer. It would be valuable to verify the water level performance in both the storm sewer and the combined sewer in the area of interest during storm events.

It is recommended to place a level meter in structure S07_ID010 for the storm sewer with S07_ID005 as a backup option depending on the ease of installation. It is recommended to place the second level meter in structure B08_01158 for the combined sewer with B08_01188 as a backup option depending on the ease of installation.

The Stormwater Master Plan identified the southwest area of Evanston as prone to surface flooding. Pre-regulatory development along the North Shore Channel was built several feet above natural ground, which cuts off the overland flow paths from the residential area between Oakton St. and Main St. It is recommended that the City purchase an additional level meter to install in the southwest area to confirm and evaluate the existing sewer system. Structure S11-00478 on Hartey Ave. south of Keeney St. is recommended as a monitoring location due to the model indicating that it surcharges frequently.

Installation Procedure

Level meters work by reading pressure and temperature, which is then converted to water level. In addition to any level meters deployed in the field, an additional level meter should be kept above ground to monitor the ambient barometric pressure, preferably an indoor location without an HVAC system.

A stilling tube should be installed in the manholes of interest to provide an area free of turbulence in the manhole. The stilling tube could be a section of perforated vertical pipe with access provided at the surface. The stilling tube can be fastened to the manhole steps with strong zip ties or with pipe straps to keep it stable. For manholes without steps, the stilling tube can be attached to the inner wall of the manhole. More information on stilling well construction can be found at: www.onsetcomp.com/resources/tech-notes/how-to-build-stilling-well

The level meters can be suspended from the top of the stilling tube using an eyehook, carabiner, and no-stretch stainless steel wire or cable. The final depth of the level meter port from the structure rim should be measured and recorded (may require adding two or more measurements together). If the level meter is positioned too deep in the structure, the pressure port can become clogged. If clogging is observed when downloading meter readings, squirt the port holes with water to clear the mud. If clogging continues to occur, consider slightly raising the height of the meter deployment. It is recommended to install the level meter at a depth where the port is just above the crown of any connecting pipes to avoid additional turbulence. This will still allow for the level meter to measure any surcharge conditions. The depth of the level meter (measurement line) should then be subtracted from the rim of the structure to establish the depth of the meter. Figure 1 shows a water level meter.



Figure 1. Level Meter Data Logger

Data Collection

Every 30 days (or more if desired), after the monitoring time period is complete, or after significant rainfall events the data can be downloaded from the level meters and compared with rainfall data from local rain gauges. Depending on the goal of the monitoring, these data points can be compared with the model to determine if any adjustments are necessary, report on a flooding problem, or inform project development.