

RAS2UNET

User's Guide

Introduction

RAS2UNET is a utility program designed to convert an HEC-RAS geometry file into an HEC-UNET geometry file. The geometry file(s) produced by HEC-RAS contain literally all the data entered into HEC-RAS through its geometry editor. However, not all HEC-RAS data has a direct parallel in HEC-UNET; therefore, not all data available in the HEC-RAS geometry file will find its way into the HEC-UNET geometry file through this utility program.

Installation

Install this program to the \hecexe directory on your computer. This directory should already exist if you have installed HEC-UNET. If you installed HEC-UNET to a directory other than \hecexe, install RAS2UNET.EXE in the same directory as the HEC-UNET executables. When finished, be sure that \hecexe (or the directory containing RAS2UNET) is on your computer's search path.

Usage

The command line syntax to execute RAS2UNET is:

RAS2UNET I=*input_file* O=*output_file* S=*sort_flag*

where: *input_file_name* is the name of the HEC-RAS geometry file to be converted (No Default).
 output_file_name is the name of the HEC-UNET (CSECT) geometry file to be created (Default is UNET.CS)
 sort_flag is YES or NO. (Default is NO.) See Sorting section for details.

For example, if the name of the HEC-RAS geometry file that you wish to convert is MYPROJ.G01, then you might use the command:

RAS2UNET I=MYPROJ.G01 O=MYPROJ.CS

What You Need to Know

- The RAS2UNET input file must be a geometry file saved by HEC-RAS version 2.1 or newer.
- The RAS2UNET output file will be an HEC-UNET geometry file in CSECT format. Although almost all relevant data available in an HEC-RAS geometry file will be converted, the output file will be incomplete for HEC-UNET because certain required records which are the responsibility of the user to add will be missing (e.g. the XK record).
- The first title record (T1) for each reach will begin with the string "REACH# nnn" where nnn is the reach number used by RAS2UNET to build the UB and DB records. Reach numbers (nnn) will be assigned to each reach in the order the reach is encountered in the input file unless sorting is turned on (in which case, each reach name must contain a unique whole number to be used to identify and order the reaches. See the section on Sorting for important details.) Following the reach number will be the river and reach names (separated by a comma) as specified in the HEC-RAS geometry file.
- Junction information in the input file will be used to build the UB and DB records in the output file that indicate reach connections to HEC-UNET. Junction names from the HEC-RAS data will be used internally in RAS2UNET but will not find their way into the output file. If for any reason RAS2UNET has problems building the UB or DB records, a 0 (zero) will be placed on the record to indicate that RAS2UNET expected to identify a reach connection but encountered an error. A UB or DB record with a 0 on it is not valid to HEC-UNET and must be corrected by the user. On the other hand, a blank UB or DB record indicates an external boundary condition and is valid input to HEC-UNET.
- HEC-RAS stores cross sections in decreasing RiverStation order. Typically, this means upstream to downstream and implies a positive flow direction from first to last cross section. HEC-UNET assumes that the order of the cross sections in the geometry file implies a positive flow direction; therefore, the order of the cross sections in the output file produced by RAS2UNET will be the same as that in the input file.
- Wherever possible, data stored in the input file will be exactly duplicated in the output file. However, cross section identifiers or RiverStations should be limited to six numeric characters (including the decimal) by the HEC-RAS user or the ID will get truncated by RAS2UNET when the X1 record is created for the cross section. This limitation is a result of the six character field available on the X1 record for cross section identification in the CSECT input format. This six character limitation also affects the elevation data for each cross section. The first field of each GR record is only six characters in size, therefore, every fifth elevation value of the cross section geometry data starting with the first may also get truncated (i.e., EL(1), EL(6), EL(11), etc.)

- Interpolated sections stored in the HEC-RAS geometry file (those whose RiverStations include a “*”) will be treated in the same manner as any other section. However, the “*” will not be retained in the cross section ID and comment records will precede the section in the output file to indicate that the section is interpolated.
- The description data (if any) for a cross section in the input file will be included in the output as comment records preceding the X1 record for that section.
- NC and NH data records will be developed from HEC-RAS Manning’s N data; however, equivalent roughness data is not used by HEC-UNET so will not be converted. A blank NC record will be placed in the output file at cross sections where equivalent roughness data was encountered. Also, contraction and expansion coefficients will be ignored since HEC-UNET does not use them.
- If encountered in the input file, “normal” ineffective flow and “normal” blocked encroachments will be converted to X3 record data (fields 4,5,6 &7). In UNET if the elevations (fields 5 & 7) are positive, the region outside the stations is “ineffective” or storage. The difference between RAS and UNET is that in RAS, once the water surface exceeds the specified elevation - the ineffective region becomes effective. In UNET, regardless of the water surface, the region outside the specified stations and below the specified elevations is ineffective - always... area above, however, can convey water. Similarly, if the elevations are “negative” (fields 5 & 7) then the region outside the stations is blocked. Think of it as physically modifying the cross section in UNET. The cross section modification will remain in effect regardless of the water surface. All area above the “encroachment” can convey water.
- Bridges and culverts will NOT be converted. Their location in the reach will be marked with comment records in the output file.
- A cross section lid will be converted into BT data.

Sorting

In HEC-UNET, the order of the reaches in the geometric input file is significant in a number of ways. First, there is no mechanism that allows the user to label the reaches and use that label when defining the connections. Instead, the reach is identified by its position in the input file. The first reach is reach 1, the second is reach 2, and so on. The user must then use that number when defining the reach connectivity on the UB and DB records. If for any reason a reach needed to be inserted into the middle of an HEC-UNET geometry file, all the reaches from the new one down will effectively be renumbered and almost all the UB and DB records will need to be corrected.

The reach order and resulting connectivity can also affect the efficiency of the HEC-

UNET solution matrix and therefore execution time. Most HEC-UNET users are aware of this issue and design their input files to increase efficiency. To enable the HEC-RAS modeler to produce a geometry file that will assemble into a preconceived order during conversion, a mechanism was added to RAS2UNET to sort the reaches. The rules are simple:

- Include in each reach name (in the HEC-RAS model) a whole number (made up only of digits) indicating the reach's number or sequence after conversion.
- The number must be the only number in the reach name.
- No special characters or strings are required.
- The number does not need to be in a particular location in the name.
- Start numbering with 1 and do not skip numbers. (Although this is not required for sorting, if you do not start at 1 or if you skip numbers, the reach numbers used by RAS2UNET to label each reach will not match your numbering scheme.)

The following table illustrates some valid and invalid (for sorting) reach names:

Valid	Reason	Invalid	Reason
1	one number in name	Reach 1 seg#24	more than 1 number in name
7 Lower Rose Cr	one number in name	Sacramento	no number in name
reach9	one number in name	Stream 2.37	2.37 is not a whole number
seg#97 Yuba	one number in name	Upper Eel 1,234	1,234 will be seen as 1 & 234 - - 2 numbers!

Once the reaches have been defined following the above rules, the sort option of RAS2UNET must be turned on from the command line. This is done by adding SORT=YES after the specification of the input and output file names. For example, if the HEC-RAS geometry file named "MYPROJ.G01" has reach names that include a numbering scheme, then to convert that file for use by HEC-UNET, use the following command line:

```
RAS2UNET I=MYPROJ.G01 O=MYPROJ.CS SORT=YES
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