



Project Summary

Project:

BMW of North America

Project Location:

Borough of Woodcliff Lake, N.J., USA

Organization:

Paulus Sokolowski & Sartor (PS&S)

Be Inspired Awards category:

Innovation in Water, Wastewater, and Stormwater Networks

Project Objectives:

Site analysis and design, master planning, and construction for the expansion of BMW's North American Headquarters South Campus.

Products used:

StormCAD®, WaterCAD®

PS&S Deploys Bentley Software to Design BMW's U.S. Headquarters Expansion

Improves Design Time by Replacing Labor-Intensive Hand Calculations with Dynamic Modeling

To win the design contract for BMW's North American Headquarters' South Campus Expansion project in Woodcliff Lake, N.J., Paulus Sokolowski & Sartor (PS&S) needed to address the project's tight schedule. To significantly reduce design time, PS&S deployed Bentley's WaterCAD and StormCAD software products for water distribution and storm sewers modeling rather than inefficient and labor-intensive hand calculations. The campus expansion design incorporated two existing office buildings, an existing maintenance building, and an apple orchard.

PS&S provided comprehensive civil and site services for the project, including integrated site analysis and design, master planning, and construction-phase services for the entire 80-acre site. It also provided surveying services including preparing boundary and topographic surveys as well as subdivision plans and documents. PS&S worked together with the borough and its professionals to rezone the project site prior to initiating the design. New construction elements included two three-story buildings, surface parking, and infrastructure.

Project Challenges

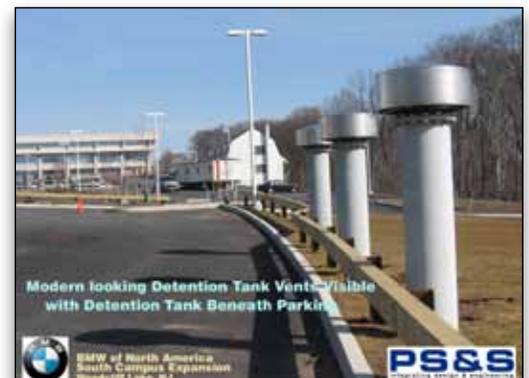
The site design incorporated a total vertical drop of more than 100 feet, creating a challenging site to develop within the parameters of the new zoning ordinance. Numerous retaining walls were required to minimize site disturbance and address infrastructure requirements. Additionally, freshwater wetlands and rock outcrops located throughout the site impacted the overall layout. This required multiple grading iterations to meet strict municipal zoning and address site constraints. Lastly, potable and fire water system analyses were required by the local water purveyor.

The project design included a very extensive and innovative stormwater management plan to meet the New Jersey Department of Environmental Protection's (NJDEP) Stormwater II regulations. The plan incorporated a nearly two-acre wet pond, a 1.8 million gallon subsurface detention tank, a surface detention basin, and groundwater recharge and water quality measures. A reduction in stormwater runoff at the site positively impacted the adjacent properties. Moreover, properly sized storm sewer systems convey the on-site impoundments where the run-off is detained prior to release off site.



Retention pond construction complete

PS&S prepared multiple stormwater studies to select the most efficient and cost-effective stormwater solution for the project. Options for the southeastern watershed area included underground detention comprised of a series of large diameter, high-density polyethylene pipes and manifolds, concrete box culverts in series, a large detention tank, and an above-ground retention pond at the base of the slope.



Modern looking detention tank vents visible with detention tank beneath parking

While more costly, the project team selected a 120-foot diameter, 22-foot deep Natgun pre-stressed wire-wound concrete water tank to address peak flow attenuation for this area because of site constraints and local zoning criteria.

Fast Facts

- The project included the design of a very extensive and innovative stormwater management plan to meet NJDEP Stormwater II regulations.
- The flexibility of StormCAD and WaterCAD allowed PS&S engineers to perform multiple iterations of the models to determine the most efficiently designed system.
- PS&S prepared multiple stormwater studies to select the most efficient and cost effective stormwater solution for the project.

"The project team reduced substantially the time it took to perform storm and water design analysis."

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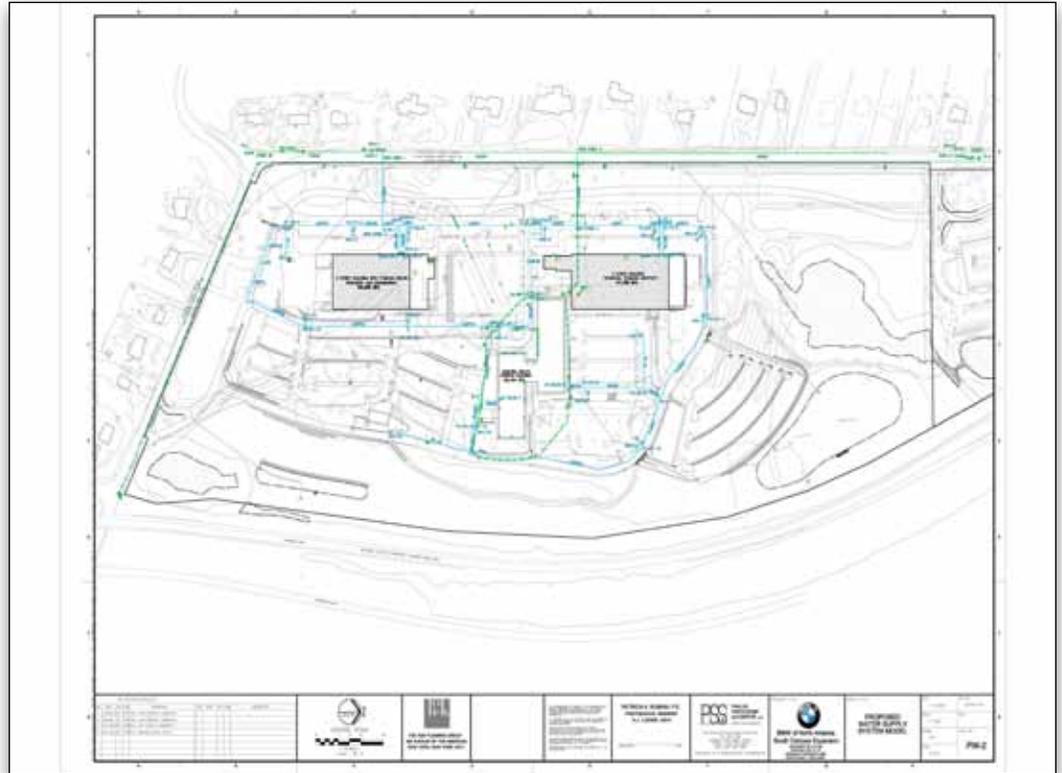
Design of the subsurface detention tank included incorporating the outlet control components into the tank, HS-20 loading for future traffic loads on the tank, and five 18-inch vertical air transfer vents with a modern, stylish appearance.

WaterCAD and StormCAD Model Complex New Infrastructure

By using Bentley's WaterCAD and StormCAD modeling software products, the project team reduced substantially the time it took to perform storm and water design analysis. Indeed, the very flexible and user-friendly software eliminated the hours of training typically necessary to use such tools for project design and development. The flexibility of the

programs allowed for multiple iterations of the models to determine the most efficient system design. This enabled the project team to meet its stringent deadlines and successfully transform a challenging site into a Class A development.

Implementing an underground detention tank beneath a parking area preserved the environmentally sensitive apple orchard, steep slopes, tree buffers, and freshwater wetlands. The massive detention tank was hidden underground in an area already assigned to be disturbed, thereby reducing the overall site disturbance for the entire project. Keeping the apple orchard retained the beauty of the complex, while tree buffers along the property boundaries screened the development from the adjacent properties and traffic.



WaterCAD model of the BMW site expansion