

UK/Nicholasville Road Flood Mitigation Project

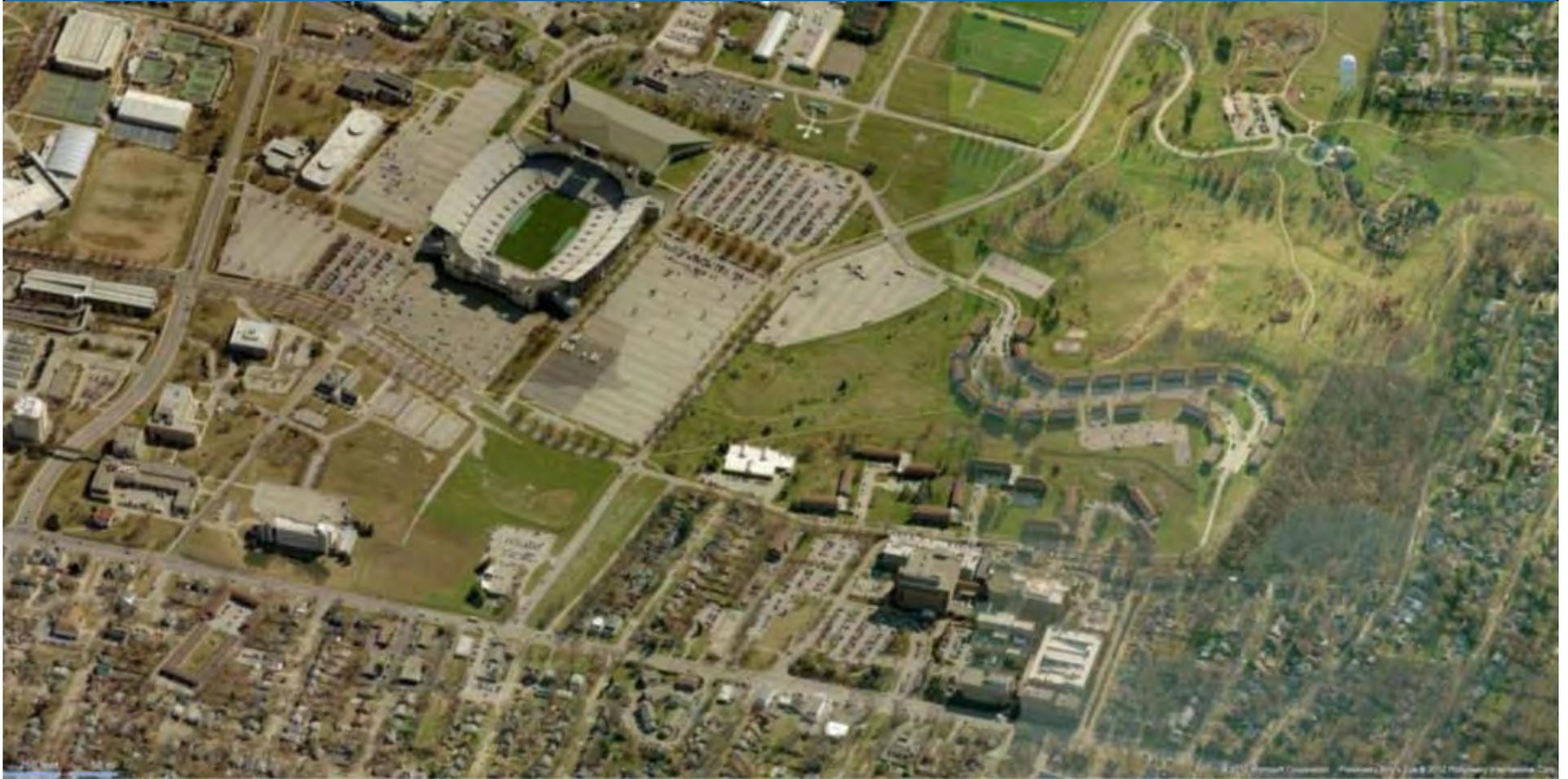
Bell Engineering

October 11, 2017

2017 SESWA Annual Conference



About The Project





“Serving Our Commonwealth”

Award Briefing

HMGP DR-1818-0096
University of Kentucky

Nicholasville Road Drainage Improvement Project

February 8, 2011



“Serving Our Commonwealth”

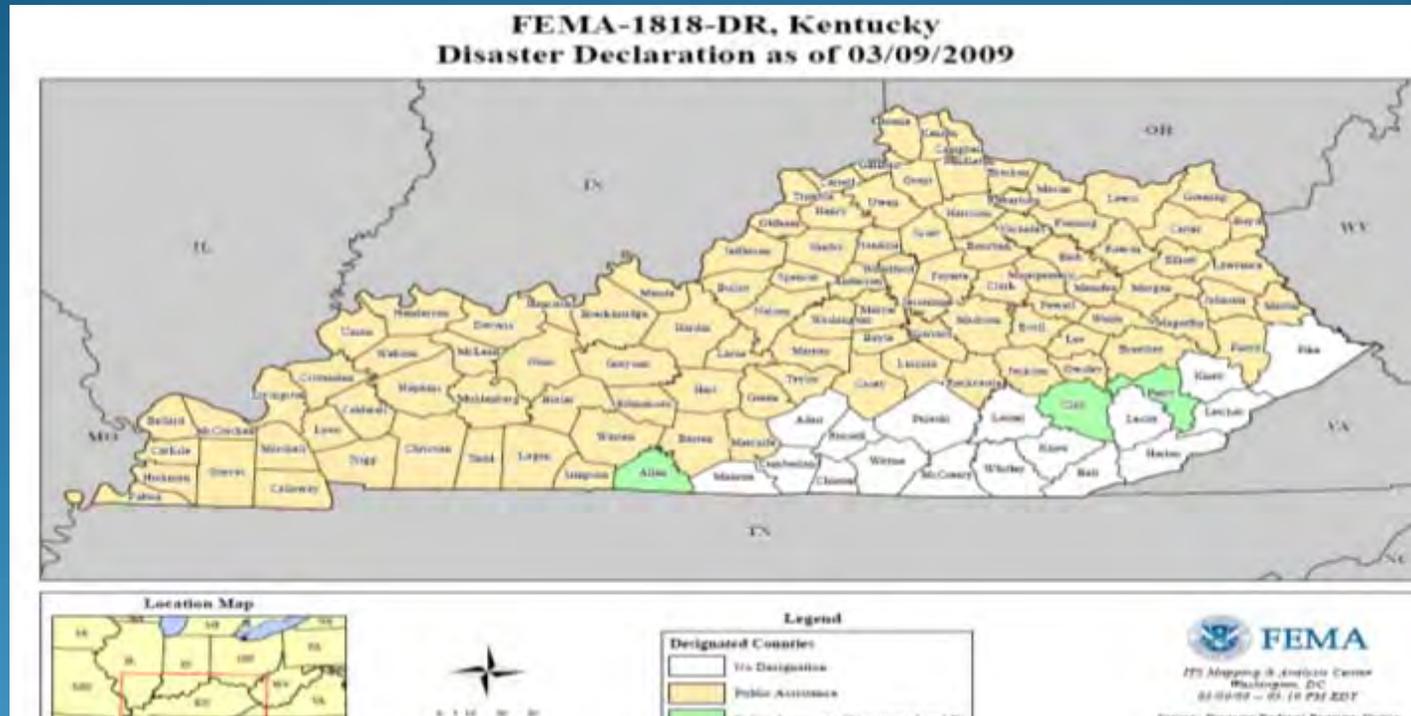
A Human Tragedy was the Driving Force

On September 23, 2006, Lexington, Kentucky experienced severe rain storm event that resulted in the drowning death of two women:

Lauren Brook Fannin of Martin County, Kentucky

Lindsey Marie Harp of Franklin County, Kentucky

DR-1818 Declaration



Major Disaster Declaration declared on February 5, 2009



“Serving Our Commonwealth”

Essential Elements of the Mitigation Project Creation

- University of Kentucky
 - Division of Crisis Management & Preparedness (UK-CMP)
 - Hazard Mitigation Grants Program Office, Martin School of Public Policy & Administration (UK-HMGP)
 - Capital Project Management Division (UK-CPMD)
 - Vice President for Facilities
 - Controller’s Office
 - General Accounting
 - Sponsored Projects Accounting
 - Office of Sponsored Projects Administration



“Serving Our Commonwealth”

Essential Elements of the Mitigation Project Creation

- Lexington Fayette Urban County Government (LFUCG)
- Wolfe Creek Neighborhood Association
- Kentucky Utilities
- Kentucky American Water Company
- Columbia Gas



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Essential Elements of the Mitigation Project Creation

- Federal Emergency Management Agency:
 - Hazard Mitigation Assistance (HMA)
 - Hazard Mitigation Grants Program (HMGP)
- Kentucky Emergency Management (KYEM)
 - Mitigation Branch



“Serving Our Commonwealth”

“Luck is what happens when preparation meets opportunity.”

- Seneca the Younger

Goals

- Control 100-year, 24-hr storm event
- Create a visually pleasing engineering design
- Accommodate key stakeholders
- Manage fixed budget
- Maximize parking
- Accommodate/
incorporate Alumni
Drive realignment



Key Elements

- Aggressive schedule
- Site limitations
- Limited budget
- Evolving scope of work
- Managing multiple contractors
- Accommodating University, hospital and other stakeholder activities
- Constant communication with Owner



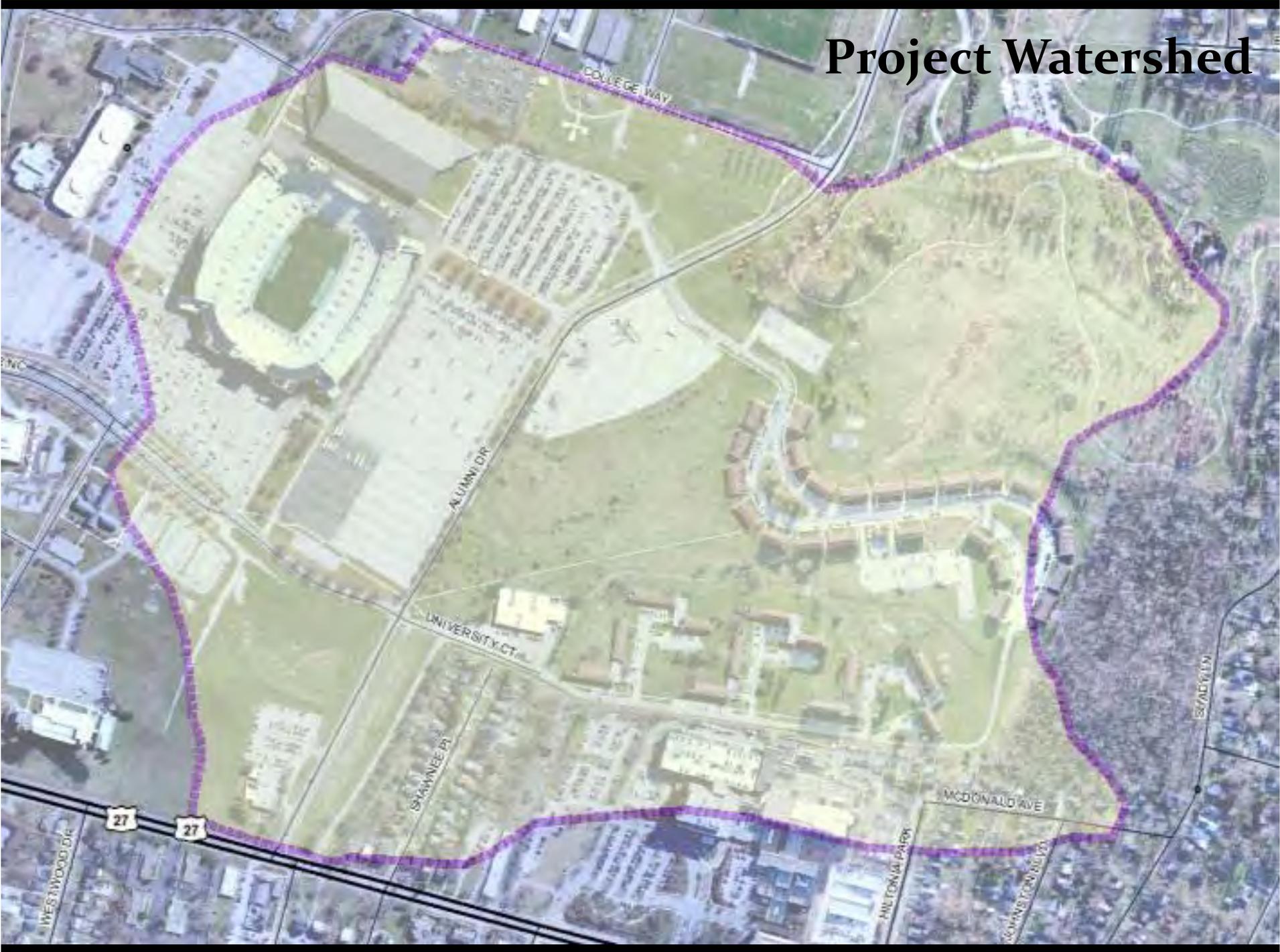


Stakeholders

- UK
 - Ag Campus
 - Parking
 - Athletics
 - Housing
 - Transportation
 - Master Planners
 - Arboretum
 - Physical Plant
- Non-University
 - KYEM/FEMA
 - LFUCG
 - Utilities
 - Baptist Health
 - Corps Of Engineers
 - KY DOW
 - Friends of Wolf Run
 - Neighborhood Associations

Hydraulic Model

Project Watershed



ENC

COLLEGE WAY

ALUMNI DR

UNIVERSITY CT

SHAWNEE PL

MCDONALD AVE

WESTWOOD DR

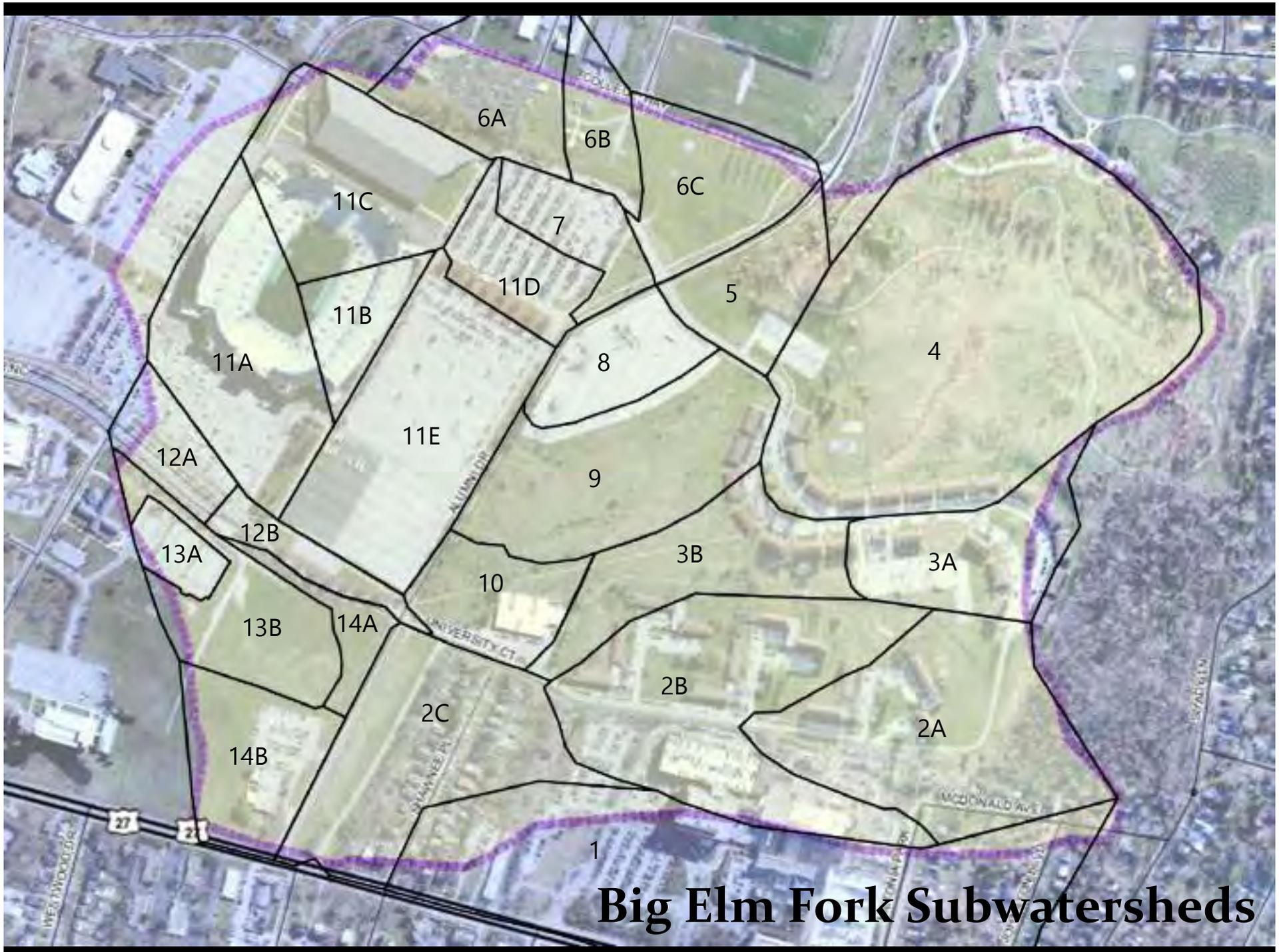
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METONIA PARK

JOHNSTON BLVD

SKADY LN



Big Elm Fork Subwatersheds

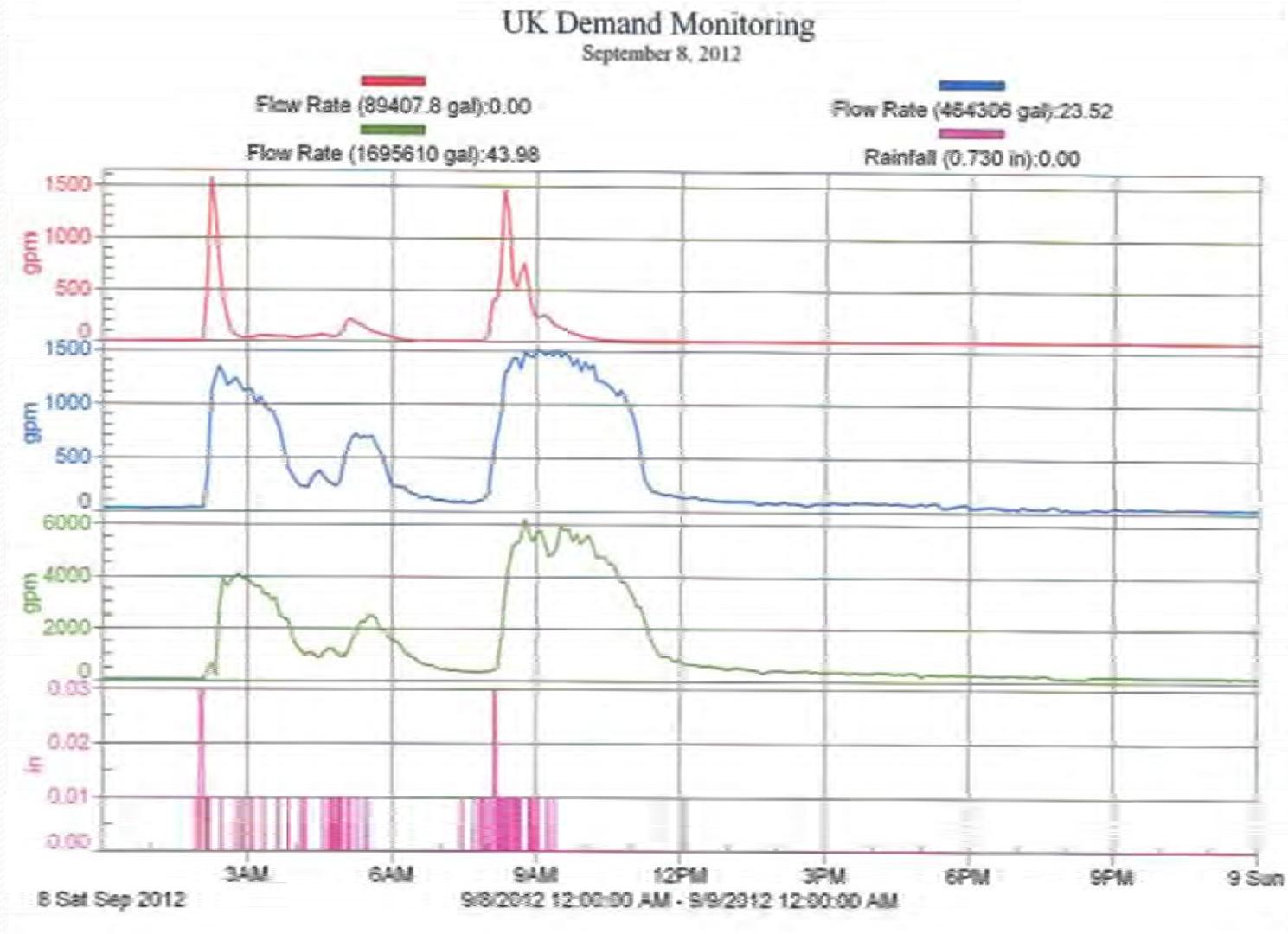
SWMM Modeling & Calibration Process

- Built hydrologic/ hydraulic model in EPA SWMM to analyze flow
- Flow and rain gauges to compare flow characteristics/ storm response

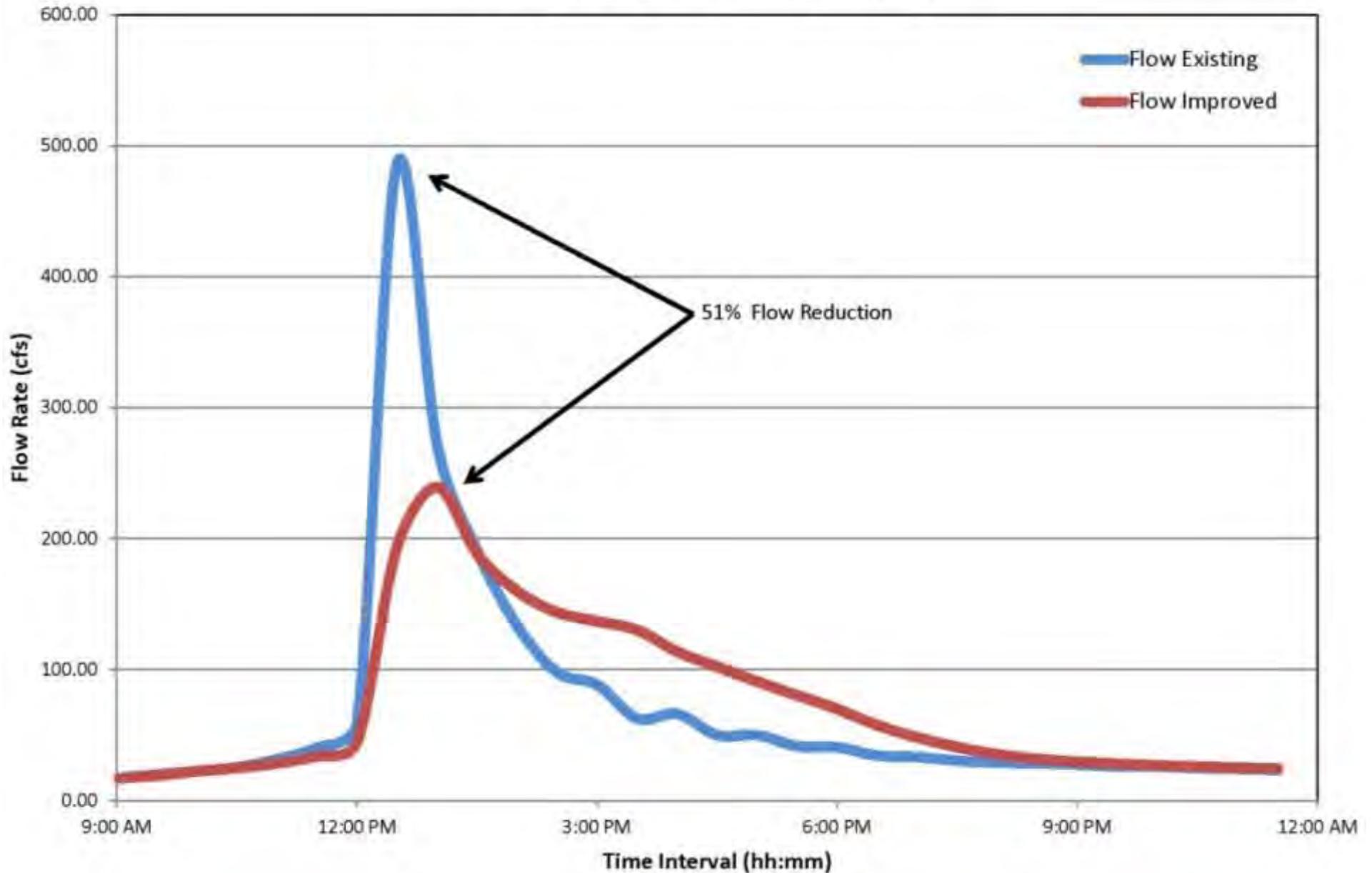




Model Calibration



**Existing Condition - Box Culvert @ Nicholasville Rd.
24-hour, 100-year Storm (6.81 in)**



Planning & Utilities

Utilities

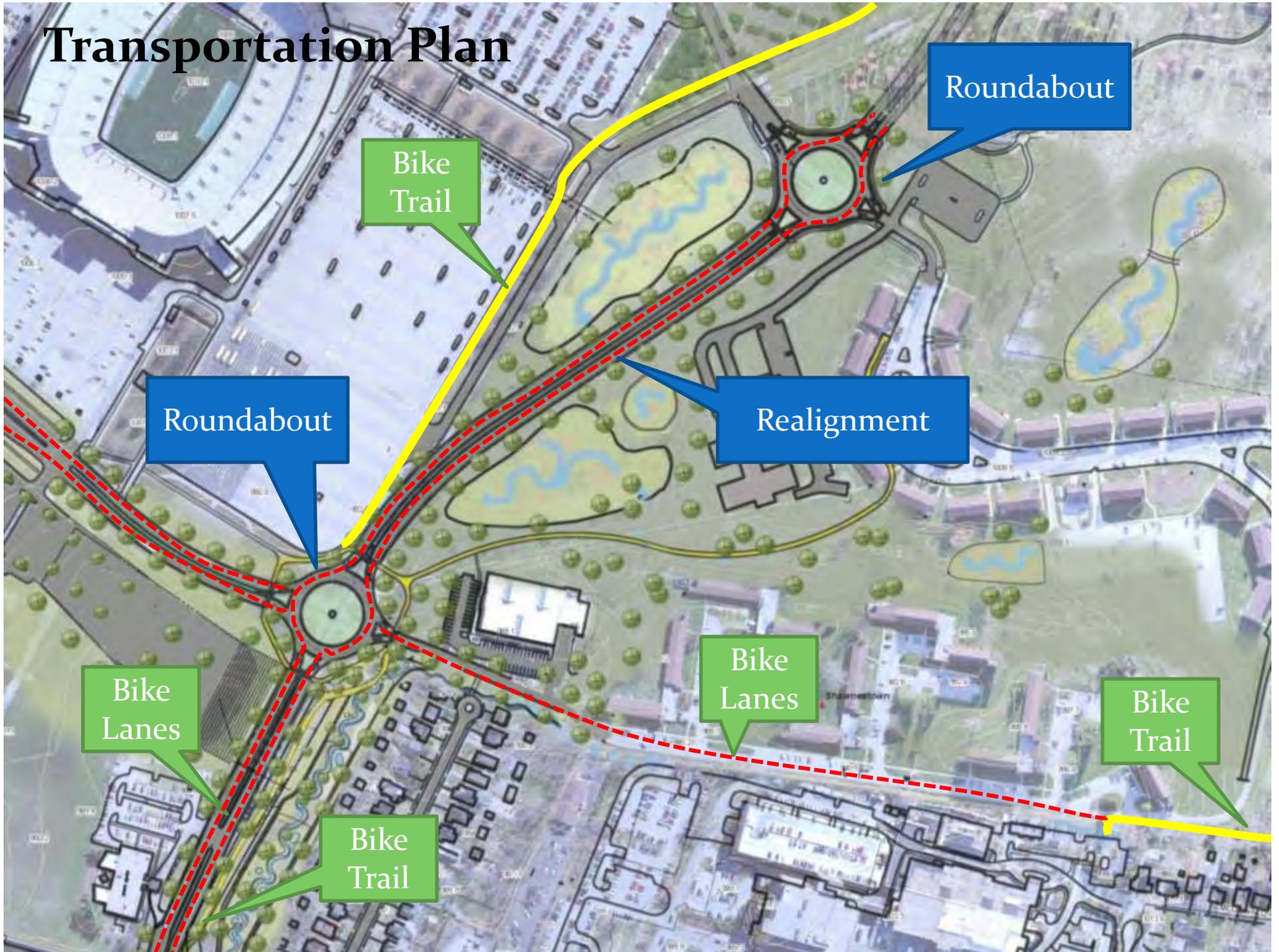
- KYTC
- LFUCG Sewers
- LFUCG Stormwater
- LFUCG Traffic
- Columbia Gas
- Kentucky American Water
- Kentucky Utilities



UK Master Plan



Transportation Plan



Roundabout

Bike Trail

Roundabout

Realignment

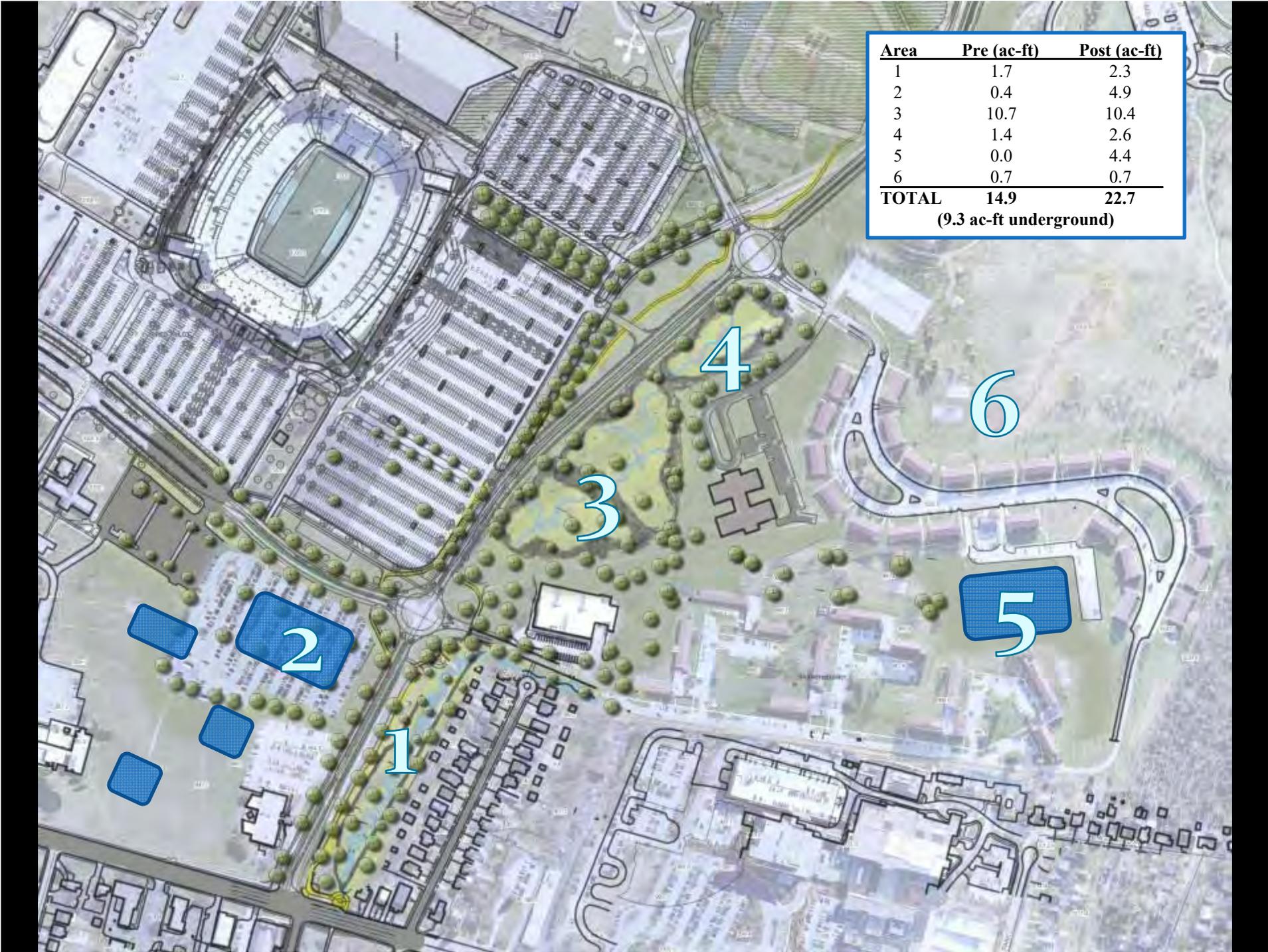
Bike Lanes

Bike Lanes

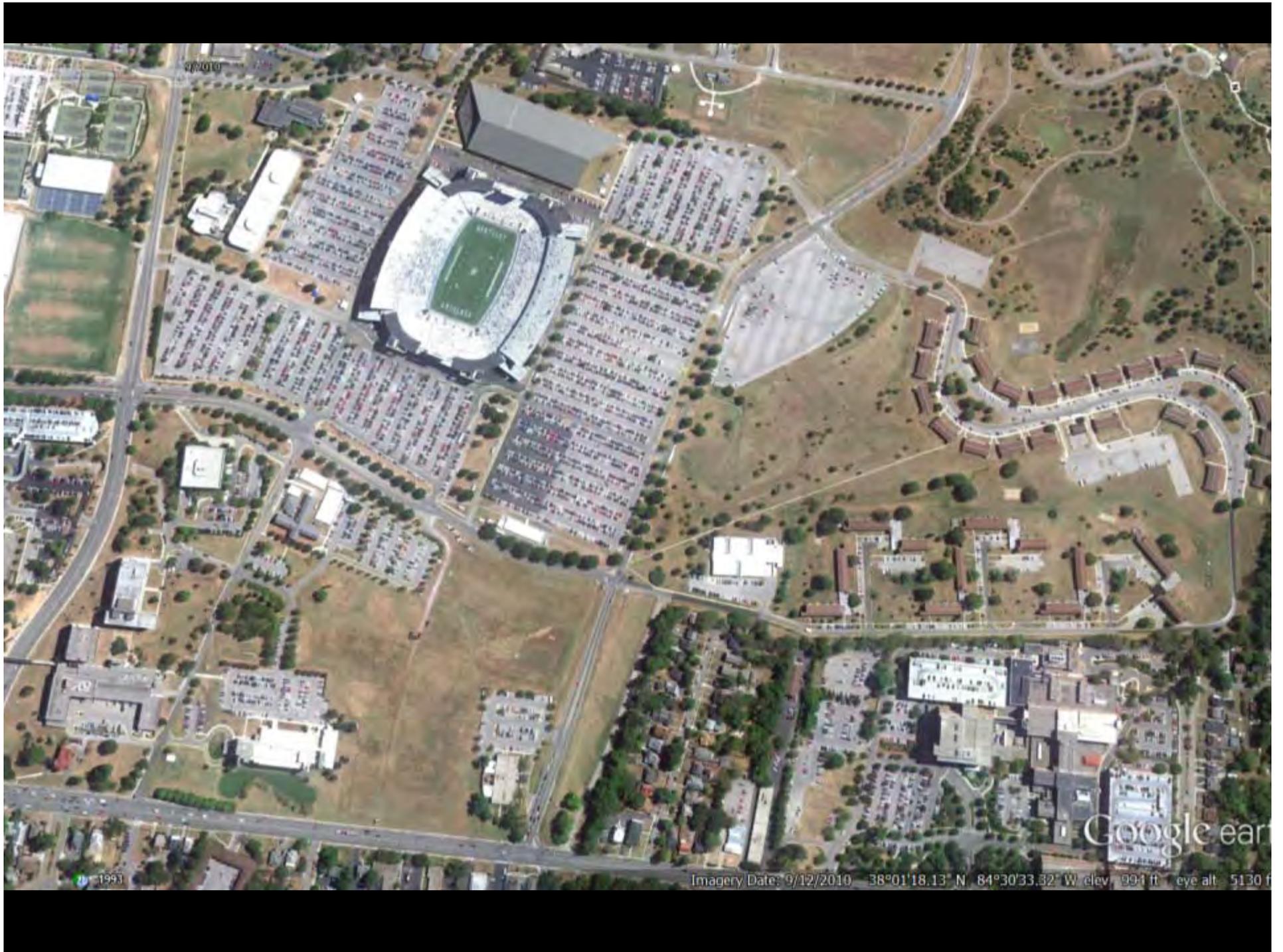
Bike Trail

Bike Trail

Area	Pre (ac-ft)	Post (ac-ft)
1	1.7	2.3
2	0.4	4.9
3	10.7	10.4
4	1.4	2.6
5	0.0	4.4
6	0.7	0.7
TOTAL	14.9	22.7
	(9.3 ac-ft underground)	



Vision & Implementation

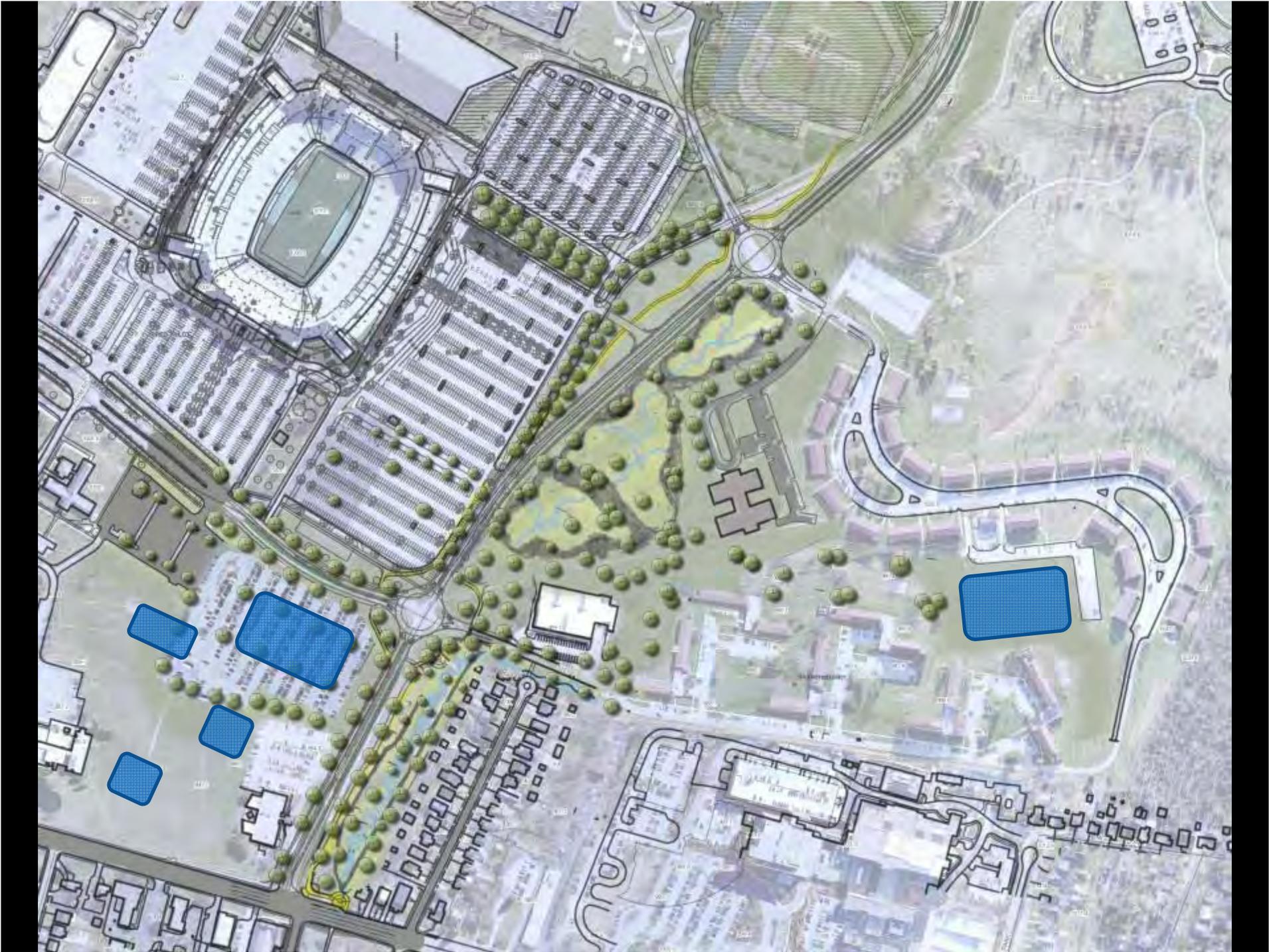


9/2010

Google earth

Imagery Date: 9/12/2010 38°01'18.13" N 84°30'33.32" W elev. 994 ft eye alt. 5130 f

1993



Area 2 – Before



Parking Plan

PROPOSED PARKING	
FEMA	= 645
REVISED GOOD BARN	= 231
SOUTH CAMPUS	= 370
TOTAL PROPOSED PARKING	= 1,246
FUTURE SOUTH CAMPUS	= 35
TOTAL W/FUTURE	= 1,281



Area 2 – Proposed (2-years)



Area 2 – During Construction



Area 2 – During Construction





Image Landsat
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Go

1995

38°01'21.51" N 84°30'31.84" W elev 1060 f

Area 5 (Greg Page) – During Construction



Area 5 (Greg Page) – During Construction



Area 5 (Greg Page) – During Construction



Area 3 – Proposed



Area 3 – Pre-Construction



Area 3– End of Construction



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Image Landsat

1998

38°01'12.15" N 84°30'26.48" W











Area 4 – Pre-Construction



Area 4 – Proposed Alumni Drive





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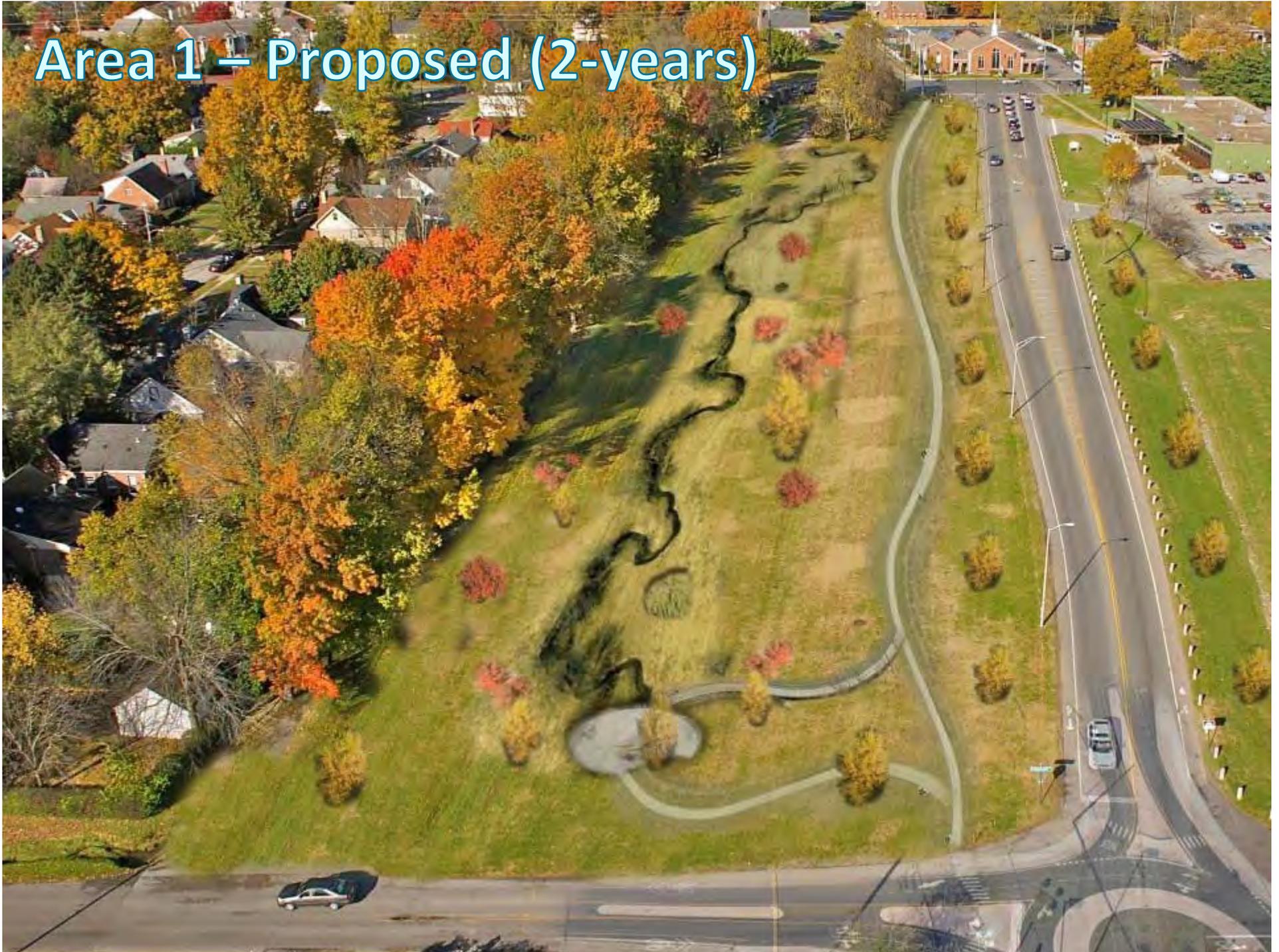
38°01'11.58" N 84°30'21.37" W elev 100



Area 1 – Pre-Construction



Area 1 – Proposed (2-years)





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1993

38°01'18.73" N 84°30'37.01" W elev 98

Area 1 – Pre-Construction



Area 1 – During Construction



Area 1 – Current















UK NICHOLASVILLE ROAD FEMA FLOOD MITIGATION

Client/Owner: University of Kentucky
Project Location: Lexington, KY
Entering Firm: Bell Engineering



Bell Engineering began working with the University of Kentucky in 2012 to alleviate repetitive flooding issues on the south end of campus. Due to increased runoff volume, at times the storm drainage system was overwhelmed and overtopped a major urban arterial highway, causing both traffic and safety concerns. The University was awarded a FEMA Hazard Mitigation Grant to address the need for more detention to control flow rates and reduce flooding. Bell prepared a detailed evaluation of the watershed including flow monitoring, stormwater modeling, land use determinations/green space protection, and utility needs. The project incorporated several surface and underground detention basins, stream restoration, and bio-swales concepts into a linear stormwater park that provides storage in the upper reaches of the watershed while reducing downstream flooding. There were numerous challenges in achieving these goals, including a need to reduce the peak flow for the 100-year, 24-hour event by over 100 cfs. Usable surface areas for detention were at a premium due to the growth of the University. The watershed contains the football stadium, family housing and a child care center, requiring continuous coordination of multiple stakeholders and causing potential safety concerns for open basins. The owner also wanted a pleasing, park like feel in this high profile area. Prior to the project, the watershed had 14.9 acre-feet of detention. There is now 21.7 acre-feet of detention including 13.4 acre-feet in open basins and 9.3 acre-feet in underground detention including underneath parking areas.



Questions?

Josh Karrick, PLA, ASLA, AICP

jkarrick@hkbell.com

Asheville, NC

828/771-0838

Bell Engineering

www.hkbell.com

Brian Gathy

bdgath2@uky.edu

Lexington, KY

859/257-8485

