# Tutorial 4:  Overhead sign with lane control arrows:



**SignCAD Analysis**

*The sign above splits multilane freeway traffic into two routes/destinations.  It uses the overhead lane control arrows.  The top half  has three columns: Column 1 is I35 SOUTH San Antonio, and Column 3 is I10 WEST El Paso. Column 2 is the vertical line.  Both columns 1 and 3 are similar arrangements of two rows, the top row containing a route marker and a cardinal direction*

*The bottom half contains the arrows which are positioned with object spacing to align over the lanes.*

*The sign is designed in the Texas DOT standard.*
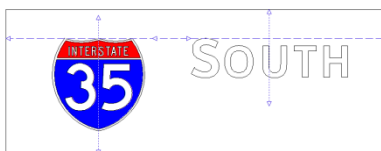


1       The row arrangement above is discussed in Tutorial 3.

2       The panel is created using two multipanels, shown below.  When created with two multipanels the arrangements and spacing in each panel are independent of one another.
It is possible to create this sign in one panel, however it becomes more difficult to align the vertical line to the center of the double arrow as one modification affects everything else.

3       Start by creating a panel selecting Type Guide sign in the general tab of the rectangular panel dialog box.  Drag either the I35 SOUTH arrangement into the panel, or create and place the objects one at a time into the panel.  Top align SOUTH if not already top aligned.  (S OUTH is text aligned baseline)

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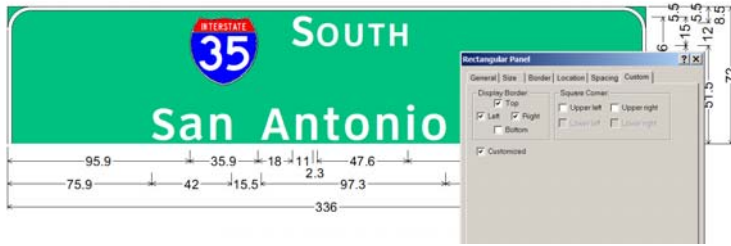
4        Type San Antonio below the I35 SOUTH in 16" ClearviewHwy-5-R font (Texas Standard) or EMod an any other standard.

5        Pick the rectangle tool and drag I10, WEST and El Paso into it to make a similar arrangement and select it to drag into the panel to create a new column, then delete the rectangle to leave the new arrangement in place.  You will not be able to drag the objects directly into the panel, because you will not be able to find a row under only the I10 West row.  To get around this, create the arrangement and drag it into the panel.

Using the rectangle tool is a convenient way to place objects into multiple arrangements, such as 10 West in a row, and El Paso below it to create another row.  The Arrange Tool>Row only allows you to place objects into one row, and the Arrange Tool>Column only allows placing objects into one column.  You could place the row into a column, but the Rectangle tool allows you to do the same thing in fewer steps.



6        Pick the vertical line tool and pick a point when you see a blinking column between the two.
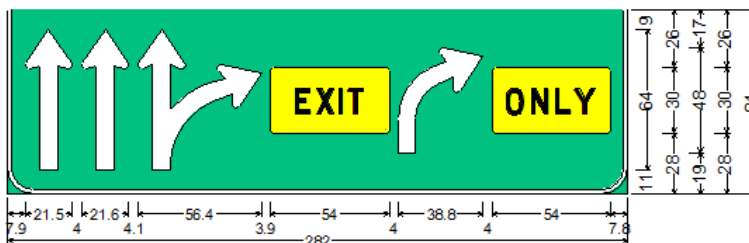


7        Create the bottom panel with the top border off (uncheck top border in the Custom tab) and place the lane control arrows into it:  All objects are in one row.  Right click on any on to bottom align the entire row.

8        Pick the second vertical arrow from the left and pick object spacing: left and right = 134,

which will position the three arrows at 13' centers.  Set the left spacing of the left arrow to 16"

9        Right click on the right turn arrow and set its left spacing to 8" and right spacing to a negative value that will result in a distanc of 8" to the ONLY plaque. The width of the right turn arrow is 38.8", the shaft width is 8" and the desired spacing is 8".  Therefore 38.8-16 =  22.8 entered as a negative spacing value for right spacing of the arrow.

10      Right click on the yellow plaque and set its left spacing to a value not to interfere with the arrow negative spacing, such as -26, and a right spacing of 16" minimum spacing to the panel edge.

11      The remaining value to be determined is the distance between the right two arrows. Which is 66" based on the sum of the size and spacing of the objets: 156" lane centerlines – 8" -54" plaque, - half width of double headed arrow = 66".  A further adjustment may be made to account for the centerline of the right turn arrow.  For this tutorial the value is 66" for right spacing of the double headed arrow.

12      Once the panels are created and the objects are in their arrangements,  an analysis can determine how to proceed.

13      The following procedure is used to analyze and complete the design of the panel, including the alignments, internal spacing and finally external spacing to the border:

**13A:   Determine what the constraints and requirements are:**
   1) The arrows must be separated by object spacing to align over the lanes.
   2) A minimum of 16" is required from the left arrow to the edge of the panel, and from the ONLY plaque to the right edge.
   3) The vertical line in the top panel must be visually centered over the double headed arrow in the bottom panel.
   4) The messages in the top panel must be centered in the green areas to the left and to the right of the vertical line.

**13B:   Determine what the arrangements and alignments should be:**
   1) I35 SOUTH is top aligned and centered above San Antonio.
   2) I10 WEST is top aligned and centered above El Paso.
   3) The vertical line extends to the bottom of the legends.
   4) The arrows and plaques in the bottom panel are all bottom aligned.
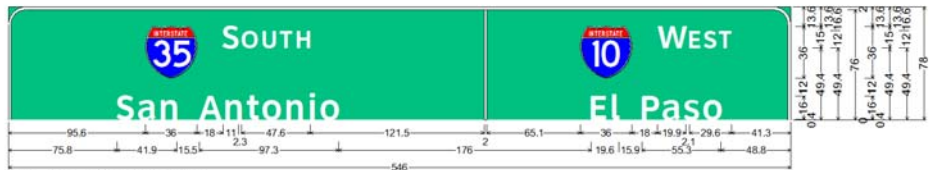
12.0" Radius, 2.0" Border, White on Green;
Interstate 35 M1-1; "S OUTH" ClearviewHwy-5-W-R; "San Antonio" ClearviewHwy-5-W-R; Interstate 10 M1-1; "W EST" ClearviewHwy-5-W-R;
"El Paso" ClearviewHwy-5-W-R;
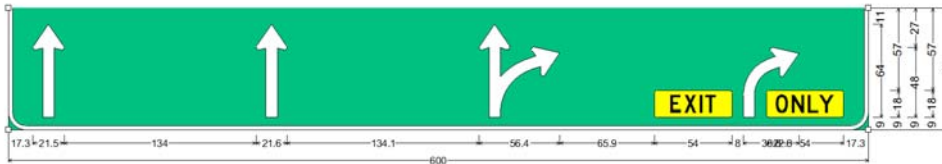
12.0" Radius, 3.0" Border, White on Green;
Standard Arrow Custom 64.0" X 21.6" 90"; Standard Arrow Custom 64.0" X 21.6" 90"; Option Arrow - 90"; Rounded Rectangle 1.5" Radius Yellow;
Right Turn Arrow - 90"; Rounded Rectangle 1.5" Radius Yellow;

## 13C:   Determine what the internal spacing should be:
1) The distance to the top of the panel
2) The distance between the route markers and the cardinal directions
3) The distance between the legends and the route markers
4) The distance between the legends and the top of the arrows
5) The distance from the bottom of the arrows to the bottom edge of the panel

Drag the top panel to attach to the bottom panel by selecting the green background and positioning the move hand over the top of the bottom panel, watching for a blinking line.  Release the mouse button to attach the panels.  If they are different widths, right click on the narrower panel and pick edit data> Size, Enlarge to fit when in multipanel:
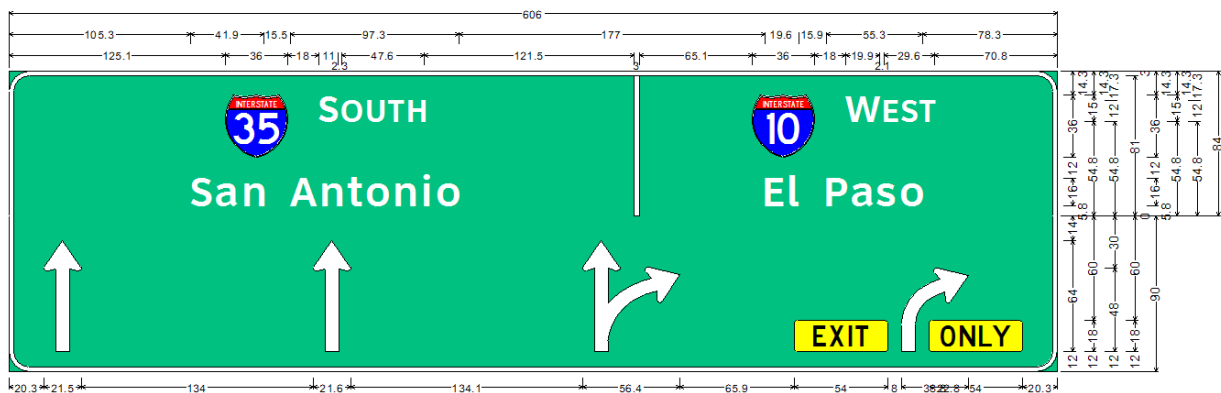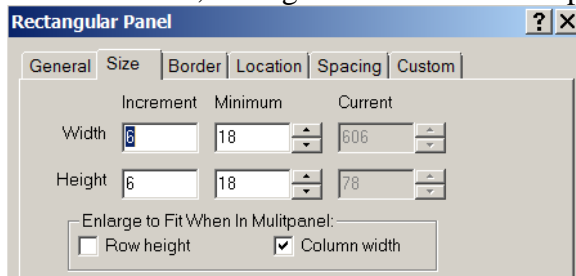




## 13D:   Determine what is controlling what:
1) The arrows are controlling the entire width of the panel
2) The bottom spacing of any one of the arrows or plaques is controlling the distance to the bottom of the panel.  (bottom spacing of 9" to 3" border results in bottom spacing = 12")
3) The top spacing of any one of the route markers or cardinal direction is controlling the

distance to the top of the panel.  Top aligning all of the objects in the top panel will set the spacing to 14.3.

4)  (3/4 of 15 = 11.25" top spacing of the W and S, add 3" border = 14.3)
5)  The default spacing above and below the legends is 3/4" of the legend height, or 12", which sets the space to the route marker and the bottom of the top panel.  Setting the bottom spacing of San Antonio and El Paso to 0 allows the panel to reduce in 6" increments that adjusts the line length to approximately the bottom of the legends, but subject to the 6" panel height increment.  Setting the line to be flush with the bottom of the legend can take place later.
6)  The widths and lateral spacing of the two columns (San Antonio and El Paso) will position the columns between the vertical line and the vertical line over the double headed arrow.
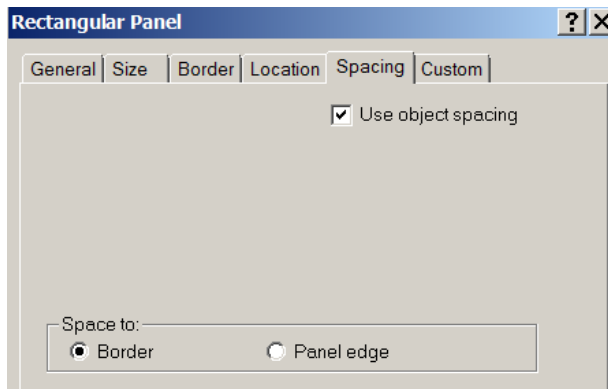


The spacing option in the Rectangular panel dialog box: Space to Border or Space to Panel Edge determines how the spacing to panel behaves.  If Panel edge is selected, then the bottom object spacing of the arrow at 9" sets the dimension to 9, and if to the border, sets it to 9+3 border width = 12".  Likewise top of cardinal direction is either 11.25 to panel edge or 11.25+3 border =14.25".

**14**     **Note:** Set the top spacing of the cardinal direction to 11", which will set the top dimension to 14" with the 3" border.  That value will also establish the vertical line to be flush with the bottoms of the legends, also because the sum of heights of route marker, legend and spacing is also exactly 78".
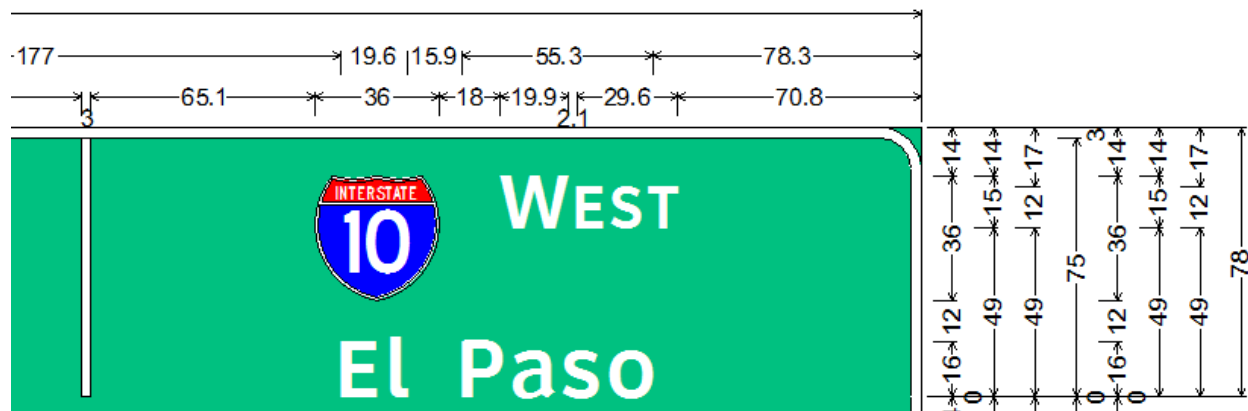


15     The top panel is 78".  The bottom panel is 90" based on the fact that the straight arrows are 64" high, the bottom dimension is 12" = 76", and the current top arrow spacing is 9" = 85", which pushes the panel height to the next 6" increment = 90", and resulting in the top spacing of 14" between the arrow and legend.

16     Changing the top spacing of the arrow from 9" to 8" drops the bottom panel height from 90 to 84" and 8" between the arrow and legend which may not be enough according to the standard spacing.

At this point the panel vertical dimensions are established.

## 17      Establishing the horizontal positions

The next step is to establish the horizontal positions of the objects in the top panel starting with where the vertical line should be positioned over the arrow.

Only two objects control the entire top of the sign, the object spacing of El Paso and the object spacing of San Antonio.  The entire arrangement floats in the top panel so changing the left and right values of the two legends will adjust the entire arrangement.

18      Find the interior values – the required distance from the legends to the vertical line first, considering that you know where the vertical line needs to be (centered above the arrow) and that you want the legends to be centered in the green area.

19      It is encourged to highlight the arrange tool and practice adjusting the left and right spacing of the legends to learn how the panel adjusts.

20      The image below shows the final object spacing of San Antonio which centers the column in the green area between the borders.

21      Since the entire arrangement floats, and adjusting one object spacing will adjust the whole arrangement, determine what the total dimension between the panel edge and vertical line is when the vertical line is centered over the arrow.

22      You can use an arbitrary line tool or rectangle tool to create a temporary ruler to find the widths of the green areas between the borders, and getting the distance to the midpoints (halfwidth) on both sides of the vertical line.

23      Subtract half the length of the two legends to determine what the right spacing of San Antonio and left spacing of El Paso need to be to center them both in the green panel.

24      That will size the entire arrangement.  Then using the arrange tool to select and move only the left spacing arrow of San Antonio and the right spacing of El Paso so that the vertical line centers over the arrow.  The vertical dashed lines will be the guidelines.

25      Your adjustments will update the positions.  Once aligned, you are done.

## 26      If you want to do the math, here is a description:

27      The total distance from the left edge of the panel to the vertical line when centered over the arrow must be 358.1, because adding up the dimensions of arrows and spacing and centerline of the arrow is 359.6, less half the width of the vertical line to 358.1, and less 3" border is 355.1, the width of the green area on the San Antonio side.

28      Divide that by 2 to get 177.55, the distance to the center of the green area.  The length of San Antonio shown below is 154.75, half of that is 77.375.  These are the centerline locations. Subtract 77.375 from 177.5 to get 100" which is the value to enter for the right spacing of San
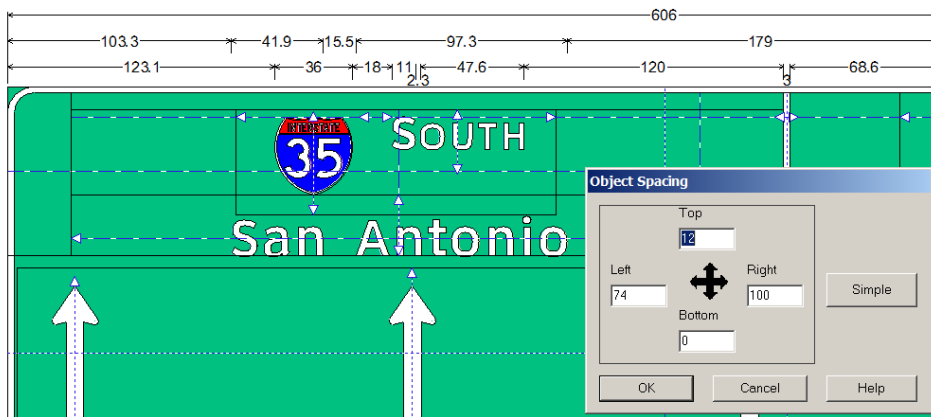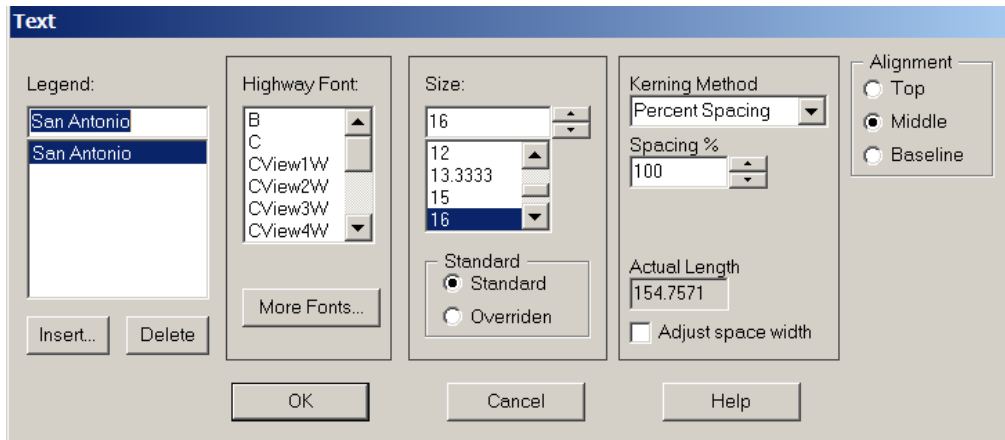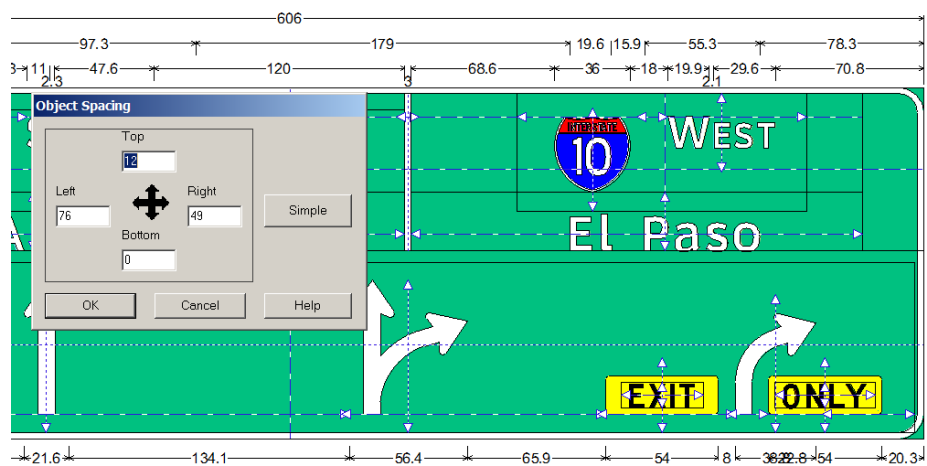
Antonio.





29      The left spacing has not been determined yet, but the final value that positions the entire arrangement will be adjusting the left spacing of San Antonio and the right spacing of El Paso to re center the line over the arrow.

30      On the right side the green area is the panel width of 606" – 358" left side = 248" right side. Subtract the border and half width of the vertical line is 243.5, and divide by 2 to find the center = 121.75

31      Divide the width of El Paso at 90.85 by to = 45.4 which is the half width.
Subtract from the half width of the green area: 121.75-45.4 = 76.3. which is the left spacing of El Paso.
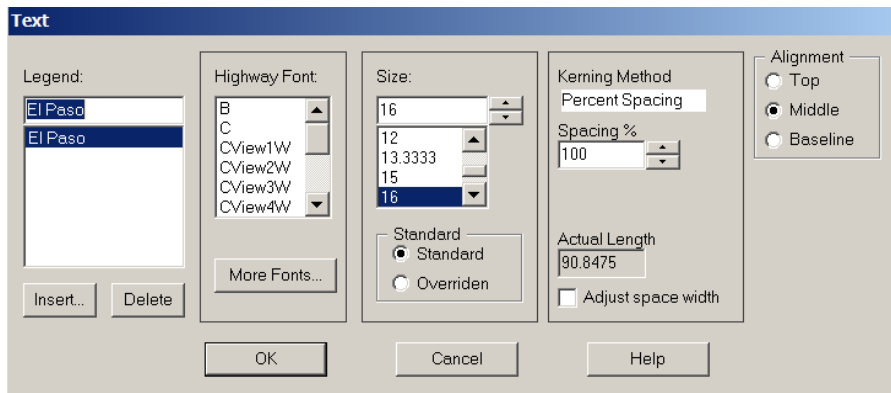
32      The image below shows the object spacing of El Paso, which centers it in the green area between the borders.



33      If the entire arrangement centers the line over the arrow, you are done.  If not, then drag the spacing triangles at the right of El Paso and lef of San Antonio until it centers.  The final values are shown in the object spacing dialog boxes for El Paso and San Antonio.


**You have successfully completed this tutorial.**