Overview: Create a graphical plot and a report showing the cut/fill at each top width edge of a waterway design. A new alignment is created along each edge and a profile of the waterway top and a profile of the ground and of the cut/fill depth at the same location is created. The profile view is created and a cut sheet report can be created.
Note: The alignments along the edge of the waterway will have slightly different stationing values due to curves and direction changes.

Software: AutoCAD Civil 3D, NRCS 2018 WW subassemblies & template

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Notation: Button to Press *Displayed Text* **Icon** <u>Action</u> {Text to Enter} *Menu Item...*

<u>Prerequisite</u>
A waterway has been completed using the instructions for *Waterway Corridor Design* including creating a volume surface

<u>Create the Alignment & Profiles along the Waterway Edges</u>

Create an alignment along the edges of the top width of the waterway.
1) <u>Click</u> *Home... Create Design... Alignment... Create Alignment from Corridor...*
2) <u>Select</u> the feature line along the right top width of the waterway. <u>Press Enter</u>
3) <u>Input</u> the *Name* to {*RTop WW1*}
4) <u>Uncheck</u> *Create Profile*.
5) <u>Click</u> OK
6) <u>Select</u> the feature line along the left top width of the waterway. <u>Press Enter</u>
7) <u>Input</u> the *Name* to {*LTop WW1*}.
8) <u>Uncheck</u> *Create Profile*.
9) <u>Click</u> OK
10) <u>Press</u> ESC

11) Set the drawing annotation scale to match the desired horizontal profile scale.

   (Optional) Extract a Profile of the Ground & Waterway Surfaces to a profile view

12) <u>Click</u> *Home... Create Design... Profile... Create Surface Profile* ...
13) <u>Pulldown</u> the alignment to *RTop WW1*.
14) <u>Click</u> to select the original ground surface to be profiled. E.g. {*Ognd*}
15) <u>Click</u> Add>>
16) In the Profile list <u>pulldown</u> the style for the ground surface E.g. *Original Ground*.
17) <u>Click</u> to select the design waterway surface to be profiled. E.g. {*WW1 Planned*}
18) <u>Click</u> Add>>
19) In the Profile list <u>pulldown</u> the style to indicate the side of the WW.
    E.g. *Bank – Right (Orange)* or *Bank – Left (Blue)*.
20) <u>Click</u> Draw in Profile View

21) Set the Profile View style to the Horizontal/Vertical scaling desired. E.g. {*A100Hx5V*} Click Next
22) Select *User Specified range*. Adjust values if needed. Click Next
23) Select *User Specified* view height. Adjust values if needed. Click Next
24) Click Create Profile View
25) Click a location in the drawing for the profile to appear.
26) Repeat for the opposite edge.
Create a Named View in order to find these Profile Views easily later
27) Zoom to a full view of the profile view that you just created.
28) Click the View Controls… *View Manager… New…*
29) Input a View Name. E.g {*RTop WW1 Profile*}
30) On the View Properties tab Uncheckmark *Save layer snapshot with view*.
31) Click OK. Click OK.
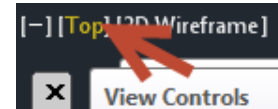
Create Graphical Plot of the Cut/Fill Values

Create Cut/Fill Profile along the Right edge from the Volume Surface into a Profile View

32) Click *Home… Create Design… Profile… Create Surface Profile* 📉 *…*
33) Pulldown the alignment to *RTop WW1*.
34) Click to select the surface to be profiled. E.g. {*V WW1 - Ognd*}
35) Click Add>>
36) In the Profile list pulldown the style to match the side of the WW. E.g.:
    For Right use *Bank – Right (Orange)*
37) Click Draw in Profile View
38) Set the Profile View style to the Horizontal/Vertical scaling desired. E.g. {*A100Hx2V*} Click Next
39) Set Station Range = *Automatic*. Click Next
40) Select User Specified view height & input grid elevations of {-4} & {2}. Click Next
41) Uncheck all except *RTop WW1– V WW1– Ognd*.
42) Click Create Profile View
43) Click a location in the drawing for the profile to appear.

Create Cut/Fill Profile for the Left top edge cut/fill

44) Click *Home… Create Design… Profile… Create Surface Profile* 📉 *…*
45) Pulldown the alignment to *LTop WW1*.
46) Click to select the surface to be profiled. E.g. {*V WW1 - Ognd*}
47) Click Add>>
48) In the Profile list pulldown the style to match the side of the WW. E.g.:
    For Left use *Bank – Left (Blue)*.
49) Click Draw in Profile View
50) Set the Profile View style to the Horizontal/Vertical scaling desired. E.g. {*A100Hx2V*} Click Next
51) Set Station Range = *Automatic*. Click Next
52) Select User Specified view height & input grid elevations of {-4} & {2}. Click Next

53) Uncheck all except *LTop WW1– V WW1– Ognd*.
54) Click Create Profile View
55) Click a location in the drawing for the profile to appear.

Create Cut/Fill Profile for the CL cut/fill

56) Click *Home... Create Design... Profile... Create Surface Profile* ⬚ ...
57) Pulldown the alignment to *CL WW1*.
58) Click to select the surface to be profiled. E.g. {*V WW1 - Ognd*}
59) Click Add>>
60) In the Profile list pulldown the style. E.g.: For CL use *Excavation*
61) Click Draw in Profile View
62) Set the Profile View style to the Horizontal/Vertical scaling desired. E.g. {*A100Hx2V*} Click Next
63) Set Station Range = *Automatic*. Click Next
64) Select User Specified view height & input grid elevations of {-4} & {2}. Click Next
65) Uncheck all except *CL WW1– V WW1– Ognd*.
66) Click Create Profile View
67) Click a location in the drawing for the profile to appear.

Superimpose the Right & Left cut/fill profiles into the CL cut/fill profile.
68) Click *Home... Create Design... Profile...Create Superimposed Profile...*
69) Source Profile: Select the profile of the Right Edge Cut/Fill "orange" from the Rt Top WW1 Profile view
70) Destination Profile View: Click on the grid of CL Cut/Fill Profile
71) Click OK.
72) Click *Home... Create Design... Profile...Create Superimposed Profile...*
73) Source Profile: Select the profile of the Left Edge Cut/Fill "blue" from the Lt Top WW1 Profile view
74) Destination Profile View: Click on the grid of CL Cut/Fill Profile
75) Click OK.
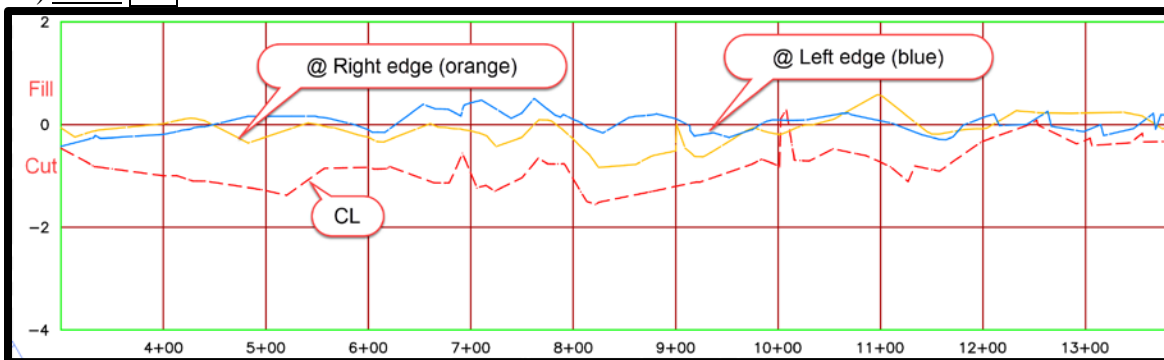
Note: These profiles will update either automatically or by doing a manual rebuild of the corridor & surfaces.
Note: If the waterway alignment is changed then a new "alignment from corridor" will be needed for the right & left top edges.

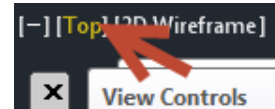Create a Named View in order to find these Profile Views easily later
76) Zoom to a full view of the profile view that you just created.
77) Click the View Controls… *View Manager… New…*
78) Input a View Name. E.g {*WW1 Cut-Fill Graph*}
79) On the View Properties tab Uncheckmark *Save layer snapshot with view*.
80) Click OK. Click OK.

Make changes to the waterway profile as needed. If necessary manually rebuild the corridor and surfaces.

<u>Create a Report with the Cut/Fill Values</u>

Important: This process will need to be redone if the waterway design profile is modified.

Create a final alignment along the edges of the top width of the waterway.
81) Click *Home… Create Design… Alignment… Create Alignment from Corridor…*
82) Select the feature line along the right top width of the waterway. Press Enter
83) Input the *Name* to {*Final WW1 R*}
84) Check *Create Profile.*
85) Click OK
86) General: Profile Style = *Finished Ground*
87) Click OK
88) Select the feature line along the left top width of the waterway. Press Enter
89) Input the *Name* to {*Final WW1 L*}.
90) Check *Create Profile.*
91) Click OK
92) General: Profile Style = *Finished Ground*
93) Click OK
94) Press ESC

Extract a Profile of the Ground Surface for each edge
95) Click *Home… Create Design… Profile… Create Surface Profile* 📈 *…*
96) Pulldown the alignment to *Final WW1 R* .
97) Click to select the surface to be profiled. E.g. {*Ognd*}
98) Click Add>>
99) In the Profile list pulldown the style to match the type of surface E.g. *Original Ground*.
100)   Click OK
101)   Repeat for the opposite edge.

Create the report showing the cut along the edges
Note: Report precision settings are found in *Toolspace… Settings…*then right-click on the Active drawing name and click *Edit Drawing Settings*. Click the *Ambient Settings* tab. *Coordinate--Precision, Elevation--Precision, & Station--Precision* apply to this report.

Note: To set the Report defaults go to *Toolspace...Toolbox...* and click the **Edit Report** icon. The *Owner* section is really the designer and contains "Prepared by" info. The *Client* section contains "Client" info. The *Alignment* and *Profile* settings found here do not affect this report.
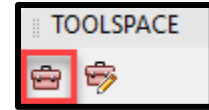
102) Click *Toolspace...Toolbox... Reports Manager...Profile...*
    Double click *Incremental Station Elevation Difference Report*

103) In the *List of design profiles* find the alignment named *Final WW1 R* and checkmark the "*Right*" profile (See A).

Include	Name	Description	Station Start	Station End	Alignment
☐	WWay1CL Fini1		2+66.55	17+28.63	CL WW1
☐	WWay1CL Left		2+68.42	16+73.68	Final WW1 L
☑	WWay1CL Right		2+68.42	16+16.13	Final WW1 R
☐	WWay2CL Fini		0+00.00	9+20.35	WWay2CL

104) In the *List of existing profiles* checkmark the "*Ognd*" profile (See B).

Include	Name	Description	Station Start	Station End	Alignment
☑	Final WW1 R - Ognd		2+68.42	16+16.13	Final WW1 R

105) In the Report settings checkmark only *Regular Interval* and set the *Station Interval*.

Report settings
Start station: [ ]
End station: [ ]
Station interval: 50

☑ Regular Interval
☐ Horizontal tangent points
☐ Vertical tangent points
☐ Existing ground points

Important: The alignments along the edge of the waterway will have slightly different stationing values than the CL due to curves and direction changes.

106) Click Create Report and click Yes at the message to continue.
    The report will open in a web browser. The *Existing* elevation is the Ognd. The *Design* elevation is from on the corridor.
    The *Elevation Difference* is the amount of Cut. A negative value means fill.

107) When finished close the browser and then Click Done.

108) Repeat for the opposite top width edge.

Note: The alignments are found in Prospector as Offset Alignments.

▣ Alignments
  ⊞ Centerline Alignments
  ⊟ Offset Alignments
    ⊞ Final WW1 L
    ⊞ Final WW1 R
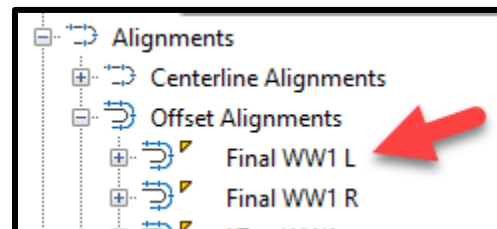
Profile Elevation Differences Report

5/7/2019

Client:

Client

Client Company

Address 1

Date: 5/7/2019 10:17:37 AM

Prepared by:

N Friedrich

USDA NRCS

Vertical Alignment: WWay1CL Left

Existing Profile: Final WW1 L - Ognd

Description:

Station Range: Start: 2+68, End: 16+74

Cut
Note: Negative values are Fill

PVI	Station	Easting	Northing	Elevation Existing	Elevation Design	Elevation Difference	Point Type
0	2+68.4	1944422.4'	15332379.4'	821.6'	822.2'	-0.6'	Regular
1	3+00	1944453.8'	15332375.7'	822.2'	822.6'	-0.4'	Regular
2	4+00	1944552.4'	15332359.6'	823.9'	823.8'	0.1'	Regular
3	5+00	1944648.6'	15332332.6'	825.5'	825.0'	0.5'	Regular
4	6+00	1944744.2'	15332303.3'	826.4'	826.2'	0.2'	Regular
5	7+00	1944838.5'	15332270.3'	827.3'	827.4'	-0.1'	Regular
6	8+00	1944924.4'	15332219.3'	829.0'	829.6'	-0.6'	Regular
7	9+00	1944995.6'	15332149.4'	831.2'	831.3'	-0.1'	Regular
8	10+00	1945053.7'	15332069.4'	832.7'	832.6'	0.2'	Regular
9	11+00	1945100.8'	15331981.7'	834.5'	834.1'	0.4'	Regular
10	12+00	1945141.6'	15331890.3'	835.8'	835.8'	-0.0'	Regular
11	13+00	1945187'	15331801.3'	837.6'	837.6'	-0.0'	Regular
12	14+00	1945233.9'	15331713'	839.5'	839.8'	-0.3'	Regular
13	15+00	1945278.4'	15331623.4'	841.5'	842.0'	-0.5'	Regular
14	16+00	1945322'	15331533.4'	843.8'	844.2'	-0.4'	Regular
15	16+73.7	1945348'	15331464.7'	845.5'	845.6'	-0.1'	Regular