

# LAB 25 - Variable Median Ditch

When a divided highway has separate horizontal and vertical controls for each driving surface, the median can not have a fixed width. In this lab, an end condition section is developed for a variable width median.

## Chapter Objectives:

- Build components for each median situation.
- Assemble the components into a single section.
- Add Display Rules to turn components on and off.
- Add the median ditch section to a template.
- Update a corridor to use the template and examine its behavior.

The Following files are used in this lab:

- C:\Projects\12345\Design\Drawings\Reference\_Files\12345DES\_Model\_Median-Ditch.dgn
- C:\Projects\12345\Design\InRoads\12345DES\_Median-Lab.alg
- C:\Projects\12345\Design\InRoads\12345DES\_Templates\_Median-Ditch.itl
- C:\Projects\12345\Design\InRoads\12345DES\_Median-Ditch.ird
- C:\Projects\12345\Design\InRoads\12345DES\_Northbound.dtm
- C:\Projects\12345\DesignROW\_Survey\InRoads\DTM\12345SURV\_Existing\_Ground\_VMD.dtm

## Lab 25.1 - Create Median Ditch Components

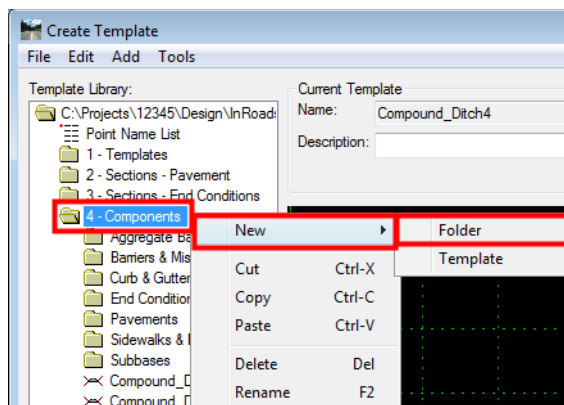
The median section attaches to the right side of the southbound template. There are four different situations that have to be accounted for on the median ditch. These are:

- ◆ 6:1 / 6:1 “V” Ditch - This option is used when the inside EOP points are less than 24’ apart.
- ◆ 6:1 - 10:1 / 6:1 - 10:1 Compound Ditch - This option is used when the inside EOP points are greater than 24’ apart.
- ◆ 6:1 - 10:1 / 6:1 Compound Ditch - This option is used when the southbound lanes are higher than the northbound lanes and the left 10:1 slope intercepts the right 6:1 slope.
- ◆ 6:1 / 6:1 - 10:1 Compound Ditch - This option is used when the northbound lanes are higher than the southbound lanes and the right 10:1 slope intercepts the left 6:1 slope.

A separate component will be built for each situation and tested to be sure it works.

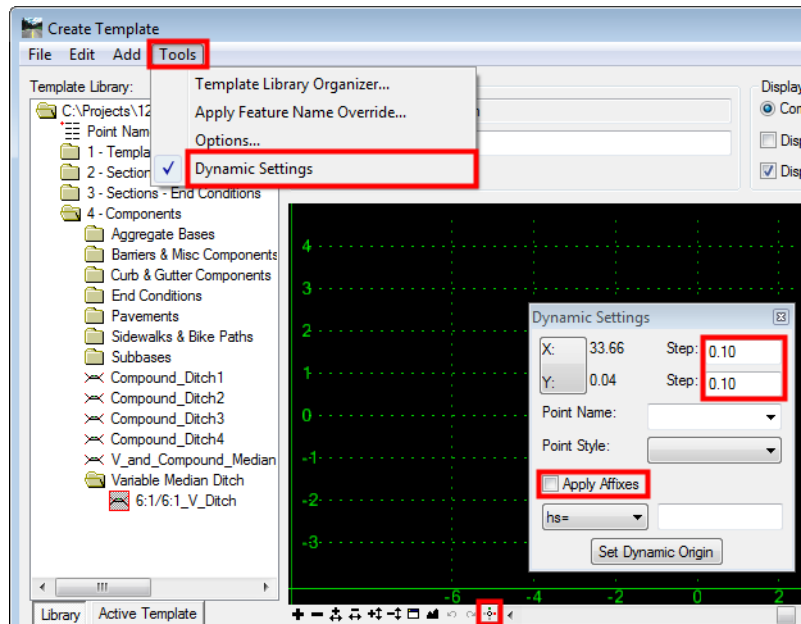
1. Open MicroStation and InRoads using the **C:\Projects\12345\Design\Drawings\Reference\_Files\12345DES\_Model\_Median-Ditch.dgn** file.
2. Load the following files into InRoads:
  - ◆ **C:\Projects\12345\Design\InRoads\12345DES\_Median-Lab.alg**
  - ◆ **C:\Projects\12345\ROW\_Survey\InRoads\DTM\12345SURV\_Existing\_Ground\_VMD.dtm**

- ◆ C:\Projects\12345\Design\InRoads\12345DES\_Templates\_Median-Ditch.itl
  - ◆ C:\Projects\12345\Design\InRoads\12345DES\_Median-Ditch.ird
  - ◆ C:\Projects\12345\Design\InRoads\12345DES\_Northbound.dtm
3. Verify that the C:\Workspace\Workspace-CDOT\_XM\Standards-Global\InRoads\Preferences\CDOT\_Civil.xin file is loaded.
  4. From the InRoads menu bar, select **Modeler > Create Template**.
  5. Expand the **4 - Components** folder of the template library.
  6. **<R>** on the **4 - Components** folder and select **New > Folder** from the right click menu.

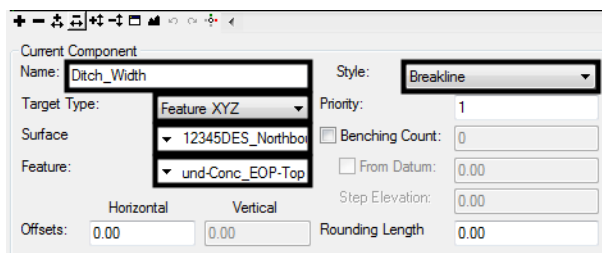


7. Key in ***Variable Median Ditch*** for the folder name.
8. **<R>** on the **Variable Median Ditch** folder and select **New > Template** from the right click menu.
9. Key in ***6:1/6:1\_V\_Ditch*** for the template name. The new template is automatically opened for editing.
10. Display the **Dynamic Settings** dialog box.
11. Set both the **X Step** and **Y Step** to ***0.10***.

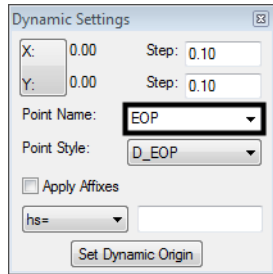
12. Verify that **Apply Affixes** is toggled off.



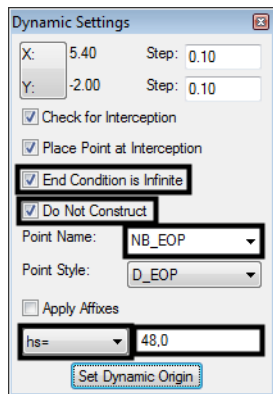
13. <R> in the template view and select **Add New Component > End Condition** from the right click menu.
14. In the *Current Component* area, key in **Ditch\_Width** for the *Name*.
15. Set the *Style* to **Breakline**.
16. Set the *Target Type* to **Feature XYZ**.
17. Set the *Surface* to **12345DES\_Northbound**.
18. Set the *Feature* to **Northbound-Conc\_EOP-Top**.



- In the *Dynamic Settings* dialog box, select **EOP** for the *Point Name*.



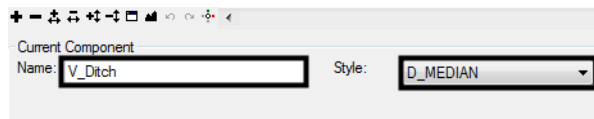
- Move the cursor to the template origin (0.00,0.00) and **<D>** to place the point.
- In the *Dynamic Settings* dialog box, key in **NB\_EOP** for the *Point Name*.
- Toggle on **End Condition is Infinite** and **Do Not Construct**.
- Set the key in mode to **hs=**.
- Key in **48,0** in the precision key in field and press **Enter**.



- <R>** and select **Finish** from the right click menu.

This end condition is used to determine the width of the median. Each of the four components used for this median ditch will contain this end condition. Next, the ditch component is added.

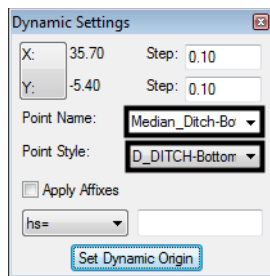
- <R>** in the template view and select **Add New Component > Unconstrained** from the right click menu.
- In the *Current Component* area, key in **V\_Ditch** for the *Name*.
- Set the *Style* to **D\_Median**.



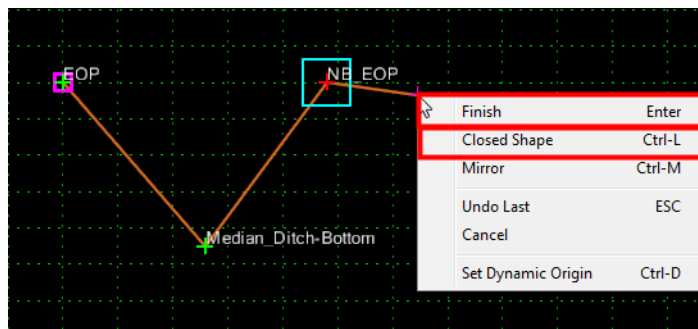
- <D>** on the **EOP** point to start the component at the origin.

**Note:** When the “+” symbol turns white, the cursor is snapped to the point and the points automatically merge.

30. In the *Dynamic Settings* dialog box, key in **Median\_Ditch-Bottom** in the *Point Name* field.
31. Select **D\_DITCH-Bottom** for the *Point Style*.

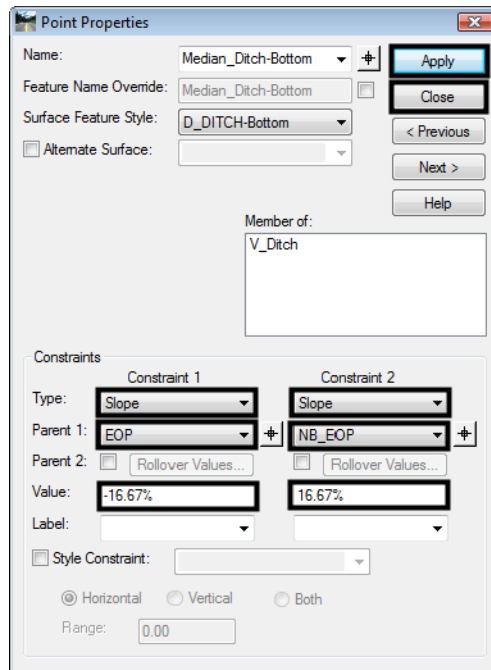


32. <D> between and below the *EOP* and *NB\_EOP* points.
33. <D> on the *NB\_EOP* point.
34. <R> in an open area. Verify that **Closed Shape** is toggled off, then select **Finish**.



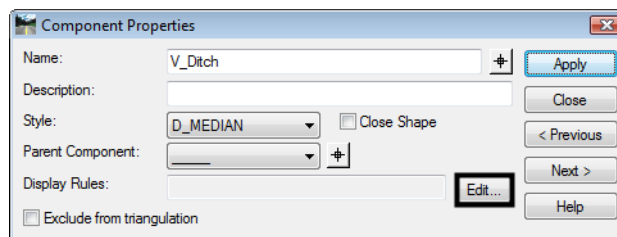
35. <D> <D> on the **Median\_Ditch-Bottom** point to display the *Point Properties* dialog box.
36. In the *Point Properties* dialog box, set both constraints to **Slope**.
37. Set the *Parent 1* for *Constraint 1* to **EOP**.
38. Set the *Parent 1* for *Constraint 2* to **NB\_EOP**.
39. Key in **-16.67%** for the *Value* of *Constraint 1*.
40. Key in **16.67%** for the *Value* of *Constraint 2*.

41. **<D> Apply** then **<D> Close** to dismiss the *Point Properties* dialog box.



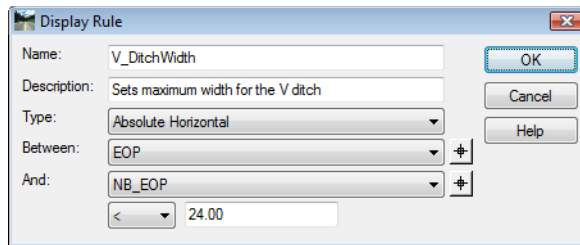
This component will now construct a “V” ditch with 6:1 slopes on each side. Now it must be restricted to display only when the EOP and NB\_EOP points are within 24’ horizontally of each other. This is accomplished using a Display Rule.

42. **<D> <D>** on the line forming the ditch to display the *Component Properties* for the *V\_Ditch* component.
43. In the *Component Properties* dialog box, **<D>** the **Edit** button. This displays the *Component Display Conditional Expression* dialog box.

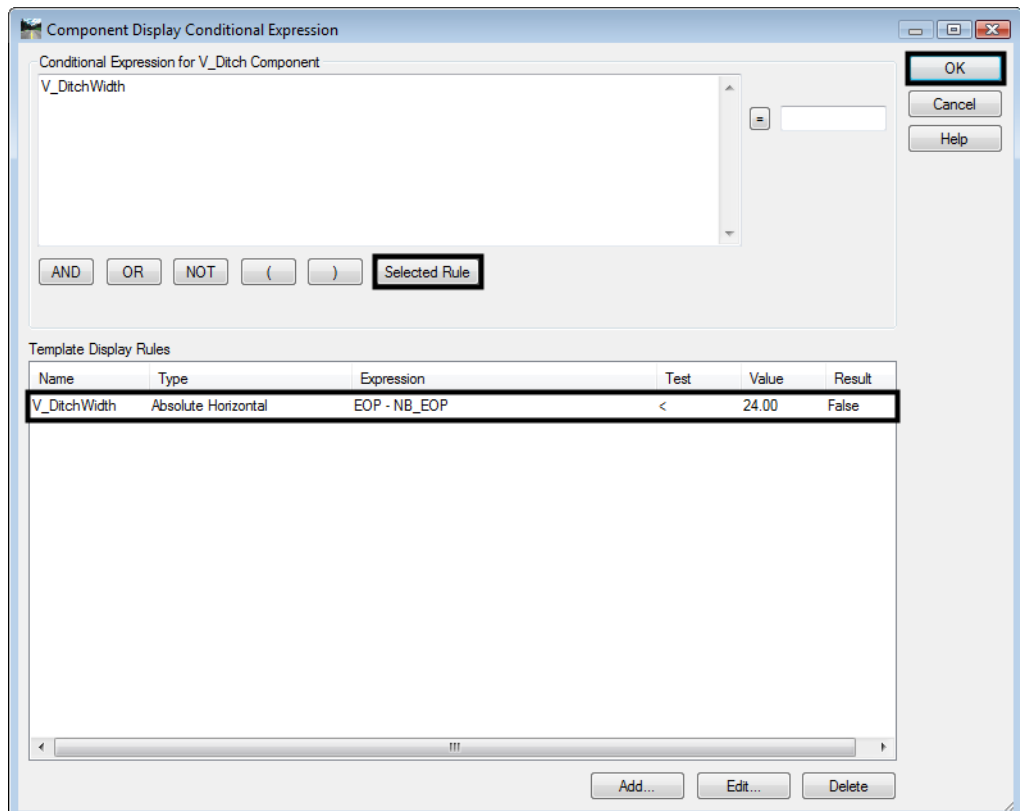


44. In the *Component Display Conditional Expression* dialog box, **<D>** the **Add** button. This displays the *Display Rule* dialog box.
45. In the *Display Rule* dialog box, key in *V\_DitchWidth* for the *Name*.
46. Key in *Sets maximum width for the V ditch* for the *Description*.
47. Set the *Type* to **Absolute Horizontal**.
48. Set *Between* to **EOP**.
49. Set *And* to **NB\_EOP**.

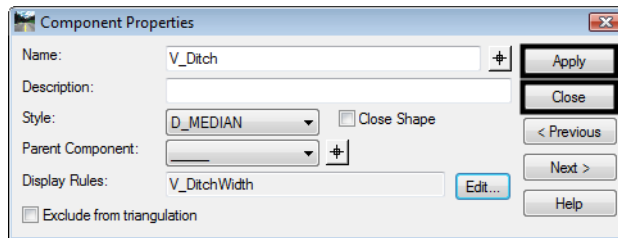
50. Set the operator to **<** and key in **24.00** for the value. The dialog box with completed entries is illustrated below:



51. **<D> OK**. This dismisses the *Display Rule* dialog box.
52. In the *Component Display Conditional Expression* dialog box, highlight **V\_DitchWidth** in the *Template Display Rules* area.
53. **<D>** the **Selected Rule** button.
54. **<D> OK**. This dismisses the *Component Display Conditional Expression* dialog box and adds the rule to the component properties of *V\_Ditch*.



55. In the *Component Properties* dialog box, <D> **Apply** then <D> **Close** to dismiss the dialog box.

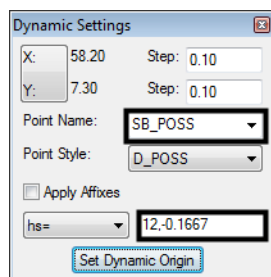


If the V\_Ditch does not disappear right away, it will when you click in the template view. This is because the Display Rule returned a false value (EOP and NB\_EOP are more than 24 feet apart). Because an end condition controls the NB\_EOP point, the template can be tested to see if it works properly.

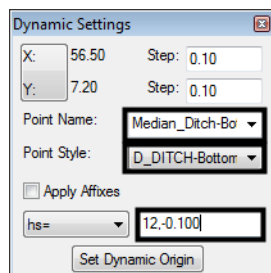
56. <D> the **Test** button.
57. In the *Test End Conditions* dialog box, <D> the **Draw** button.
58. Move the cursor slowly from right to left in the dialog box. Notice that once the cursor is moved left of the 25 grid line, the template displays.
59. <D> **Close** to dismiss the *Test End Conditions* dialog box.
60. Select **File > Save** from the *Create Template* menu bar.
- The next component to build is the 6:1 - 10:1 / 6:1 - 10:1 Compound Ditch. This component has a 12 foot 6:1 slope extending from each pavement edge. The slope changes to 10:1 at this point to form the ditch bottom.
61. Create a new template in the *Variable Median Ditch* folder as described in steps 6 through 9 above. Name the template **Standard Compound Ditch**.
62. <R> in the template view and select **Add New Component > End Condition** from the right click menu.
63. In the *Current Component* area, key in **Ditch\_Width** for the *Name*.
64. Set the *Style* to **Breakline**.
65. Set the *Target Type* to **Feature XYZ**.
66. Set the *Surface* to **12345DES\_Northbound**.
67. Set the *Feature* to **Northbound-Conc\_EOP-Top**.
68. In the *Dynamic Settings* dialog box, select **EOP** for the *Point Name*.
69. Move the cursor to the template origin (0.00,0.00) and <D> to place the point.
70. In the *Dynamic Settings* dialog box, key in **NB\_EOP** for the *Point Name*.
71. Toggle on **End Condition is Infinite** and **Do Not Construct**.



72. Set the key in mode to **hs=**.
73. Key in **48,0** in the precision key in field and press **Enter**.
74. **<R>** and select **Finish** from the right click menu.
75. **<R>** in the template view and select **Add New Component > Unconstrained** from the right click menu.
76. In the *Current Component* area, key in **Std\_Compound\_Ditch** for the *Name*.
77. Set the *Style* to **D\_Top-of-Cut**. Using a different style for each ditch component will make it easier to troubleshoot the template if there is a problem
78. **<D>** on the **EOP** point to start the component at the origin.
79. In the *Dynamic Settings* dialog box, select **POSS** for the *Point Name*. Then key in **SB\_POSS** for the *Point Name*. Selecting POSS first automatically sets the Point Style, then “SB\_” can be appended to the name.
80. In the precision key in field, type **12,-0.1667** and press **Enter**.

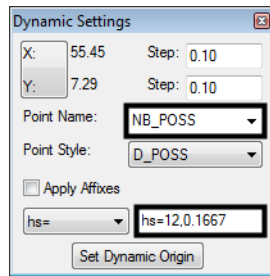


81. In the *Dynamic Settings* dialog box, key in **Median\_Ditch-Bottom** in the *Point Name* field.
82. Select **D\_DITCH-Bottom** for the *Point Style*.
83. In the precision key in field, type **12,-0.100** and press **Enter**.



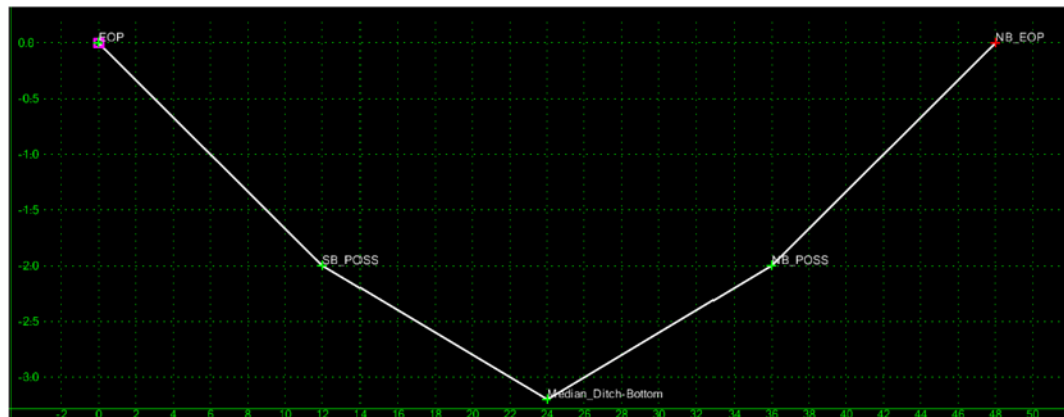
84. In the *Dynamic Settings* dialog box, select **POSS** for the *Point Name*. Then key in **NB\_POSS** for the *Point Name*.

85. In the precision key in field, type **12,0.100** and press **Enter**.



86. **<D>** on the **NB\_EOP** point.

87. **<R>** and select **Finish** from the right click menu. The illustration below shows the component as it appears at this point.



The points on the component form the proper shape. Now they must be constrained to maintain that shape.

88. **<D> <D>** on the **SB\_POSS** point.

89. In the **Point Properties** dialog box, set the **Constraint 1 Type** to **Horizontal**.

90. Set the **Constraint 2 Type** to **Slope**.

91. Set the **Parent 1** for both constraints to **EOP**.

92. <D> **Apply**.

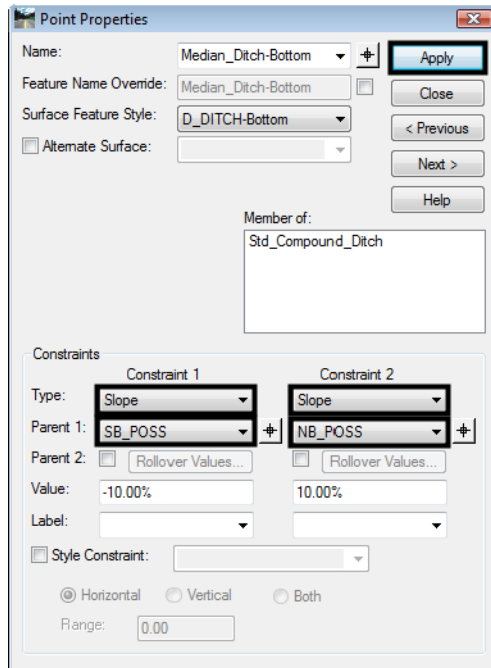
The screenshot shows the 'Point Properties' dialog box. The 'Name' field is 'SB\_POSS'. The 'Feature Name Override' field is 'SB\_POSS'. The 'Surface Feature Style' is 'D\_POSS'. The 'Member of' field is 'Std\_Compound\_Ditch'. The 'Constraints' section has two columns: 'Constraint 1' and 'Constraint 2'. 'Constraint 1' has 'Type' set to 'Horizontal' and 'Parent 1' set to 'EOP'. 'Constraint 2' has 'Type' set to 'Slope' and 'Parent 1' set to 'EOP'. The 'Value' for 'Constraint 1' is '12.00' and for 'Constraint 2' is '-16.67%'. There are buttons for 'Apply', 'Close', '< Previous', 'Next >', and 'Help'. At the bottom, there are radio buttons for 'Horizontal', 'Vertical', and 'Both', and a 'Range' field set to '0.00'.

93. <D> the **Next** button to select **Median\_Ditch-Bottom**.

94. Set the *Type* of both constraints to **Slope**.

95. Set the *Parent 1* of *Constraint 1* to **SB\_POSS**.

96. Set the *Parent 1* of *Constraint 2* to **NB\_POSS**.

97. <D> **Apply**.

98. <D> the **Next** button to select **NB\_POSS**.

99. Set the *Constraint 1 Type* to **Horizontal**.

100. Set the *Constraint 2 Type* to **Slope**.

101. Set the *Parent 1* for both constraints to **NB\_EOP**.

102. <D> **Apply** then <D> **Close** to dismiss the Point Properties dialog box.

There are three situations where this component will not work correctly. These are 1) when the median is less than 24 feet wide 2) when the NB\_POSS drops below the 10:1 slope from the SB\_POSS and 3) when the Median\_Ditch-Bottom is left of the SB\_POSS (this can occur when the NB\_EOP is higher than the SB\_EOP). Display rules are used to test for each of these situations.

103. <D> <D> on the line forming the ditch to display the *Component Properties* for the *Std\_Compound\_Ditch* component.

104. In the *Component Properties* dialog box, <D> the **Edit** button. This displays the *Component Display Conditional Expression* dialog box.

105. In the *Component Display Conditional Expression* dialog box, <D> the **Add** button. This displays the *Display Rule* dialog box.

106. In the *Display Rule* dialog box, key in *Std\_Compound\_DitchWidth* for the *Name*.

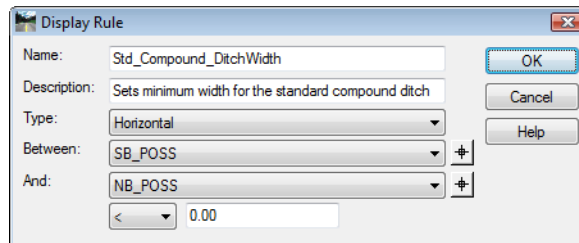
107. Key in *Sets minimum width for the standard compound ditch* for the *Description*.

108. Set the *Type* to **Horizontal**.

109. Set *Between* to **SB\_POSS**.

110. Set *And* to **NB\_POSS**.

111. Set the operator to **<** and key in **0.00** for the value. The dialog box with completed entries is illustrated below:



112. **<D> OK**. This dismisses the *Display Rule* dialog box.

113. In the *Component Display Conditional Expression* dialog box, **<D>** the **Add** button.

114. In the *Display Rule* dialog box, key in **Std\_Compound\_DitchVertical1** for the *Name*.

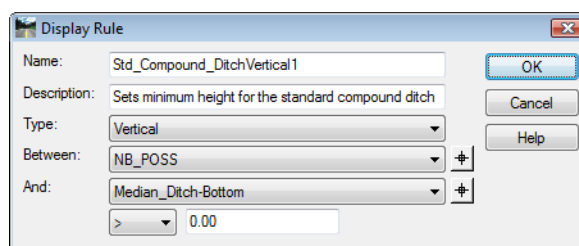
115. Key in **Sets minimum height for the standard compound ditch** for the *Description*.

116. Set the *Type* to **Vertical**.

117. Set *Between* to **NB\_POSS**.

118. Set *And* to **Median\_Ditch-Bottom**.

119. Set the operator to **>** and key in **0.00** for the value. The dialog box with completed entries is illustrated below:



120. **<D> OK**. This dismisses the *Display Rule* dialog box.

121. In the *Component Display Conditional Expression* dialog box, **<D>** the **Add** button.

122. In the *Display Rule* dialog box, key in **Std\_Compound\_DitchVertical2** for the *Name*.

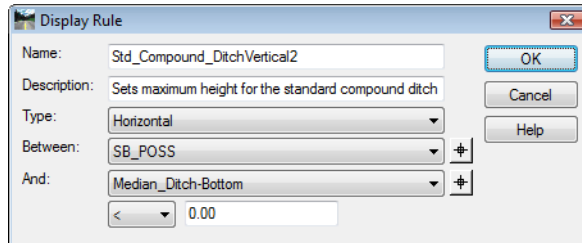
123. Key in **Sets maximum height for the standard compound ditch** for the *Description*.

124. Set the *Type* to **Horizontal**.

125. Set *Between* to **SB\_POSS**.

126. Set *And* to **Median\_Ditch-Bottom**.

127. Set the operator to **<** and key in **0.00** for the value. The dialog box with completed entries is illustrated below:



128. **<D>** **OK** to accept the entries and dismiss the dialog box.

129. In the *Component Display Conditional Expression* dialog box, highlight **Std\_Compound\_DitchWidth** in the *Template Display Rules* area.

130. **<D>** the **Selected Rule** button.

131. **<D>** the **AND** button.

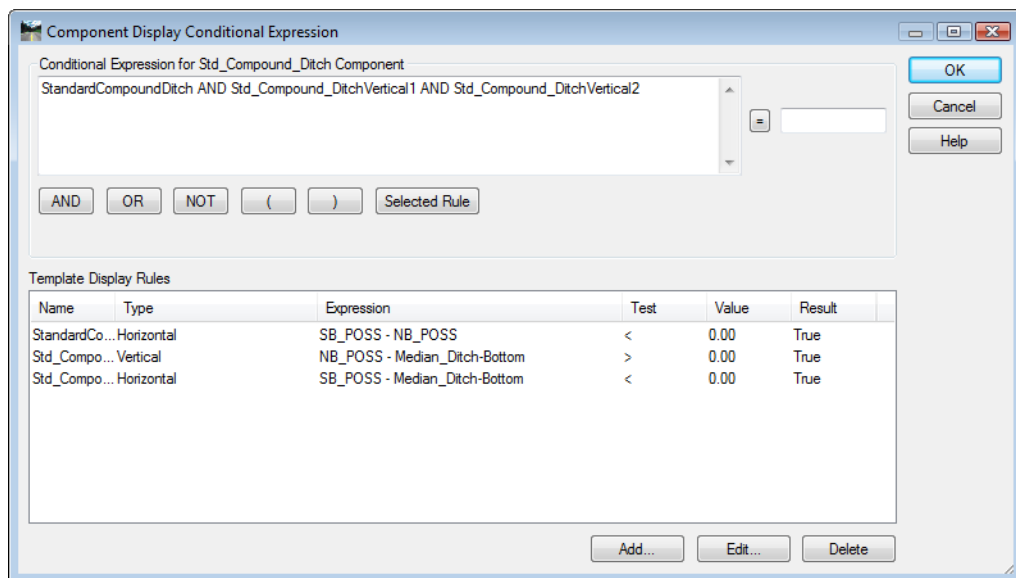
132. Highlight **Std\_Compound\_DitchVertical1** in the *Template Display Rules* area.

133. **<D>** the **Selected Rule** button.

134. **<D>** the **AND** button.

135. Highlight **Std\_Compound\_DitchVertical2** in the *Template Display Rules* area.

136. **<D>** the **Selected Rule** button. The dialog box with completed entries is illustrated below:



137.<D> **OK**. This dismisses the *Component Display Conditional Expression* dialog box and adds the rule to the component properties of *Std\_Compound\_Ditch*.

138.<D> the **Apply** button then <D> the **Close** button to dismiss the Component Properties dialog box.

Using the three display rules with the AND operator means that all of the rules must return a True result in order for the component to be displayed.

139.<D> the **Test** button.

140.In the *Test End Conditions* dialog box, <D> the **Draw** button.

141.Move the cursor slowly from right to left and up and down in the dialog box. Notice the different situations that cause the template to disappear.

142.<D> **Close** to dismiss the *Test End Conditions* dialog box.

143.Select **File > Save** from the *Create Template* menu bar.

Two of the four components required for this template have been completed. The final two components define the ditch where the 10:1 slope from one side of the ditch intercepts the 6:1 slope on the other side.

144.Create a new template in the *Variable Median Ditch* folder as described in steps 6 through 9 above. Name the template *Compound Ditch NB\_EOP High*.

145.<R> in the template view and select **Add New Component > End Condition** from the right click menu.

146.In the *Current Component* area, key in *Ditch\_Width* for the *Name*.

147.Set the *Style* to **Breakline**.

148.Set the *Target Type* to **Feature XYZ**.

149.Set the *Surface* to **12345DES\_Northbound**.

150.Set the *Feature* to **Northbound-Conc\_EOP-Top**.

151.In the *Dynamic Settings* dialog box, select **EOP** for the *Point Name*.

152.Move the cursor to the template origin (0.00,0.00) and <D> to place the point.

153.In the *Dynamic Settings* dialog box, key in *NB\_EOP* for the *Point Name*.

154.Toggle on **End Condition is Infinite** and **Do Not Construct**.

155.Set the key in mode to **hs=**.

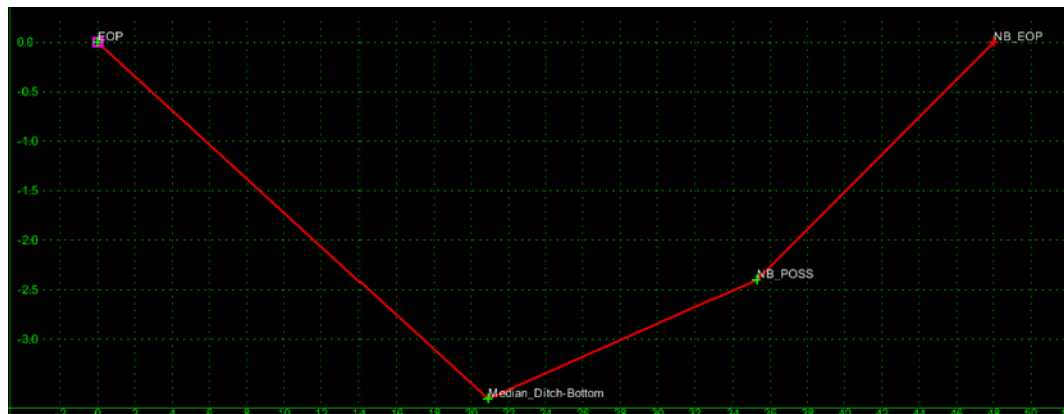
156.Key in **48,0** in the precision key in field and press **Enter**.

157.<R> and select **Finish** from the right click menu.

158.Add a new unconstrained component.

159.Key in *NB\_EOP-High* for the *Name*.

160. Select **D\_CONC\_Sw** for the *Style*.
161. **<D>** on the **EOP** point to start the component at the origin.
162. In the *Dynamic Settings* dialog box, key in **Median\_Ditch-Bottom** in the *Point Name* field.
163. Select **D\_DITCH-Bottom** for the *Point Style*.
164. **<D>** between and below the **EOP** and **NB\_EOP** points.
165. In the *Dynamic Settings* dialog box, key in **NB\_POSS** in the *Point Name* field.
166. Select **D\_POSS** for the *Point Style*.
167. **<D>** to the right and above **Median\_Ditch-Bottom** and to the left and below **NB\_EOP**.
168. **<D>** on the **NB\_EOP** point.
169. **<R>** and select **Finish** from the right click menu. The illustration below shows the component as it appears at this point.



170. **<D>** **<D>** on the **Median\_Ditch-Bottom** point.
171. In the *Point Properties* dialog box, set the *Type* to **Slope** on both constraints.
172. Set the *Parent 1* for *Constraint 1* to **EOP**.
173. Set the *Parent 1* for *Constraint 2* to **NB\_POSS**.
174. Key in the **-0.1667** for the *Value* of *Constraint 1*.
175. Key in the **0.1000** for the *Value* of *Constraint 2*.
176. **<D>** **Apply**.
177. **<D>** **Next** to select the **NB\_POSS** point.
178. Set the *Constraint 1 Type* to **Horizontal**.
179. Set the *Constraint 2 Type* to **Slope**.
180. Set the *Parent 1* for both constraints to **NB\_EOP**.



181. Key in the **12.00** for the *Value* of *Constraint 1*.

182. Key in the **0.1667** for the *Value* of *Constraint 2*.

183. **<D> Apply** then **<D> Close** to dismiss the dialog box.

The shape of the ditch is now fixed. Now display Rules must be added to control when this component is displayed.

184. **<D> <D>** on the line forming the ditch to display the *Component Properties* for the **NB\_EOP\_HIGH** component.

185. In the *Component Properties* dialog box, **<D>** the **Edit** button. This displays the *Component Display Conditional Expression* dialog box.

186. In the *Component Display Conditional Expression* dialog box, **<D>** the **Add** button. This displays the *Display Rule* dialog box.

187. In the *Display Rule* dialog box, key in **NB\_EOP\_HIGHWidth** for the *Name*.

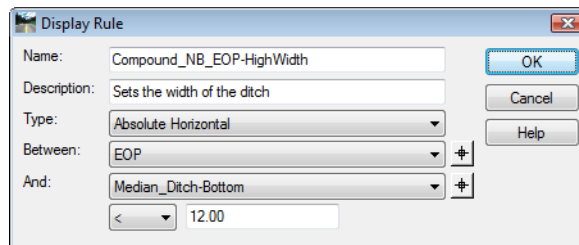
188. Key in **Sets width for ditch** for the *Description*.

189. Set the *Type* to **Absolute Horizontal**.

190. Set *Between* to **EOP**.

191. Set *And* to **Median\_Ditch-Bottom**.

192. Set the operator to **<** and key in **12.00** for the value. The dialog box with completed entries is illustrated below:



193. **<D> OK**. This dismisses the *Display Rule* dialog box.

194. In the *Component Display Conditional Expression* dialog box, **<D>** the **Add** button.

195. In the *Display Rule* dialog box, key in **NB\_EOP\_HIGHVertical** for the *Name*.

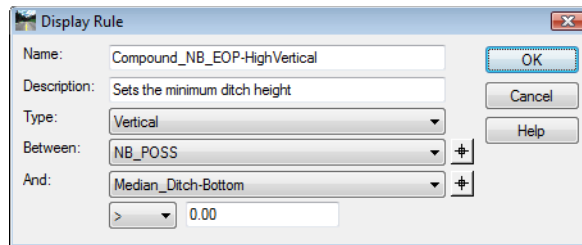
196. Key in **Sets height for the ditch** for the *Description*.

197. Set the *Type* to **Vertical**.

198. Set *Between* to **NB\_POSS**.

199. Set *And* to **Median\_Ditch-Bottom**.

200. Set the operator to **<** and key in **0.00** for the value. The dialog box with completed entries is illustrated below:



201. **<D>** **OK**. This dismisses the *Display Rule* dialog box.

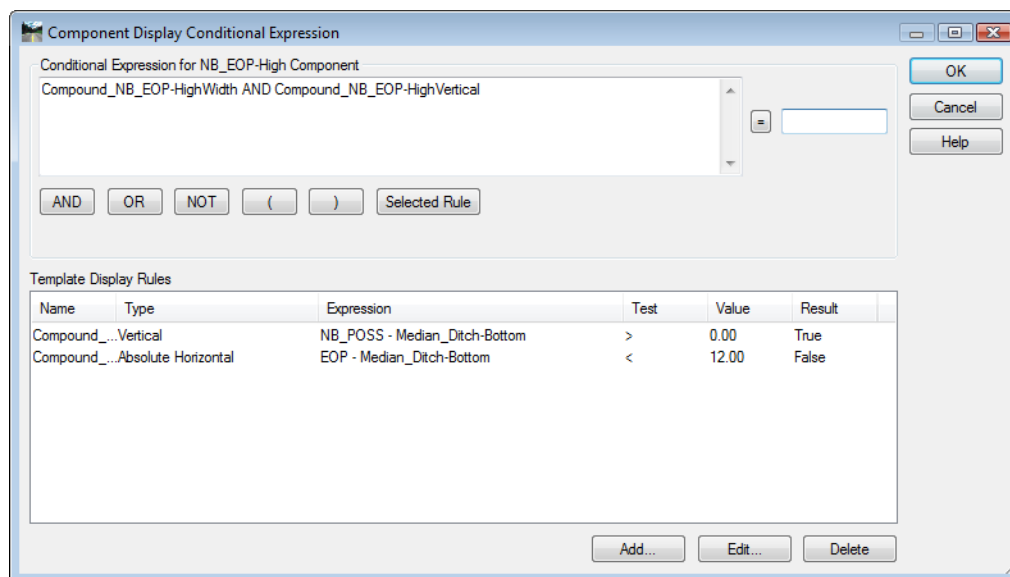
202. In the *Component Display Conditional Expression* dialog box, highlight **NB\_EOP\_HIGHWidth** in the *Template Display Rules* area.

203. **<D>** the **Selected Rule** button.

204. **<D>** the **AND** button.

205. Highlight **NB\_EOP\_HIGHVertical** in the *Template Display Rules* area.

206. **<D>** the **Selected Rule** button. The dialog box with completed entries is illustrated below:



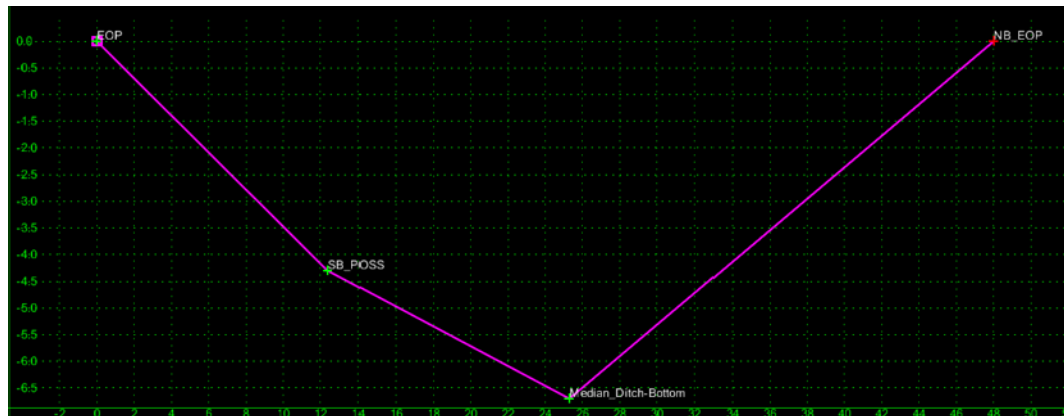
207. **<D>** **OK**. This dismisses the *Component Display Conditional Expression* dialog box and adds the rule to the component properties of **NB\_EOP High**.

208. **<D>** the **Apply** button then **<D>** the **Close** button to dismiss the Component Properties dialog box.

This completes the *Compound Ditch NB\_EOP High* component. Next the final component is built.

209. Create a new template in the *Variable Median Ditch* folder as described in steps 6 through 9 above. Name the template ***Compound Ditch SB\_EOP High***.
210. <R> in the template view and select **Add New Component > End Condition** from the right click menu.
211. In the *Current Component* area, key in ***Ditch\_Width*** for the *Name*.
212. Set the *Style* to **Breakline**.
213. Set the *Target Type* to **Feature XYZ**.
214. Set the *Surface* to **12345DES\_Northbound**.
215. Set the *Feature* to **Northbound-Conc\_EOP-Top**.
216. In the *Dynamic Settings* dialog box, select **EOP** for the *Point Name*.
217. Move the cursor to the template origin (0.00,0.00) and <D> to place the point.
218. In the *Dynamic Settings* dialog box, key in **NB\_EOP** for the *Point Name*.
219. Toggle on **End Condition is Infinite** and **Do Not Construct**.
220. Set the key in mode to **hs=**.
221. Key in **48,0** in the precision key in field and press **Enter**.
222. <R> and select **Finish** from the right click menu.
223. Add a new unconstrained component.
224. Key in **SB\_EOP-High** for the *Name*.
225. Select **D\_Shoulder** for the *Style*.
226. <D> on the **EOP** point to start the component at the origin.
227. In the *Dynamic Settings* dialog box, key in **SB\_POSS** in the *Point Name* field.
228. Select **D\_POSS** for the *Point Style*.
229. <D> between and below the **EOP** and **NB\_EOP** points.
230. In the *Dynamic Settings* dialog box, key in **Median\_Ditch-Bottom** in the *Point Name* field.
231. Select **D\_DITCH-Bottom** for the *Point Style*.
232. <D> between and below the **SB\_POSS** and **NB\_EOP** points.
233. <D> on the **NB\_EOP** point.

234. <R> and select **Finish** from the right click menu. The illustration below shows the component as it appears at this point.



235. <D> <D> the **SB\_POSS** point.

236. Set the *Constraint 1 Type* to **Horizontal**.

237. Set the *Constraint 2 Type* to **Slope**.

238. Set the *Parent 1* for both constraints to **EOP**.

239. Key in the **12.00** for the *Value* of *Constraint 1*.

240. Key in the **-0.1667** for the *Value* of *Constraint 2*.

241. <D> **Apply** to accept the changes.

242. <D> **Next** to select the **Median\_Ditch-Bottom** point.

243. In the *Point Properties* dialog box, set the *Type* to **Slope** on both constraints.

244. Set the *Parent 1* for *Constraint 1* to **SB\_POSS**.

245. Set the *Parent 1* for *Constraint 2* to **NB\_EOP**.

246. Key in the **-0.1000** for the *Value* of *Constraint 1*.

247. Key in the **0.1667** for the *Value* of *Constraint 2*.

248. <D> **Apply**.

The shape of the ditch is now fixed. Now display Rules must be added to control when this component is displayed.

249. <D> <D> on the line forming the ditch to display the *Component Properties* for the **SB\_EOP-High** component.

250. In the *Component Properties* dialog box, <D> the **Edit** button. This displays the *Component Display Conditional Expression* dialog box.

251. In the *Component Display Conditional Expression* dialog box, <D> the **Add** button. This displays the *Display Rule* dialog box.

252. In the *Display Rule* dialog box, key in **SB\_EOP\_HIGHWidth-Max** for the *Name*.

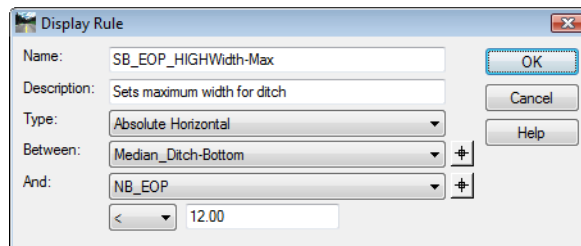
253. Key in **Sets maximum width for ditch** for the *Description*.

254. Set the *Type* to **Absolute Horizontal**.

255. Set *Between* to **Median\_Ditch-Bottom**.

256. Set *And* to **NB\_EOP**.

257. Set the operator to **<** and key in **12.00** for the value. The dialog box with completed entries is illustrated below:



258. **<D> OK**. This dismisses the *Display Rule* dialog box.

259. In the *Component Display Conditional Expression* dialog box, **<D>** the **Add** button.

260. In the *Display Rule* dialog box, key in **SB\_EOP\_HIGHWidth-Min** for the *Name*.

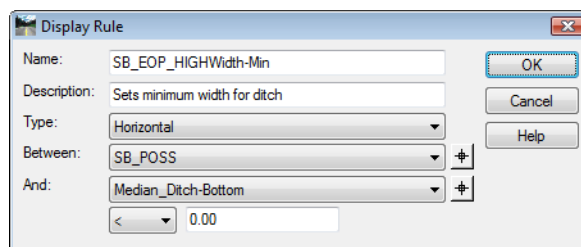
261. Key in **Sets minimum width for ditch** for the *Description*.

262. Set the *Type* to **Horizontal**.

263. Set *Between* to **SB\_POSS**.

264. Set *And* to **Median\_Ditch-Bottom**.

265. Set the operator to **<** and key in **0.00** for the value. The dialog box with completed entries is illustrated below:



266. **<D> OK**. This dismisses the *Display Rule* dialog box.

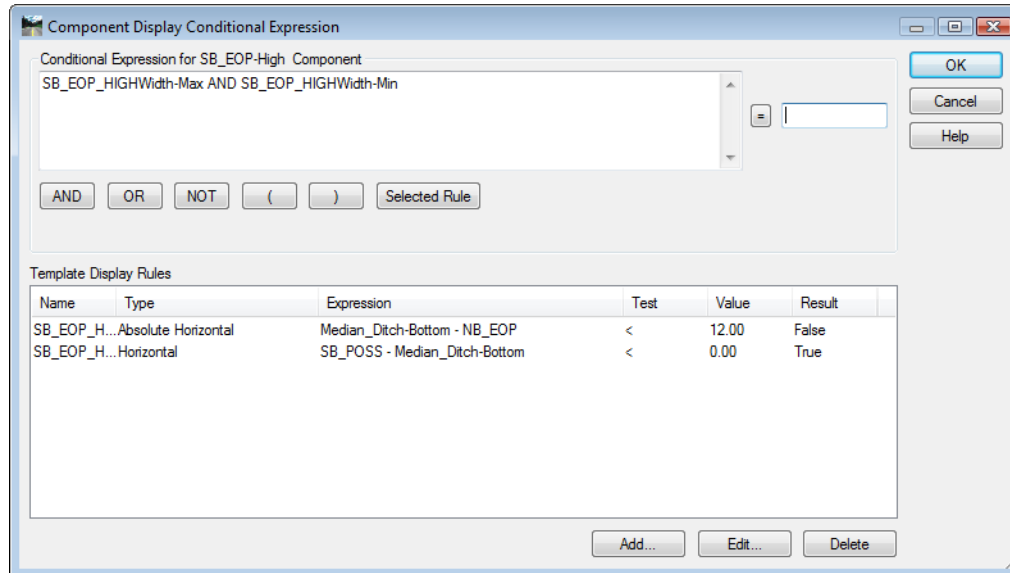
267. In the *Component Display Conditional Expression* dialog box, highlight **SB\_EOP\_HIGHWidth-Max** in the *Template Display Rules* area.

268. **<D>** the **Selected Rule** button.

269. **<D>** the **AND** button.

270. Highlight **SB\_EOP\_HIGHWidth-Min** in the *Template Display Rules* area.

271. <D> the **Selected Rule** button. The dialog box with completed entries is illustrated below:



272. <D> **OK**. This dismisses the *Component Display Conditional Expression* dialog box and adds the rule to the component properties of *SB\_EOP High*.

273. <D> the **Apply** button the <D> the **Close** button to dismiss the Component Properties dialog box.

This completes the *Compound Ditch SB\_EOP High* component. All of the variable median ditch components can be placed into a single section.

### Section Summary:

- ◆ The components use an end condition to find the edge of the northbound pavement. This is so that the component can be tested before it is added to the template. The same results can be accomplished with a null point and a point control.
- ◆ Display rules are used to define when a component will be used.
- ◆ Different Styles are used for the ditch line in each component. This is done to facilitate troubleshooting. Once the components are assembled into a section and it is working properly, the styles will be set to match for each component.

## Lab 25.2 - Assemble the Components into a Section

Now that the individual components for the variable median ditch are built, they can be assembled into a section.

### Section Objectives:

- ◆ Create a new folder for the variable median ditch section.
- ◆ Create a new template for the variable median ditch section.
- ◆ Add the components to the section.

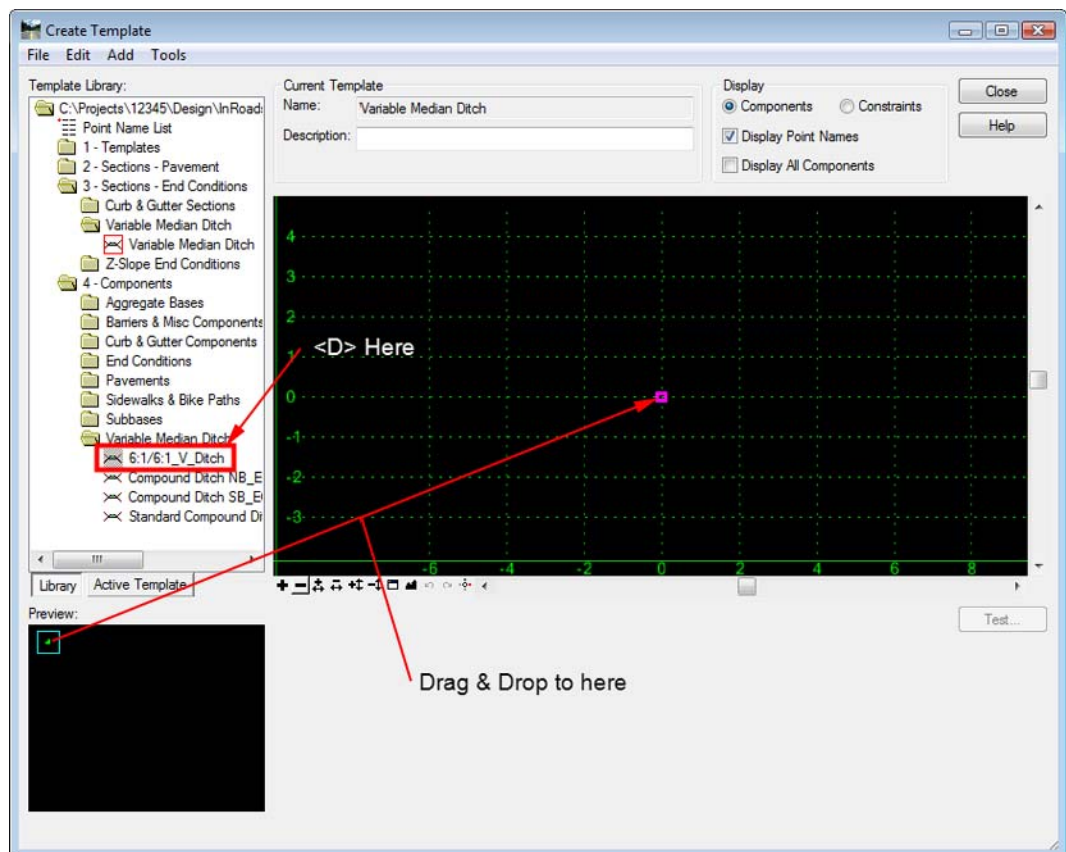
- ◆ Delete the redundant end condition components.
- ◆ Add additional display rules so that only one component is displayed at a time.

The first step is to create the folder and template for the variable median ditch section.

1. Expand the **3 - Sections - End Conditions** folder of the template library.
2. **<R>** on the **3 - Sections - End Conditions** folder and select **New > Folder** from the right click menu.
3. Key in **Variable Median Ditch** for the folder name.
4. **<R>** on the **Variable Median Ditch** folder and select **New > Template** from the right click menu.
5. Key in **Variable Median Ditch** for the template name. The new template is automatically opened for editing.

Now the components can be placed into the new template.

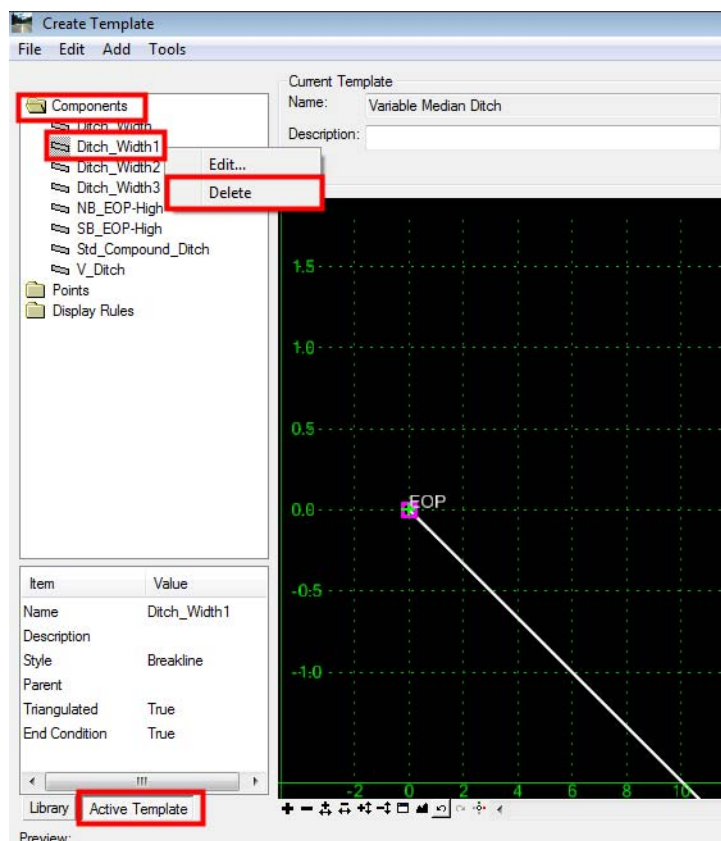
6. **<D>** on the **6:1/6:1\_V\_Ditch** component so that it is displayed in the preview window.
7. Drag the component by its origin (the green dot in the upper left corner) and drop it on the origin in the template view.



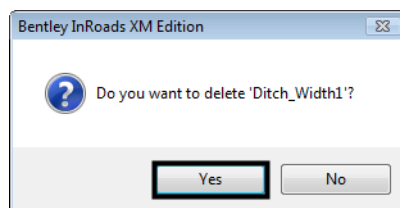
8. Repeat steps 6 and 7 with the **Compound Ditch NB\_EOP High**, **Compound Ditch NB\_EOP High**, and **Standard Compound Ditch**.

Because each component has the same end condition in it, the Variable Median Ditch section now has four identical end conditions. Three of these end conditions are deleted to remove redundancies in the template. Because the same point names are used in each component, deleting the extra end conditions will not affect how the individual components operate.

9. <D> the **Active Template** tab at the bottom of the Template Library tree view.
10. Expand the **Components** folder.
11. <R> on **Ditch\_Width1** and select **Delete** from the right click menu.



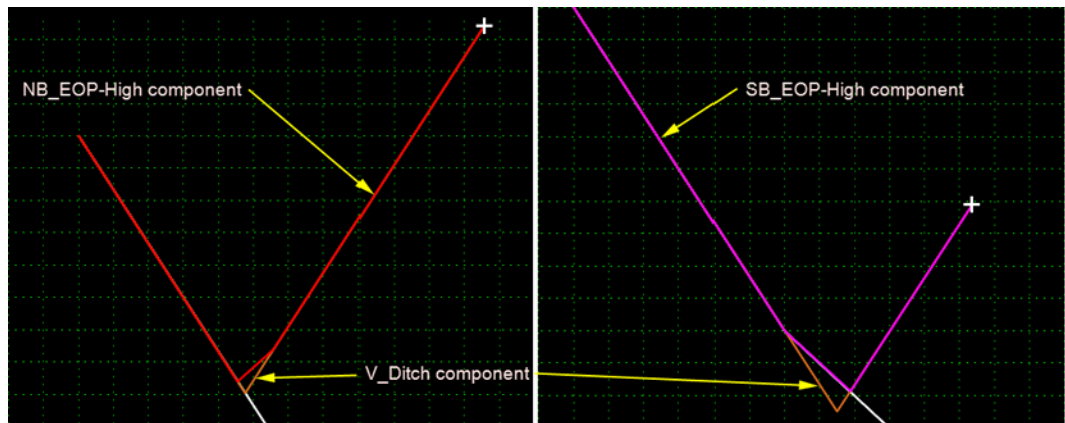
12. <D> **Yes** on the delete warning message box.



13. Repeat steps 10 through 12 for **Ditch\_Width2** and **Ditch\_Width3**.
- Next, test the section and see how each of the components behave.
14. <D> the **Test** button.
  15. In the **Test End Conditions** dialog box, <D> the **Draw** button.

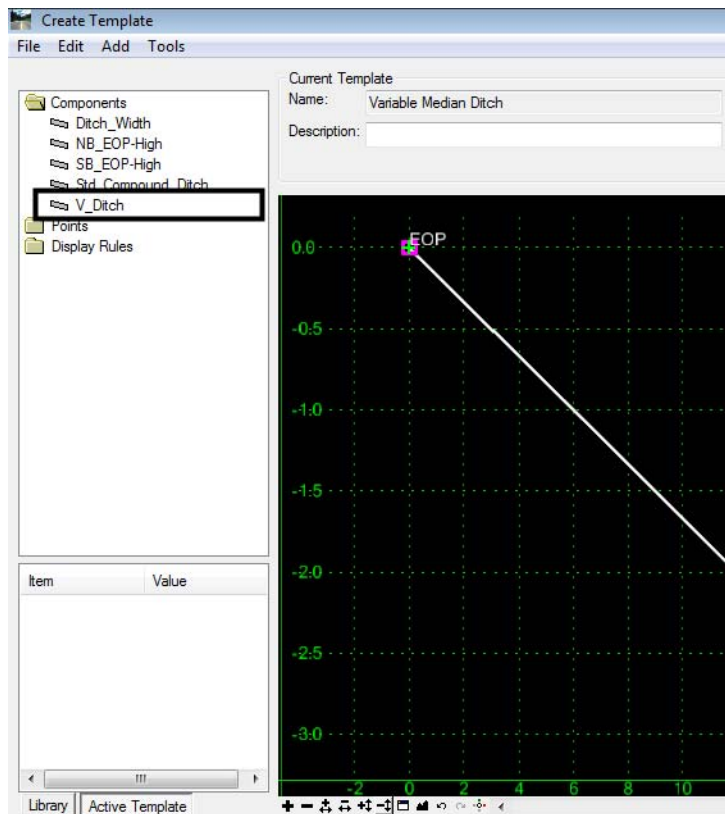


16. Move the cursor around slowly in the view area. Notice that there are two instances when two components are displayed at the same time. These occur when the horizontal distance between the EOP and NB\_EOP is less than 24' and there is an elevation difference between the points.

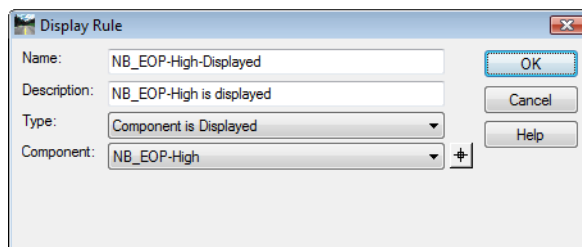


This is fixed by adding two more display rules to the V\_Ditch component.

17. **<D> Close** to dismiss the *Test End Conditions* dialog box.
18. In the *Create Templates* dialog box, **<D> <D>** on the **V\_Ditch** component in the *Active Template* tree view. This opens the *Component Properties* dialog box.



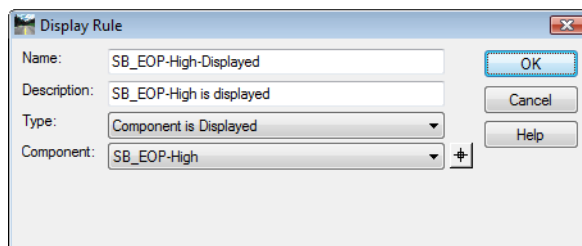
19. <D> the **Edit** button to display the *Component Display Conditional Expression* dialog box.
20. In the *Component Display Conditional Expression* dialog box, <D> the **Add** button to display the *Display Rule* dialog box.
21. In the *Display Rule* dialog box, key in **NB\_EOP-High-Displayed** for the *Name*.
22. Key in **NB\_EOP-High is displayed** for the *Description*.
23. Set the *Type* to **Component is Displayed**.
24. Set the *Component* to **NB\_EOP-High**. The dialog box with completed entries is illustrated below:



25. <D> the **OK** button. This dismisses the *Display Rule* dialog box and adds the new rule to the Template Display Rules list on the *Component Display Conditional Expression* dialog box.

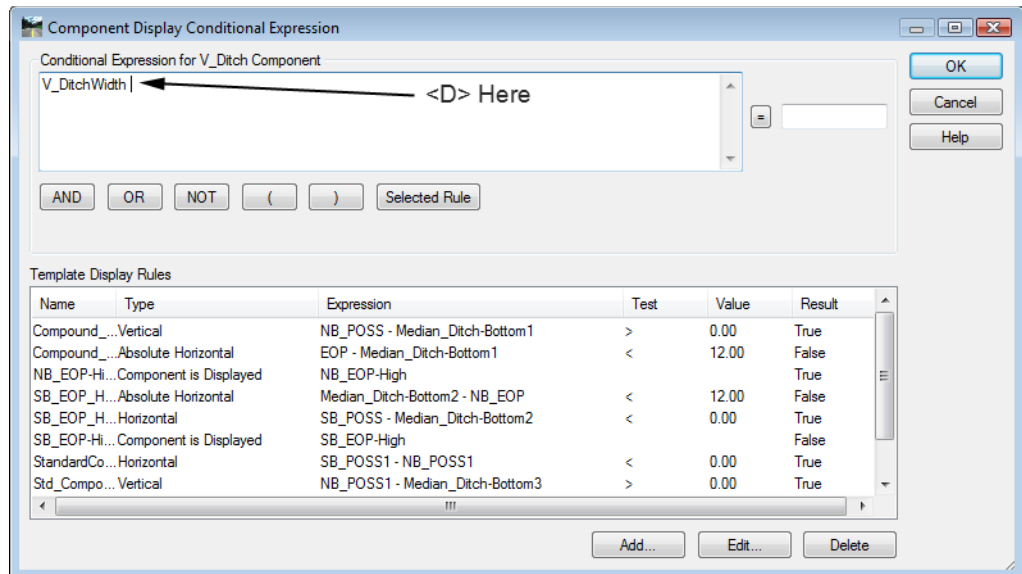
**Note:** The Template Display Rules list contains all of the rules created thus far in the lab.

26. In the *Component Display Conditional Expression* dialog box, <D> the **Add** button to display the *Display Rule* dialog box.
27. In the *Display Rule* dialog box, key in **SB\_EOP-High-Displayed** for the *Name*.
28. Key in **SB\_EOP-High is displayed** for the *Description*.
29. Set the *Type* to **Component is Displayed**.
30. Set the *Component* to **SB\_EOP-High**. The dialog box with completed entries is illustrated below:



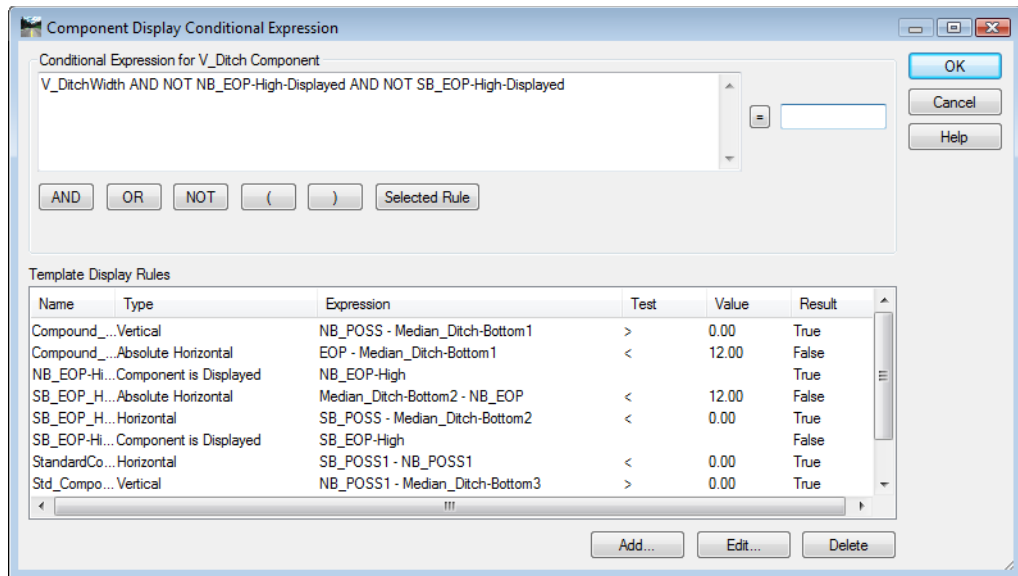
31. <D> the **OK** button.

32. In the *Component Display Conditional Expression* dialog box, **<D>** in the *Conditional Expression for V\_Ditch* area to the right of the *V\_DitchWidth* entry.

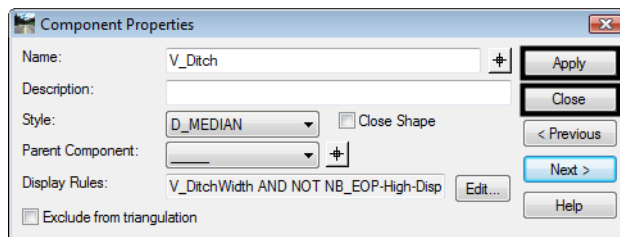


33. **<D>** the **AND** button.
34. **<D>** the **NOT** button.
35. Highlight the **NB\_EOP-High-Displayed** rule in the *Template Display Rules* list.
36. **<D>** the Selected Rule button.
37. **<D>** the **AND** button.
38. **<D>** the **NOT** button.
39. Highlight the **SB\_EOP-High-Displayed** rule in the *Template Display Rules* list.

40. <D> the **Selected Rule** button. The dialog box with completed entries is illustrated below:



41. <D> the **OK** button to accept the changes and dismiss the dialog box.
42. On the Component Properties dialog box, <D> **Apply** then <D> **Close**.



43. Test the section again. Notice that only one component at a time is displayed.
44. <D> **Close** on the *Test End Conditions* dialog box.
45. Select **File > Save** from the *Create Template* menu bar.

The Variable Median Ditch section is ready to be used on a template.

**Section Summary:**

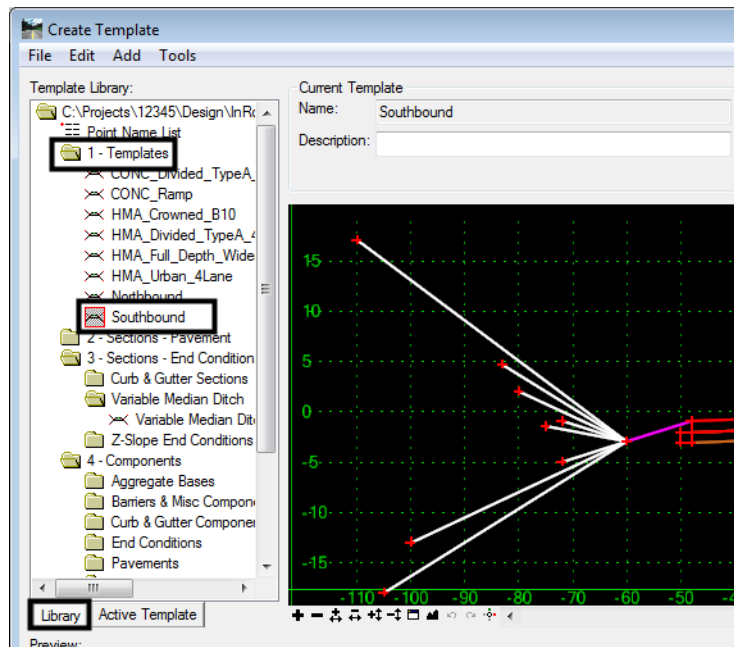
- ◆ As components were added to the section, common points were merged but common components (like the end conditions) are not.
- ◆ Use the Active Template tree view to access components that are not displayed.
- ◆ Additional display rules can be used to turn off a component when two are displayed at the same time.

## Lab 25.3 - Adding the Section to a Template and Reviewing the Corridor

The variable median ditch section can now be added to the template and used in the design corridor.

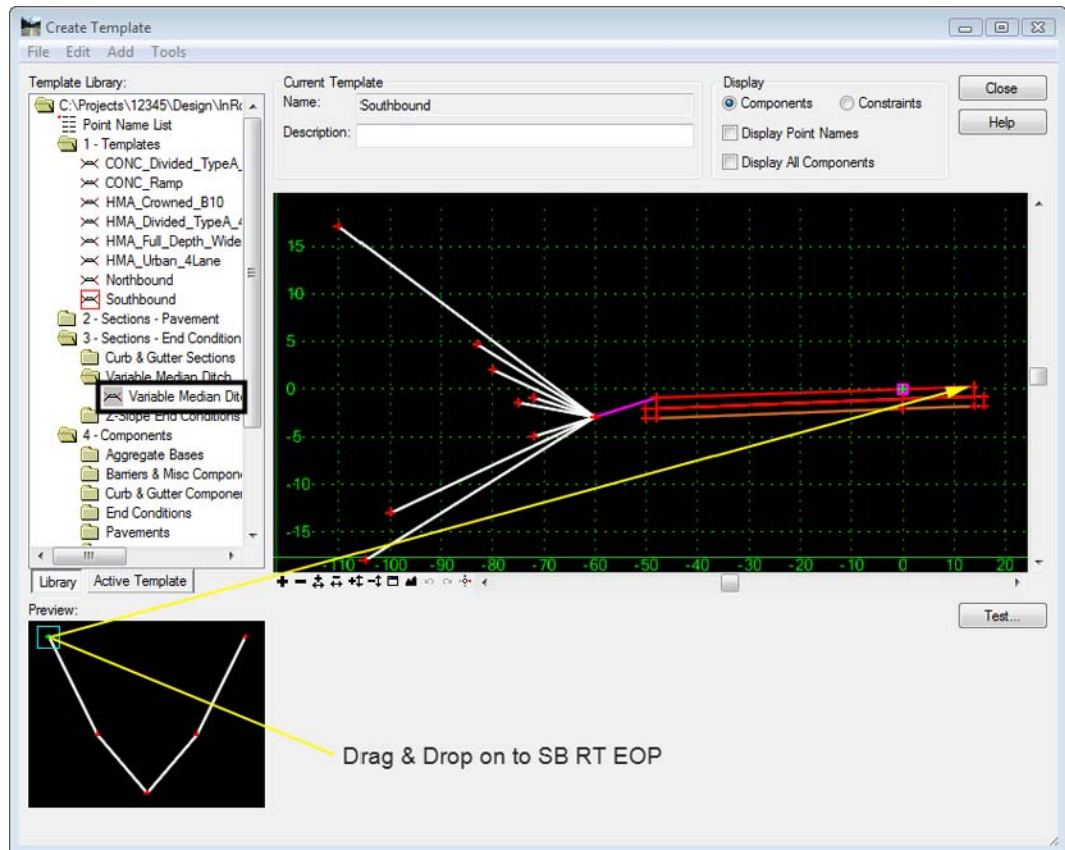
### Section Objectives:

- ◆ Add the variable median ditch to the southbound backbone template.
  - ◆ Update the corridor to use the modified template.
  - ◆ Examine the results in the Roadway Designer dialog box.
1. <D> the **Library** tab to show the *Template Library* tree view.
  2. Expand the **1 - Templates** folder.
  3. <D> <D> on the **Southbound** template to make it active.



4. <D> on the **Variable Median Ditch** section (in the *3 - Sections - End Conditions > Variable Median Ditch*) to display it in the Preview area.
5. In the Preview area, <D> and hold on the *Variable Median Ditch* origin.

6. **Drag** the section into the template view and **Drop** it on the **SB RT EOP** point.

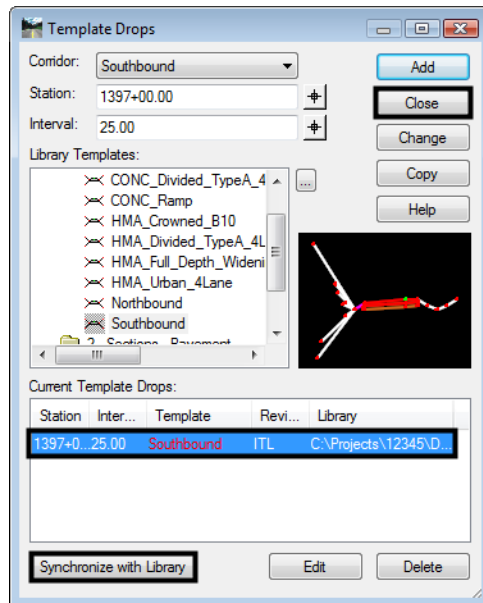


7. Select **File > Save** from the *Create Template* menu bar.
8. **<D> Close** on the *Create Template* dialog box.
- The template is now ready to use in the corridor.
9. From the InRoads main menu bar, select **Modeler > Roadway Designer**. This displays the *Roadway Designer* dialog box.
10. In the *Roadway Designer* dialog box, verify that the Southbound corridor is active.



11. Select **Corridor > Template Drops** from the Roadway Designer menu bar.
12. Highlight the entry in the Current Template Drops list.
13. **<D>** the **Synchronize with Library** button.

14. <D> Close to dismiss the Template Drops dialog box.



15. Scroll through the stations watching the template view. Notice the changes in the median ditch (especially around stations 1407+25 and 1415+75.). The different styles used on the median ditch components make it easy to spot when the component changes.
16. On the Roadway Designer menu bar, select **File > Save** to save the modified ird file.
17. <D> **Close** on the *Roadway Designer* dialog box.
18. Close InRoads and MicroStation.

### **Section Summary:**

- ◆ The variable median ditch requires no further editing to be used in the template.
- ◆ Always check the Template Drops after editing templates.
- ◆ After examining the corridor, go back and change the styles of the median ditch components so they match.

### **Chapter Summary:**

- Build complex sections in smaller components that can be tested prior to assembling the whole thing.
- Use display rules to select a single component when more than one can be displayed.
- Use different styles to facilitate trouble shooting.

