Profiles & Sections

**Overview:** Create profile or cross sectional views for surfaces in the project. Labeling tools can be used to identify elevations on the profiles.

**Software:** AutoCAD Civil 3D 2016, Civil 3D Workspace, NRCS C3D 2016 template

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

**Prerequisite**

Follow the instructions for *Original Ground Contours*. Create any additional surfaces.

Create Alignment and Create Profile View

Create an alignment to be profiled if not already done.

1. Tool Palette>NRCS 11x17B… Click Plan Commands… Alignment Generic
2. Draw a line that represents the alignment.
3. Click Home… Create Design… Alignment… Create Alignment from Object
4. Select the alignment line. Press Enter
5. If the direction of the alignment is correct, press Enter. (R to reverse)
6. Enter the **Name** to E.g. *CL dam*.
7. On the General Tab, set **Site** to None, checkmark **Erase existing entities**.
8. Uncheck **Add curves between tangents** if you want to keep the object as is.
9. Click **OK**

Create a Named View in order to find this Alignment easily later

10. Zoom to a full view of the alignment that you just created.
11. Click the View Controls… View Manager… New…
12. Input a View Name. E.g *CL Dam Plan View*
13. On the View Properties tab Uncheck **Save layer snapshot with view**.
14. Click OK.

Reversing the direction of an existing Alignment (optional)

15. Select the alignment.
16. From the activated Alignment ribbon use **Modify**. **Reverse Direction**.

Change the Stationing of an Alignment (optional)

17. Select the alignment
18. Right-Click **Alignment Properties**…
19. **Station Control** Tab
20. Click **Pick reference point** and snap to a location in the drawing.
21. Set the station value of the reference point. E.g *1000*
22. Click **OK**.
Profiles & Sections

Extract profiles from surfaces and place them into a profile view.

23. Decide on the horizontal scale that you want for the Profile Views and set the drawing annotation Scale.

<table>
<thead>
<tr>
<th>Horizontal scale vs Profile length</th>
<th>that fits a viewport for NRCS 11x17 template.</th>
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<tbody>
<tr>
<td>(1”=5’) 70’; (1”=10’) 140’; (1”=20’) 280’; (1’=30’) 420’; (1”=40’) 560’; (1”=50’) 700’; (1”=100’) 1400’; (1”=200’) 2800’; (1’=400’) 5600’.</td>
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</tr>
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</table>

24. Click Home... Create Design... Profile... Create Surface Profile ...
25. Pulldown the alignment to CL dam.
26. The Station range To sample can be used to limit the length of the alignment profiled.
27. Use Ctrl + Click to select the multiple surfaces to be profiled.
28. The Sample offsets can be checkmarked to draw profiles parallel to the alignment.
   E.g. { -20, 20 }
29. Click Add>> to apply the process to the selected surfaces
30. In the Profile list pulldown the style to match the type of surface E.g. ( Stripping, Original Ground, Embankment, Bank –Right (Orange), etc)
31. Click Draw in Profile View
32. Set the Profile View style to the Horizontal/Vertical scaling desired. E.g. (A40Hx10V) Click Next
33. Select User Specified Range and input values for starting and stopping. Click Next
34. Select User Specified view height and input values for grid elevations. Click Next
35. Click Create Profile View
36. Click a location in the drawing for the profile to appear.

Create a Named View in order to find this Profile View easily later
37. Zoom to a full view of the profile view that you just created.
38. Click the View Controls… View Manager... New...
39. Input a View Name. E.g {CL Dam- Profile}
40. On the View Properties tab Uncheckmark Save layer snapshot with view.
41. Click OK.

Extract additional profiles into an existing profile view if needed.
42. Click Home... Create Design... Profile... Create Surface Profile ...
43. Pulldown the alignment to CL dam. You will see existing profiles in the profile list.
44. Select the new surface to be profiled.
45. Use Station ranges and Offset as needed.
46. Click Add>> to apply the settings to the selected surface
47. In the Profile list pulldown the style to match the new surface (E.g. Stripping, etc.)
48. Click OK. The profile will be added to ALL Profile Views for this alignment.

Refer to the document Profiles Creation & Editing for creating planned profiles.
Creating Multiple Profile Views

A profile that is too long to fit in on a page can have multiple adjoining profile views created. Each profile view has a grid that fits into a layout for plotting.

49. Decide on the horizontal scale that you want for the Profile Views and set the drawing annotation Scale. See Horizontal scale vs Profile length, earlier.

50. Click Home... Profile & Section Views... Create Multiple Profile Views...

51. Select the correct Alignment name.

52. Set the Profile View style to the H/V scaling desired. E.g. \(A50Hx5V\) Click Next.

53. Select Automatic and input the length of each view. E.g \(700\) for a 1”=50’ scale.

54. Click Next.

55. Select Automatic. Click Next.

56. In the Draw column checkmark the profiles that you want to have displayed. (E.g. Planned WW Main & CL WW Main – Ognd.) Review the Style column.

57. Set the Labels column for the planned profile to Finished.

58. Click Create Profile View.

59. Click a location in the drawing for the profile views to appear.

60. Create named views for each Profile View

Adding Profile Labels

Profile labels: Label grades along a profile

61. Click Annotate... Labels & Tables... Add Labels... Add/Edit Profile Labels...

62. Click the Profile line.

63. Set Type = Lines, Profile Tangent Label Style = Grade %. Click Add>

64. Uncheck Start & End stations to control locations by inputting the starting and stopping station. Click OK

Profile labels: Label 100’ stations & elevations along a profile

65. Click Annotate... Labels & Tables... Add Labels... Add/Edit Profile Labels...

66. Click the Profile line.

67. Set Type = Major Stations, Profile Tangent Label Style = Station and Elev (Perp) Click Add>

68. Uncheck Start & End stations to control locations by inputting the starting and stopping station. Click OK

Profile View labels: Label stations & elevations manually in a profile view (not live linked to a profile)

69. Click Annotate... Labels & Tables... Add Labels... Profile View... Station Elevation...

70. Click the Profile View.

71. Input or click to the station to be labeled. Press Enter

72. Input or click to the elevation to be labeled. Press Enter

73. When done Press Enter
Profile View labels: Label the profile view with the planned elevations and cut
74. **Select** the Profile View
75. **Right-click**… **click** Profile View Properties…
76. In the Profile Views Properties box go to the Bands tab.
77. **Click** Import Band Set…
78. **Select** Elev & Fill at Major Stations - in Grid
79. **Click** Ok] A Profile Bank is added to the List of bands.
80. **Pulldown** the column for Profile1 to the planned profile (e.g. Planned WW Main)
81. **Pulldown** Profile2 to the original ground surface profile (e.g. CL WW Main – Ognd)

![List of bands](image)

82. **Click** Ok] The elevation and cut will be added along the bottom of the profile view.

Removing Profile Labels
Profile Labels: Individual labels or entire sets of labels can be deleted.
83. Use Ctrl+Click to select individual labels to be deleted. **Press Delete**.
84. **Click** any label and all of the labels of that set will be selected. **Press Delete**.

Modifying Profile Views
Profile views: Adjusting the scale or the station and elevation range.
85. **Select** the Profile View grid. **Right-click**… **click** Profile View Properties
Changing the Scale of the view:
86. On the Information tab, **Pulldown** the Object Style to the desired scaling (E.g. A100Hx2V). The text will be sized correctly once you set the drawing scale (or viewport scale) to match the horizontal scale of the profile view. (E.g. 1” =100’)

Modifying the extent of the stations and elevation
87. On the Stations tab, select User specified range and input the start & end stations.
88. On the Elevations tab, select User specified height and input the minimum & maximum elevations.

Controlling the display of profiles
89. On the Profiles tab, checkmark the Draw column for items that you want to display.
   To change the display style of a profile in the current view only, use the Override style rather than the Style column.
90. **When done** **click** Ok
Note: If you added plain AutoCAD labels or objects to a Profile View, the location of those items will NOT be correctly adjusted if you change the scaling of the view.
Profiles & Sections

Create Sections and Section Views

Create the sampling locations along the alignment for the Sections.
91. Click the View Controls... Custom Model Views.. CL Dam – Plan View to zoom to the Alignment.
92. Click Home... Profile & Section Views... Sample Lines...
93. Press Enter to see the list of alignments available.
94. Select the correct alignment E.g. CL Dam. Click OK
95. Set the data sources to sample. Checkmark the Ognd source, etc. Set the Style. (E.g Original Ground) Click Ok. Click Ok
96. Input the stationing of a cross section that is wanted. E.g. 125 Press Enter
97. Input the left extent of the cross section E.g. 100 Press Enter
98. Input the right extent of the cross section E.g. 100 Press Enter
99. Repeat the previous 3 steps for additional cross sections
    Optional: For stations at uniform increments
100. In the Sample Line Tools: Set the Creation Method to By Range of Stations.
    a) Set widths to 100’.
    b) Set all Sampling Increments to 100’
    c) Set Additional Sample: At Horizontal Geometry to False.
    d) Click Ok.
101. Press ESC when done specifying cross sections. Cross section markers will appear along the alignment.

Create all of the section views for a Sample Line Group.
102. Decide on the horizontal scale that you want for the Section Views and set the drawing annotation Scale.
    Based on the horizontal scale, here are section widths that fit a viewport.

<table>
<thead>
<tr>
<th>Scale</th>
<th>1 column</th>
<th>2 columns</th>
<th>3 columns</th>
</tr>
</thead>
<tbody>
<tr>
<td>1’=5’</td>
<td>70</td>
<td>30</td>
<td>20</td>
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<tr>
<td>1’=10’</td>
<td>140</td>
<td>60</td>
<td>40</td>
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<tr>
<td>1’=20’</td>
<td>280</td>
<td>120</td>
<td>80</td>
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<tr>
<td>1’=30’</td>
<td>420</td>
<td>180</td>
<td>120</td>
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<td>1’=40’</td>
<td>560</td>
<td>240</td>
<td>160</td>
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<td>1’=50’</td>
<td>700</td>
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<td>200</td>
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<tr>
<td>1’=100’</td>
<td>1400</td>
<td>600</td>
<td>400</td>
</tr>
</tbody>
</table>

103. Click Home... Profile & Section Views... Section Views... Create Multiple Views...
104. In the dialog box Set the Select alignment to the correct alignment. And the Sample Line Group Name that you just created.
105. Set Section View Group Name that you just created.
106. Click Next
107. Select Production
108. **Browse to** `C:\ProgramData\CAD Std 2016\Templates\Iowa11x17EngSectionsTemplate(B).dwt`
109. **Click** Open
110. Select the layout with the correct scale. (E.g. Sections 20 scale)
111. **Click** Ok
112. **Set Group Plot Style = Waterway Array**
113. **Click** Next
114. Select **User specified**. Input left and right distances that fit 1, 2, or 3 columns.
   E.g. For 1’=20’ scale @ 1 column use Left = -140, Right = 140. (280’ total width)
115. **Click** Next
116. Typically leave the Elevation Range as **Automatic**. **Click** Next
117. Verify the Sections that you want to Draw and the Style used. (E.g Embankment)
118. **Click** Create Section Views
119. **Pan** to a location for the Section Views and **click** to place them.
120. Create a named view for this group of Section Views.

### Adding Cross Section Labels

Label grades between 2 points on a cross section
121. **Click** Annotate... Labels & Tables... Add Labels... Section View... Grade...
122. **Click** the Section View.
123. **Click** the first point on a grade
124. **Click** the second point on a grade
125. **Press** ESC when done
126. The display style can be changed in
   Properties: General: Section Depth Grade Label Style. Default is Grade (Percent).
   Try Slope (Run over Rise).

Label offsets & elevations in a cross section view
127. **Click** Annotate... Labels & Tables... Add Labels... Section View... Offset Elevation..
128. **Click** the Section View.
129. **Click** to the location to be labeled.
130. When done **Press Enter**
131. The display style can be changed in
   Properties: General: Section View Offset Label Style. Default is Elev (Vertical Above).
   Try OS and Elev (Vertical Above).

Section labels: Label sections lines
132. **Click** Annotate... Labels & Tables... Add Labels... Section View... Add/Edit Section Labels...
Profiles & Sections

133. Click the Section line.
134. Set Type = Segments if you want each line segment labeled with a % grade. OR
135. Set Type = Grade Breaks if you want each grade break labeled with Offset distance and elevation.
136. Click Add for each type of item that you want added.
137. Uncheck Start & End stations to control locations by inputting the starting and stopping offset. A weeding distance can also be applied.
138. Click OK

Modifying Section Views

Section view groups: Adjusting the scale or the display of all section views in a group.
139. Select the Section View grid. Right-click… click Section View Group Properties
Changing the Scale of the all of the Section views:
140. On the Section Views tab, Pulldown the Style in the first line to the desired scaling (E.g. A10Hx2V). Click OK The text will be sized correctly once you set the drawing scale (or viewport scale) to match the horizontal scale of the profile view. (E.g. 1” =10’)

Controlling the display of sections
141. On the Sections tab, checkmark the Draw column for items that you want to display. To change the display style of a profile in the current view only, use the Override style rather than the Style column.
142. Click OK

Section views: Adjusting the scale or offset/elevation range to individual section views.
143. Select the Section View grid. Right-click… click Section View Properties
Changing the Scale of the view:
144. On the Information tab, Pulldown the Object Style to the desired scaling (E.g. A10Hx2V). The text will be sized correctly once you set the drawing scale (or viewport scale) to match the horizontal scale of the profile view. (E.g. 1” =10’)

Modifying the extent of the offsets and elevation
145. On the Offsets tab, select User specified range and input the left & right distance.
146. On the Elevations tab, select User specified height and input the minimum & maximum elevations.

Controlling the display of sections
147. On the Sections tab, checkmark the Draw column for items that you want to display. To change the display style of a profile in the current view only, use the Override style rather than the Style column.
148. When done click Ok

If you’ve changed the scale of Section Views and they are now overlapping each other:
149. Select a Section View grid.
150. Click Section View … Modify View… Update Group Layout

Note: If you added plain AutoCAD labels or objects to a Section View, the location of those items will NOT be correctly adjusted if you change the scaling of the view.
Profiles & Sections

Adding more Section data to Section View
Section views: If you currently have only the ground surface in a section view, you can extract section data for new surfaces that have been created.
151. Select a Section View grid.
152. Click Section View … Modify Section… Sample More Sources
153. Select the Surface in the Available Sources, then click Add>>
154. Set the Style for the newly added source. Click Ok.
155. Click Ok.
156. Sections from the new source will be added to all Section Views

Controlling the Display of Gridlines
Fine Gridlines are controlled by the Layer 3.Grid.Fine. This needs to be done through the Layer manager.
To Freeze the display of fine grids in one viewport only.
157. Switch into the Modelspace of the viewport.
158. Home… Layers.. Layer Properties Manager
159. Use the Grid filter or find the 3.Grid.Fine layer and use the VP Freeze column

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<th>Freeze</th>
<th>L.</th>
<th>Color</th>
<th>Linetype</th>
<th>Lineweight</th>
<th>Transpar</th>
<th>Plot Style</th>
<th>Print Style</th>
<th>VP Freeze</th>
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Profiles & Sections

Overview of Profiles & Sections

Profiles
An alignment must exist before a Profile can be created.
Types of profiles:

- Surface profiles – extracted from a surface and dynamically linked to the surface
- Layout profiles – proposed profiles created by using the Profile Layout Toolbar
- And others

In order to see a profile there must be a Profile View

Profile Views
A profile view is used to display profiles as graphed lines on a grid.
A specific profile can be displayed in more than one profile view.
Each profile view allows you control what data is displayed, the scale, and the style.

- Profile labels are live linked to the profile
- Profile view labels stay at the same place in the view even if a profile is changed.

New profiles that are created will be added to all the existing profile views of that alignment.

Sections
An alignment and surfaces must exist before Sections can be created.
Sample lines are setup along an alignment in order to extract Sections from the surfaces.
In order to display sections there must be a Section View

Sample Line
The user sets the locations of where they want to extract a section & the width to extract.

Section Views
A Section View is used to display Sections extracted at a sample line location.
A specific section can be displayed in more than one section view.
Section Views can be created as a group or individually
Each section view allows you control what data is displayed.

- Section labels are live linked to the sections
- Section view labels stay at the same place in the view even if a section is changed.

Sample Line Groups are the holder for Sample lines, Sections, and Section View Groups

Section View Groups are the holder for Section Views

If the scaling of a Section View or Profile View is changed, the Civil 3D labeling adjusts.
Profiles & Sections

In Toolspace... Prospector... Profiles, Profile Views, and Sample Line Groups are found under Alignments.