Chapter 7

• Designing Vertically Using Profiles
  – Topics
    • Creating surface profiles
    • Displaying profiles in profile views
    • Creating design profiles
    • Editing profiles
    • Using design check sets and design criteria files
Creating Surface Profiles

• Before designing a profile, you need to see what the existing profile looks like.
• You can “slice through” a surface to create a surface profile.
• Surface profiles are dynamically linked to the surface and alignment.
  • If the alignment changes – the profile will change automatically
  • If the surface changes – the profile will change automatically.
Profile Views

- Profiles cannot exist on their own; they must be displayed within a profile view.
- The profile view provides the grid backdrop and annotation for the profile(s).
- Profile views have their own styles; in fact, they’re one of the most sophisticated types styles.
Design Profiles

• Design profiles “smooth out” the existing ground to create a safe and comfortable riding experience.

• They consist of tangents and vertical curves.

• Profile curve geometry is different; it can be circular, parabolic, or asymmetric.

• Similar to alignments, there is a special toolbar for layout.
Profile Terminology

**Profile Terminology**

Familiarizing yourself with the following terms will be helpful as you work with design profiles:

- **Tangent** The straight-line portions of a profile.
- **PVI** Point of vertical intersection; the location where two tangents intersect.
- **PVC**: Point of vertical curvature; in other words, the beginning of a vertical curve.
- **PVT** Point of vertical tangency; in other words, the end of a vertical curve.
- **Parabolic curve** A vertical curve that does not have a constant radius and follows the shape of a parabola.
- **Circular curve** A vertical curve that has a constant radius.
- **Asymmetric** A vertical curve that is created from two back-to-back parabolic curves.
- **Crest curve** A vertical curve at the top of a hill where the grade leading into the curve is greater than the grade leading out. The PVI is located above the curve.
- **Sag curve** A vertical curve at the bottom of a valley where the grade leading into the curve is less than the grade leading out. The PVI is located below the curve.
Editing Profiles: Grips

- PVI

- Tangent slope

- Tangent midpoint
Editing Profiles: Grips

- Curve Pass-thru point

- Curve start/end point
Editing Profiles

• Profiles can also be edited using the Profile Layout Tools.

• This is the same set of tools used to create the profile.
Editing Profiles

• Profiles can be edited numerically using Profile Grid View, which opens Panorama.

• They can also be edited by using the Profile Layout Parameters command.

• It is good practice to round off values for PVI stations, elevations, and curve lengths.
  • This makes your design easier to construct and less prone to errors.
Exercises

7.6: Edit a Profile Using Profile Grid View  
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7.7: Edit a Profile Using Component-Level Editing  
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Design Check Sets

• Like alignments, profiles can be assigned a design check set to keep tabs on design parameters.

• Warning symbols appear where there are violations.

• The design is not modified; that is up to you.
Design Criteria Files

• Like alignments, a design criteria file can also be assigned to a profile.
• Design criteria files are more sophisticated and check more things.
• But just like design check sets, warning symbols appear where there are violations.

• The design is not modified; that is up to you.
Now You Know…

• How to create surface profiles
• How to design a new profile
• How to edit profiles graphically, numerically, and using editing tools
• How to check your design using design check sets and design criteria files
The Essentials and Beyond

• Now that you’ve learned how to create surface profiles, display profiles in profile views, create design profiles, edit profiles, and apply design checks, use what you’ve learned to design the profile for Madison Lane.