Welcome to a Civil Engineering Overview

by Mark S. Ditko
from Zen Engineering

A 'Civil' Overview

- What is 'Civil' Engineering
- What Civil Engineers do
- What a good Civil knows
- Civil Engineering basics
- Show how a project is done
  (if there is enough time)
- Questions and Answers

Civil Engineering

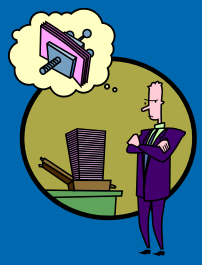
Does anyone know what Civil Engineering is?

Engineering

- The work of planning and building machines, roads, bridges, buildings and other things.

Engineers

- Basically, engineers have to figure things out.



Types of Engineering

- Electrical

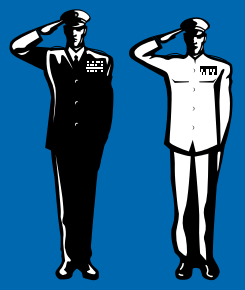
- Mechanical

- Structural

- Chemical
- Civil…

Civil

- Started in the early 1800's
- Civil – 'made up of citizens'
- 'Civil' was really used to separate '*private*' engineers from the '*military*' engineers
- 'Civil' now refers to projects related to the 'public'



Civil Engineering

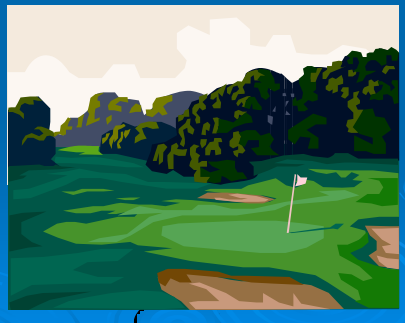
- 2 Main Activities
  - 'Area' Engineering
  - Transportation

Civil Engineering

- Transportation Design:
  - Roads & Streets
  - Highways
  - Subways
  - Railways
  - Bridges
  - Tunnels

Civil Engineering

- Area Design:
  - Housing developments
  - Golf Courses
  - Parks
  - Parking Lots
  - Malls & Stores
  - Airports



Civil Engineering

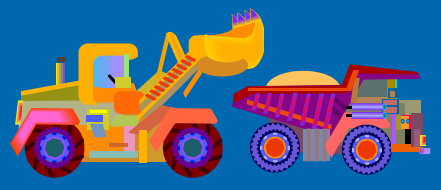
- Architects design the buildings
- Civil Engineers do the parts all around it

'*Designing*' Defined

- To think up and make plans for something
- To arrange things in a special way for some purpose

The ‘Engineering’ Goal

- To think up and plan all the information that someone would need in order to build something.

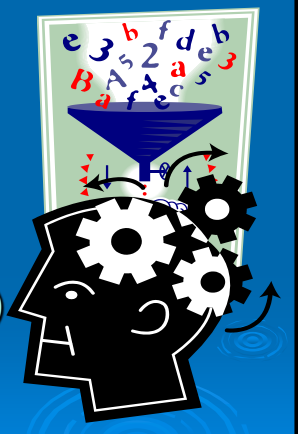


Things ‘Civils’ think about

- What happens to all of the water when it rains? Where will it go?
- Is the road safe to drive on?
- Is the road big enough?
- How will it get built?
- How much will it cost?

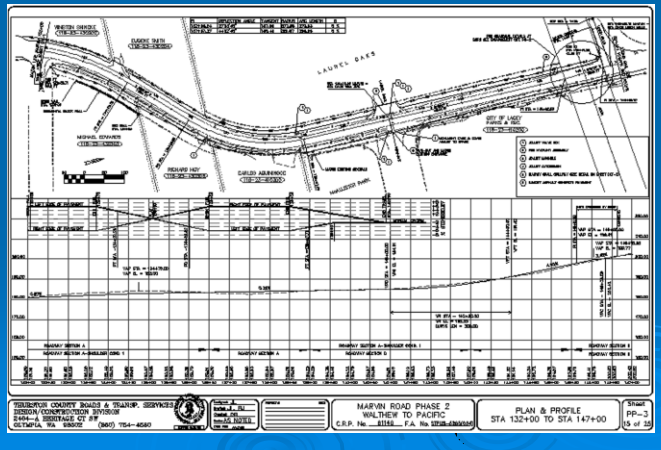
What Engineers Need to Know

- How to communicate ideas
- How to work in a team
- Math, especially Geometry
- Computers in general
- Drawing Software (CAD)
- Engineering Software (InRoads)
- The science of Engineering
  (learned in College)



CAD

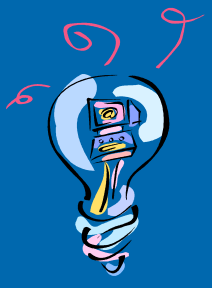
- Computer Aided Drafting



InRoads

- Civil Engineering computer software

Computers & Software

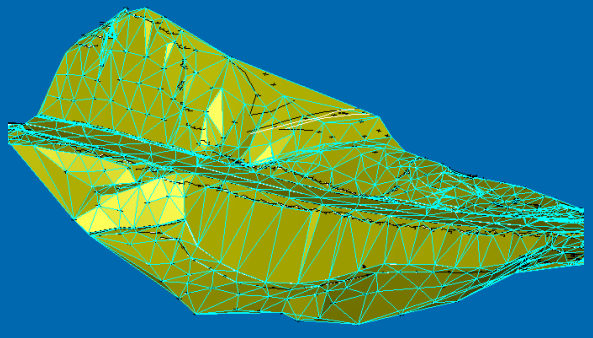


- Really changed Civil Engineering work
  - Automatically do a lot of the math
  - Automatically creates a lot of the drawings

Extreme Engineering Stuff

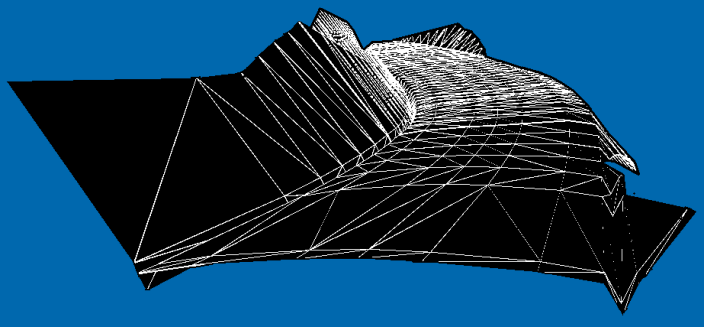
- Key Civil Engineering concepts
  - 3-D Models
  - Roadway math layout
  - Sectional views
  - Designing a Roadway
  - Reviewing the results

3-D Models



- Computer created 3-Dimensional surfaces
- 3-D models of the existing conditions are very important

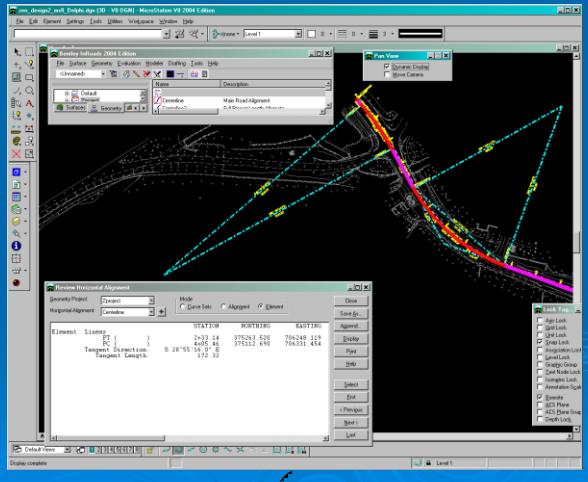
3-D Models



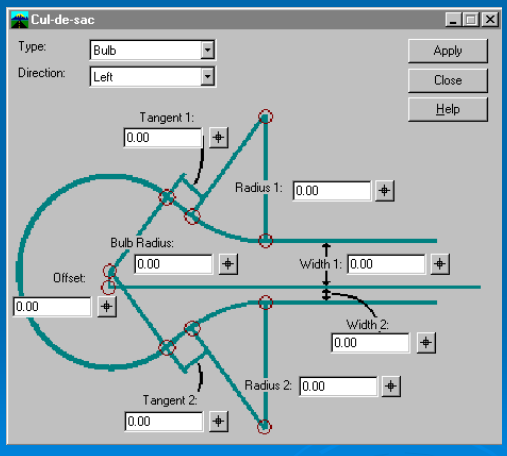
- 3-D Models of the Design work will also be created showing the detail of the new work to be built

Geometry / Math

- Math along the road centerline is very important and exact



Laying Out Cul-de-sacs

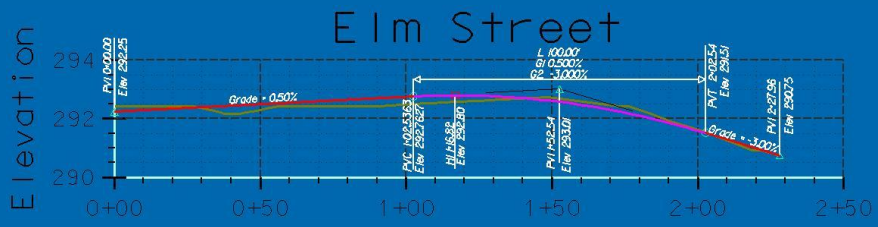


- Math is used quite a bit in engineering
  - Cul-de-sac geometry

A 'Profile' Defined

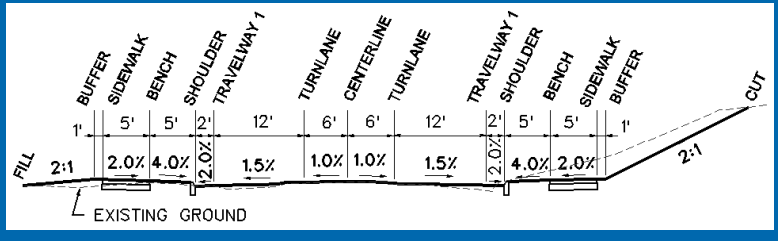
- A slice, or side-view of a roadway
- Profiles are used a lot in Civil work

More Geometry



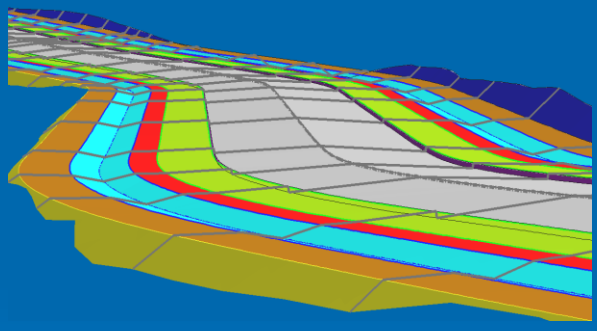
- The center of a new roadway has a mathematical layout in two directions

A Typical Section



- The *Typical Section* describes a slice across the new road (not along like a profile)
- This section is the 'design' of the road

New Road Design



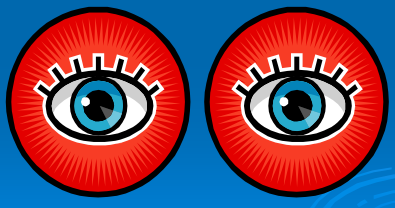
- The ‘Typical Section’ is used to create the new road 3-D model

Final Road Design

- The final 3-D model can be used to create a visual look at the design.

Show How it Works?

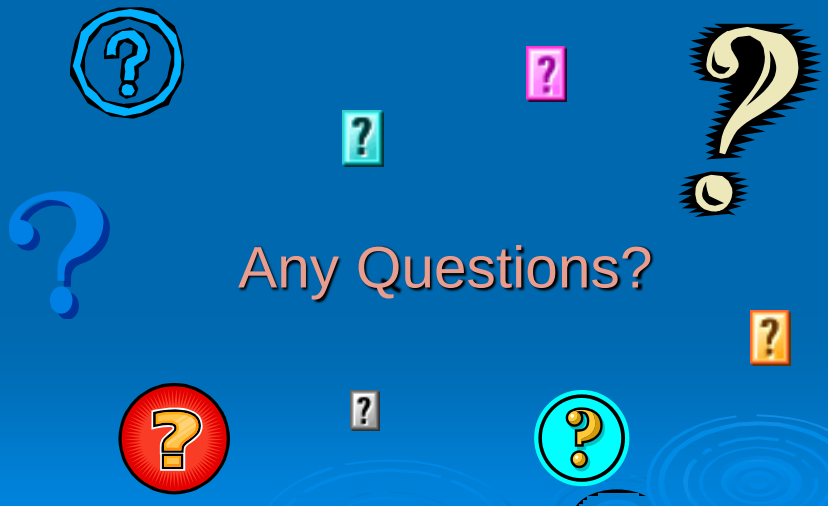
- If there is time I'll show how this is done with the InRoads software



Civil Engineering - Summary

- Civil Engineers deal with jobs that affect everyone's lives
- Civil projects are always different
- Engineers requires good math skills
- Engineers need good 'people' skills
- College is where the 'science' of engineering is learned

Civil Engineering

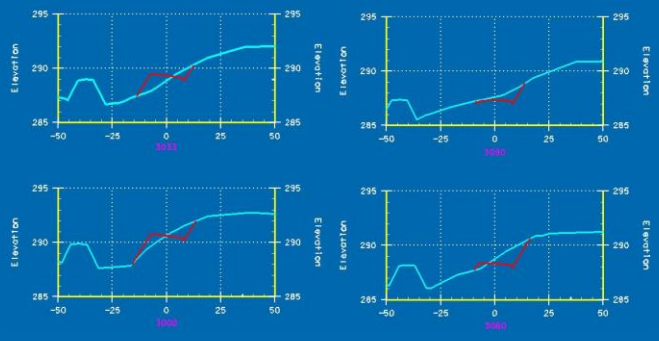


Any Questions?

A Bit More

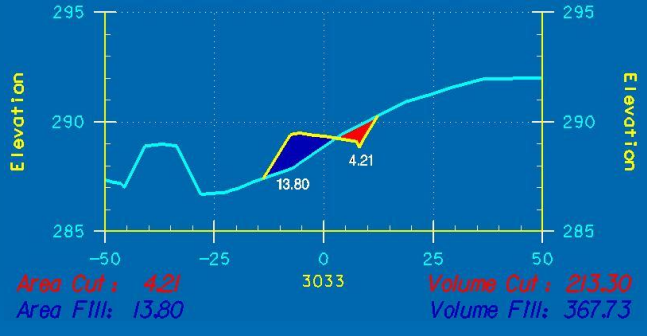
- If there is time let's cover a bit more about Civil work. …

Cross Sections



- Cross Sections, like profiles, are slices perpendicular across the road showing the completed design

End Area Volume Results



- 'End Area' volumes show how much dirt has to be moved to build the new road