

Project: (D214267) NYSTA / NYSCC Term Agreement for Design and Implementation of Flood Warning System

Location: Mohawk and Upper Hudson River Basins, New York

Client: NYSTA / NYSCC

Year: 2014-2015

Fee: \$163K

Work Performed:

- Hydrographic Survey & Mapping
- Single-Beam Sonar
- Final Survey Report Review

This project involved the design and implementation of a flood warning system that measures rainfall amounts; monitors water levels and flow rates in reservoirs, lakes, rivers, and streams; and provides notification of projected flood conditions on a near real-time basis for three watersheds in upstate New York maintained by the NYS Canal System:

- ❖ Upper Hudson River Basin: 4,620 square miles, upstream of the Troy Dam on the Hudson River;
- ❖ Mohawk River Basin: 3,460 square miles, upstream of the confluence of the Mohawk River with the Hudson River in Waterford;
- ❖ Oswego River Basin: 5,100 square miles, upstream of the confluence of the Oswego River with Lake Ontario.

The scope of this multifaceted project involved the development, calibration, and validation of detailed hydrologic and hydraulic models using available hydrodynamic modeling for each basin; accounting for reservoir and water control structure operations; using existing and new USGS streamflow, stage, and precipitation gages; and integration of National Weather Service precipitation forecasts, system optimization, and flood mitigation analyses. The project also included incorporating a web-based interactive mapping system using orthoimagery to illustrate event-based flood forecasted water levels, timing of peak water levels, and projected flood inundation throughout each of the watersheds.

As a subconsultant to Riverside Technology, Inc., Prudent Engineering's survey team provided hydrographic survey data to complete the hydraulic modeling for the Mohawk and Upper Hudson River Basins. Prudent's team reviewed available survey data and sought permission of data owners to use the existing records, which, in some cases, required the team to convert older data to the current NGVD88 vertical datum. The team was assigned survey tasks encompassing the majority of the basins' non-navigable waters. Using traditional GPS and single-beam sonar, Prudent's survey covered 120 miles of river reaches and approximately 109 locations.



Single-beam Sonar

There were three levels of detail for surveying each reach: (1) confirm top-of-structure deck and obstruction elevations; (2) conduct bathymetric survey near bridge elements, abutments, and bridge low chords; and (3) bathymetric survey. In reaches where a hydraulic model already existed and data was only required to confirm the model and update structure elevations, Prudent provided a limited survey of the upstream face of the structure and the width in the direction of flow. At the structures, the survey collected data to define the low chord, high chord, top of abutment, edge of water, pier locations, and bathymetry at the structure face.

Additionally, where existing hydraulic models did not exist, a full survey of the structures, in addition to four bounding bathymetric sections located at 100 and 200 feet upstream and downstream, were performed in accordance with the FEMA-modified Appendix M. Standards. Prudent reviewed and commented on project parameters and inputs.