

Applications of Oblique Aerial Imagery

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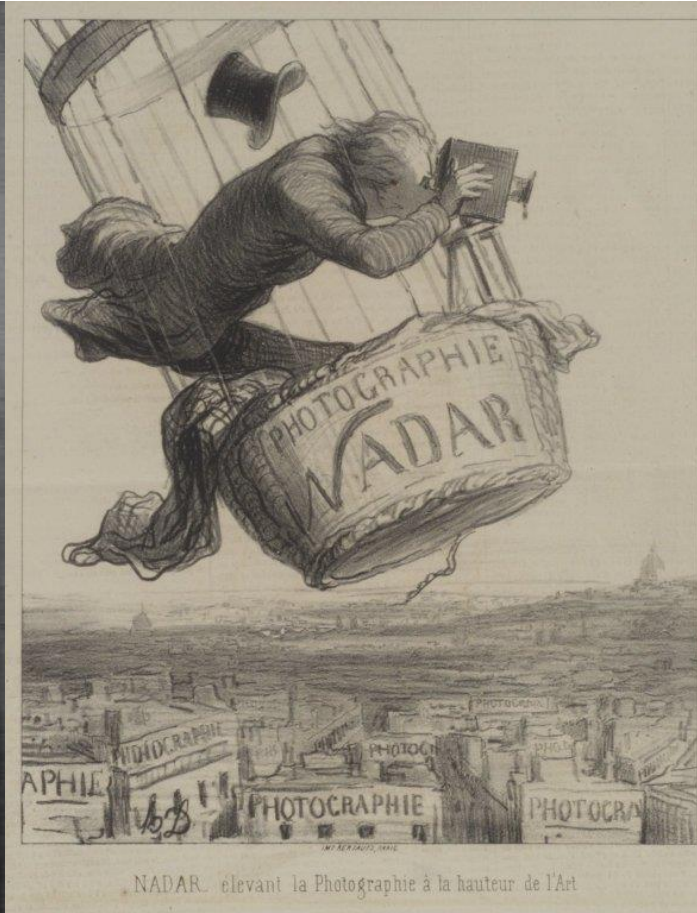
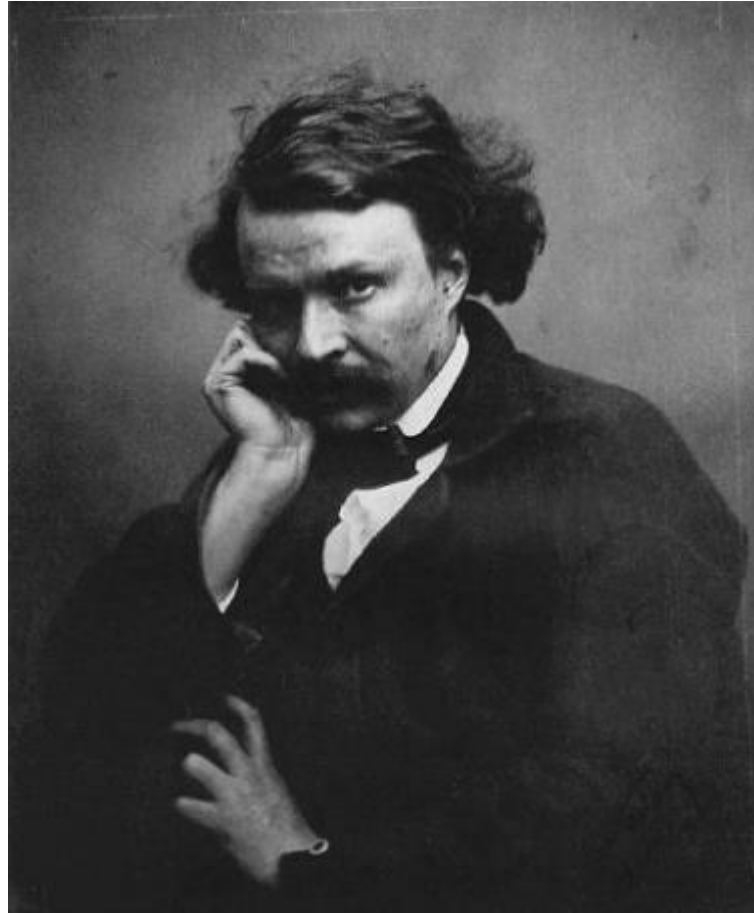


Pioneers in Aerial Imagery



Gaspard-Félix Tournachon “Nadar”

1858 First Aerial Image



James Wallace Black, 1860

“Boston as the Eagle and the Wild Goose Sees It”



Julius Neubronner

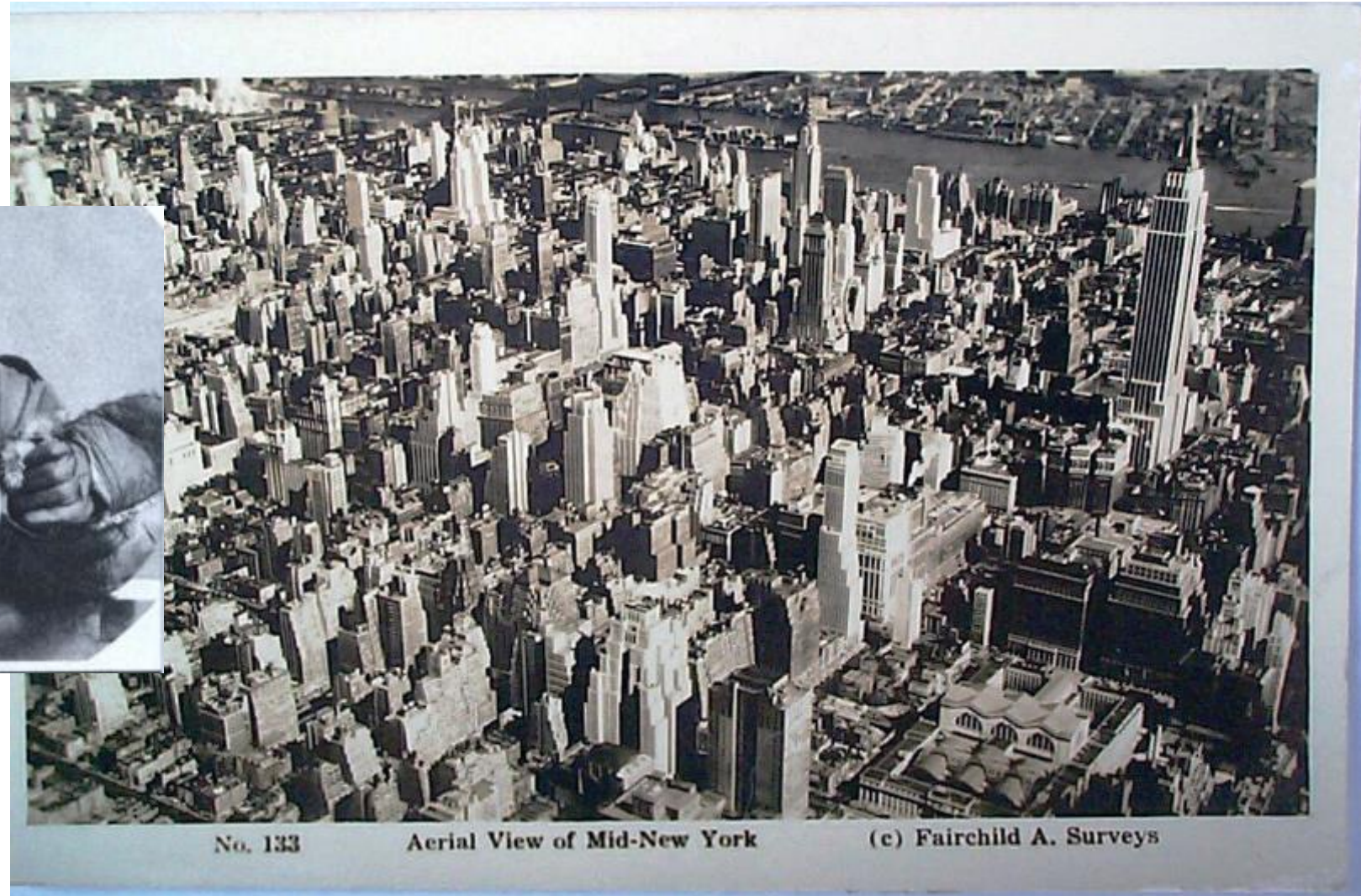
Pigeon photography, 1907



Fairchild Aerial Camera 1929



Camera Operator, Fairchild Oblique image of Manhattan



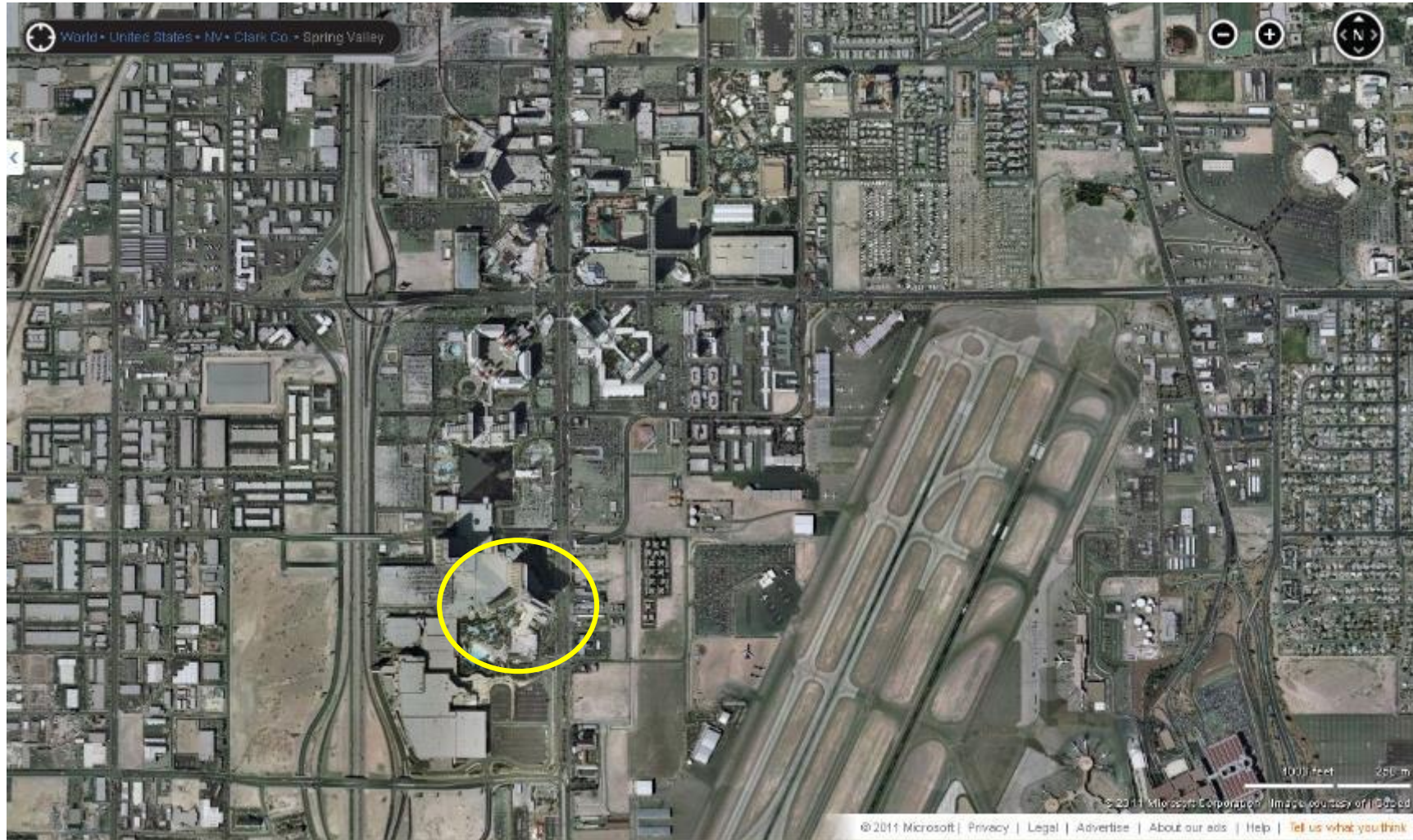
No. 133

Aerial View of Mid-New York

(c) Fairchild A. Surveys



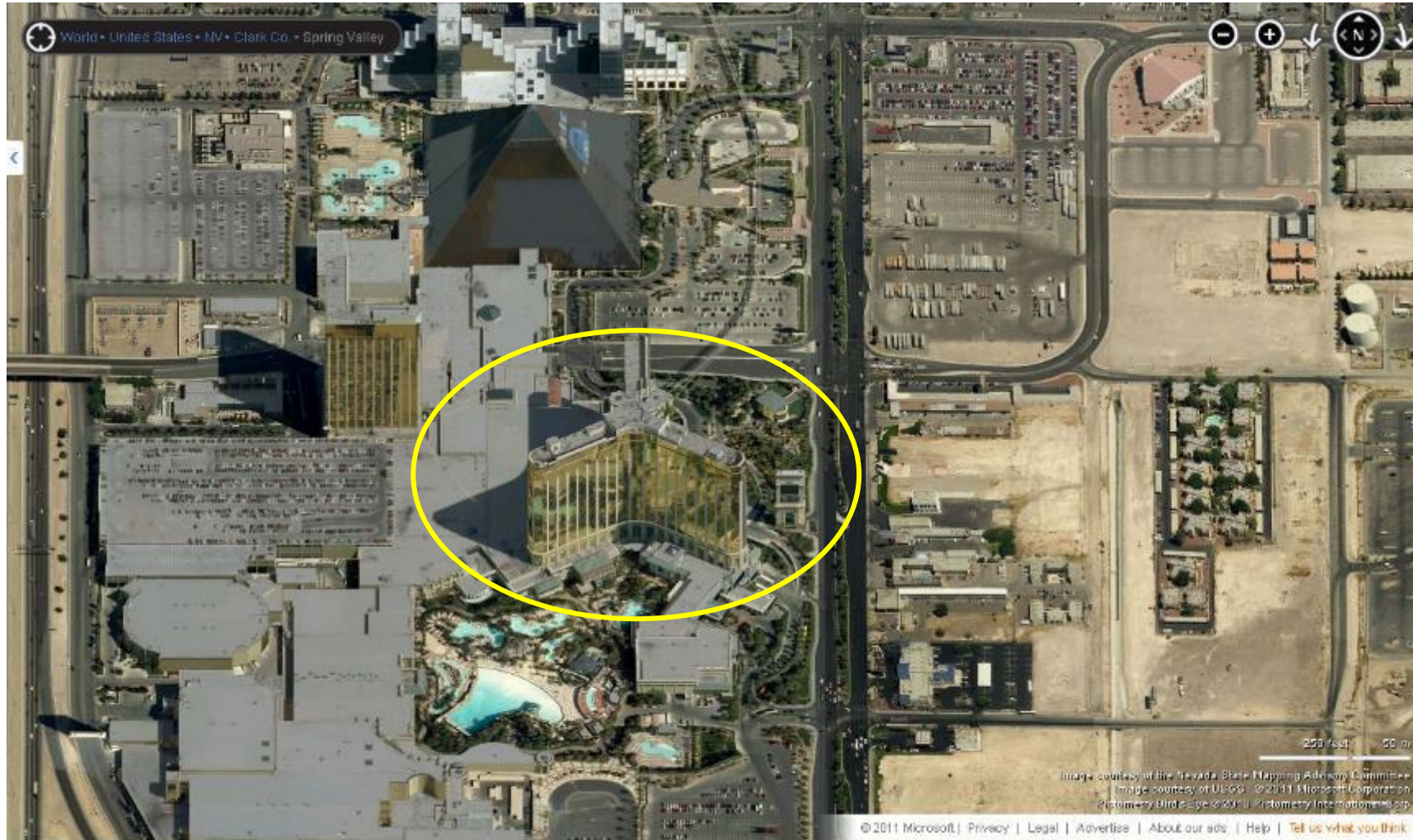
Aerial Imagery Before 2000



The world viewed straight down and at medium resolution (~12 Inch GSD)



Aerial Imagery After 2000



The world looked at an angle and at high resolution (~3 inch GSD)



Oblique Images Before 2000



Oblique aerial images were just pretty pictures



Oblique Images After 2000



Oblique aerial images were measurable, metric, and GIS ready



Oblique Images After 2014



Oblique aerial images were high resolution, allowing for greater accuracy and opening up many more applications for use.



Traditional Ortho Imaging



Oblique Imaging



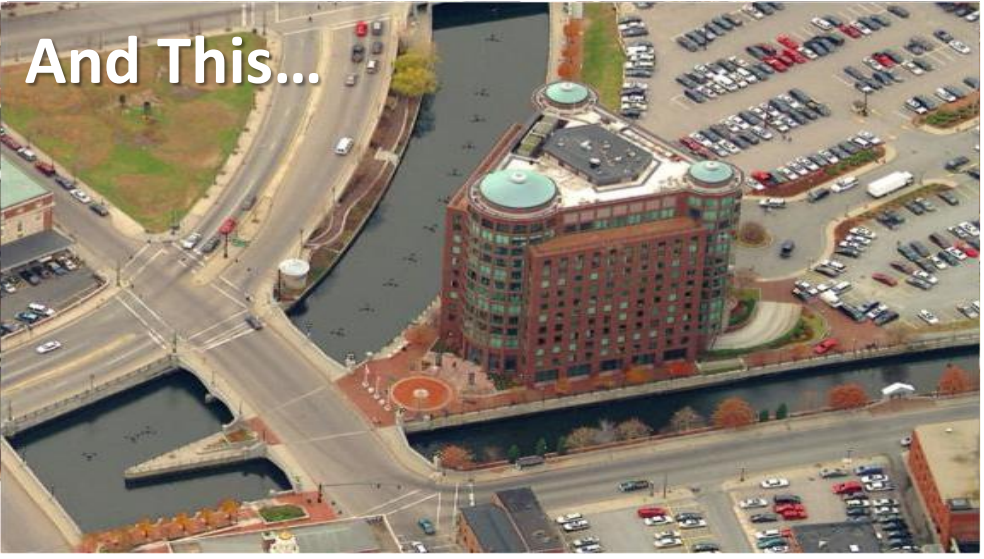
So In Addition To This...



You Get This...



And This...



And This...



What make the imagery unique?

- Captured at a 40 degree angle
- Allow user to view locations from multiple angles
- Metadata imbedded into pixels
- Ability to measure accurately



About Image Capture



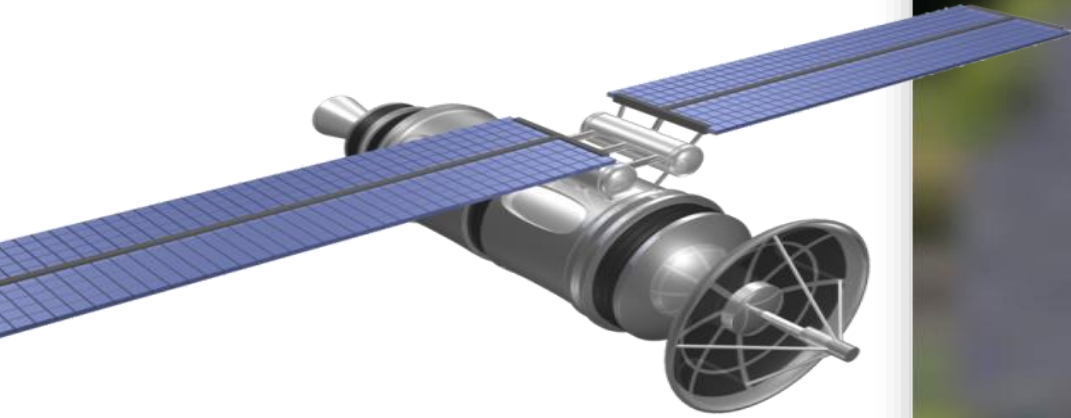
Innovated the capture of aerial metric oblique imagery and its measurement.

40°

Images are captured from a 40-45 degree angle. Image resolution ranges from 3" to 12" ground sample distance (GSD).



Satellite



Satellite: 18 inches per pixel



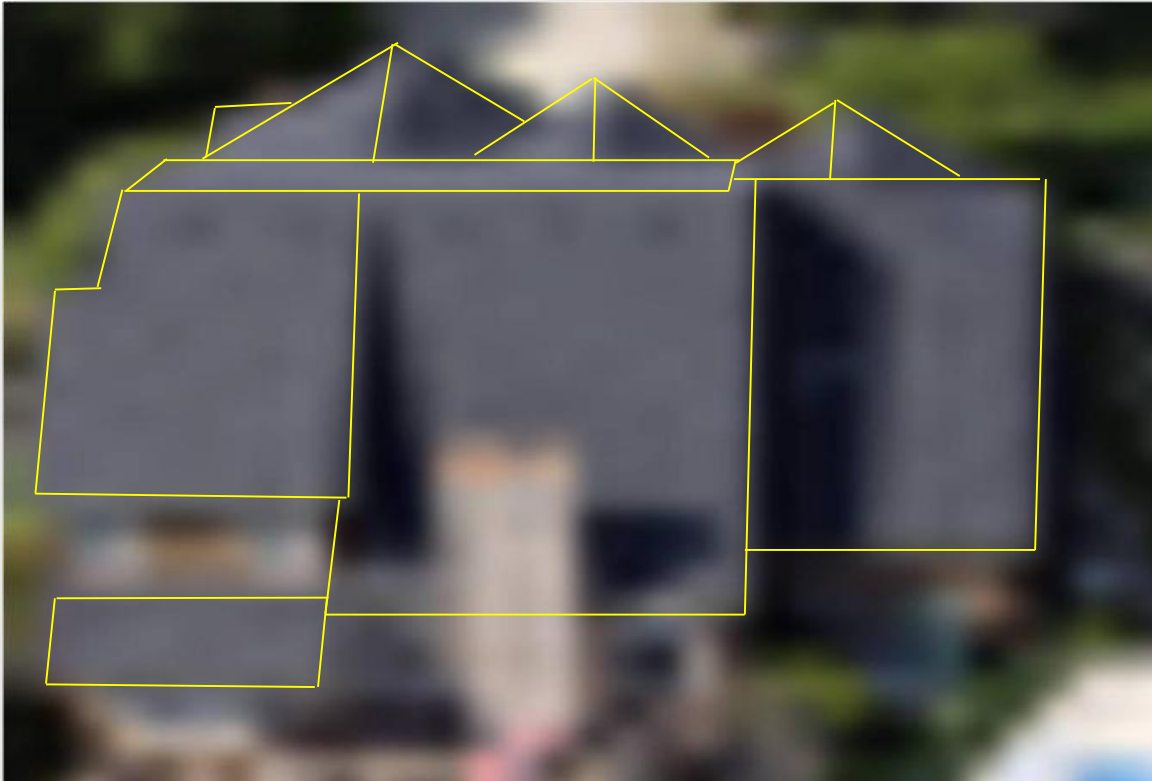
Aerial



Aerial: 2-6 inches per pixel



Image Technology



1 pixel per 18 inches



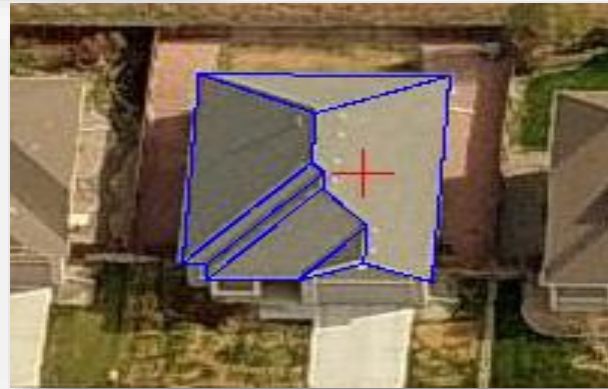
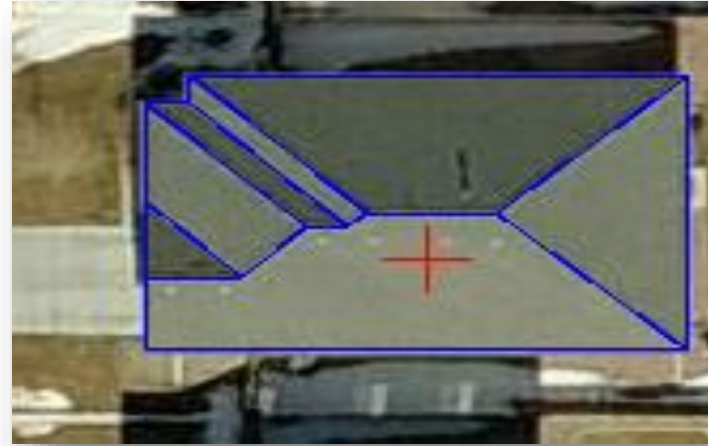
1 pixel per 2-6 inch



Specialized Capture Process



3D Technology



GIS / Geography Programs

Remote Sensing Applications

Ortho and Oblique Imagery

Preplanning for field visits

As a base map for viewing data

ArcGIS Extension

KML File Use and Creation

Shapefile Use



Business GIS

Target markets

Demographical data

Site location

Logistics

Insurance

Construction



Urban Planning and Development

Site Development

Before and After

Cityscapes

3D Models

Blight Mapping

Redevelopment

Crime Mapping



Natural Hazards and Disasters

- Flooding
- Coastal Hazards
- Tornadoes
- Hurricanes
- Wild Fires
- Biological Hazards



Hydrology

- Sink holes
- Stream heads
- Septic systems
- Watershed conservancy
- Change detection



Examples of Use

- Assessment
- Public Safety
- Insurance
- Construction
- Infrastructure



Examples of Use

Assessment

- Property review
- Change Detection

Public Safety

- 9-1-1 centers
- Police/Fire
- FEMA
- Emergency Management



Examples of Use

Insurance

- Risk Management
- Flood Insurance
- Pre/Post disaster
- Claim Management

Construction

- Site Location
- Roof and Wall Reports
- Estimating

Infrastructure

- Site Location
- Roof and Wall Reports
- Estimating



Connecting Washington and Fayette Counties

Bethany Bowersox, Jared Mendicino, Ryan Novelli, Nick Roberts, and Chris Schreiber

The purpose of this project was to determine which locations in Washington and Fayette Counties would benefit from the construction of a bridge.

Using various tools such as Pictometry imagery, Digital Elevation Models (DEM), and ArcGIS helped determine that Allenport and Fayette City, PA would benefit most.

About 9,565 residents will benefit from the construction of a bridge (US Census Bureau). Areas near Allenport and Fayette City will also benefit. Travel time will be reduced for those who want to get from one area to another. The bridge would serve a wide age range, from college students



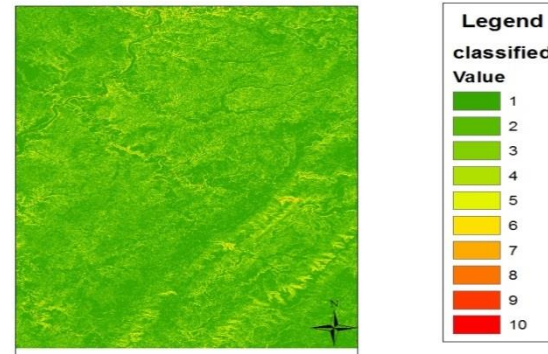
Both Allenport and Fayette City, PA are located near the Monongahela River. Those who want to travel to and from these locations need to go around the river. Constructing a bridge across the Monongahela would reduce travel time and distance. The image above shows both the boroughs of Allenport and Fayette City, PA. This was taken from Pictometry. The map to the right depicts a slope analysis of the selected locations. The values are classified from one to ten: One representing gradual slope, ten representing steep slope.

Several tools in both Pictometry and ArcGIS were utilized in the project. In Pictometry, the distance and slope tools were used where construction should take place. The distance from Allenport to Fayette City while traveling Interstate 70 and PA-201 is about 43,824 feet. The PA-88 and PA-906 Route distance is 33,792 feet.. A bridge across the river would cut travel to 938.87 feet.



Slopes of Selected Locations

Allenport and Fayette City, PA



0 28,567,000 114,000 171,000 228,000 Feet

Map Created By: Bethany Bowersox
April 27, 2014
Data From: USGS

Part of this project also entailed determining what type of bridge would be best to build across the river. After researching different types of bridges, the best type of bridge for this project is a Box Beam bridge. The low structural deficiency, high performance levels, curvature, and durability were the factors taken into consideration when selecting the proper bridge type.

There are many factors which need to be considered determining the cost of a bridge. The factors include, height, number and height of piers, number and type of bridge shoes, and location and length of steel pipe.

According to the California Department of Transportation Division of Engineering Services, the average cost of per square foot of a Box Beam bridge is between \$130-\$200. After multiplying the number of square feet by the cost, the total cost of the bridge would range from \$1,220,531-1,877,740.

Preserving Farmland:

Effectively Maximizing Farmland for Preservation and Productivity.

Nikolas Douventzidis, Cindy Anchor, Ray McGrew, Ryan McGrew
The Property



"To conserve and enhance pheasant and other wildlife populations through habitat restoration and improvements in the land," Habitat Forever, LLC.

Mission Statement



The Goal: Habitat Forever LLC., in partnership with landowners, works to maintain the quality and integrity of the wilderness that surrounds and overlaps farmland. On this property, streams will be protected, natural flora planted, and habitats will be established for the endangered Golden-wing warbler and the American Woodcock, all while redesigning the pasture layouts for increased efficiency of land usage. By using Pictometry Online we can estimate the amount of materials needed to complete a project set out by Habitat Forever LLC.

Construction of a Stream Crossing



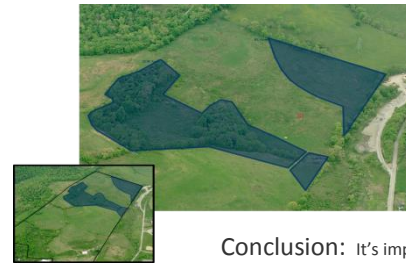
How It's Done: Much of the work done involves the construction of electric fences. These fences keep the livestock removed from areas of concern, such as streams and endangered species habitats. Stream crossings and armored pathways protect the integrity of streams, stream banks, and areas of high traffic. Several layers of differently graded stone are layered to lift the livestock above the mud and prevent any degradation,

4. Interior Fencing: It is important to rotate use of the pasture when grazing cattle in order to preserve its integrity. The pasture grass may die if grazed off too close to the ground, increasing the chance of erosion and costing the farmer time and money to reseed. To avoid these negative effects, we plan to install interior fencing to create sections of pasture that can be grazed in rotation. Additionally, interior fencing will be placed to keep the cattle out of the CREP areas. All interior fencing will have posts placed 10 feet apart, and will consist of 3 strands of hot wire.

Inferior Fencing



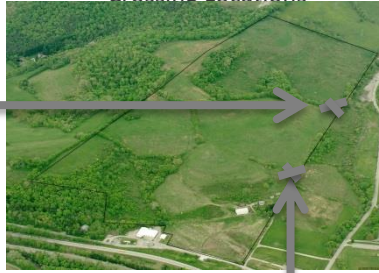
CREP Areas



1. Exterior Fencing: Exterior fences on a livestock farm serve many useful purposes. Most importantly they are used to keep livestock inside the property and keep predators out. Having a strong, durable fence is very important to farmers because they lose money every time livestock escapes from the property or is predated upon by an intruding predator animal. Electric fences are most useful when it comes to keeping livestock in and predator animals out. The construction process of fences and other structures on a livestock farm is strictly monitored by the NRCS. They make sure all of the environmental rules and regulations are followed when it comes to farmland development.

2. Stream Crossings: For this site, two stream crossings had to be added. Often when a stream outlines a pasture field, the livestock tend to migrate to it causing sediment erosion and an increase in nutrients that can pollute the water. Stream crossings give the livestock a chance to cross the stream without getting stuck in the soft/muddy area around the stream or polluting the stream through their waste. According to the NRCS, stream crossings must be a minimum of 12 feet wide.

Crossing Locations



Wiring	(in feet)	Product
	98545	Total Wire Needed
	24515	Distanced Fenced
		490 posts needed
Crossings	(in yards ²)	Product
	(per crossing x 2)	
	100.8	GeoTextile Fabric
	136	B4 Rock
	9.08	2A Modified Rock
		R4/R5 Rock
Armored Pathway	(in yards ²)	
	2496	B4 Rock
		2A Modified Rock

Conclusion: It's important to conserve and preserve what's left, and Habitat Forever is working to do just that. This project aids the crew in precisely mapping out and calculating the needs for the project.

Finished Property



So What's Next?: Using this information, the Habitat Forever field crew is able to go out to the job site with the proper amount of equipment to complete the job. This map can be used to provide a general idea of what is needed and where materials will go.

Materials Needed: Using the distances drawn from Pictometry Online, the second final deliverable is providing Habitat Forever with the necessary materials to bring the project to completion. Following NRCS guidelines, we were able to calculate everything from the yardage of stone needed of armored pathways and stream crossings to the number of posts and the length of wire. This information can help streamline the project and will save time and energy in estimating the materials needed, increasing the overall effectiveness.

3. Armored Paths: Heavily traveled pathways and areas of poor drainage are typically armored with stone to prevent livestock from getting stuck in the mud and to protect the integrity of a walkway. On this site, one large walkway leading from one pasture to another is being reinforced to better withstand the traffic.

Armored Pathway Location



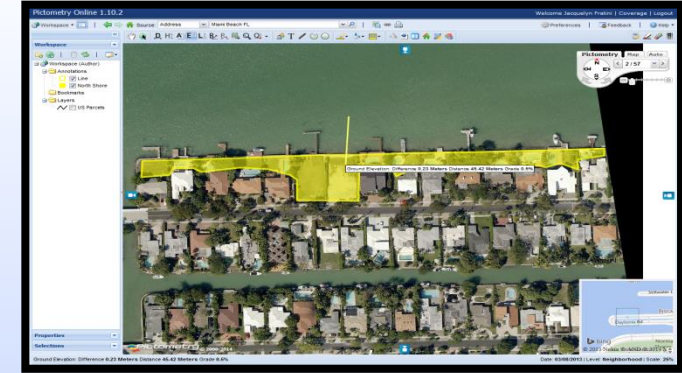
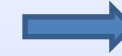
The Crossings



Loss of Coastline: Biscayne Point, FL



Jacquelyn Fratini, Kelsey O'Pry, Becky Onusko, Greg Jackson



Source: POL Biscayne Point.
The average elevation of this area is a little less than 1 meter above sea level.

Using the Area Tool we found that this site location has a total area of 33240.39 sq. m.

Average Elevation Change: 0.80m.

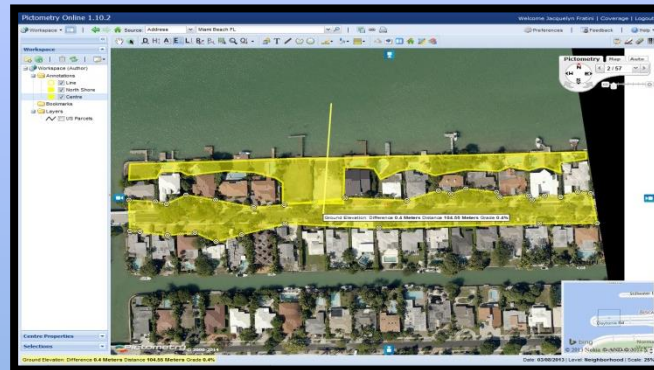


We used the Area Tool to calculate the total area.

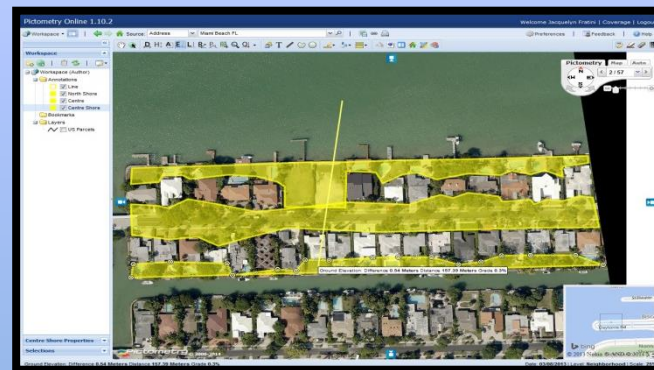
Due to the glacial caps melting caused by the increase in average temperature worldwide over the next 100 years, sea levels are predicted to rise by at least 1 meter; 2 meters if the Greenland glaciers melt. This will affect any structures on the coastline that have an elevation less than or near 1 meter.



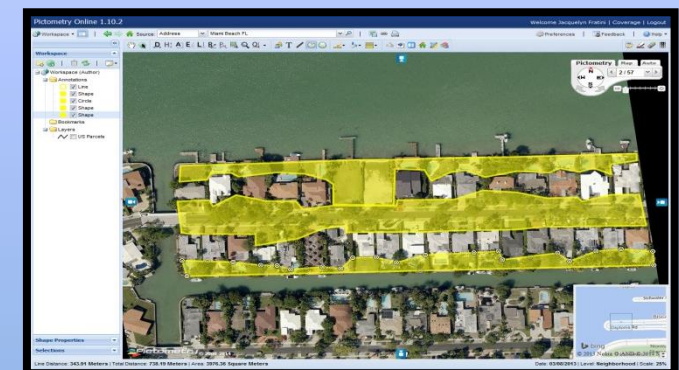
Using the Line Tool we selected the area that is under 1 m elevation



Average Elevation Change: 0.85m



Average Elevation Change: 0.15m

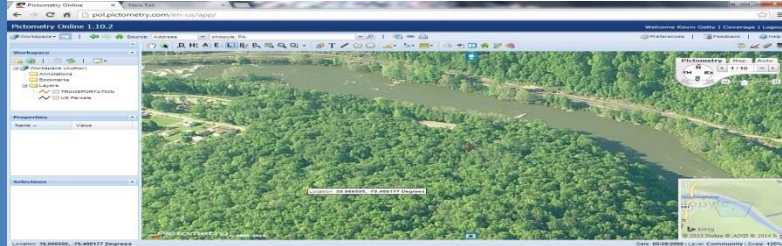


This area will be covered by ocean water within the next 100 years.

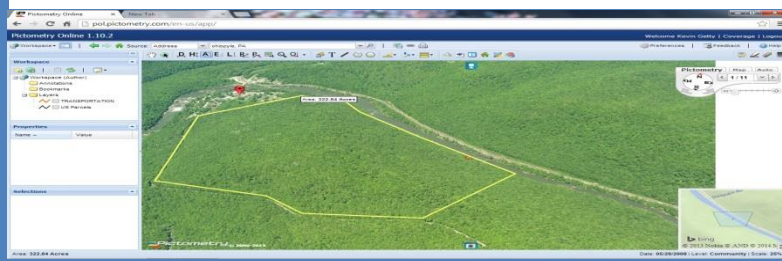


Pictometry Applications in the Real World

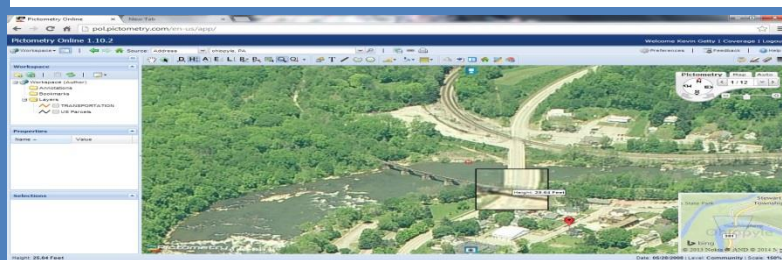
Pictometry has many uses, from finding elevations of a certain location to finding areas of locations, this project was made to show off the uses and applications of



This image shows the use of pol.pictometry.com to find the lat/long of any given location. In my example it was for a lumber company that acquired an area of land to be cut down.



When trying to find the exact area of land the company acquired that was to be cut down, we can use the area tool to find out the exact amount of acres.

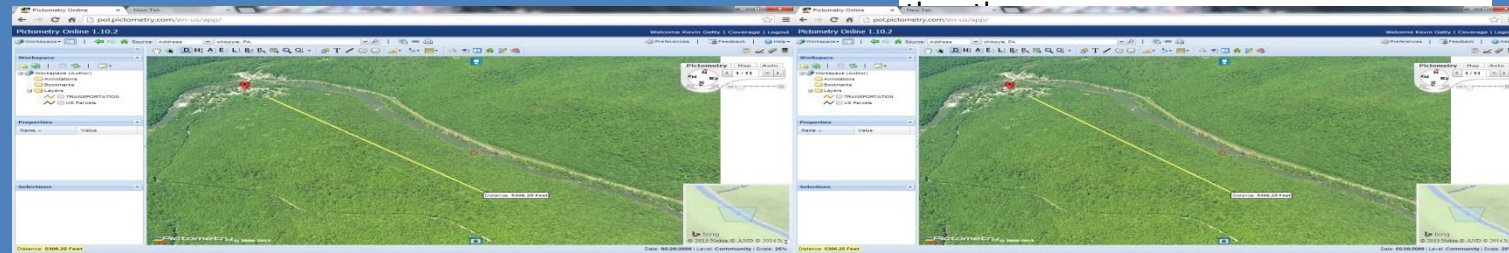


Some of the machinery required have height limitations, so underpass's and tunnels are a limiting factor to what you can bring to a site.

By: Kevin Getty



These set of images shows the elevation changes throughout the four main points of the land acquired. This helps the company determine what type of machinery they need in order to properly harvest the trees, also to see how much land they need to level to create a stable road from one end to



This set of images shows the two main roads that the logging company would have to create to most efficiently reach the largest amount of lumber, the quickest. While the third picture shows the length of the average road in the area (including sidewalks). With this we can determine the size of the road needed, and amount of material needed to create these makeshift roads.

Conclusion: While this may seem like a daunting task, with many obstacles, Pictometry can make the entire process a lot quicker, easier, and with much less hassle. Pictometry cuts down the number programs, maps, and time needed to get a "project" such as the one shown above down by a significant amount of time. If more companies and industries could put Pictometry to use their projects, would be much easier and simpler to use.

Pre Planning Housing Construction

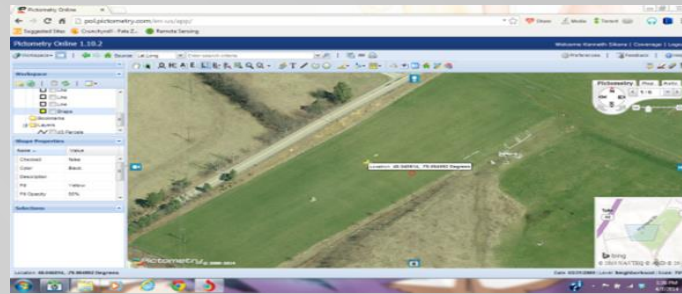


1. A company recently bought a small piece of property near California University and had hopes of building student housing. Having other obligations, they contacted our company looking for assistance in mapping out the area. They asked us to present to them how to properly use the land to their advantage, with the requirements they set for us.



5. The **distance tool** was used to measure from the road to the potential house. On average each house was about 98 feet from the road. The company had asked for a distance of about 100 feet to be between the homes and the road, and a distance of about 50 feet to be between each house. Once again using the **distance tool**, the shortest distance was 51 feet, the furthest was 53 feet. Because of these requirements, we were only able to place five houses.

2. Using a program called Pictometry, we used the search bar and the **location tool** to locate their development area. We have highlighted in yellow the tools we used in this situation.



6. We utilized the **height tool** by measuring a nearby house. It was about 18 feet tall. The company asked for all houses to be about 18 feet tall. We also measured the nearby telephone poles to make sure they were tall enough for construction vehicles to get under the lines. One pole was 29.7 feet and the taller was 31.28 feet meaning it was safe for the vehicles to travel under.



3. Working with the **area tool**, we measured the property. The square feet of useable land that the company purchased was 102,254.25, they requested each house be about 8 to 900 square feet. The smallest home was about 820 square feet and the largest was 886 square feet.

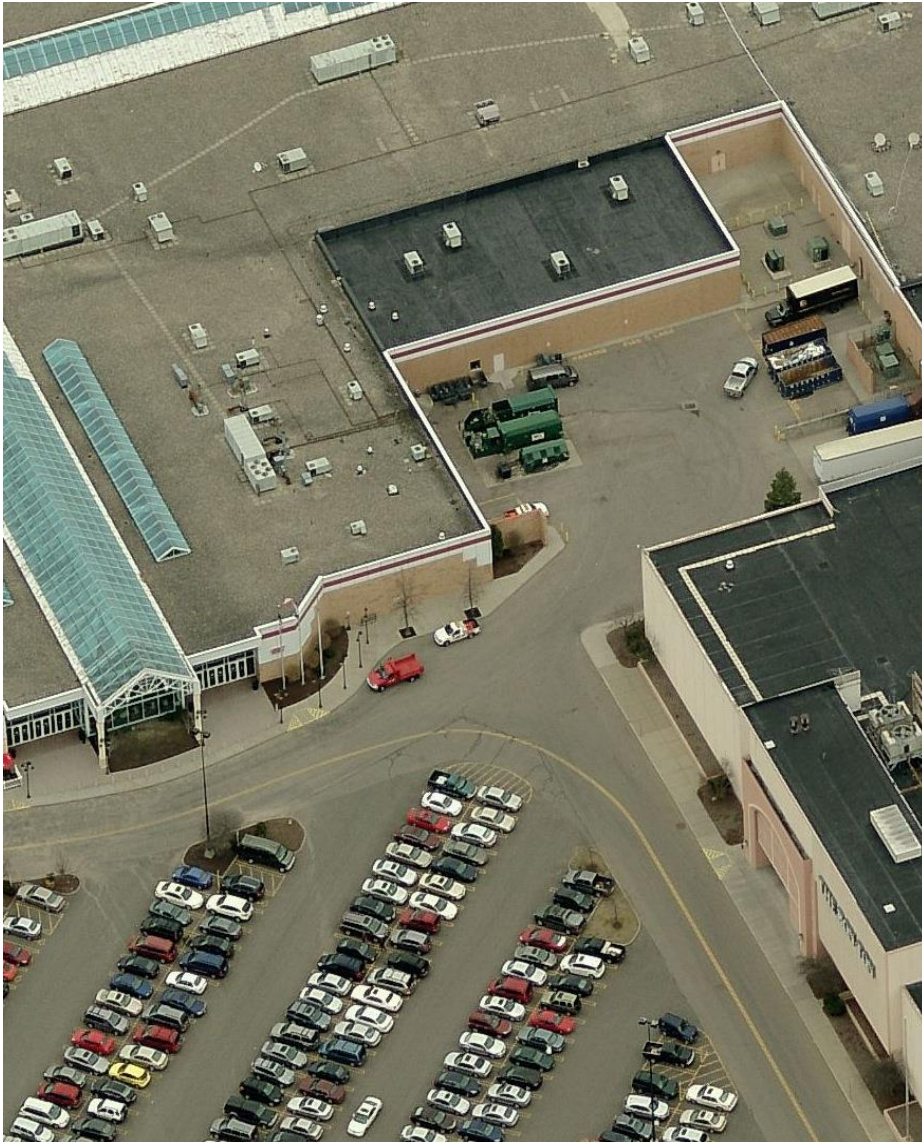
We as contractors are known for site visits, estimating cost, proposals, and maintenance. (Images, 2013) But by using Pictometry, we are able to cut down time by using the high resolution aerial images instead of personally visiting the sites. We can see from directly above or at a slight angle to properly measure out an area with the tools in the program. Pictometry gave us a way to present our measurements to companies contracting us, in an efficient manner.

Other companies have similarly used the resources available through Pictometry such as Jaco Roofing and Construction, Inc. They use these tools to help measure roof's angles so they can properly apply solar panels to the roof's of their customers. Pictometry helps them save time and money in an efficient manner. (Pictometry, 2013)

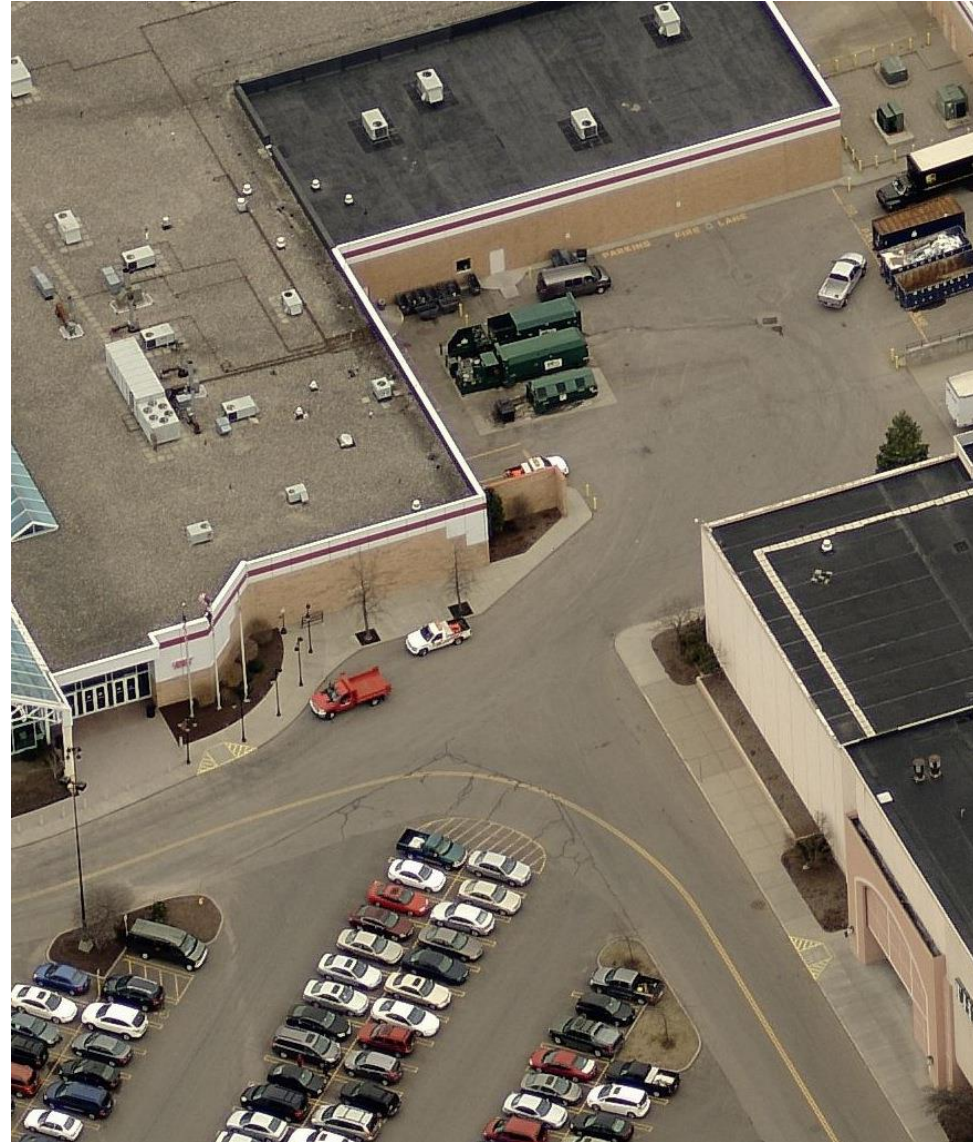
4. With the **elevation tool**, we found that the property was on average 1,163.77 feet above sea level. With this knowledge we were able to determine whether the property was safe from flooding before building on it.



16mp vs 29mp camera rigs



16mp



29mp

At same flying height 4-inch GSD becomes 3-inch GSD



29mp camera rigs



29mp



29mp camera resolution at 1:1



29mp



4 Inch GSD



Sub 2 Inch GSD : Roof Conditions



Sub 2 Inch GSD : Window Shopping



Sub 2 Inch GSD : Redbox Movie Selection



Sub 2 Inch GSD : Can you hear me now?

