

3D MODELING UTAH VALLEY UNIVERSITY GIS & REMOTE SENSING



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ABSTRACT

THE NEED

WHAT?!

- „ Reconstructing UVU's 3D virtual model
 - „ Initial results
- „ Future Research Directions

WHY?!

- „ Demand for 3D geospatial data
- „ Initiated by the Geomatics program (Summer 2013)
 - „ To develop 3D virtual photorealistic model of the campus of UVU



$40^{\circ} 16' 37'' \text{ N}$



4606 ft



$111^{\circ} 42' 46'' \text{ W}$

UTAH VALLEY UNIVERSITY



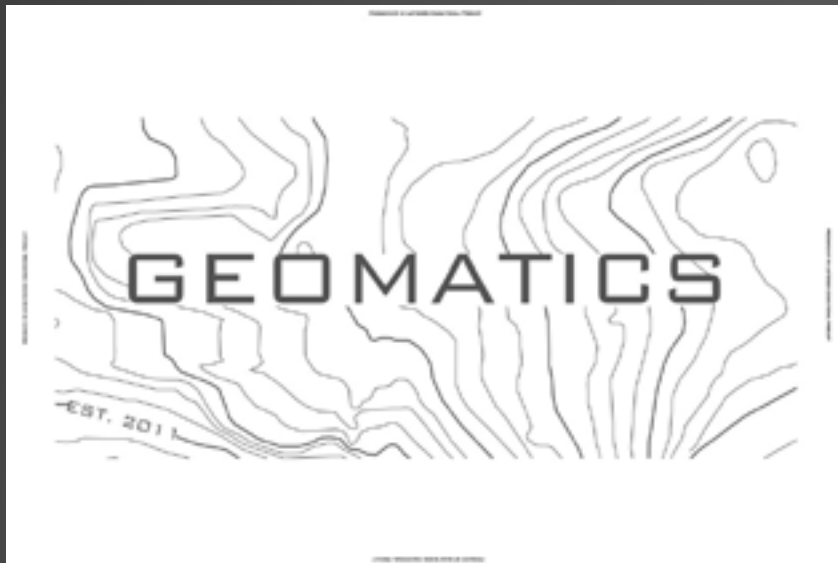
Public University

Strong core values on **Teaching and Engagement**

Largest public University in Utah

Founded in 1941

UVU - GEOMATICS PROGRAM



- Ø Program started in 2011
- Ø Currently 35+ declared majors in Geomatics
- Ø Builds students in all aspects of geospatial technology : surveying, geodesy, legal and law, remote sensing, AND GIS

SOMETHING NEW AT UVU

GIS and Geospatial technology is a new concept



GRANTS FOR ENGAGED LEARNING

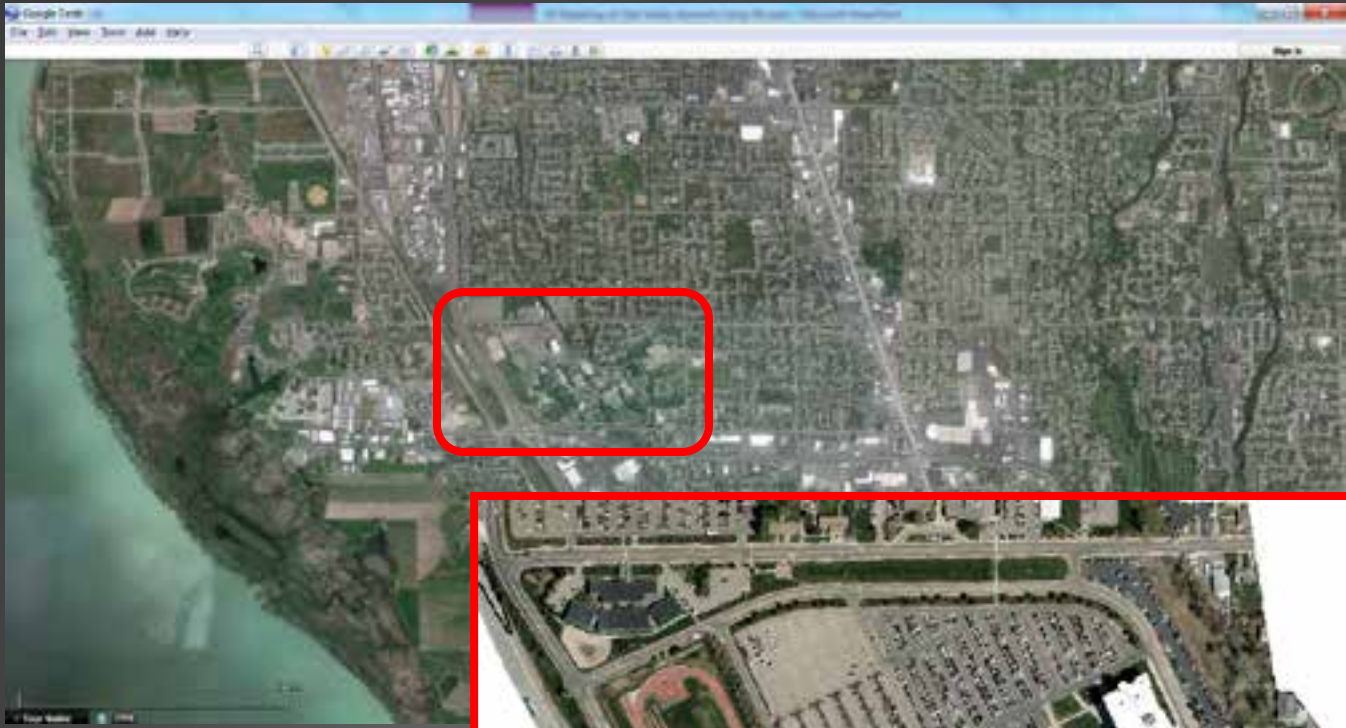


- „ Funded in 2012-13
 - „ Acquire very high resolution aerial imagery and high dense LiDAR data

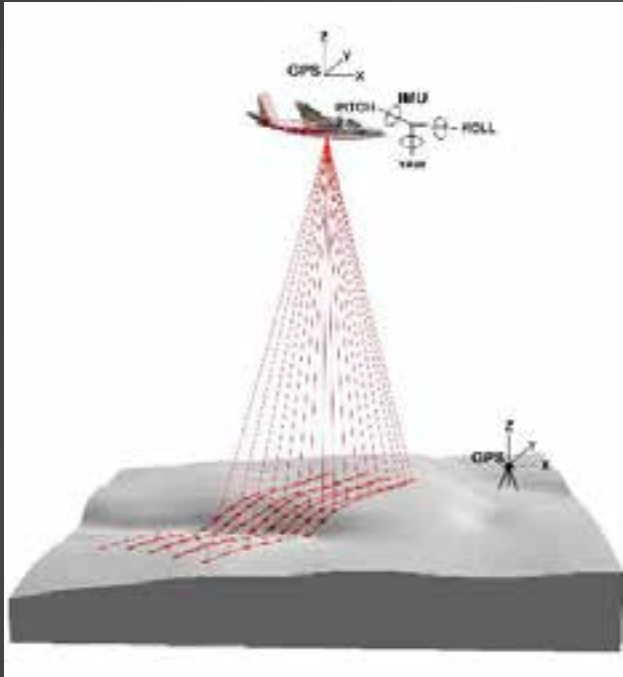
AERIAL IMAGERY

- „ Spatial resolution – 10cm
- „ Spectral resolution – 4 bands (B, G, R and IR)
- „ Large format Ultra CamX camera
- „ After winter, before spring (April 24th, 2013)

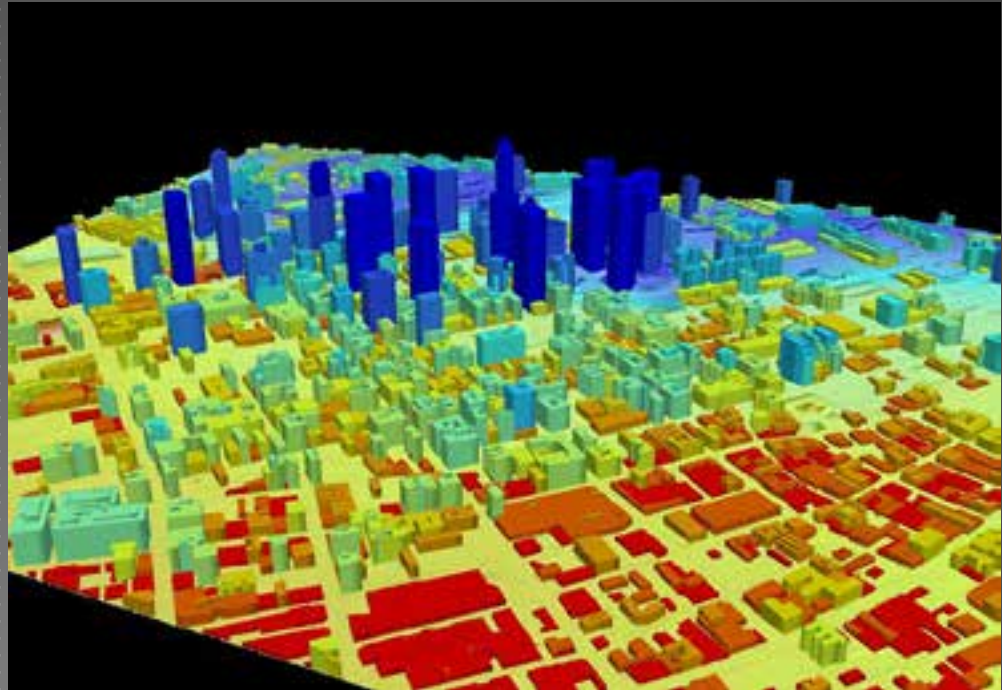




LIDAR – LIGHT DETECTION AND RANGING DATA



Courtesy:
http://forsys.cfr.washington.edu/JFSP06/lidar_technology.htm

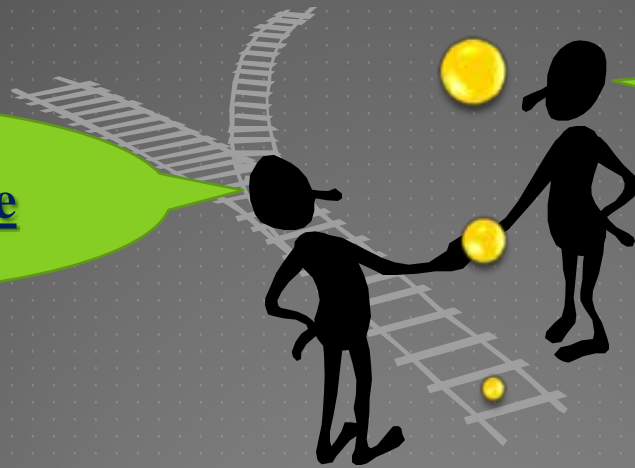


Courtesy:
<http://www.leidos.com/geospatial/modeling/lidar-urban-modeling>

Remote Sensing & GIS

!!!

Yo, I'm sam Image



Hey, I'm john LiDAR

..

DATA FOR 3D MODELS

- „ Integrating aerial and LiDAR data
- „ To reconstruct
 - „ terrain surface with various topographic features
 - „ Building geometry

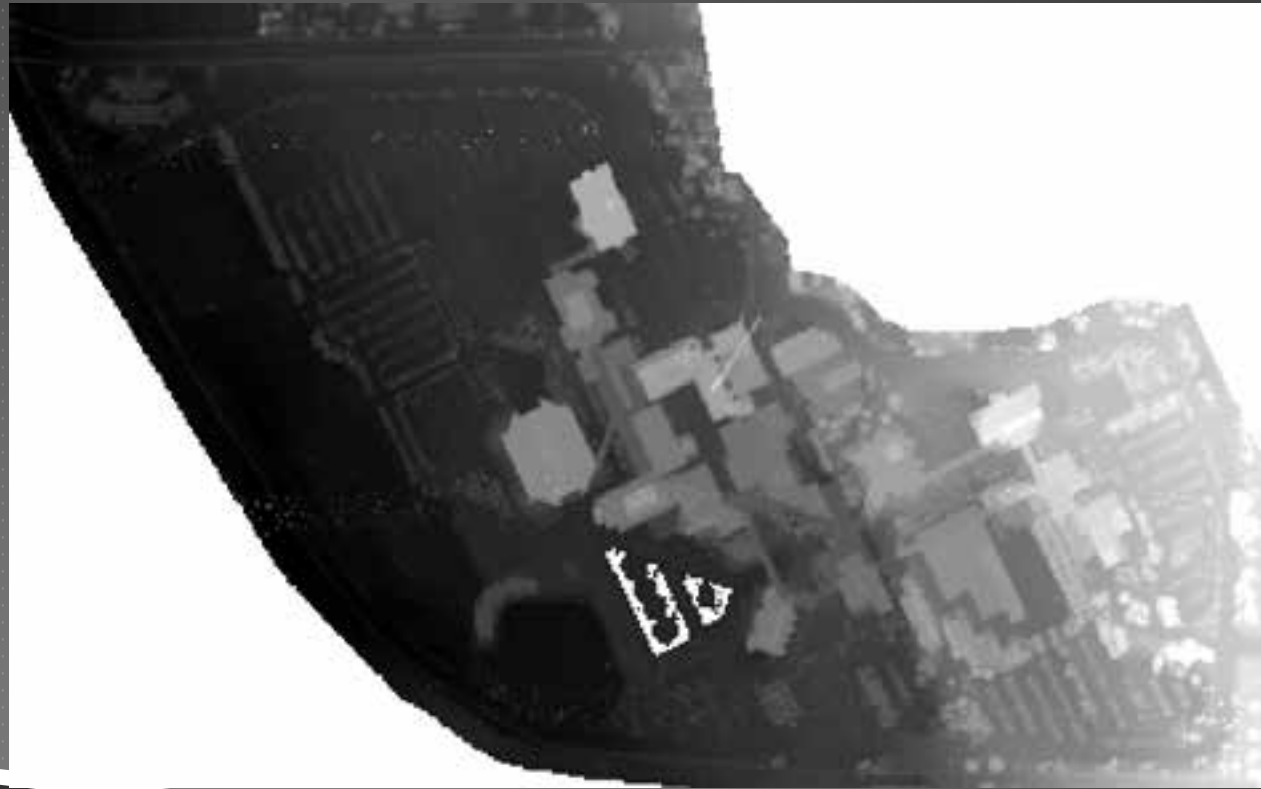
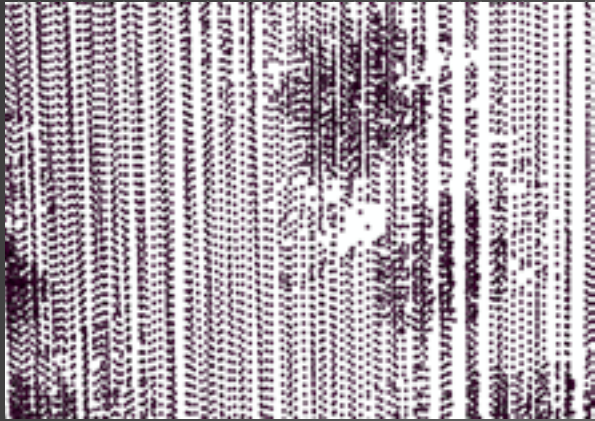
INTEGRATION OF MULTI SENSORS – WHY?!

- „ Accuracy enhancement
- „ Limitations related to occlusions, shadows and disadvantageous viewing angles

DERIVED-DATA FROM LIDAR

- " Multi points to earth model
- " Hill shade
- " Contour
- " Building elevations and geometry

LIDAR - MULTI POINT (LAS) TO RASTER



LIDAR - HILL SHADE OF UVU

UVU_bareearth_hillshade.tif

Value

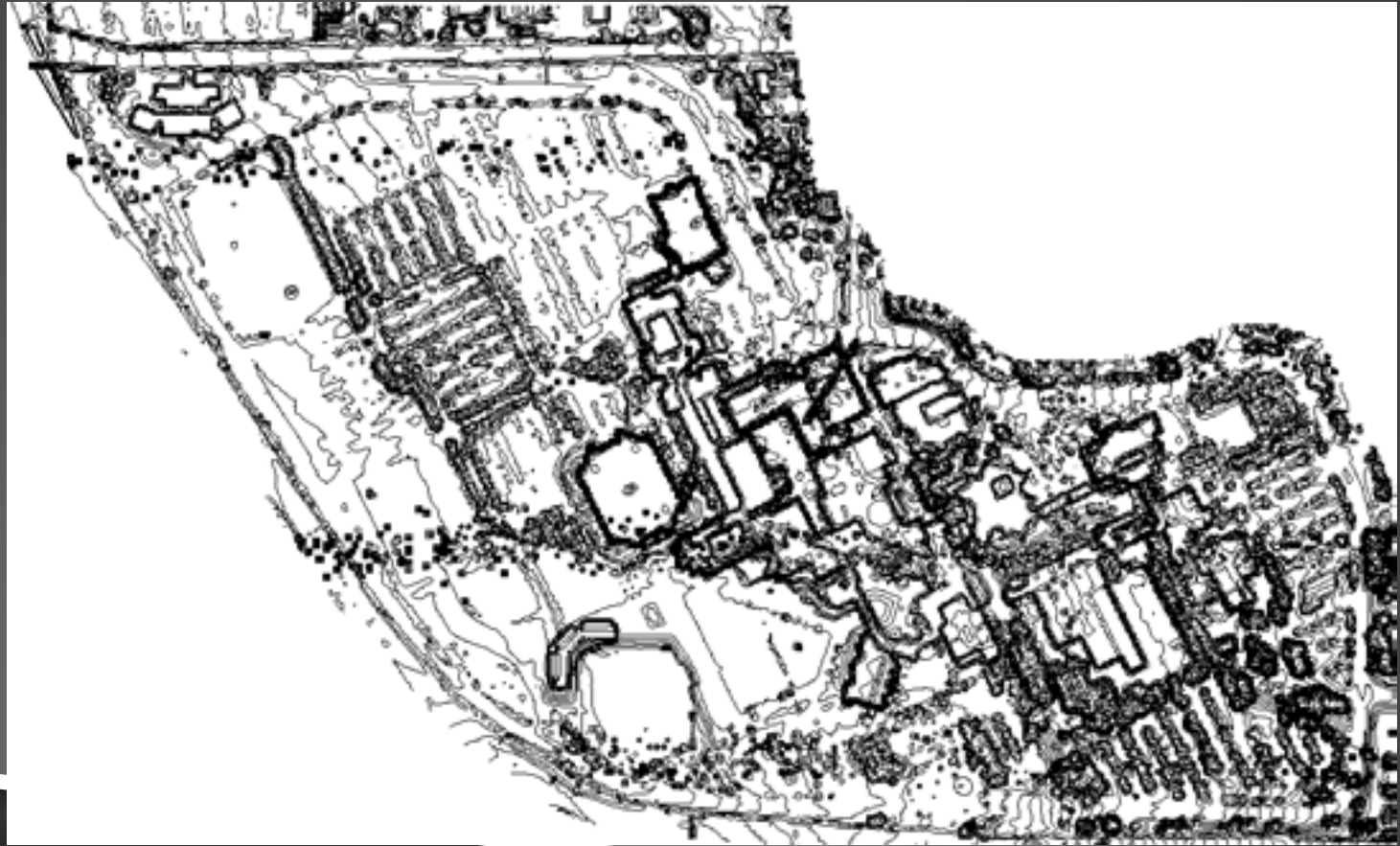
High: 254

Low: 0



LIDAR - CONTOURS OF UVU

uvu_bareearth_contour

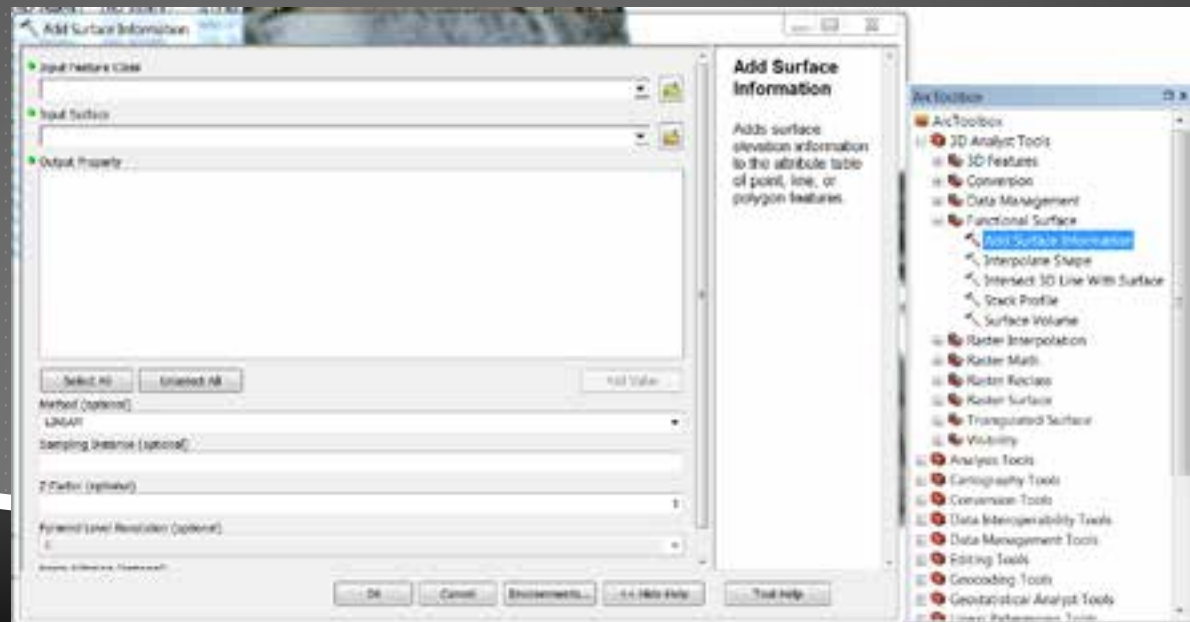
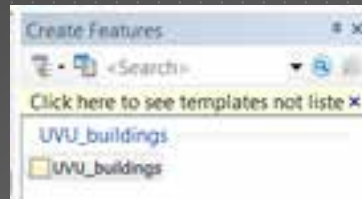
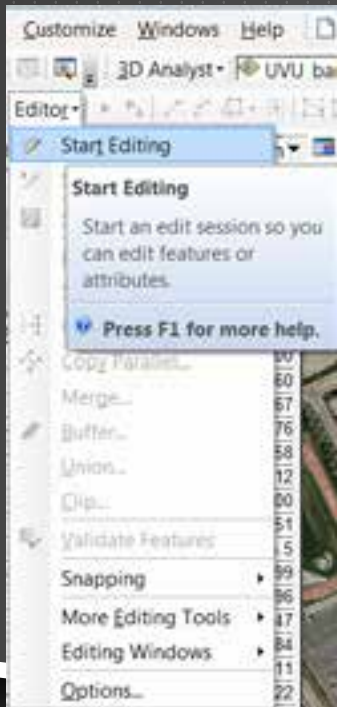


DERIVED DATA FROM AERIAL IMAGERY

- " Polygon - Building footprints with surface info
- " Polygon - Sports & Stadium
- " Polygons – Parking lots
- " Lines – Roads

BUILDING FOOTPRINTS

A functional surface was created with the building footprints



BUILDING FOOTPRINTS



File View

UVU Buildings

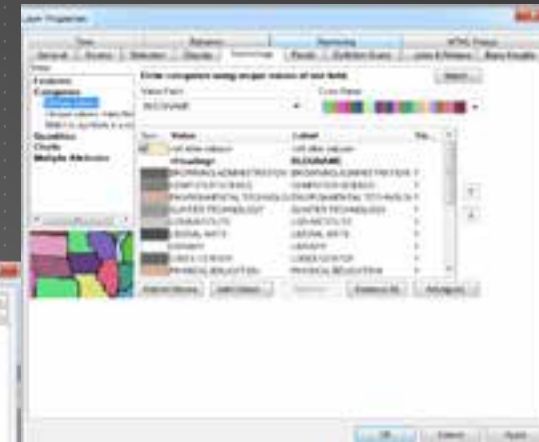
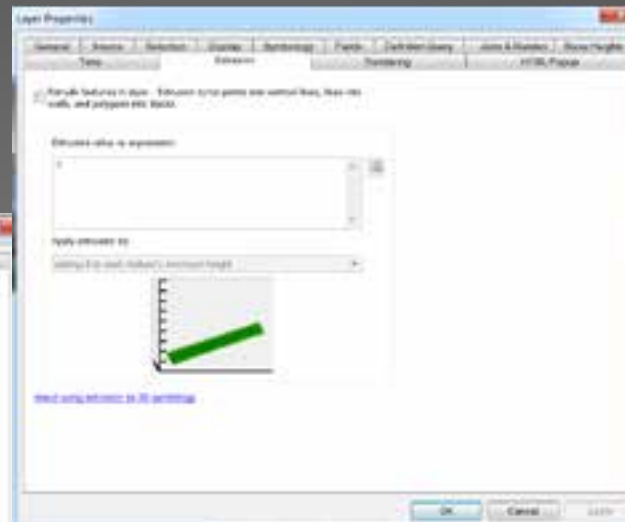
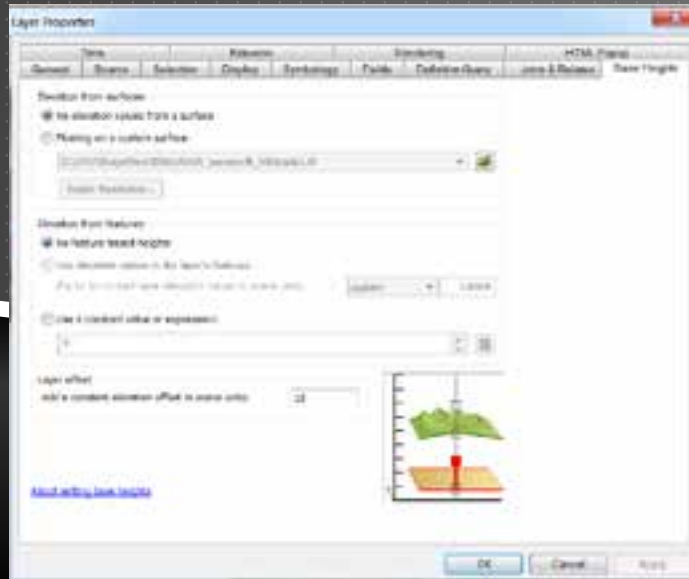
ID	Shape	Area	F Min	F Max	F Mean	Area	ID (VALLAM)	Georef. ID
1	Polygon	1273 75706	1382 279791	1389 732797	1394 209994	1000000000	COLLEGE SERVICE CENTER	195
2	Polygon	1393 83706	1387 764799	1393 186976	1411 254205	1000000000	COLLEGE SERVICE CENTER E	196
3	Polygon	1384 472844	1418 181091	1399 261114	1406 276447	1000000000	LOCAL CENTER	197
4	Polygon	1385 194485	1411 869647	1423 205446	1396 168344	1000000000	LIBRARY	198
5	Polygon	1385 709627	1425 708266	1396 167292	1417 188150	1000000000	LIBERAL ARTS	199
6	Polygon	1383 482287	1398 788279	1394 264499	1402 127161	1000000000	PHYSICAL EDUCATION	200
7	Polygon	1382 828291	1398 964279	1392 942279	1478 257160	1000000000	SCIENCE BUILDING	201
8	Polygon	1382 947251	1398 735271	1395 142718	1406 273415	1000000000	SCIENCE	202
9	Polygon	1382 823250	1383 827076	1381 85791	1401 85791	1000000000	PHYSIOLOGICAL TECHNOLOGY	203
10	Polygon	1384 129424	1394 847919	1394 749268	1412 196989	1000000000	PROFESSIONAL ADMINISTRATION	204
11	Polygon	1388 232150	1394 784684	1394 740062	1402 942876	1000000000	WOODWORKY BUSINESS	205
12	Polygon	1388 362308	1398 868863	1395 829988	1397 476986	1000000000	LEARNING CENTER	206
13	Polygon	1391 870058	1401 922207	1401 267190	1407 868174	1000000000	LOGOS CENTER	207
14	Polygon	1391 862626	1406 479256	1398 847276	1404 158276	1000000000	LOG RESTAURANT	208
15	Polygon	1400 444874	1424 623458	1410 802004	1393 294730	1000000000	COMPUTER SCIENCE	209
16	Polygon	1398 874401	1421 967159	1412 961412	1400 639169	1000000000	CLINICAL TECHNOLOGY	210
17	Polygon	1392 967968	1424 968201	1421 739648	1406 125444	1000000000	STANLEY ALTERNATIVE	211

3D MODELING IN ARCSCE

Animation in ArcScene



LAYER PROPERTIES IN ARCSCE



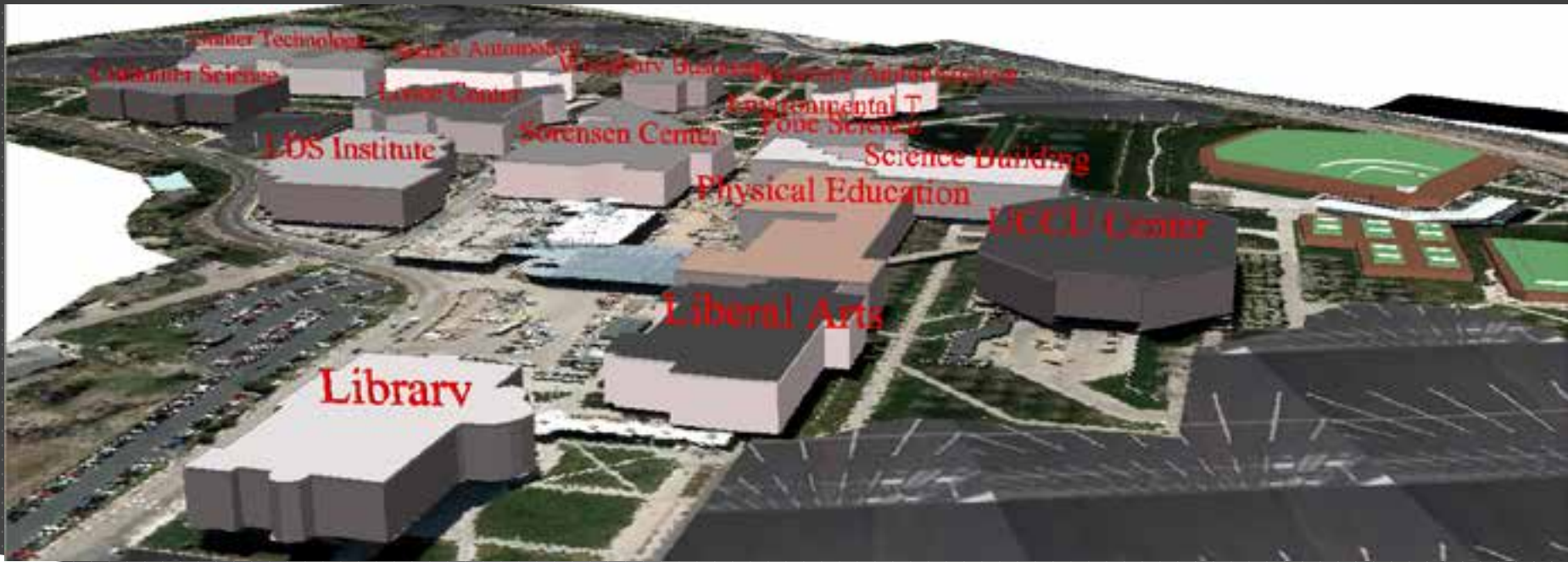
TEXTURING PARKING LOTS WITH PICTURE FILL



SPORTS' & STADIUM AT UVU



GRAPHICS TEXT



3D UVU MODEL



3D UVU MODEL



FUTURE WORK

- " Building photo realistic texturing using SketchUp fusion
- " Roads rendering
- " Accurate parking lot features
- " Customized graphics and texts

ACKNOWLEDGEMENTS

- " Utah Valley University – Grants for Engaged Learning (GEL) for the financial support
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THANK YOU !

www.uvu.edu/geomatics

