

CivilStorm®

Comprehensive Stormwater Modeling and Analysis

CivilStorm is a fully dynamic, multi-platform, hydraulic modeling solution developed for the analysis of complex stormwater systems. Engineers can analyze these systems using built-in hydraulic and hydrology tools and a variety of wet-weather calibration methods. From stormwater master plan development to water quality studies, CivilStorm provides an easy-to-use environment for engineers to analyze, design, and operate stormwater systems.

One Solution for all Stormwater System Modeling Needs

CivilStorm performs comprehensive analysis of all aspects of stormwater systems: rainfall, runoff, inlet capture and bypass, gravity and pressure piping, ponds, outlet structures, open channels, culverts, and more.

Engineers can analyze pressure and free-surface flow conditions for networks of channels and closed conduits; model complex pond outlets for a variety of tailwater conditions; and use weirs, orifices, culverts, risers, and inlet boxes in their design, all within a single product.

Model in Stand-alone or Within Favorite CAD Platform

CivilStorm works as a stand-alone application, or can be run from within MicroStation or AutoCAD. Regardless of the platform used, CivilStorm maintains a single set of modeling files for true interoperability across platforms, support for multiple background layers, conversion utilities from CAD, GIS, and databases, and unlimited undo and redo.

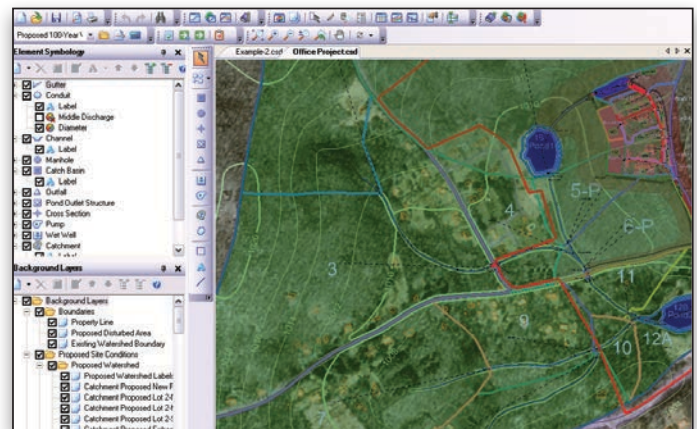
CivilStorm can run from within MicroStation – at no additional cost – providing a geospatial and engineering design environment with unrivaled visualization and publishing tools. AutoCAD users can choose to add support to run CivilStorm models from within AutoCAD, to build and lay out models with engineering precision in an environment with which they are already comfortable.

Streamlined Model Building

Engineers can leverage geospatial data, CAD drawings, databases, and spreadsheets to jump-start the model building process. CivilStorm provides synchronized database connections, geospatial links, and advanced model-building modules that connect with virtually any digital data format. In addition, modelers can import SWMM files as well as StormCAD files into CivilStorm. CivilStorm also provides drawing and connectivity review tools to guarantee a hydraulically coherent model.

Easy Model Management with Scenarios

The Scenario Management Center in CivilStorm gives engineers full control to configure, run, evaluate, visualize, and compare an unlimited number of scenarios within a single file. Engineers can easily make decisions by comparing alternative designs or proposed rehabilitation methods for a variety of system conditions (including pre- and post-development).



Map and model systems in a scaled environment whether the work is done in the stand-alone, MicroStation, or AutoCAD interface.

Built-in Stormwater Hydrology

Engineers can load models with wet weather runoff flows derived from precipitation using the CivilStorm built-in rainfall distributions, or user defined rainfall events. Runoff flows are modeled using a choice of hydrograph methods, including RTK, SCS, Modified Rational, EPA -SWMM, or user-defined generic unit hydrographs.

Low Impact Development

CivilStorm can model the effect that low impact development controls have in retaining runoff before it enters the stormwater system.

Multiple Solvers

Modelers can easily switch among multiple solvers, according to the type of system they are analyzing.

- To solve the Saint Venant equations, users can choose between 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.
- With the rational/gradually varied flow solver, peak flows in the storm sewer system are calculated using the rational method. Use this solver to analyze peak flow conditions, or to automatically design storm sewers.

For more information about the solvers supported by CivilStorm, download *What Is the Right Way to Analyze Collection System Hydraulics?* from www.bentley.com/SewerStormPaper.

System Requirements

Refer to the 'Installation Requirements' section of CivilStorm's ReadMe file:

www.bentley.com/CivilStorm-Spec

Platform pre-requirements:

CivilStorm runs without platform restrictions as a stand-alone application.

It can also run from within AutoCAD and MicroStation. The requirements are also available in CivilStorm's ReadMe file.

Find out about Bentley at: www.bentley.com

Contact Bentley

1-800-BENTLEY (1-800-236-8539)
Outside the US +1 610-458-5000

Global Office Listings

www.bentley.com/contact

CivilStorm At-A-Glance

Interface and Graphical Editing

- Stand-alone Windows interface included
- Ability to run within MicroStation (MicroStation license required)
- Ability to run within PowerCivil for North America (PowerCivil for North America license required)
- Ability to run within AutoCAD (add-on option) (AutoCAD license required)
- InRoads® Storm and Sanitary file import/export
- MX Drainage file import
- Unlimited undo and redo
- Element morphing, splitting, and reconnection
- Nodes in close proximity merging tool
- Automatic element labeling
- Scaled, schematic, and hybrid environments
- Inference tool (to interpolate missing data)
- Element prototypes (one-click setup)
- Dynamic zooming
- Named view
- Aerial view
- Multiple background file support
- Image, CAD, and GIS background layer support
- Automatic input and result fields filtering (based on solver used)

Interoperability and Model Building

- Single set of model files for four compatible interfaces
- GIS-ID property (to maintain associations between records in source file and elements in model)
- Polyline-to-pipe conversion from DXF and DWG files
- Spreadsheet, database, Shapefile, and OleDb connections
- Oracle spatial import/export
- LandXML data import/export
- SWMM files import
- Observed data import
- Time series data import
- Automated assignment of elevation data to manhole elements
- Unified file format with SewerGEMS, SewerCAD, and StormCAD

Model Management

- Unlimited scenarios and alternatives
- Comprehensive scenario management
- Scenario comparison
- Active topology (to activate or deactivate network elements)
- Tabular reports with global editing
- Sorting and persistent filtering on tabular reports
- Statistical analysis from tabular reports
- Customizable engineering libraries
- Dynamic (query based) and static selection sets
- Element selection by polygon
- Element selection inversion
- Table opening on selection
- Global engineering units management
- Drawing review tools for connectivity consistency
- Automatic topology review
- Drawing navigator
- Orphaned node and dead-end pipe queries
- Custom data fields (with user-assigned or formula-based values)
- Hyperlinks for network elements
- Surface water flow direction displayed across any terrain
- Support of ProjectWise® and ProjectWise® Geospatial Management

Hydraulics and Operations

- Ability to switch readily between two engines for solving the full set of St. Venant equations
- Implicit dynamic engine included

- Explicit dynamic engine included (EPA-SWMM)
- Gradually varied flow-rational engine included (StormCAD's engine)
- Steady-state simulations (peak flow)
- Automatic constraint-based design for storm sewers
- Long-term simulations with statistical reports
- HEC-22 inlet capacity calculations
- HEC-22 node headloss calculations
- Support for V-shaped and parabolic gutters
- Evaporation definition
- Aquifer simulation
- Pollution analysis with optional definition of land use categories and land surface characteristics
- Treatment analysis
- Pond infiltration
- Culvert roadway overtopping
- Rule-based controls
- Variable-speed pumping
- Low impact development control analysis

Rainfall Data

- Synthetic design storms or gauged events, including SCS Types (I, IA, II, or III), Bulletin 71 rainfall, cumulative depth, dimensionless depth (and depth and time), incremental depth, and intensity hyetograph

Stormwater Load Allocation and Estimation

- Runoff methods: SCS Unit Hydrograph, Modified Rational Method, EPA SWMM, RTK Unit Hydrograph, generic Unit Hydrograph, Time-Area Method, ILSAX and user-defined hydrograph
- Time of concentration methods: User-defined, Carter, Eagleson, Espey/ Winslow, Federal Aviation Agency, Kerby/Hathaway, Kirpich (PA and TN), Length and Velocity, SCS Lag, TR-55 Sheet Flow, TR-55 Shallow Concentrated Flow, TR-55 Channel Flow, Friend, Kinematic Wave, Bransby-Williams, and UK standard
- Loss Methods: Constant loss rate, Green and Ampt, Horton, Initial Loss and Constant Fraction, Initial Loss and Constant Loss Rate, SCS Curve Number
- Inflow control center

PondMaker: Pond Outlet Design

- Automatic update of worksheet containing design data for multiple design trials of a single pond
- Multiple pond designs possible
- Maximum outflow rates establishment (user-defined or pre-development flows)
- Post-development pond inflows computation
- Pond size requirements estimation
- Pond geometry design (grading plan or underground storage)
- Outlet structure design
- Pre- and post-development peak flow and volume comparison
- Hydrograph routing through ponds

Presentation of Results

- Thematic mapping
- Dynamic multi-parameter and multi-scenario graphing
- Advanced dynamic profiling
- Advanced tabular reporting with FlexTables®
- Property-based color coding and symbology
- Property-based annotation
- Contouring with Shapefile and DXF export
- EQT (elevation vs. flow) curve to outfall element
- Publishing of i-models in 2D or 3D, including to Bentley Map Mobile