

# Conservation Engineering in Southeast Missouri

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# Movement of Water

- For almost all conservation practices, NRCS analyzes water movement;
  - How much
  - How fast
  - Where does it go
  - How to manage it in a safe and economical way





# Typical Information Needed

- Drainage Area
- Flow Length
- Ground Profile Data
- Storage Area
- Slope
- Soil Types
- Curve numbers

# Practices





# Issues we deal with

- Weather
- Cropping Season
- Available time for surveys



# Planning tools 20 years ago



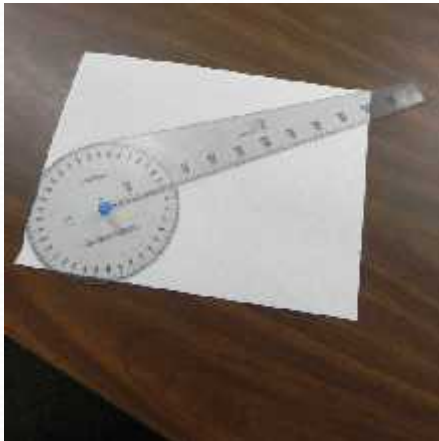
Level



Planimeter



Stereo Scopes



Stadia



USGS Topography Maps

# Today

- LiDAR
- Trimble VRS
- Levels
- Hand held GPS
- ArcGIS/Missouri CARES



# Grade Stabilization Structure Site

- Located on west side of Dunklin County adjacent to the St. Francis River
- Landowner said erosion had accelerated over the last few years





# Grade Stabilization of Bottomland Field

- Information Needed
  - Drainage Area
  - Stabilization Elevation
  - Outlet Elevation
  - Levee Cross Section



# Aerial Photo vs Hillshade



2012 Aerial Photo



2012 Aerial Photo with hillshade

# Contour Comparison



5 ft Contours



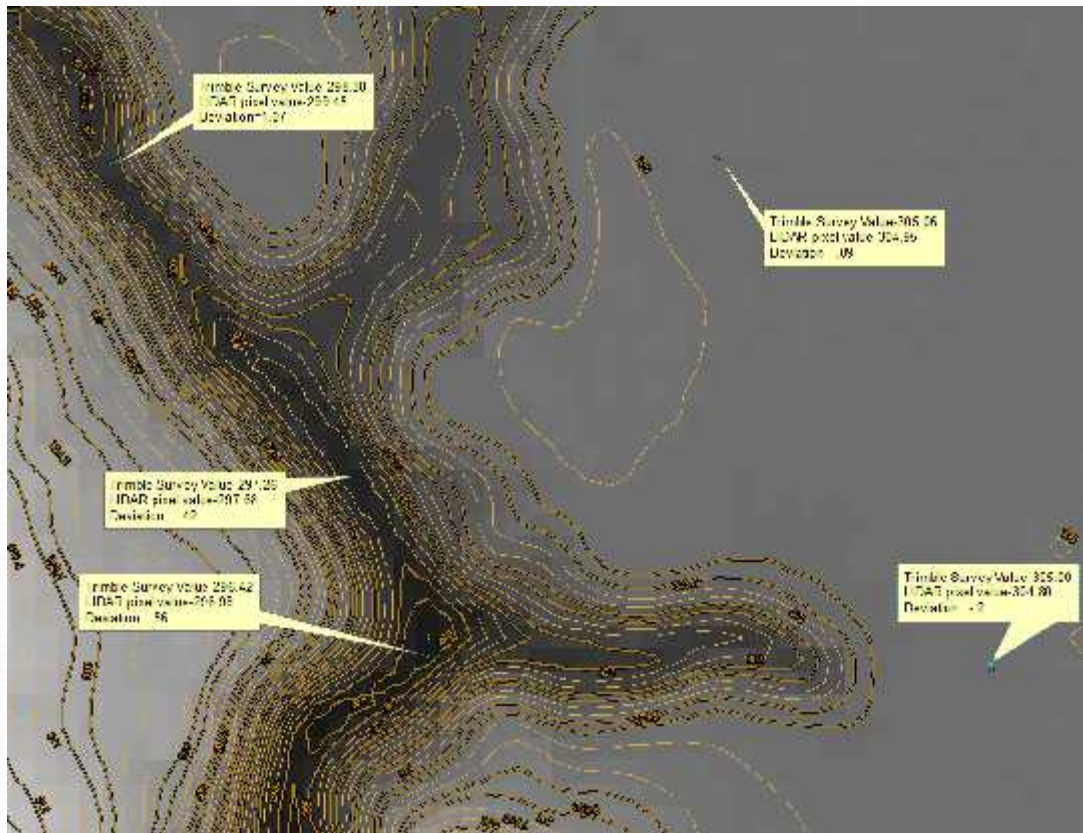
0.5 ft Contours

# Watershed Delineation





# Elevation Comparison



# Water and Sediment Control Basin

- Located in Northwest Stoddard County
- Producer had been disking in site annually to fix the problem. After some heavy winter/spring rains, site became too deep for disking



# Water And Sediment Control Basin

- Drainage Area
- Avg Slope
- Flow Length
- Stage Storage Data
- Cross Section
- Outlet Elevation





# Aerial Photo vs Hillshade



2012 Aerial Photo



2012 Aerial Photo with Hillshade



# Contour Comparison

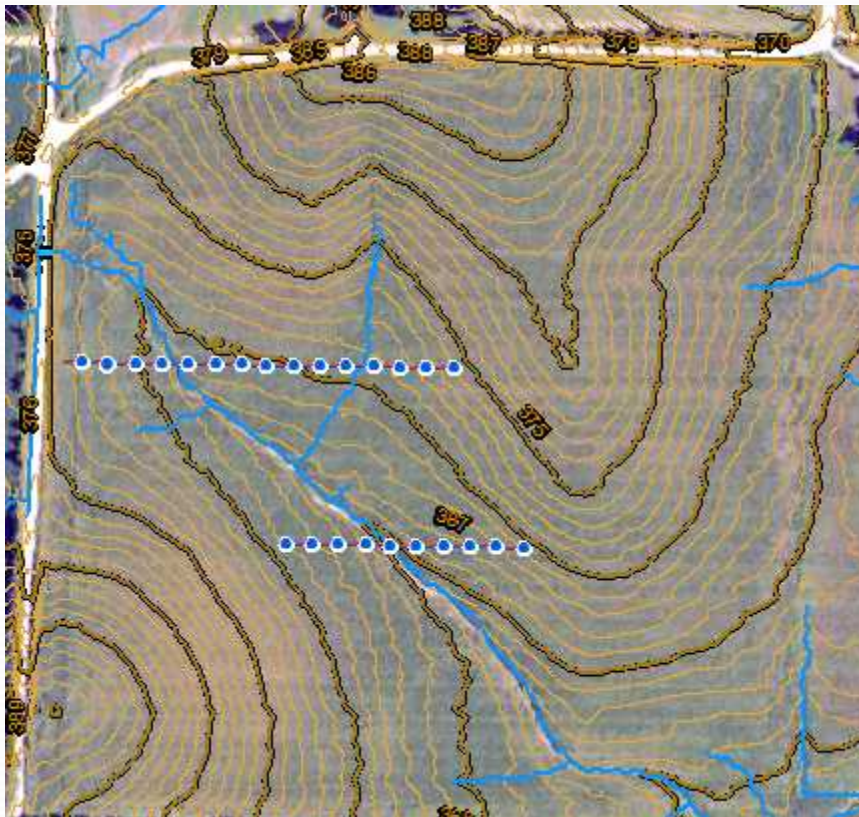


10 ft Contours



1 ft Contours from LiDAR

# Cross Section Data



File Edit View Tools Windows Help

MBall N2lower XYZ points

	OBJID (CID)	Shape	ID	STATION	POINT_Z	POINT_X	POINT_Y
1	Point ZM	1	0	359 100006	757436.949834	4093751.704279	
2	Point ZM	1	25	358 200012	757429.337145	4093751.31826	
3	Point ZM	1	50	357 600006	757421.725053	4093750.93224	
4	Point ZM	1	75	357 110000	757414.117467	4093750.54627	
5	Point ZM	1	100	356 700012	757406.500282	4093750.20020	
6	Point ZM	1	125	363.5	757398.837391	4093749.324132	
7	Point ZM	1	150	356 259588	757391.275305	4093749.163167	
8	Point ZM	1	175	356 100006	757383.653118	4093749.21243	
9	Point ZM	1	200	363.5	757376.050731	4093748.355123	
10	Point ZM	1	225	354 359594	757368.438343	4093748.500104	
11	Point ZM	1	250	355 210012	757361.875155	4093748.144014	
12	Point ZM	1	275	366	757353.213367	4093747.783055	
13	Point ZM	1	300	367	757345.601173	4093747.132045	
14	Point ZM	1	325	357 359594	757337.938791	4093747.075026	
15	Point ZM	1	350	357 100006	757330.375401	4093746.725015	
16	Point ZM	1	375	358 200012	757322.754015	4093746.363936	
17	Point ZM	1	400	358 700012	757315.151827	4093746.007957	
18	Point ZM	1	420	359 100006	757305.051717	4093745.723117	



# Drainage Area



# Stage Storage Data



Table

VRM/Modeler - All Tools

DIRID/ID	Shape *	ELEV_FOOT	POOL_ACRE	POOL_SQF	ACRE_FOO	Shape_Length	Shape_Area
1	Polygon	300	2.0	100976	10.2	922	9460
2	Polygon	388	1.5	68917	4.1	698	6301
3	Polygon	387	0.5	23777	1.4	484	2236
4	Polygon	300	0.2	7484	0.0	230	713
5	Polygon	388	11	11888	11	87	7101



# Elevation Comparison

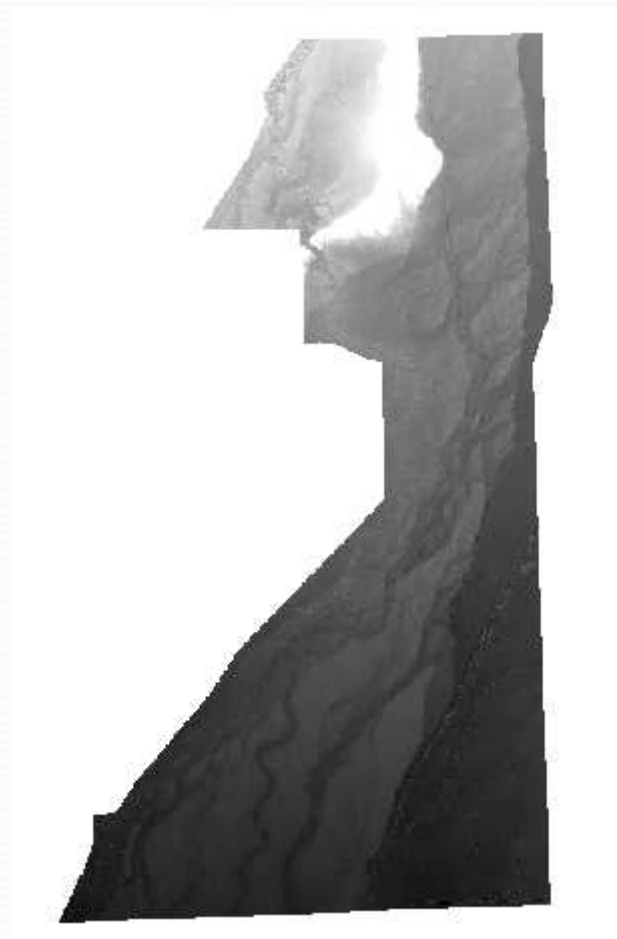
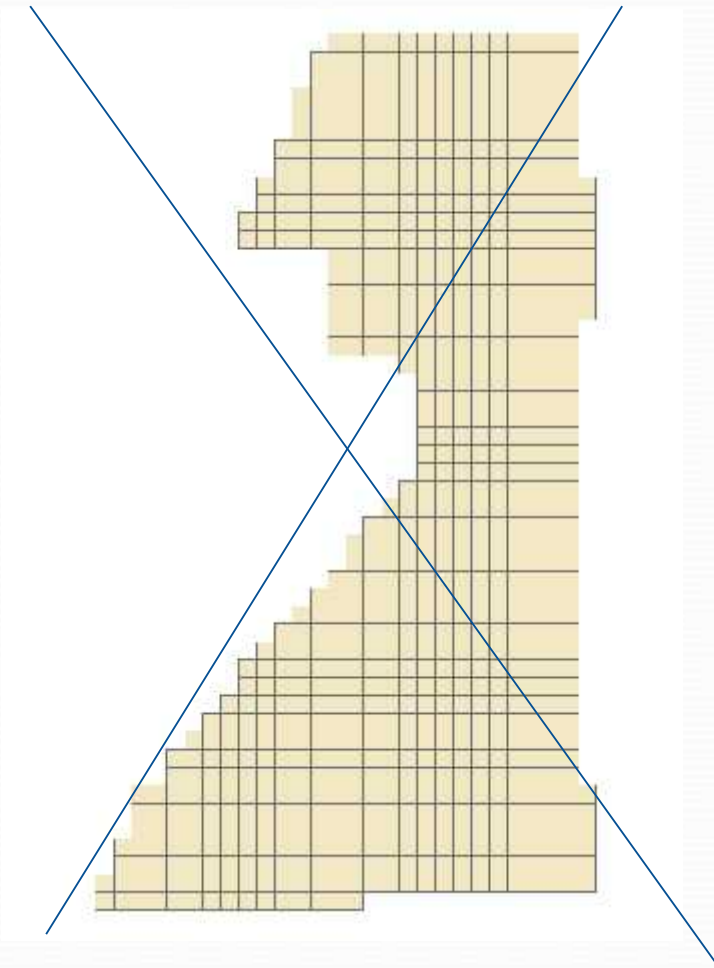




# Skill levels

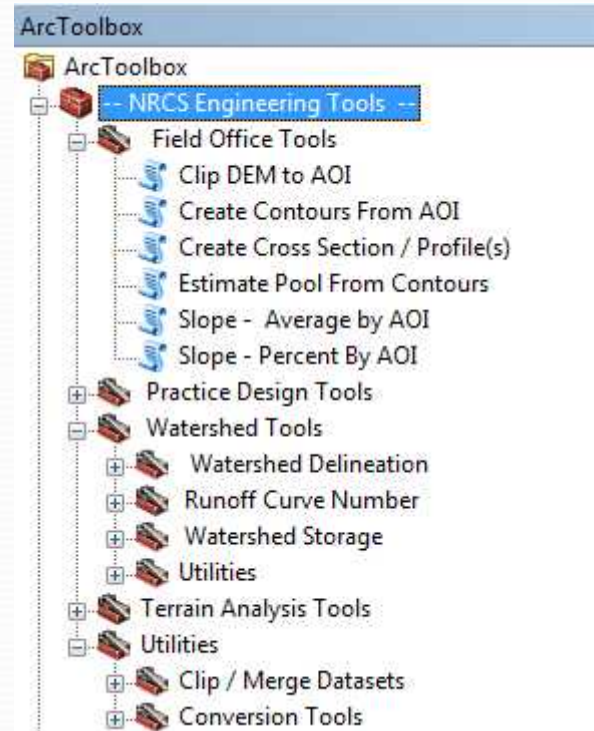
- Engineers
- Soil Scientist
- Soil Conservationist
- NRCS technicians
- SWCD technicians

# Merging Tiles at a County Level



# Minnesota Engineering Tool

- Allows for simpler utilization of LiDAR data
- Users have to understand engineering concepts





# Utilizing Survey Grade GPS

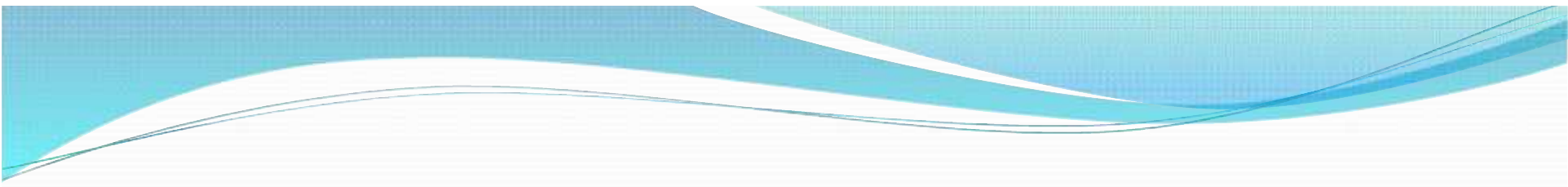
- Provides quick comparisons
- Elevations are same as LiDAR values so no need for conversion





# Conclusion

- LiDAR is one of the most effective planning tools for conservation engineering in the last 20 years
- LiDAR data has been reliable where there is not active erosion
- We have found you do not need to be a GIS specialist to effectively use LiDAR data for planning



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