# Chapter 6. A first parametric SPF

## Build a curve-fitting spreadsheet

The curve fitting spreadsheet in Section 6.3 of the book uses Segment Length as the only variable and obtains parameter estimates by minimizing the sum of squared differences between observed and fitted values. The task here is threefold:

1. Build a C-F spreadsheet with Segment Length and AADT as predictor variables using the model equation ;
2. Estimate parameters once by minimizing the sum of squared differences between observed and fitted values and once by minimizing the sum of absolute differences.
3. Note that whatever the objective function the sum of fitted and observed values will not be the same. Add a constraint to ensure equality and re-estimate the parameters.

The data are in the ‘Problem 1. Colorado condensed.xls’ file a part of which is shown in Figure 1.

Figure 1.tif

Figure

## Estimating the σ{μ}

The model equation used problem 1 is the right-hand-side of the equation on the left side of which is the estimate of E{μ}-the ‘fitted value’. To illustrate, consider an imagined population of Colorado rural two-lane road segments which are all 1.89 miles long and all have an AADT=2058.4 vpd. When, as in problem 1, the parameters of the model equation are β0=5.08×10-4, β1=1.143 and β2=1.046, then the estimate of the expected number of Injury and Fatal accidents in 1994-1998 is 3.09. This is the estimate of E{μ} which is the average of the diverse μ’s of the road segments in this (imagined) population. But the estimate of E{μ} is only one of the elements needed in the applications discussed in Chapter 1; the other the estimate of σ{μ}.

The task here is to obtain an estimate of the V{μ} (=σ2{μ}) for the imagined population of Colorado rural two-lane road segments which are all 1.89 miles long and all have an AADT=2058.4 vpd. To answer follow the guidance in Section 6.5 and use the SD’s and fitted values obtained by minimizing the sum of absolute differences (SAD). These are in the ‘Problem 2. SD and Fitted Values.xls’ file.