

**CE 466 / 566 Highway Geometric Design**  
**Homework 7**

Due Wednesday, May 6, 2009

We will again be working with the roadway design on the extension of Sabino Canyon Road to Kolb Road (connecting the intersection of Tanque Verde and Sabino Canyon with Kolb). You may wish to start with your submission from Homework 5, or you can start over using the same surface and existing alignments of adjacent roadways on the web site. For the 20 points available in this assignment, you must:

1. If necessary, re-design your proposed alignment in view of your critical review in Homework 6.
2. Create a set of cross-sections and estimate earthwork volumes.

Separate tutorials for this part of the assignment are included on the course web site. You should use a 4-lane cross-section (with or without a median, as you think is best).

- (a) With your alignment, apply your proposed 4-lane cross-section at 50-ft intervals along the roadway. Use your cut/fill tables to apply the cross-section.
- (b) Generate a plan and a profile view, with horizontal and vertical annotation.
- (c) Generate a set of cross-sections at least every station (100 ft).
- (d) Calculate the earthwork requirements two ways:
  - (1) Use the end-area method. With this approach, generate a mass haul diagram for your project.
  - (2) Use the surface method, and compare the volume with the end-area method. A mass haul diagram may be useful here as well.

Your solution should consist of a DGN or DWG file that includes the plan view, a profile view, the cross-sections, and a mass haul diagram. You should also include a short write-up that includes the volume calculations from part (d), and any comments you care to make about the alignment, cross-sections, and/or earthwork results.

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For up to an additional 15 “bonus” homework points (on top of the 20 points above), you may also complete the following.

Complete a preliminary design of the intersection of the Sabino Canyon extension and Kolb. You should generate a plan view of the new intersection (e.g., a top-down view). This can be done directly in MicroStation (no InRoads necessary) or AutoCAD. In your design, begin 500 feet from the intersection on each approach. You should lay out the through lanes, turning lanes (length, tapers, etc.), crosswalks, bike lane treatments, any channelization and islands, and the curb locations (assume curbs are used).

***In addition to your CAD file***, you should include a 1- to 2-page write-up describing your design, indicating the design choices you made and why you made them. You should also explain your traffic control concept for this intersection.

Of course, you should use City of Tucson intersection design guidelines. These can be found in the City’s Street Development Manual (See Homework 5). Additional intersection design guidance, particularly for pavement markings, can be found from the Pima County Traffic Engineering site, at <http://www.dot.co.pima.az.us/trafeng/>.