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 2018, Civil 3D Workspace, NRCS C3D 2018 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 Click OK.
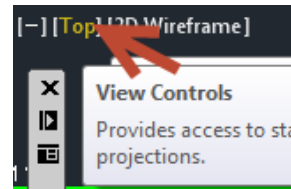
Reversing the direction of an existing Alignment (optional)
15. Select the alignment.
16. From the activated Alignment ribbon use *Modify▼.. Reverse Direction*. Click OK

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** (See A), Click OK at the warning message, and snap to a location in the drawing.
21. Set the station value of the reference point. E.g {*1000*} (See B)
22. Click OK. Click OK at the warning message. Click OK
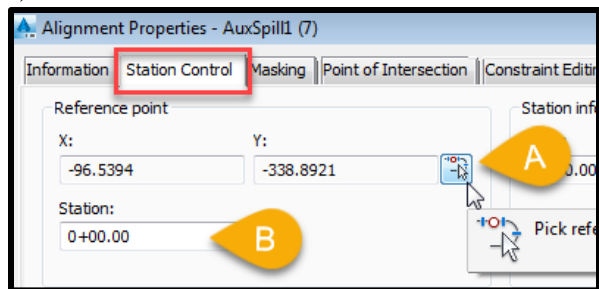
Extract profiles from surfaces and place them into a profile view
23. Decide on the horizontal scale that you want for the
   Profile Views and set the drawing annotation Scale.

Horizontal scale vs Profile length that fits a viewport for NRCS 11x17 template.
(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'.
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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*.
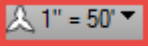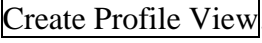41. Click OK Click OK.
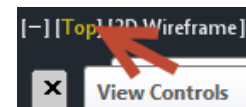
Extract additional profiles into an existing profile view if needed.
42. Click *Home... Create Design... Profile... Create Surface Profile ...*
43. Pulldown the alignment to *CL dam*. You will see existing profiles in the profile list.
44. Select the new surface to be profiled.
45. Use Station ranges 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. <u>Decide</u> on the horizontal scale that you want for the Profile Views and <u>set</u> the drawing annotation Scale. See **Horizontal scale vs Profile length,** earlier.

50. <u>Click</u> *Home... Profile & Section Views... Create Multiple Profile Views...*

51. <u>Select</u> the correct *Alignment name*.
52. Set the Profile View style to the H/V scaling desired. E.g. {*A50Hx5V*} <u>Click</u> Next.
53. <u>Select</u> Automatic and <u>input</u> the length of each view. E.g {*700*} for a 1"=50' scale.
54. <u>Click</u> Next.
55. <u>Select</u> Automatic. <u>Click</u> Next.
56. In the Draw column <u>checkmark</u> the profiles that you want to have displayed. (E.g. *Planned WW Main & CL WW Main – Ognd*.) <u>Review</u> the Style column.
57. <u>Set</u> the Labels column for the planned profile to *Finished*.
58. <u>Click</u> Create Profile View.
59. <u>Click</u> 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. <u>Click</u> *Annotate... Labels & Tables... Add Labels... Add/Edit Profile Labels...*
62. <u>Click</u> the Profile line.
63. <u>Set</u> Type = *Lines*, Profile Tangent Label Style = *Grade %* <u>Click</u> Add>
64. <u>Uncheck</u> *Start & End* stations to control locations by inputting the starting and stopping station. <u>Click</u> OK

Profile labels: Label 100' stations & elevations along a profile
65. <u>Click</u> *Annotate... Labels & Tables... Add Labels... Add/Edit Profile Labels...*
66. <u>Click</u> the Profile line.
67. <u>Set</u> Type = *Major Stations*, Profile Tangent Label Style = *Station and Elev (Perp)* <u>Click</u> Add>
68. <u>Uncheck</u> *Start & End* stations to control locations by inputting the starting and stopping station. <u>Click</u> OK

Profile View labels: Label stations & elevations manually in a profile view (not live linked to a profile)
69. <u>Click</u> *Annotate... Labels & Tables... Add Labels... Profile View... Station Elevation..*
70. <u>Click</u> the Profile View.
71. <u>Input</u> or click to the station to be labeled. <u>Press Enter</u>
72. <u>Input</u> or click to the elevation to be labeled. <u>Press Enter</u>
73. When done <u>Press Enter</u>

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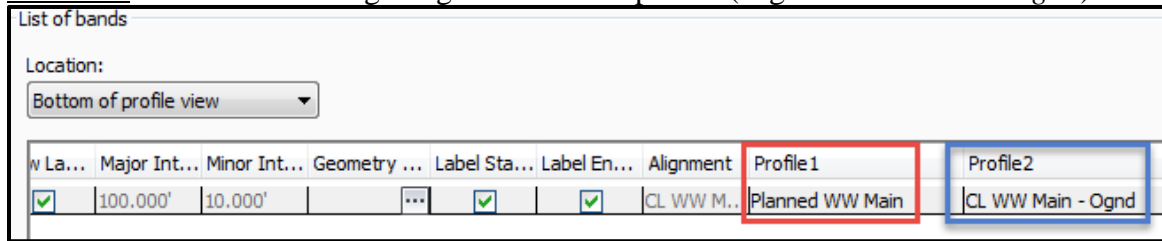
82. Click Ok. The elevation and cut will be added along the bottom of the profile view.

<div align="center">Removing Profile Labels</div>

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.

<div align="center">Modifying Profile Views</div>

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.

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.

| Custom Model Views | ▶ | CL Dam - Plan View |

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.

| 1" = 20' ▼ |

Based on the horizontal scale, here are section widths that fit a viewport.

Scale	Total Section Width, Ft		
	1 column	2 columns	3 columns
1'=5'	70	30	20
1"=10'	140	60	40
1"=20'	280	120	80
1"=30'	420	180	120
1"=40'	560	240	160
1"=50'	700	300	200
1"=100'	1400	600	400

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 Style* to the correct scaling. E.g. *A 20Hx10V*.
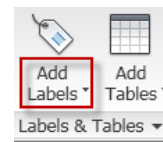106. Click Next
107. Select *Production*

108.   Browse to *C:\ProgramData\CAD Std 2018\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 *Embamkment*)
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.
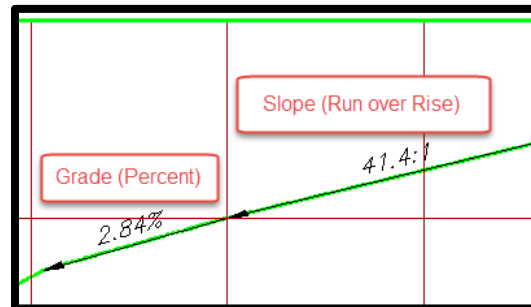
<div align="center">Adding Cross Section Labels</div>

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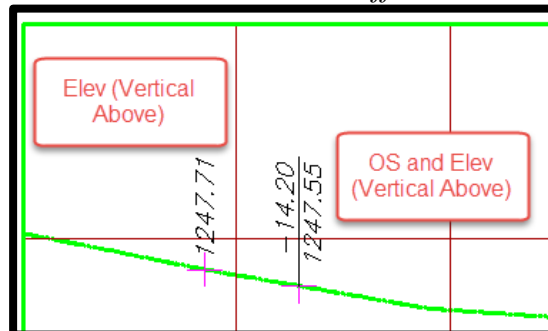121.   Click *Annotate... Labels & Tables... Add Labels... Section View... Grade...*
122.   Click the Section View.
123.   Click the first point on a grade
124.   Click the second point on a grade
125.   Press ESC when done
126.   The display style can be changed in *Properties: General: Section Depth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

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 to put labels farther apart.
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.

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
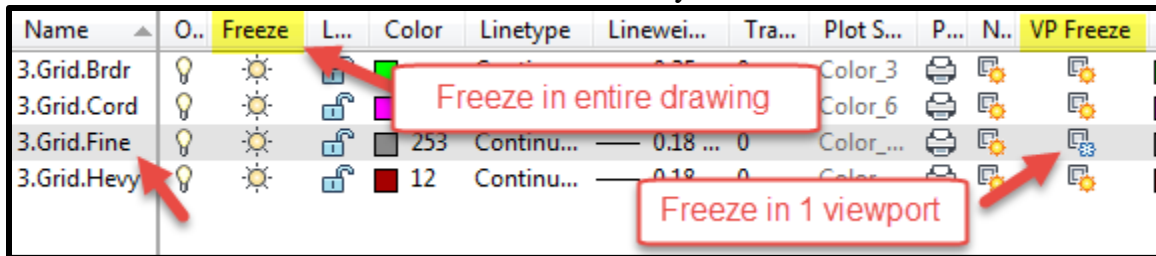
Overview of Profiles & Sections

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.

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