UK/Nicholasville Road Flood Mitigation Project

Bell Engineering
August 29, 2017
2017 KAMM Annual Conference
About The Project
Award Briefing

HMGP DR-1818-0096
University of Kentucky

Nicholasville Road Drainage Improvement Project

February 8, 2011
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
Major Disaster Declaration declared on February 5, 2009
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
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
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
“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
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)

51% Flow Reduction

Flow Existing
Flow Improved
Utilities

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

- Bike Lanes
- Bike Trail
- Roundabout
- Realignment

Bike Lanes
Bike Trail
Roundabout
Realignment
<table>
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<th>Post (ac-ft)</th>
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(9.3 ac-ft underground)
Vision & Implementation
Parking Plan

PROPOSED PARKING
- FHA: 448
- REVISED GOOD BARN: 231
- SOUTH CAMPUS: 370
- TOTAL PROPOSED PARKING: 1,246

FUTURE SOUTH CAMPUS: 35
- TOTAL W/FUTURE: 1,281

Bus Stop

Existing Parking
- GOOD BARN: 190

Scale 1" = 40'
Area 2 – Proposed (2-years)
Area 2 – During Construction
Area 2 – During Construction
Area 5 (Greg Page) – During Construction
Area 5 (Greg Page) – During Construction
Area 4 – Proposed Alumni Drive
Area 1 – Proposed (2-years)
Area 1 – Pre-Construction
Area 1 – During Construction
Area 1 – Current
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%. Durable surface areas for detention were 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.
Video
Questions?

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