



# WATER INFRASTRUCTURE

While there is consensus that the infrastructure improvements must be the top priority in projects like smart cities, their sustainability and efficiency in the long run are a cause of concern. Express Water talks to experts and explores the reasons...

# Adequate Water Infrastructure Must Keep Up with the Urban Development!

Bentley Systems provides engineers, architects, geospatial professionals, constructors, and owner-operators with comprehensive software solutions for advancing the infrastructure.

**Mayur Sharma** recently interacted with the Bentley team (**Amit Trehan** - Director - Corporate Communications, **Frank Braunschweig** - Senior Project Manager, **Perrine Parrod** - Senior Product Marketing Manager Water, **Slavco Velickov** - Global Water Industry Sales Director, and **Alan Lamont** - VP Digital Advancement Academies) on various topics ranging from the growth of water sector - to the state of infrastructure and the role of new software-based platforms in their sustainability.



Amit Trehan

## How do you see the “Indian Water & Wastewater sector” growing going ahead?

**Bentley Team:** With the rapid population growth and urbanization rate that India is seeing (jumping 2.63 percent from 2001 to 2011, according to India’s census), adequate water infrastructure must keep up with urban development. Existing water and wastewater systems continue to need to be improved and developed. There is still need for pipe replacement and repair, as well as an extension of existing water and wastewater systems to cater to population growth. In the last few years, we have seen new urban areas such as Navi Mumbai emerge with newly designed infrastructure.

Regarding water distribution, the current focus is on improving service levels for existing infrastructure. For example, there is a strong

focus on reducing water loss, both leakage and water theft, so that nonrevenue water can be recuperated to improve water supply. Bentley water software, such as WaterGEMS, HAMMER, and Open Utilities, can help with remediating water loss. We recommend applying our water applications to the IWA Best Practices, which combine four strategies to address water leakage: Active Leakage Control, Pressure Management, Speed and Quality of Repairs, and Infrastructure Management.

Regarding wastewater, the government created the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) with the objective to improve water and wastewater infrastructure, so we recently witnessed an increase in wastewater infrastructure projects, where new wastewater systems were built, improving sanitation services, hygiene, and reducing pollution in nearby water bodies such as rivers and lakes. Bentley’s SewerGEMS and SewerCAD hydraulic modeling products are helping many projects in India analyze and design effective wastewater systems.

## What do you think will be the next biggest technology development in terms

## of Big data, Industry 4.0, and IoT...to really drive the water industry forward?

**Bentley Team:** To learn about your infrastructure, you must have data. Without data, utilities cannot really be informed about what is happening in their water and wastewater systems. However, this type of data-driven technology can only provide limited information. Utilities need to take the Smart Water Network approach, to leverage their infrastructure data, a simulation application such as WaterGEMS is needed so that their water professionals can review the behavior of the system and the impact that any changes will have on the rest of the system. Simulation capabilities can also automate many aspects of water system analysis. For example, WaterGEMS includes optimization algorithms that assist with detecting water leakage, identifying the most energy efficient pump scheduling strategy, and finding the optimum designs and rehabilitation strategies. Ultimately, with Smart Water Networks, water utilities will not only increase their ROI on infrastructure data but also make better decisions about their water systems.

## What are the latest solu-

## tions you are offering when it comes to “Urban Water Infrastructure” development?

**Bentley Team:** As a solutions provider to the urban water industry, Bentley brings together the capital and operational aspects of managing urban water infrastructure to realize gains on all sides. Bentley’s solutions span every step in the cycle, linking planners, engineers, construction staff, operations, and management with the information they need to implement the strongest asset performance strategies. Our software plays a key role in facilitating decision making about new and existing infrastructure, in each phase of the water lifecycle, determining the viability of legacy systems and optimizing the construction of new networks and treatment plants. BIM, hydraulic modeling, GIS, asset management, and reality modelling all serve as critically important solutions in making certain that investment in urban water infrastructure is spent wisely and effectively and that the systems will be in place for decades.

## Can you cite a few recent cases of successful “international sewer & wastewater projects”?

**Bentley Team:** A few suc-



Frank Braunschweig Alan Lamont

cessful wastewater projects have taken the smart wastewater network approach, a recent emerging approach where utilities leverage existing infrastructure data in simulation software to make better-informed decisions about how to operate their wastewater systems.

In Brazil, AEGEA’s Smart Wastewater Management Network approach prioritized investments.

Prolagos provides water and sanitation services for five municipalities in Rio de Janeiro’s Region of the Lakes, where seasonal populations fluctuate from nearly 400,000 to more than 2 million. As an operator of the Prolagos concession, AEGEA Saneamento e Participações S.A. (AEGEA) prepared the Sewer Master Plan 2041 for expanding sewerage coverage from 76 to 90 percent and stopping contamination of Araruama Lagoon.

SewerGEMS enabled AEGEA to model the 900-kilometer drainage network, incorporating GIS, CAD, and SCADA data to accurately



Perrine Parrod

**ling software business of “Action Modulers”. Can this platform support the Indian municipal agencies facing the challenges associated with climate change, rising sea levels, and increased incidences of flooding?**

**Bentley Team:** Flood risk is the result of natural processes (e.g. intense precipitation), which are enhanced by climate change and by the impact of anthropogenic activities on the water cycle (e.g. soil sealing, river regularization). Risk mitigation on a municipal scale can be achieved by different actions, among them: (a) acting on the processes determining the rate of accumulation of water in a particular region; (b) reducing the socio-economic consequences of the floods; and (c) transmitting early warning so proactive measures can be taken. The flood modeling software acquired by Bentley helps with all above-mentioned actions. Regarding (a), MOHID Studio & MOHID Land can create detailed performance analysis on how specific measures will reduce the rate of accumulation (e.g. construction of the dams, retention basins, LIDs). Regarding (b), MOHID Land can help define areas that are likely to be flooded and, together with municipal master planning, the socio-economic impacts can be reduced by prohibiting construction in areas that are likely to flood, for example. Action Flood can help with regards to (c). Having a reliable FEWS, which transmit early warnings, mitigates the impact by preparing response teams and protecting or evacuating people and goods from areas that will be affected.

**Stormwater systems, storm drainage & sewer development projects can be very difficult to design and build. How can you help the engineers, urban master planners, and municipal agencies?**

**Bentley Team:** Indeed, designing stormwater and

storm drainage systems can be difficult because water always has to flow downhill, meaning that the design of such systems has to be gravity-flow based. Engineers need to determine elevations and pipe sizes that will provide enough capacity without requiring excessive excavation.

When inputting catchment and rainfall information, Bentley’s stormwater and sewer software applications such as StormCAD and SewerCAD, automatically compute the optimum pipe sizes and invert elevations that will provide sufficient capacity at the lowest cost. The automated design capability provided by our software products enable users to add constraints on design elevations, such as avoiding existing underground services/utilities. Also by providing the terrain model, our software applications can ensure that minimum cover is achieved throughout the stormwater system.

The automated design can also be generated from within CivilStorm or SewerGEMS (using StormCAD and SewerCAD gradually varied flow solved). If users want to analyze potential overflows, the Saint Venant equations need to be solved. To do this, users can choose between SewerGEMS/CivilStorm’s explicit EPA SWMM solver and the implicit dynamic wave engine. These two dynamic engines account for storage effects within structures and quantify flooding should it occur. Engineers can also use the SWMM water quality features to comply with water quality regulations.

Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL) appointed Tata Consulting Engineers Limited (TCE) to prepare a detailed project report for integrated and comprehensive stormwater management facilities in the city of Salem, a municipal corporation covering 91.34 square kilometers.

TCE analyzed the existing

stormwater drainage system and developed a prioritized capital investments plan. TCE used StormCAD to analyze 1,100 kilometers of existing drains and perform hydraulic modeling of proposed drains. The software reduced design time by three months, optimized drain sizes, and reduced project costs. With this INR 7.45 billion project, TNUIFSL will help minimize flooding and improve stormwater collection and conveyance in Salem in the state of Tamil Nadu.

**What is the latest update on “The Year in Infrastructure 2018 conference & awards”?**

**Bentley Team:** The nomination deadline for the awards ended recently. More than 80 projects have been submitted from India, including a significant number of entries in water, wastewater and stormwater networks category.



Slavco Velickov

**What are some of the specific water/sewage related solutions by Bentley for the ‘Construction and Buildings’ projects?**

**Bentley Team:** The fact that infrastructure budgets are limited for consultants and constrained by revenue for owner-operators is an industry challenge. Consequently, Bentley understands that it is important for engineers to be as effective as possible on short-term infrastructure projects such as land development, construction, and building projects so that less time is spent on modeling and more time is spent

on engineering.

Regarding land development projects, with Bentley’s easy-to-use hydraulics and hydrology software WaterCAD and SewerCAD, water professionals are ensured about the ability to cost-effectively deliver quality projects through advanced functionality providing accurate analysis and automated design. These capabilities result in high-quality design projects, customizable model outputs to streamline regulatory approval processes, and CAD- and GIS-platform support (with no platform restriction), all of which reduce project time. Treatment plant design and construction projects are a multidisciplinary problem. Bentley solutions provide all the necessary capabilities to design and build a treatment plant from the initial site grading to 3D visualization of the final design and efficient construction management and help EPCs do so in record time under budget, in a fully managed, collaborative team environment. Bentley’s plant, structural, and building applications are used together with ProjectWise around the world on projects ranging from small retrofits to existing facilities to the creation of large greenfield facilities.

Regarding asset performance, with Bentley’s AssetWise, asset performance and reliability strategies can be intelligently planned and implemented. AssetWise provides informed decision support from capital planning through proactive asset maintenance, which allows owner-operators and their consultants to mitigate risk, increase operational efficiency, and ensure regulatory compliance. With improved information flow and interoperability that can be collected, water professionals in this industry can analyze and control relevant asset information. AssetWise delivers actionable information that supports owner-operators’ business processes and drives the performance of their infrastructure assets.

**Last year Bentley Systems had acquired water model-**