The Cannon Drive Levee:
Flood Protection at The Ohio State University

2019 ASFPM Conference
May 23, 2019

...or,

Is a Levee Really a Levee if You Can't See it?
The Ohio State University Main Campus:

- Situated on the Olentangy River
- Over 1,700 acres
- Over 61,000 enrolled in Columbus
University Framework Plan 2.0

- Enhanced access to the University’s Medical Campus and other core areas
- Flood protection for the campus
- Connection to the Olentangy River Bikepath
Project Goals: Cannon Drive

- Create a north-south gateway and connection between Lane and King Ave
- No impact to the SR 315 exit ramp capacity
- Provide a 500-year level of flood protection
- Levee recognized by NFIP
- Create 12 acres of developable land
- Green infrastructure
- Olentangy River to be part of an open space amenity
- Relocate Franklin Main
- Minimize impacts to AEP distribution systems
Other Project Considerations

- Transportation Needs
- OSU WMC Expansion
- Maintenance of Traffic
- Park Development
- Landscaping
- Utility Coordination
- Medical Center and Battelle Access
- Engineered Levee
- NFIP Acceptance (CLOMR/LOMR)
- ODNR Approval
- Columbus Approval

- Environmental Covenant Modification
- Section 404 Permit (USACE)
- NPDES Stormwater NOI (OEPA)
- Columbus Stormwater Drainage Manual Compliance
- Scheduling and permitting timelines
Project Stakeholders

- The Ohio State University
- Department of Natural Resources
- AEP American Electric Power
- The City of Columbus
- Andrew J. Ginther, Mayor
- State of Ohio Department of Transportation
- U.S. Department of Homeland Security
- FEMA
- Battelle
- U.S. Army Corps of Engineers
Medical Campus and Research Center in the 500-Year Floodplain

Woody Hayes Drive

King Avenue
Fifth Avenue Dam Removal

- Precursor project
- Restored free flowing bankfull channel with connected floodplain bench
- Grading and landscaping connectivity to Cannon Drive project
- Provided updated hydraulic model for Olentangy River
Phase I

Phase II

Relocated Cannon Drive & Line of Flood Protection
Examples of Roadways Constructed on Dams

Images: Bing Maps, Google Earth
Phase I

Phase II

Relocated Cannon Drive/
Line of Flood Protection

Woody Hayes Drive

Woddy Hayes Dr

Cannon Drive

Olenary Rd

King Avenue

W 9th Ave

King Ave

W 6th Ave

McMillen Ave

W 7th Ave

Cannon Rd

W 9th Ave

E 16th Ave

E 15th Ave

E 9th Ave
Levee Vegetation Limitations – USACE ETL 110-2-583
Jet Grout Seepage Barrier

JET GROUT SEEPAGE BARRIER LEVEE TYPICAL SECTION
Sta 0+28 to Sta 0+55
Jet Grout Seepage Barrier

Image: Haywood Baker
Riverine H&H

- 543 sq. mi. watershed
- FEMA model revised after 5th Ave Dam Removal
- Hydrology influenced by Delaware Dam
- Peak discharge rates based on USGS Gaging Station in Worthington
- SWMM model prepared to validate FEMA flows
- Revised HEC-RAS 1-D analysis
- Levee final design based on FEMA 500 year streamflow plus two foot freeboard to address uncertainty concerns
• Likelihood of local rain event and Olentangy River flood occurring simultaneously
• Review of historical rainfall data and stream gage records
• Analysis determined weak correlation

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<tr>
<th>River Flood Frequency</th>
<th>Interior Design Storm Event</th>
<th>24-Hour Rainfall Depth</th>
<th>HGL Elevation at POI</th>
<th>Joint Probability of Occurrence</th>
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• SWMM analysis
• Routing to detention basin under river low flow condition
• Under river high flow condition, weir opens at pump station to divert flow
• Box culvert (8’x5’) in Cannon Drive provides conveyance and storage
HIGH RIVER TAILWATER CONDITION
Interior Drainage System – Phase 1 Pump Station

- Maximum capacity = 120 cfs (77 MGD)
  - 3 duty pumps; 2 submersible pumps
- Primary electrical feed with natural gas backup generator
ODNR Levee Construction Permit

• Preliminary Design Report: Phase 1 & 2
• Final Design Report: Phase 1 only in 2017
• Permit issued for Phase 1 construction: September 2017
Levee Review – Federal

Conditional Letter of Map Revision

- Phase 1: Issued Feb. 2017
- Phase 2: Revised CLOMR
- LOMR to be filed upon completion of Phase 2
- NFIP 65.10 compliance
  - Freeboard (7 to 8 feet provided for 100 year flood)
  - Closures (Checkmate backflow valves)
  - Scour protection
  - Embankment Stability, Seepage, & Settlement
  - Interior drainage analysis
  - Operation and Maintenance Plan
PHASE 1

Under Construction
Completion December 2019

PHASE 2

In Design Phase
Construction TBD
Phase I

Relocated Cannon Drive/
Line of Flood Protection

Phase II

King Avenue

Woody Hayes Drive

Olenary Island

College Rd
Phase 2 – Existing Conditions
Phase 2 – Proposed Conditions
Phase 2 – Proposed Conditions