

Landbase Plans

Keith G Stump, March 11, 2014

Recommended Actions

by Plangraphics, Nov. 2013

- ✓ • Take advantage of Pictometry project to reduce costs
- ✓ • Upgrade Pictometry ortho-photography with better accuracy (to AccuPlus)
- ✓ • Acquire LiDAR at the same time
 - Extract features from LiDAR
 - Compile reduced set of Planimetry features

Base Products from Pictometry

- Obliques

- Four directional views
E, S, N, W



- Ortho-Photo (*standard*)

- Seam-lines
- Color Imbalances
- Clouds
- Distortions
- Warping



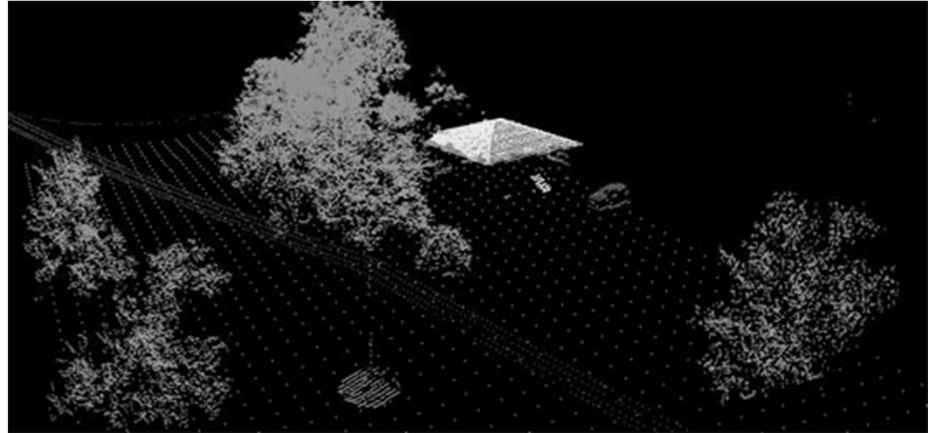
Pictometry Ortho-Photo Accu-Plus

- seamless; color-balanced; minimized building lean
- horizontal accuracy: Class 2 ASPRS at 1":100'
- cost for Knox County: \$ 75,800 estimated
 - ACTUAL = \$ 75,708
- cost for KUB extended area: \$ 56,000 *
 - ACTUAL = \$ 56,277

* includes Obliques



Pictometry LiDar



- X, Y, Z points, intensity, *classification*
- cost for Knox County: \$72,200 est.
 - Actual: \$ 42,303
- cost for KUB extended area: \$72,200 est.
 - Actual: \$ 11,896

Status of Pictometry

as of March 11, 2014

- Control Points paneled by City
- KGIS provided existing 3-D data to Pictometry
- **LiDAR mission has been flown**
- **81% of Aerial mission completed** KGIS received some “Getting Started” technical docs
 - Pictometry OnLine
 - Pictometry Connect
- 30-60 Day Delivery for Obliques; +60-90 days for Orthos

Next Step

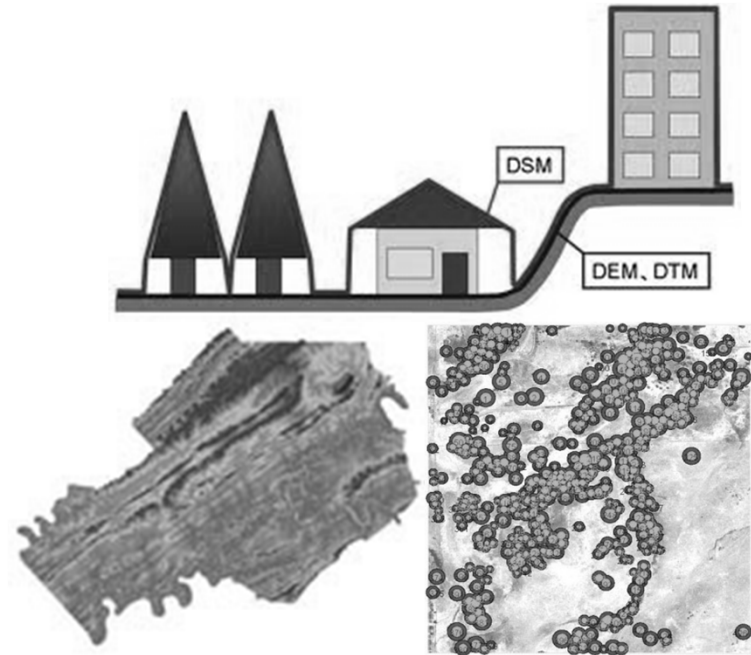
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Extract Features from LiDAR (derivative products)

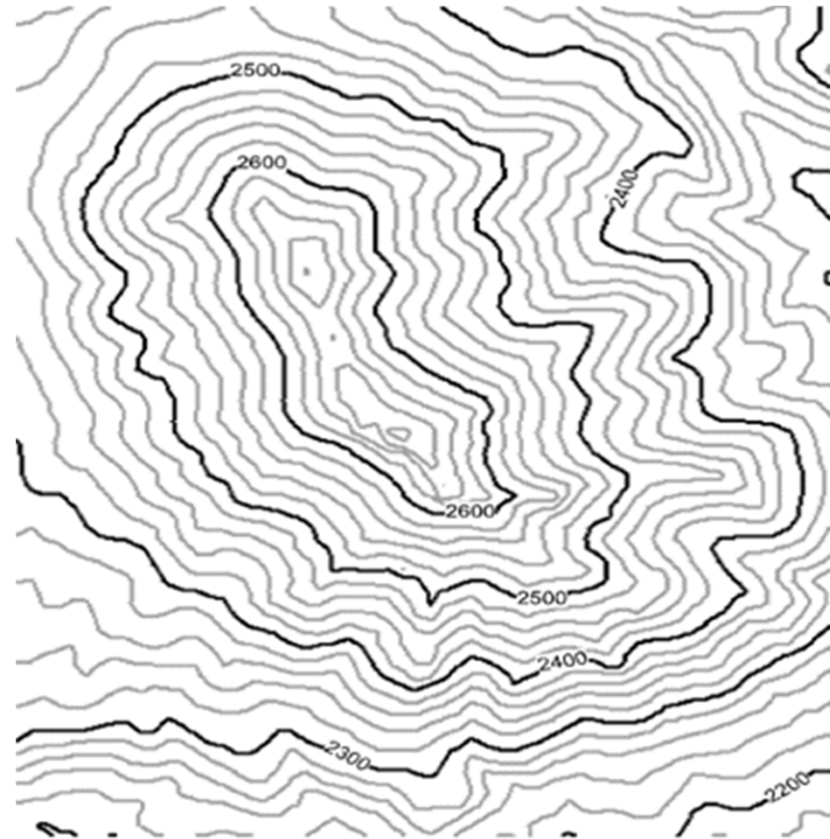
- Digital Surface Model (DSM)
- Digital Elevation Model (DEM)
 - HillShade
 - Shaded Relief
- Tree Canopy (treelines)
- Slope / Aspect
- Some Planimetric ???
- Spot Elevations ???
- **2' contours**



- Estimated
Cost
\$20,000

Questions about Contours derived from the LiDAR

- hydro-enforced?
- spot elevations?
- depressions?
- obscure?
- areas under construction?
- annotation; textual?
- generalization?

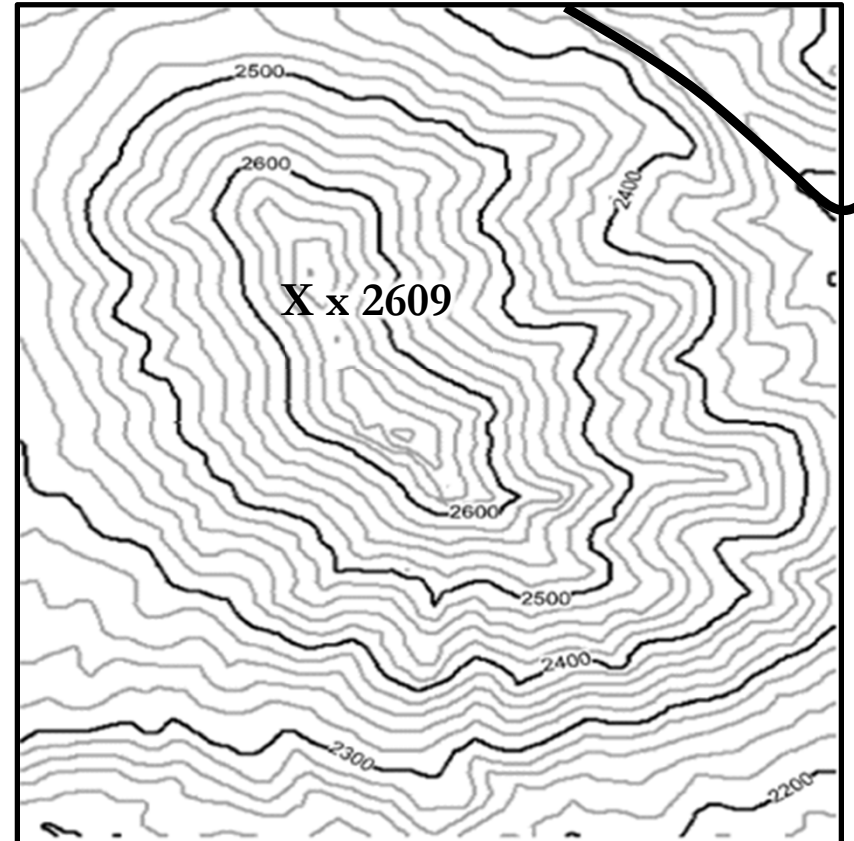


Breakline and Spot Elevation Enforcement

Unless Breakline-enforced, newly derived contours will not coincide with existing streams / water, or with retaining walls

Unless spot elevation enforced, contours will not coincide with existing elevation text

- LiDAR – derived contours valuable for planning / profiling, but not best for cartographic accuracy

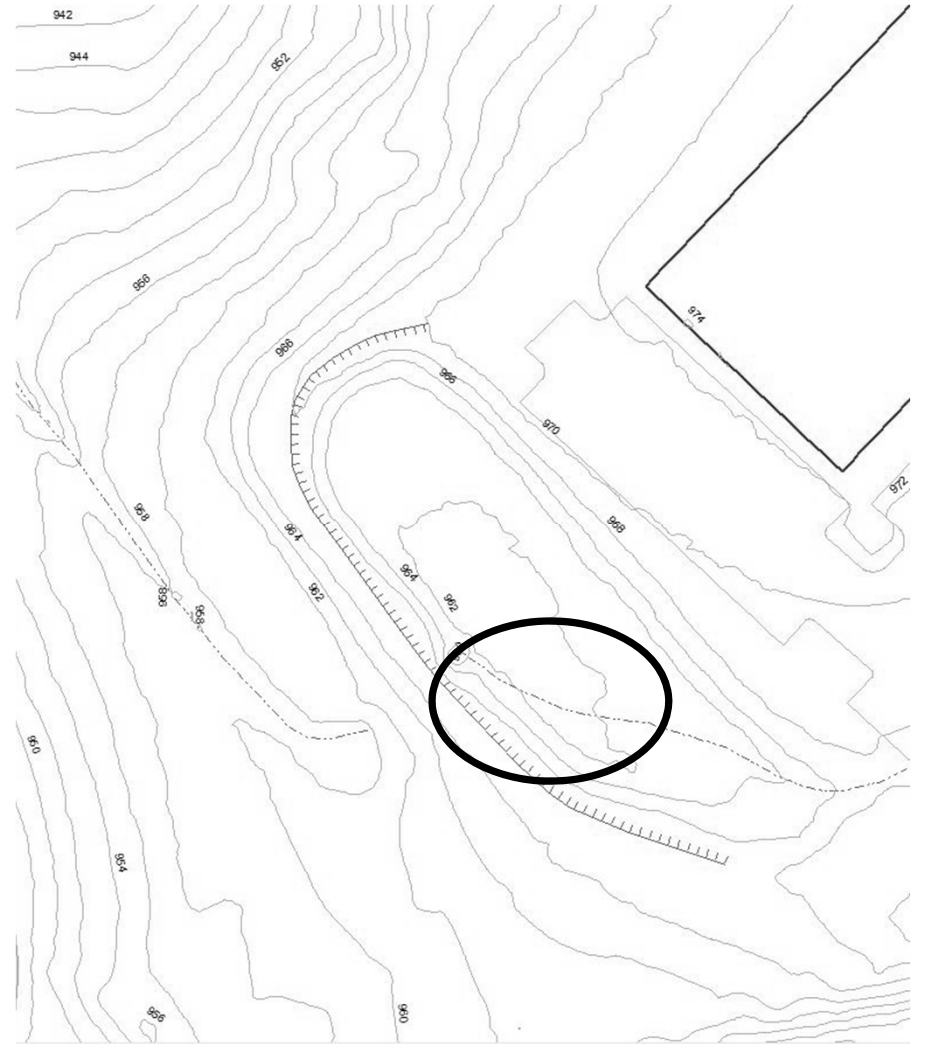
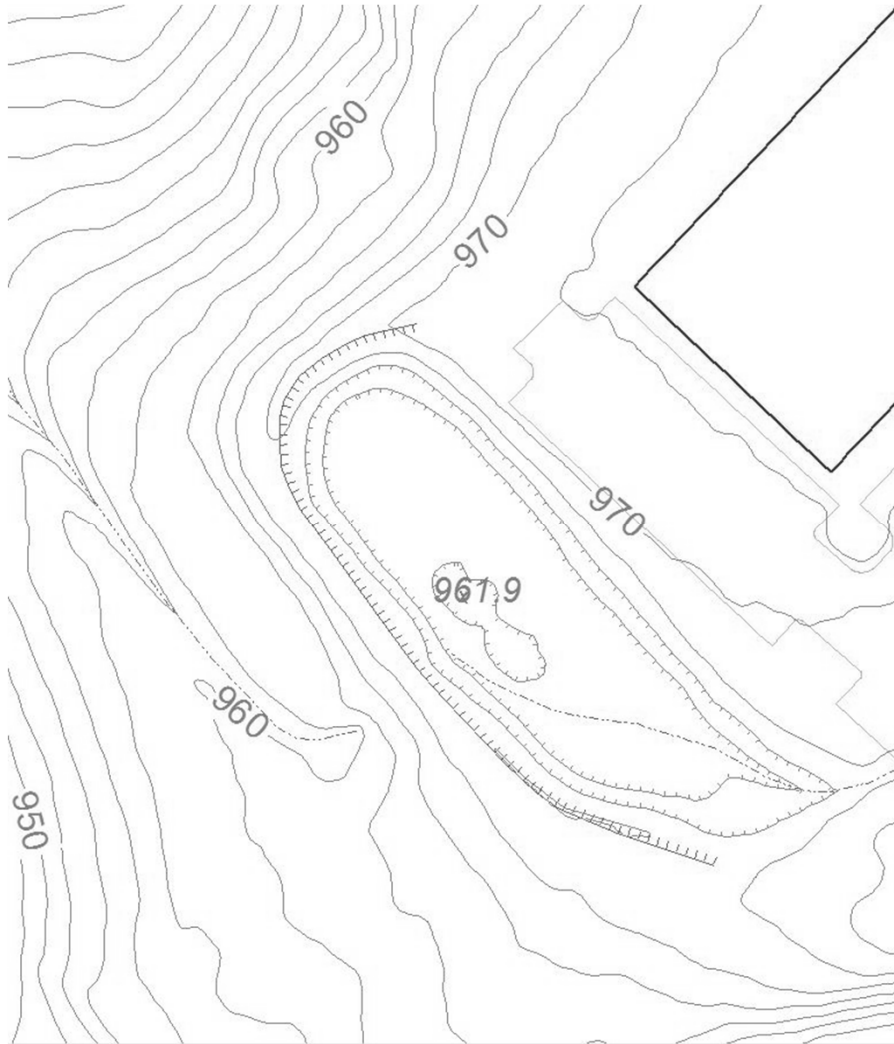


Topographic Contours Comparison

Current

vs.

Proposed LiDAR-Based

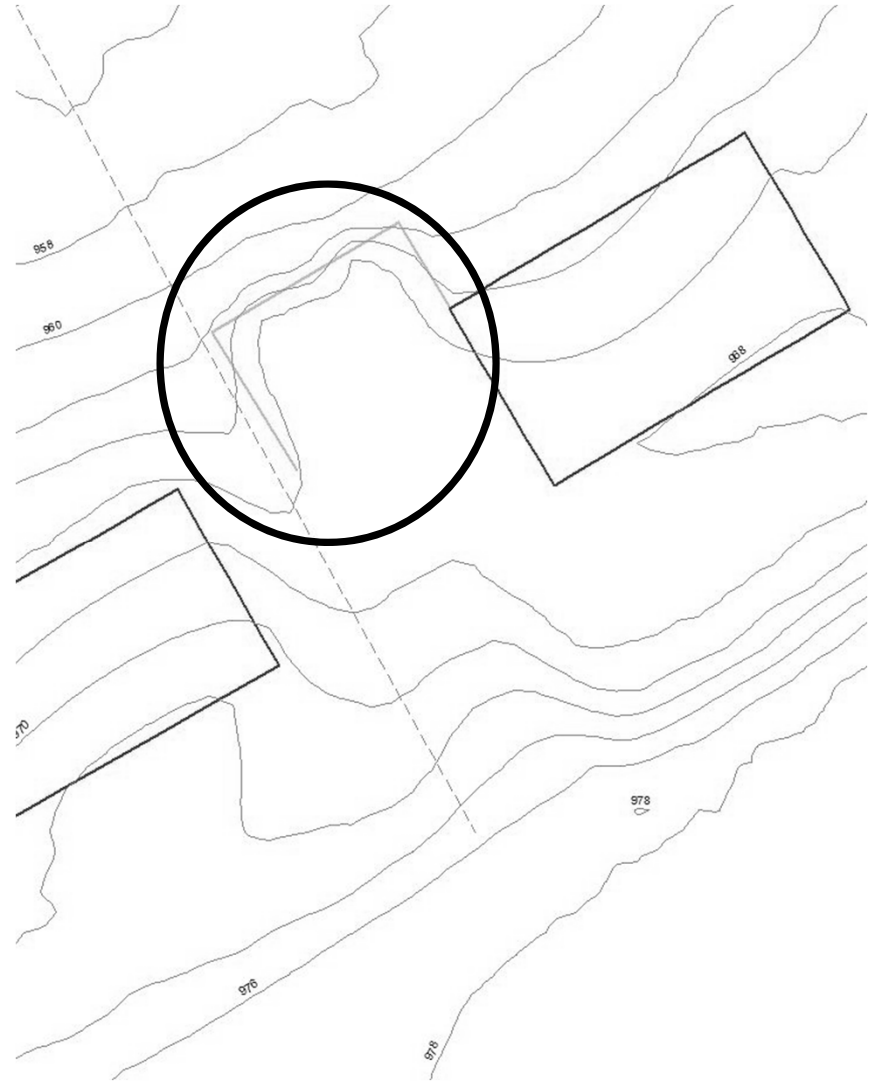
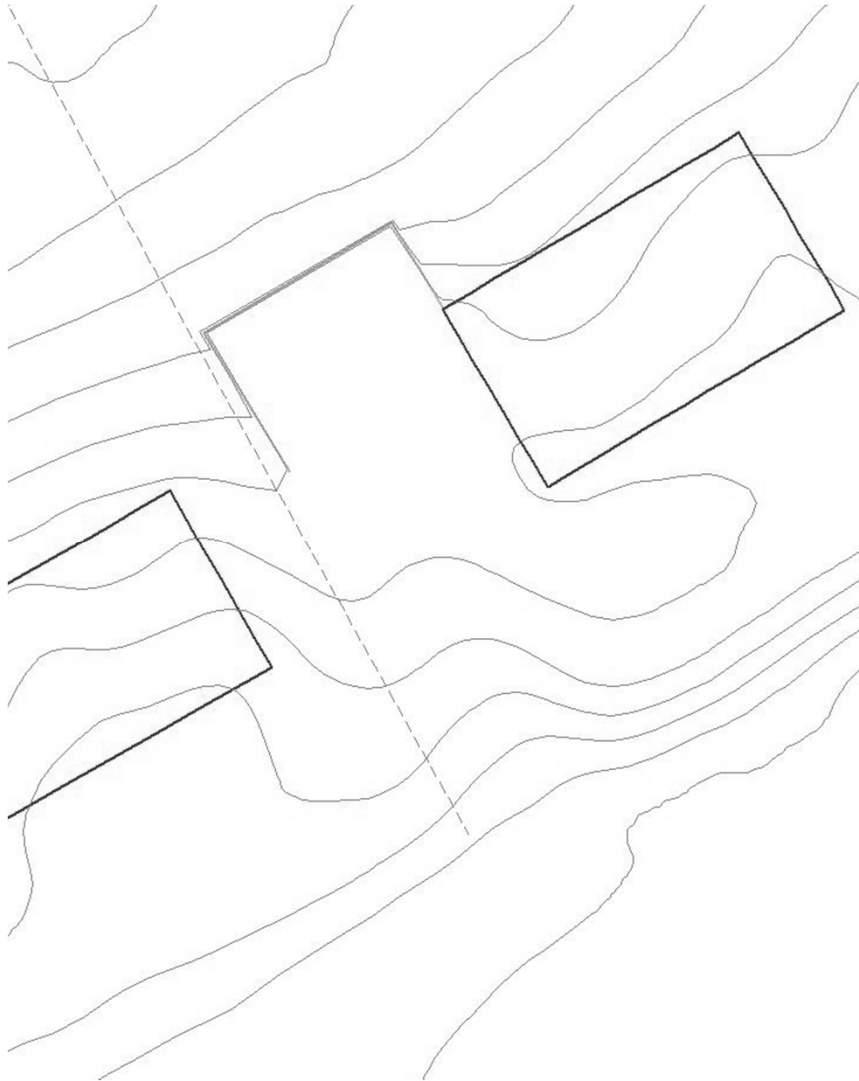


Topographic Contours Comparison

Current

vs.

Proposed LiDAR Based



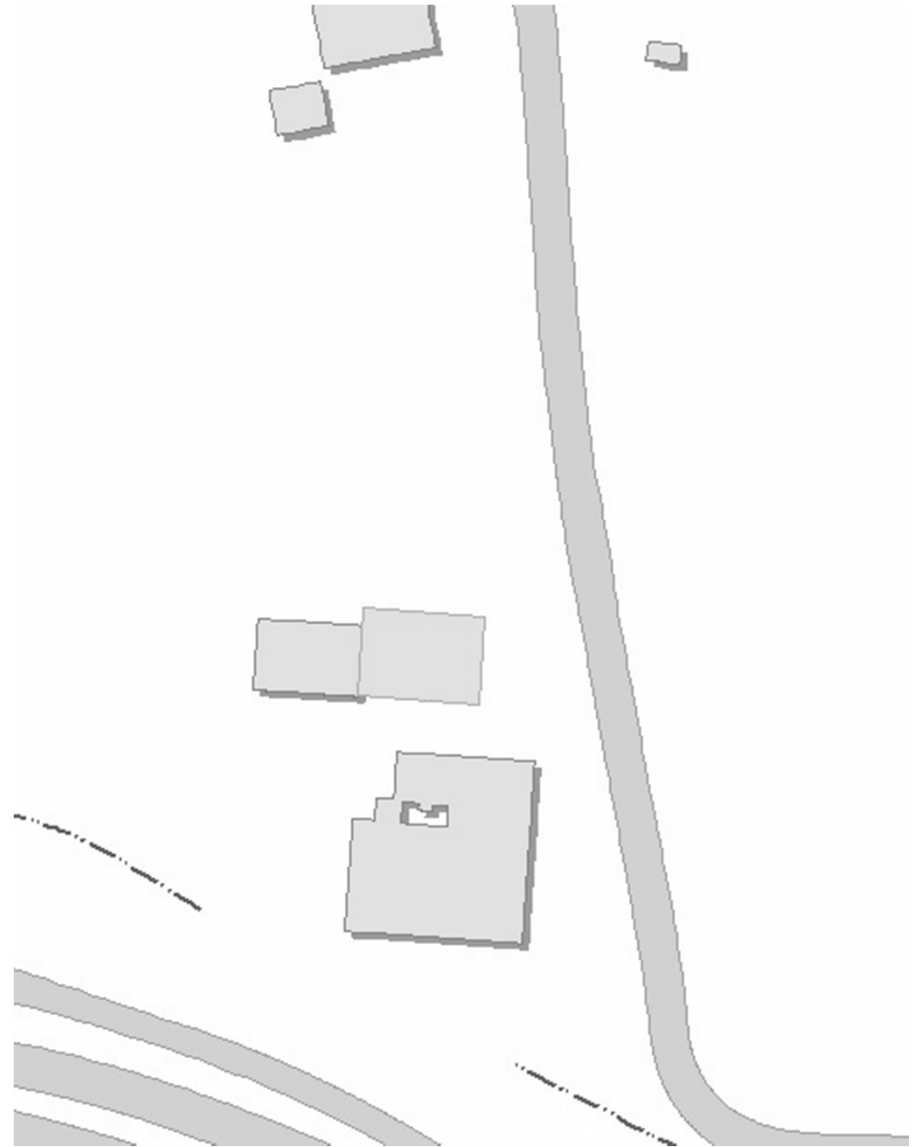
Compile Reduced set of Planimetric

Compilation of limited amount of planimetric features from the new ortho-photography

- Edges of Travelled Way / Shoulders
- Hydrographic
- Building Footprints

Should also consider including Spot Elevations, Dams, Retaining Walls, Bridges

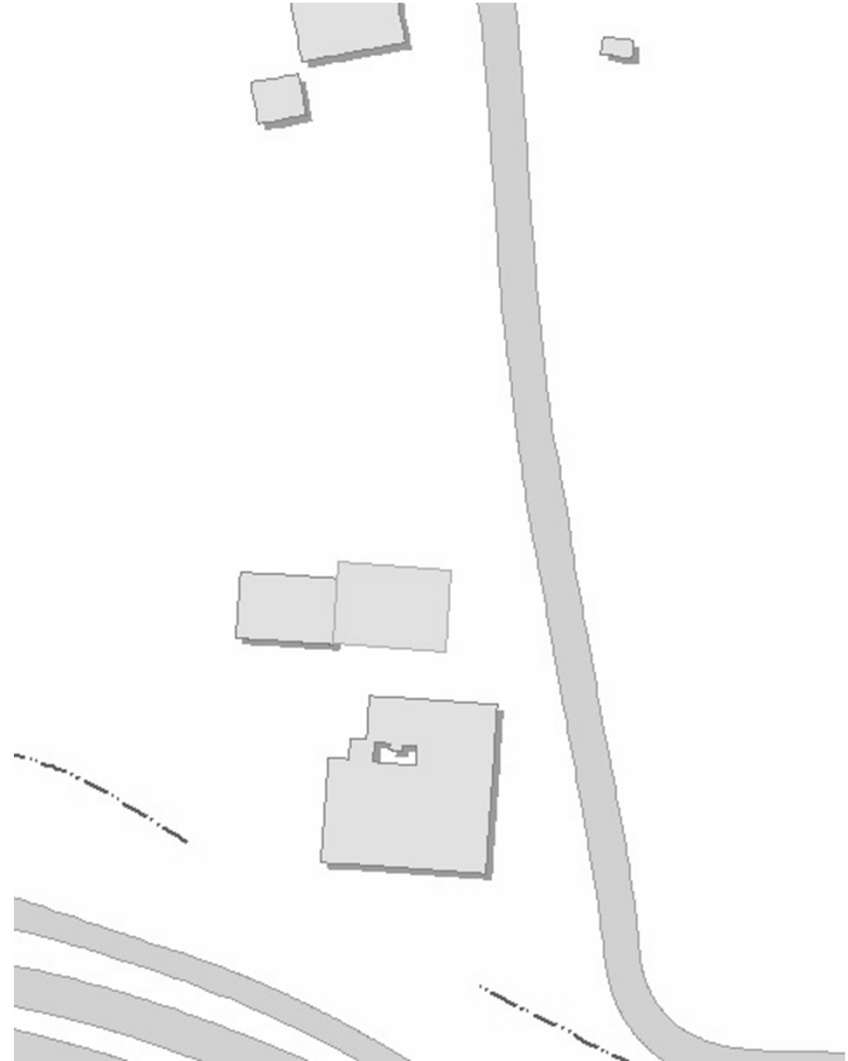
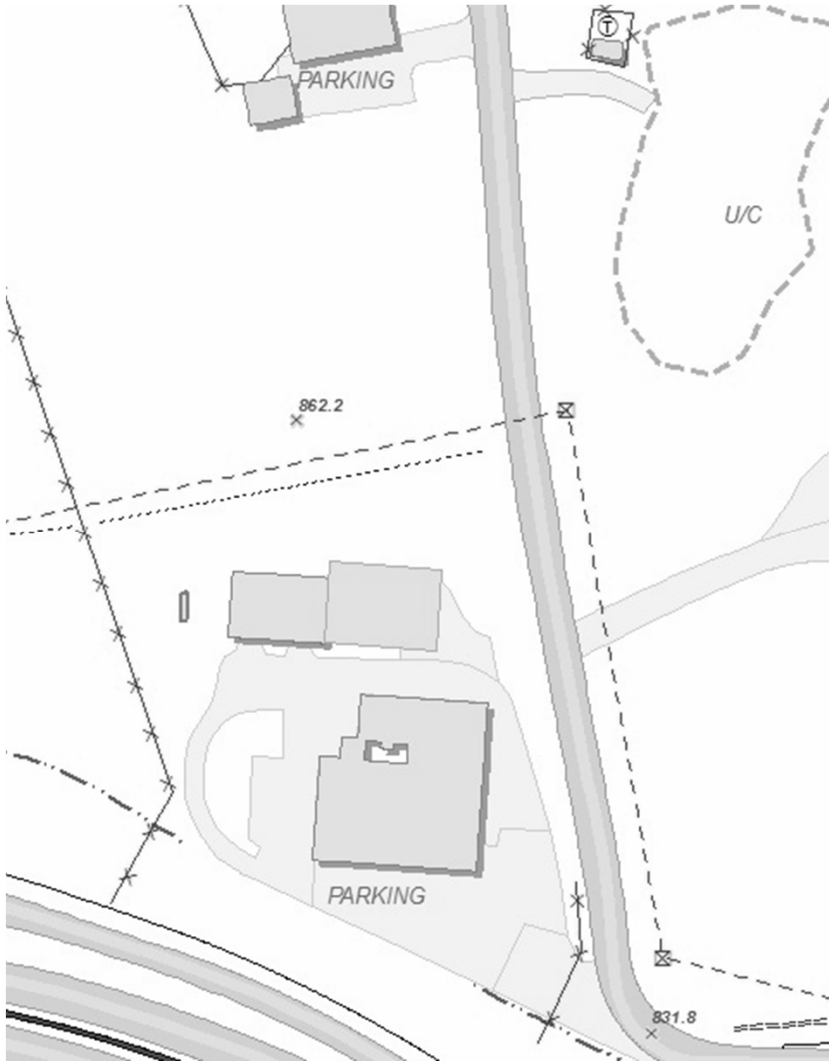
Estimated Cost
\$50,000



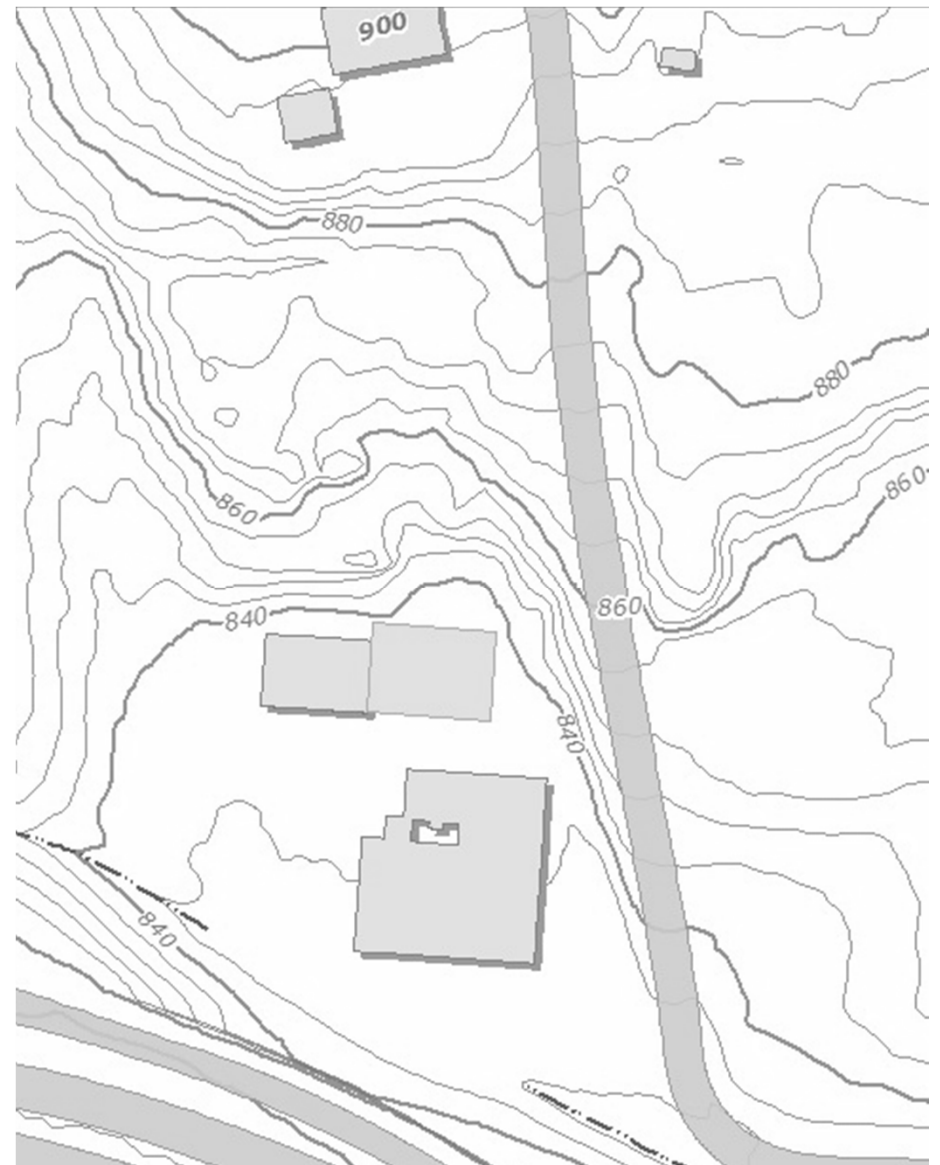
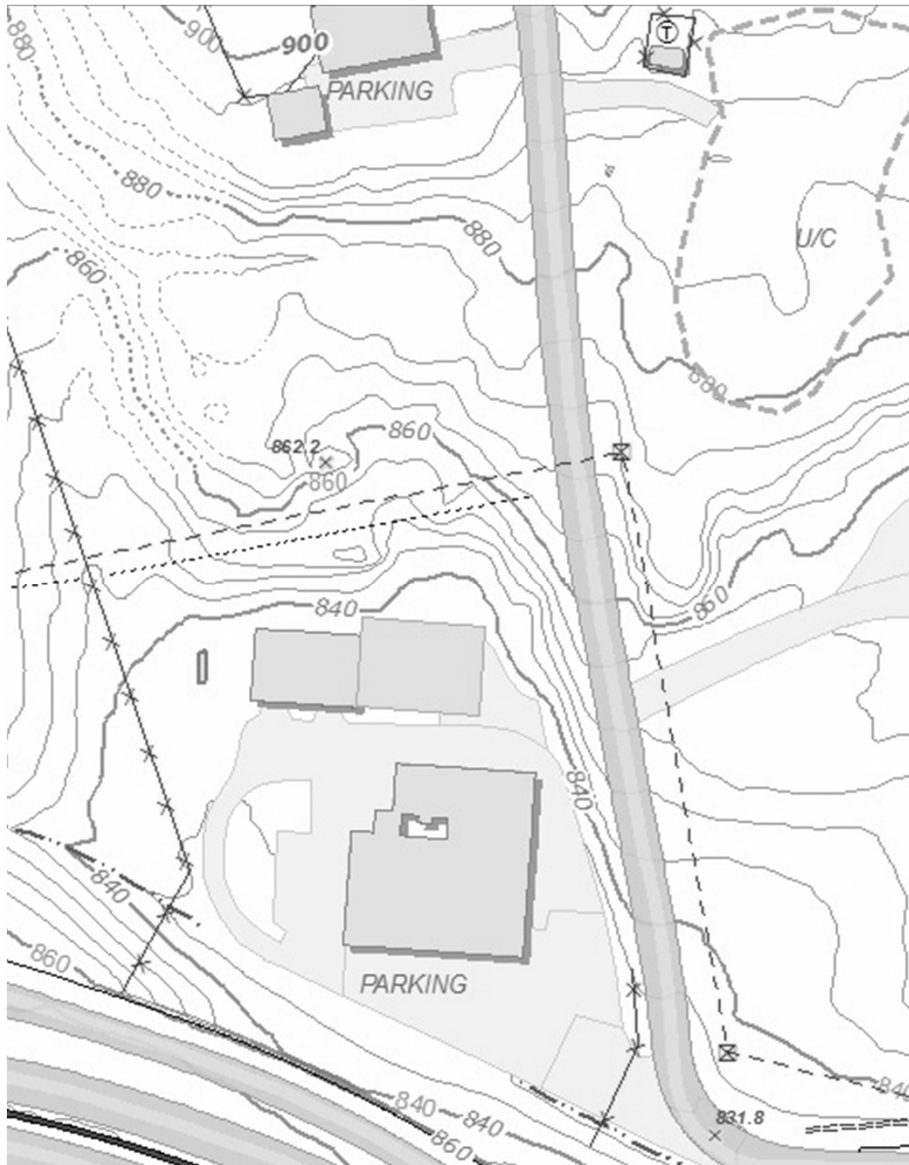
Planimetric (3-d)

Comparison

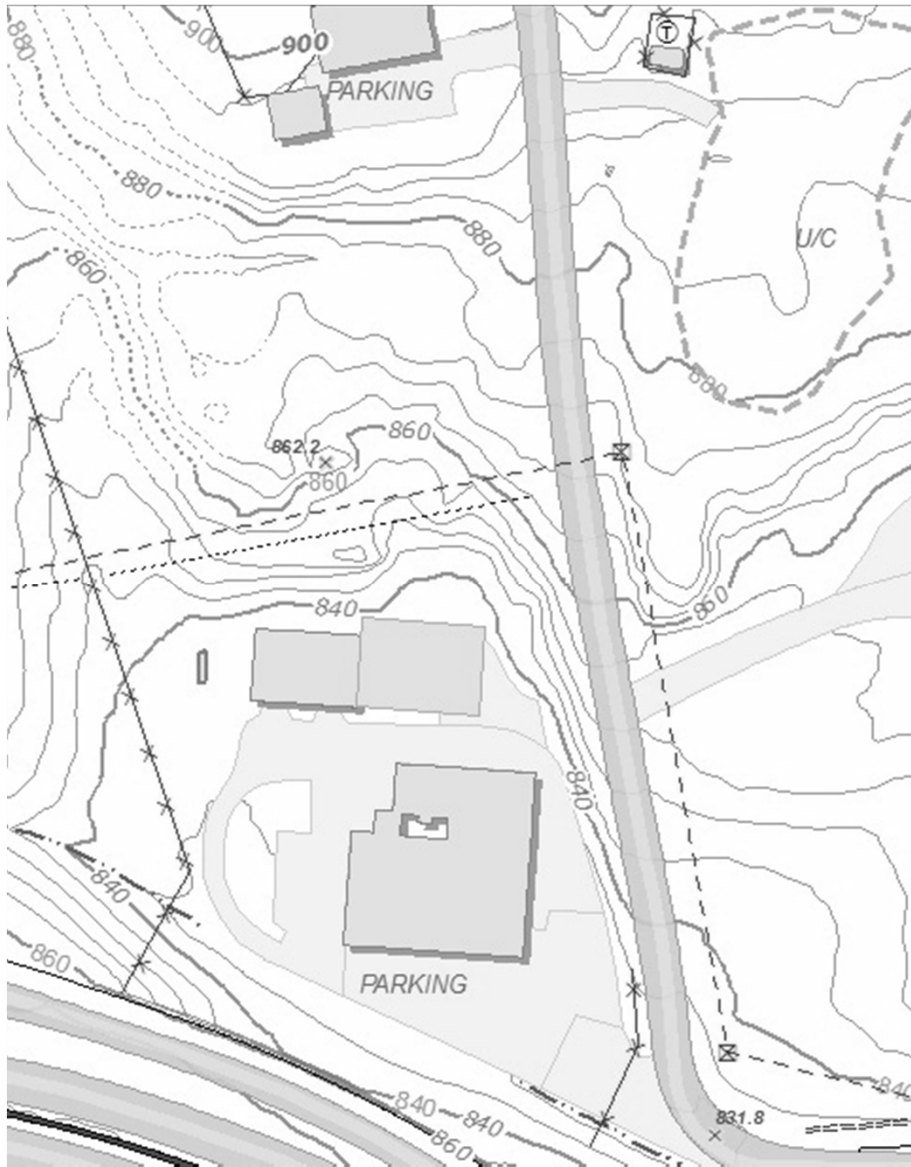
Current Planimetric vs. Proposed Planimetric



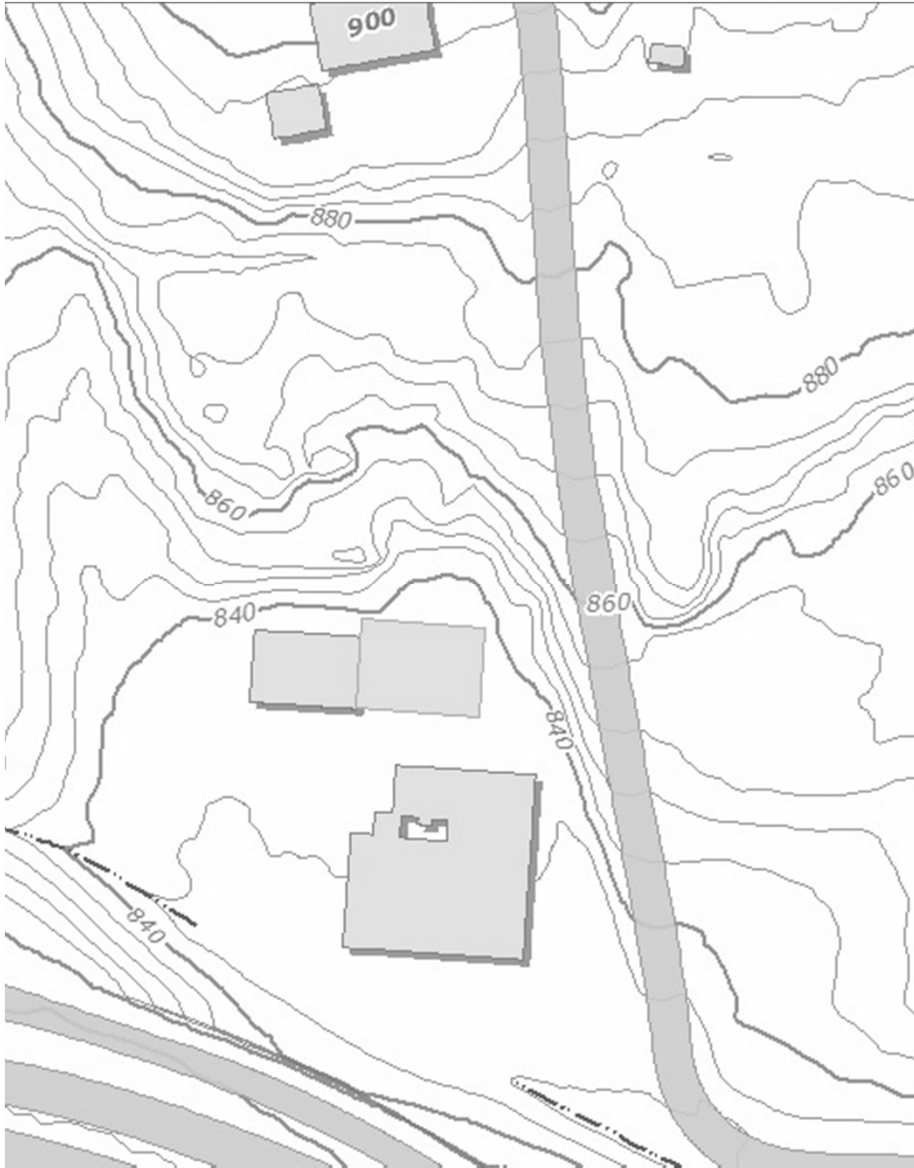
Compare Current Map vs. Proposed Map



Compare Current Map vs. Aerial



Compare Proposed Map vs. Aerial



Projected Costs

by Plangraphics, Nov. 2013

Obliques		Oblique “bird’s-eye-view” photos from each of the four compass directions
Orthos		4” and 6” resolution areas; minimal control
LiDar	\$72,200	LiDar Point Cloud used as a base for all derivative products, including the AccuPlus orthos
Ortho AccuPlus	\$75,800	3” and 6” resolution areas; enhanced w better accuracy and improvement from occlusions and seam-lines
LiDar Extracts	\$20,000	Semi-automated derivative products of the Lidar: DEM, contours, tree canopy, spot elevations (?), depression contours (?)
Planimetric (3-D)	\$50,000	Compile reduced set of features: major roads, hydro, buildings

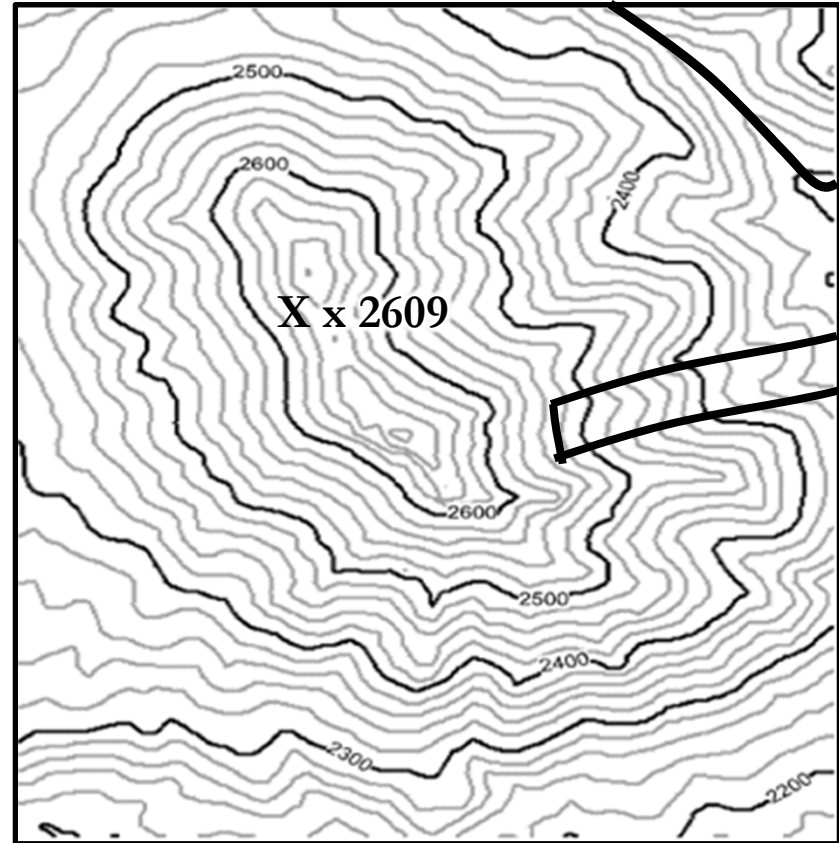
Other Items To Consider

Re-Generate Topographic

Using:

- LiDar
- Updated spot elevations
- Updated Hydrographic
- Updated Edges of Traveled Way
- Retaining Walls

Cost Est:
\$30,000

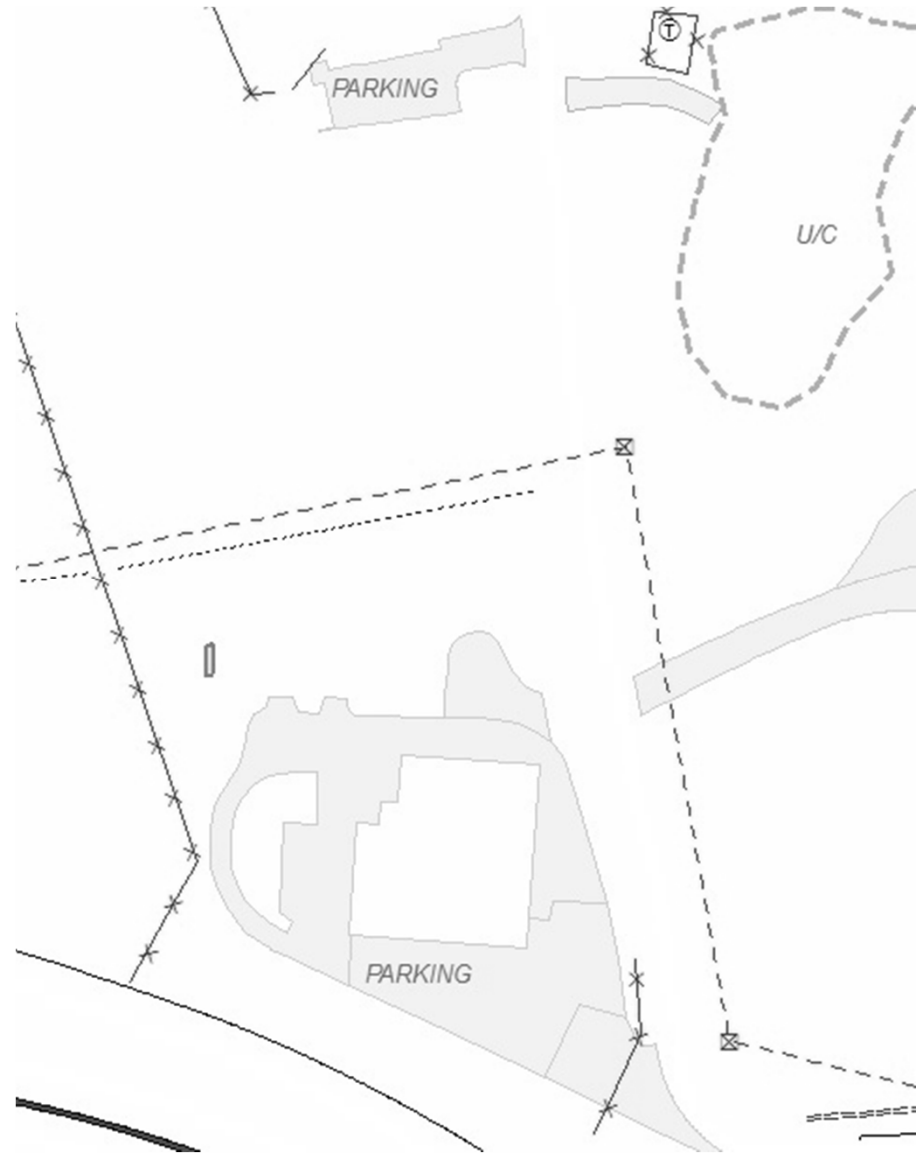


Other Items to Consider

Heads-Up Digitize
other planimetry as
needed

- existing staff
- interns
- contracted labor

Cost Est:
\$15,000



Features Maintained on As-Needed Basis

- fences
- apparent property lines
- areas under construction
- transmission lines
- ruins
- jersey barriers
- sidewalks
- parking
- driveways
- paved courts / surfaces
- annotation / labels
- elevated / obscured attributes
- dams
- railways
- swimming pools
- tanks
- towers
- greenways



















Projected Costs


















with KGIS Adjustments to Plangraphics

Obliques			Oblique “bird’s-eye-view” photos from each of the four compass directions
✓ Orthos			4” and 6” resolution areas; minimal control
✓ LiDar	\$ 72,200		LiDar Point Cloud used as a base for all derivative products, including the AccuPlus orthos
✓ Ortho AccuPlus	\$ 42,300		3” and 6” resolution areas; enhanced w better accuracy and improvement from occlusions and seam-lines
LiDar Extracts	\$20,000	\$100,000 Capital Cost	* Semi-automated derivative products of the Lidar: DEM, contours, tree canopy, spot elevations (?), depression contours(?) + improved classification
Planimetric (3-D)	\$50,000		* Compile reduced set of features: major roads, hydro, buildings
Topographic (hydro)	\$30,000		* Re-generate cartographic improved contours that are hydro enforced
Planimetric (2-D)	\$15,000		Compile and update other features that can be easily seen from orthos: parking, driveways, sidewalks, swimming pools, tanks, transmission lines

Plangraphics Proposal: 2 yr Aerial, 8 yr Lidar

	Orthos \$76k	LiDar \$72k	Elevation \$20k	3-d Plan \$50k	Topo (Hydro-based)	2-d Plan	Cost
2014	 Accu						\$168,000
2015				 3-d	 H	 2-d	\$50,000
2016	 Accu						\$75,800
2017						 2-d	\$0
2018	 Accu						\$75,800
2019						 2-d	\$0
6-yr Total: \$ 369,600 \$61,600 / yr							
2020	 Accu						\$75,800
2021						 2-d	\$0
2022	 Accu			 3-d			\$168,000

KGIS Proposed Option 1: 2 yr Aerial, 6 yr Lidar

	Orthos \$76k	LiDar \$43k	Elevation \$20k	3-d Plan \$50k	Topo (Hydro-based) \$30k	2-d Plan \$15k	Cost
2014	 Accu						\$126,000
2015				 3-d	 H	 2-d	\$115,000
2016	 Accu						\$76,000
2017						 2-d	\$15,000
2018	 Accu		6-yr Total: \$ 423,000 \$70,500 / yr				\$76,000
2019						 2-d	\$15,000
2020	 Accu						\$126,000
2021				 3-d	 H	 2-d	\$115,000
2022	 Accu						\$76,000

KGIS Landbase Budget

Year	Cost
1985 Flight	\$2.4 million (<i>initial bond</i>)
1990-2001	\$200,000 / yr
2003	\$350,000 / yr
2007 / 2008*	\$200,000 / yr
2010	\$200,000 / yr
2015	\$ 70,500 / yr <i>to \$100,000 / yr</i>