Chapter 12: Introducing Decision Tables

Chapter Overview
This chapter addresses the following major topics:

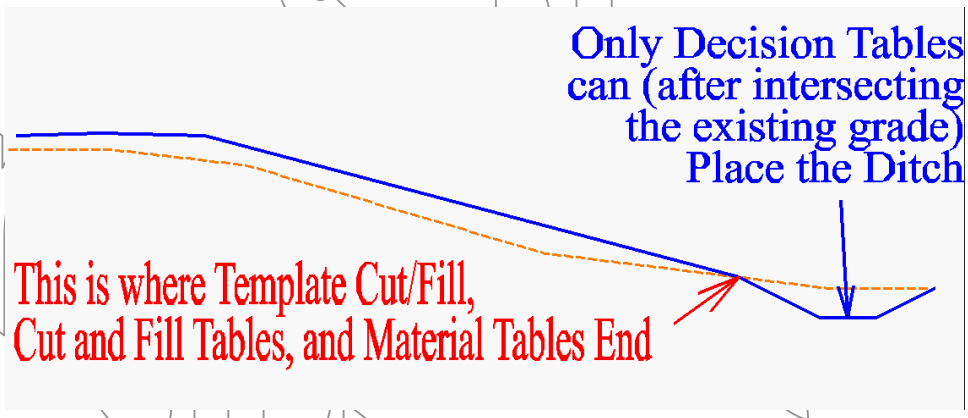
- Reducing the Engineering
- How Decision Tables Work
  - Controls
  - Logic
- Building Decision Tables

Section 1 - Overview

The "Holy Grail" for Roadway Modeling is to correctly and accurately model 200 miles of a roadway through all sorts of wild terrain with the push of a button. The Template, Cut-and-Fill Table, and Material Table methods do not really provide this level of capability. Decision Tables do.

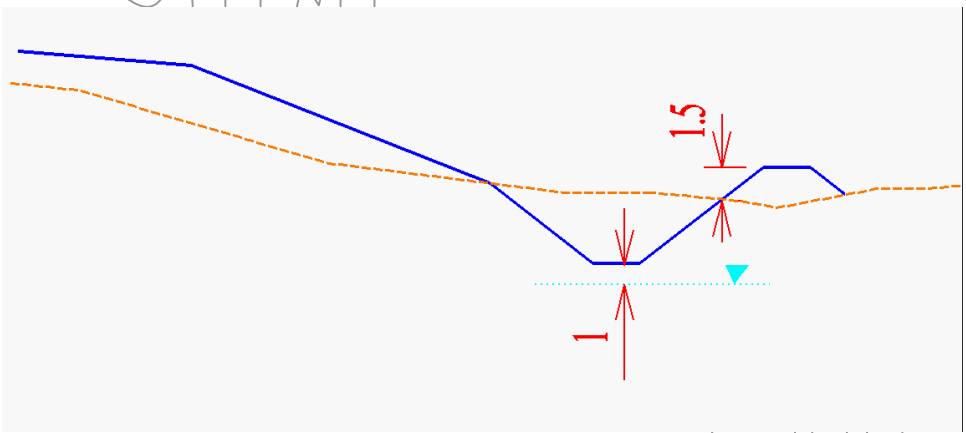
Decision tables are designed to handle the wide variety of side slope treatments found in roadway design. Depending on the relationship between the roadway and the existing ground, there tends to be a finite number of discrete specifications as to how to tie into the ground. As the name implies, Decision Tables has the capability to "make decisions" on the proper way to tie in. Decision tables were also designed to surmount the limitations inherent in the other Catch Point methodologies.

Template Cut/Fill, Cut and Fill Tables, and Material Tables all stop once they find a solution with the designated Target Surface. Decision Tables can "Seek" additional "targets" after intercepting the "target surface."



Decision Tables can seek more than one target surface and can adjust the elevation of the intercept point. The screenshot to the right shows the Decision Table:

- hitting the existing surface,
- changing slope ,
- hitting a water table surface,
- "backing up" a foot vertically,
- hitting the existing surface again,
- adding 18" vertically

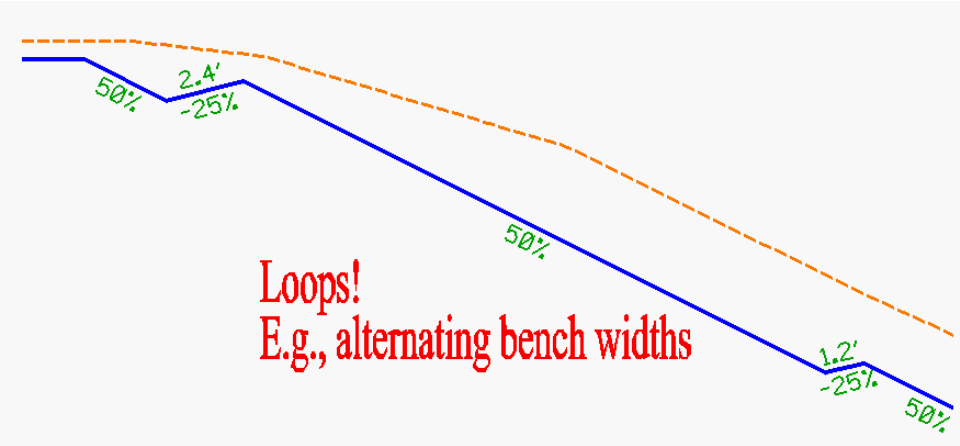


and finally tying back
into the existing surface.

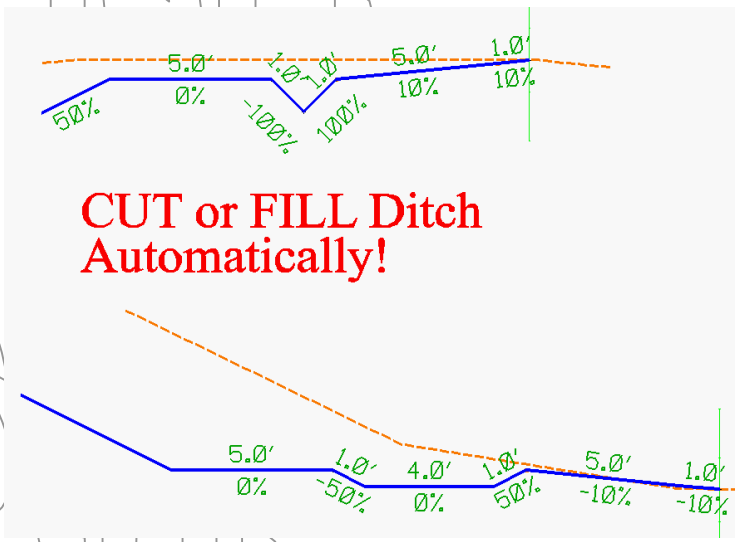
This cannot be done with the other methods.

Decision tables "targets" can be surfaces, features, known elevations, and horizontal and vertical alignments.

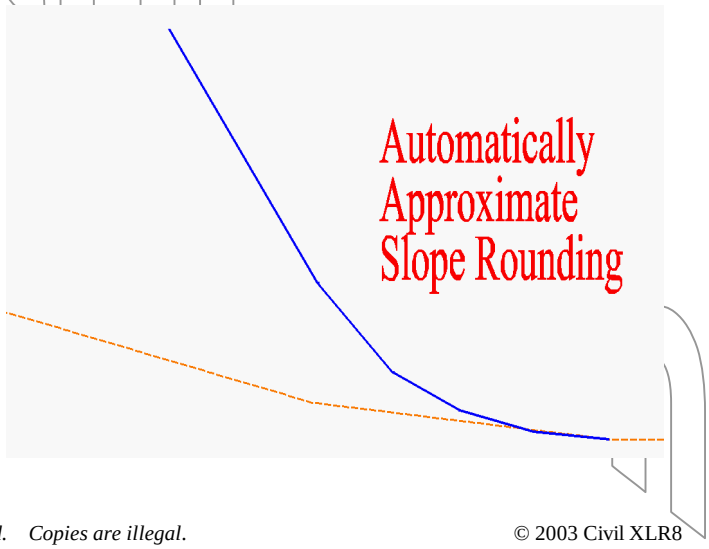
Decision Tables provide the ability to provide the ability to "loop" a series of requirements. The screenshot to the right shows an loop containing two different "bench widths."



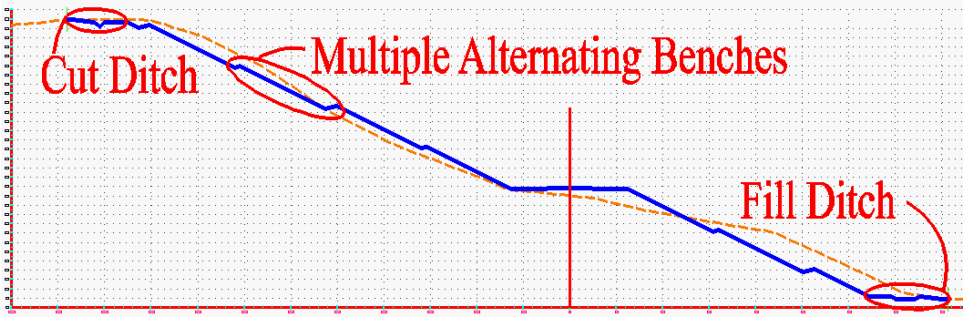
If objects are specified differently for cut and fill, Decision Tables can place appropriate versions automatically.



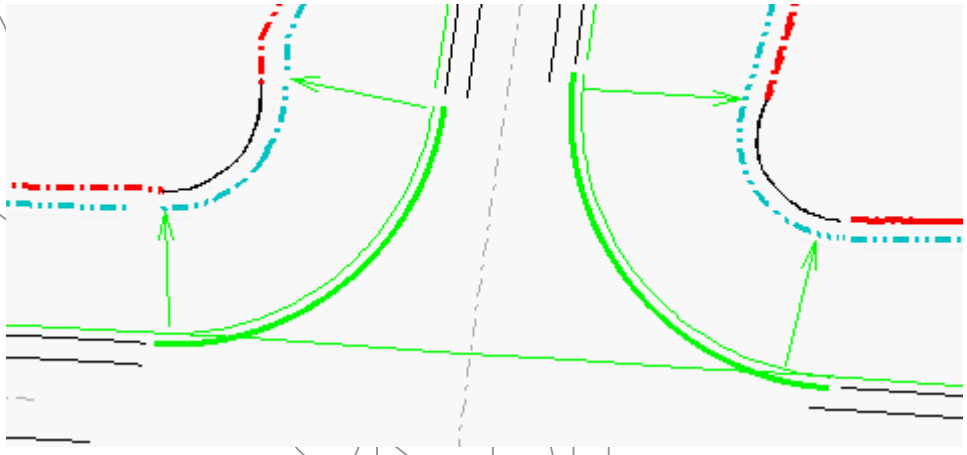
Do you need to show slope rounding on cross sections? InRoads can make slope rounding part of the DTM itself, not just cross section display.



InRoads can do all this things all at once or not at all, as appropriate for the conditions at the template drop.



Decision Tables can be run along any graphic. The screenshot to the right shows a Decision Table run off a curb return Generated using the Fillet Feature command.

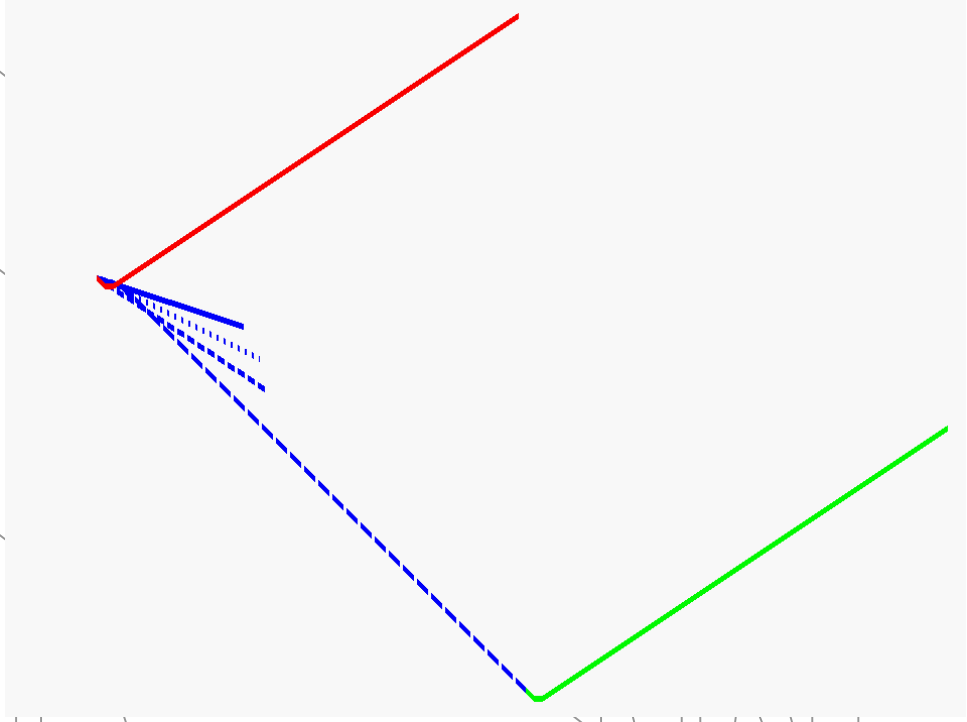


A general rule for Decision Tables is that if you can describe the solution discretely (meaning with definite steps in a definite priority) Decision Tables can do it.

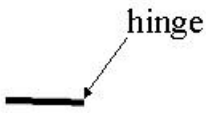
Section 2 - Reducing the Engineering

Vague specifications seldom work in engineering, they work less often in InRoads. If you are vague on the engineering criteria, you are not ready to start defining Decision Tables. The first step in defining Decision Tables is "Reducing the Engineering." This is "reducing" in the Cartesian sense: breaking it down into its smallest components. Only when we break the engineering down into its most discrete steps are we ready to think about Decision tables. Bentley recommends drawing your solutions on paper to help break it down.

The diagram to the right may represent an agencies side slope treatment requirements. Let's break this down into discrete steps.

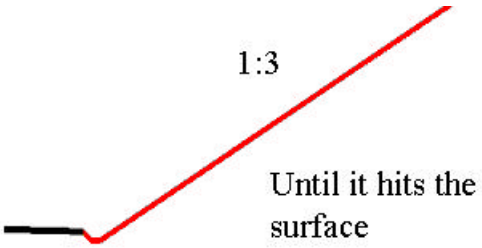


The decision table starts at the outside of the backbone.

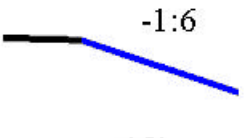


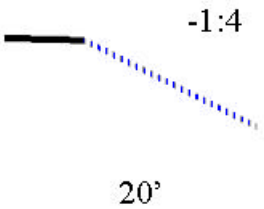
We will start defining the cut condition.

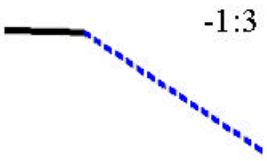
For cut, start with a cut ditch



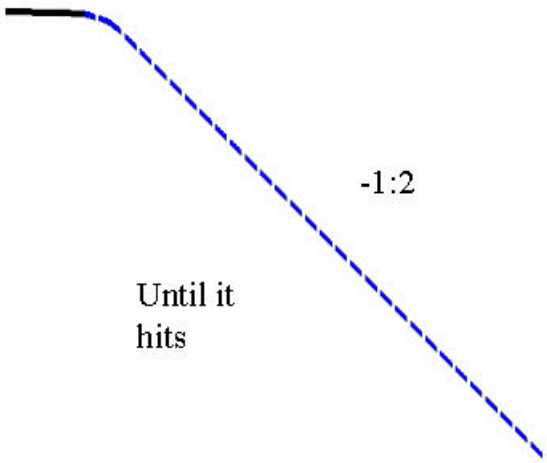
Then we will define the Fill condition. Our fill slope criteria tries tying into the existing surface at ever increasing slopes.

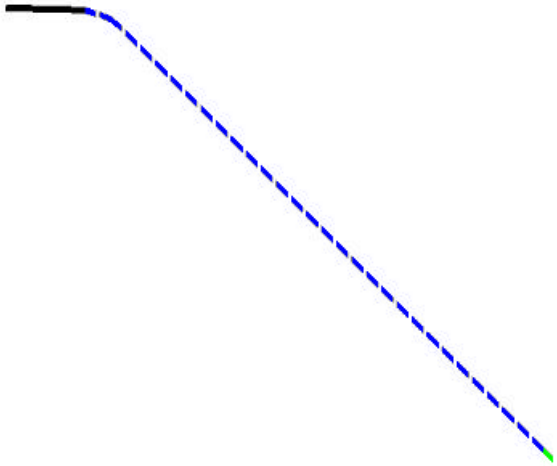


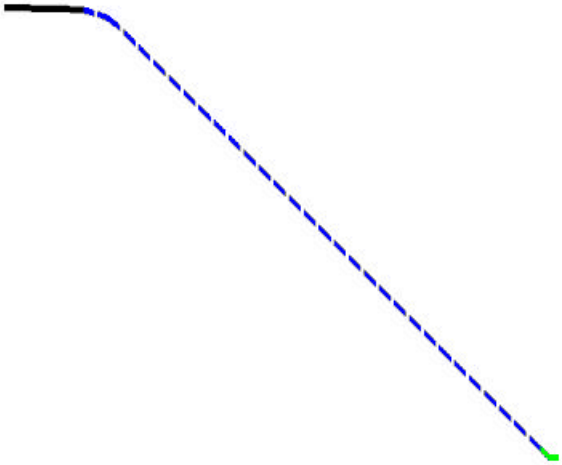


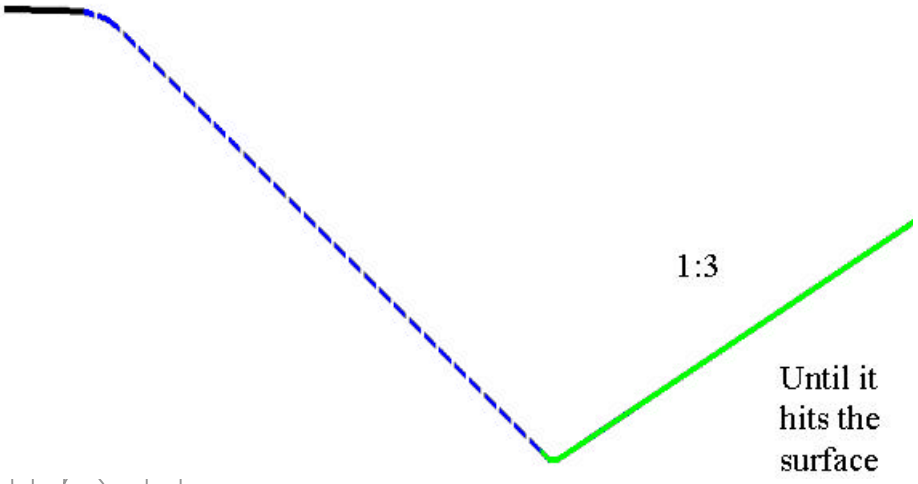


If the surface is not found at a –1:3 slope up to a width of 21 feet, we will put in a guardrail shoulder and then tie in at a –1:2 slope









The above represents the individual steps in defining the side slope treatment. The steps can be grouped into functional blocks as follows:

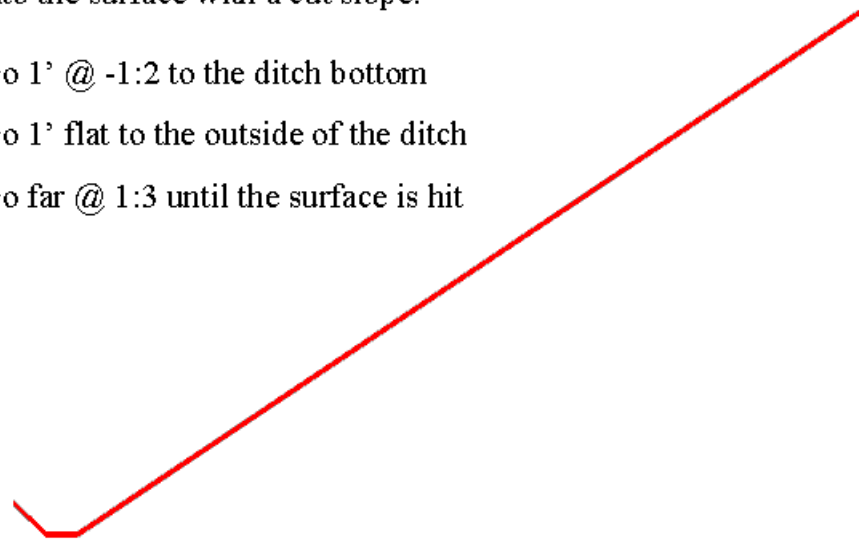
Cut Block

If the hinge is in cut, then start with a cut ditch and then tie into the surface with a cut slope:

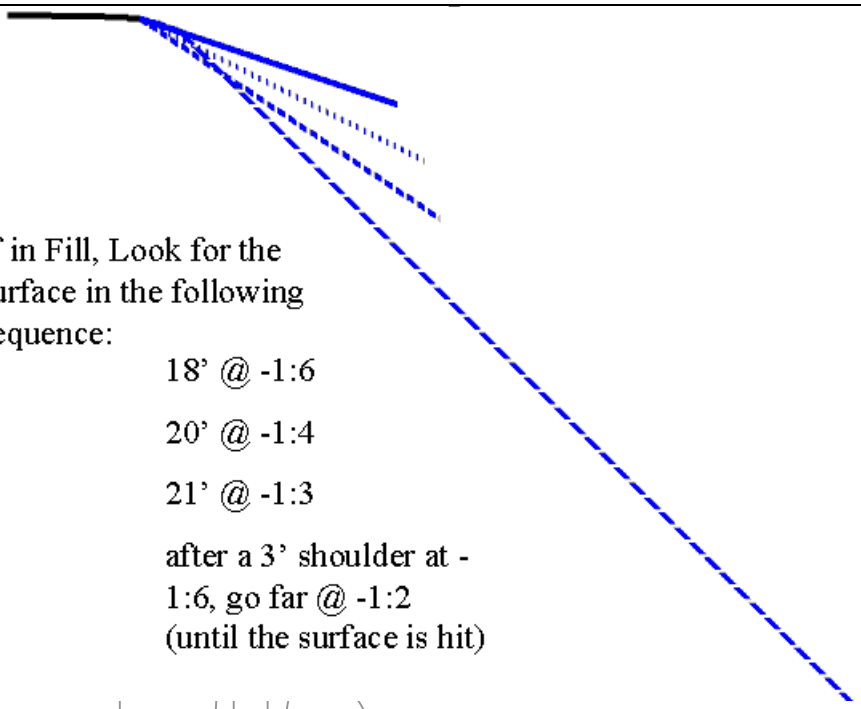
Go 1' @ -1:2 to the ditch bottom

Go 1' flat to the outside of the ditch

Go far @ 1:3 until the surface is hit



Fill Block



If in Fill, Look for the surface in the following sequence:

18' @ -1:6

20' @ -1:4

21' @ -1:3

after a 3' shoulder at -1:6, go far @ -1:2 (until the surface is hit)

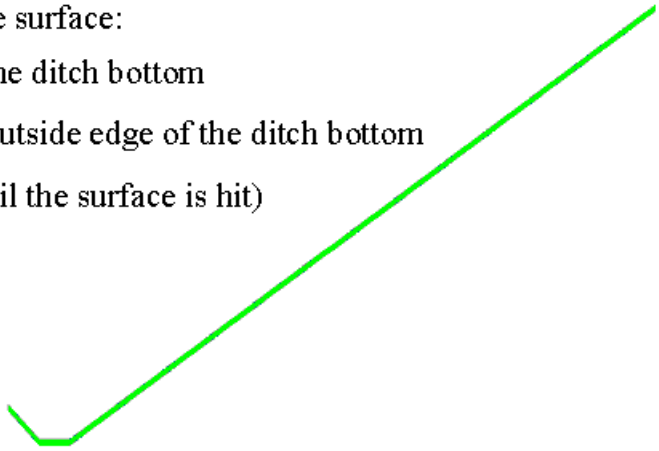
Fill Ditch Block

After finding the surface (in fill) add a fill ditch and tie back into the surface:

Go 1' @ -1:2 to the ditch bottom

Go 1' flat to the outside edge of the ditch bottom

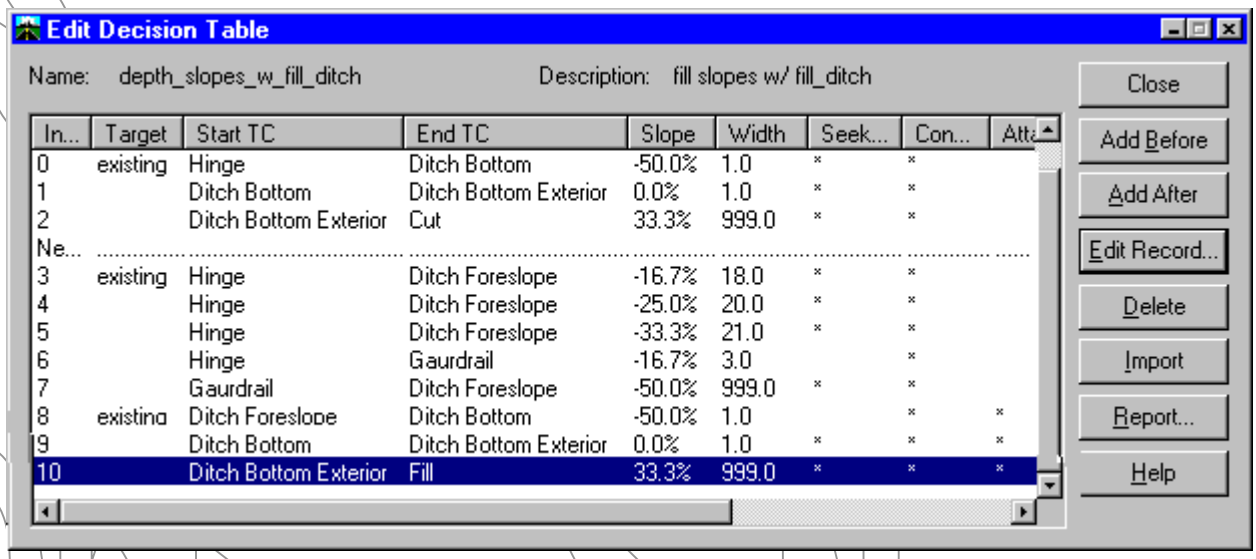
Go far @ 1:3 (until the surface is hit)



"Reduced" to this discrete logic, our engineering translates to decision tables relatively directly.

Section 3 - How Decision Tables Work

The engineering solution described above is shown as the decision table below. Each record in the decision table represents a discrete step in the engineering solution. Decision Tables process the Records in the Table sequentially. "Decisions" are made when a record "Seeking" a target succeeds or fails. We will discuss the logic structure in a moment.



In...	Target	Start TC	End TC	Slope	Width	Seek...	Con...	Att
0	existing	Hinge	Ditch Bottom	-50.0%	1.0	*	*	
1		Ditch Bottom	Ditch Bottom Exterior	0.0%	1.0	*	*	
2		Ditch Bottom Exterior	Cut	33.3%	999.0	*	*	
Ne...								
3	existing	Hinge	Ditch Foreslope	-16.7%	18.0	*	*	
4		Hinge	Ditch Foreslope	-25.0%	20.0	*	*	
5		Hinge	Ditch Foreslope	-33.3%	21.0	*	*	
6		Hinge	Gaurdrail	-16.7%	3.0		*	
7		Gaurdrail	Ditch Foreslope	-50.0%	999.0	*	*	
8	existing	Ditch Foreslope	Ditch Bottom	-50.0%	1.0		*	*
9		Ditch Bottom	Ditch Bottom Exterior	0.0%	1.0	*	*	*
10		Ditch Bottom Exterior	Fill	33.3%	999.0	*	*	*

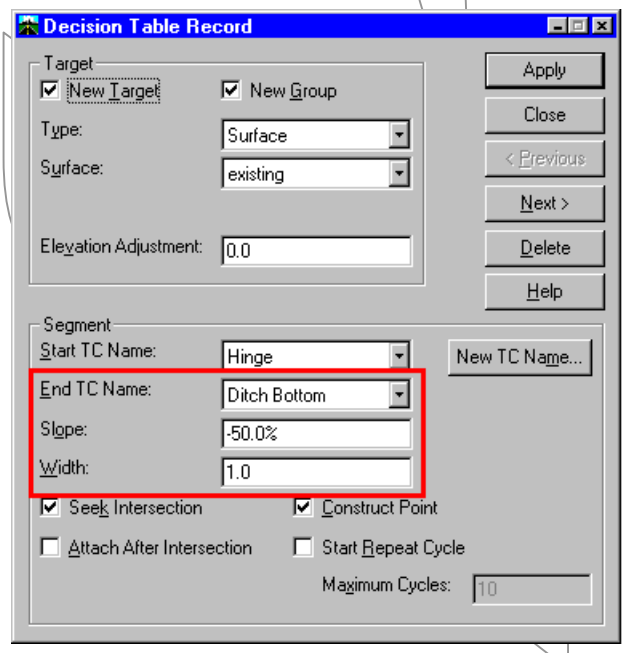
Records can be added to the Decision Table by using the Add Before and Add After buttons. Double-clicking on a row (or selecting a row and hitting the Edit button) will invoke the Decision Table Record form, which is shown on the following pages.

Decision Tables essentially provide a "programming language" without having to write code. The combination of sequence, controls, and a strict logical structure provides a very robust solution.

Decision Table Record Controls

There are a number of controls in the Decision Table Record form. Three should be very familiar:

- Slope
- Width
- What it is (End TC Name).



These are the primary bits of information required in Templates.

Decision Tables require an additional Field to define the segment: Start TC Name. Why? Templates do not make decisions: the Start TC of one segment is the End TC of the previous. Decision table segments can start from a segment prior to the previous segment.