TITLE 210 – NATIONAL ENGINEERING HANDBOOK

Part 650 – Engineering Field Handbook

Chapter 8 Terraces

Amended April 2025

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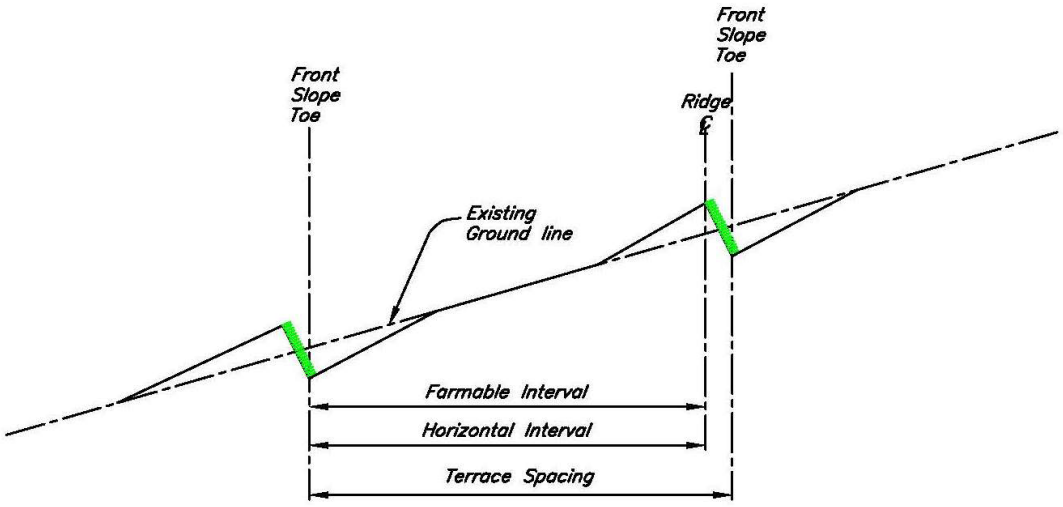
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IA650.0804 Types of Terrace Cross Sections

F. Steep Front – Farmable Backslope Terrace

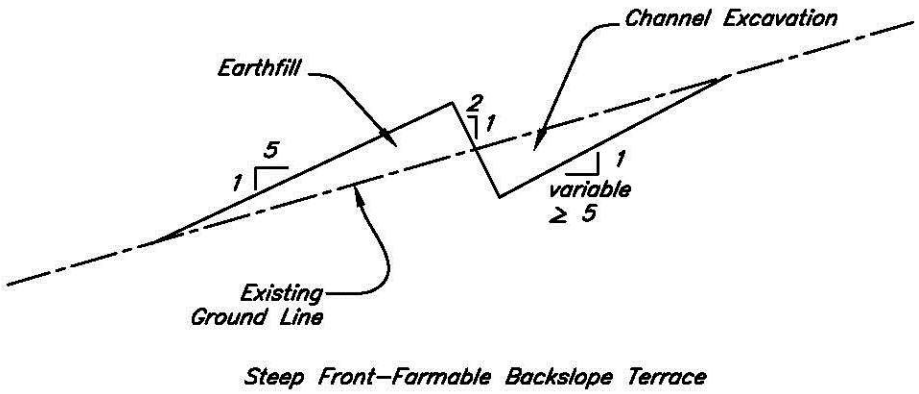
1. Steep front–farmable backslope terraces (also referred to as grassed front–farmable backslope terraces) are defined as terraces which have a 2:1 or flatter front slope and a farmable backslope with a 5:1 or flatter slope. Earthfill for the terrace ridge may be taken from the downhill side or from excavation of the terrace channel. The ridge front slope is not cropped and is seeded to permanent grass. The terrace channel is normally triangular shaped with the flow line located at the toe of the steep front slope. Figure IA8-1 shows terrace spacing terms for a steep front–farmable backslope terrace. Figure IA8-2 shows a typical steep front-farmable backslope terrace cross section with fixed front slope and backslope ratios.
2. Steep front–farmable backslope terraces are a new type of terrace cross section. Some farmers prefer this type of cross section because it allows them to farm the backslope which reduces the amount of ground taken out of production. It also allows for the intake of the underground outlet to be placed at the toe of the steep front slope. This keeps the intake in a non-cropped area and minimizes the chance of the intake being damaged during farming operations.

Figure IA8-1: Terrace Spacing Terms



Steep Front–Farmable Backslope Terrace

Figure IA8-2: Constructed with Fixed Frontslope and Backslope Ratios



3. Steep front–farmable backslope terraces may be used on slopes up to 8 percent; however, it is generally recommended that the maximum slope for this type of terrace be limited to 6 percent. The primary reason for this limitation is that the ground slope in the farmable or horizontal interval increases with the construction of this type of terrace. This increase must be taken into consideration when determining terrace spacing requirements based on sheet and rill erosion.
4. As with narrow based and grassed backslope terraces, it is normally desirable to use a parallel alignment for this terrace cross section because the terrace ridge cannot be crossed with farm equipment. The use of a terrace spacing based on an even number of equipment widths is also advantageous since it provides for round trips back to the terrace access point for field operations.

IA650.0806 Terrace Spacing

D. Terrace spacing based on erosion prediction tools

5. The Revised Universal Soil Loss Equation, Version 2, (RUSLE2) can be used to determine terrace spacing for site specific designs. However, use of the tool for this purpose can be complex due to the large number of variables including types of crops, crop rotations, tillage operations, soil types, rainfall factors, topography, etc. Results can vary significantly with relatively small changes in one or more of the variables.
6. In addition to helping control sheet and rill erosion, terraces are an effective practice to control ephemeral gully erosion. RUSLE2 does not provide a method for calculating ephemeral gully erosion; therefore, terrace spacing criteria for controlling ephemeral gullies was estimated based on soil type, land slope, and experience.
7. To facilitate the design of terrace systems, charts have been developed to provide maximum terrace spacings based on RUSLE2 and the criteria for ephemeral gully control. These charts start on the following page. Here are the steps to use the charts:
    a. Select the appropriate chart to use for a specific county based on the R (Rainfall Factor) value provided in Figure IA8-3.
    b. Select whether the terrace will be a level terrace or storage/gradient terrace.
    c. Determine the type of terrace cross section.
    a. Select a soil K value (Soil Erosion Factor) based on the soil type. If the actual K value is not shown, use the table value shown in Figure IA8-4 closest to the actual K value.
    d. Select the applicable slope range.
    e. From the table provided in Figure IA8-4, read the maximum spacing allowed.

Figure IA8-3: Rainfall Factors – R

County	R		County	R		County	R
Adair	180		Greene	160		Page	190
Adams	190		Grundy	170		Palo Alto	140
Allamakee	140		Guthrie	170		Plymouth	130
Appanoose	190		Hamilton	160		Pocahontas	150
Audubon	160		Hancock	150		Polk	170
Benton	170		Hardin	170		Pottawattamie	160
Black Hawk	170		Harrison	150		Poweshiek	180
Boone	170		Henry	190		Ringgold	190
Bremer	160		Howard	150		Sac	150
Buchannan	170		Humboldt	160		Scott	170
Buena Vista	150		Ida	150		Shelby	160
Butler	170		Iowa	180		Sioux	130
Calhoun	160		Jackson	160		Story	170
Carroll	160		Jasper	170		Tama	170
Cass	170		Jefferson	180		Taylor	190
Cedar	170		Johnson	180		Union	180
Cerro Gordo	160		Jones	170		Van Buren	190
Cherokee	140		Keokuk	180		Wapello	180
Chickasaw	160		Kossuth	150		Warren	180
Clarke	190		Lee	190		Washington	180
Clay	140		Linn	170		Wayne	200
Clayton	150		Louisa	180		Webster	160
Clinton	170		Lucas	190		Winnebago	150
Crawford	150		Lyon	120		Winneshiek	150
Dallas	170		Madison	180		Woodbury	130
Davis	190		Mahaska	180		Worth	150
Decatur	190		Marion	180		Wright	160
Delaware	170		Marshall	170			
Des Moines	180		Mills	170			
Dickinson	140		Mitchell	160			
Dubuque	160		Monona	140			
Emmet	140		Monroe	190			
Fayette	160		Montgomery	180			
Floyd	160		Muscatine	180			
Franklin	170		O'Brien	140			
Fremont	170		Osceola	130			

Figure IA8-4: Maximum Terrace Spacings (ft.)

Graded Terraces – Maximum Terrace Spacings for R = 120 and 130								
Slope	Grassed Back, Farmable Front Slope				Narrow Base			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	350	350	400	400	350	350	400	400
5-6	250	300	350	350	250	300	350	350
7-8	250	300	350	350	200	300	350	350
9-10	180	300	350	350	130	300	300	350
11-12	150	250	270	300	120	220	220	300
13-14	150	240	240	300	120	150	150	300
15-16	150	200	200	270	120	140	140	220
17-18	120	190	190	250	120	120	130	200
Slope	Broadbase				Grassed Front, Farmable Backslope			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	350	350	400	400	350	350	400	400
5-6	250	300	350	350	250	300	350	350
7-18	Not Allowed							
Level Terraces – Maximum Terrace Spacings for R = 120 and 130								
Slope	Grassed Back, Farmable Front Slope				Narrow Base			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	350	350	400	400	350	350	400	400
5-6	250	300	350	350	250	300	350	350
7-8	250	300	350	350	250	300	350	350
9-10	250	300	350	350	250	300	350	350
11-12	150	250	300	300	200	250	300	300
13-14	150	250	300	300	160	250	300	300
15-16	150	250	280	300	140	230	230	300
17-18	150	250	250	300	130	200	200	290
Slope	Broadbase				Grassed Front, Farmable Backslope			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	350	350	400	400	350	350	400	400
5-6	250	300	350	350	250	300	350	350
7-18	Not Allowed							

Figure IA8-4: Maximum Terrace Spacings (ft) – continued

Graded Terraces – Maximum Terrace Spacings for R = 140								
Slope	Grassed Back, Farmable Front Slope				Narrow Base			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	350	350	400	400	350	350	400	400
5-6	250	300	350	350	250	300	350	350
7-8	180	300	350	350	130	300	350	350
9-10	140	230	260	350	120	150	210	350
11-12	120	200	220	300	120	130	170	280
13-14	120	170	200	280	120	120	150	210
15-16	120	170	170	190	120	120	120	140
17-18	120	160	170	180	120	120	120	130
Slope	Broadbase				Grassed Front, Farmable Backslope			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	350	350	400	400	350	350	400	400
5-6	220	300	350	350	220	300	350	350
7-18	Not Allowed							

Level Terraces – Maximum Terrace Spacings for R = 140								
Slope	Grassed Back, Farmable Front Slope				Narrow Base			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	350	350	400	400	350	350	400	400
5-6	250	300	350	350	250	300	350	350
7-8	250	300	350	350	250	300	350	350
9-10	210	300	350	350	150	300	350	350
11-12	150	250	300	300	120	250	280	300
13-14	150	250	270	300	120	200	220	300
15-16	150	210	220	250	120	150	160	180
17-18	150	190	190	220	120	140	140	150
Slope	Broadbase				Grassed Front, Farmable Backslope			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	350	350	400	400	350	350	400	400
5-6	250	300	350	350	250	300	350	350
7-18	Not Allowed							

Figure IA8-4: Maximum Terrace Spacings (ft.) – continued

Graded Terraces – Maximum Terrace Spacings for R = 150								
Slope	Grassed Back, Farmable Front Slope				Narrow Base			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	350	350	400	400	350	350	400	400
5-6	250	300	350	350	220	300	350	350
7-8	170	300	350	350	120	300	350	350
9-10	130	230	240	350	120	180	180	350
11-12	120	200	200	300	120	150	140	250
13-14	120	170	190	240	120	120	120	190
15-16	120	170	170	190	120	120	120	140
17-18	120	160	170	180	120	120	120	120
Slope	Broadbase				Grassed Front, Farmable Backslope			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	300	350	400	400	300	350	400	400
5-6	160	300	350	350	200	300	350	350
7-18	Not Allowed							

Level Terraces – Maximum Terrace Spacings for R = 150								
Slope	Grassed Back, Farmable Front Slope				Narrow Base			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	350	350	400	400	350	350	400	400
5-6	250	300	350	350	250	300	350	350
7-8	250	300	350	350	230	300	350	350
9-10	190	300	350	350	140	300	350	350
11-12	150	250	300	300	120	210	280	300
13-14	150	240	270	300	120	170	220	300
15-16	150	200	220	250	120	130	170	220
17-18	150	180	180	220	120	120	130	190
Slope	Broadbase				Grassed Front, Farmable Backslope			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	350	350	400	400	350	350	400	400
5-6	250	300	350	350	250	300	350	350
7-18	Not Allowed							

Figure IA8-4: Maximum Terrace Spacings (ft.) – continued

Graded Terraces – Maximum Terrace Spacings for R = 160								
Slope	Grassed Back, Farmable Front Slope				Narrow Base			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	x	300	350	350	x	300	350	350
5-6	230	250	300	300	180	250	300	300
7-8	150	250	300	300	120	250	300	300
9-10	120	210	240	290	120	170	190	240
11-12	120	170	200	230	120	130	150	180
13-14	120	160	180	200	120	120	130	150
15-16	120	150	160	170	120	120	120	120
17-18	120	120	160	170	120	120	120	120
Slope	Broadbase				Grassed Front, Farmable Backslope			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	x	300	350	350	x	300	350	350
5-6	140	250	300	300	190	250	300	300
7-18	Not Allowed							

Level Terraces – Maximum Terrace Spacings for R = 160								
Slope	Grassed Back, Farmable Front Slope				Narrow Base			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	x	300	350	y	x	300	350	y
5-6	200	250	300	y	200	250	300	y
7-8	200	250	300	y	190	250	300	y
9-10	150	250	300	y	120	250	300	y
11-12	140	200	250	y	120	200	220	y
13-14	120	200	230	y	120	160	180	y
15-16	120	180	190	y	120	130	140	y
17-18	120	170	180	y	120	120	130	y
Slope	Broadbase				Grassed Front, Farmable Backslope			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	**x**	**300**	**350**	**y**	**x**	**300**	**350**	**y**
5-6	**200**	**250**	**300**	**y**	**200**	**250**	**300**	**y**
7-18	**Not Allowed**							

"x" indicates there are no soils in this category that are commonly terraced

"y" indicates there are no soils in this category that are commonly level terraced

Figure IA8-4: Maximum Terrace Spacings (ft.) – continued

Graded Terraces – Maximum Terrace Spacings for R = 170								
Slope	Grassed Back, Farmable Front Slope				Narrow Base			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	x	300	350	350	x	300	350	350
5-6	170	250	300	300	120	250	300	300
7-8	150	250	300	300	120	200	300	300
9-10	120	180	240	240	120	120	190	220
11-12	120	170	200	220	120	120	150	150
13-14	120	160	180	200	120	120	130	130
15-16	120	150	160	160	120	120	120	120
17-18	120	150	150	150	120	120	120	120
Slope	Broadbase				Grassed Front, Farmable Backslope			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	x	300	350	350	x	300	350	350
5-6	120	250	300	300	120	250	300	300
7-18	Not Allowed							

Level Terraces – Maximum Terrace Spacings for R = 170								
Slope	Grassed Back, Farmable Front Slope				Narrow Base			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	x	300	350	y	x	300	350	y
5-6	200	250	300	y	190	250	300	y
7-8	180	250	300	y	130	250	300	y
9-10	150	220	280	y	120	160	220	y
11-12	120	190	220	y	120	130	150	y
13-14	120	170	190	y	120	120	120	y
15-16	120	160	160	y	120	120	120	y
17-18	120	160	160	y	120	120	120	y
Slope	Broadbase				Grassed Front, Farmable Backslope			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	x	300	350	y	x	300	350	y
5-6	x	250	300	y	x	250	300	y
7-18	Not Allowed							

"x" indicates there are no soils in this category that are commonly terraced
"y" indicates there are no soils in this category that are commonly level terraced

Figure IA8-4: Maximum Terrace Spacings (ft.) – continued

Graded Terraces – Maximum Terrace Spacings for R = 180								
Slope	Grassed Back, Farmable Front Slope				Narrow Base			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	x	250	300	300	x	250	300	300
5-6	x	200	250	250	x	200	250	250
7-8	x	200	250	250	x	150	250	220
9-10	x	140	140	140	x	120	120	120
11-12	x	140	140	140	x	120	120	120
13-14	x	140	140	140	x	120	120	120
15-16	x	120	120	120	x	120	120	120
17-18	x	120	120	120	x	120	120	120
Slope	Broadbase				Grassed Front, Farmable Backslope			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	x	250	300	300	x	250	300	300
5-6	x	200	250	250	x	200	250	250
7-18	Not Allowed							

Maximum Terrace Spacings for R = 190 and 200								
Slope	Grassed Back, Farmable Front Slope				Narrow Base			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	x	250	300	300	x	250	300	300
5-6	x	200	250	250	x	200	250	250
7-8	x	160	160	250	x	120	120	220
9-10	x	140	140	140	x	120	120	120
11-12	x	120	120	120	x	120	120	120
13-14	x	120	120	120	x	120	120	120
15-16	x	120	120	120	x	120	120	120
17-18	x	120	120	120	x	120	120	120
Slope	Broadbase				Grassed Front, Farmable Backslope			
	Soil K Value				Soil K Value			
	0.49	0.43	0.37	0.32	0.49	0.43	0.37	0.32
0-4	x	250	300	300	x	250	300	300
5-6	x	140	170	250	x	140	230	250
7-18	Not Allowed							

"x" indicates there are no soils in this category that are commonly terraced

IA650.0808 Underground Outlet Design

C. Storage Pool Volume Calculations

5. Graphical Routing Procedures for Terraces and Water and Sediment Control Basins

b. One of the methods which may be used to determine the required storage pool volume due to runoff is a simplified flood routing procedure commonly referred to as the "Caldwell method." This method is utilized in the Underground Outlet Design part of the Terrace Design Tool (TDT). While it is recommended that the TDT be used to design terraces and water and sediment control basins, there may be instances when it is helpful to perform the simplified routing manually. This amendment provides a graph which may be used to perform the routing.

b. The following procedure may be used:

(1) Determine the runoff from a 10-yr., 24-hr. rainfall. This may be done using the hydraulics tab in the TDT or by using the Engineering Field Handbook Chapter 2 (EFH2) program.

(2) Determine the Drainage Coefficient to be used for the design. This should be the value needed to drain the terrace or basin within 48 hours after the storm. For example, if the storm runoff is 3.0 inches, a drainage coefficient of 1.5 inches/day will be needed to drain the terrace or basin within 48 hours.

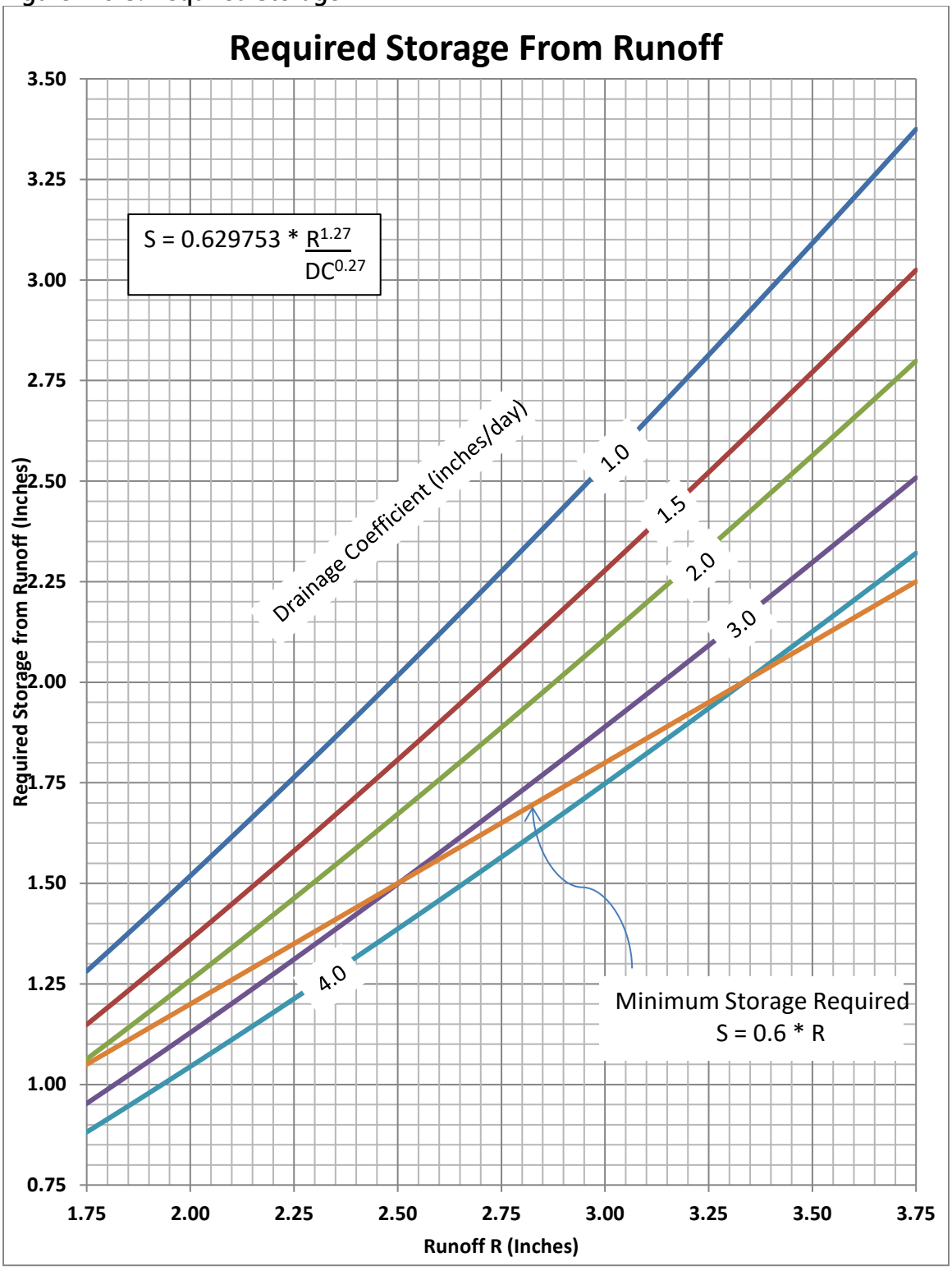
(3) Determine the storage volume required due to runoff from the graph. Enter the graph on the bottom with the runoff; go vertically up to the appropriate drainage coefficient line; read horizontally to the left to determine the storage required due to runoff.

(4) The minimum storage required from runoff is 60% of the total runoff. This can be checked by a simple calculation or by making sure the point where the runoff intersected the drainage coefficient line on the graph shown in Figure IA8-5 is above the minimum storage line.

(5) Determine the sediment storage required. This is the amount of sediment to be accumulated over the 10-year life span of the terrace or basin. This value can be obtained from the sediment storage tab within the TDT.

(6) The total volume of storage required is the sum of the volume due to runoff (step 3) and the volume due to sediment (step 5).

Figure IA8-5: Required Storage



IA650.0808 Underground Outlet Design

K. Relief Wells

6. Relief wells may be used to protect a tile line from developing excessive pressure. Two common examples when this can occur are:
   a. An underground outlet from a new tile outlet terrace system is connected to an existing tile line. The capacity in the existing line may not be adequate to carry part, or all the additional flow from the underground outlet without creating pressure flow.
   b. A tile line transitions from a steeper slope to a flatter slope. The capacity of the tile on the flatter slope is less than the tile on the steeper slope. This could create pressure flow in the tile line.
7. The relief well should be designed so the maximum velocity through the relief well pipe will not exceed 2 feet per second. Figure IA8-6 shows the maximum flow for various pipe sizes.

Figure IA8-6: Relief Well Design Flow

Nominal Pipe Diameter (in.)	Maximum Flow (cfs)
4	0.17
5	0.27
6	0.39
8	0.70
10	1.09
12	1.57
14	2.14
15	2.45
16	2.79
18	3.53
21	4.81
24	6.28

8. Use the full pipe flow in the upstream tile line(s) minus the flow in the downstream tile line flow to design the relief well. The full pipe flow in each

line may be estimated based on the type of tile, diameter, and the slope of the line.

9. The relief well should be located upstream of and as close as possible to the junction of the two lines or the slope break.

Appendix IA8C Iowa EFT Preferences for Terraces, Underground Outlets, and Non-practice Specific Items

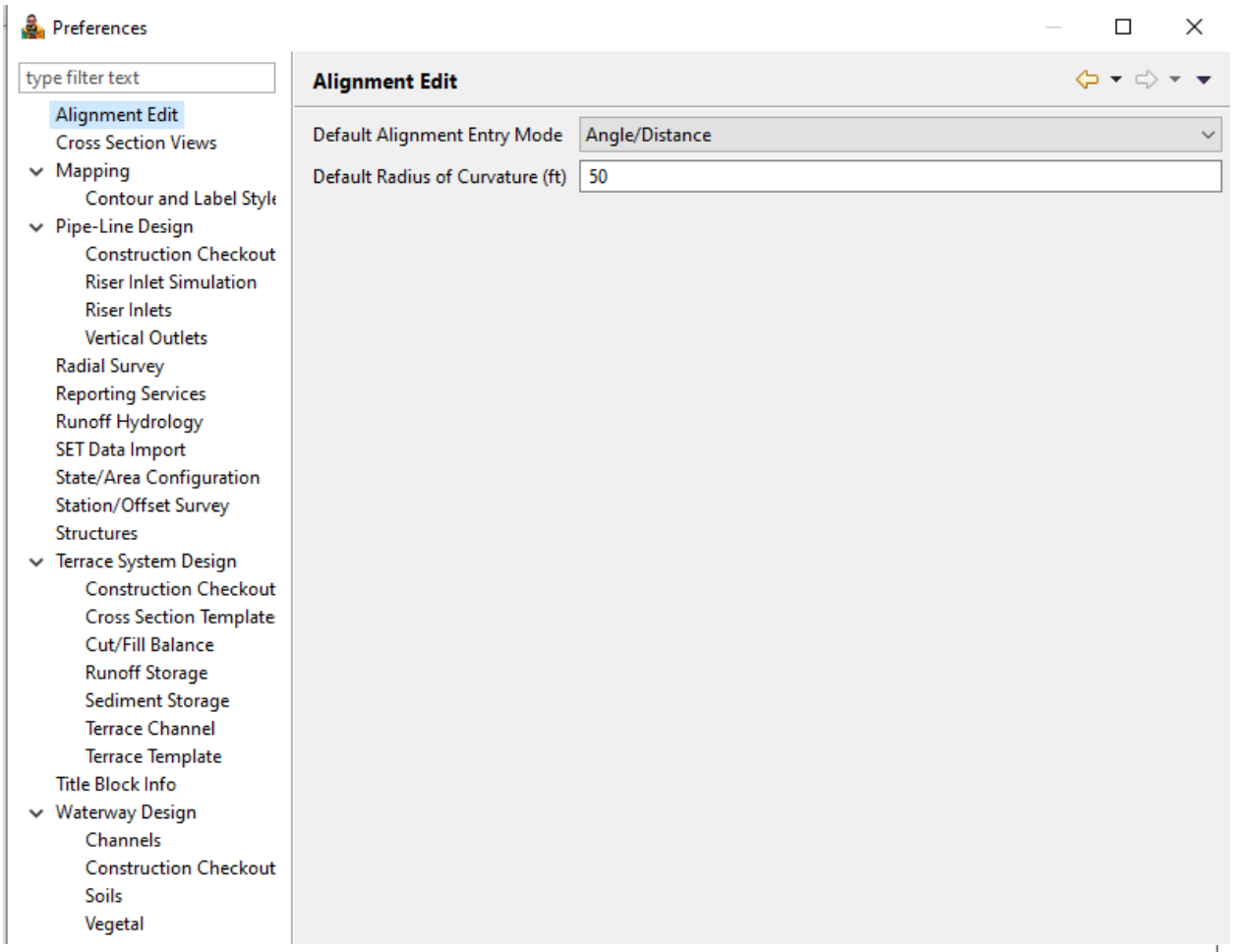
A. The NRCS Engineering Field Tools (EFT) software includes a preferences section that allows the user to minimize data entry by setting default values for many design parameters.

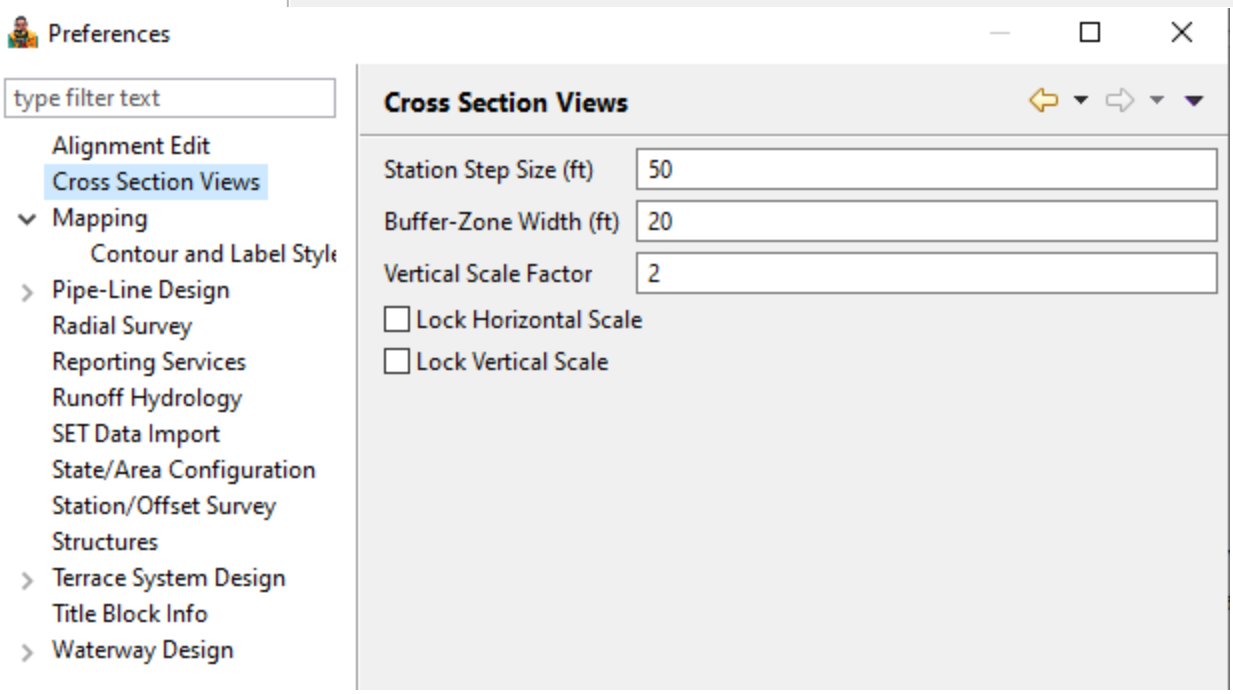
B. This Appendix provides the Iowa EFT preferences for terraces/water and sediment control basins and underground outlets. It also documents the preset values for general items that apply to grassed waterways as well as terraces/water and sediment control basins. In some cases where an item applies to both types of practices, the specific variable will show the preference for terraces. An example of this is the "station/offset survey" item. The default offset entry panel style is shown as "cross-slope table." For waterways, this would generally be changed to "scrolling tables."

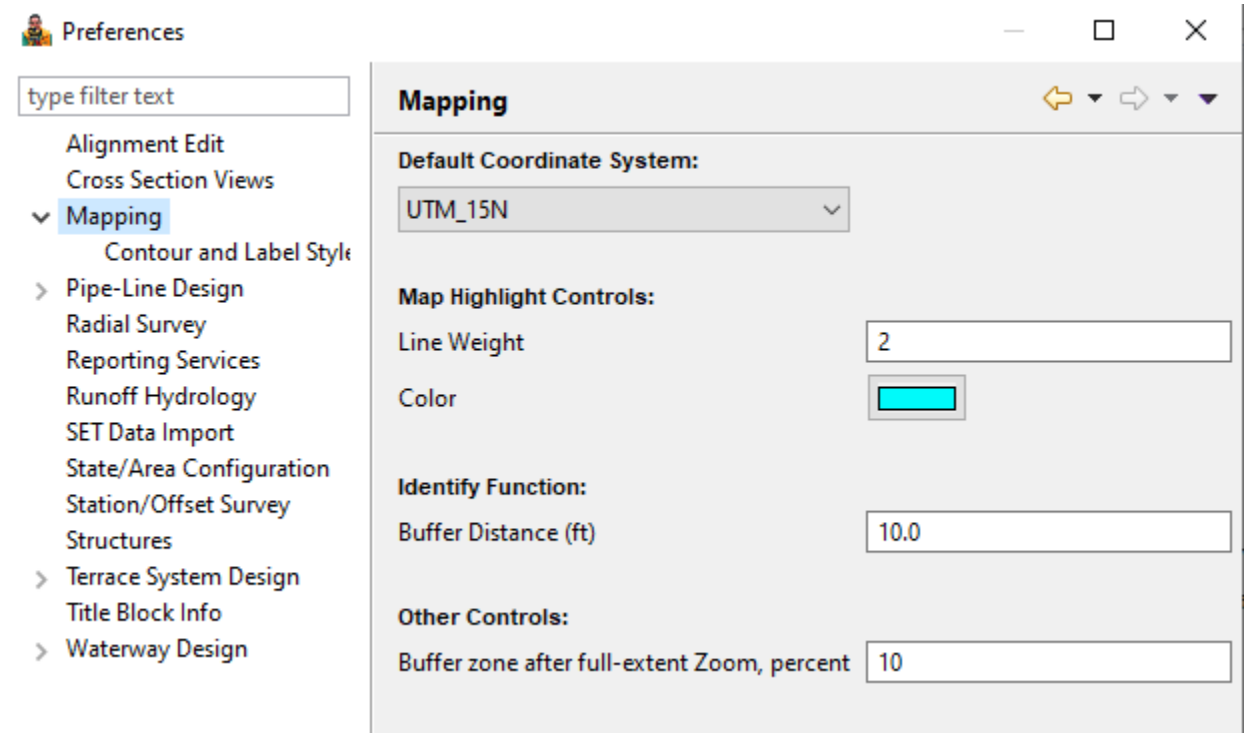
C. Iowa EFT preferences for grassed waterways are included in EFH, Chapter 7, Grassed Waterways, Appendix IA7E.

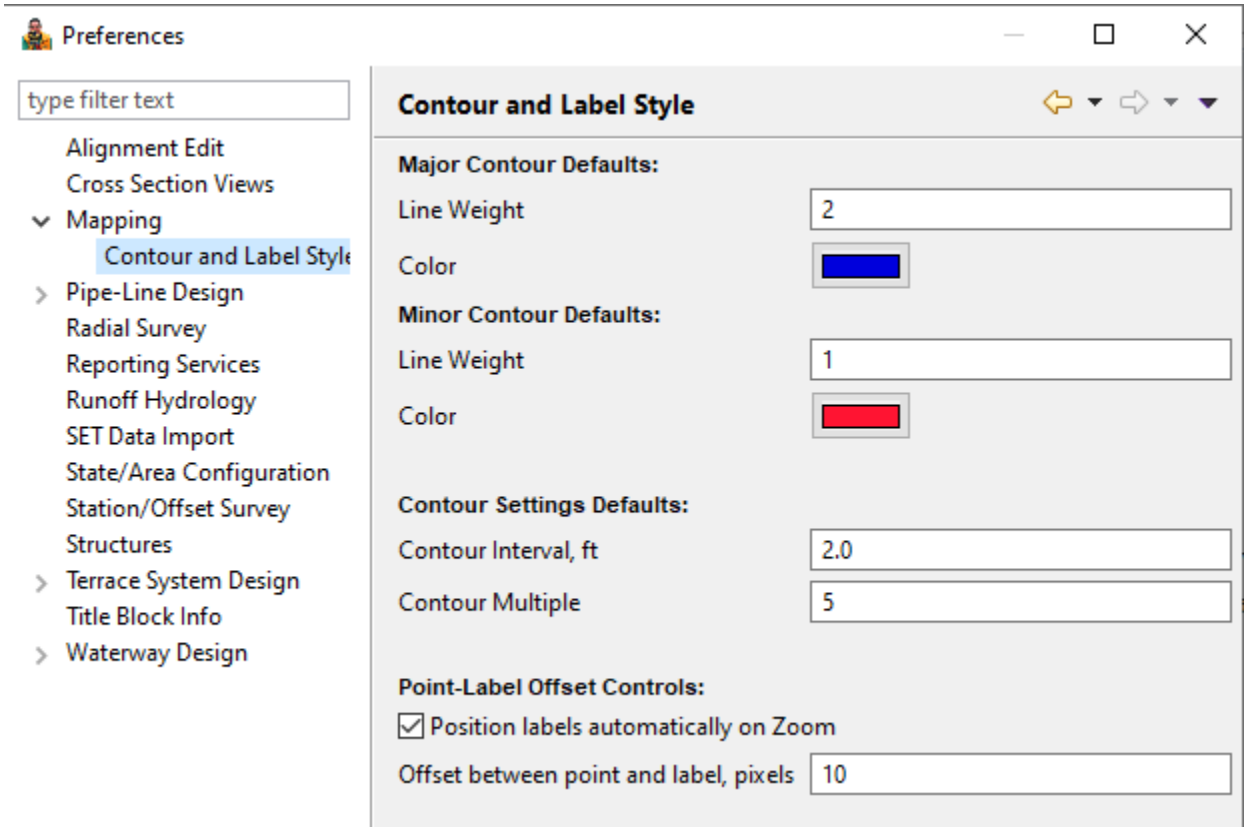
D. The preferences and screen shots shown in this appendix are specifically for version 4.0.2.2 of the EFT. When new versions of the tool are released, the layout and content of some of the screens may change. However, the values used for specific variables should still be valid.

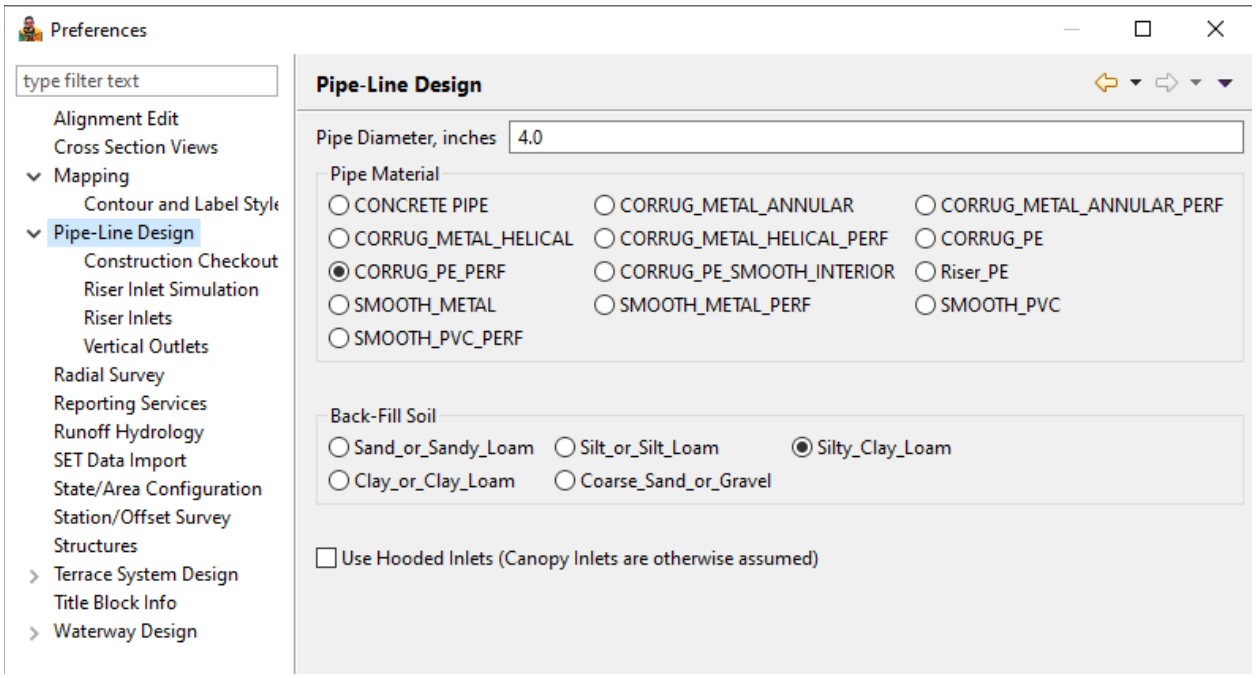
E. The current preferences settings are available to NRCS and partner staff on the "Iowa NRCS EFT" SharePoint site as a file that can be imported into EFT.

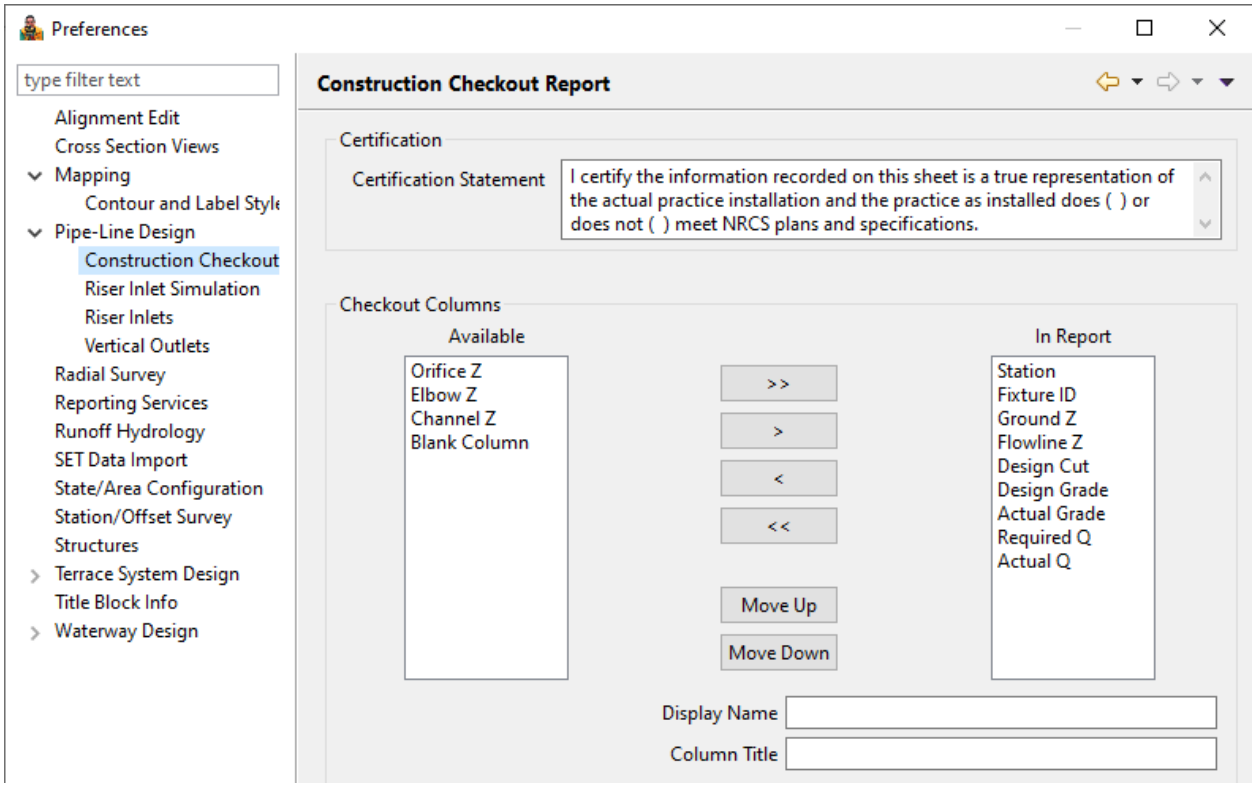

Preferences
type filter text
Alignment Edit
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Terrace Template
Title Block Info
Waterway Design
Channels
Construction Checkout
Soils
Vegetal
Alignment Edit
Default Alignment Entry Mode
Angle/Distance
Default Radius of Curvature (ft)
50

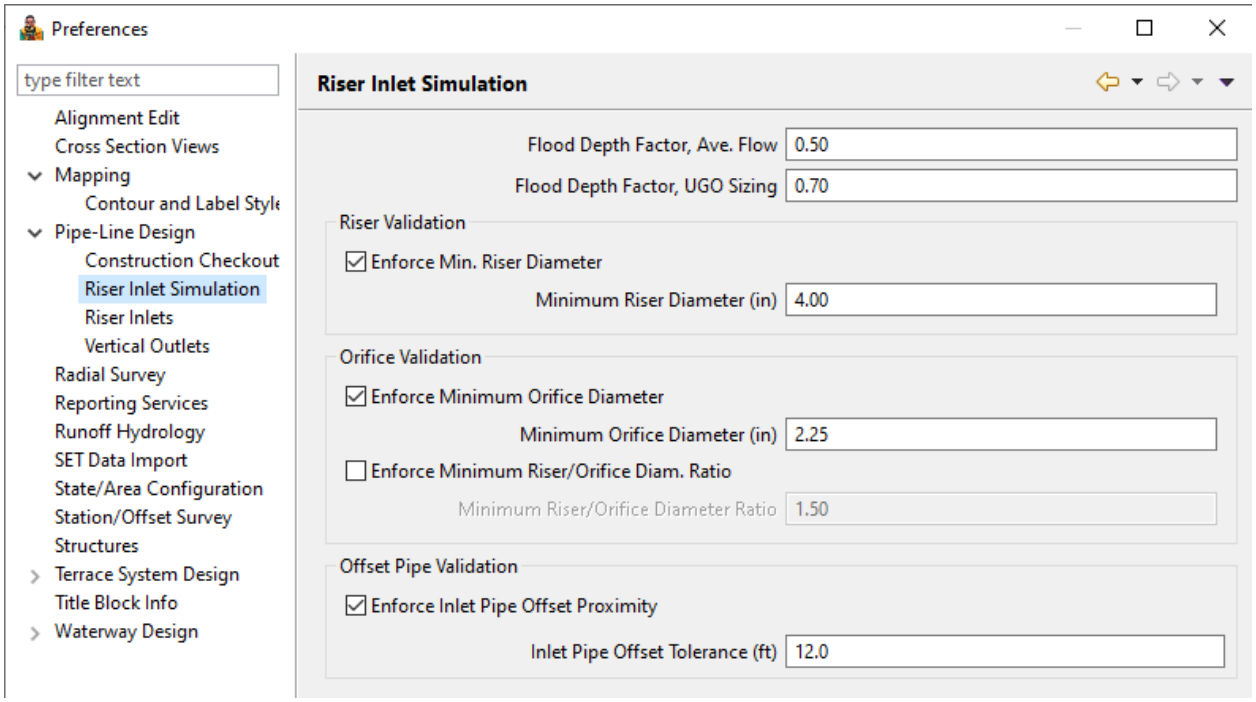

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type filter text
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Terrace System Design
Title Block Info
Waterway Design
Cross Section Views
Station Step Size (ft)
50
Buffer-Zone Width (ft)
20
Vertical Scale Factor
2
Lock Horizontal Scale
Lock Vertical Scale

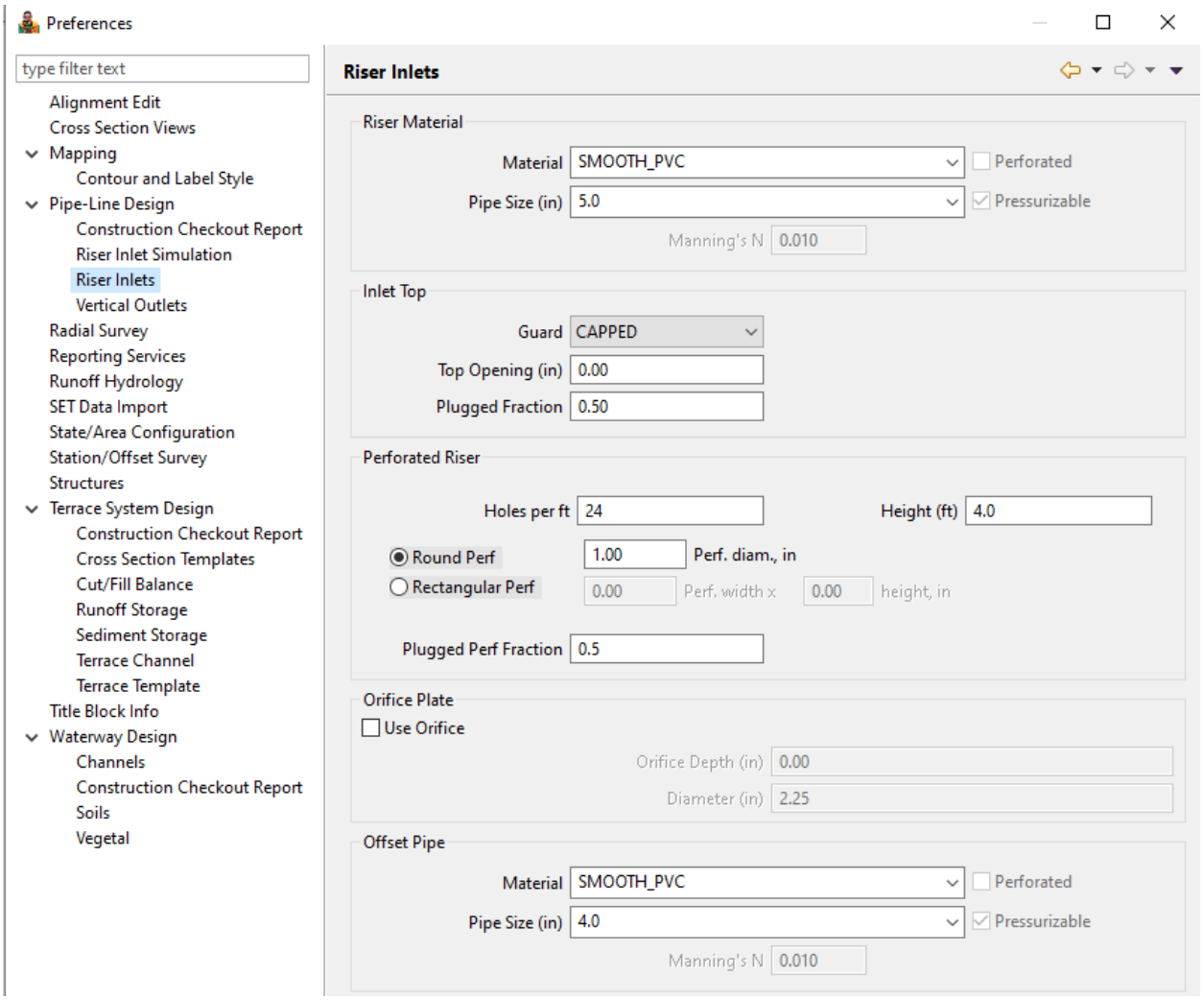

Preferences
type filter text
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Title Block Info
Waterway Design
Mapping
Default Coordinate System:
UTM_15N
Map Highlight Controls:
Line Weight
2
Color
Identify Function:
Buffer Distance (ft)
10.0
Other Controls:
Buffer zone after full-extent Zoom, percent
10


Preferences
type filter text
Alignment Edit
Cross Section Views
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Contour and Label Style
Major Contour Defaults:
Line Weight
2
Color
Minor Contour Defaults:
Line Weight
1
Color
Contour Settings Defaults:
Contour Interval, ft
2.0
Contour Multiple
5
Point-Label Offset Controls:
Position labels automatically on Zoom
Offset between point and label, pixels
10

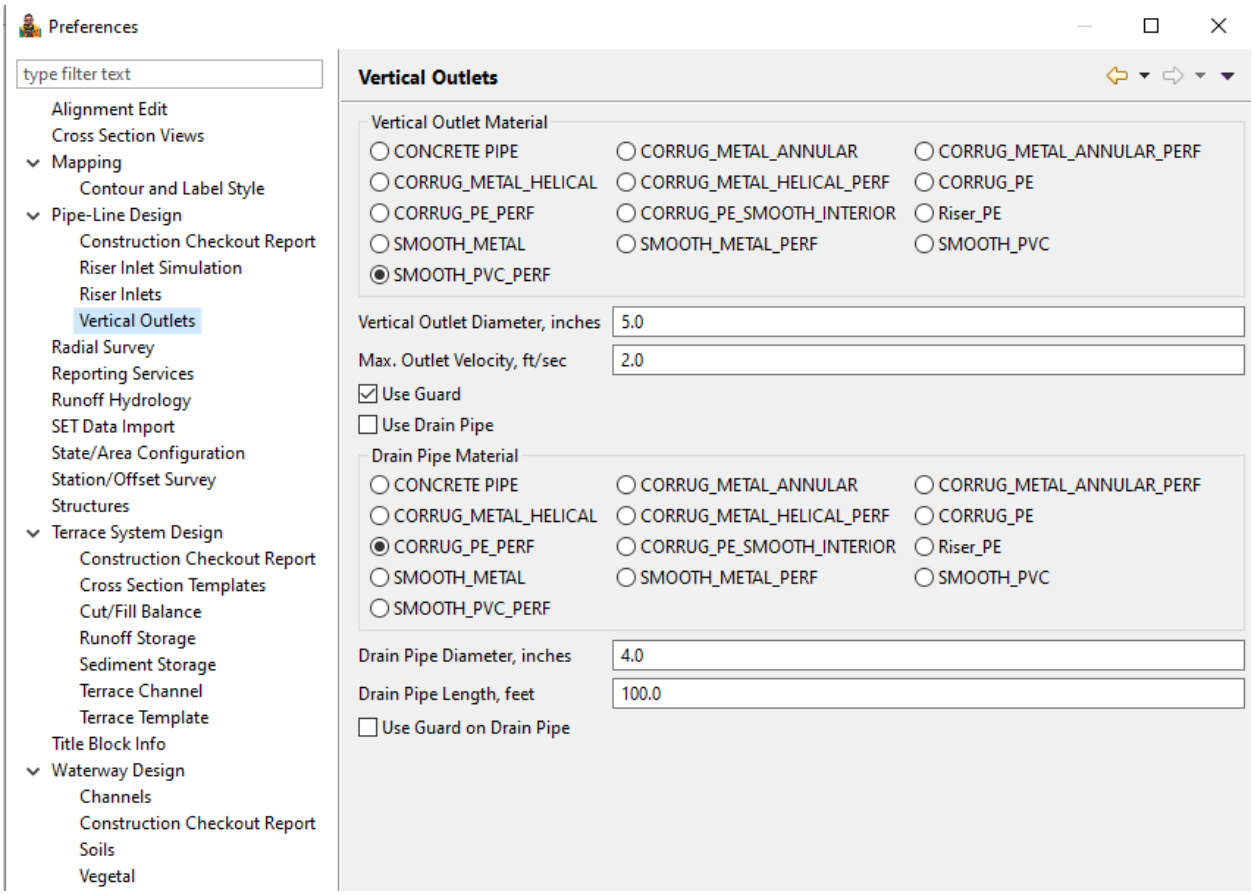

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type filter text
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Pipe-Line Design
Pipe Diameter, inches
4.0
Pipe Material
CONCRETE PIPE
CORRUG_METAL_ANNULAR
CORRUG_METAL_ANNULAR_PERF
CORRUG_METAL_HELICAL
CORRUG_METAL_HELICAL_PERF
CORRUG_PE
CORRUG_PE_PERF
CORRUG_PE_SMOOTH_INTERIOR
Riser_PE
SMOOTH_METAL
SMOOTH_METAL_PERF
SMOOTH_PVC
SMOOTH_PVC_PERF
Back-Fill Soil
Sand_or_Sandy_Loam
Silt_or_Silt_Loam
Silty_Clay_Loam
Clay_or_Clay_Loam
Coarse_Sand_or_Gravel
Use Hooded Inlets (Canopy Inlets are otherwise assumed)

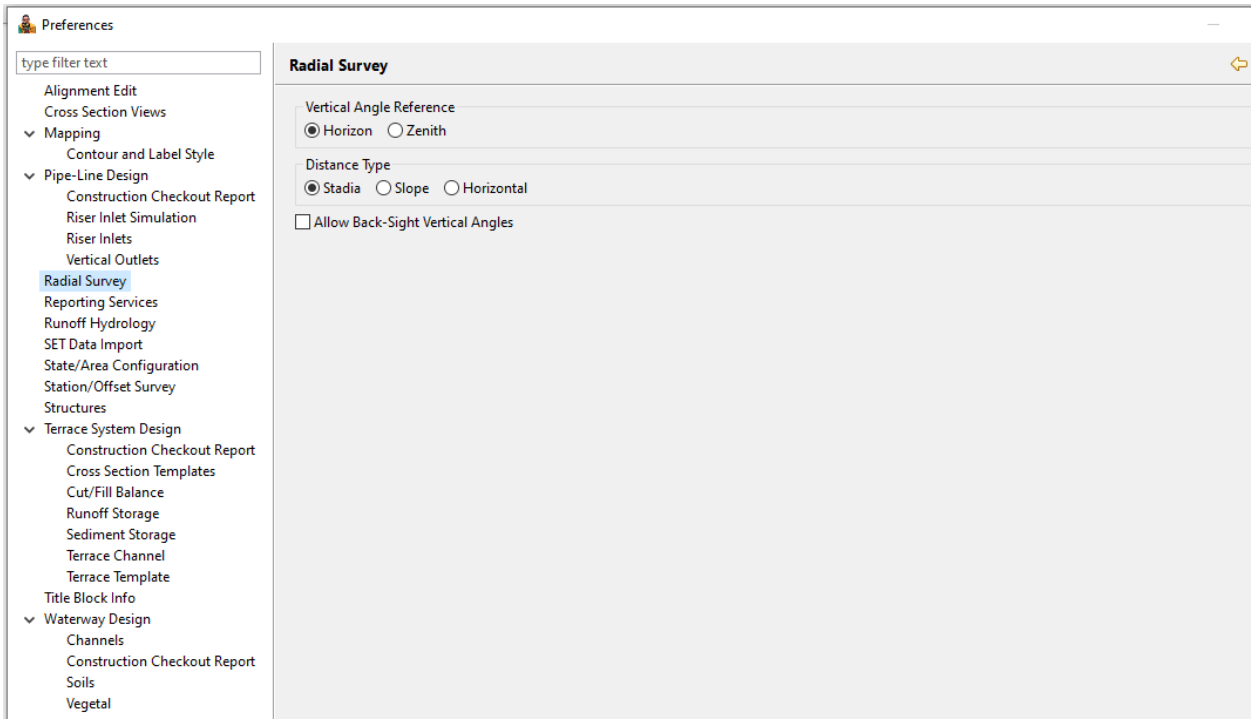

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Certification
Certification Statement
I certify the information recorded on this sheet is a true representation of the actual practice installation and the practice as installed does ( ) or does not ( ) meet NRCS plans and specifications.
Checkout Columns
Available
Orifice Z
Elbow Z
Channel Z
Blank Column
>>
>
<
<<
Move Up
Move Down
In Report
Station
Fixture ID
Ground Z
Flowline Z
Design Cut
Design Grade
Actual Grade
Required Q
Actual Q
Display Name
Column Title

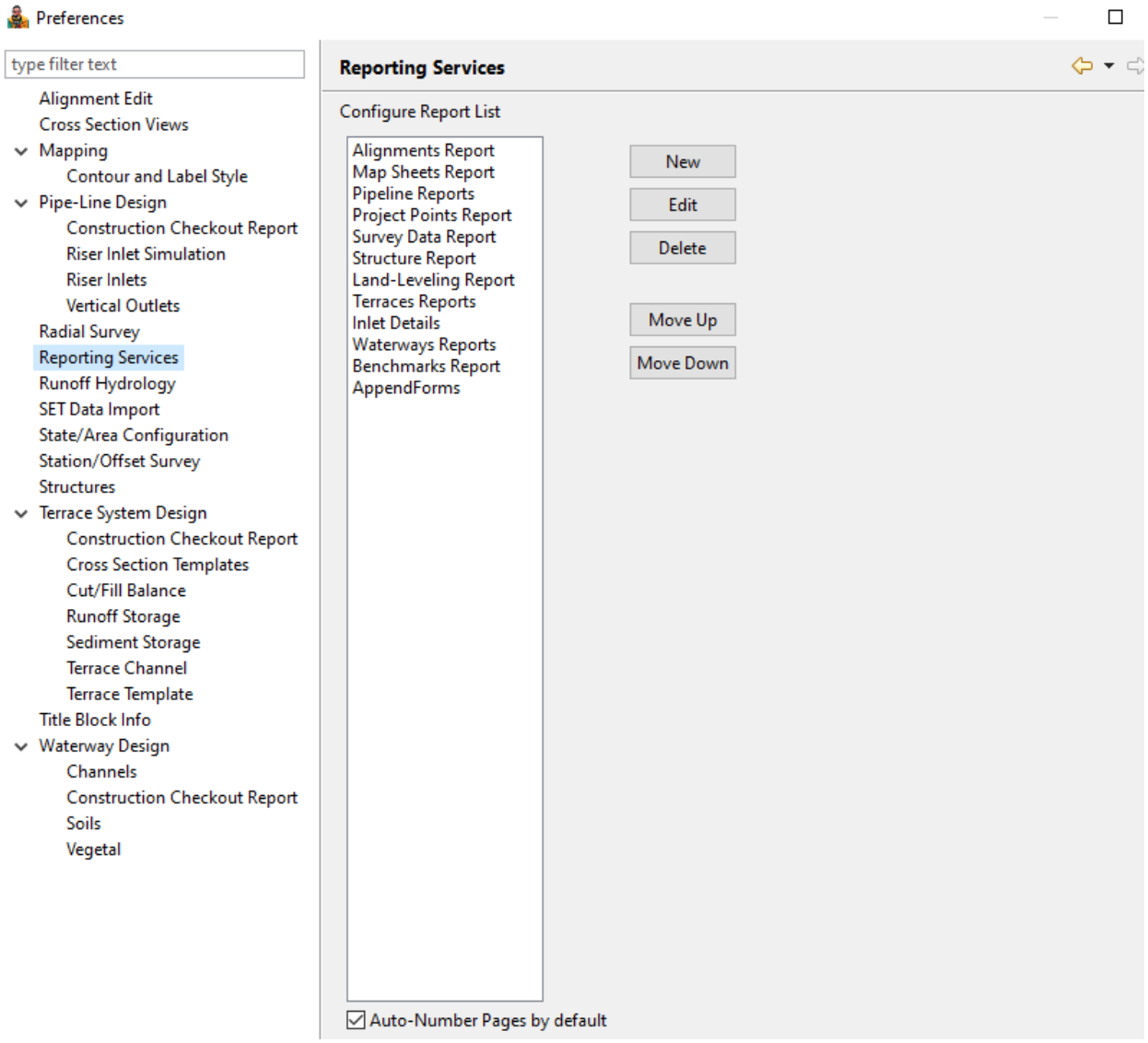

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Flood Depth Factor, Ave. Flow
0.50
Flood Depth Factor, UGO Sizing
0.70
Riser Validation
Enforce Min. Riser Diameter
Minimum Riser Diameter (in)
4.00
Orifice Validation
Enforce Minimum Orifice Diameter
Minimum Orifice Diameter (in)
2.25
Enforce Minimum Riser/Orifice Diam. Ratio
Minimum Riser/Orifice Diameter Ratio
1.50
Offset Pipe Validation
Enforce Inlet Pipe Offset Proximity
Inlet Pipe Offset Tolerance (ft)
12.0

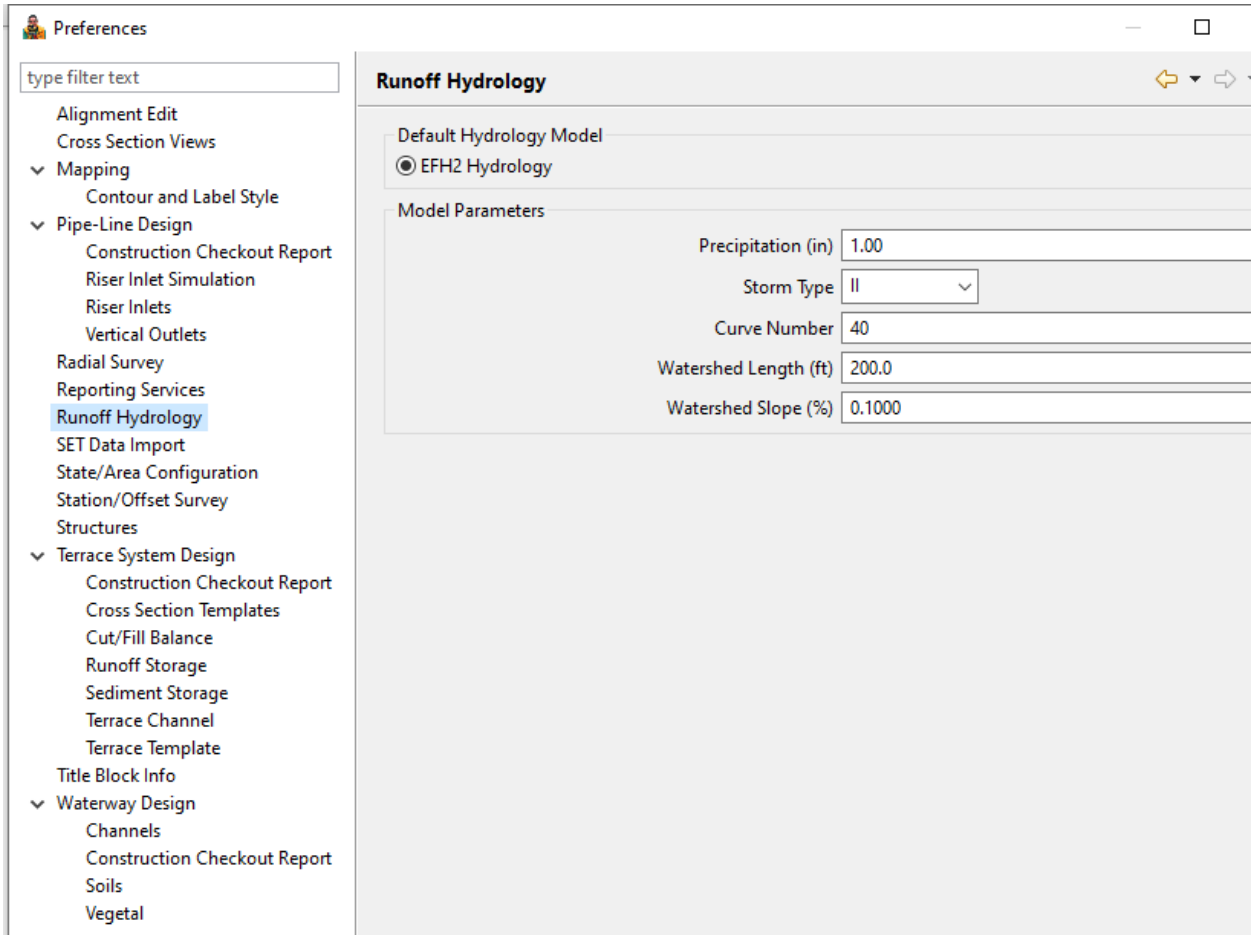


Note: The percentage of holes plugged in the perforated riser has been set at 0.50 to be consistent with the conservation practice standard. The previous value of 0.85 was used to make the results obtained from the UGO part of TDT consistent with the old capacity charts in EFH Chapter 8. However, since the Surface Inlet Riser computation method has been updated in EFT and the charts in Chapter 8 have been eliminated, the 0.85 factor is no longer valid.

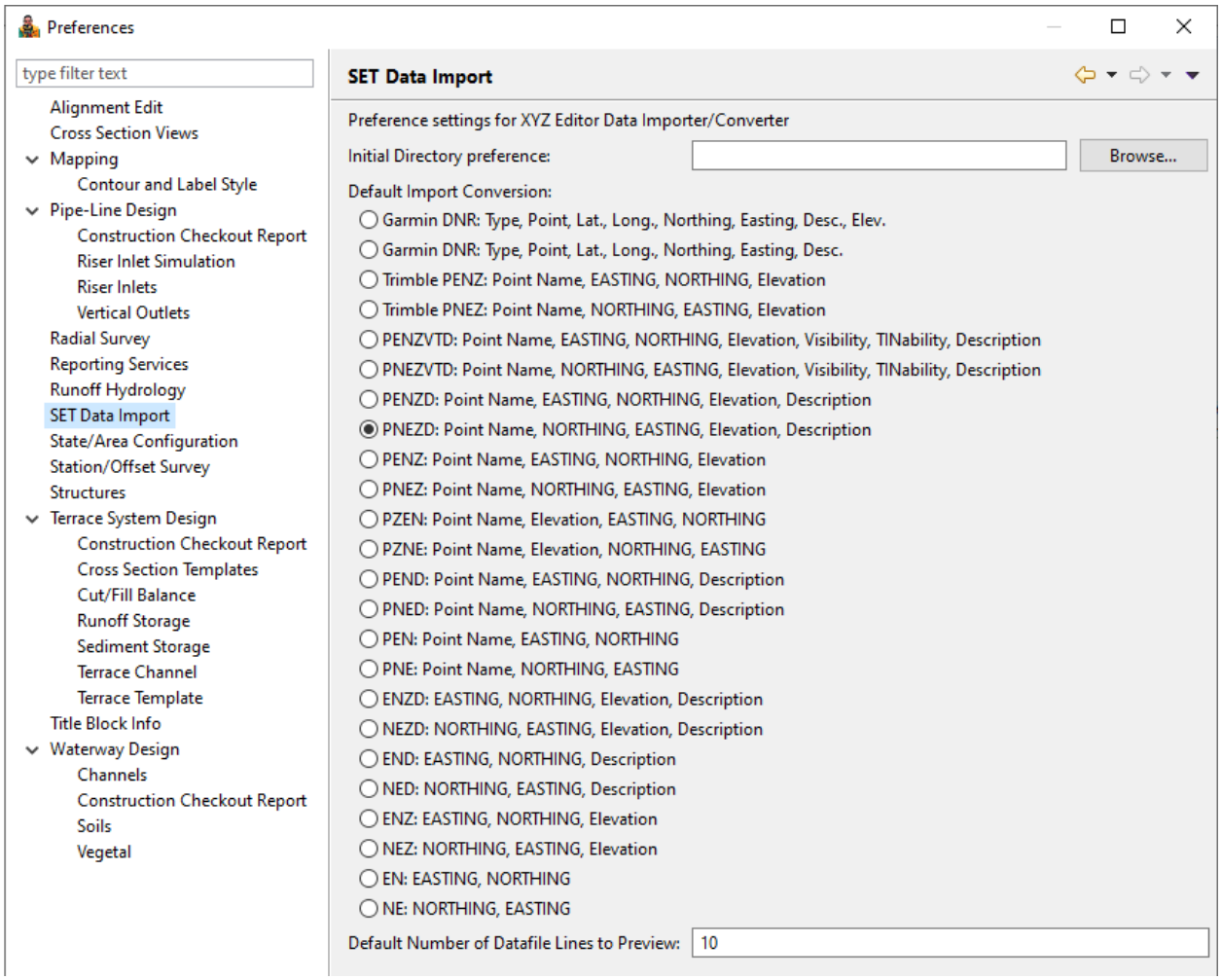

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Vegetal
Vertical Outlets
Vertical Outlet Material
CONCRETE PIPE
CORRUG_METAL_ANNULAR
CORRUG_METAL_ANNULAR_PERF
CORRUG_METAL_HELICAL
CORRUG_METAL_HELICAL_PERF
CORRUG_PE
CORRUG_PE_PERF
CORRUG_PE_SMOOTH_INTERIOR
Riser_PE
SMOOTH_METAL
SMOOTH_METAL_PERF
SMOOTH_PVC
SMOOTH_PVC_PERF
Vertical Outlet Diameter, inches
5.0
Max. Outlet Velocity, ft/sec
2.0
Use Guard
Use Drain Pipe
Drain Pipe Material
CONCRETE PIPE
CORRUG_METAL_ANNULAR
CORRUG_METAL_ANNULAR_PERF
CORRUG_METAL_HELICAL
CORRUG_METAL_HELICAL_PERF
CORRUG_PE
CORRUG_PE_PERF
CORRUG_PE_SMOOTH_INTERIOR
Riser_PE
SMOOTH_METAL
SMOOTH_METAL_PERF
SMOOTH_PVC
SMOOTH_PVC_PERF
Drain Pipe Diameter, inches
4.0
Drain Pipe Length, feet
100.0
Use Guard on Drain Pipe

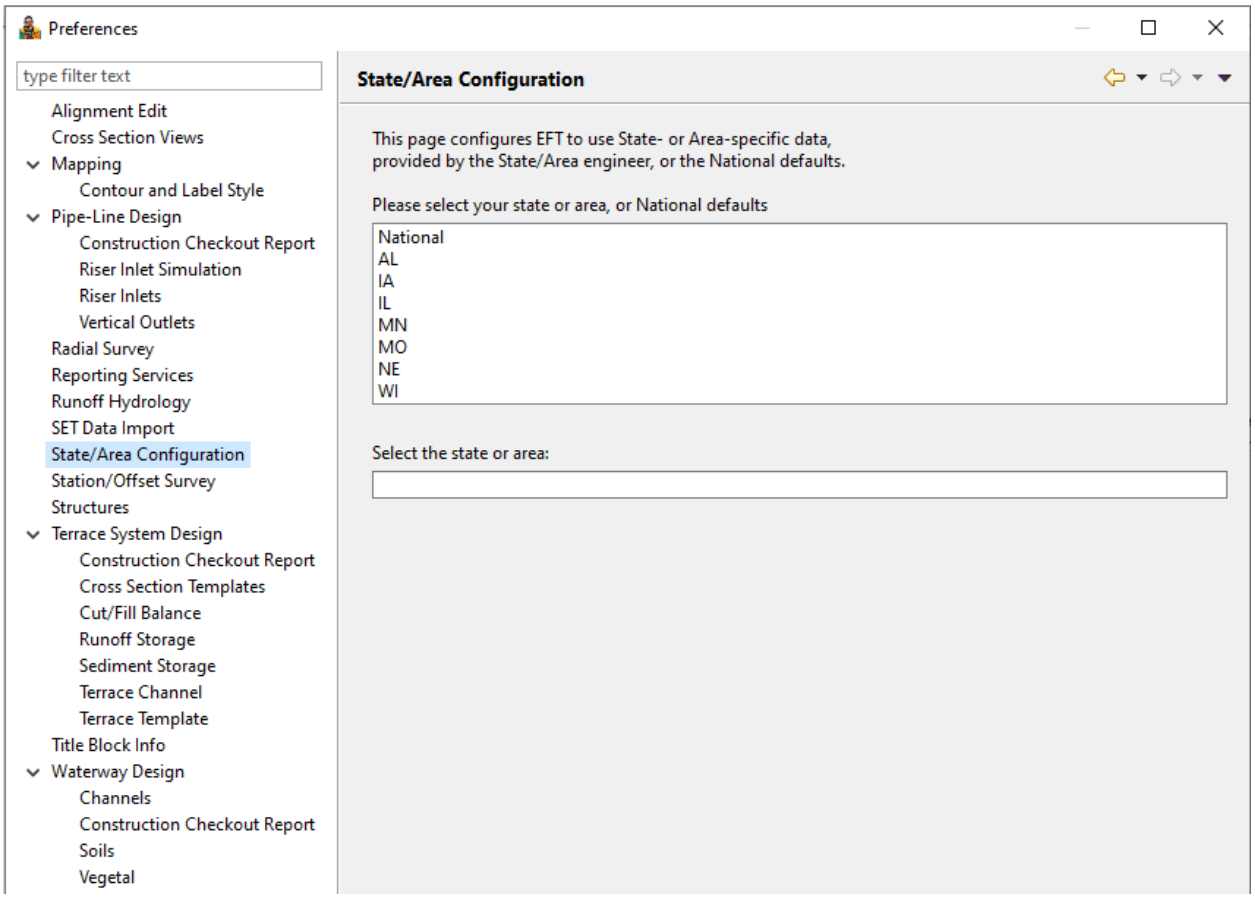

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Vertical Angle Reference
Horizon
Zenith
Distance Type
Stadia
Slope
Horizontal
Allow Back-Sight Vertical Angles


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Alignments Report
Map Sheets Report
Pipeline Reports
Project Points Report
Survey Data Report
Structure Report
Land-Leveling Report
Terraces Reports
Inlet Details
Waterways Reports
Benchmarks Report
AppendForms
New
Edit
Delete
Move Up
Move Down
Auto-Number Pages by default

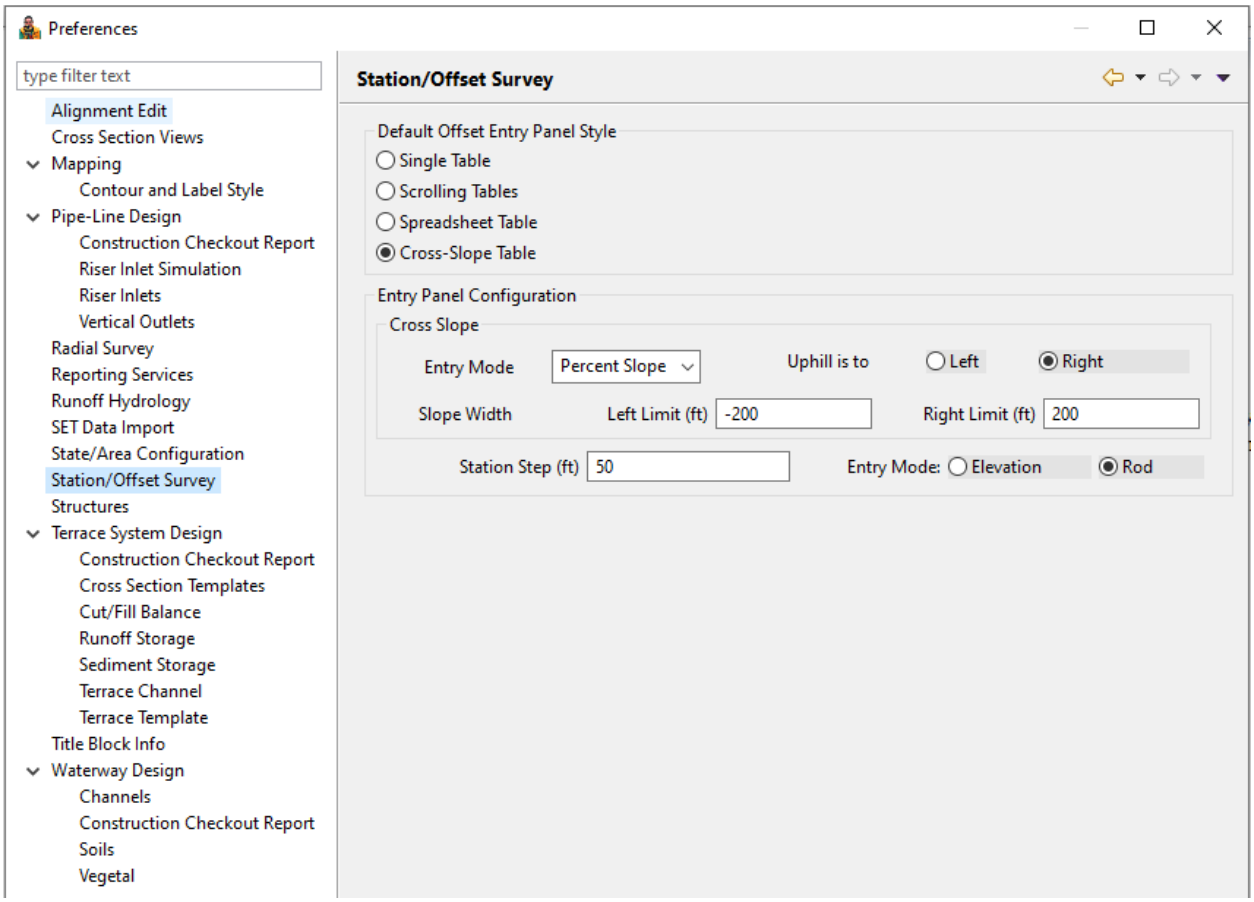


Note: The user can input the P10 rainfall value and storm type for their county after importing the Iowa Preferences file.


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Terrace Template
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Waterway Design
Channels
Construction Checkout Report
Soils
Vegetal
SET Data Import
Preference settings for XYZ Editor Data Importer/Converter
Initial Directory preference:
Browse...
Default Import Conversion:
Garmin DNR: Type, Point, Lat., Long., Northing, Easting, Desc., Elev.
Garmin DNR: Type, Point, Lat., Long., Northing, Easting, Desc.
Trimble PENZ: Point Name, EASTING, NORTHING, Elevation
Trimble PNEZ: Point Name, NORTHING, EASTING, Elevation
PENZVTD: Point Name, EASTING, NORTHING, Elevation, Visibility, TINability, Description
PNEZVTD: Point Name, NORTHING, EASTING, Elevation, Visibility, TINability, Description
PENZD: Point Name, EASTING, NORTHING, Elevation, Description
PNEZD: Point Name, NORTHING, EASTING, Elevation, Description
PENZ: Point Name, EASTING, NORTHING, Elevation
PNEZ: Point Name, NORTHING, EASTING, Elevation
PZEN: Point Name, Elevation, EASTING, NORTHING
PZNE: Point Name, Elevation, NORTHING, EASTING
PEND: Point Name, EASTING, NORTHING, Description
PNED: Point Name, NORTHING, EASTING, Description
PEN: Point Name, EASTING, NORTHING
PNE: Point Name, NORTHING, EASTING
ENZD: EASTING, NORTHING, Elevation, Description
NEZD: NORTHING, EASTING, Elevation, Description
END: EASTING, NORTHING, Description
NED: NORTHING, EASTING, Description
ENZ: EASTING, NORTHING, Elevation
NEZ: NORTHING, EASTING, Elevation
EN: EASTING, NORTHING
NE: NORTHING, EASTING
Default Number of Datafile Lines to Preview:
10



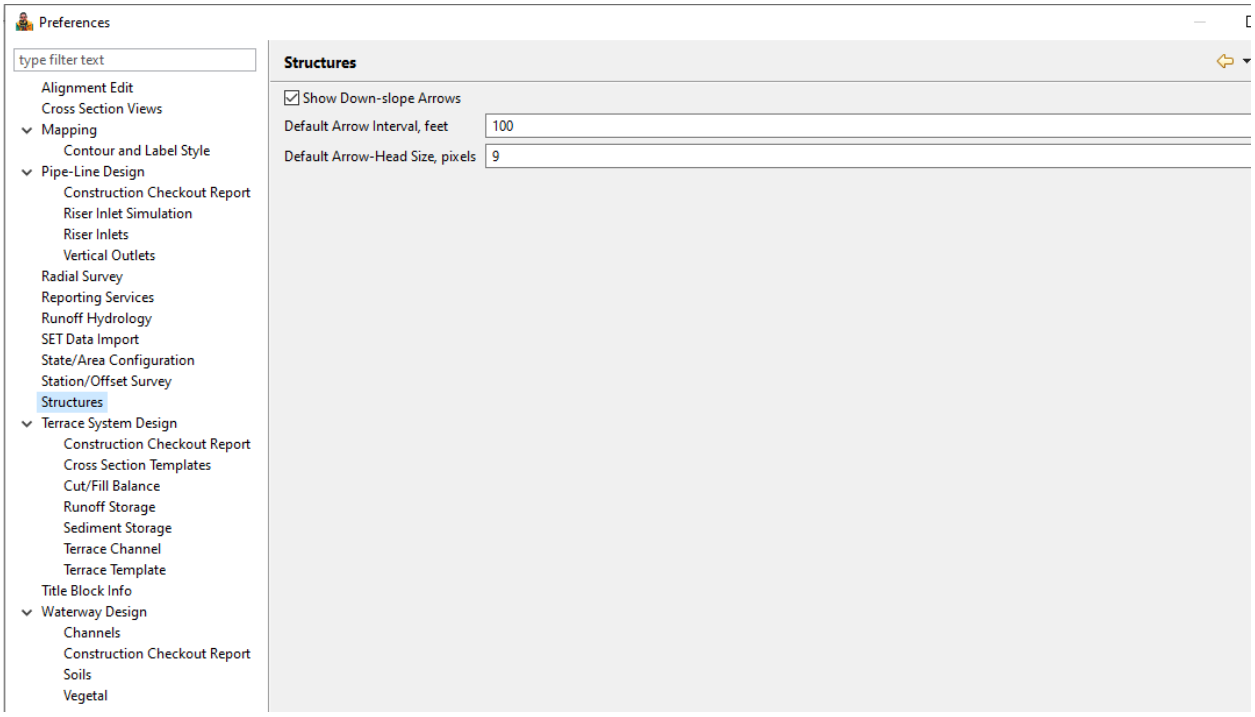
Note: The user should select “IA” as the state after importing the Iowa Preferences file.

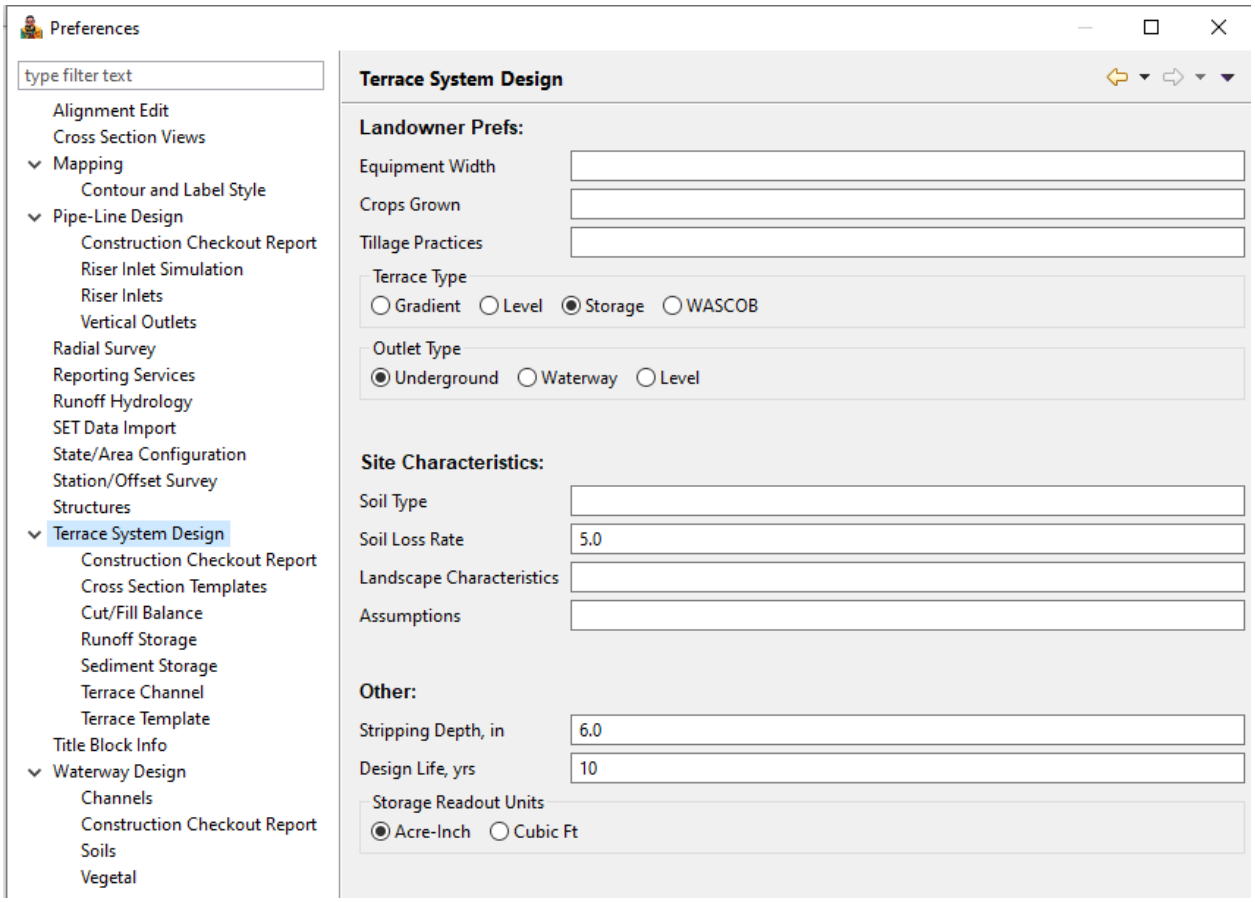


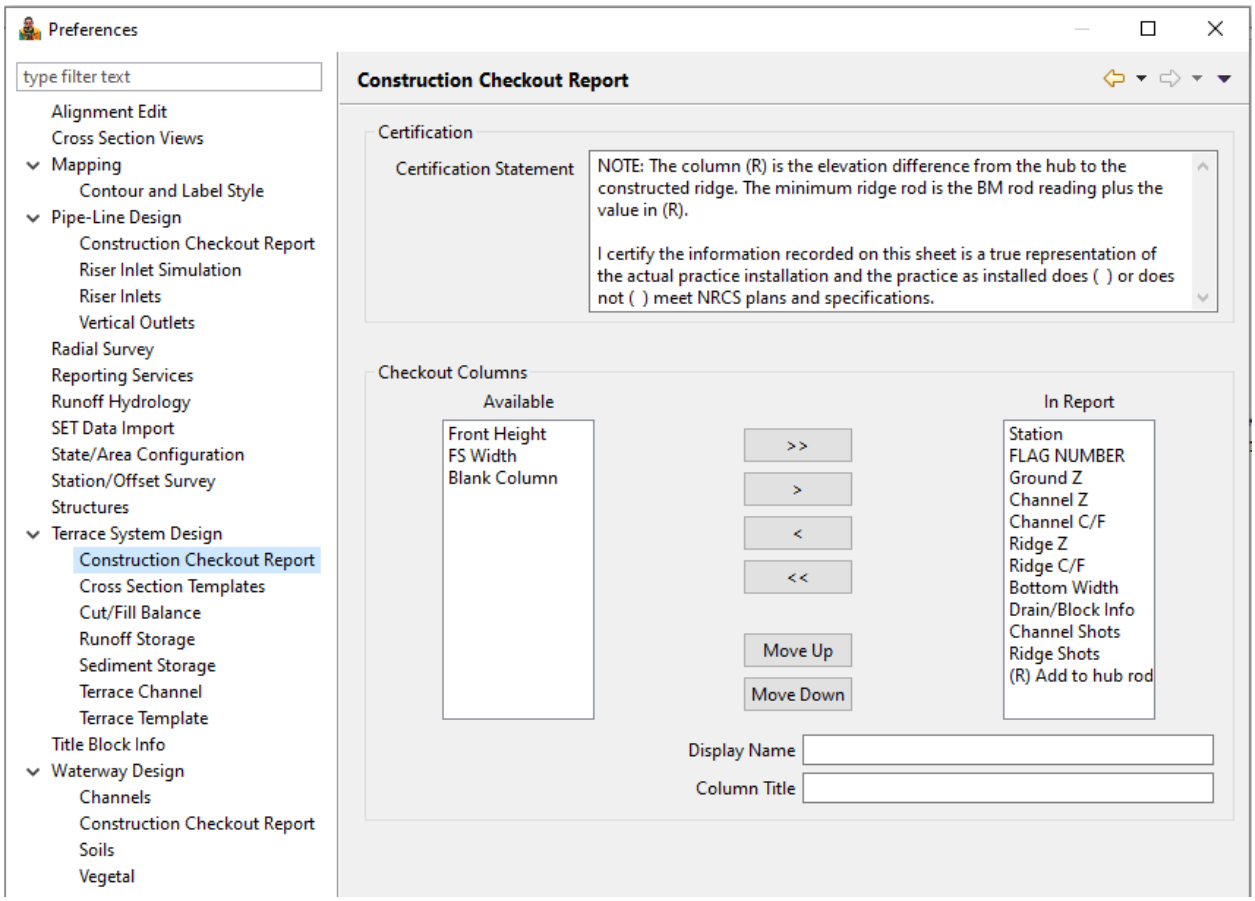
Notes: For Terraces, “Cross-Slope Table” is typically used. For Waterways, “Scrolling Tables” is commonly used.

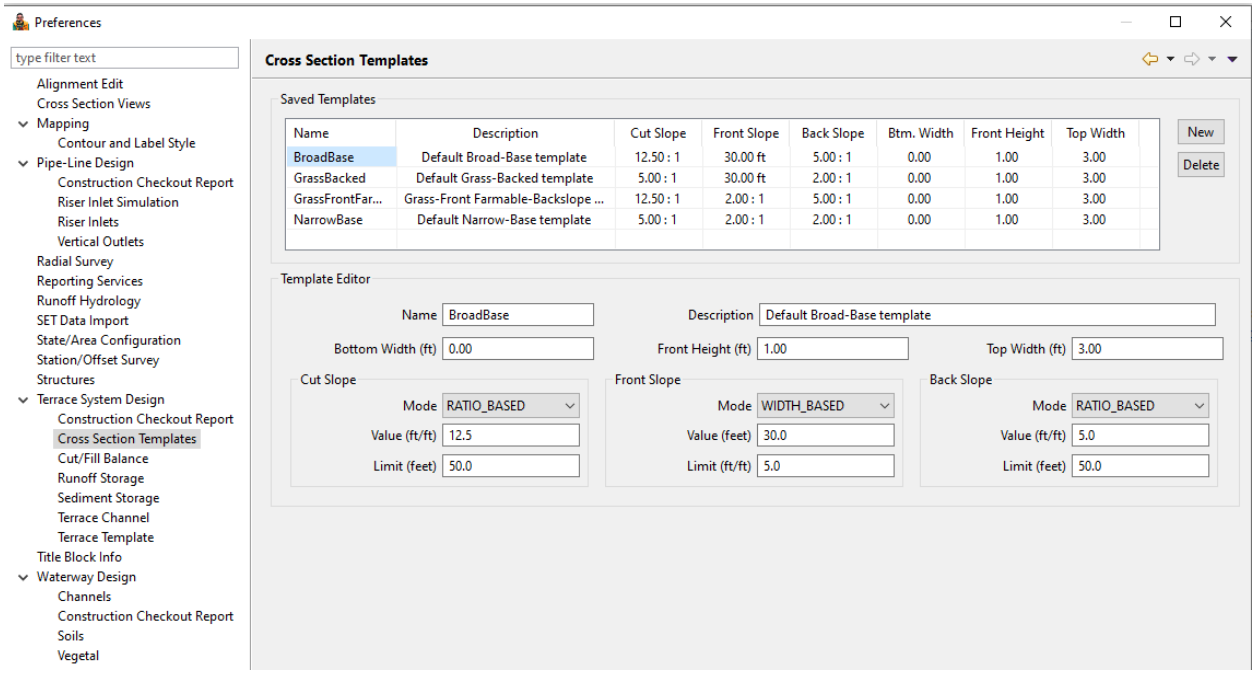
“Uphill is to” Explanation: Selecting “Left” or “Right” informs the program which side of the alignment is the uphill side based on the State End position. For example, if you stood at the Start End station and looked down the terrace flag line, is the uphill side to your left or to your right? The program will create the surface model based on this input.

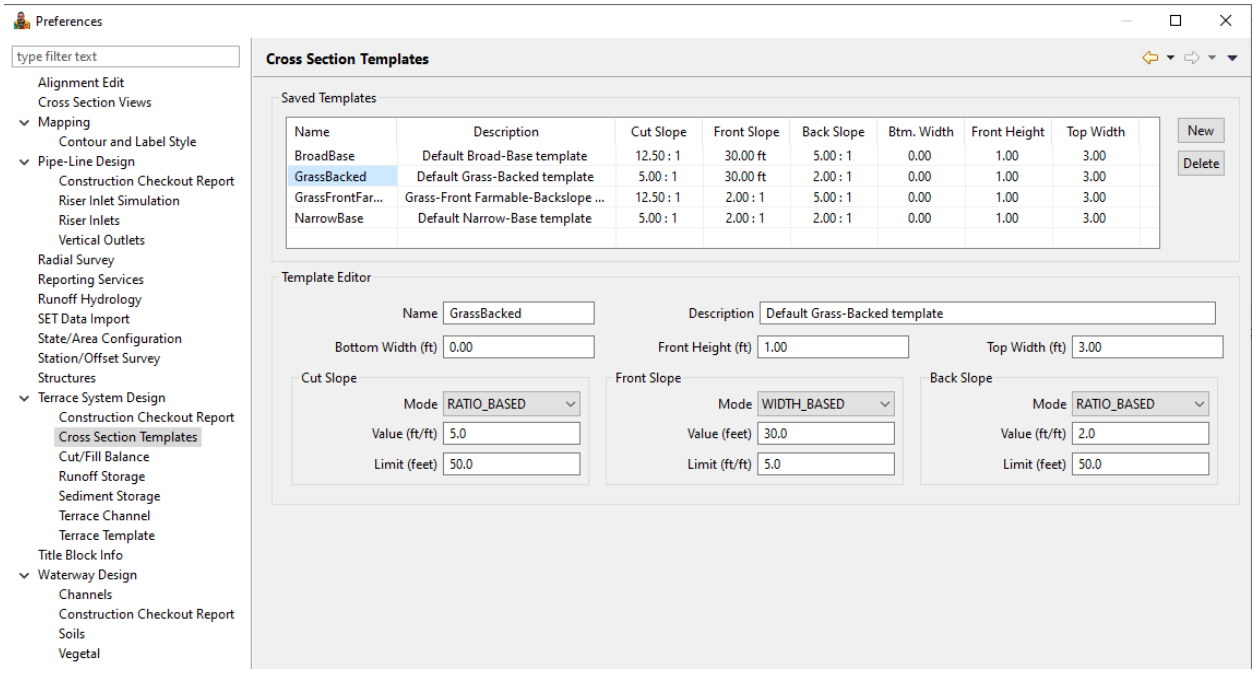
“Slope Width” Explanation: The slope Width setting is the distance left or right of the terraced alignment to extend the hill slope. These will be the uphill and downhill limits of the surface model created by the program.

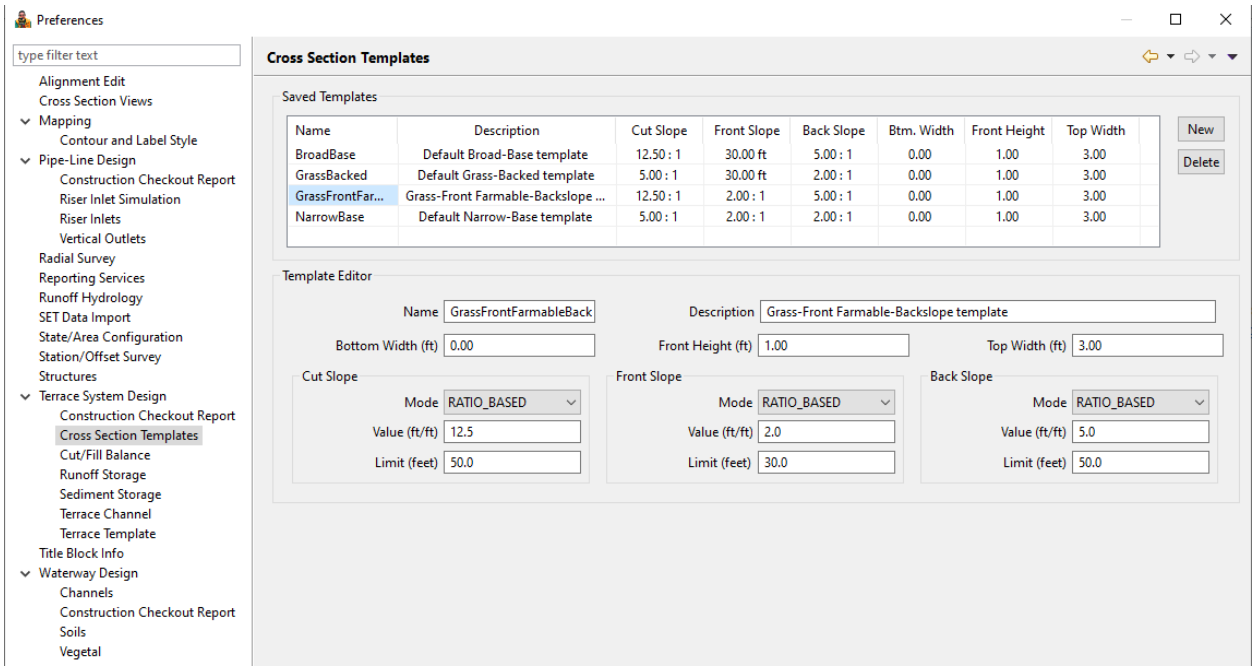

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Terrace Template
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Channels
Construction Checkout Report
Soils
Vegetal
Structures
Show Down-slope Arrows
Default Arrow Interval, feet
100
Default Arrow-Head Size, pixels
9

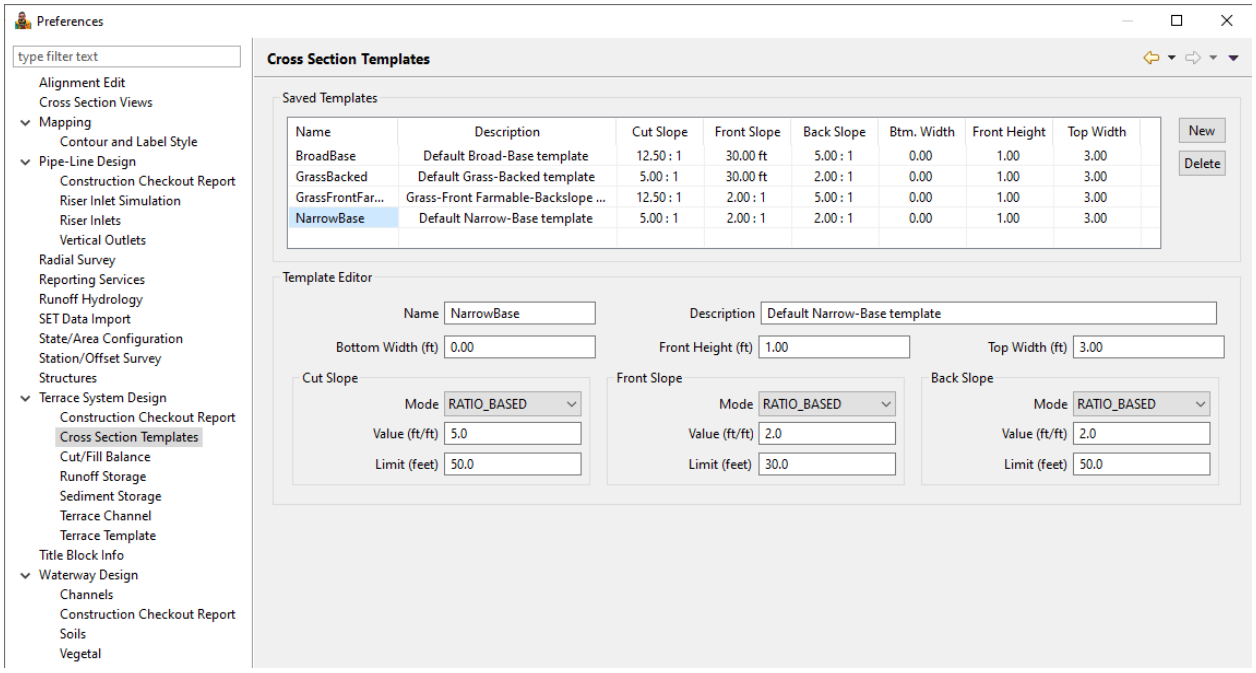

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Landowner Prefs:
Equipment Width
Crops Grown
Tillage Practices
Terrace Type
Gradient
Level
Storage
WASCOB
Outlet Type
Underground
Waterway
Level
Site Characteristics:
Soil Type
Soil Loss Rate
5.0
Landscape Characteristics
Assumptions
Other:
Stripping Depth, in
6.0
Design Life, yrs
10
Storage Readout Units
Acre-Inch
Cubic Ft

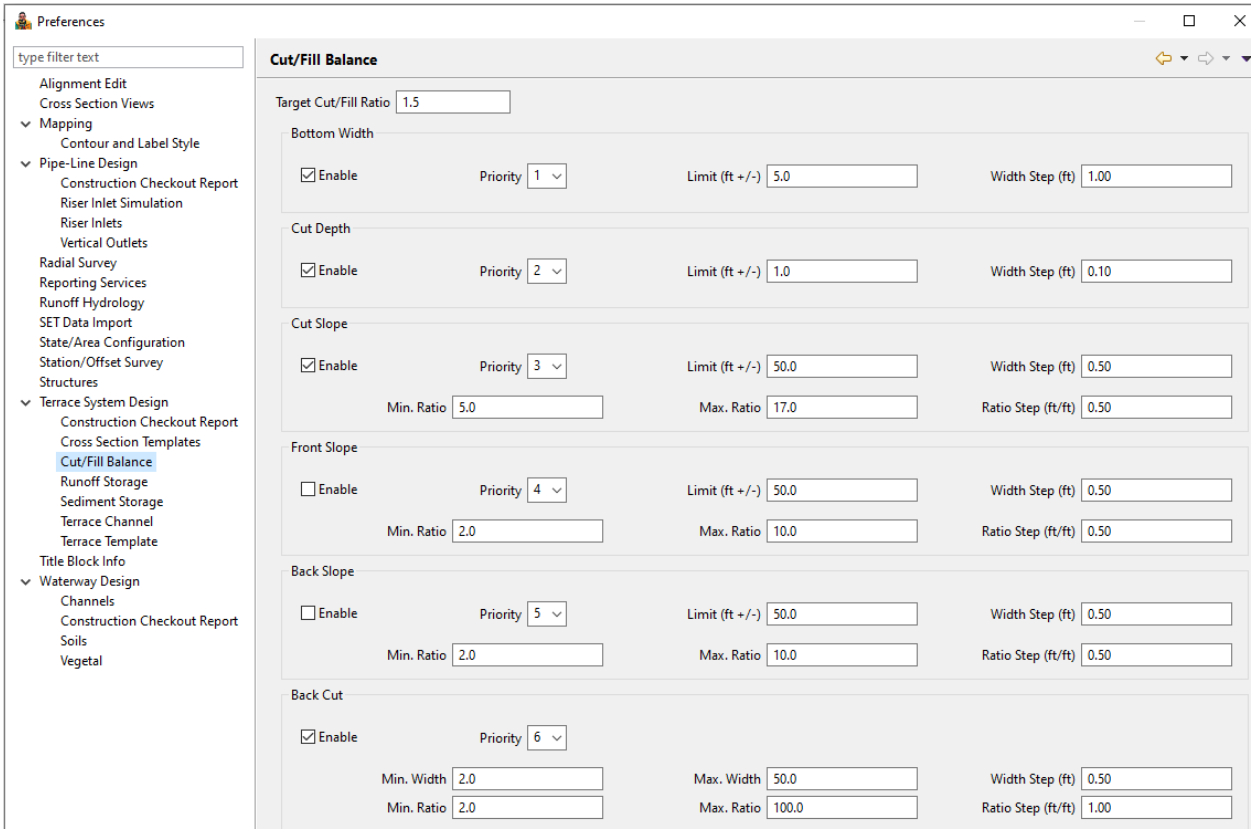

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Construction Checkout Report
Certification
Certification Statement
NOTE: The column (R) is the elevation difference from the hub to the constructed ridge. The minimum ridge rod is the BM rod reading plus the value in (R).
I certify the information recorded on this sheet is a true representation of the actual practice installation and the practice as installed does ( ) or does not ( ) meet NRCS plans and specifications.
Checkout Columns
Available
Front Height
FS Width
Blank Column
>>
>
<
<<
Move Up
Move Down
In Report
Station
FLAG NUMBER
Ground Z
Channel Z
Channel C/F
Ridge Z
Ridge C/F
Bottom Width
Drain/Block Info
Channel Shots
Ridge Shots
(R) Add to hub rod
Display Name
Column Title

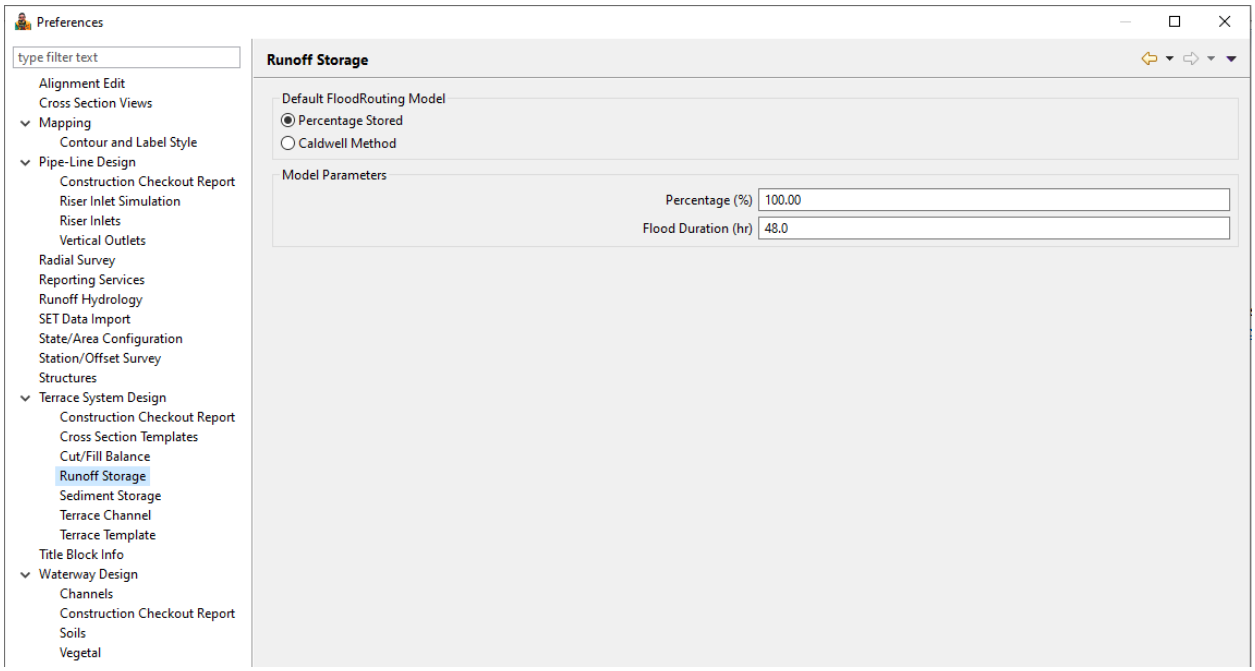

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Saved Templates
Name
Description
Cut Slope
Front Slope
Back Slope
Btm. Width
Front Height
Top Width
BroadBase
Default Broad-Base template
12.50 : 1
30.00 ft
5.00 : 1
0.00
1.00
3.00
GrassBacked
Default Grass-Backed template
5.00 : 1
30.00 ft
2.00 : 1
0.00
1.00
3.00
GrassFrontFar...
Grass-Front Farmable-Backslope ...
12.50 : 1
2.00 : 1
5.00 : 1
0.00
1.00
3.00
NarrowBase
Default Narrow-Base template
5.00 : 1
2.00 : 1
2.00 : 1
0.00
1.00
3.00
New
Delete
Template Editor
Name
BroadBase
Description
Default Broad-Base template
Bottom Width (ft)
0.00
Front Height (ft)
1.00
Top Width (ft)
3.00
Cut Slope
Mode
RATIO_BASED
Value (ft/ft)
12.5
Limit (feet)
50.0
Front Slope
Mode
WIDTH_BASED
Value (feet)
30.0
Limit (ft/ft)
5.0
Back Slope
Mode
RATIO_BASED
Value (ft/ft)
5.0
Limit (feet)
50.0

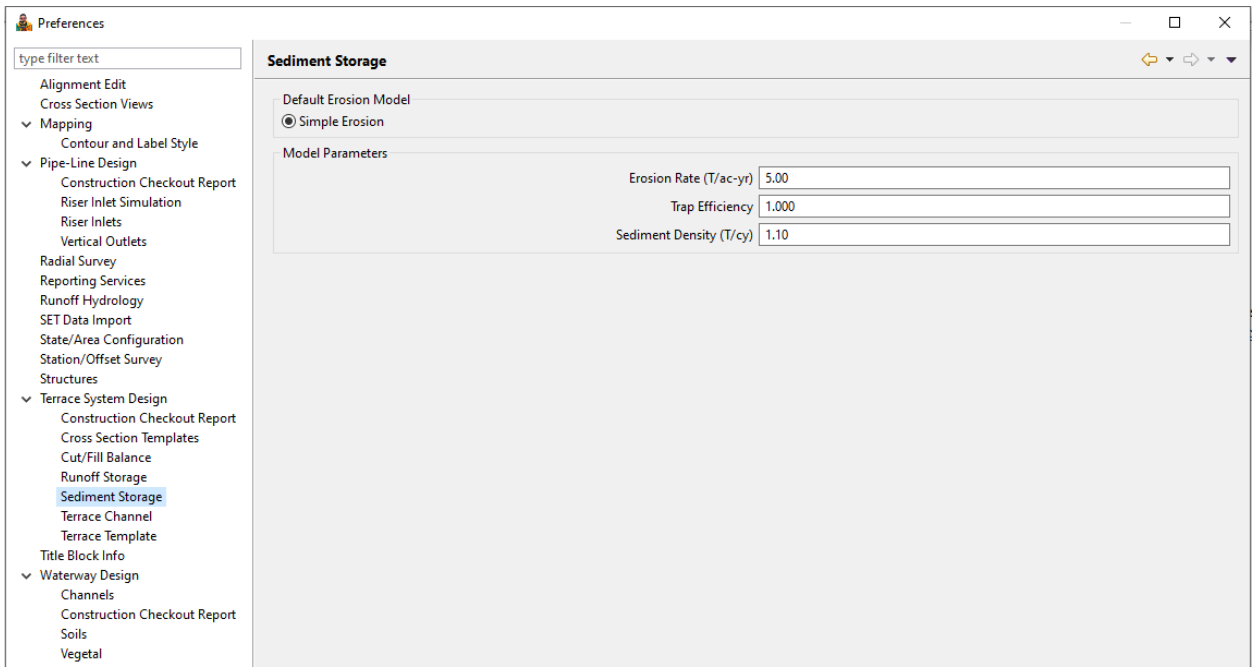

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Name Description Cut Slope Front Slope Back Slope Btm. Width Front Height Top Width
BroadBase Default Broad-Base template 12.50 : 1 30.00 ft 5.00 : 1 0.00 1.00 3.00
GrassBacked Default Grass-Backed template 5.00 : 1 30.00 ft 2.00 : 1 0.00 1.00 3.00
GrassFrontFar... Grass-Front Farmable-Backslope ... 12.50 : 1 2.00 : 1 5.00 : 1 0.00 1.00 3.00
NarrowBase Default Narrow-Base template 5.00 : 1 2.00 : 1 2.00 : 1 0.00 1.00 3.00
New
Delete
Template Editor
Name GrassBacked
Description Default Grass-Backed template
Bottom Width (ft) 0.00
Front Height (ft) 1.00
Top Width (ft) 3.00
Cut Slope
Mode RATIO_BASED
Value (ft/ft) 5.0
Limit (feet) 50.0
Front Slope
Mode WIDTH_BASED
Value (feet) 30.0
Limit (ft/ft) 5.0
Back Slope
Mode RATIO_BASED
Value (ft/ft) 2.0
Limit (feet) 50.0

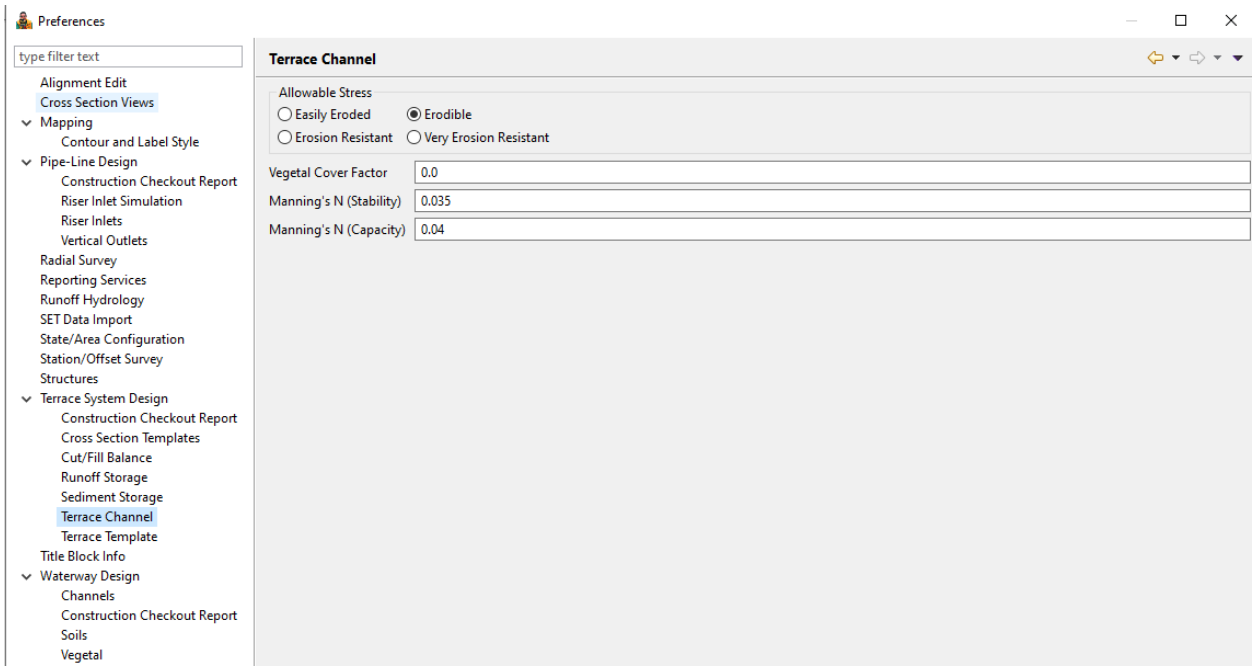

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Name Description Cut Slope Front Slope Back Slope Btm. Width Front Height Top Width
BroadBase Default Broad-Base template 12.50 : 1 30.00 ft 5.00 : 1 0.00 1.00 3.00
GrassBacked Default Grass-Backed template 5.00 : 1 30.00 ft 2.00 : 1 0.00 1.00 3.00
GrassFrontFar... Grass-Front Farmable-Backslope ... 12.50 : 1 2.00 : 1 5.00 : 1 0.00 1.00 3.00
NarrowBase Default Narrow-Base template 5.00 : 1 2.00 : 1 2.00 : 1 0.00 1.00 3.00
New
Delete
Template Editor
Name GrassFrontFarmableBack
Description Grass-Front Farmable-Backslope template
Bottom Width (ft) 0.00
Front Height (ft) 1.00
Top Width (ft) 3.00
Cut Slope
Mode RATIO_BASED
Value (ft/ft) 12.5
Limit (feet) 50.0
Front Slope
Mode RATIO_BASED
Value (ft/ft) 2.0
Limit (feet) 30.0
Back Slope
Mode RATIO_BASED
Value (ft/ft) 5.0
Limit (feet) 50.0

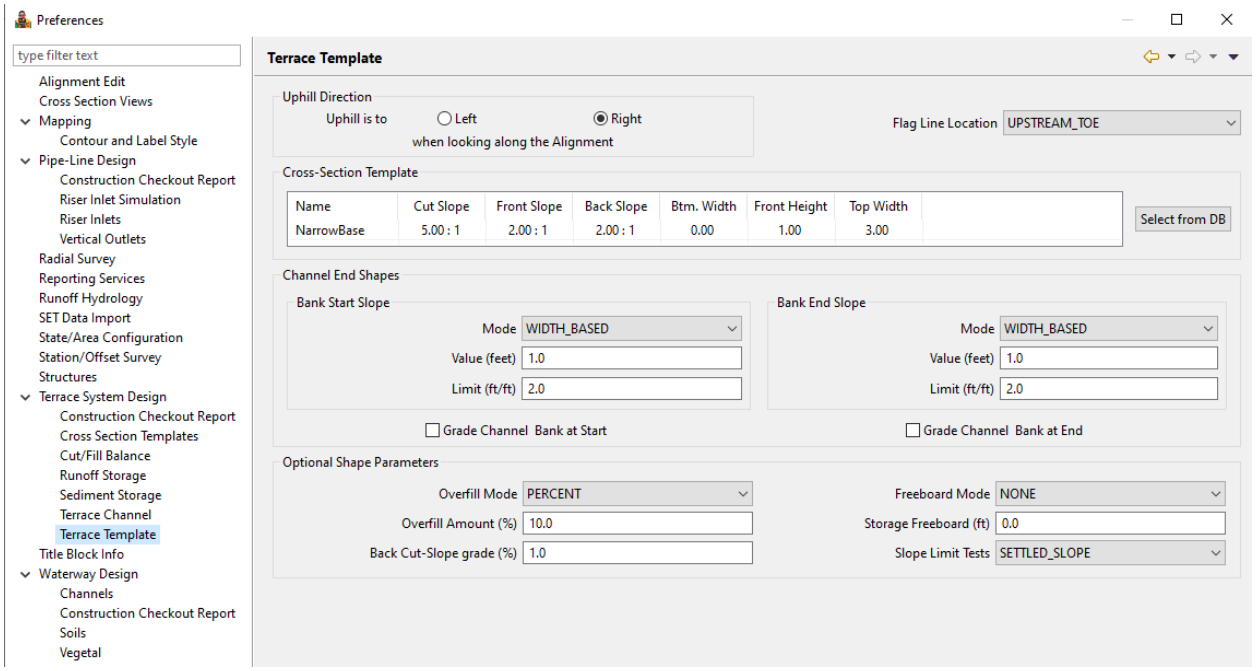

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Terrace Template
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Vegetal
Cross Section Templates
Saved Templates
Name
Description
Cut Slope
Front Slope
Back Slope
Btm. Width
Front Height
Top Width
BroadBase
Default Broad-Base template
12.50 : 1
30.00 ft
5.00 : 1
0.00
1.00
3.00
GrassBacked
Default Grass-Backed template
5.00 : 1
30.00 ft
2.00 : 1
0.00
1.00
3.00
GrassFrontFar...
Grass-Front Farmable-Backslope ...
12.50 : 1
2.00 : 1
5.00 : 1
0.00
1.00
3.00
NarrowBase
Default Narrow-Base template
5.00 : 1
2.00 : 1
2.00 : 1
0.00
1.00
3.00
New
Delete
Template Editor
Name
NarrowBase
Description
Default Narrow-Base template
Bottom Width (ft)
0.00
Front Height (ft)
1.00
Top Width (ft)
3.00
Cut Slope
Mode
RATIO_BASED
Value (ft/ft)
5.0
Limit (feet)
50.0
Front Slope
Mode
RATIO_BASED
Value (ft/ft)
2.0
Limit (feet)
30.0
Back Slope
Mode
RATIO_BASED
Value (ft/ft)
2.0
Limit (feet)
50.0


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Cut/Fill Balance
Target Cut/Fill Ratio
1.5
Bottom Width
Enable
Priority
1
Limit (ft +/-)
5.0
Width Step (ft)
1.00
Cut Depth
Enable
Priority
2
Limit (ft +/-)
1.0
Width Step (ft)
0.10
Cut Slope
Enable
Priority
3
Limit (ft +/-)
50.0
Width Step (ft)
0.50
Min. Ratio
5.0
Max. Ratio
17.0
Ratio Step (ft/ft)
0.50
Front Slope
Enable
Priority
4
Limit (ft +/-)
50.0
Width Step (ft)
0.50
Min. Ratio
2.0
Max. Ratio
10.0
Ratio Step (ft/ft)
0.50
Back Slope
Enable
Priority
5
Limit (ft +/-)
50.0
Width Step (ft)
0.50
Min. Ratio
2.0
Max. Ratio
10.0
Ratio Step (ft/ft)
0.50
Back Cut
Enable
Priority
6
Min. Width
2.0
Max. Width
50.0
Width Step (ft)
0.50
Min. Ratio
2.0
Max. Ratio
100.0
Ratio Step (ft/ft)
1.00

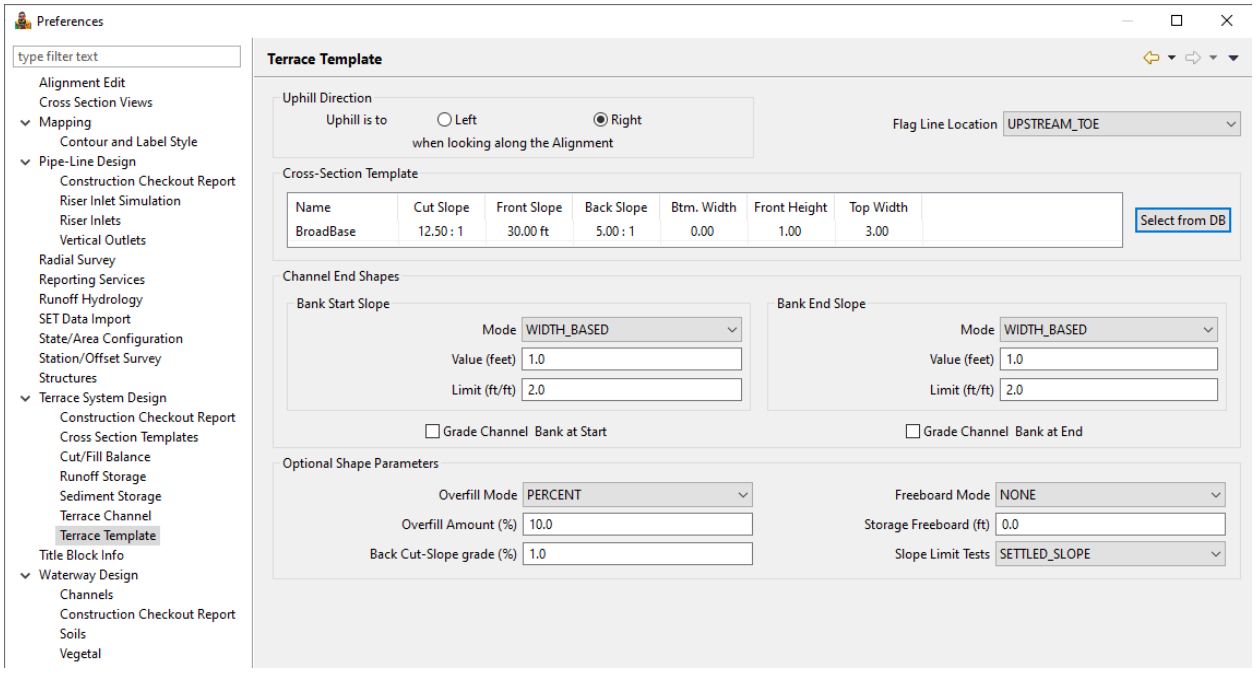

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Default FloodRouting Model
Percentage Stored
Caldwell Method
Model Parameters
Percentage (%) 100.00
Flood Duration (hr) 48.0


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Default Erosion Model
Simple Erosion
Model Parameters
Erosion Rate (T/ac-yr) 5.00
Trap Efficiency 1.000
Sediment Density (T/cy) 1.10

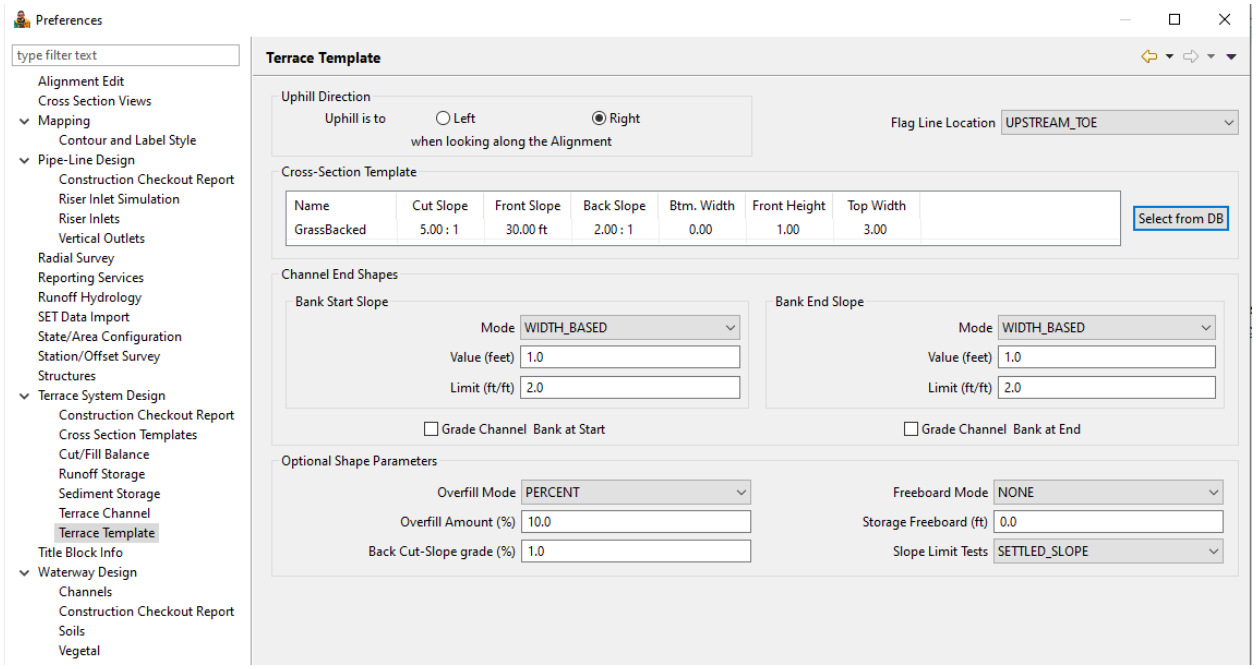




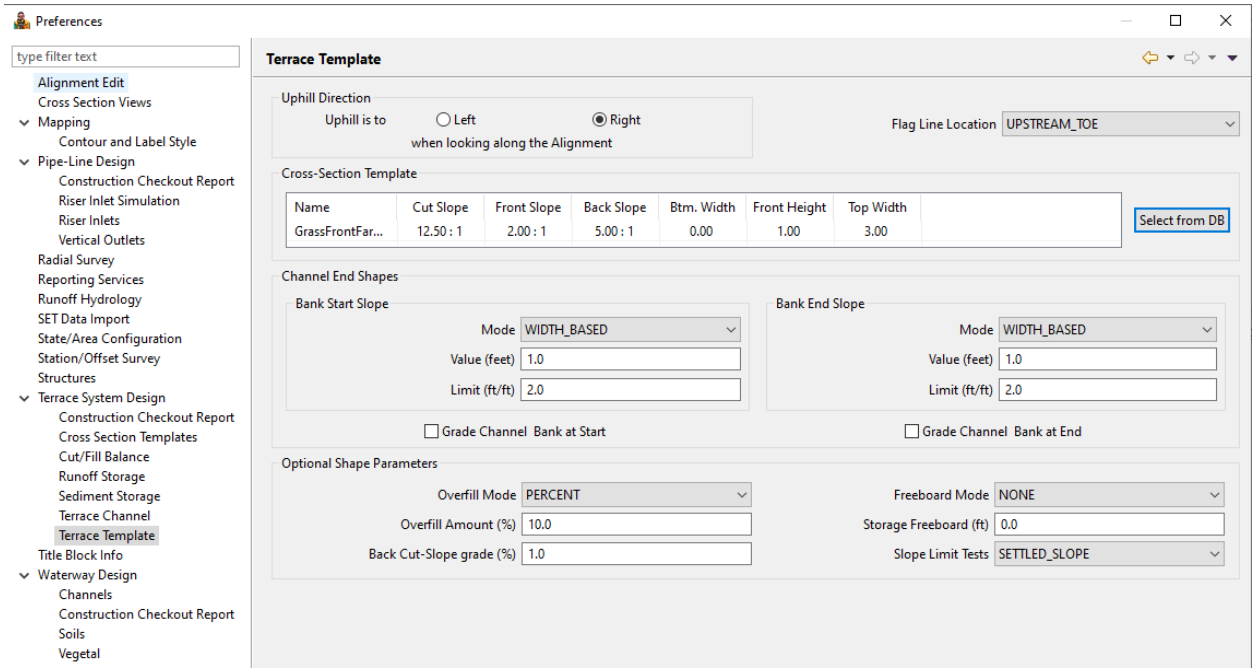
Note: “NarrowBase” is set as the default template. After importing the Iowa preference file, the user can set their county’s main type of terrace from the drop box. The “Overfill Amount” can be changed based on the type of terrace selected.



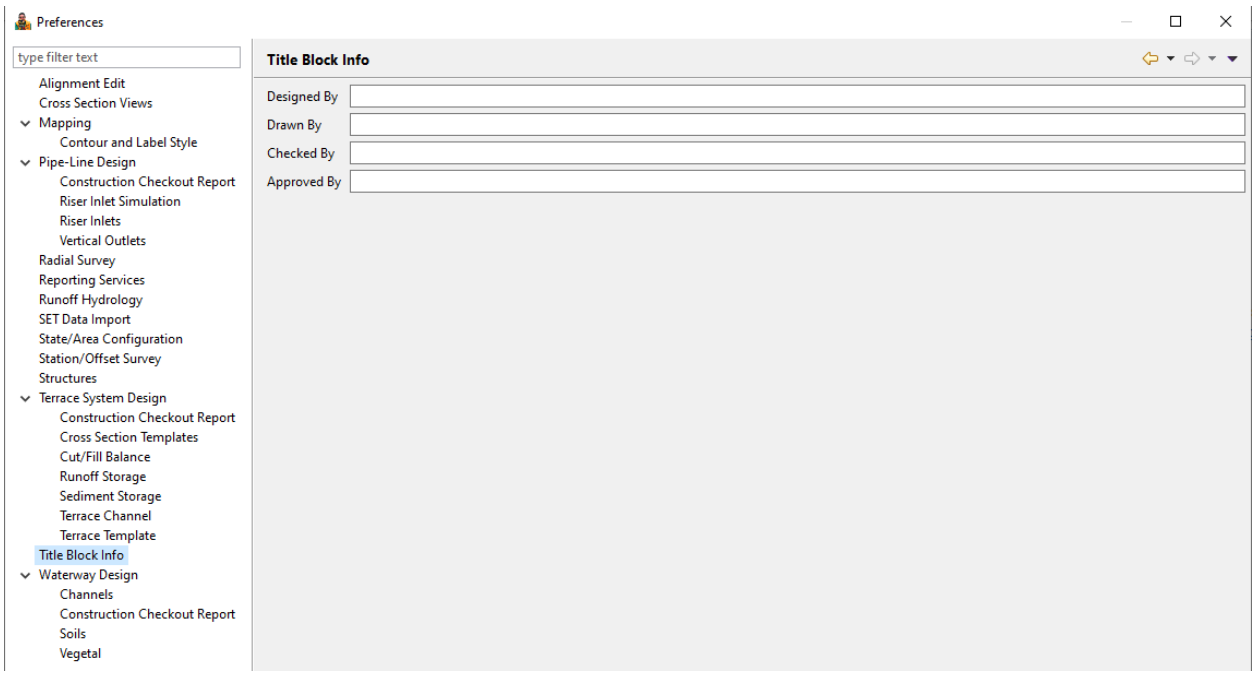
Note: Broadbase selected from the drop box. The Overfill Amount may be changed to 5%.



Note: GrassBacked selected from the drop box. The Overfill Amount may be changed to 5%.



Note: GrassFrontFarmableBack selected from the drop box. The Overfill Amount may be changed to 5%.



Note: The user can set the “Designed By” and “Drawn By” information after importing the Iowa Preference file.