ROAD ALIGNMENT OPTIMIZATION

You set the standards and parameters
Softree Optimal will find the lowest cost solution.
EVERY TIME.

Softree Optimal
Consistently **Better** Design

SAVE TIME AND MONEY

Softree Optimal minimizes road and corridor earthwork costs. It saves engineering time and construction expenses. Using sophisticated mathematics, it solves the complex 3D problem of minimizing excavation, embankment and haulage while meeting design constraints and standards.

AUTOMATED CORRIDOR DESIGN

Softree Optimal allows engineers to generate the optimal vertical alignment based on a given horizontal alignment and various design constraints.

Softree Optimal is fully-user controllable. All constraints are entered and managed by the engineer using the program. Curvature, grading, and a variety of other constraints are available to handle drainage, special fill conditions and existing utilities. The material movement costs used to calculate an optimal lowest cost are also defined by the user.

REDUCED DESIGN TIME

The iterative process involved in balancing a road by hand is very time-consuming. Softree Optimal mathematically optimizes this process and achieves a truly optimal solution, often in a matter of minutes.

Reduced design time ultimately means reduced design cost, but it also means engineers can spend more time adding value to other aspects of their designs, such as safety and environmental impact, just to name a few.

Quicker design also means engineers can more effectively interact with clients and stakeholders, updating designs quickly based on feedback and providing detailed costing.

Let the math do the work for you

CONSISTENCY

Because Softree Optimal delivers a truly optimal solution every time, it can be used to compare multiple designs quickly in a quantitative manner.

Small changes in vertical alignment can produce huge differences in cut/fill quantities and material moved. With Softree Optimal, a variety of designs can be produced quickly for comparison by changing the horizontal alignment or by manipulating design constraints.

Softree

ADVANTAGE OVER MANUAL DESIGN METHODS

Three-dimensional alignment design is a complicated geometric problem. In addition to design standards such as design speed and maximum grade, engineers must contend with a variety of conditions and restrictions such as right of way, utilities and crossing grades. These constraints make finding the best alignment very challenging.

Manual Design Is Approximate

The current procedure for determining the vertical alignment is largely based on trial and error. The alignment is iteratively adjusted while the engineer looks for the lowest cost solution meeting the design criteria. This iterative process continues until the designer is satisfied. The problem is, this solution is approximate. As shown below, small changes in the alignment result in significant cost differences.

Small vertical alignment changes can result in huge cost differences

Manual Design Simplifies or Overlooks Material Movement

Movement of material is a significant expense in road construction. In manual design it is common to categorize materials into movement classes (Freehaul, Haul and Overhaul etc.) and minimize movement using a mass haul diagram. This procedure is largely qualitative and does not accurately account for individual material movements.

While finding the best solution, *Softree Optimal* considers the most efficient material movement in each of these categories based on hauling and loading costs. It also considers the movement of material downhill and location and cost of waste pits. Consideration for all these factors using conventional design methods is very difficult. As a result material movement is approximated or even overlooked.
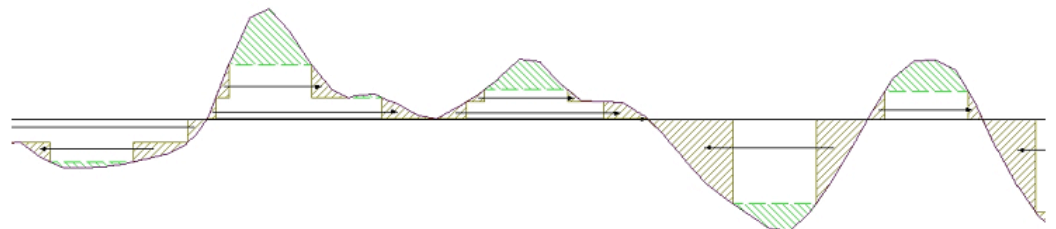
OPTIMAL $256K

CONVENTIONAL $304K

Calculate optimal haulage while you design

Material Movement

Minimum movement quantities and distance of all materials classes (Freehaul, Overhaul etc.)

⬦ Freehaul

⬦ Overhaul

Softree Optimal

1
DESIGN TIME COSTING
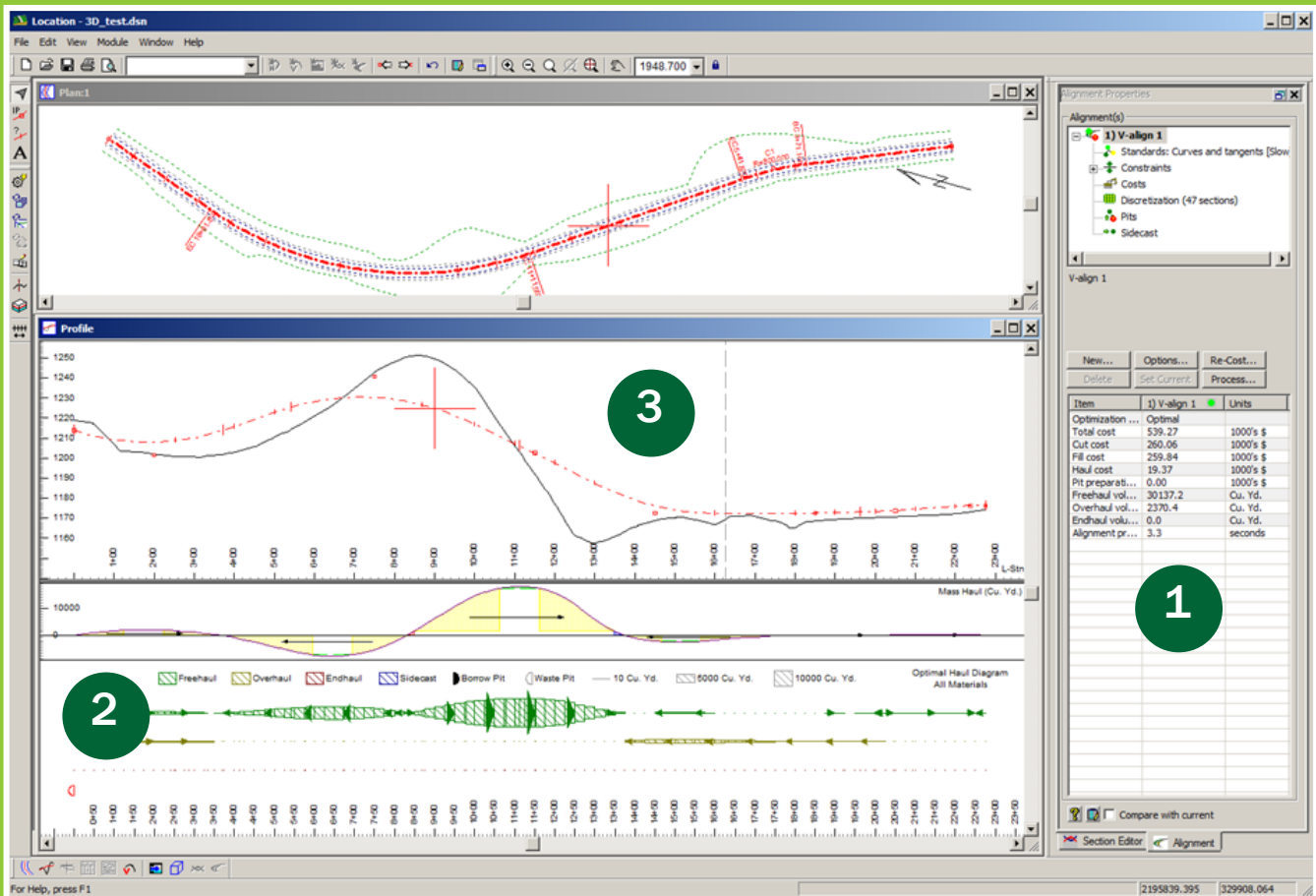allows you to quantitatively compare designs.

2
OPTIMAL HAUL CALCULATION & SMART PITS
allow you to calculate and display the lowest cost material movement. This includes borrow, waste and sidecast.

3
OPTIMAL PROFILE
Automatically generates the lowest cost profile matching your curvature and grade constraints.

WORK FLOW

Softree Optimal works from existing ground surface, horizontal alignment, cross section definition and design parameters.

Existing Ground

A surface model of the existing ground and optional sub-surface layers is used by *Softree Optimal* to calculate excavation and embankment quantities. The surface model can be generated from raw data or imported from external sources via LandXML.

Horizontal Alignment

The horizontal alignment is used by *Softree Optimal*. It can be created in RoadEng® or imported from external sources via LandXML.

Detailed Cross Section(s)

Detailed cross section information is used by *Softree Optimal* to generate quantities. Templates can be used to account for various situations along the alignment such as ditches, pavement, sub-base materials, varying lane widths, super-elevation, cut slopes, variable height fill slopes, curbs, sidewalks etc.

Existing Ground → Horizontal Alignment → Cross Section(s) → Parameters → **SOFTREE OPTIMAL** → **Optimal Vertical Alignment**
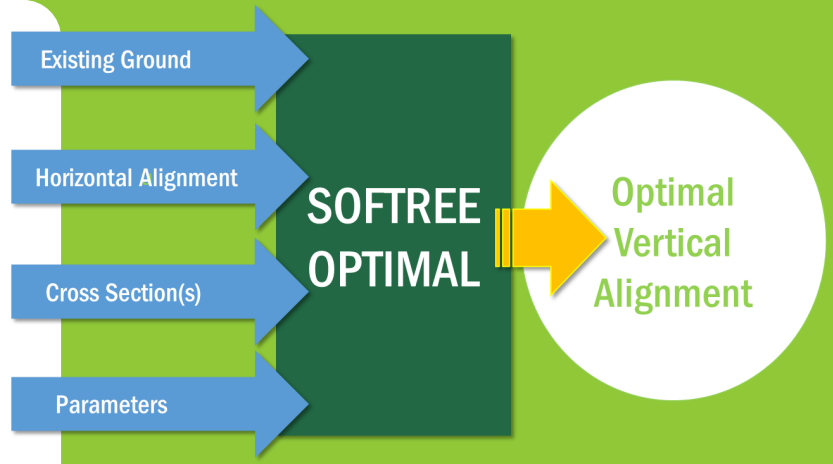
Parameters

Costs	Excavation, embankment and haul costs.
Constraints	Minimum K value, minimum and maximum grades, minimum fill, movement direction, full bench etc.
Control Points	Station, elevation and grade control for intersections, driveways, utilities, etc.
Borrow / Waste	Borrow, waste and sidecast locations and associated costs.

KEY BENEFITS

☑ REDUCED ENGINEERING TIME

Automation saves engineering time. Time spent by engineering staff iteratively trying alignments is reduced or eliminated. Existing designs can be compared to optimized results for 'sanity check-ing' and quality control. Errors and oversights are reduced.

☑ CONSTRUCTION SAVINGS AND IMPROVED DESIGN

Automation allows quick evaluation of alternatives such as horizontal curves and alignment modifications, vertical curve design speeds (K-value), and borrow/waste (pit) locations. This results in construction savings and improved design.