Accurate Digital Terrain Models

Huntington Hodges, P.L.S.
D.O.T.D. Location and Survey Section
Accurate Digital Terrain Models

Software
DTM definitions
Surfaces
Triangulation
Controlling triangulation
Complete model
DTM breakline feature
Inserting breaklines
Data perimeter
Software limitations
Field survey tips
Software

Bentley® InRoads®
2004 Edition

08.07.01.22
Engineering Automation
Louisiana DOTD

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DTM
Digital terrain model

a method of transforming elevation data into a contoured surface or a three-dimensional display

any digital representation of a topographic surface

a quantitative model of a topographic surface in digital form

a model of reality which includes information relating to factors such as surface texture as well as elevation

Surface
Simple surface

Time for the sheet of paper
Complex surface

Now the box
Intelligent surface

And the other box
Triangulation

Delaunay triangulation

A triangulation of a vertex set with the property that no vertex in the vertex set falls in the interior of the circumcircle (circle that passes through all three vertices) of any triangle in the triangulation.
Triangulation

Delaunay triangulation

Delaunay triangulations maximize the minimum angle of all the angles of the triangles in the triangulation; they tend to avoid "sliver" triangles
Triangulation
Ideal triangles
Triangulation
Bad triangles
Triangulation
Four survey points
Triangulation
Two possible ways of triangulation
Triangulation
Two possible results
Controlling triangulation
Controlling triangulation
Random points – little control
Controlling triangulation
Breaklines - maximum control
Inroads software tools for controlling triangulation

Maximum segment length
Inroads software tools for controlling triangulation

Maximum triangle length
Complete model
Complete model
Complete model
Complete model
Complete model
Complete model
Complete model
Complete model
Complete model
Complete model
Complete model
DTM breakline feature
DTM breakline feature
DTM breakline feature
DTM breakline feature
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Inserting breaklines
Inserting breaklines
Inserting breaklines
Inserting breaklines
Inserting breaklines
Inserting breaklines
Inserting breaklines
Data perimeter
Data perimeter
Data perimeter
Data perimeter
Data perimeter
Data perimeter
Inroads software limitations

Overlapping breaklines

Mismatched elevations
# Field survey tips

## Target heights

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# Field survey tips

## Target heights

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Field survey tips

Cross sectional observation pattern
Field survey tips

Numerous observations
Field survey tips

Details
Field survey tips

Details
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Details
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Any questions?

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