AutoCAD Civil 3D and Subassembly Composer—Real-World-Practice Tips and Tricks (CI123653)

Jowenn S. Lua
Senior Civil 3D Designer - ARCADIS
Learning Objectives

- Importance of customizing a code set style
- Create a smarter custom subassembly, and learn how to create multilink solid transitions
- Extract solid from a corridor that can transition link to zero
- Gain valuable AutoCAD Civil 3D tips and tricks
Importance of customizing a code set style
Code Set style

- Control the visual appearance of a code set
  - Point Code
  - Link Code
  - Shape Code
- Type of object that uses code set style
  - Assembly and Subassembly
  - Corridor
  - Section View
Code Set style

- Flexibility
- Standardized
- Auto Labels
- Workflow improvement
- Less CAD re-work
- Improves performance
Subassembly Codes

- Point, Link and Shape Codes
Clients requirements in Civil 3D Model

- Model submitted as Genio format (String model)
- XS to reflect string labels
- Create solid model and add attributes

Images taken from: Mainroads Western Australia website
Clients requirements in Civil 3D Model

From Metric template

Clients standards

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<tr>
<th>Station</th>
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Clients requirements in Civil 3D Model

From Metric template

 Clients standards
Traditional XS from Surface vs XS from Corridor
Code Set Style - “That works for us”

Used for Design

Used for Plotting
Code Set Style - “That works for us”

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For Section

For Plan
Code Set Style - “That works for us”
**Code Set Style - “That works for us”**

For Section

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For Solid Layer Name
Code Set Style - “That works for us”

Edit to use shape code as solid layer name
Tips Revealed - Useful Shortcut / Links

- %AppData% and %LocalAppData%
Tips Revealed - Useful Shortcut / Links

- For Local C-drive Autodesk Support
  %AppData%\Autodesk\C3D 2018\enu\Support

- For Civil 3D Tool Palette Images
  %AppData%\Autodesk\C3D 2018\enu\support\toolpalette\Palettes\images

- For Civil 3D default template location
  %LocalAppData%\autodesk\c3d 2018\enu\template
Tips Revealed – Use dynamic input

- Dynmode set to 3 to Turn on

- This allows you to enter specific chainage or station
Live Demo 1
Create Smarter Custom Subassembly and Create Multi Link Solid Transition
Components of Smarter Custom Subassembly

- Useful and can be re-used
- Define point, link and shape codes
- Input parameters
- Output parameters
- Target parameters if required
- Can adapt any code set style
- Chm help file (Compiled HTML file format)
- Image
- Version control

Photo Credit: https://www.emaze.com/@ALWCICQT/NSE-2015
Subassembly Composer

- Tool used in creating a complex subassembly without a need of programming.

Photo Credit: http://www.triplesystems.co.th/
Create a SA with unique name
Create a folder for all PKT
Create a legend or identifier
Create a subassembly register or log sheet
Multi-Link Transition (MLT) Subassembly

- Hard to close to exact start point.
- Fixed static shape unless you use number transform and parameter reference.
- All Points are using the same point code by default.
- All links are using the same link code all throughout.

VS

- Can transform from one polygon to another polygon.
- User defined point, link, shape code(s).
- User can see how your subassembly will look like in any part of the region.
- Can define Top and Datum link separately.
- Can extract solid shape.
Multi-Link Transition (MLT) Subassembly
Multi-Link Transition (MLT) Subassembly
Multi-Link Transition (MLT) Subassembly

Start

Version = 2.01 (Demo)

Define Parameter Variable

True
Decision

StationDelta = LayoutRatio

Define Output Variable

Draw Multi Transition

Auxiliary Initial Condition

Auxiliary Final Condition

Auxiliary Connection

AP10 AP9
AL8
AL11 AP8
AL12 AP7
AP12
AL10
AL16 AL15
AL14 AL13
AL18
AL17
AP4 AL2 AP3
L1 S1
L5 AL5
AP6 AL6
P6 L6
P4 L3 P8 L2
AP11
AP1 AP4 AL5 AP2 AP6
P1 P2 P3 P5
AP1

Multi-Link Transition (MLT) Subassembly
# Multi-Link Transition (MLT) Subassembly

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<td>Version</td>
<td>Author: Jowenn S. Lua</td>
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# Multi-Link Transition (MLT) Subassembly

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<td>Input</td>
<td>-0.32</td>
<td>F- Link Below P4 delta Y -L5 Final</td>
</tr>
</tbody>
</table>

- 1 Point Code(s) - Default as CL - Kerb Lip
- 2 Point Code(s) - Default as CF - Kerb Flowline
- 3 Point Code(s) - Default as CT - Kerb Top
- 4 Point Code(s) - Default as CB - Kerb Back
- Link Code(s) for Top
- Link Code(s) for Bottom
- Shape Code(s) for Kerb Transition
- Yes=Create Solid / No=Top Link Only & No Solid

Change in X from P1 to P5 in metre (m) - Link 4 Initial
Change in Y from P1 to P5 in metre (m) - Link 4 Initial
Change in X from P4 to P6 in metre (m) - Link 5 Initial
Change in Y from P4 to P6 in metre (m) - Link 5 Initial
Change in X from P1 to P5 in metre (m) - Link 4 Final
Change in Y from P1 to P5 in metre (m) - Link 4 Final
Change in X from P4 to P6 in metre (m) - Link 5 Final
Change in Y from P4 to P6 in metre (m) - Link 5 Final
Multi-Link Transition (MLT) Subassembly
Multi-Link Transition (MLT) Subassembly
Sample Multi-Link Transition (MLT)
Sample Multi-Link Transition (MLT)

Edit Final Condition
PKT – Formula Math Concept

Slope = \frac{y_2 - y_1}{x_2 - x_1}

\frac{y-y_1}{x-x_1} = \frac{y_2-y_1}{x_2-x_1}

y = \frac{y_2-y_1}{x_2-x_1} \times (x-x_1) + y_1
**PKT – Formula used**

### Define Parameter Variable

*Double-click to view*

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<th>Formula</th>
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</tr>
<tr>
<td>LVy4</td>
<td>dVpy1f-dVpy1i</td>
</tr>
<tr>
<td>LVx5</td>
<td>dVpx4f-dVpx4i+Lx3</td>
</tr>
<tr>
<td>LVy5</td>
<td>dVpy4f-dVpy4i+Ly3</td>
</tr>
</tbody>
</table>

### StationDelta

$$\text{StationDelta} = \frac{(\text{Baseline.Station} - \text{Baseline.RegionStart})}{(\text{Baseline.RegionEnd} - \text{Baseline.RegionStart})}$$
PKT – Formula used
### PKT – Formula used

<table>
<thead>
<tr>
<th>OutLx1</th>
<th>dx1i+Lx1*StationDelta</th>
</tr>
</thead>
<tbody>
<tr>
<td>OutLy1</td>
<td>dy1i+Ly1*StationDelta</td>
</tr>
<tr>
<td>OutLx2</td>
<td>dx1i+dx2i+Lx2*StationDelta</td>
</tr>
<tr>
<td>OutLy2</td>
<td>dy1i+dy2i+Ly2*StationDelta</td>
</tr>
<tr>
<td>OutLx3</td>
<td>dx1i+dx2i+dx3i+Lx3*StationDelta</td>
</tr>
<tr>
<td>OutLy3</td>
<td>dy1i+dy2i+dy3i+Ly3*StationDelta</td>
</tr>
<tr>
<td>OutLx4</td>
<td>dVPx1i+LVx4*StationDelta</td>
</tr>
<tr>
<td>OutLy4</td>
<td>dVPy1i+LVy4*StationDelta</td>
</tr>
<tr>
<td>OutLx5</td>
<td>dx1i+dx2i+dx3i+dVPx4i+LVx5*StationDelta</td>
</tr>
<tr>
<td>OutLy5</td>
<td>dy1i+dy2i+dy3i+dVPy4i+LVy5*StationDelta</td>
</tr>
</tbody>
</table>
# PKT – Formula used

<table>
<thead>
<tr>
<th>Top</th>
<th>Bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>From</td>
</tr>
<tr>
<td>P1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>P2</td>
<td>OutLx1</td>
</tr>
<tr>
<td></td>
<td>OutLy1</td>
</tr>
<tr>
<td>P3</td>
<td>OutLx2</td>
</tr>
<tr>
<td></td>
<td>OutLy2</td>
</tr>
<tr>
<td>P4</td>
<td>OutLx3</td>
</tr>
<tr>
<td></td>
<td>OutLY3</td>
</tr>
</tbody>
</table>
PKT – Layout view concept

In Corridor

In Layout

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Direction</th>
<th>Default Value</th>
<th>DisplayName</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>StationDelta</td>
<td>Double</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LayoutRatio</td>
<td>Double</td>
<td>Input</td>
<td>1</td>
<td>Layout Ratio</td>
<td>Choose Layout Region Ratio to display (0 - 1) - For Layout View Purpose</td>
</tr>
</tbody>
</table>
Live Demo 2
Create solid that transition to Zero
Ways to create horizontal transition to zero

- Using Horizontal Target
  - Polyline target
  - Feature line target
  - Offset Alignment target

- Using Parameter reference
  - Slope transition (Peter Funk, Au 2011)
  - Number transformation (Stack Subassembly)
Sample Scenario: 3 Lanes to transition to 2 Lanes

Assembly to use:

3 Lanes

Transition – using manual target

2 Lanes

Transition – using reference parameter
Sample Scenario: 3 Lanes to transition to 2 Lanes

1. Create 3 lanes
Sample Scenario: 3 Lanes to transition to 2 Lanes

2. Split region into 3 regions
Sample Scenario: 3 Lanes to transition to 2 Lanes

3. Change assembly (3 Lanes, Trans, 2 Lanes)
Sample Scenario: 3 Lanes to transition to 2 Lanes

4. Create top surface tin
Sample Scenario: 3 Lanes to transition to 2 Lanes

5. Extract solid from corridor – Missing Solid
Ways to manage and share custom subassembly

- Content Browser and tool catalog
- Share Package File (PKT)
- Export/Import Tool Palette Files (XTP)
- Export/Import Tool Palette Group Files (XPG)
- Copy local Imported tool and paste to another computer in the same location
- Tool Palette Pushout

We use this method
Tool Palette Pushout (TPP)

Workflow we use to share and manage our custom subassembly.

- Requirements for TPP
  - Shared Server
  - Bat file for C3D Admin
  - Bat file for C3D Users
  - Instruction Manual
  - CHM Help folder
  - Imported Tools folder
  - Template folder
  - Palettes folder
  - Profile folder
TPP – Shared Server

Sample server folder structure

- C:\_AU2017\Sample_Server
TPP – Shared Server

Sample server folder structure

- C:\_AU2017\Sample_Server

![Folder structure diagram]
TPP – Shared Server

Sample server folder structure
- C:\_AU2017\Sample_Server

Target:
"C:\Program Files\Autodesk\AutoCAD 2018\acad.exe" /ld
"C:\Program Files\Autodesk\AutoCAD 2018\AecBase.dbx" /p
"ARCADIS_SYD_r2018_C3D_RMS" /product "C3D"

Start in:
"C:\Program Files\Autodesk\AutoCAD 2018\UserDataCache"
TPP – Shared Server

Sample server folder structure

- C:\_AU2017\Sample_Server
TPP – Shared Server

Sample server folder structure

- C:\_AU2017\Sample_Server

Created from: HTML Help Workshop
TPP – Shared Server

Sample server folder structure

- C:\_AU2017\Sample_Server

As many as you need...
TPP – Shared Server

Sample server folder structure

- C:\_AU2017\Sample_Server

- Palettes
- Profile
- Subassemblies
- Subassemblies CHM Help
- Templates
- _TPP_USER_Server_to_Local.bat
- _TPP_USER_Server_to_Local.docx

User bat file and Instruction manual
TPP – C3D Admin Bat File

- xcopy "C:\ProgramData\Autodesk\C3D 2018\enu\Imported Tools"
  "C:\_AU2017\Sample_Server\Subassemblies" /Q /Y /I /E

- xcopy "C:\Subassemblies CHM Help"
  "C:\_AU2017\Sample_Server\Subassemblies CHM Help" /Q /Y /I /E
TPP – C3D Users Bat File

- xcopy "C:\_AU2017\Sample_Server\Subassemblies" "C:\ProgramData\Autodesk\C3D 2018\enu\Imported Tools" /Q /Y /I /E
- xcopy "C:\_AU2017\Sample_Server\Subassemblies CHM Help" "C:\Subassemblies CHM Help" /Q /Y /I /E
- xcopy "C:\_AU2017\Sample_Server\Palettes\Global Generic\Images" "%AppData%\Autodesk\C3D 2018\enu\support\toolpalette\Palettes\images" /Q /Y /I /E
- xcopy "C:\_AU2017\Sample_Server\Palettes\RMS\Images" "%AppData%\Autodesk\C3D 2018\enu\support\toolpalette\Palettes\images" /Q /Y /I /E
TPP – C3D Users Bat File

- `xcopy "C:\_AU2017\Sample_Server\Templates\Plan Production" "C:\_AU2017\Sample_User\Template\Civil3D2018" /Q /Y /I /E`
- `xcopy "C:\_AU2017\Sample_Server\Templates\_C3D_2018_Arcadis_RMS.dwt" "C:\_AU2017\Sample_User\Template\Civil3D2018" /Q /Y`
TPP – Flowcharts C3D Admin and Users
TPP – Flowchart

1. Start
   - Create Manage SAC
     - Palette Exist
       - Yes: Tool Palette A, B, C
       - No: Create Tool Palette

Options:
- Move Up
- Move Down
- View Options...
- Paste
  - New Palette
  - Delete Palette
  - Rename Palette
  - Import Subassemblies...
TPP – Flowchart

New Subassembly

Yes

Delete Current Subassembly from TP A, B or C

No

Import New Subassembly to TP A, B or C

Import new version

Import Subassemblies...

Customize Palettes...
Customize Commands...

Civil Imperial Subassemblies
Civil Metric Subassemblies
ANZ Content 2018
Civil Materials
Civil Multiview Blocks

RMS SubAssembly

KERB_RMS

v2.01 - K06_KERB_RMS - RMS Standard Kerb and Gutter Shapes from MD.R15.A01.A.2 / Plus add on modified details for elongated shapes.
TPP – Flowchart

1. Yes: New XTP
   - Export Tool Palette as XTP
   - Run .bat file to copy source file to shared server
2. No: Delete Current Image folder from shared XTP
   - Save XTP in Shared Server

End
TPP – Flowchart

Start

Save and close Civil 3D and Run .bat file to copy from shared server to local drive

Open Civil 3D and in Tool Palletes 'Ctrl 3' right click mouse and click Customize Palette

Right-click mouse

C3D Users
TPP – Flowchart

1. Start
2. Save and close Civil 3D and Run .bat file to copy from shared server to local drive
3. Open Civil 3D and in Tool Palletes 'Ctrl 3' right click mouse and click Customize Palette

Menu:
- Auto-hide
- Transparency...
- New Palette
- Rename
- Customize Palettes...
- Customize Commands...
- Import Subassemblies...
- Civil Imperial Subassemblies
- Civil Metric Subassemblies
- ANZ Content 2018
- Civil Materials
TPP – Flowchart

1. Delete old palette you want to update
2. Right click mouse on any palette
3. Click Import...
4. Select XTP from server
TPP – Flowchart

1. Delete old TP A, B or C
2. Updating Current Imported XTP
   - Yes
   - No
3. Import new TP A, B or C
4. Check updates
5. Tool Palette A, B or C
6. CIRCULAR_PIPE
   - v2.02 - G10_CIRCULAR_PIPE - User defined circular shape pipe with inner diameter and outer thickness.
7. End

C3D Users
Tips Revealed – Bonus Corridor Workflow

- Alternative approach

Use “0001 Method”
Live Demo 4
Summary

- We’ve learned:
  - Importance of Code Set Style
  - Smarter subassembly / Multi Link Transition
  - Solid that transition to Zero
  - Civil 3D Tips and Tricks
    - `%appdata% and %localappdata%
    - Tool palette pushout (TPP)
    - Null assembly and “0001 Method”
Be heard! Provide Au session feedback.

- (CI123653) AutoCAD Civil 3D and Subassembly Composer—Real-World-Practice Tips and Tricks
- Via the survey stations, email or mobile device
- Chance to win AU 2018 Pass each day
- Best to do it right after each session
- AU speakers will get feedback in real-time