

CASE STUDY: CONSTRUCTION OF URBAN STORMWATER AND FLOOD MANAGEMENT PLATFORM BASED ON 3D REALITY MODEL AND HYDRODYNAMIC MODEL

By Sandra DiMatteo, Industry Marketing Director, Water Infrastructure, Bentley Systems



User Name : Shanghai Investigation, Design & Research Institute Co., Ltd.

Project Name : Construction of Urban Stormwater and Flood Management Platform Based on 3D Reality Model and Hydrodynamic Model

Location : Jiujiang, Jiangxi, China

Overview : SIDRI created a CNY 8 billion hydraulic analysis system that can determine how to eliminate

flooding and waterlogging problems in Jiujiang, Jiangxi, China.

Year in Infrastructure Award 2020 Nominee, Going Digital: Advancing Water, Wastewater and Stormwater Networks

Impact of Severe Flood Events Led Impetus for Change

In 2020, significant flooding along the Yangtze River killed 141 people and displaced 38 million more. For the city of Jiujiang, the disaster was the latest in a string of overflow and waterlogging incidents caused by accelerated urbanization, and officials initially could not determine how to prevent them. To better prepare for future flooding events and minimize disruption to city life, China Three Gorges Corporation directed Shanghai Investigation, Design & Research Institute (SIDRI) to create a hydraulic analysis system that can simulate a variety of water conditions in the city. However, they lacked adequate data for the current state of the flood control and drainage system.

Seeking More Detailed Data

To provide the information, the hydraulic analysis system would need to clearly display detailed data, plan flood control tasks, and pinpoint emergency events. Frequently updated hydraulic data needed to be easily accessible to shorten the time needed to dispatch emergency services. SIDRI determined they had to create a reality model to provide them with crucial information. However, the technological leap would require software that could also move beyond traditional hydraulic modeling methods and incorporate Internet of Things data, providing the insight necessary to determine how to reduce flooding risk.

Linking Hydraulic Models within a Reality Model

SIDRI determined they could create a reality model that could support all the city's flood prevention goals with Bentley applications. They first captured images and created a reality model of the 21 square-kilometer area with ContextCapture. Within that model, they used OpenFlows FLOOD and OpenFlows SewerGEMS to create and link one-dimensional and two-dimensional hydrodynamic models. With IoT sensors, the models can provide real-time calculations. Lastly, they integrated the 3D reality model into the hydrodynamic models with LumenRT for dynamic animation of flooding events.

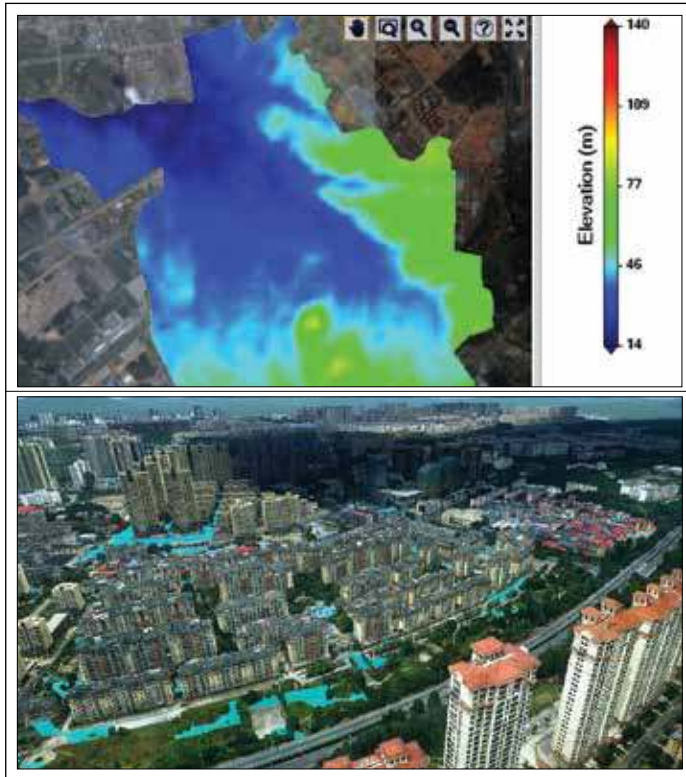
Improving Emergency Response with Real-time Data

With the ability to predict potential waterlogging, officials can now identify and address critical drainage problems in advance. Real-time data overlaid onto the reality model allows the city to make emergency responses to flooding in a timely manner. The intuitive and accurate analysis has helped the city to optimize their emergency response plan and determine the type of infrastructure they need to improve water flow, protect residents, and prepare the city for future weather-related events.

Project Playbook: ContextCapture, LumenRT, OpenFlows FLOOD, OpenFlows SewerGEMS

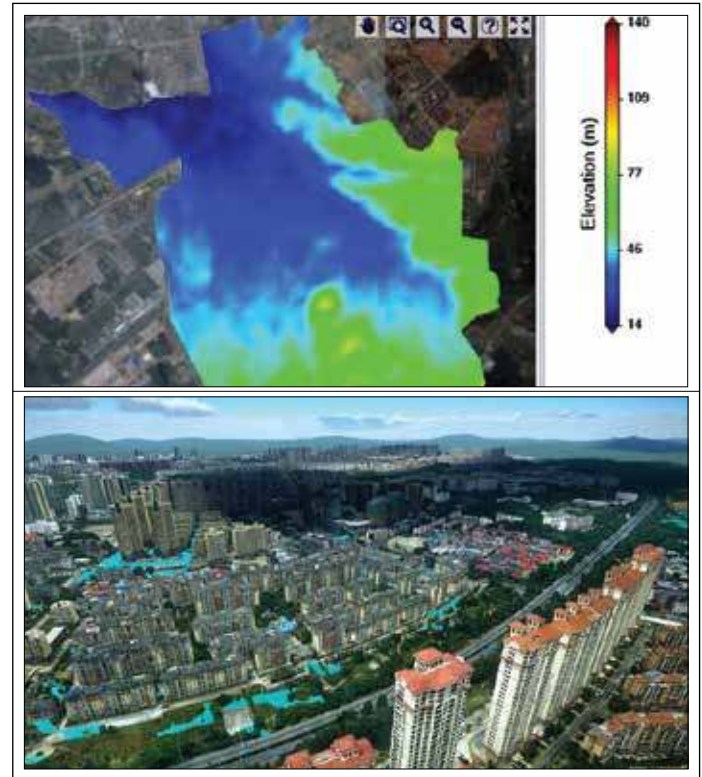
Outcome/Facts:

- As a result of significant flooding along the Yangtze River, the city of Jiujiang needed to prepare for future flooding events and minimize

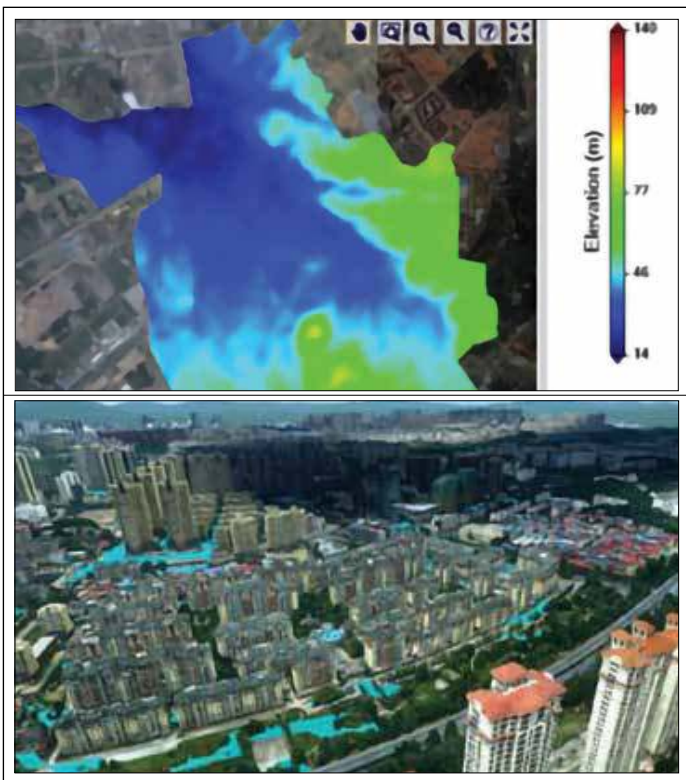


As a result of significant flooding along the Yangtze River, the city of Jiujiang needed to prepare for future flooding events and minimize disruption to city life. Image courtesy of Shanghai Investigation, Design & Research Institute Co., Ltd.

- disruption to city life.
- By combining hydraulic analysis and real-time data with a reality model, city officials have greatly improved the response time of emergency services.
- The analysis helps the city determine the type of infrastructure they need to improve water flow, protect residents, and prepare the city for future weather-related events.



By combining hydraulic analysis and real-time data with a reality model, city officials have greatly improved the response time of emergency services. Image courtesy of Shanghai Investigation, Design & Research Institute Co., Ltd.



The analysis helps the city determine the type of infrastructure they need to improve water flow, protect residents, and prepare the city for future weather-related events. *Image courtesy of Shanghai Investigation, Design & Research Institute Co., Ltd.*

About the Author

Sandra DiMatteo is the Director, Industry Marketing, Water at Bentley Systems. Sandra DiMatteo is the Industry Marketing Director, Water Infrastructure at Bentley Systems. She has more than 25 years of experience in reliability and asset performance management software, asset lifecycle information management, and is an expert in digital twin cloud solutions in the water and wastewater, energy and process industries. Sandra holds an honors degree in accounting and is a Certified Reliability Leader. She sits on the Reliability Leadership Institute Board of Advisors and founded the Ontario Chapter of the Society of Maintenance and Reliability Professionals.

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