CE 466 / 566 Highway Geometric Design
Homework 1
Due by 5 pm (hard copy) or by midnight (electronic) on Tuesday, January 27, 2009

Problem 1

Based on the highways you are familiar with in Tucson, answer the following questions. The word "facility" in this question means either (1) a highway segment (intersection-to-intersection or interchange-to-interchange) or (2) a specific intersection or interchange.

(a) Identify a facility in Tucson / Pima County that you believe is well designed. Describe the physical characteristics of the facility that make it well designed, in your opinion. Also, comment on the aesthetic features of the facility. A written description of one-half to one page is expected.

(b) Identify a facility in Tucson / Pima County that you believe is poorly designed. Describe the physical characteristics of the facility that make it poorly designed, in your opinion. Again, comment on the aesthetic features of the facility. A written description of one-half to one page is expected.

Problem 2

This problem is intended to help you get re-acquainted with MicroStation or AutoCAD. It also serves as a brief refresher of some geometric design concepts. Answers to this problem should be submitted electronically (by e-mail) to the instructor (i.e., as a dwg or dgn file). No hard copy needs to be submitted.

(a) A sag vertical curve with a length of 520 ft connects two tangent segments. The first tangent has a grade of –2.4% and connects to a second tangent with a grade of +1.7%. The point of intersection (PVI) of the two tangents occurs at station 14+60, at an elevation of 168.0 ft. Using MicroStation or AutoCAD, sketch a profile view of this crest curve. Include a 300-ft tangent segment before the point of vertical curvature (PVC) and a 300-ft tangent segment after the point of vertical tangent (PVT). Also, show the point of vertical intersection (PVI) of the two tangents. Clearly indicate the PVC, PVI, and PVT in your drawing, and include their stations and elevations. Finally, indicate the location (station and elevation) of the low point of the curve.

(b) A circular curve with a radius of 1600 ft to the centerline and an angle of deflection (central angle) of 64° connects two tangent segments of a four-lane undivided highway. The roadway has 13-ft lanes. Using MicroStation or AutoCAD, sketch a plan view of this circular curve. Again, include a 300-ft tangent segment before the point of curvature (PC), a 300-ft tangent segment after the point of tangent (PT), and show the location of the point of intersection (PI) of the two tangents. Clearly indicate the PC, PT and PI in your drawing, and include dimensioning of the length of the tangent segments, the length of the tangent (T) connecting the PC to the PI, the circular curve radius, and the angle of deflection.