

# Using ArcGIS and Network Analyst for Optimizing Campus Tour Routes



**WKU**



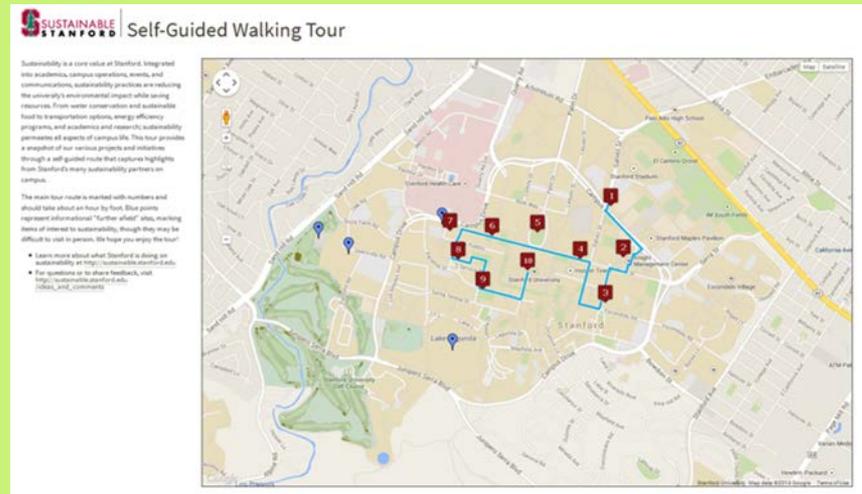
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# Background: Campus Sustainability Tours



- Campus Sustainability Tours are available at **over 60** universities in the US
- Supplemental materials include:
  - Interpretive Signage
  - Brochures
  - Guided Tours
  - Self-guided Tours
  - Virtual Tours
  - Websites
  - QR codes
- Minimal research conducted on tours and signage on the university campus environment.



# Collected Data



- There are many barriers to normal guided and self-guided tours
  - Weather
  - Language
  - Time
  
- Professors at WKU indicated interest in using the Green Tour, in addition to the following options:
  - 58% in online virtual tours
  - 47% themed tours
  - 16% phone accessible tours

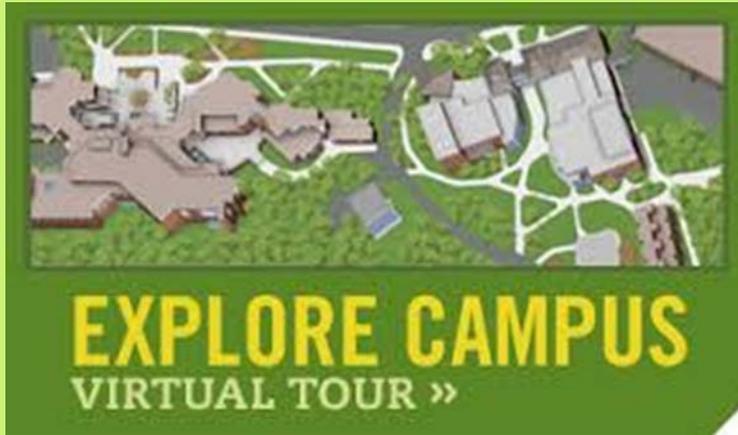


# Research Objectives and Questions



- How is GIS technology currently used in campus sustainability tours?
- How can GIS technology be used to improve sustainability tours and their use?
  - How can GIS optimize tour routes?
  - How can themed tours be developed? Are they needed?

# Methods

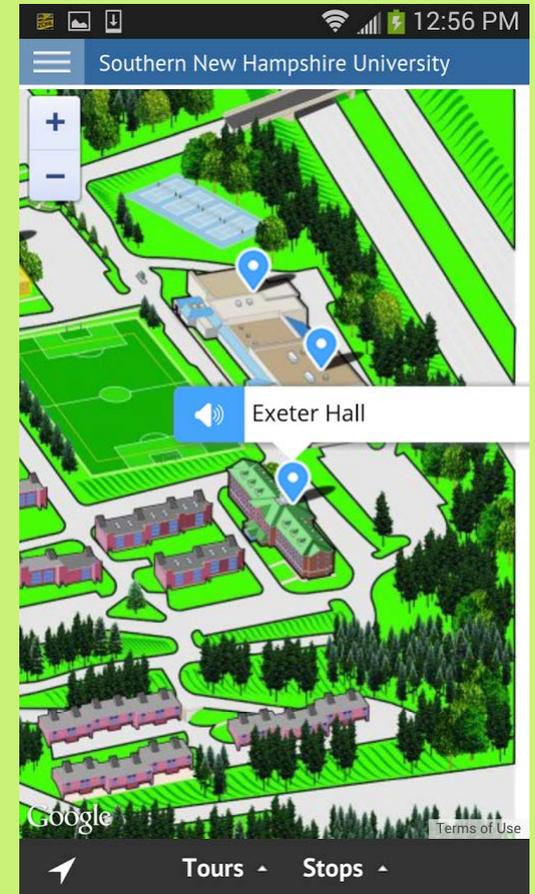


- Literature was assessed for current use patterns
- GIS Network Analyst tool was used to determine the most efficient routes for guided and self-guided Green Tours
- GIS Network Analyst tool was used to create themed Green Tours

# Current Use



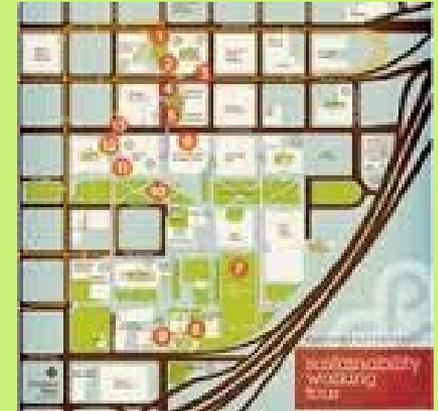
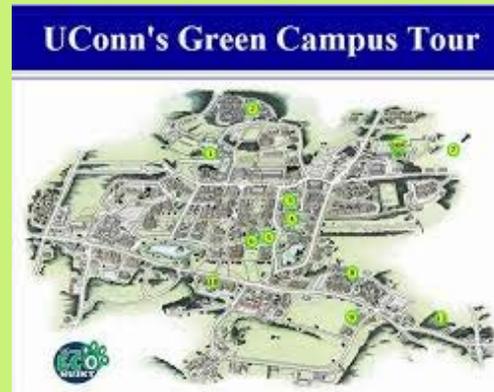
- GIS has been used to develop online virtual tours and mobile guided tours at multiple universities
- These GIS-based mobile tools have been shown to be effective in educating students (Kingston, 2012; Wolf et al, 2013)
- It is suggested that virtual and in-person tours are equally effective in educating participants (Easley et al, 2002)
- Minimal research has been conducted on the educational effectiveness of virtual tours



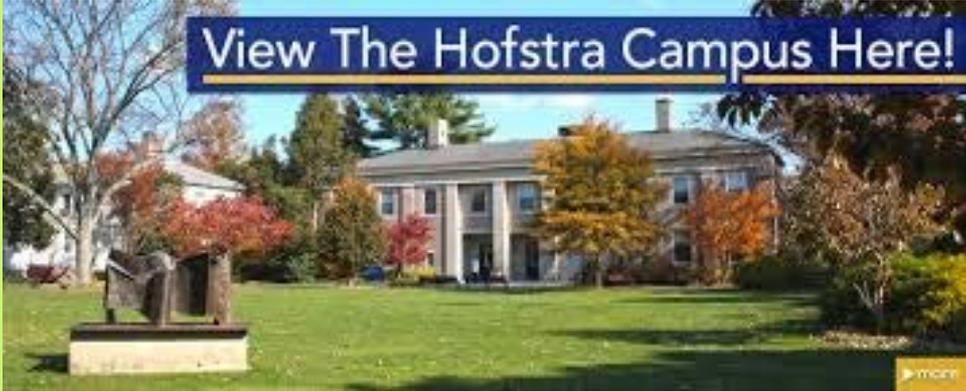
# Current Use



- Virtual tours come in many styles and offer many benefits
  - Removes barriers
  - Improved accessibility
  - Ease of change
  - Reduces need for staff
- Not targeted toward the current campus in most cases, often offered as an ‘introduction to campus’



# Current Use



# Current Use



A unique aspect of ASU is that we are "one university in many places," not a system with separate campuses, and not one main campus with branch campuses. Each campus has a unique identity. ASU's online tours introduce you to the unique beauty of each campus.

Campuses in Metro Phoenix:  
[Downtown Phoenix](#)  
[Polytechnic](#)  
[Tempe](#)  
[West](#)

Other ASU locations:  
[Lake Havasu City](#)

Themed tour: [sustainability points of pride](#)



Come see for yourself: [schedule a visit](#)

## Academic & Residential Core

Each link below corresponds with a number on the map at right. Upon clicking the link, the user will be directed to a detailed description of that sustainable feature.

2. Bike Cave
3. Bike to School Day
4. Bobcat Blend
9. Environmental Service Committee
10. Food for Thought Garden
12. Living Library
13. On Campus Dining (Commons Dining Hall)
14. Pack it Up & Pass it On
15. Rainwater Collection
18. Sustainability Exploration
19. Texas State Recycles Day
20. Vermicomposting
21. Wear the Sun-Solar Drying



## Campus Tour

- [Campus Tour](#)
- [Campus Map](#)
- [Locations](#)
- [Webcams](#)



Next

## Aquifer

A groundskeeping truck pulling a 300-gallon tank around campus that reads "Free Water From the Oakland Aquifer" represents one small part of Pitt's green efforts.

Beneath Pitt lies the Oakland aquifer, stretching roughly from Herron Hill to Schenley Park. From mid-spring to early fall, Pitt groundskeepers access the water from the lower level of the Sennott Square parking garage. While building Sennott Square in 2001, a pump system was installed to keep the water from filling the construction site. After construction was completed, the continuous water flow provided a simple solution to watering the gardens on

[VIEW ON MAP](#)

### Related Links

"Groundskeepers tap into free water on campus." *University Times*, July 26, 2012.

# Results and Discussion



- Virtual tours can remove many barriers to campus sustainability tours
- Virtual tours should be designed for specific incorporation in courses, utilizing tools which would empower professor use
- Universities should consider implementing online survey tools on their virtual tour sites

# Study Area



- **The WKU Green Tour:**
  - Established in 2008
  - Intended to showcase sustainability initiatives
  - Uses guided tours, a website, and interpretive signage
  - Relies mostly on interpretive signage (9) to catch readers' attention
  - Uses QR codes embedded in the signs
  - Covers items such as xeriscaping, LEED buildings, rain gardens, and permeable pavement



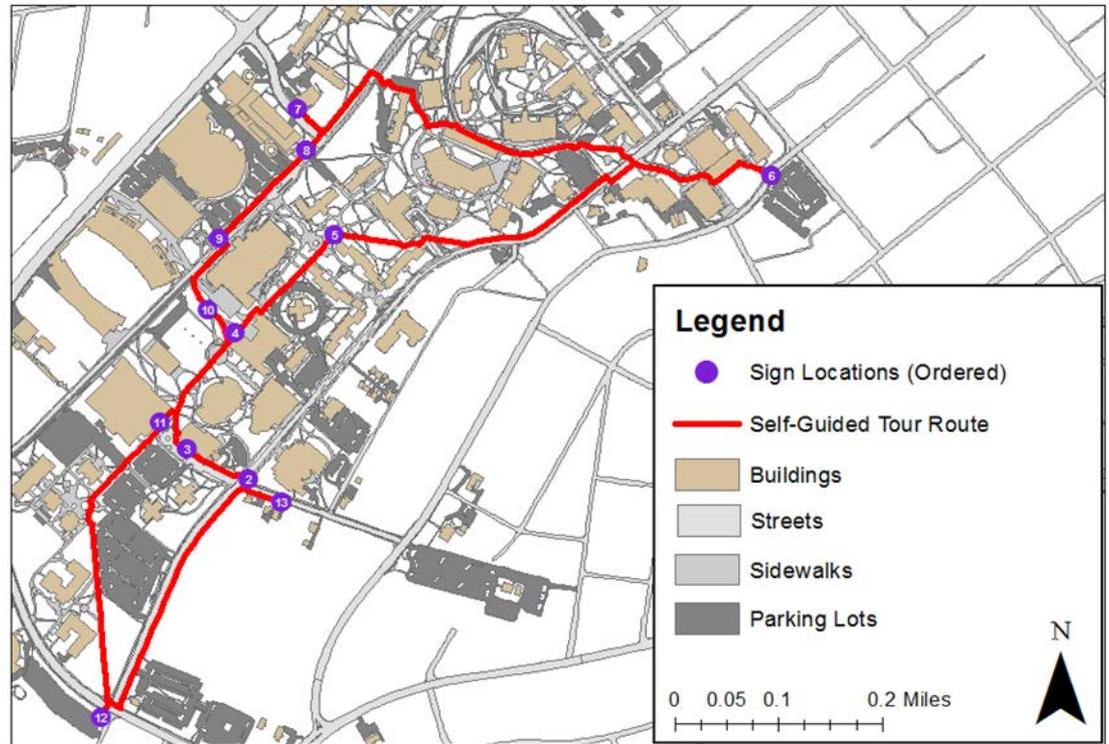


# Potential Applications



- The same tool was used to develop an efficient self-guided route

WKU Green Tour  
Self-Guided Route



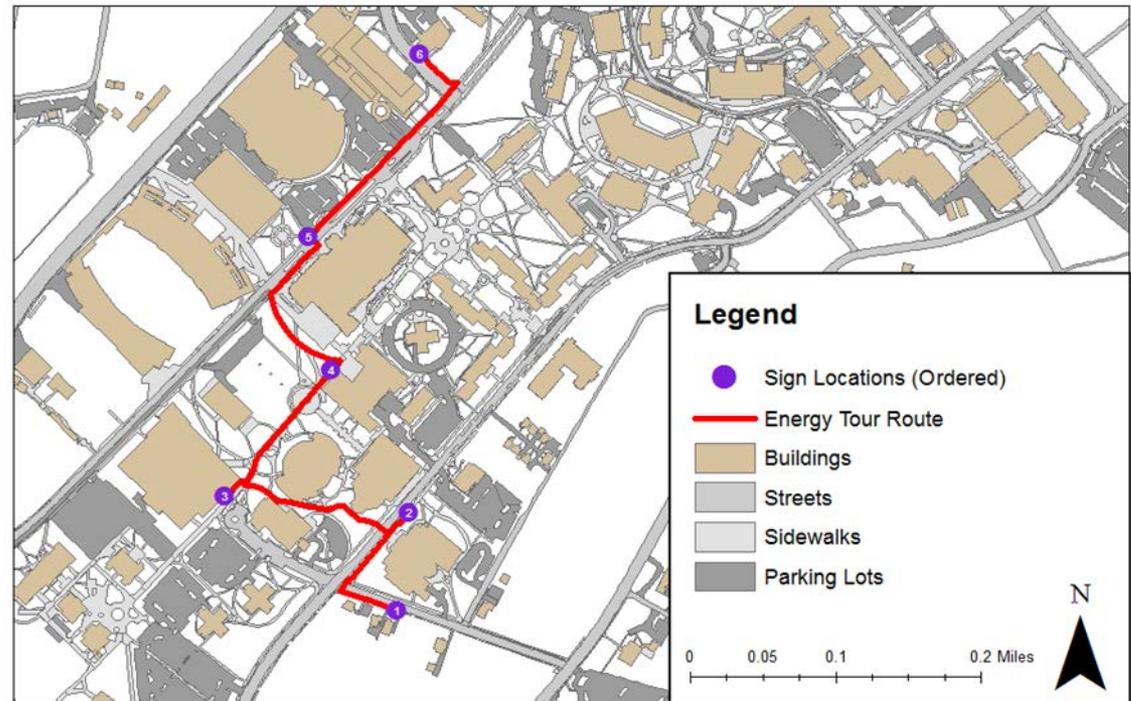
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# Potential Applications



- Three themed tours were developed using Network Analyst, as this was identified by professors as an improvement that would increase their use

WKU Green Tour  
Themed Tour: Energy

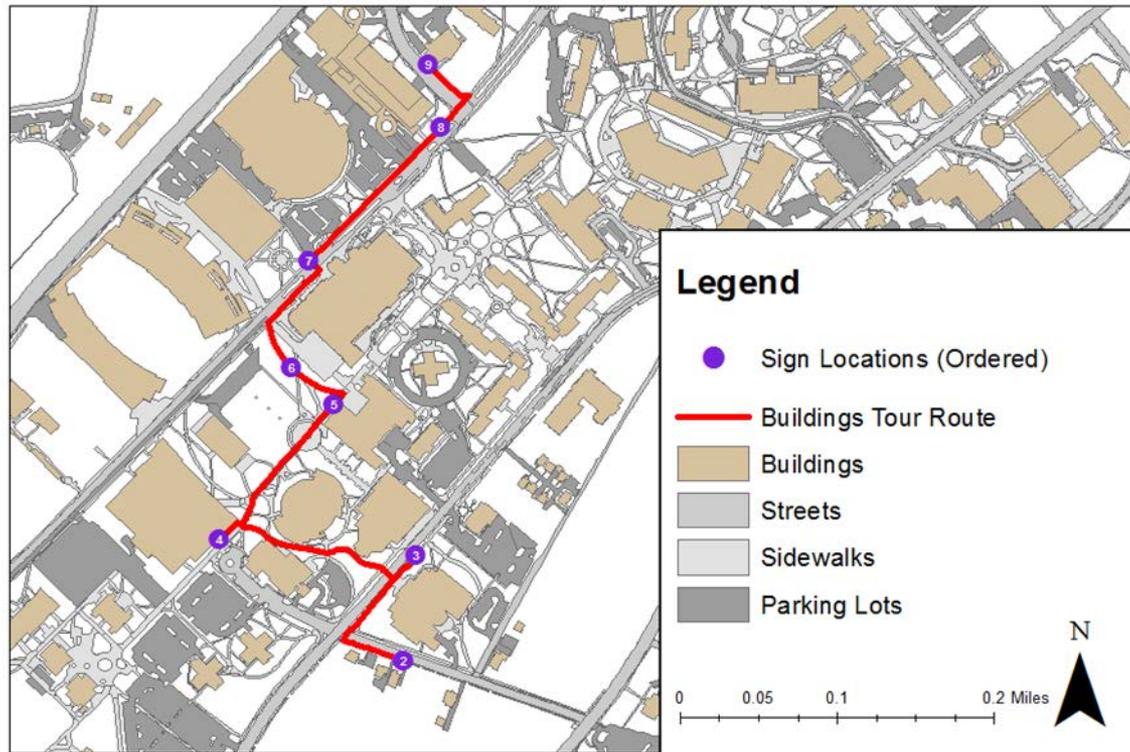


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# Potential Applications



## WKU Green Tour Themed Tours: Buildings

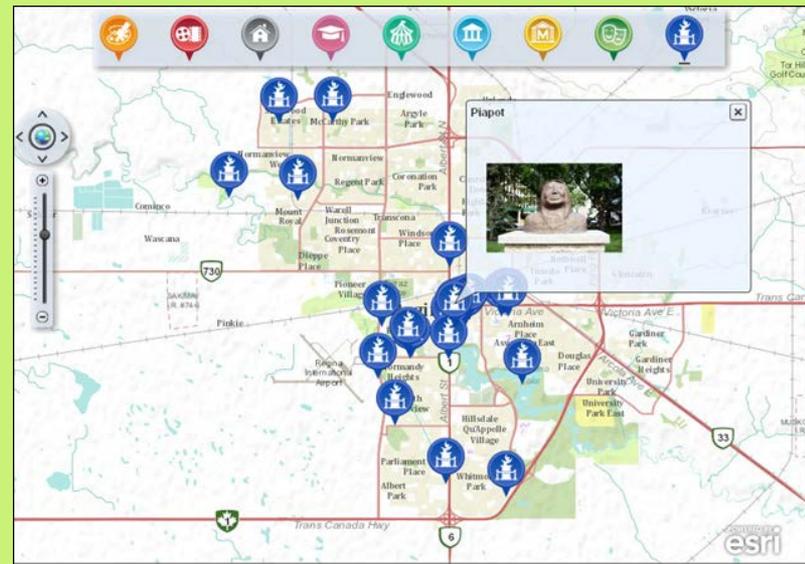
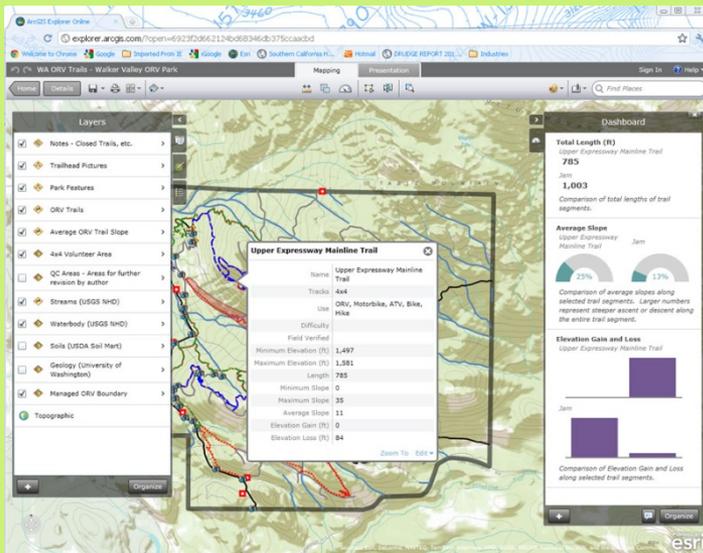


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# Potential Applications



- An interactive GIS Online map which utilizes network analyst would be useful to users
  - A map could allow users to select those sites they would like to visit, and the tool could create an efficient route for those sites
  - More efficient, and more relevant for learners and professors



# Conclusions



- More data should be collected regarding the effectiveness and use of virtual and mobile tours as supplemental tools to campus sustainability tours
- Universities should utilize GIS as a tool to improve their campus tours and tour routes
- A new GIS Online tool which could allow for self-directed learning and empowerment of professors could be developed

# Sources



Easley, E. C. (2002). Comparing the effectiveness of virtual and traditional forestry field tours.

Kingston, D. G. et al (2011). Experiences of using mobile technologies and virtual field tours in Physical Geography: implications for hydrology education. *Hydrology and Earth System Sciences*.

Thomashow, M. (2014). *The Nine Elements of a Sustainable Campus*. Massachusetts Institute of Technology Press.

Wolf, Isabelle D., Stricker, Heidi K., and Hagenloh, Gerald (2013). Interpretive media that attract park visitors and enhance their experiences: A comparison of modern and traditional tools using GPS tracking and GIS technology. *Tourism Management Perspectives*, 7, 9-72.

# Thank You! Questions?

