



StormCAD®

Storm Sewer Design and Modeling

StormCAD is a comprehensive modeling software program for the design and analysis of storm sewer systems. StormCAD provides calculations for catchment runoff, inlet capacity, and gutters and pipe network flow.

Interoperability

Out of the box, StormCAD users can employ this product as a stand-alone application or work directly from within MicroStation®, while an additional integration option lets users model directly in AutoCAD.

Regardless of the platform used, StormCAD maintains a single set of modeling files for true interoperability across platforms.

The stand-alone interface offers easy-to-use model layout tools, multiple background support, conversion utilities from CAD, GIS, and databases, and unlimited undo and redo layout.

The ability to run from within MicroStation, which is included at no additional cost with all StormCAD versions, provides a geospatial and engineering design environment with unrivaled visualization and publishing tools.

AutoCAD users can add the ability to run StormCAD from within AutoCAD to build, lay out, and plot models with engineering precision within an environment where they are already comfortable.

StormCAD can now import and export drainage data directly from InRoads, GEOPAK, and PowerCivil for North America, providing engineers and designers with a way to achieve an optimized workflow and better coordination between engineering teams.

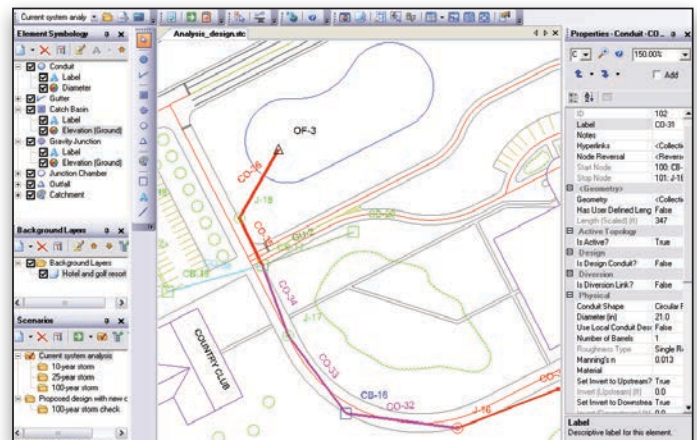
Inlet and Network Hydraulics

StormCAD determines intercepted flow at network inlets, and routes bypass flow to selected bypass targets. Inlets can be computed using the U.S. Federal Highway Administration (FHWA) HEC-22 methodology and users can choose from grate, curb, slot, ditch, and combination inlet types. Engineers can use a variety of methods to compute headloss, including HEC-22 Energy and AASHTO.

StormCAD solves for subcritical, critical, and supercritical conditions with its robust gradually varied, standard-step algorithm. StormCAD calculates friction losses using Manning, Kutter, Darcy-Weisbach, and Hazen-Williams, and users can choose circular, box, arch, or elliptical pipe section shapes or irregular, trapezoidal, or triangular channel sections.

Hydrology and Loads Allocation

StormCAD uses the Rational Method to calculate peak flows in the storm sewer design, or accepts direct input of known flows for inlet inflows. StormCAD allows users to specify Intensity-Duration-Frequency data using equations or tables. Modelers can then plot the IDF curves, and reuse their data for other projects in



Users can employ StormCAD as a stand-alone application, within MicroStation, or, with optional integration, within AutoCAD.

that region. Engineers can work with an unlimited number of sub-watershed areas and C coefficients for each inlet watershed.

StormCAD allows the input of external contributing areas, additional flows, and carryover flows to model non-local runoff contributing to the discharge at any inlet. StormCAD provides several methods for computing travel time, including full pipe velocity, normal velocity, average end velocity, and weighted average velocity.

Automatic Design

The constraint-based design features in StormCAD allow modelers to automatically design gravity piping and structures.

The design is flexible enough to allow users to specify the elements to be designed, from a single pipe size to the entire system, by simply entering the appropriate design conditions: minimum/maximum velocities, covers, and slopes; pipe elevation offsets (including whether or not to allow drop structures), maximum spread and depth for inlets in sag; and minimum efficiency for inlets on grade.

StormCAD will automatically determine cost-effective pipe sizes and invert elevations while minimizing pipe cover to avoid unnecessary pipe trench excavation.

Comprehensive Scenario Management

With StormCAD scenario management center, engineers can evaluate, visualize, and compare an unlimited number of what-if scenarios within a single file. They can easily make decisions by comparing design approaches with varying velocity, slope and cover restrictions, evaluating system capacity for multiple storm events, or analyzing outlet flow using different estimations for the catchment Rational Coefficients.

System Requirements

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

www.bentley.com/StormCAD-Spec

Platform pre-requirements:

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

It can also run from within AutoCAD and MicroStation. The requirements are also available in the StormCAD ReadMe file.

Find out about Bentley at: www.bentley.com

Contact Bentley

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Global Office Listings

www.bentley.com/contact

StormCAD At-A-Glance

Interface and Graphical Editing

- Stand-alone Windows interface
- Ability to run within AutoCAD (AutoCAD license required)
- Ability to run within MicroStation (MicroStation license required)
- Ability to run within PowerCivil for North America (PowerCivil for North America license required)
- InRoads®/GEOPAK®/PowerCivil™ drainage file import/export
- Unlimited undo/redo of layout and editing
- Element morphing, splitting, and reconnection
- Nodes in close proximity merging tool
- Automatic element labeling
- Scaled, schematic, and hybrid environments
- Scaled catchment and gutter elements
- Element prototypes
- Aerial view and dynamic zooming
- Named views library
- Multiple background-layer support
- Image, CAD, and GIS background support
- Element Prototypes (one-click setup)
- Automatic input and result fields filtering (based on solver used)

Interoperability and Model Building

- Single set of model files for four compatible interfaces
- Import of MX Drainage files
- GIS-ID property (to maintain associations between records in source file and elements in model)
- LandXML data import and export
- Oracle spatial support
- Polyline-to-pipe connections from DXF and DWG files
- Spreadsheet, database, Shapefile, and ODBC connections
- Automated assignment of elevation data to manhole elements
- Unified file format with CivilStorm, SewerGEMS, and SewerCAD

Model Management

- Unlimited scenarios and alternatives
- Comprehensive scenario management
- Active topology (to activate or deactivate network elements)
- Scenario comparison
- Tabular reports with global editing
- Tabular report sorting and persistent filtering
- 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
- Hyperlink for network elements
- Custom data fields (with user-assigned or formula-based values)
- Surface water flow direction displayed across any terrain
- ProjectWise® and ProjectWise® Geospatial Management support

Hydraulics

- Steady-state simulations
- Flow profile methods: capacity and backwater analysis
- Headloss methods: AASHTO, HEC-22 (2nd and 3rd editions), standard, absolute, generic, and headloss-flow curve
- Diversion simulation
- Automatic constraint-based design
- Friction loss methods: Manning, Kutter, Darcy-Weisbach, and Hazen-Williams
- Curb, grate, ditch, slot, generic, combination, and user-defined capture curve inlet types
- Open channel and closed conduit hydraulics
- Support for V-shaped and parabolic gutters
- Support for pressure elements (including pumps)
- Pond outlet structure calculations
- Culvert inlet control calculations
- Support for culvert headwalls and endwalls

Hydrology and Load Allocation

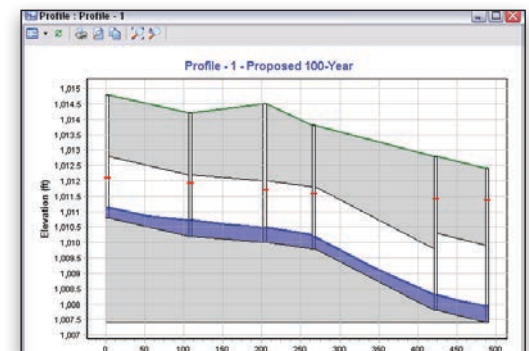
- Rational Method
- Rainfall data input: user-defined Intensity-Duration-Frequency (IDF) table, Hydro-35, IDF table equation, IDF curve equation, IDF polynomial log equation
- Time of concentration methods: User-defined, Carter, Eagleson, Espey/Winslow, Federal Aviation Agency, Kerby/Hathaway, Kirpich (PA and TN), Length and Velocity, SCS Lag, TR-55 Sheet Flow, TR-55 Shallow Concentrated Flow, TR-55 Channel Flow, Kinematic Wave, Friend, Bransby-Williams
- External load assignment

Results Presentation

- Thematic mapping
- Dynamic, multi-parameter, and multi-scenario graphing
- Advanced profiling
- Advanced tabular reporting with FlexTables®
- Property-based color coding and symbology
- Property-based annotation
- Contouring with Shapefile and DXF export
- Publishing of i-models in 2D or 3D, including to Bentley Map Mobile

ID	DesignSystem	Alternative	Editor	Model	Conduit	GravityJunction	CatchBasin	JunctionChamber	Outlet
16:	CB-1	✓	16	CB-1	50.0	0.50	8.0	✓	✓
17:	CB-2	✓	17	CB-2	50.0	0.50	8.0	✓	✓
58:	CB-3	✓	58	CB-3	50.0	0.50	8.0	✓	✓
75:	CB-4	✓	75	CB-4	0.0	0.00	0.0	✓	✓
77:	CB-5	✓	77	CB-5	0.0	0.00	0.0	✓	✓
79:	CB-6	✓	79	CB-6	50.0	0.50	8.0	✓	✓
81:	CB-7	✓	81	CB-7	50.0	0.50	8.0	✓	✓
83:	CB-8	✓	83	CB-8	50.0	0.50	8.0	✓	✓
85:	CB-9	✓	85	CB-9	50.0	0.50	8.0	✓	✓
87:	CB-10	✓	87	CB-10	0.0	0.00	0.0	✓	✓
89:	CB-11	✓	89	CB-11	50.0	0.50	8.0	✓	✓
91:	CB-12	✓	91	CB-12	50.0	0.50	8.0	✓	✓
93:	CB-13	✓	93	CB-13	0.0	0.00	0.0	✓	✓

StormCAD's constraint-based design automatically determines diameters and invert elevations.



Locate bottlenecks quickly using thematic mapping, FlexTables, and profiles.