HydroCAD, TR-20, TR-55, and InfoDrainage

HYDROLOGY AND HYDRAULICS SOFTWARE COMPARISON

Criteria	HydroCAD	TR-20	TR-55	InfoDrainage
Runoff methodology	• Unit hydrograph procedure (unlimited points) • Santa Barbara Urban Hydrograph • Rational Method	Unit hydrograph procedure (301 points)	Tabular method derived from TR-20	• SWMM method • Rational method • Modified Rational method • SCS method • Santa Barbara Unit Hydrograph • FEH Method • FSR Method • Time of Concentration Method • A long list of others
Rainfall types	Extensive rainfall library, user-defined storms, and synthetic rainfall distributions generated from local precipitation frequency data	SCS type I, IA, II & III	SCS type I, IA, II & III	Extensive rainfall library, user-defined storms, and synthetic rainfall distributions generated from local precipitation frequency data
Unit hydrograph	Extensive UH library including SCS, Delmarva, and others	SCS Unit Hydrograph or user-defined curve	SCS Unit Hydrograph only	Extensive UH library including ToC, SBUH, SCS, Laurenson, Modified Rational method, SWMM and others, plus user-defined
Curve number entry	Automatic Curve Number look-up and weighting, with adjustment for unconnected impervious areas 12 hrs	Requires direct entry of composite curve number	Automatic Curve Number look-up and weighting, with adjustment for unconnected impervious areas	Automatic Curve Number calculations and adjustments based on imported land use and soil polygons
Curve number weighting	Area-weighted, or separate runoff for each Curve Number with weighted flow	Requires direct entry of composite Curve Number	Area-weighted Curve Number	Automatic Curve Number calculations and adjustments based on imported land use and soil polygons
Curve number limitations	No restrictions	No restrictions	Reduced accuracy as Curve Number differs from 75	No restrictions
Time of concentration calculations	All TR-55 methods plus common channel shapes, upland method, Curve Number method, and Kerby/Kirpich method	Contains no Tc calculations; requires direct Tc entry	Calculates Tc for sheet, shallow concentrated, and channel flow	Embedded calculators for Kirby/Kirpich, TR-55, Kinematic Wave and others
Tc limitations	No restrictions	Must be greater than zero	Limited to 0.1–2 hours	No restrictions
Tc precision	1/10 minute or 1/600 hour	1/100 hour	Rounded to nearest step	1/100 of a minute
Subarea limitations	None	None	Must not differ by more than factor of 5	None
Runoff accuracy	Within 1% of 1982 TR-20 release	“The standard”	Within +25% of TR-20 release	Within 1% of 1982 TR-20 release
Reach routing	Muskingum-Cunge or Storage indication method with optional routing delay (translation)	Modified Att-Kin procedure	No routing, separate tables for travel times of 0–3 hours	Dynamic wave equations
Reach hydraulics	Automatic calculation for common shapes or custom cross-sections	None; requires entry of routing coefficients	N/A; no reach routing	Based on open channel and closed system geometry
Pond routing	Storage-indication method, dynamic Storage-indication method, or simultaneous routing	Storage-indication method	None; only estimates ponding effects	Routing determined by the size, dimensions, and attributes of the pond, subject to the dynamic wave equations
Pond hydraulics	Automatic calculations for orifice, weir, culvert, etc; used alone or combined for outlet structures	Must be entered directly; no calculations provided	N/A; no pond routing	Embedded calculators for common outlet structures and configurations including multi-stage risers, orifices, weirs, gates, etc
Tailwater	Dynamic tailwater handling with all standard outlet devices	None; uses static stage-discharge curves	None; uses static stage-discharge curves	Tailwater can be free discharge or based on a fixed or variable WSE
Dam breach	Progressive dam breach triggered at specified time or WSE	None	None	None
Pumps	Full pump simulations including pipe losses and tailwater effects	None	None	Full pump simulations as outlet from SCMs
Pond sizing estimate	Using actual inflow hydrograph	None	Using assumed hydrograph shape	Embedded calculators for pond size estimate based on discharge and quantity requirements
Detention time	By plug-flow and center-of-mass methods	Not calculated	Not calculated	By plug-flow and center-of-mass methods; not explicitly reported
Pond storage calculations	Automatic calculation from pond dimensions or surface areas, plus direct entry	Direct entry only	N/A; no pond routing	Automatic calculation based on the pond dimensions, shape, and slope
Underground storage	Automatic chamber layout and modeling, including embedded storage calculations	Requires external calculations	Requires external calculations	Various underground storage (box, arch chambers, etc) can be modeled along with estimation with embedded calculators
Flow diversions (split flows)	Automatic diversion of outflow from specified pond outlet(s)	Separate “Divert” procedure based on user-defined curve	N/A	Split flows based on HGL in the system subject to the dynamic wave equations
Pollutant loading	Automatic land-use reporting and pollutant loading calculations.	None	None	Offers automatic pollutant loading options and removal methods via percentage and first-order decay
Routing diagram	Interactive, on-screen, with labels and background image	None	None	• All infrastructure is drawn 'true to site' • Interactive, on-screen layouts which can be directly published to Civil 3D to be used in site plans • Adjustable labels, background imagery, surfaces, and more
Calculation procedure	Automatically calculated as required	“Batch mode” calculation of entire watershed	Manual initiation of each calculation	Standard 1D analysis or 1D-2D analysis with fully exposed SWMM5 engine
Unit system	US English, metric, or custom, plus split input/output units	US English only	US English only	US English, metric, or custom, plus split input/output units
Graphics capabilities	Full graphics to screen, printer, or file	None	None	Full graphics, tables, videos, or files
Reports	Automatic reports with headings, graphics, etc	Manual	Manual	• Custom or automatic options • Includes flexible reporting tables and easy exports to Civil 3D, PDF, or Excel
Data storage	Automatic by job name	Manual	Manual	• Manual based on project name • Includes phase/scenario management with templates (rainfall data, SCMs, pipes and structures, etc) • Supports file recovery if program closes unexpectedly

Full methodology available on the One Water Blog.

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