Advantages of Implementing StormCAD for OpenRoads (SUDA)

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What is Subsurface Utility Design and Analysis?
What is StormCAD for OpenRoads?
Subsurface Utility Design and Analysis (SUDA)

Subsurface Utility Engineering

- Conflict Management
- SUE Attribution

StormCAD 100 Inlets Included

- 3D Modeling of all underground
- Integrated with OpenRoads

- Storm/Sanitary Hydraulic Analysis and Design
- Hydrology
Advantages: of 3D Utility Models
3D Utility Models

- FHWA Every Day Counts 2 - 3D modeling in transportation construction is a mature technology that serves as the building block for the modern-day digital jobsite. The technology allows for faster, more accurate and more efficient planning and construction.

- Every Day Counts 3 effort focuses on three practices: using the raw data from which the model is created for roadway inventory and asset management purposes, incorporating schedule (4D) and cost (5D) information into models, and using post-construction survey data to correct the design model and create an accurate as-built record drawing.
Constructability

A recent survey of DOT’s conducted by Dr. Ralph Ellis and Dr. Randolph Thomas, as part of NCHRP 2-24(12), found that the top five causes of construction delays were:

1. **Utility Relocation Delays**
2. **Utility Delays due to differing site conditions**
3. Permitting
4. Weather
5. **Errors in Plans and Specifications**
• **Virginia DOT** credits SUE with helping to reduce the time needed to design highways from 5 years to 4 years, a 20% reduction in time.

• **Florida DOT** analyzed the use of SUE on major projects in Tallahassee and Miami and found that it saved $3 in contractor construction delay claims for every $1 spent for subsurface utility engineering.
Advantage: Create 3D Models from Legacy Sources
Build Hydraulic and 3D Models from Legacy Sources

- **Direct Import from:**
  - StormCAD, CivilStorm, SewerCAD, SewerGEMS (.stsw)
  - SWMM V5
  - LandXML
  - MicroDrainage
  - GEOPAK Drainage
  - InRoads S&S
  - MX Drainage

- **Using Model Builder link/import from:**
  - Microsoft Excel
  - Microsoft Access
  - Text Files (.csv, .txt)
  - ESRI (.shp)
  - Bentley Map
Advantage: Automatic 3D Models While Layout Networks
Modeling Storm and Sanitary Networks

- Inlets, headwalls and catch basins ruled to OpenRoads geometry and surfaces.
- Pipes ruled to the nodes.
- Multi-pipe profile runs
- Hydraulic properties linked into feature definitions.
Best Practices - Layout

• If you don’t know how to use Civil Accudraw, put it on your training list. It will make your life easier and OpenRoads more powerful.

• When connecting pipes to headwalls, remember that the direction determines whether the headwall is an inlet or an outlet.
Catchments
Advantage: State of the Art Drainage Design Calculations
Peak Flow Hydraulic Analysis/Design

- Included with OpenRoads - drainage networks up to 100 inlets.
- StormCAD GVF calculations engine.
- 3D Model updates with design changes.
- Includes latest HEC-22 methods.
Advantage: Scenario Manager
Scenario Manager

- Scenario Manager provides unlimited variation of design parameters with complete confidence that known good alternatives can be recalled at any time.
Advantage: Lateral Connections
Drainage Laterals

- Flows thru the terminal inlet are computed and inlet can be designed.
- Flows from inlet are passed thru lateral pipe but lateral pipe is not designed.
- Lateral connects to trunk line but does not split in two.
- All lateral flows are accumulated and applied at upstream end of trunk.
Advantage Culverts
Culvert Design / Analysis

• Perform Culvert Analysis by flipping the “Is Culvert” switch in properties to True

• Define inlet coefficients on conduit or the end node
Advantage: Advanced Hydraulic Calcs
Activating Advanced Hydraulic Analysis Tools

- StormCAD functionality for up to 100 Inlets included in OpenRoads.

- 100 inlet count applies per drainage design model. Split multiple networks across multiple models for longer projects.

- Activate higher level licenses from Tools Menu.
Higher Level License Highlights

• **StormCAD Unlimited** – Same functionality as base OpenRoads but unlimited inlet count.

• **SewerCAD**
  – Adds Convex compute engine
  – Sewer Loading tools
  – And more…

• **CivilStorm**
  – Adds Dynamic Wave and SWMM compute engines
  – Pond Maker tool
  – Compute Storage in network
  – Low Impact Development structures (LIDs)
  – And more…

• **SewerGEMS** – All the above and more, such as long term simulations
SWMM Analysis

- Using EPA SWMM analysis allows validation of a peak flow design.
- Network is analyzed for the entire storm event, not just the peak flow.
- Available in CivilStorm and SewerGEMS.
Pond Maker

• Detention Pond Analysis tool

• An aid in determining necessary storage requirements and analyzing adequacy of storage

• Composite Outlet Structures

• Includes Seepage

• Available with CivilStorm and SewerGEMS
Storage Chambers

- Included in CivilStorm and SewerGEMS
- Allows definition of standard storage chambers which can be defined in array and used in detention calculations.
Low Impact Development Controls

- Available in CivilStorm and SewerGEMS
- Bio-retention cells
- Green Roof
- Infiltration Trench
- Porous Pavement
- Rain Barrel
- Rain Garden
- Vegetative Swales
Load Builder

- Define sanitary sewer loads in a variety of methods.
- Available in SewerCAD and SewerGEMS
Questions?

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