Stakeout C3D Embankment (No berm)

Overview: Stakeout an embankment from an AutoCAD Civil 3D design. No wave berm.

- The alignment and profile of the embankment is exported from CAD.
- Determine the details of any Control Points that you will need. They can be linked from the original survey or a coordinate text file of control points can be uploaded to the Trimble unit.
- A template is created in Trimble Access for the embankment.
- The embankment is staked from the Roading component of Trimble Access.

Equipment: Trimble TSC3, Total Station or GNSS receiver, Trimble Access v2015.22, AutoCAD Civil 3D 2014/2016

Preparing the Alignment and Profile for Export In AutoCAD C3D

In AutoCAD C3D:

1. Note the name of the Alignment you created for the Section on CL of Fill for your dam.
2. Note the Alignment Stationing where the settled top of dam meets original ground at the beginning and the end of dam for reference later when staking the dam in Roads (ignore the fact that there is an auxiliary spillway on the dam if one is present).
3. Create a *simplified* profile along the CL of the constructed dam.
   Create Design… Profile… Profile Creation Tools… to create a new profile (eg. TOF Profile).
   Use the Profile Layout tool *Draw Tangents* and Osnap to the grade breaks along the CL of the embankment in the Profile view for the profile on CL of the dam. (ignore the auxiliary spillway if present)

   If needed use *Profile Grid View*  to edit the stationing and elevations.
   The Profile elevations should match your designed top of dam constructed elevations.

Exporting Embankment Alignment from AutoCAD C3D

In AutoCAD C3D:

4. From Civil 3D Click *Trimble Link…Export Alignment*
5. Under Select Alignment: Select the alignment that you want to export (e.g. CL Dam) Checkmark *Export Profile:*
   Profile = Select the new profile you just created….(e.g **TOF Profile**)
   Coordinate Units = **International Feet**
6. Press OK to continue
7. At the message : "Warning.... Trimble Survey Controller coordinate system data is not available for this project. The coordinate system can be set up later on the Trimble Survey Controller"….Press OK
8. Save As Select the device to save the exported file…
   If you have not previously setup a "device" for file exporting, do steps a-d.
   a. Use window explorer to create a folder called Trimble Link under the P: drive (P:\Eng Projects\Common\Trimble Link Export)
   b. From Trimble Link click **Create New Device** button  … Select *Survey Data Card*…Click OK…..
   c. Browse to the P: Drive and select the Trimble Link Export folder you created earlier (P:\Eng Projects\Common\Trimble_Link_Export)… Press *Next*
   d. Enter a name for the new device, e.g. "Trimble Link Export"…Press Finish….

9. Select your storage location "device" and Press *Open*
10. Save As…Enter a file name (ex. landowner name and project)….Press Save to create a .rxl file for the Roads program in the data collector

Go to AutoCAD C3D instructions "Importing Survey Coordinate Point Files" – Step 37: "Exporting Survey Points to File" to export any additional points you would want (ex. Auxiliary spillway corners, upstream and downstream toes for comparing to the toes staked using Roads, pipe inlet and pipe outlet, etc.)

Use the **Trimble Access Upload** instructions to transfer the Roads .rxl file to the controller. Save the file under - *\Trimble Data\NRCS* – Note: the .rxl file is independent of the job file and is accessible from all jobs in the Roads function.

Setting up Job for Stakeout of Embankment

Link Uploaded text file to Job on TSC3 controller

11. Power on TSC3 and press the **Trimble** button to launch Trimble Access.
12. *Roads…Jobs… New Job….*
13. Input a job name for this embankment stakeout survey.
14. Select the template for NRCS-GPS or Total Station.
15. Click *Linked Files: None...*
16. Checkmark the file or job with your control points. E.g. ***Smith Control.txt***.
17. Click Accept.
18. Click Accept.

Review Embankment Alignment with Elevations and Define Template

19. Click *Define…*
20. Select the AutoCAD C3D .rxl file with your alignment and associated profile data. E.g. ***Smith 410 IFoot.rxl.***
21. Highlight **Horizontal Alignment**
22. To review the highlighted starting point coordinates Click *Edit* (make sure data looks correct)
23. Press *Next* to see more horizontal positions or Press *ESC*
24. Press *ESC* to stop reviewing the horizontal elements
25. Highlight **Vertical Alignment** Click *Edit…*
26. To review the highlighted starting point station and elevation Click *Edit*
27. Press *Next* to see more stations and elevations or Press *ESC*
28. Press *ESC ESC* to stop reviewing the vertical elements
29. Highlight **Templates**… Click *New*…
30. Enter a Name E.g. ***10TW 3SS*** (for 10 ft top width and 3:1 side slopes)….Click *Enter… Add*
31. Press *New*…String Name: **Edge Dam**….. Method: **Delta Elevation and Offset**……Delta Elevation: **0**…..Offset: **enter 1/2 of the top width** (e.g. 10 Ft top, so enter 5)….the boxes below should have no checkmarks….Press *Enter…..*Press *Store…*
32. Press *New*….String Name: **Toe**…..Method: **Side Slope**….Cut Slope: **Enter desired cut slope** (e.g. 3 for 3:1)….Fill Slope: **Enter desired fill slope** (e.g. 3 for 3:1)…Press *Enter*….Cut ditch width: 0…Press *Store…..*Press *Accept…..*…Press *Accept*

33. Highlight **Template Positions**….Press *New*…..Insert at Start: **Yes**….Start Station: **0**….Left Template: **Select the Template name you created above**….Right Template: **Select the template name** …..Press *Store*….. Press *Accept*….
34. Click *Store*…to return to the Roads menu
35. Close out of Trimble Access and power down the controller

Stakeout the Embankment

Set up Instrument

36. Set up total station or GPS for surveying as normal.
37. Power on TSC3 and press the **Trimble** button to launch Trimble Access.
38. *General Survey…Jobs… Open Job….*
39. Select the job name for this embankment stakeout survey.
40. Click *OK*.

Begin Survey

41. Click on *Measure…*
    a. For total station click *VX & S Series…*
    b. For GPS click *IaRTN…*
42. *Measure Topo*
43. Continue with normal setup of survey and set a TBM or control point or check an existing one.

Stakeout Embankment in Roads

44. Press the **Trimble** Button
45. Click *Trimble Access…*Click *Roads…*
46. Click *Survey…Survey Roads…*
47. Highlight the Road from the list. E.g. ***Smith 410.rxl.*** Click *Next*
48. Pulldown *Stake* = ***Station & offset***.
49. Screen 2 shows the planned elevation. The station & interval can also be changed.
50. *Station: Right Arrow Click…..List* to select stationing that you want to stake. *Offset….Right Arrow Click….List* will allow you to change staking location on the cross section (ex. CL, Right Edge Dam, (Right Side Slope) toe, etc.)
51. Click Start and Move the target to the correct staking location
    a. Orientation is relative to the alignment as looking in the direction of increasing stationing.
    b. When staking **toes** make sure to be on the correct stationing by going forward or backwards along the alignment until it is at 0.0 AND make sure to go left or right until the cut is at 0.0 on original ground prior to construction
52. Once Target is at acceptable location click accept.
53. Input As-staked Name E.g. {*SO1004* } for StakeOut and a Code (e.g. CL Embk).
54. Click Enter
55. Click Store
56. Select next station or offset from list and repeat.
57. When done with Stakeout Press ESC.

Stakeout Any Additional Points from AutoCAD C3D (the additional points loaded after step 9.)

58. Use notes for "Stakeout Points" to stakeout the additional points you loaded in the collector

Quit out of Survey

59. Switch to General Survey to take a topo shot on a known benchmark or turning point as a final check.
60. When survey is completed, Escape to main menu, & click *Survey… End Survey*
61. Click Yes to Power down Instrument. Click Ok & Disconnect the power.
62. Click Exit. Click Yes to Power Off.