Stage Construction Exercise

1. Open the MicroStation file:
PW:\District CADD\Design\Cole\J5P0100\data**Rte50_Pattern_Shape.dgn**.

2. Copy the working alignment **MoDOT** to **Stage1**, and select this working alignment.

3. Update the **Stage1** Working Alignment with the following settings:

Plan View
- Design File = **Rte50_Plan.dgn**
- Chain = **ROUTE50**

Pattern =
- Design File = **Rte50_Pattern_Shape.dgn**
- Level Name = **Geopak-Pattern line 1**
- Color = **5**

Shapes
- Design File = **Rte50_Pattern_Shape.dgn**
- Level Name = **Geopak-Shapes 1**
- Color = **1,6**

Cross Section View = **XS_Stage1.dgn**

4. Using D&C Manager and the Draw Transition Tool, draw the following **Slopes Override Lines** in the future median area (Design Standards\Roadway\Slopes):

Override tool	Station	Input Value
Ditch Width		
	446+00	8
	448+00	0
	489+00	0
	491+00	8
Ditch Fore Slope 2		
	446+00	5.5:1
	448+00	2:1
	489+00	2:1
	491+00	5.5:1

Override tool	Station	Input Value
Fill Slope 2		
	446+00	5.5:1
	448+00	2:1
	489+00	2:1
	491+00	5.5:1
Ditch Back Slope		
	446+00	3:1
	448+00	2:1
	489+00	2:1
	491+00	3:1

5. Select the **Proposed Cross-Sections**. Copy the **MoDOT** run to **Stage1**.

6. Setup the Shape Cluster as follows:

shape cluster baseline = **ROUTE50**
shape cluster profile = **ROUTE50PR**
shape cluster tie = **-30.000**

Apply the "**New Pavement**" typical to this shape cluster.

7. In the **Define Variables** set the following values for the given variables:

Cross Section DGN = **XS_Stage1.dgn**
Proposed Plan DGN = **Rte50_Plan_Stage1.dgn**
GEOPAK Lines DGN = **Rte50_Pattern_Shape.dgn**

8. Set the following the **Redefinable Variables** with the following values:

_d_StandardDitchDepth_Right

```
if (Sta >= 0+00 R 1) then
  {
    _d_StandardDitchDepth_Right = 4
  }
if (Sta >= 447+00 R 1) then
  {
    _d_StandardDitchDepth_Right = 2
  }
if (Sta >= 491+00 R 1) then
  {
    _d_StandardDitchDepth_Right = 4
  }
```

_d_FillSlope1_Right

```
if (Sta >= 0+00 R 1) then
  {
    _d_FillSlope1_Right = 2:-1
  }
```

9. **Save the Settings** and process the cross sections by choosing **Run**.

10. Select "**File > Save"** to save change to the MicroStation File.

11. Select "**File > Save As"** and name MicroStation file **xs_stage2.dgn**.

12. In **Cross Section Reports** tools, open the **Multi-Line Report**.

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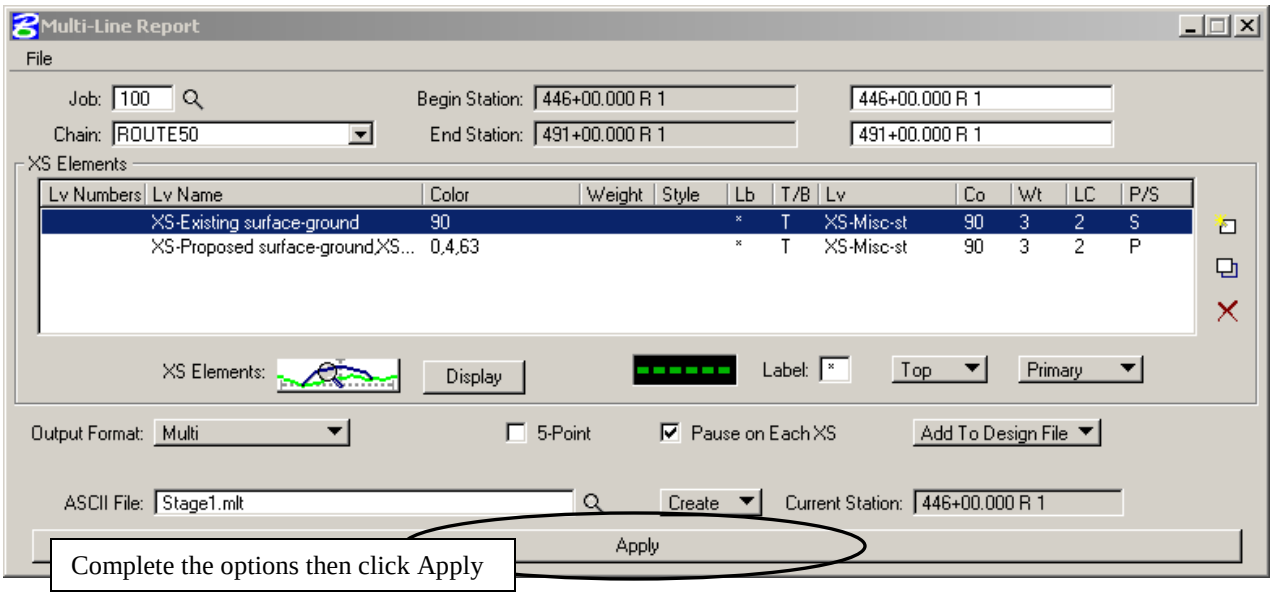
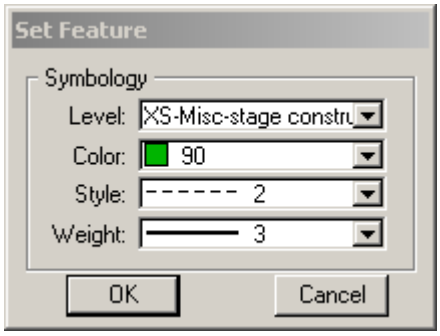
13. Within the Multi-Line Report the user will scan both the existing ground and proposed template from stage 1 and create a Stage 2 existing ground line. Setup the **Multi-Line Report** as shown.



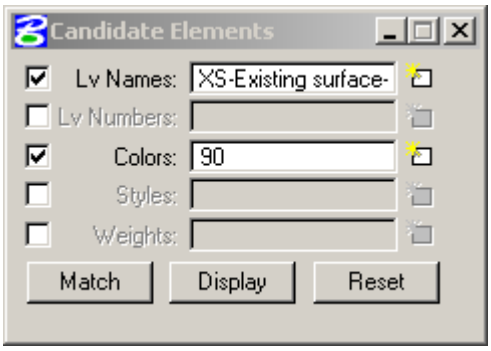
Add to Design File Symbology:



Level Names = XS-Misc-stage construction
Colors = 90
Style = 2
Weight = 3

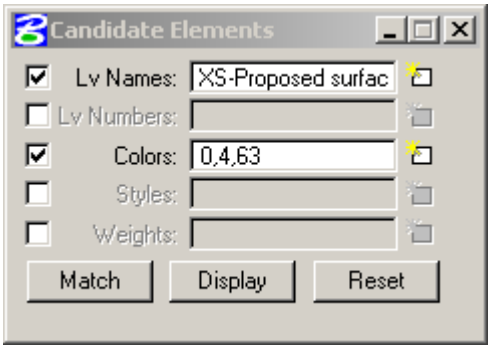
Note: The level filter may need to be changed to All Levels to view the XS-Misc-stage construction level

Scan Element #1 – Existing Ground:



Level Names = XS-Existing surface-ground
Colors = 90
T/B Option = Top
P/S Option= Secondary

Scan Element #2 – Stage 1 Proposed Surface:



Level Names = XS-Proposed surface-ground
XS-Proposed surface-shoulder
XS-Proposed surface-pavement
Colors = 0,4,63
T/B Option = Top
P/S Option= Primary

14. Select **Edit** > **Select All** and then **Edit** > **Unlock**

Using **Element Selector** lock the following Levels:

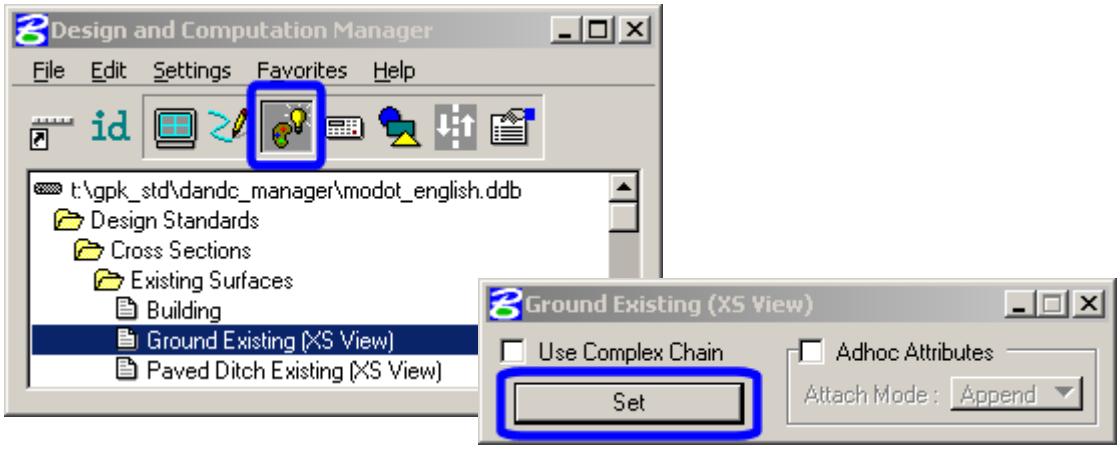
GeoPak-Cross Section Cells
XS-Misc-stage construction

Next Select **Edit** > **Select All**, then **"Delete"**

15. Using **Element Selector** once again **Unlock** the following Level:

XS-Misc-stage construction

Open **D&C Manager** and **Set** the **XS-Misc-stage construction** elements back to **Ground Existing**



16. Select **Edit** > **Select All** and then **Edit** > **Lock**

17. Copy the working alignment **Stage1** to **Stage2**, and select this working alignment.

18. In the Define box, under the **Shape** section change colors to **3 & 5**.

Under the **Cross Section View** section change the dgn file to **XS_Stage2.dgn**

19. Open **Rte50_Pattern_Shape.dgn** and delete the all slope override lines.

20. Using **D&C Manager**, place a **Back Slope Constraint Line** on top of the **Stage 1's** right shoulder location.

Note: The criteria will draw to the **Back Slope Constraint Line** at ground from the back of ditch location. With this setup the criteria will hold the ditch width constant and varies the ditch back slope.

21. Place a **Ditch Back Slope Override Line** in the median location and define the **Begin** and **End Adhoc** value as a **5.5:1** slope.

Note: With the addition of the **Ditch Back Slope Override Line** the criteria will now draw with a constant slope to the Back Slope Constraint line at ground from the back of ditch location by adjusting the ditch width.

22. Select the **Proposed Cross-Sections**. Copy the **MoDOT** run to **Stage2**.

23. Setup the Shape Cluster as follows:

shape cluster baseline = **ROUTE50**
shape cluster profile = **ROUTE50PR**
shape cluster tie = **30.000**

Apply the "**New Pavement**" typical to this shape cluster.

24. In the **Define Variables** set the following values for the given variables:

Cross Section DGN = **XS_Stage2.dgn**
Proposed Plan DGN = **Rte50_Plan_Stage2.dgn**
GEOPAK Lines DGN = **Rte50_Pattern_Shape.dgn**

25. Set the following the Redefinable Variable with the following value:

_d_DitchForeSlope2_Left

```
if (Sta >= 0+00 R 1) then
   {
_d_DitchForeSlope2_Left = 5.5:-1
   }
```

26. **Save the Settings** and process the cross sections by choosing **Run**.

27. Select **File > Save**.

Side note: Some users might wonder why some sections draw a **(6:1) Fill Slope**. The reason for this is because the existing ground is already in the correct location for the **(5.5:1) Ditch Fore** and **Back Slope**. In other words the existing ground is already at the correct location for the ditch bottom for Stage 2. When the criteria tried to draw the **(5.5:1) Ditch Fore Slope** and **8ft Ditch Bottom**, it hit the surface of the existing ground. Since it was not below the ground line, it then went ahead and drew the **(6:1) Fill Slope**.

28. In **Reports and XS Quantities**, open the **DTM Proposed 3D** report.

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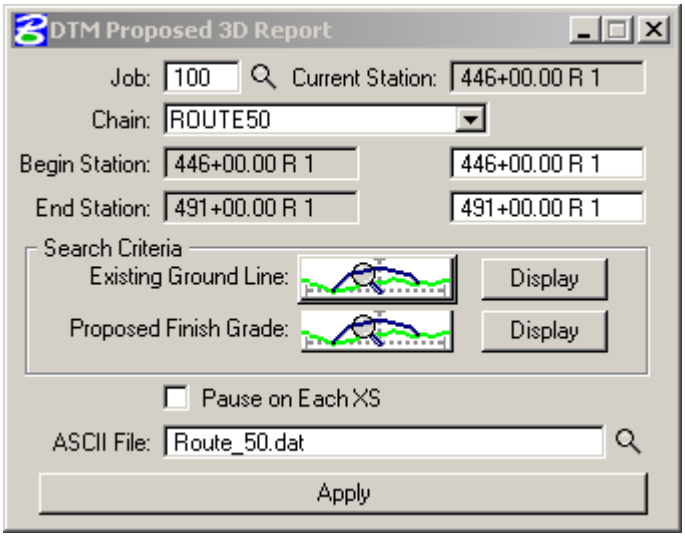
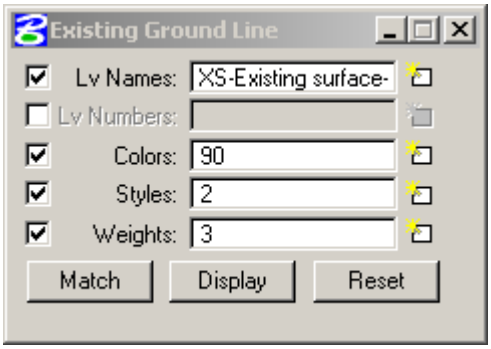
29. Setup the **DTM Proposed 3D** report as shown.



Existing Ground Line

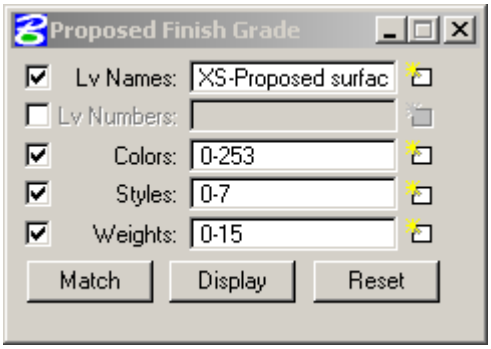
Level Names = XS-Existing surface-ground
Colors = 90
Styles = 2
Weights = 3



Proposed Finish Grade

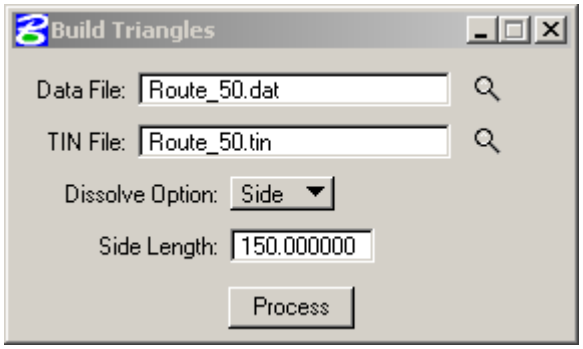
Level Names = XS-Proposed surface*
Colors = 0-253
Styles = 0-7
Weights = 0-15

* = Wildcard



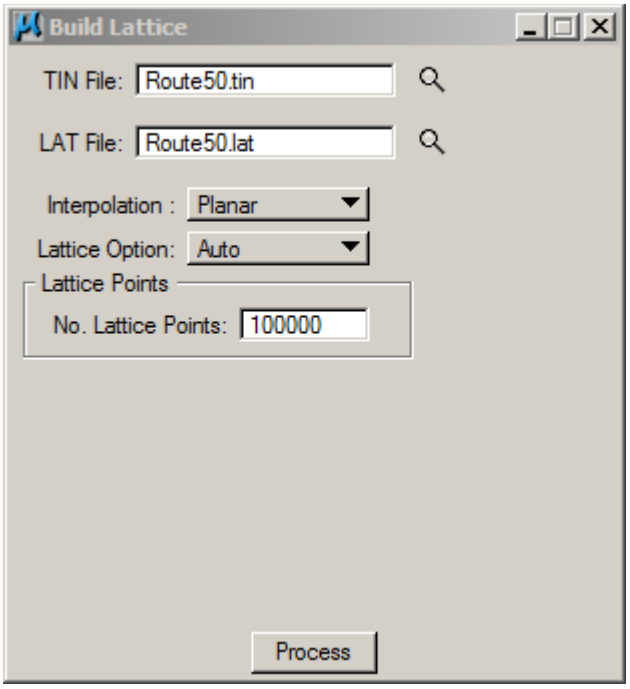
Process the **DTM Proposed 3D Report** by selecting the "**Apply**" button.

30. In the **DTM tools**, select **Build > Triangles**. Fill out the dialog as follows:



Select **Load > DTM** Features and display the triangles.

31. To view the design surface better, build a lattice and view that file in a 3D drawing. To do this open the **DTM tools**, select **Build > Lattice**. Fill out the dialog as follows:



Two Interpolation options are supported: **Planar** and **Polynomial**. The **Polynomial method** represents the fifth order partial derivatives of the triangulated data. It should be used only when the data is natural ground, rather than abrupt changes of slope found in roadways, ditches, etc. where **Planar** should be utilized.