

Internet on the Edge

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You are here

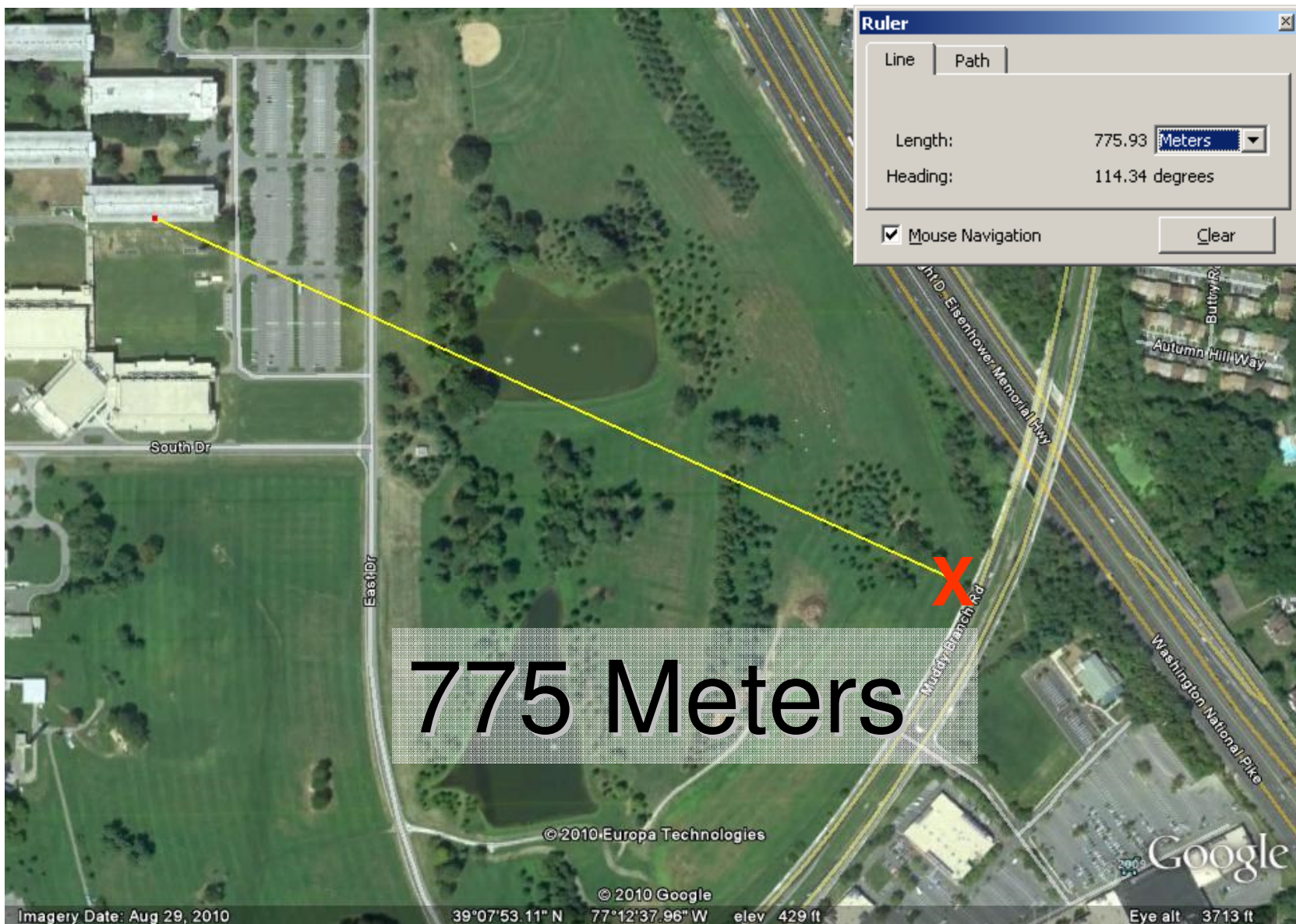


Your customer is over there



(no, not the deer)

Distance between here and there



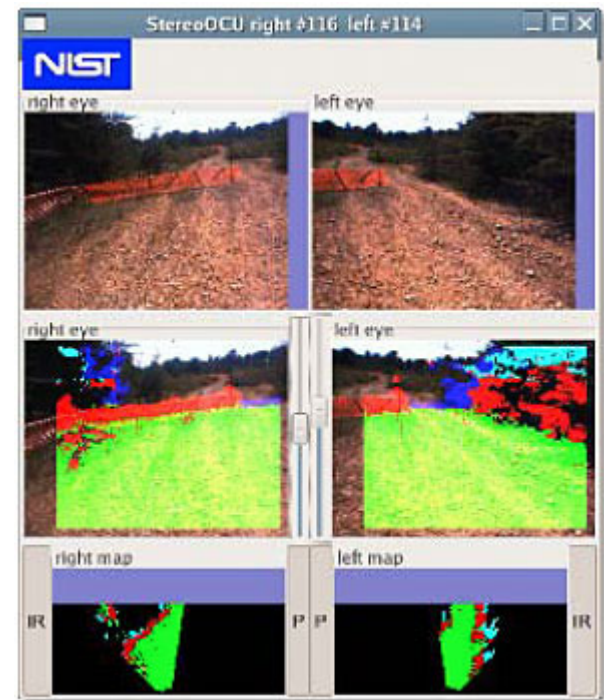
Distance between here and there



Can this be done?

- Power
- Network
- Environment
- Schedule

- Network connection for the Defense Advanced Research Projects Agency (DARPA) robotics trials



Them

- We need Internet access in Building 202.
- It has to be a Visitor Network connection.
- But we also need a wired Visitor Network for some hardware.

Us

- Wired connection. How hard is that?
- Wireless Visitor Network.
- Workgroup Bridge to convert the wireless Visitor Network to a wired connection.

Them

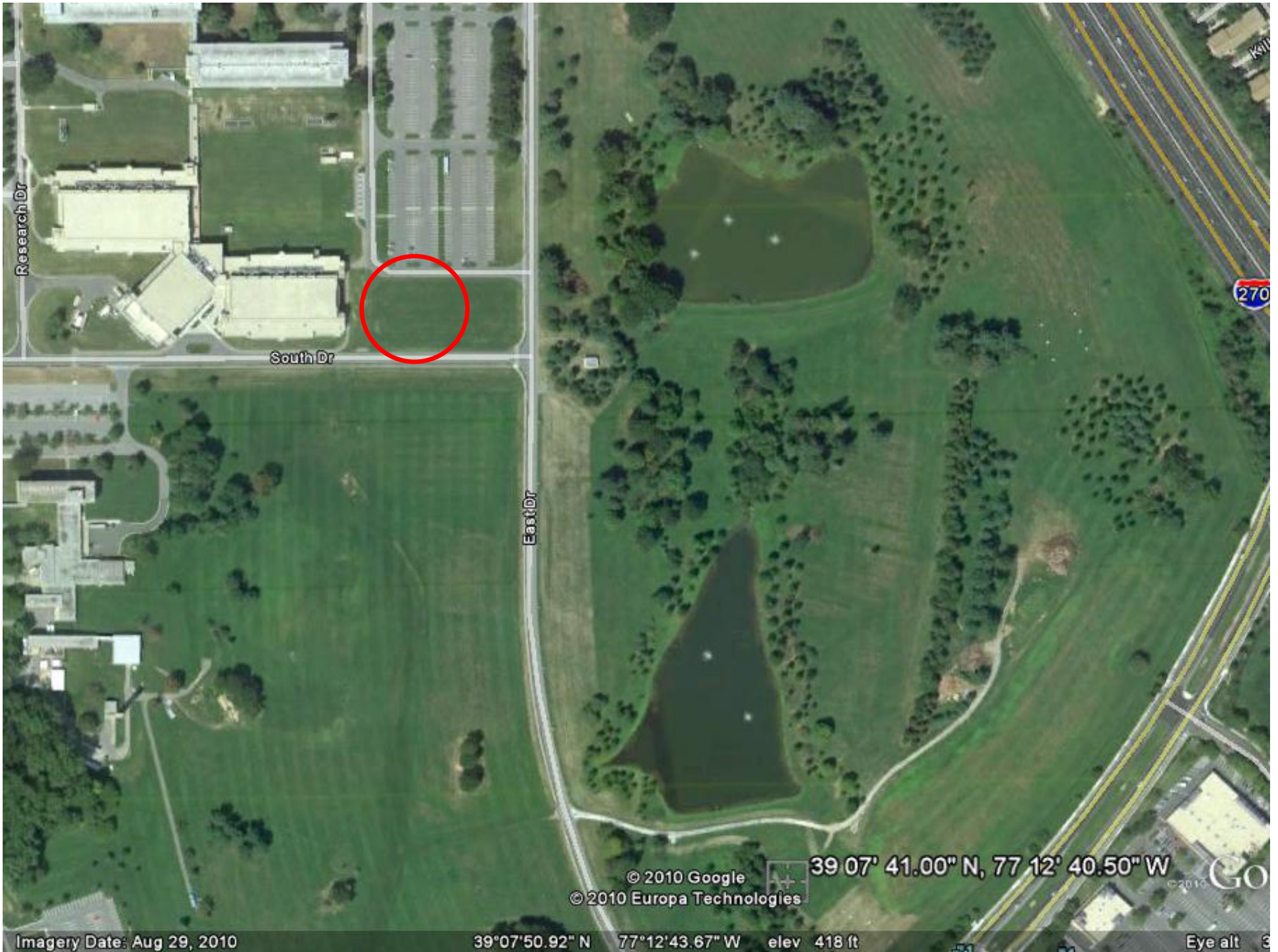
- Can we get wireless across the street?
- How about down the street, across the pond, behind the trees?

Us

- Access point with an external directional antenna.
- We've never done that before.....

Plan A





Imagery Date: Aug 29, 2010

39°07'50.92" N 77°12'43.67" W elev 418 ft

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39 07' 41.00" N, 77 12' 40.50" W

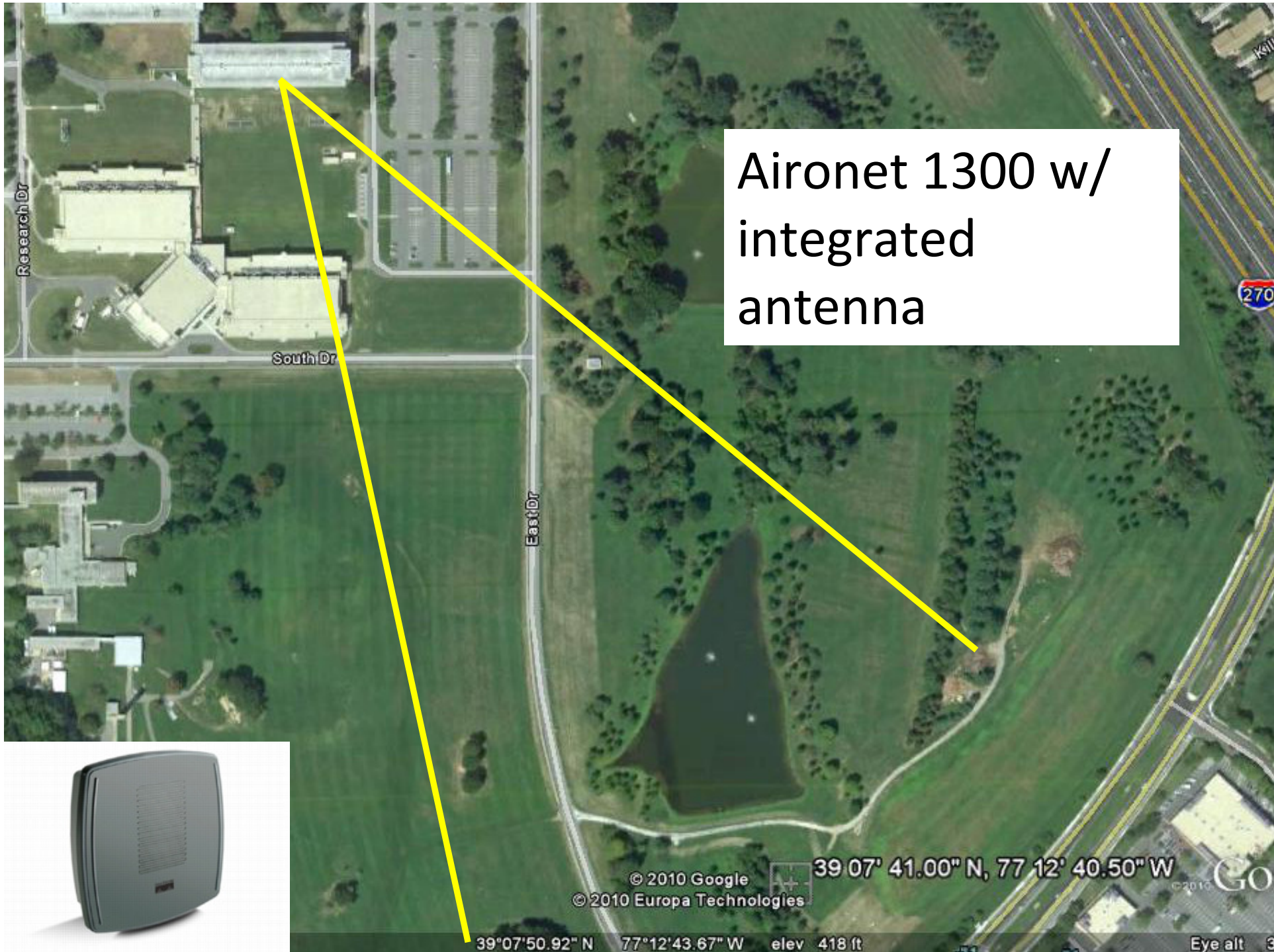
GO

Eye alt 3



Initial Testing

- Cisco 1240AG access point and external directional antenna
- Less than acceptable results (80 Kbps)
- Needed more power and increased directionality



Aironet 1300 w/
integrated
antenna

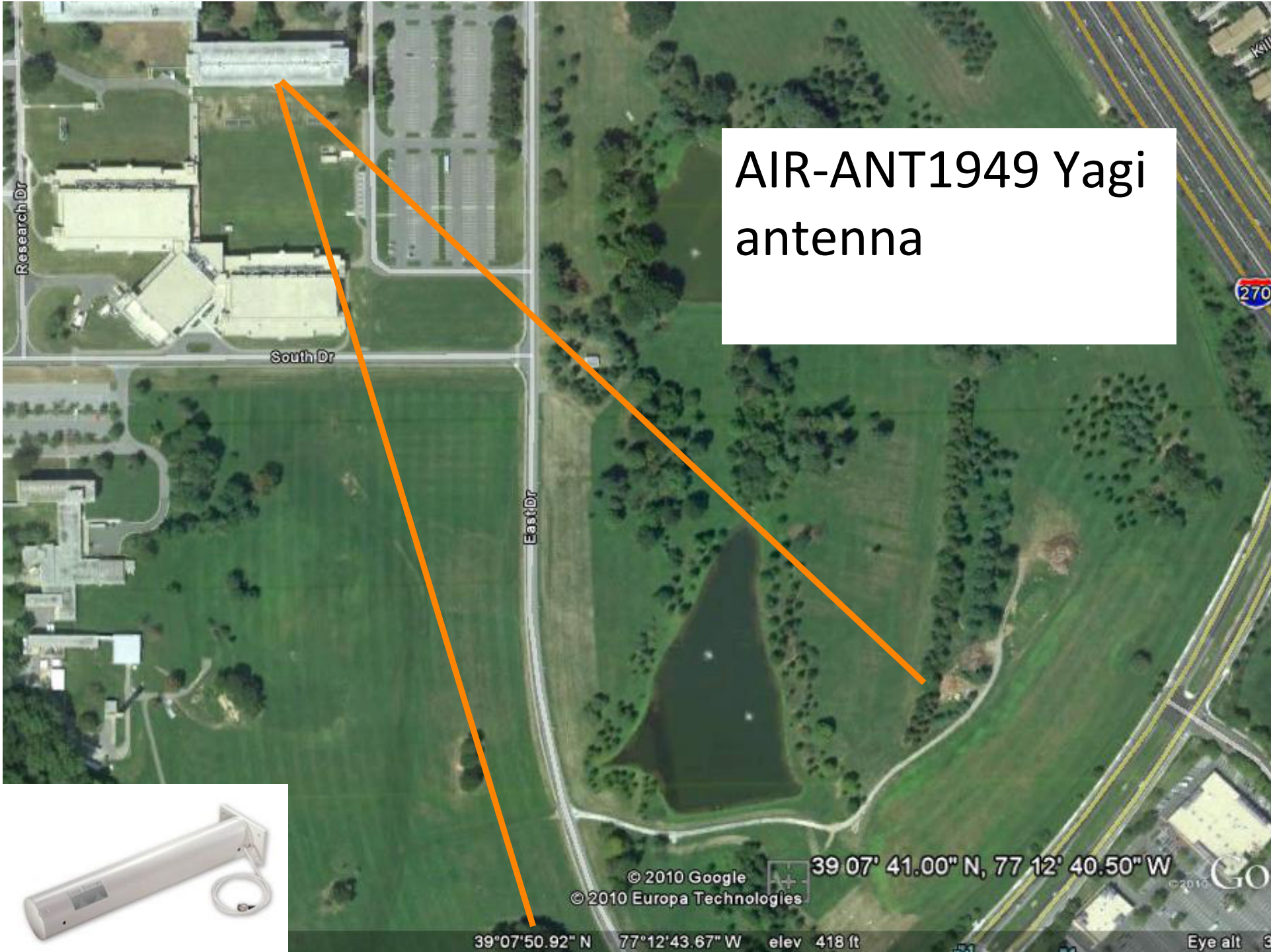


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AIR-ANT1949 Yagi antenna



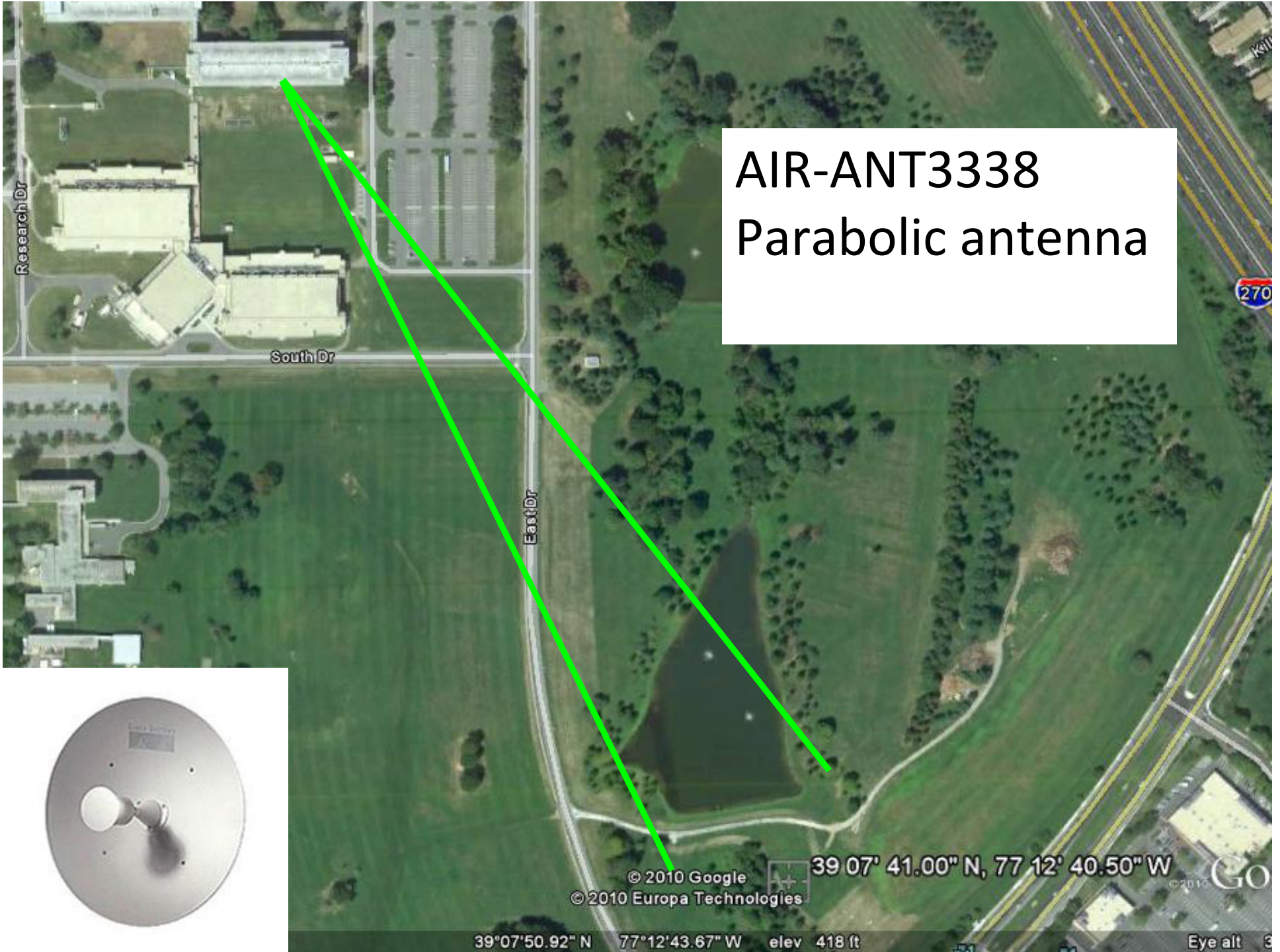
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AIR-ANT3338
Parabolic antenna



Purchased

- (2) Cisco Aironet 1300 series outdoor access point/bridge devices
- (2) AIR-ANT 3338 parabolic dish antennas.



Configuration

- Rooftop
 - 1300 series in **LWAPP Access Point role**
 - WPA2-PSK with AES encryption
 - Connected to AIR-ANT 3338 dish antenna.
- DARPA trailer
 - 24 foot enclosed trailer with roof rack
 - 1300 series in **autonomous Workgroup Bridge role**
 - Connected to AIR-ANT 3338 dish antenna
 - Power

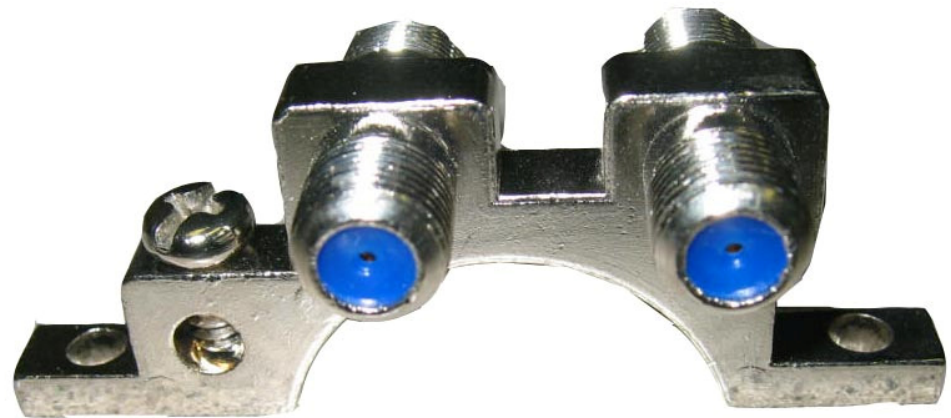
Configuration

- LR-2 power injector mounted indoors
- Converted Ethernet and power to dual coaxial RG-6 cables.
- Purchased additional 60 meters of RG-6 cable (maximum of 200 meters)



Safety First!

- Electrical grounding
- Roof access
- Tools



Ready to go



What now?



What now?

- Home improvement store shopping list:

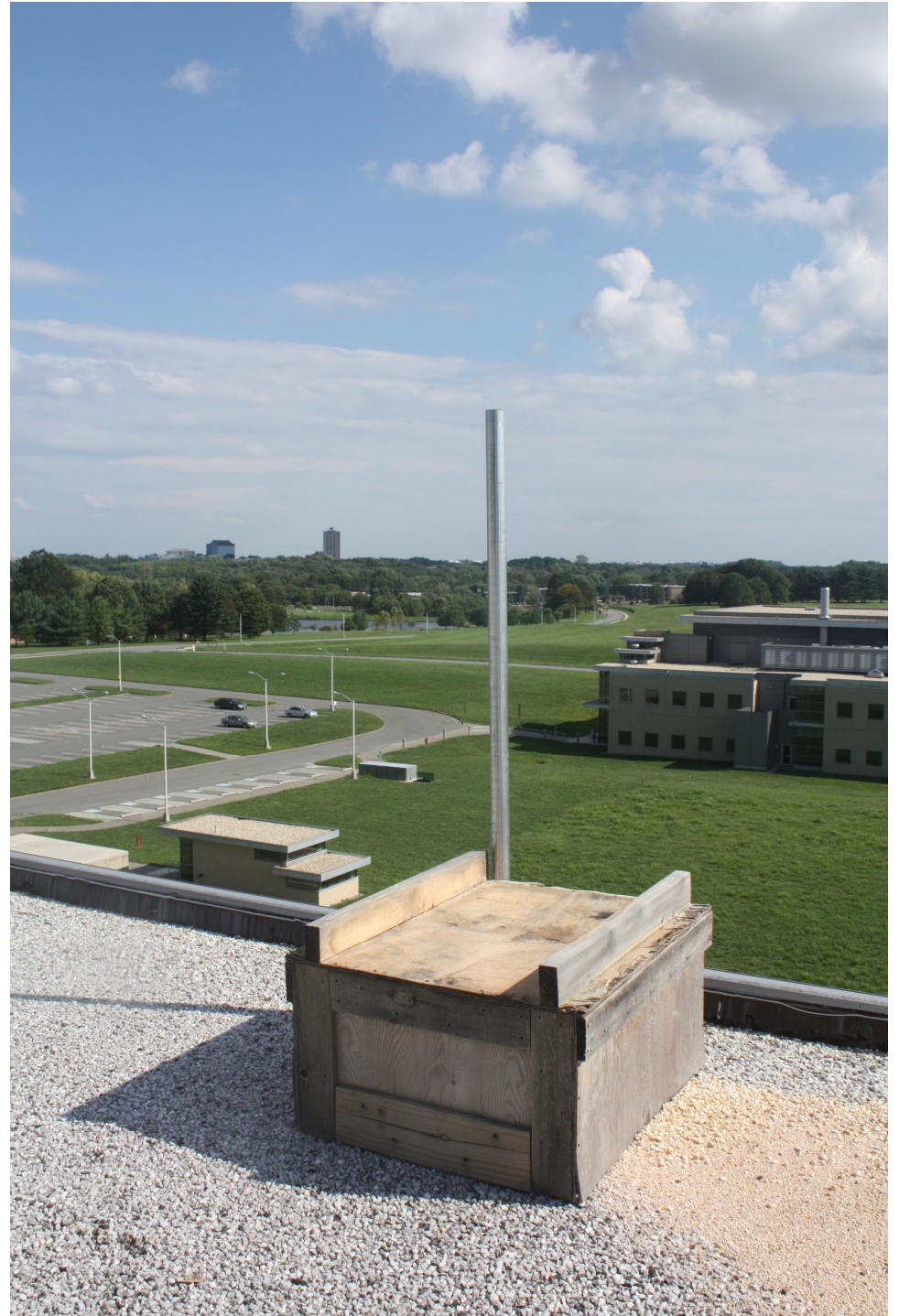


What now?



- A little cutting here and reinforcing there...

- Don't forget to add sandbags





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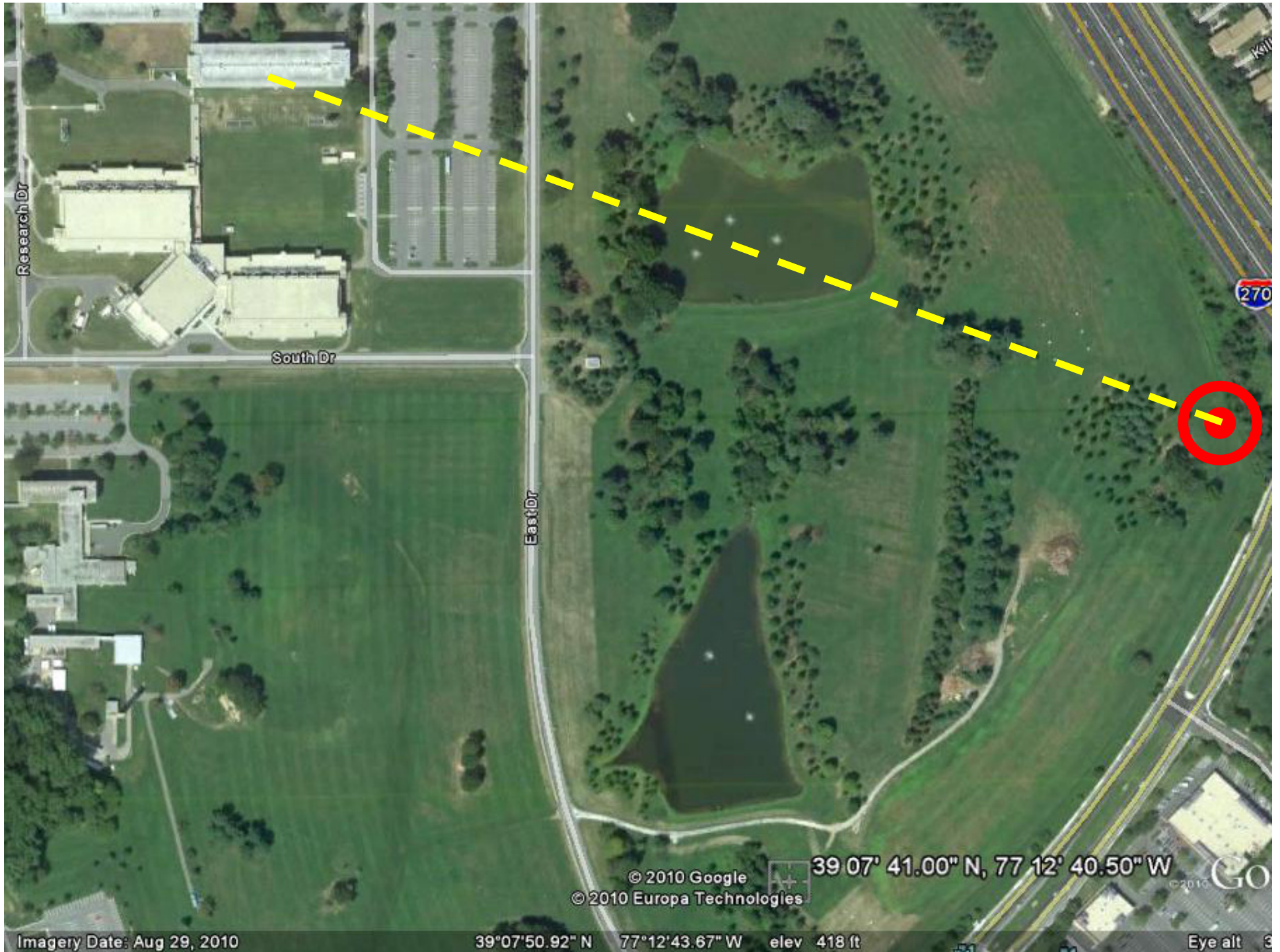
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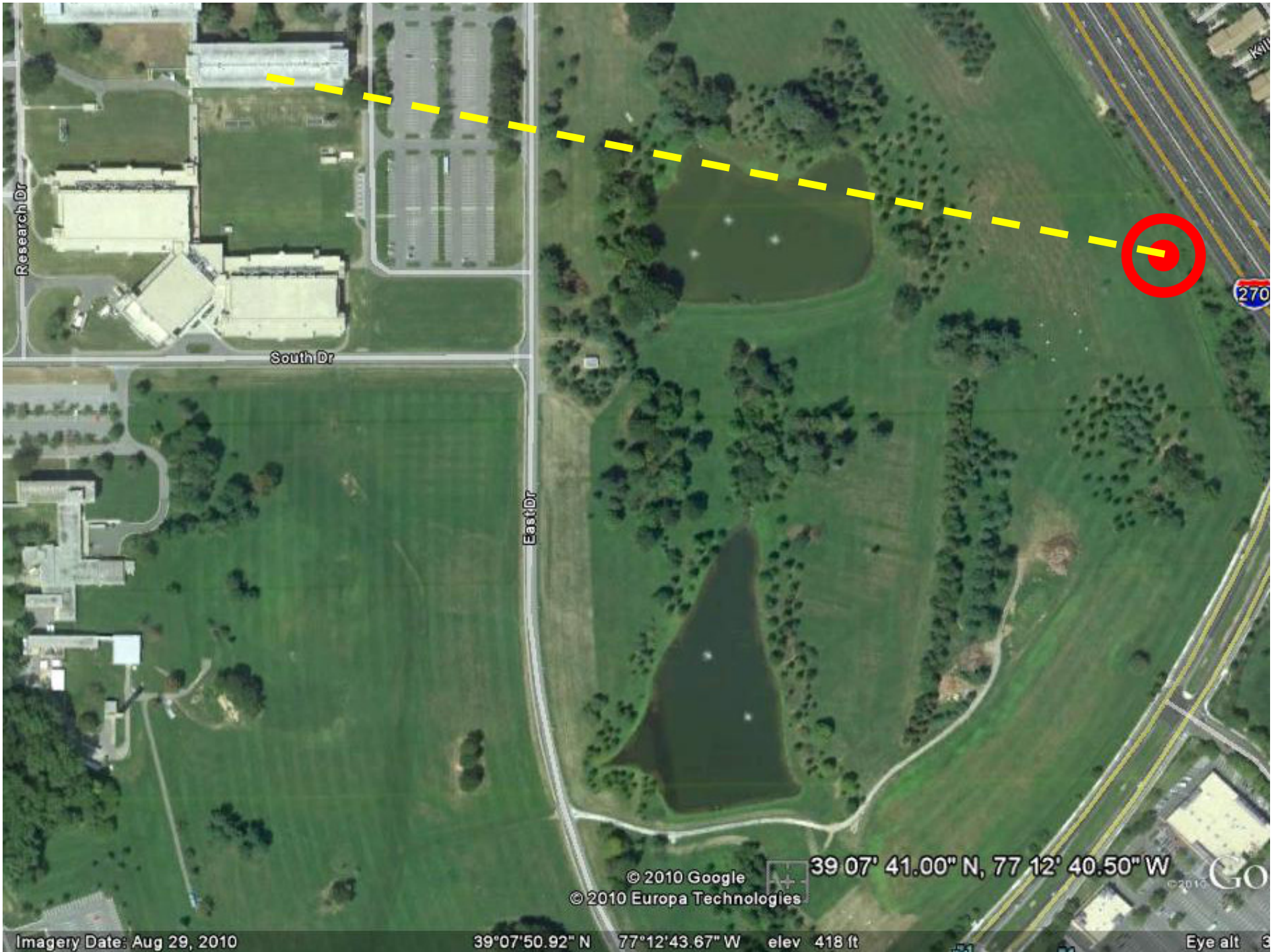
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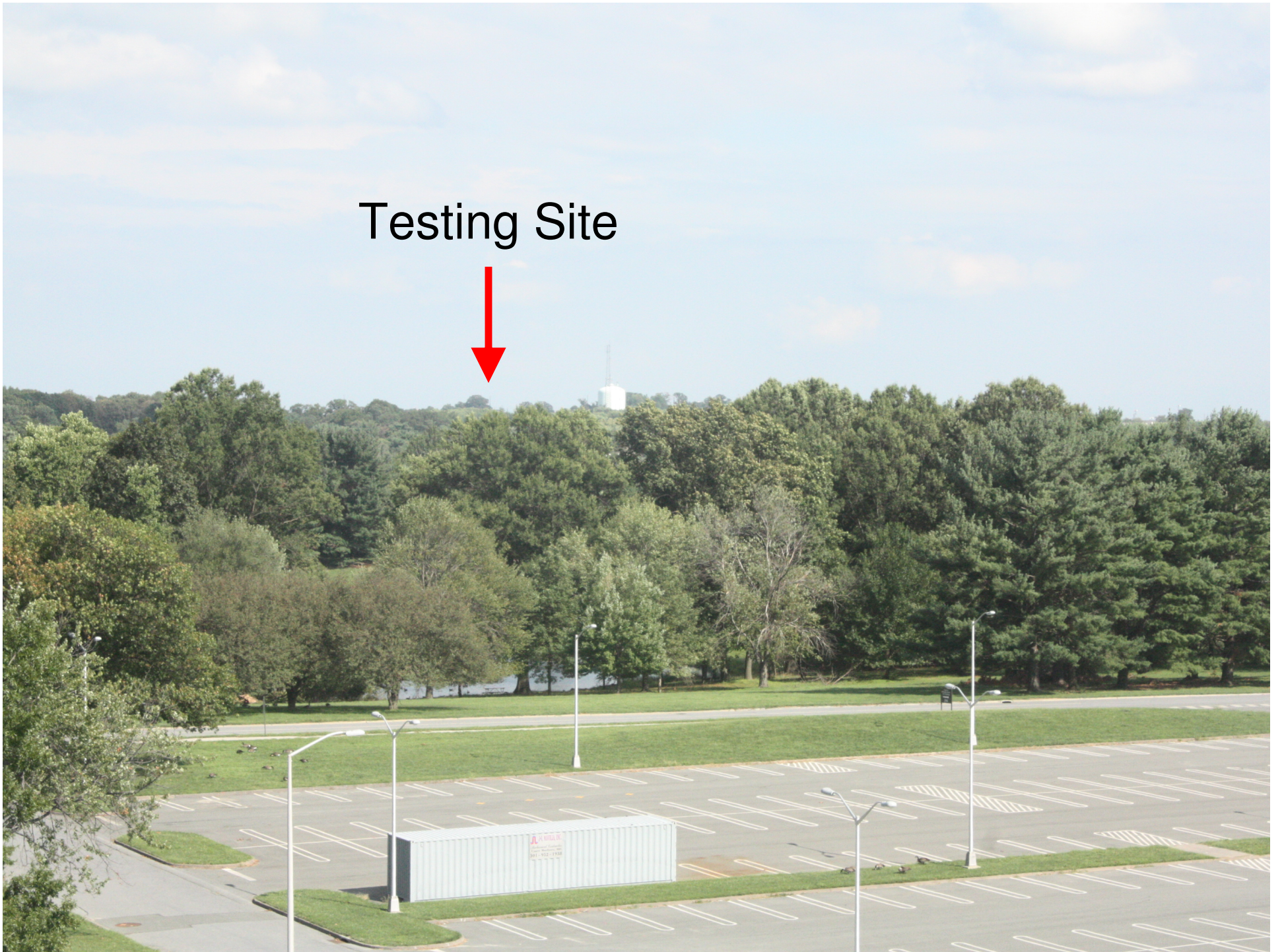
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GO

Testing Site



Keeping it Legal

- Power output regulated by FCC
- Effective Isotropic Radiated Power (EIRP)
- Not to exceed 30 dBm
- $EIRP = AP \text{ power (dBm)} + \text{antenna gain (dBi)} - \text{cable loss (dB)}$

Lessons Learned

- You need a lot more sandbags than you think you do.
- Temporary solutions aren't always temporary.
- Be flexible (“Semper Gumby”).

Questions