

## Flexibility in Dredge Design in Urban Waterways

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**Background/Objectives.** The Penn Yan former Manufactured Gas Plant (MGP) is located on the Keuka Lake Outlet in the Finger Lakes Region of New York. The outlet is a flood controlled waterway that provides the only drainage from the scenic Keuka Lake. Remediation of the impacted sediments was required in the outlet between the Site and the flood control structure located approximately 520 feet downstream. The dredge design could not impact the outlet flow as that could result in potential damage to structures along Keuka Lake, many of which were constructed in the flood plain, and would suffer damage from water level rises much smaller than the base flood elevation. Lake levels were controlled by a series of five flow-under gates that were manually operated by the local dam administrator. The administrator targets keeping the lake level within a half-foot water range during the summer months for recreational purposes, and the lake level is lowered 1.5 feet during the winter to provide higher capacity for storm storage.

**Approach/Activities.** The original dredge design divided the outlet into six cells using full hydraulic separation to prevent downstream turbidity. Steel sheet piling was to be installed on three sides of the cell with the outlet bank providing the fourth side and water would be allowed to continue to flow around the outside of the cell. After project mobilization during the permit issuing process, stakeholders raised concern about even small lake level rises during storm events. The design of the dredge cells was then re-engineered to include the use of sheet pile only along centerline of the outlet, and a dual turbidity curtain configuration on the upstream and downstream sides of the cell to isolate the work area. This redesign would allow the turbidity curtains to be removed within one day to provide available water flow quickly if response to forecasted storm events.

The dredge work was originally planned to occur during the high level time of year to allow sufficient draft for barges to float through most of the outlet, however, the majority of the work was completed during a year of abnormally low precipitation and therefore low water elevations. The dredge cell configuration had to be modified to provide adequate draft, where due to the low water elevations the original configuration was not sufficient.

**Results/Lessons Learned.** The flexible design approach allowed for the project to continue despite changes to the design and field conditions. A team-based approach between the engineer and the contractor further facilitated completion of the work. The use of turbidity curtains instead of steel sheet piling, which allowed the possibility for a quick storm response, also made it possible to shift the dredge cell configuration to deal with low water elevations rather than dredging extra material to allow passage in the outlet.