StormCAD Storm Sewer and Pavement Drainage Applications

Software for the Hydraulic Engineer
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.
StormCAD Storm Sewer Design and Analysis
StormCAD Design Constraints

![Default Design Constraints Dialog Box](image)

**Gravity Pipe**

**Default Constraints**

**Velocity**: [Input Field]

**Cover**: [Input Field]

**Slope**: [Input Field]

**Measure Cover To**: [Option: Pipe Crown]

**Cover Constraints Type**: [Option: Table]

**Extended Design**

**Part Full Design**: [Check Box]

**Number of Barrels**: [Input Field]

**Section Size**: [Input Field]

**Is Part Full Design?**: [Check Box]

**Percent Full Constraint Type**: [Option: Simple]

**Percentage Full**: [Input Field] (93.8%)

**Table**

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<td>42.0</td>
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</table>

**Close** | **Help**
StormCAD Inlet Spread Analysis
Alternative Methodology

- **ODOT vs. FHWA HEC-22**
- **Similarities**
  - Gutter Flow/Spread
  - Inlets in a Sag/Spread
- **Differences**
  - Neenah Grates
  - Inlet Interception
  - Bypass Flow
  - Local Depression
Local Depression?
StormCAD Inlet Spread Analysis

Designer Tips & Tricks
• Spread in a Sag
• TC in Sag
StormCAD Inlet Spread Analysis

Designer Tips & Tricks

• Inlet Only Calculations
• Median Barrier Inlets
StormCAD Ditch Analysis
Vegetated Biofilter Calculations
I-270 in Franklin County

- Widening – Adding Inside Lane and Median Barrier (Barrier Inlets)
- StormCAD used to Design Inlet Spacing (Pavement Spread)
StormCAD Storm Data – Rainfall IDF Curves

<table>
<thead>
<tr>
<th>Duration (min)</th>
<th>1 Year (in/hr)</th>
<th>2 Year (in/hr)</th>
<th>5 Year (in/hr)</th>
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<th>50 Year (in/hr)</th>
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![Graph showing rainfall IDF curves](image)
StormCAD Engineering Libraries

Inlet Catalog

Label:
- CB No. 2.2A
- CB No. 2.2B
- CB No. 2.3
- CB No. 2.4
- CB No. 2.5
- CB No. 2.6
- CB No. 3 (Curb & Gutter)
- CB No. 3 (Curb)
- CB No. 3A (Curb & Gutter)
- CB No. 3A (Curb)
- CB No. 4
- CB No. 4A
- CB No. 5
- CB No. 5A
- CB No. 6
- CB No. 8
- CB No. 8A
- Double Standard Curb & Gutter Inlet (AA... Dummy Node 0%
- Generic Default 100%
- Inlet No. 2 (Median)
- Inlet No. 2A (Pavement)
- Inlet No. 3B (in Sags)
- Inlet No. 3B (On Grade)
- Inlet No. 3C (in Sags)
- Inlet No. 3C (On Grade)
- Inlet No. 3D (in Sags)
- Inlet No. 3D (On Grade)
- Inlet No. 4 (5 Median)
- Side Ditch CB No. 7
- Side Ditch Inlet
- Standard Curb & Gutter Inlet (AA-S128)
- Standard Curb Inlet (AA-S126)

Inlet
- Inlet Type: Combination
- Structure Width: 3.0 ft
- Structure Length: 10.0 ft

Curb
- Curb Opening Height: 4.0 in
- Default Curb Opening Length: 10.0 ft
- Local Depression: 2.0 in
- Depression Width: 48.0 in
- Throat Type: Horizontal
- Throat Angle: 0.00 degrees

Grate
- Grate Type: P-50 mm (P-1-7/8"
- Grate Width: 2.5 ft
- Default Grate Length: 3.0 ft
Scenarios are made of pre-defined Alternatives and are used for performing individual and separate types of analysis.
StormCAD Scenarios

Seed File Generic Scenarios

FRA-270 Custom Scenarios
StormCAD Scenarios and Alternatives

Understanding Scenario / Alternative Relationships
StormCAD Scenarios and Alternatives

FRA-270 Custom Alternatives – Active Topology
StormCAD Scenarios and Alternatives

FRA-270 Custom Alternatives – Physical Attributes of Network Items
StormCAD Scenarios and Alternatives

FRA-270 Custom Alternatives – Rainfall Events
### StormCAD FlexTables

#### Conduit Table (CDSS Sample 2.stsw)

<table>
<thead>
<tr>
<th>Start Node</th>
<th>Stop Node</th>
<th>Begin Station (ft)</th>
<th>End Station (ft)</th>
<th>Section Size (in)</th>
<th>Manning's n</th>
<th>Match Start Node Invert?</th>
<th>Match Stop Node Invert?</th>
<th>Invert (Start) (ft)</th>
<th>Invert (Stop) (ft)</th>
<th>Length (Scaled) (ft)</th>
<th>Slope (Calculated) (ft/ft)</th>
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</thead>
<tbody>
<tr>
<td>124: P-1</td>
<td>0</td>
<td>715+00</td>
<td>715+20</td>
<td>12 in.</td>
<td>0.015</td>
<td>✓</td>
<td>✓</td>
<td>964.50</td>
<td>964.30</td>
<td>20.0</td>
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<tr>
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<td>715+20</td>
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<td>954.30</td>
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<tr>
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#### HGL Report (CDSS Sample 2.stsw)

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<th>System Intensity (in/h)</th>
<th>Flow (cfs)</th>
<th>Diameter (in)</th>
<th>Length (Unified) (ft)</th>
<th>Slope (Calculated) (ft/ft)</th>
<th>Invert-Upstream Downstream (ft)</th>
<th>Friction Slope (ft/ft)</th>
<th>HGL-Upstream Downstream (ft)</th>
<th>Ground-Upstream Downstream (ft)</th>
<th>Ground Minus HGL (ft)</th>
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</thead>
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<tr>
<td>124: P-1</td>
<td>5.50</td>
<td>1.20</td>
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<td>125: P-2</td>
<td>4.43</td>
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### Example Storm Sewer.stsw
#### Conduit FlexTable: HGL Analysis Report

**Active Scenario: Storm Sewer Check**

<table>
<thead>
<tr>
<th>Label</th>
<th>Node Start Stop</th>
<th>Roadway Station (Start) (ft)</th>
<th>Roadway Station (Stop) (ft)</th>
<th>Upstream Inlet Area (acres)</th>
<th>System Drainage Area (acres)</th>
<th>System Inlet C (acres)</th>
<th>System G (ft)</th>
<th>System FlowTime (min)</th>
<th>System Intensity (in/h)</th>
<th>Flow (cfs)</th>
<th>Diameter (in)</th>
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<td>717+20</td>
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<td>CB-3</td>
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<td>715+20</td>
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<td>1.95</td>
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<table>
<thead>
<tr>
<th>Length (Unified) (ft)</th>
<th>Slope (ft/ft)</th>
<th>Invert Start Stop (ft)</th>
<th>Manning’s n</th>
<th>Friction Slope (ft/ft)</th>
<th>HGL Start Stop (ft)</th>
<th>Ground Start Stop (ft)</th>
<th>Ground Minus HGL (Start) (ft)</th>
<th>Cover (Start) (ft)</th>
<th>Notes</th>
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<td>Fixed invert (start)</td>
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</table>
EMH&T Customization: Storm Sewer Reports

Ability to Customize Reports Using Excel
US 23 in Franklin County

- Create Custom Structures
- Use StormCAD to Design Proposed Pipe Network
- Analyze Existing System vs. Proposed
  - Utilizes Physical Alternatives
US 23 in Franklin County

Use StormCAD in Conjunction with MicroStation

• Scaled Drainage Areas
• Scaled Pipe Lengths
EMH&T Customization – Time of Concentration

- Manually enter Tc into StormCAD
- Custom calculations show more than StormCAD reporting
StormCAD Tips and Tricks

• Naming Conventions
• Don’t Be Afraid to Create Custom Structures
  • Median Barrier Inlets
  • Non-ODOT
• Stationing (for nodes) comes standard in the ODOT seed file
  • Not very useful when creating custom reports in Excel
• Customize Items Displayed
  • Hide no-active topology

WORK SMARTER

NOT HARDER
StormCAD Lessons Learned

Minimize the number of nodes in file when possible
• Possibly keep one overall watershed per project file
• Keep under 500 nodes

Forward thinking goes a long way
• Plan Scenarios and Alternative at beginning of project
• Utilize Physical Alternatives
**StormCAD Resources**

**ODOT User Guide for StormCAD**

**Review Results**

**Properties** – view results for individual elements. The calculated results are indicated with gray attribute field names, and they are found at the bottom of the Properties dialog.

**Calculation Summary** – is automatically generated when you compute a scenario. It allows you to view detailed results for all elements.

**FlexTables** – are convenient and customized for ODOT purposes. Use the Storm Sewer Design FlexTable when *Storm Sewer Design* is the current scenario. Use the Storm Sewer Analysis or HGL Analysis FlexTables when *Storm Sewer Check* or *Constant Intensity Check* is the current scenario.
StormCAD SELECTseries 4 (2014)

SELECTseries 4 (2014)
• Runs with MicroStation SS2 and newer versions
• Improved MicroStation interoperability
• Inlet-only hydraulic calculations
• Pipe wall thickness
• Headwall and endwall elements

SELECTseries 5 (2015)
• New Tap and Lateral elements
• Use Digital Terrain Models (DTM) to account for cover
• Improved manhole loss calculations using HEC-22 3rd edition
StormCAD
<< Back to Bentley Haestad Water Modeling Products

StormCAD is a comprehensive modeling software program for the design and analysis of storm sewer systems. Its intuitive interface makes it easier than ever to design and analyze storm sewer systems from gutter to outlet.

More Information

If you already have a Bentley subscription (SELECT, ELS, etc.) for this product or other Bentley products, please use this Quote request form instead.

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Price in US $</th>
<th>Quantity</th>
<th>Add to Cart</th>
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<td>StormCAD Stand-Alone 25 Inlets</td>
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<tr>
<td>StormCAD Stand-Alone Unlimited Inlets</td>
<td>Click here to request Price Quote</td>
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<tr>
<td>StormCAD for AutoCAD 5 Inlets</td>
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<td>StormCAD for AutoCAD 10 Inlets</td>
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<td>StormCAD for AutoCAD Unlimited Inlets</td>
<td>Click here to request Price Quote</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Max quantity is 256  

ADD TO CART >>
Thank you for your time!

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