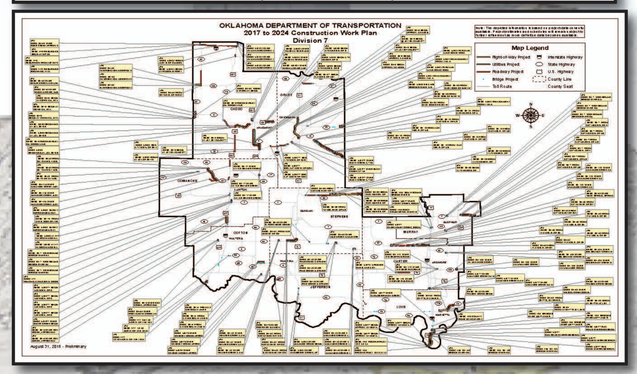
Constructing Work Plan Maps in GIS

The OKDOT 8 year Workplan Maps are created by the GIS Development branch based on Projected Plan data from our Project Management division. They are then presented to the Oklahoma Transportation Commission for approval. Upon approval they serve as a reference to the entire Department showing where future construction projects are slated to occur. The maps are generated on a yearly cycle and are subject to change throughout the year. The farther out the project is projected to be, the more likely it is to be changed at some point within the cycle. The labelling format is under strict requirements and must also pass the approval process. With some ingenuity, the use of Excel, and a few lengthy label expressions we are now able to accomplish this task rather quickly every year.

The first set of maps have a label for all projects that includes a JP# (OKDOT Internal Project Numbering System) and the first chunk of the Project Description. These maps are then marked up by Project Management and returned to GIS Development with the Project Groups labeled on the maps.



From there the project data is brought into MS Excel to be reorganized and manipulated to better create the final labels for both the Internal and External versions of the map. Each Project is placed in a Group, in order based on Project Type. The NUM_PROJ Column is used later in creating Label Classes.

USE	DESC	NUM_PRO	JP_1	JP_1_YEAR	JP_1_TYPE	JP_1_AMT	JP_2	JP_2_YEAR	JP_2_TYPE	JP_2_AMT	JP_3	JP_3_YEAR	JP_3_TYPE	JP_3_
1	I-44: BRIDGE AND APPROAI	1	###	2024	BRIDGE REHABILITATION	5,000,000								
1	SH-11: OVER ABANDONED F	1	###	2020	GRADE,DRAIN & BRIDGE	517,500								
1	I-40: INTERCHANGE AT FRIE	1	###	2020	INTERCHANGE	17,440,000								
1	SHOULDERS AND RESURFA	1	###	2024	WIDEN & RESURFACE	5,000,000								
1	SH-33; SHOULDERS AND RE	4	###	2022	WIDEN & RESURFACE	10,000,000	###	2018	RIGHT OF VAY	1,515,000	###	2018	UTILITIES	1,515,0
0	SH-33; SHOULDERS AND RE	4	###											
0	SH-33; SHOULDERS AND RE	4	###											
0	SH-33; SHOULDERS AND RE	4	###											
1	US-64, SHOULDERS AND RE	3	###	2022	GRADE,DRAINING,BRIDGE & SU	3,000,000	###	2018	RIGHT OF VAY	1,010,000	###	2018	UTILITIES	1,010,0
0	US-64, SHOULDERS AND RE	3	###											
0	US-64, SHOULDERS AND RE	3	###											
1	SH-51; SHOULDERING AND F	4	###	2023	WIDEN & RESURFACE	12,000,000	###	2023	WIDEN & RESURFACE	7,000,000	###	2018	RIGHT OF VAY	101,000
0	SH-51; SHOULDERING AND F	4	###											
0	SH-51; SHOULDERING AND F	4	###											
0	SH-51; SHOULDERING AND F	4	###											
1	I-44; DOWEL BAR RETROFIT	1	###	2022	PAVEMENT REHABILITATION	8,000,000								
1	SH-0; LINCOLN BLVD DOWEI	2	###	2020	PAVEMENT REHABILITATION	3,090,000	###	2020	PAVEMENT REHABILITATIC	2,575,000				
0	SH-0; LINCOLN BLVD DOWEI	2	###											
1	I-35; PAVEMENT REHABILIT	1	###	2017	PAVEMENT REHABILITATION	5,000,000								
1	I-40; PAVEMENT RECONSTI	3	###	2020	RECONSTRUCT-ADDED LANES	20,600,000	###	2020	BRIDGE REHABILITATION	2,060,000	###	2020	BRIDGE & APPROACH	10,300,0
0	I-40; BRIDGE RAISING AT PC	3	###											
0	I-40; BRIDGES OVER ANDEF	3	###											
1	SH-51; PAVEMENT REHABIL	1	###	2023	PAVEMENT REHABILITATION	5,000,000								
1	I-240; DIAMOND GRINDING I	1	###	2018	PAVEMENT REHABILITATION	1,545,000								
1	US-77; OVERHEIGHT WARNI	1	###	2017	SAFETY IMPROVEMENT	25,000								
1	I-44; BRIDGE REHABILITATI	1	###	2022	BRIDGE REHABILITATION	5,000,000								
1	I-44; NB AND SB BRIDGE RE	1	###	2022	BRIDGE REHABILITATION	4,000,000								
1	I-35; NB AND SB BRIDGE AN	1	###	2023	BRIDGE & APPROACHES	16,200,000								
1	SH-11; SHOULDERS AND RES	2	###	2024	RIGHT OF VAY	1,000,000	###	2024	UTILITIES	1,000,000				
0	SH-11; SHOULDERS AND RES	2	###											
1	US-69; BEGIN 5.7 MI WEST OI	1	###	2022	WIDEN & RESURFACE	1,000,000								
1	I-44; RECONSTRUCTION OF	2	###	2023	RIGHT OF VAY	1,000,000	###	2023	UTILITIES	1,000,000				
0	I-44; RECONSTRUCTION OF	2	###											

Once the data is organized, it is joined back with the Project Feature Class so that the final labels can be created. The labels needed to be a specific format and all equally sized in the format shown below.

```
                US 281:OVER AN UNNAMED CREEK
FFY 2024 BRIDGE & APPROACHES                $  5,667,200
FFY 2020 RIGHT OF WAY                       $    617,725
FFY 2020 UTILITIES                          $    926,587
                                            $  7,211,512
```

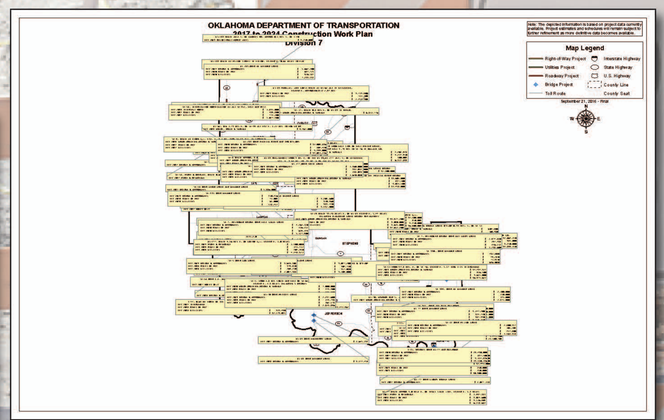
To achieve uniform label width and character alignment, two important options had to be used. First, use of a monotype font, in this case Consolas, had to be used. Second, Kerning needed to be turned off. Kerning is an option that will adjust the space between characters to adjust the total width of a line before or after dynamically splitting lines.

Due to some label size limitation in ArcGIS for Desktop, the labels could only be 80 characters wide. This means that the Project Group description would need to dynamically split and move to a second line if needed. This also means that no matter how many characters the Project Type and Project Amount was, each Project line would need to be exactly 80 characters. This required the use of the .rfind(), ljust(), rjust() functions and some string, character list manipulation.

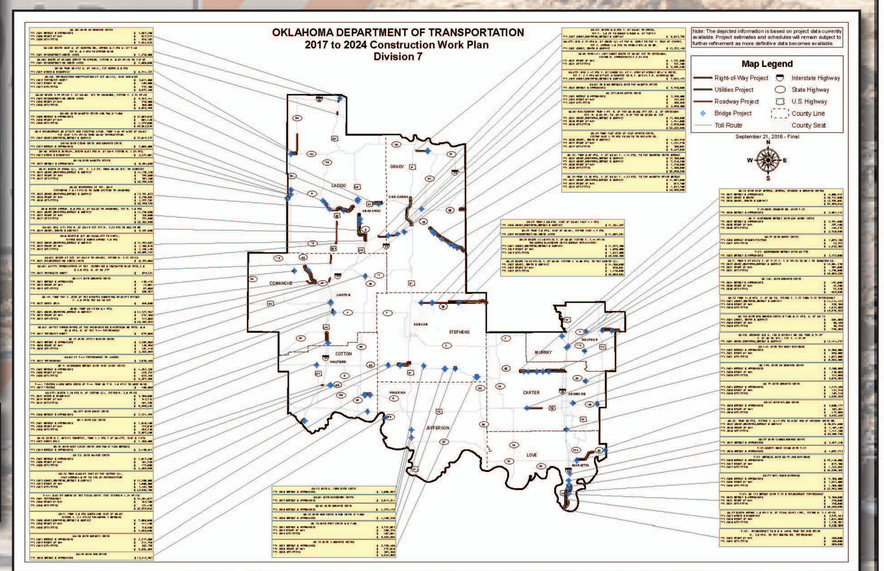
Label Groups were needed to seperate Project Groups that had differing number of Projects in them. The NUM_PROJ Column in the reorganized data was used in Label Class SQL queries to seperate the Groups. For instance, Groups with only 1 Project would be in the "1 Project" Class or Groups with 2 Projects would be in the "2 Project" Class.

The following Python Code Snippet was used in each class to dynamically create the labels for each class. This would result in the correct format and spacing needed for the labels.

```
def FindLabel ( [Grouping_Table$.DESC], [Grouping_Table$.JP_1], [Grouping_Table$.JP_1_YEAR], [Grouping_Table$.JP_1_TYPE], [Grouping_Table$.JP_1_AMT],
[Grouping_Table$.JP_2], [Grouping_Table$.JP_2_YEAR], [Grouping_Table$.JP_2_TYPE], [Grouping_Table$.JP_2_AMT], [Grouping_Table$.AMT_TXT] ):

  #Add the project description to a variable
  groupDesc = [Grouping_Table$.DESC]

  #Format the first project line so that it reads - JP# (JP Number] FFY [Year] [Project Type]
  jobLine1 = "JP# " + str([Grouping_Table$.JP_1]) + " FFY " + str([Grouping_Table$.JP_1_YEAR]) + " " + [Grouping_Table$.JP_1_TYPE]
  #Left justify the project line and pad with spaces at the end so the line is initially 68 characters long
  jobLine1 = jobLine1.ljust(68)
  #Right justify the dollar amount and pad with spaces at beginning so the amount is 11 characters long
  jobLine1Amt = [Grouping_Table$.JP_1_AMT].rjust(11)

  #Format the seccond project line so that it reads - JP# (JP Number] FFY [Year] [Project Type]
  jobLine2 = "JP# " + str([Grouping_Table$.JP_2]) + " FFY " + str([Grouping_Table$.JP_2_YEAR]) + " " + [Grouping_Table$.JP_2_TYPE]
  #Left justify the project line and pad with spaces at the end so the line is initially 68 characters long
  jobLine2 = jobLine2.ljust(68)
  #Right justify the dollar amount and pad with spaces at beginning so the amount is 11 characters long
  jobLine2Amt = [Grouping_Table$.JP_2_AMT].rjust(11)

  #*** If the largest group has more than 2 projects, repeat above code block for number of projects ***

  #Right justify the group total amount and pad with spaces so the amount is 11 characters long. Add a dollar sign the the front and then add to a variable
  groupTotal = "$" + [Grouping_Table$.AMT_TXT].rjust(11)
  #Right justify the groupTotal variable and pad with spaces so the entire line is 80 characters long
  groupTotal = groupTotal.rjust(80)

  #If the group description is longer than 80 characters, enter if statement
  if len(groupDesc) > 80:
    #First, find the first space character going backward from the 70th character and split the line
    splitChar = groupDesc.rfind(" ",0,70)
    #Add each half of the split line to separate variables
    groupDescL1 = groupDesc[:splitChar]
    groupDescL2 = groupDesc[splitChar + 1:]
    #Add a new line character between the two variables and put them back together
    groupDesc = groupDescL1 + '\n' + groupDescL2

  #Return everything to the label maker so the group description is on top, followed by project lines, and then the total
  return groupDesc + "\n" + jobLine1 + "$" + jobLine1Amt + "\n" + jobLine2 + "$" + jobLine2Amt + "\n" + groupTotal
```



Once the labels are generated, they are converted to Annotation Feature Classes. This allows them to be freely moved around the border of the map and the leader lines could be manipulated as needed. This also allowed for the Group Total Amount figure to be bolded and for the JP#s to be removed from the External version of the map. These maps are originally made at 36" x 24" Plan Sheet size to easily be reviewed. Then they were scaled down in Adobe Acrobat to 11" x 17" for informational packets.



The Final Product is available online:
https://www.ok.gov/odot/Programs_and_Projects/8_Year_Construction_Work_Plan/