

**HYDROLOGIC/HYDRAULIC ENGINEERING MICROCOMPUTER
SOFTWARE
IN USE BY THE DEPARTMENT**

HYDROGRAPH/FLOOD ROUTING

(1) HEC-1

- U.S. Army Corps of Engineers' Flood Hydrograph Package
- Computer requirements: Developed for MS-DOS but will run under WINDOWS. A printer is not required but is desirable and requires 132-column print capability.

Source: U.S. Army Corps of Engineers – Hydrologic Engineering Center
Internet web address:

<http://www.hec.usace.army.mil/software/legacysoftware/hecl/hecl-download.htm>

(2) HEC-HMS

- U.S. Army Corps of Engineers' Hydrologic Modeling System
- Computer requirements: WINDOWS-based. A printer is desirable.

Source: U.S. Army Corps of Engineers – Hydrologic Engineering Center
Internet web address:

<http://www.hec.usace.army.mil/software/hecl-hms/download.html>

(3) WIN TR-55

- An interactive package for calculating peak flows and hydrographs using the N.R.C.S.' TR-55 procedures. Routing provisions are included.
- Computer requirements: WINDOWS-based. A printer is not required but is desirable.

Source: USDA - National Resource Conservation Service
Internet web address:

<http://www.wcc.nrcs.usda.gov/hydro/hydro-tools-models-wintr55.html>

(4) WIN TR-20

- A program for performing hydrographic analyses & flood routing using N.R.C.S.' procedures described in their "NEH-4" publication.
- Computer requirements: WINDOWS-based. A printer is not required but is desirable.

Source: USDA - National Resource Conservation Service
Internet web address:

<http://www.wcc.nrcs.usda.gov/hydro/hydro-tools-models-wintr20.html>

(5) ROUT/HYDRO

- An interactive package that develops peak discharge, expands it into an inflow hydrograph, & routes using the storage indicator method.
- Computer requirements: Developed for MS-DOS but will run under WINDOWS. A printer is not required but is desirable.

Source: Muncaster Engineering
1740 Lambs Road
Charlottesville, VA 22901
Phone: (804) 978-7879
Fax: (804) 973-0249
E-mail: tmuncaster@aol.com

Note: The above software may no longer be readily available.

(6) WATERSHED MODELING

- Design and analysis of detention basins using SCS, Rational Method, and Santa Barbara Urban Hydrograph procedures.
- Computer requirements: Developed for MS-DOS but will run under WINDOWS. A printer is not required but is desirable.

Source: Eagle Point
4131 Westmark Drive
Dubuque, Iowa 52002
Phone: 1-800-678-6565

(7) VISUAL URBAN

- Urban Drainage Design Package which includes a module for flood routing using the storage-indicator method
- Computer requirements: WINDOWS based. A printer is not required but is desirable.

Source: The Federal Highway Administration's Internet web site.

Internet web address:

http://www.fhwa.dot.gov/engineering/hydraulics/software/softwaredetail.cfm#hy2_2_visual_urban

(8) CRITSTRM

- Actually "Critical Storm Duration", the program will determine the ordinates of a hydrograph for the storm even that will produce the largest volume of water for a given frequency using the Rational Formula as a basis for the calculation. This is a module of the Department's "Web-Based Hydraulics Applications".
- Computer requirements: Internet access, Microsoft WINDOWS, Microsoft "Internet Explorer" (or fully compatible web browser), and "Adobe Reader" for viewing, saving, and/or generating hardcopy printouts

Source: V.D.O.T. – Location & Design Web Section

Internet web address for access information:

<http://www.virginiadot.org/business/locdes/notification.asp>

PEAK DISCHARGE HYDROLOGY

(1) NFF

- A program for determining peak discharges using the U.S. Geological Survey's Regional Regression Equations. Program considers natural, rural watersheds but can take the effects of urbanization into account using the Urban Regression Equations.
- Computer requirements: WINDOWS- based. A printer is not required but is desirable.

Source: U.S. Geological Survey's Internet web address:

<http://water.usgs.gov/software/nff.html>

(2) PEAKFQWIN

- A program for determining design peak discharges from stream gaging records (downloadable from USGS' Internet site) using the Log-Pearson Type III frequency distribution method in accordance with WRC Bulletin 17-B guidelines.
- Computer requirements: WINDOWS- based. A printer is not required but is desirable.

Source: U.S. Geological Survey's Internet web address:

<http://water.usgs.gov/software/peakfq.html>

(3) EPSON

- A program that projects design peak flows based on analysis of annual gaged peak flows. Gage records are available on for most all gaging stations in Va. This is a module of the Department's "Web-Based Hydraulics Applications."
- Computer requirements: Internet access, Microsoft WINDOWS, Microsoft "Internet Explorer" (or fully compatible web browser), and "Adobe Reader" for viewing, saving, and/or generating hardcopy printouts

(4) DISCHAR

- A program for estimating the 2, 5, 10, 25, 50, 100 and 500 yr. peak flows using the Daniel G. Anderson Method ("MAGNITUDE AND FREQUENCY OF FLOODS IN NORTHERN VIRGINIA") and the Franklin Snyder Method (A.S.C.E. Journal – Hydraulics Division - October, 1958. One hundred point rainfall curves, in the form of external data files, are supplied with the program for use with the Franklin Snyder Method. This is a module of the Department's "Web-Based Hydraulics Applications".
- Computer requirements: Internet access, Microsoft WINDOWS, Microsoft "Internet Explorer" (or fully compatible web browser), and "Adobe Reader" for viewing, saving, and/or generating hardcopy printouts

(5) PQTRANS

- A program for estimating the peak discharges at an ungaged location from a nearby gaging station using both the U.S.G.S. and N.R.C.S. peak discharge transfer formulae. This is a module of the Department's "Web-Based Hydraulics Applications".
- Computer requirements: Internet access, Microsoft WINDOWS, Microsoft "Internet Explorer" (or fully compatible web browser), and "Adobe Reader" for viewing, saving, and/or generating hardcopy printouts

(6) VIRTOC

- A program for determining peak discharges using the Rational Formula. Program has several options for calculating both overland and channel flow time. The program uses rainfall data based on "B, D, & E" factors derived from the NOAA's "Atlas-14" publication. This is a module of the Department's "Web-Based Hydraulics Applications."
- Computer requirements: Internet access, Microsoft WINDOWS, Microsoft "Internet Explorer" (or fully compatible web browser), and "Adobe Reader" for viewing, saving, and/or generating hardcopy printouts

Source (3 thru 6): V.D.O.T. – Location & Design Web Section

Internet web address for access information:

<http://www.virginiadot.org/business/locdes/notification.asp>

(7) REGRESSION EQUATIONS

- A Microsoft EXCEL spreadsheet for calculating peak discharges using the USGS' regional regression equations as presented in the publication "Methods for Estimating the Magnitude and Frequency of Peak Discharges of Rural, Unregulated Streams in Virginia" (Bisese, 1995)
- Computer requirements: Microsoft's EXCEL spreadsheet. A printer is desirable but not required.

(8) SNYDER

- A Microsoft EXCEL spreadsheet for calculating peak discharges using the Franklin F. Snyder method (ASCE Journal of the Hydraulics Division, October, 1958). Rainfall data is predicated on VDOT-derived "B, D, & E" factors from NOAA's "ATLAS-14" rainfall data. Computer requirements: Microsoft's EXCEL spreadsheet. A printer is desirable but not required.
- Computer requirements: Microsoft's EXCEL spreadsheet. A printer is desirable but not required.

Source (7 & 8): V.D.O.T. - Hydraulics Section

Internet web address for ordering information:

<http://www.virginiadot.org/business/locdes/notification.asp>

OPEN CHANNEL FLOW

(1) HY-15

- A program for use in designing stable linings for open channels in accordance with the FHWA "HEC-15" publication. The program was originally developed by the FHWA but the Department has re-written as a WINDOWS application and is a module of the Departments "Web-Based Hydraulics Applications".
- Computer requirements: Internet access, Microsoft WINDOWS, Microsoft "Internet Explorer" (or fully compatible web browser), and "Adobe Reader" for viewing, saving, and/or generating hardcopy printouts

(2) RDDITCH

- A program for use in determining depth and velocity for the 2-yr. and 10-yr. peak flows in roadside and median ditches. Flow characteristics are calculated for Manning's "n" values of 0.03, 0.05 and 0.015. The program uses rainfall data based on "B, D, & E" factors derived from the NOAA's "Atlas-14" publication. This is a module of the Department's "Web-Based Hydraulics Applications."
- Computer requirements: Internet access, Microsoft WINDOWS, Microsoft "Internet Explorer" (or fully compatible web browser), and "Adobe Reader" for viewing, saving, and/or generating hardcopy printouts

(3) RIPRAP

- A program for designing riprap slope protection in accordance with the FHWA's "HEC-11" publication. It considers channel side slopes, bottoms, slope stability by tractive force procedures and riprap slope protection for wave action. This is a module of the Department's "Web-Based Hydraulics Applications."
- Computer requirements: Internet access, Microsoft WINDOWS, Microsoft "Internet Explorer" (or fully compatible web browser), and "Adobe Reader" for viewing, saving, and/or generating hardcopy printouts

Source (1thru 3): V.D.O.T. – Location & Design Web Section

Internet web address for access information:

<http://www.viriniadot.org/business/locdes/notification.asp>

(4) VISUAL URBAN

- Urban Drainage Design Package which includes a module for open channel flow in prismatic and circular sections
- Computer requirements: WINDOWS based. A printer is not required but is desirable.

Source: The Federal Highway Administration's Internet web site.

Internet web address:

http://www.fhwa.dot.gov/engineering/hydraulics/software/softwaredetail.cfm#hy2_2_visual_urban

(5) QUICK-2

- A program developed by the Federal Emergency Management Agency (FEMA) to perform open channel flow calculations in irregular and prismatic (and round) channels. Water surface profile computations can also be performed but on open channels only. There is no provision for analyzing culverts or bridges.
- Computer requirements: WINDOWS-based however, a DOS version is available.

Source: Federal Emergency Management Agency (FEMA)

Internet web address: http://www.fema.gov/plan/prevent/fhm/dl_qck22.shtm

PIPE FLOW/CULVERT HYDRAULICS

(1) QUICKPIPE

- A simple program for designing and/or analyzing round culvert pipes and box culverts. It doesn't consider multiple lines, elliptical, oval, or other irregular shapes, or flow overtopping the roadway.
- Computer requirements: Developed for MS-DOS but will run under WINDOWS. A printer is not required, but is desirable.

Note: if the above program is no longer available from the McTrans Center it may be possible to obtain it directly from the program's developer (provided the information shown below is still valid):

Charles K. Cover, P.E.
1084 Carriage Hill Parkway
Annapolis, MD 21401-6516
phone: (410) 266-0756 (after 5:00 PM EST)

(2) WinHY-8

- A package of interactive programs for the design and analysis of culverts. It handles overtopping and does flood routing.
- Computer requirements: WINDOWS-based. A word processor capable of generating Rich Text “.rtf” files is necessary for creating reports. A printer is optional

Source : The Federal Highway Administration (FHWA)

Internet web address is:

<http://www.fhwa.dot.gov/engineering/hydraulics/software/hy8/>

(3) BCAP

- A WINDOWS-based application for use in designing/analyzing culverts where up to two changes in the grade of the flow line are necessary. The program uses the FHWA's “HY-8” algorithms and computes a water surface profile through the culvert.
- Computer requirements: WINDOWS-based - a printer is not required but is desirable.

Source: The Nebraska Department of Roads

Internet web address is:

<http://www.dor.state.ne.us/roadway-design/downloads.htm#bcap>

(4) CS Hydraulic Tools

- A WINDOWS-based application for use in designing/analyzing ConSpan arch culverts using the FHWA's "HDS-5" procedures. The software also includes provisions for generating hydrographs and flood routing.
- Computer requirements: WINDOWS-based - a printer is not required but is desirable.

Source: CON/SPAN Bridge Systems

Internet web address is:

<http://www.con-span.com/con-span/main.html>

(5) CulvertSoftVA

- A WINDOWS-based application for use in designing/analyzing culverts using the FHWA's "HDS-5" procedures. The software also includes provisions for designing outlet protection/energy dissipators using VDOT, FHWA, & DCR procedures.
- Computer requirements: Microsoft's EXCEL spreadsheet and ACCESS database manager software. WINDOWS-based - a printer is not required but is desirable.

Source: Ensoftec, Inc.

P.O. Box 3009

Gaithersburg, MD 20885-3009

Phone: (301) 294-7066

Internet web address is:

<http://www.ensoftec.com>

DROP INLET/STORM SEWER DESIGN

(1) QHEC12

- A program that will perform analysis for all drop inlet types covered in the Federal Highway Administration's HEC-12 publication.
- Computer requirements: Developed for MS-DOS but will run under WINDOWS. A printer is not required but is desirable.

Source: HAESTAD METHODS

37 Brookside Road

Waterbury, Connecticut 06708

Phone: 1-800-422-6555

Note: The above program may no longer be available.

(2) VDOT-HGL

- A blank spreadsheet template for performing hydraulic grade line computations in accordance with the procedures outlined in Chapter IV of the VDOT DRAINAGE MANUAL.
- Computer requirements: WINDOWS-based - a printer is not required but is desirable.

Source: Signal Hill Engineering
8540 Sandstone Way
Manassas, Virginia 22111
Phone: (703) 369-9291

Note: The above spreadsheet may no longer be available.

(3) VISUAL URBAN

- Urban Drainage Design software package that includes a module for the design analysis of drop inlets. There is also a module for normal depth calculations in round pipes.
- Computer requirements: WINDOWS-based - a printer is not required but is desirable.

Source: The Federal Highway Administration's Internet web site.

Internet web address is:

http://www.fhwa.dot.gov/engineering/hydraulics/software/softwaredetail.cfm#hy2_2_visual_urban

(4) InletSoftVA

- A WINDOWS-based application for use in designing/analyzing all types of drop inlets in accordance procedures presented in the VDOT DRAINAGE MANUAL and the FHWA's HEC-22 publication. Works either as a stand-alone application or in conjunction with the PipeSoftVA software package shown below.
- Computer requirements: Microsoft's EXCEL spreadsheet and ACCESS database manager software. WINDOWS-based - a printer is not required but is desirable.

(5) PipeSoftVA

- A WINDOWS-based application for use in designing/analyzing storm sewers in accordance with procedures described in the VDOT DRAINAGE MANUAL. The software will also generate a hydraulic grade line utilizing the VDOT method. Works either as a stand-alone application or in conjunction with Inletsoft software package described above.
- Computer requirements: Microsoft's EXCEL spreadsheet and ACCESS database manager software. WINDOWS-based - a printer is not required but is desirable.

Source(4 & 5): Ensoftec, Inc.
P.O. Box 3009
Gaithersburg, MD 20885-3009
Phone: (301) 294-7066
Internet web address is:
<http://www.ensoftec.com>

WATER SURFACE PROFILES / BRIDGE HYDRAULICS

(1) HEC-2

- The U.S. Army Corps of Engineers' water surface profiles program. An ASCII text editor or word processor is required to generate or edit data input files.
- Computer requirements: Developed for MS-DOS but will run under WINDOWS. A printer with 132 column print capability is needed.

(2) EDIT2

- The U.S. Army Corps of Engineers' program that edits and checks HEC-2 data input files for errors. An ASCII text editor is required to generate or edit data input files.
- Computer requirements: Developed for MS-DOS but will run under WINDOWS. A printer is not required but is desirable.

(3) PLOT2

- The U.S. Army Corps of Engineers' program that plots HEC-2 cross sections and/or generated water surface profiles either by "screen-dumping" a high resolution graphics image to a printer or plotting the image on a Hewlett-Packard Model 7475A pen plotter.
- Computer requirements: Developed for MS-DOS but will run under WINDOWS. A printer is not required but is desirable.

(4) COED (Corps of Engineers' Editor)

- The U.S. Army Corps of Engineers' program for creating and editing input data sets for use with their "HEC" series of computer software
- Computer requirements: Developed for MS-DOS but will run under WINDOWS.

Source (1 thru 4): U.S. Army Corps of Engineers – Hydrologic Engineering Center
Internet web address:

<http://www.hec.usace.army.mil/software/legacysoftware/hec2/hec2-download.htm>

(5) HEC-RAS

- (Hydrologic Engineering Center - River Analysis System) - The U.S. Army Corps of Engineers new software package for the analysis of floodplains and bridged waterways. Full graphics package for viewing x-sections, profiles, rating curves, and 3-D floodplain views.
- Computer requirements: WINDOWS-based - a printer is not required but is desirable.

Source: U.S. Army Corps of Engineers – Hydrologic Engineering Center
Internet web address:

<http://www.hec.usace.army.mil/software/hec-ras/hecras-download.html>

(6) HY-7/WSPRO

- The U.S. Geological Survey's and F.H.W.A.'s water surface profiles program. An ASCII text editor or word processor is required to generate or edit data input files.
- Computer requirements: Developed for MS-DOS but will run under WINDOWS - a printer is not required but is desirable.

Source: The Federal Highway Administration's Internet web site.
Internet web address is:

<http://www.fhwa.dot.gov/engineering/hydraulics/software/softwaredetail.cfm#hy7>

(7) WSPROGRAPH

- A program for use in plotting water surface profiles, flood plain widths and flood plain cross sections which is intended to be used in conjunction with the U.S.G.S. and F.H.W.A.'s "WSPRO" program. WSPROGRAPH uses as its input the output (as written to disk) of the WSPRO program.
- Computer requirements: Developed for MS-DOS but will run under WINDOWS. A printer or Hewlett-Packard compatible plotter is not required but is desirable.

(8) HY-9

- A program developed by the FHWA for the determination of bridge related general and local scour. The program is based on their publication "SCOUR - TECHNICAL ADVISORY". Note: this program may not be fully compatible with the latest version of the FHWA's "HEC-18" publication.
- Computer requirements: Developed for MS-DOS but will run under WINDOWS. A printer is not required but is desirable.

(9) SWITCH

- A program to convert HEC-2 data files to HY-7/WSPRO format and vice versa.
- Computer requirements: Developed for MS-DOS but will run under WINDOWS.

Source (7 thru 9): McTrans Center
University of Florida
512 Weil Hall
P.O. Box 116585

(10) FESWMS-2DH

- (Finite Element Surface Water Modeling System) is a two dimensional stream flow model which employs finite element analysis techniques.
- Computer requirements: MS-DOS 3.1 or greater operating system, 640K RAM (minimum), a 10-MEGABYTE hard disk (minimum), a math coprocessor, a printer or a Hewlett-Packard model 7475A pen plotter is required.

Source: The Federal Highway Administration's Internet web site.
Internet web address is:

http://www.fhwa.dot.gov/engineering/hydraulics/software/softwaredetail.cfm#feswms_2dh

(11) BRRIPRAP

- A program that calculates the size of riprap necessary to protect bridge abutments based on the FHWA's "HEC-18" publication (as revised 4/93). This is a module of the Department's "Web-Based Hydraulics Applications".
- Computer requirements: Internet access, Microsoft WINDOWS, Microsoft "Internet Explorer" (or fully compatible web browser), and "Adobe Reader" for viewing, saving, and/or generating hardcopy printouts

Source: V.D.O.T. – Location & Design Web Section
Internet web address for access information:

<http://www.virginiadot.org/business/locdes/notification.asp>

(12) GIANTP

- An interactive program used to develop an input data for pre-1995 versions of the FHWA/USGS WSPRO program.
- Computer requirements: Developed for MS-DOS but will run under WINDOWS.

Source: Mr. Gamal E. Hassan, PE

GHassan@TRCSOLUTIONS.com

(13) CHECK2

- A software package developed by the Federal Emergency Management Agency (FEMA) specifically for checking HEC-2 data sets for compliance with FEMA modeling practices. However, the package is also set up for creating/editing and processing HEC-2 data sets as well. The HEC-2 program (as well as its supporting programs) are included with the package.
- Computer requirements: WINDOWS-based. A printer with 132 column print capability is needed.

(14) CHECKRAS

- A software package developed by the Federal Emergency Management Agency (FEMA) specifically for checking HEC-RAS data sets for compliance with FEMA modeling practices. Note: this software works in conjunction with HEC-RAS so it must be installed on the user's computer.
- Computer requirements: WINDOWS-based. A printer is not required but is desirable.

(15) RASPLOT

- A software package developed by the Federal Emergency Management Agency (FEMA) specifically generating water surface profile plots in FEMA's preferred format as extracted from HEC-RAS. Note: this software works in conjunction with HEC-RAS so it must be installed on the user's computer.
- Computer requirements: WINDOWS-based. A printer is not required but is desirable.

Source (13 thru 15): Federal Emergency Management Agency (FEMA)

Internet web address: http://www.fema.gov/plan/prevent/fhm/frm_soft.shtm#1

INTERACTIVE HYDROLOGIC/HYDRAULIC ENGINEERING PACKAGE

(1) HYDRAIN

- (Also know as POOL FUND PROJECT) An interactive package of programs that perform most hydrologic/hydraulic engineering functions. A master program supervisor and data input shells are included to facilitate using the individual programs. The package currently includes HYDRO (a program to develop peak flows, inflow hydrographs, and analyze gaging data), HYCULV & HY-8 (programs for the design and analysis of culverts), HYDRA (a program for the design and analysis of storm sewers, sanitary sewers, and combination sewers), HY-7/WSPRO (water surface profiles) and HYCHANL (a program for designing channels, ditches & linings).
- Computer requirements: Developed for MS-DOS but will run under WINDOWS.

Source: The Federal Highway Administration, though it apparently is no longer available as a download option on their web site. You might try contacting Joe Krolak either by e-mail at joseph.krolak@fhwa.dot.gov or by phone at (202) 366-4611.

MISCELLANEOUS

(1) PROJFLOTATION

- Determines hydrostatic uplift forces at the entrance of culvert pipes and the counterweight requirements necessary to offset such forces.
- Computer requirements: WINDOWS based.

Source: V.D.O.T. - Hydraulics Section

Internet web address for ordering information:

<http://www.virginiadot.org/business/locdes/notification.asp>

(2) FISHXING

- Assists in designing and analyzing highway culvert pipes to facilitate the passage of various fish species.
- Computer requirements: WINDOWS based.

Source: Internet web address: <http://www.stream.fs.fed.us/fishxing/>

(3) HYPERCALC

- English to SI metric (and vice-versa) converter particularly geared to hydraulic engineering.
- Computer requirements: WINDOWS based.

Source: The Federal Highway Administration's Internet web site.

Internet web address is:

<http://www.fhwa.dot.gov/engineering/hydraulics/software/hyper.cfm>

DISCLAIMER

It should be noted that the Department does not necessarily prefer everything that is included on the above list for a given application nor does it necessarily reject software that is not included. The list is intended only to represent such hydrologic and/or hydraulic engineering software that the Department either currently uses or has at least summarily tested. It serves as a recommendation, not a requirement. If there is any question as to the application of hydrologic and/or hydraulic engineering software either on Department projects or those projects that will ultimately come under the Department's jurisdiction, an inquiry should be made to the Department's Central Office Hydraulics Section (in Richmond) to:

Mr. D.M. LeGrande, Sr.
Assistant State Hydraulics Engineer
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219

Phone: (804) 371-2807
Fax: (804) 225-3686
E-mail: David.LeGrande@VDOT.Virginia.gov