Overview: Create the profile views for a saturated buffer water control structure and distribution lines.

Software: AutoCAD Civil 3D 2022, Civil 3D Workspace, Iowa NRCS C3D 2022 template

Notation: Button to Press *Displayed Text* **Icon** Action {Text to Enter} *Menu Item…*

Prerequisite: A surveyed site is needed with enough details to provide these items:
- a surface model covering the stream water level, banks, and buffer area;
- the location of existing tile to be intercepted and tile depths;
- a continuous breakline representing the edge of water along the stream.

Follow the instructions for *Original Ground Contour* and *Profile of Existing Tile*.

Saturated Buffer

Model the Distribution Lines

Offset the stream water level to identify the preliminary distribution line guidelines.
1. Click *Home… Modify… Offset* ⊑ …
2. Input an offset distance. E.g {*30*}. Press Enter.
3. Select the *Waterline Breakline* closest to the bank where you plan to install the buffer.
4. Click on the side toward the buffer.
5. Select the newly created line
6. Move your cursor away from the *waterline breakline*. (don't click yet)
7. Input another offset distance for an outer guide. Eg. {20}
8. Press Enter
9. Press ESC to exit the *Offset* command.

Create the distribution line alignment. - **Option A: Manually create alignment**
Allows some variation of distance to smooth out final distribution line

10. Click *Home… Create Design… Alignment… Alignment Creation Tools* 🖈 …
11. Input the *Name* as {*Distribution Line*}.
12. On the General Tab, set *Site* to *None* and *Alignment Style* to *Layout and Design*.
13. Click OK

14. From the *Alignment Layout Tools* toolbar dropdown the first column to click *Curve and Spiral Settings…*
15. Input the *Curve Default Radius* as {50} Click OK.
16. From the *Alignment Layout Tools* toolbar dropdown the first column to click *Tangent-Tangent (With curves)*
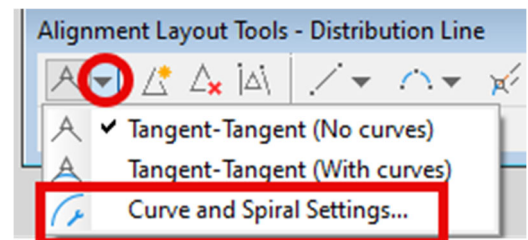
17. The command line will display *Specify Start Point*. Click a location for the start point for the most uphill end of the distribution line.
18. As you click the next locations, notice how the radius affects the alignment placement.
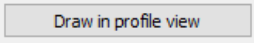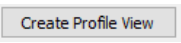19. Continue clicking to create alignment points. When done press ESC.

20. <u>Close</u> the Alignment Layout Tools box. <u>Go </u>to step 29.

Create the distribution line alignment. - **Option B: Alignment using offset line**
21. <u>Click</u> *Home… Create Design… Alignment… Create Alignment from Object* ⬚…
22. <u>Select</u> the distribution line (offset from WL) closer to the uphill end. <u>Press Enter</u>
23. If the direction arrow of the alignment is pointing downhill then <u>press Enter</u>.
    (if not input {R} <u>Enter</u> to reverse)
24. <u>Input</u> the *Name* as {*Distribution Line*}.
25. On the General Tab, <u>set</u> *Site* to *None*.
26. <u>Uncheck</u> *Erase existing entities* if you want to keep the 2D polyline (recommended).
27. <u>Check</u> *Add curves between tangents* using a *Default radius* of {50}..
28. <u>Click</u> OK

Create a Profile of the ground surface along the distribution line and a Profile View.
29. <u>Click</u> *Home… Create Design… Profile… Create Surface Profile …*
30. <u>Pulldown</u> the alignment to *Distribution Line*.
31. <u>Select</u> *Ognd* surface… <u>Click</u> [Add>>] to apply to Profile.
32. <u>Click</u> [Draw in profile view]
33. Set the Profile View style to the Horizontal/Vertical scaling desired. E.g. (*A100Hx5V*)
34. <u>Click</u> [Create Profile View]
35. <u>Click</u> a model space location in the drawing to place your created Profile View
36. <u>Select</u> the profile grid (it will turn blue or "highlighted").
37. <u>Right-click</u> and <u>Click</u> *Display Order*… <u>Click</u> *Send to Back*.
    This is optional, but helps make the profiles more visible.
    Also toggle **Show/hide Lineweight** to *On*
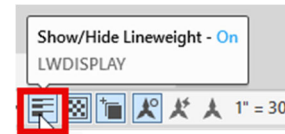
Create a Named View in order to find this Profile View easily later
38. <u>Zoom</u> to a full view of the profile view that you just created.
39. <u>Click</u> *View … View Manager… New…*
40. <u>Input</u> a View Name. E.g {*Profile Distribution Line*}
41. <u>Open</u> the advanced settings tab by <u>clicking</u> ⊙ … On the View Properties tab <u>Uncheck</u> *Save layer snapshot with view*.
42. <u>Click</u> OK to go back to the *View Manager*… <u>Click</u> OK to exit the *View Manager*.

Optional: Editing the alignment direction and stationing.
43. If the new alignment is backwards, <u>select</u> the alignment. On the context sensitive ribbon use *Alignment…Modify*▼ *… Reverse Direction*. Then<u> click OK. </u>

44. To the set a specific stationing value for a location along the alignment.
    (Eg. Set the stationing for the CL pipe at the CL of dam to 10+00.)
    a. <u>Select </u>the alignment

      b. Right-Click *Alignment Properties…*
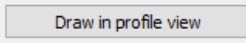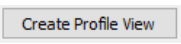

      c. *Station Control* Tab

      d. Click **Pick reference point** (See A)

      e. Click OK at the warning message.

      f. Snap to a location in the drawing. E.g. Intersection of 2 alignments, a survey shot, etc.

      g. Set the station value of the reference point. E.g {*1000*} (See B)

      h. Click OK. Click OK at the warning message. Click OK.
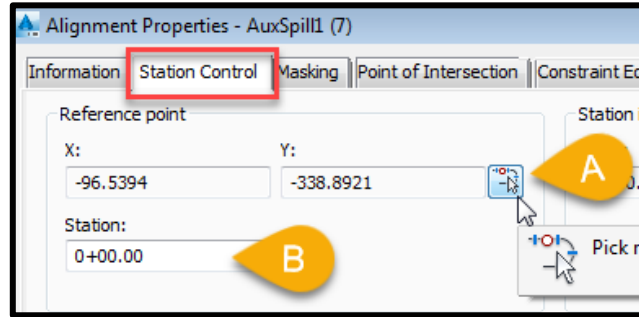
Create an alignment along the stream water level breakline.

45. Click *Home… Create Design… Alignment… Create Alignment from Object* …

46. Select the waterline breakline closer to the uphill end. Press Enter

47. If the direction arrow of the alignment is pointing downhill then press Enter. (if not input {R} Enter to reverse)

48. Input the *Name* as {*Left WL*}.

49. On the General Tab, set *Site = None, Alignment Style = All Alignments,* and *Alignment Label Set = <off>*

50. Uncheck *Add curves between tangents*

51. Uncheck *Erase existing entities*

52. Click OK

Create a Profile along the water level breakline of the ground surface and a Profile View.

53. Click *Home… Create Design… Profile… Create Surface Profile …*

54. Pulldown the alignment to *Left WL*.

55. Select *Ognd* surface… Click Add>> to apply to Profile.

56. Set the Style = *Flowline*

57. Click Draw in profile view

58. Set the Profile View style to the Horizontal/Vertical scaling desired. E.g. (*A100Hx5V*)

59. Click Create Profile View

60. Click a model space location in the drawing to place your created Profile View

61. Select the profile grid.

62. Right-click and Click *Display Order*… Click *Send to Back*. Toggle **Show/hide Lineweight** to *On*

Superimpose the stream water level onto the *Distribution Line* Profile View.

63. Click *Home… Create Design… Profile… Create Superimposed Profile …*

64. Select the water level profile from the profile view for the water level alignment.

65. Select the profile view of the distribution line.

66. At the Superimposed Profile Options screen click OK. The water level profile will appear in the distribution line profile view.

Determine the stations on the *Original Tile* and the *Distribution Line* where they cross.
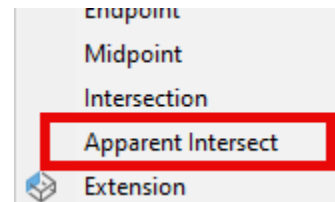67. <u>Zoom</u> to the location where the alignments cross.
68. Click *Annotate… Labels & Tables… Add Labels▼ …Alignment… Station/Offset…*
69. <u>Select</u> the *Original Tile* alignment.
70. At *Specify Station along baseline* <u>Osnap</u> to the *apparent intersection* of the alignments.
71. At *Specify Station offset* <u>type</u> {0} <u>Enter.</u>
72. <u>Press ESC</u>

73. Click *Annotate… Labels & Tables… Add Labels▼ …Alignment… Station/Offset…*
74. <u>Select</u> the *Distribution Line* alignment.
75. At *Specify Station along baseline* <u>Osnap</u> to the *apparent intersection* of the alignments.
76. At *Specify Station offset* <u>type</u> {0} <u>Enter.</u>
77. <u>Press ESC</u>
78. <u>Select</u> the *Move Label* grip of the label to relocate the label to the side.

Draw the Water Control Structure (WCS) on the *Distribution Line* Profile View.
   Note: Determine the elevation of the bottom and top of the WCS from your design and determine the station of the WCS identified from the intersection of the alignments.
79. <u>Click</u> *Home… Create Design… Profile…Profile Creation Tools*
80. <u>Select</u> the *Distribution Line* Profile View.
81. <u>Input</u> Name as {*WCS*}.
82. General: Profile Style = *Road*
83. Label <u>Set</u> = *<none>*
84. <u>Click</u> OK
85. On the Profile Layout Toolbar <u>click</u> **Draw Tangents** …
86. Activate the transparent command for Profile: Station & Elevation.
   <u>Type</u> {'PSE} <u>Press Enter</u>
87. <u>Select</u> the profile view again.

88. <u>Input</u> the WCS station value of the intersection location along the Distribution line.
   E.g. {*537.8*}. <u>Press Enter</u>.
89. <u>Input</u> the bottom elevation of the WCS E.g. {*1048.7*}. <u>Press Enter</u>.

90. <u>Input</u> the intersection station value plus 0.01'. E.g. {*537.81*}. <u>Press Enter</u>.
91. <u>Input</u> the top of the WCS elevation E.g. {*1054.7*}. <u>Press Enter</u>.

Optional: Draw the length of the WCS box.
92. <u>Input</u> intersection station value plus 1'. E.g. {*538.8*}. <u>Press Enter</u>.
93. <u>Input</u> the top of the WCS elevation E.g. {*1054.7*}. <u>Press Enter</u>.
94. <u>Input</u> the intersection station value plus 1.01'. E.g. {*538.81*}. <u>Press Enter</u>.
95. <u>Input</u> the bottom elevation of the WCS E.g. {*1048.7*}. <u>Press Enter</u>.

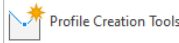96. <u>Press Esc</u>. <u>Press Esc</u>.

97. Close Profile Layout Tools box.
98. Repeat on the Existing Tile profile view using those station values.

Draw the stop log elevation onto the length of the *Distribution Line* Profile View.
   Note: Determine the stop log elevation from the design.

99. Click *Home… Create Design… Profile…Profile Creation Tools* Profile Creation Tools
100. Select the Profile View of the Distribution line.
101. Input Name as {*Stop Log Elev*}
102. General: Profile Style = *Flowline*
103. Label Set = *Off*
104. Click OK
105. On the Profile Layout Toolbar click **Draw Tangents** …
106. Activate the transparent command for Profile: Station & Elevation.
   Type {'PSE} Press Enter
107. Select the profile view again.
108. Input upstream most station for the stop log elevation to appear E.g. {*0*}. Press Enter.
109. Input the stop log elevation E.g. {*1052.5*}. Press Enter.
110. Input the downstream most station to show the profile line. E.g. {*1200*}. Press Enter.
111. Input the stop log elevation E.g. {*1052.5*}. Press Enter.
112. Press Esc. Press Esc.
113. Close Profile Layout Tools box.

Draw the flowline of the distribution line on the *Distribution Line* Profile View.

114. Click *Home… Create Design… Profile…Profile Creation Tools* Profile Creation Tools
115. Select the Profile View of the Distribution line.
116. Input Name as {*Flowline Dist Line*}.
117. General: Profile Style = *Flowline*
118. Label Set = *Finished*
119. Click OK
120. On the Profile Layout Toolbar click **Draw Tangents** …
121. Activate the transparent command for Profile: Station & Elevation.
   Type {'PSE} Press Enter
122. Select the profile view again.
123. Input the upstream most station of the distribution line E.g. {*5*}. Press Enter.
124. Input the proposed elevation of the distribution line flowline at that station
   E.g. {*1050*}. Press Enter.
125. Input the station of the WCS E.g. {*537.8*}. Press Enter.
126. Input the proposed elevation of the distribution line flowline at the WCS.
   E.g. {*1048.8*}. Press Enter.
127. Input the downstream most station of the distribution line E.g. {*1200*}. Press Enter.
128. Input the proposed elevation of the distribution line flowline at that station
   E.g. {*1049.5*}. Press Enter.
129. Press Esc. Press Esc.
130. Close Profile Layout Tools box.

Saturated Buffer

Editing the profile of the distribution line
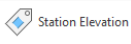131. To insert additional vertices if necessary, select the profile line. <u>Right click</u>, <u>click</u> *Edit Profile Geometry.* <u>click</u> **Insert PVI** from the Profile Layout toolbar.
132. <u>Click</u> to set the location of a new PVI. (Or use {'PSE} to then input the station & elevation values. <u>Press ESC</u> to exit the 'PSE mode.)
133. <u>Press ESC</u> when done entering additional PVI locations.

134. To view & edit the distribution line flowline PVIs <u>click</u> the *Profile Grid View* 🔵.
135. <u>Double click</u> PVI values to edit them and to enter new values. <u>Press Enter</u>.
136. <u>Close</u> out of *Profile Entities Panorama* when done editing.
137. <u>Close</u> out of the *Profile Creation Tools* by <u>clicking</u> ❌
138. To remove all station and elevation labels on the profile, <u>press</u> <u>ESC, select</u> a label. <u>Press</u> <u>delete</u>.

Optional: Copy the flowline of the distribution line and raise to the top of tile elevation.
139. <u>Select</u> the Profile of the *Flowline Dist Line*.
140. <u>Right-click</u> *Edit Profile Geometry*
141. On the Profile Layout toolbar <u>click</u> **Copy Profile**
142. PVI Range = *All*, <u>Choose</u> *Create New Profile*.
143. <u>Click</u> OK
144. <u>Press ESC ESC</u>
145. <u>Select</u> the copy of the flowline profile. (It will be on top since it is the most recent)
146. <u>Right-click</u> *Profile Properties*
147. On the Information tab change the name to {*Top of Distribution Line*}
148. Change the *Object Style* to *Core Trench*. <u>Click</u> Ok.
149. <u>Right-click</u> *Edit Profile Geometry*
150. On the Profile Layout toolbar <u>click</u> **Raise/Lower PVIs**
151. Input the *Elevation change* as the tile diameter. E.g. {*6"*}
152. *PVI Range = All*. <u>Click</u> Ok.
153. <u>Close</u> the Profile Layout toolbar.
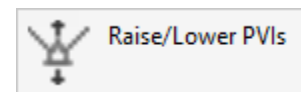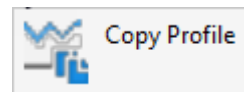
Label the distribution line Profile at grade breaks.
154. <u>Select</u> the profile.
155. <u>Right Click</u> *Edit Labels*.
156. Set Type = *Grade Breaks*. Profile Grade Break Label Style = *Grade Break*.
157. <u>Click</u> [Add>>]
158. In the *Weeding* column of the *Grade Break* row <u>reduce</u> the value: {25} or {0}. <u>Click</u> Ok.
159. To add individual labels <u>select</u> a profile.
160. From the context sensitive ribbon <u>select</u> *Add View Labels* ▼ …
161. <u>Click</u> *Station Elevations* 🔷 Station Elevation
162. Use *Endpoint* <u>Osnap</u> to set the station value of the distribution line.
163. Use *Endpoint* <u>Osnap</u> to select the elevation value at that same location.
164. <u>Repeat</u> for additional grade break locations. When done <u>press ESC</u>.

See the **Profiles & Sections** document for additional labeling options.

Create a Named View of the Profile View.
165. <u>Click</u> a location in the drawing for the profile to appear.
166. <u>Zoom</u> to a full view of the profile view that you just created.
167. <u>Click</u> the View Controls… *View Manager… New…*
168. <u>Input</u> a View Name. E.g {*Profile - Distribution Line*}
169. <u>Open</u> the advanced settings tab by <u>clicking</u> ⌄ … On the View Properties tab <u>Uncheck</u> *Save layer snapshot with view*.
170. <u>Click</u> [OK] to go back to the *View Manager…*<u>Click</u> [OK] to exit the *View Manager*.

<div align="center">

<u>Construction drawings</u>
</div>

For construction drawings you may want to a shorten the length of this Profile View if less data needs to be display.

Modifying the extent of the stations and/or elevation of a Profile View
171. <u>Select</u> the Profile View grid. <u>Right-click… click</u> *Profile View Properties*
172. On the *Stations* tab, <u>select</u> *User specified range* and input the start & end stations based on full increments of the H scale.
173. On the *Elevations* tab, <u>select</u> *User specified height* and input the minimum & maximum elevations based on full increments of the V scale.
174. When done <u>click</u> Ok.

For more options refer to the instructions for **Profile & Sections**: "Modifying Profile Views"

For Profile Views that are too long to fit on a page, you can also create multiple profile views that split the profile view into 2 or more adjoining views.
Refer to the instructions for **Profile & Sections**: "Creating Multiple Profile Views"