DRAINAGE DESIGN MANAGEMENT SYSTEM FOR WINDOWS

VERSION 5.6.0

Tutorial # 22
Pier Influence Zone Calculation
HEC-18 Procedure

KVL Consultants, Inc.

PIER INFLUENCE ZONE CALCULATION (HEC-18 PROCEDURE)

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1.0 PROBLEM STATEMENT

A pier influence zone is a top width (W_T as shown in following figure) of a pier local scour hole in cohesionless bed material. This tutorial computes pier influence zone by using procedure as outlined in Federal Highway Administration HEC-18 manual (April 2012 version).

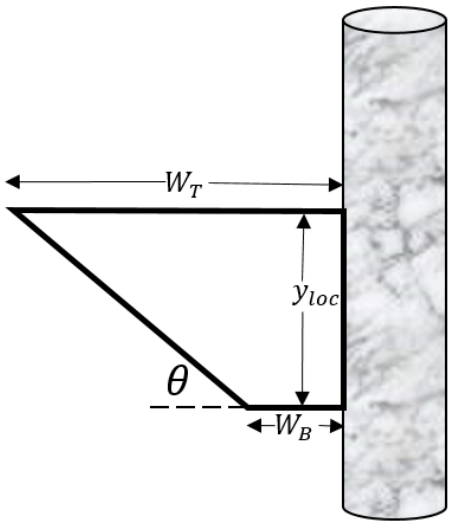


Figure 1: Top Width of Scour hole Sketch Adapted from FHWA (2012)

2.0 PIER INFLUENCE ZONE CALCULATION

To estimate the pier influence zone width use the following given conditions:

❖ Parameters for ***pier influence zone calculation***:

- **Pier Scour Depth, Ys (ft)**: *15.00*
- **Ratio of bottom width to depth of local pier scour, B**: *1.0*
- **Angle of repose of the bed material in water, θ (degrees)**: *44.00*
- **Distance from outside edge of pier, X (ft)**: *10.00*

2.1 Step-by-Step Procedures

Step 1: Establish a New River Mechanics Project and Defaults Set-up

Step 2: Set up pier influence zone basic data

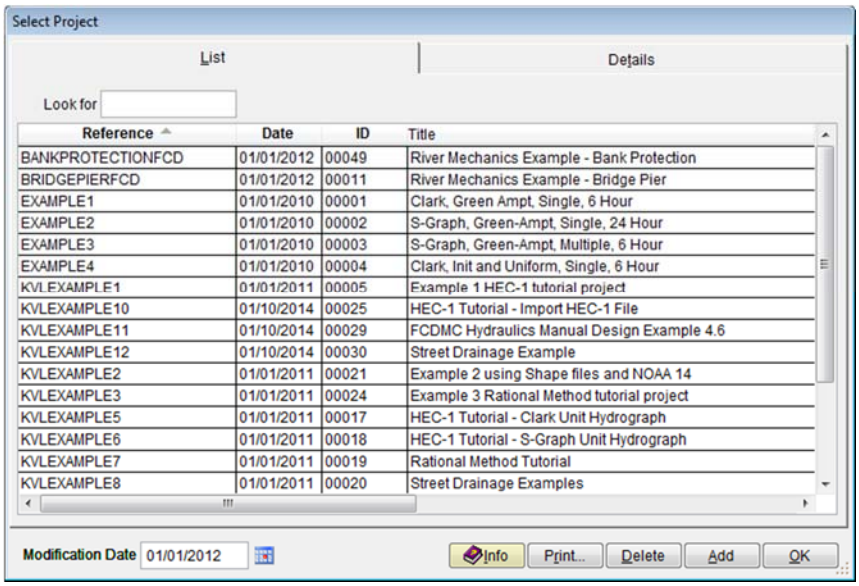
Step 3: Calculate pier influence zone width

Step 4: Report and Document the results

2.1.1 Step 1 - Establish a New Project and Defaults Set-up

(a) Click the **DDMSW** icon on the Desktop or Program menu to launch the **DDMSW.** Click the **OK** button to accept the software disclaimer as shown in the following figure.

After the **DDMSW** is launched, the **SELECT PROJECT** window is automatically opened as shown in the following figure.



(b) Click the **Add** button on the **SELECT PROJECT** window to start a new project (Or **File ➔ New Project ➔ Add**).

(c) Select **River Mechanics** checkbox and click the **OK** button on the **NEW PROJECT OPTIONS** form.

(d) Type "*PIER_INFLUENCE*" into the **Reference** textbox. This is the name of this newly created project. Users can choose any name for the Reference textbox as long as it does not exist in the current **DDMSW** project database.

(e) Type into the **Title** textbox a brief descriptive title for this project. ***(Optional)***

(f) Type into the **Location** textbox the location of this project. ***(Optional)***

(g) Type into the **Agency** textbox the agency or company name**.** ***(Optional)***

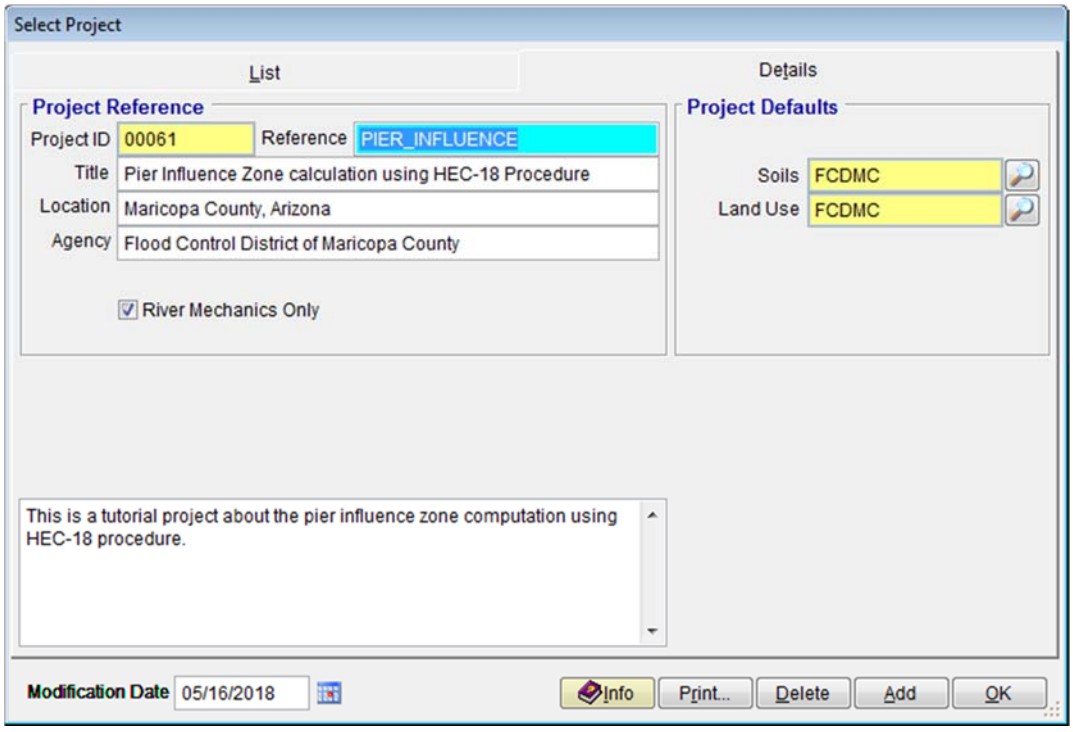
(h) Check **River Mechanics Only** checkbox for this project.

(i) Type a detailed description of this project into the comment area under the **Project Reference** frame. ***(Optional)***

(j) Set the Modification Date using today's date by clicking on the Calendar icon.

(k) Click the **Save** button to save the entered data.

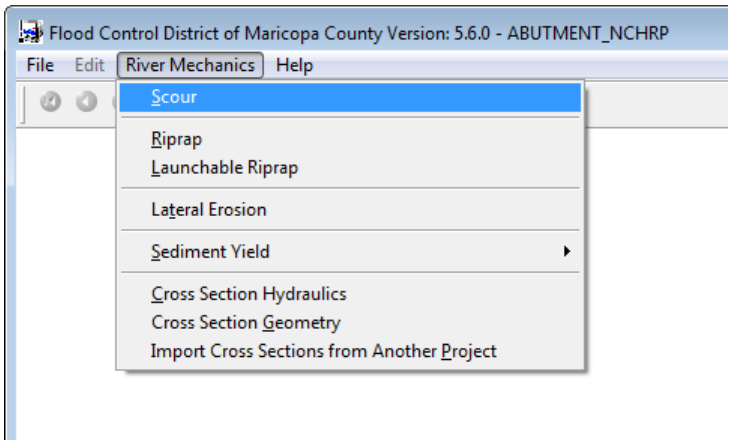
(l) Click the **OK** button on the **SELECT PROJECT** window, and click the **OK** button on the pop-up message box. The following figure shows what the window looks like.

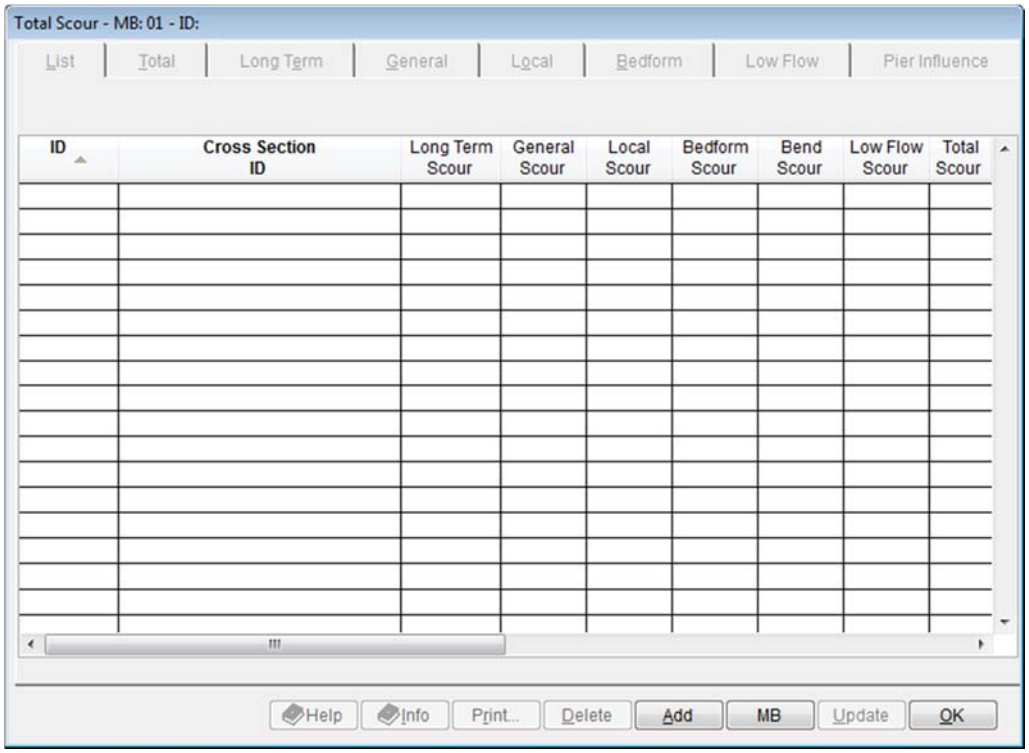


Note: the **Project ID** "*00061*" in the above figure is the unique database record identifier for the project, which is automatically generated by the program when a new project is created. When users create a new project, the **Project ID** of the new project will not be the same as the **Project ID** shown in the above figure.

2.1.2 Step 2 - Prepare cross section hydraulics Data

(a) From the menu bar of main application window, click **River Mechanics** ➔ **Scour**, to open the **TOTAL SCOUR** form.



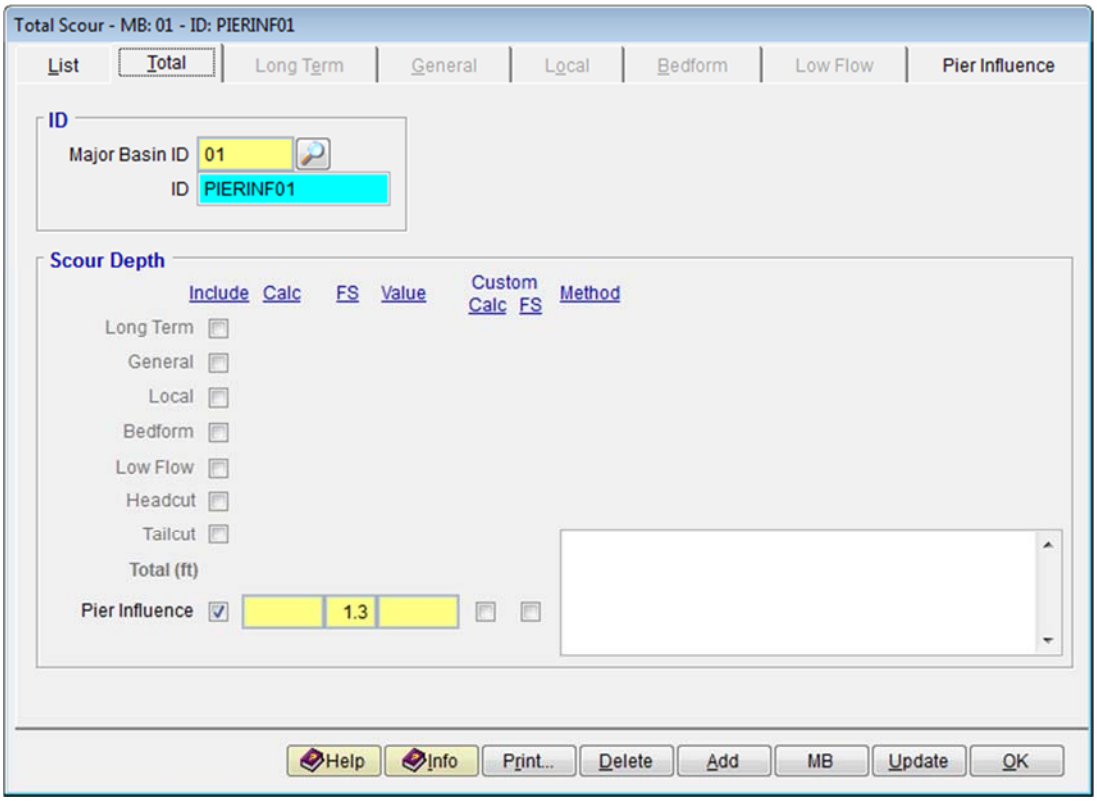


(b) Click the **Add** button to activate the necessary data entry fields.

(c) Type "*PIERINF01*" into the **ID** textbox.

(d) Check the **Pier Influence** Checkbox only.

(e) Click the **Save** button to save the entered data. The **TOTAL SCOUR – MB: 01 – ID: PIERINF01** window shows up like following figure.



2.1.3 Step 3 – Calculate Pier Influence Zone Width

(f) Click the **Pier Influence** Tab

(g) Enter *"15"* into the **Pier Scour Depth, Ys (ft)** textbox.

(h) Enter *"1.0"* into the **Ratio of bottom width to depth of local pier scour, B** textbox.

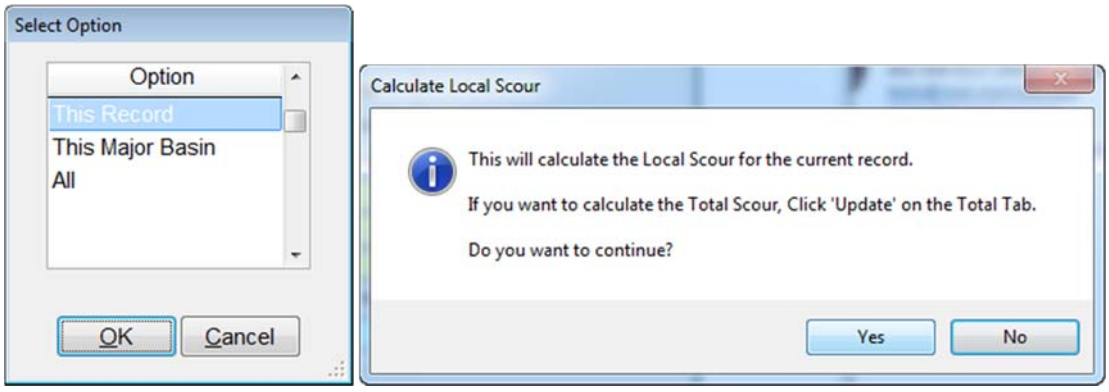
(i) Enter *"44"* into the **Angle of repose of the bed material in water, (degrees)** textbox.

(j) Enter *"10"* into the **Distance from outside edge of pier, X (ft)** textbox.

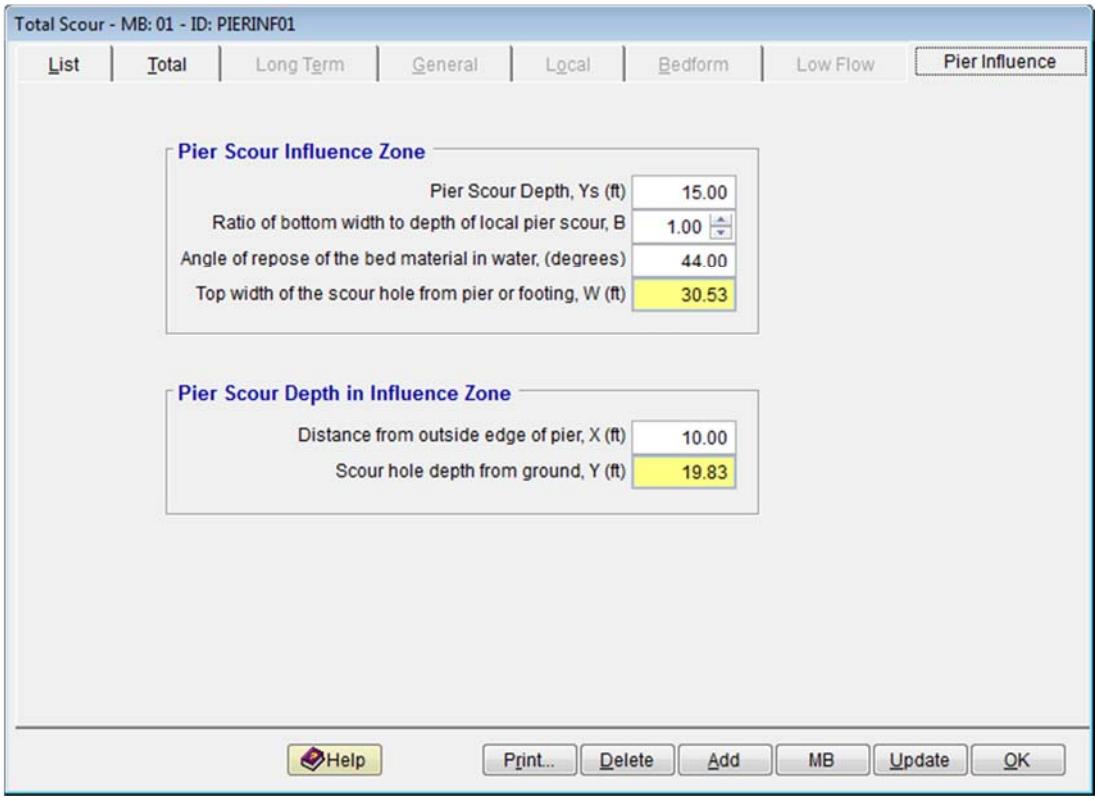
(k) Click the **Save** button to save the entered data.

(l) Click the **Update** button to update the data.

(m) Select "*This Record*" from the **SELECTION OPTION** window, and click **Yes** from the confirmation message to proceed.



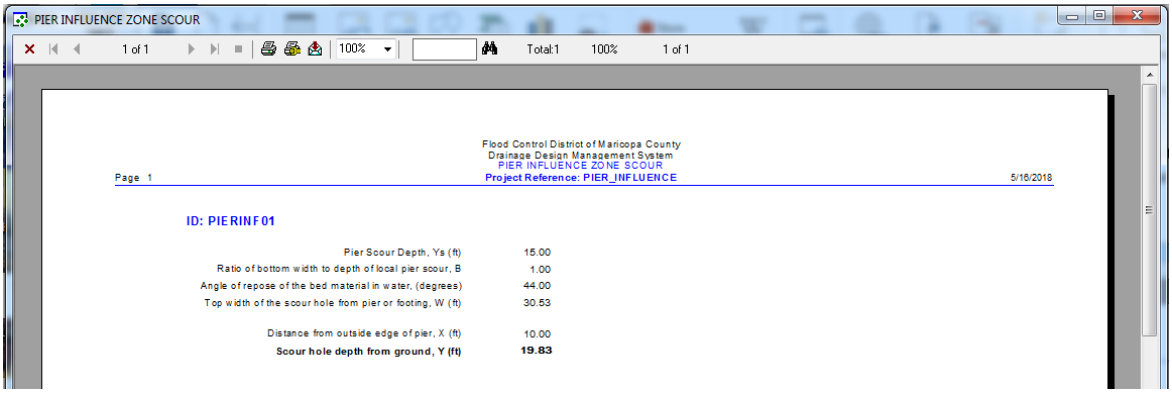
(n) After the update the window looks like what is shown in the following figure



2.1.4 Step 4 - Report and Document the Results

In this section, the instruction will be given on how to view, print, and export the calculation results of the guide bank scour.

(a) To view the results on the screen, click the **Print …** button on the Local Tab of **TOTAL SCOUR – MB: 01 – ID: PIERINF01** window, a report will be generated as is shown in the following figure.



(b) To print out the results on a printer, click the printer symbol ( ).

(c) To export the results in PDF format or other formats, click the export symbol ( )

This concludes tutorial for pier influence zone calculation.