HIGHWAY SAFETY AND ECONOMIC ANALYSIS

Dear Consultant:

Traffic safety can be an emotional issue. Identifying hazardous locations and deciding where to apply limited funds must withstand the scrutiny of concerned citizens. In this HW, you will be asked to implement certain elements of the Highway Safety Improvement Program framework (FTE Figure 6.4). Please complete the exercises below completely and clearly. You may work in a group of CE361 students not to exceed two in size. The signatures of both students must appear on the top page. Remember to label each problem with its "name".

1. **Crash rates.** A 1.12-mile segment of County Road 900N had 9 crashes last year. The ADT on that segment is 502 veh/day.
   A. (10 points) What was the crash rate for that segment of CR900N last year?
   B. (20 points) Use Critical Rate Analysis to decide whether that segment of CR900N is dangerous enough to be considered for some safety improvements. A table with last year's crash data for eight similar roadway segments is provided below. Show your calculations.

Cou Hwy	Length (mi)	ADT	Crashes
850E	0.57	1664	4
800N	0.80	652	4
300E	0.77	936	2
450E	0.66	2496	13
Division Rd	0.36	890	3
550S	0.45	778	9
050S	0.70	693	5
900S	0.97	1809	7

2. **Economic analysis.** As a result of the critical rate analysis described above, CR550S was identified as a road needing some improvements. It was determined that, by removing trees and vegetation from the roadside, the crash rate on CR550S could be reduced by 30 percent.
   A. (10 points) If no significant increase in ADT is expected on CR550S, how many crashes will be prevented each year by removing trees and vegetation from the roadside?
   B. (20 points) Over the past ten years, 13 percent of the crashes on CR550S have been personal injury crashes; the others have been PDO crashes. Using the same monetary benefit values as in FTE Table 6.4 and an interest rate of 5.85 percent over the next 10 years, what is the ~~Net~~ Present Value of the safety improvements on CR550S?
   C. (20 points) The initial costs of the improvements will be $58,400. In year 1, the costs to trim back vegetation will be $5900, but this cost will decrease by $350 each year thereafter, until year 10. Calculate the ~~Net~~ Present Value of these costs.
   D. (10 points) Because the proposal to remove vegetation will be compared with alternatives having other expected durations, calculate the EUAB and EUAC for this alternative over a 10-year project life.
   E. (10 points) What is the benefit-cost ratio for this alternative? Show your calculations.