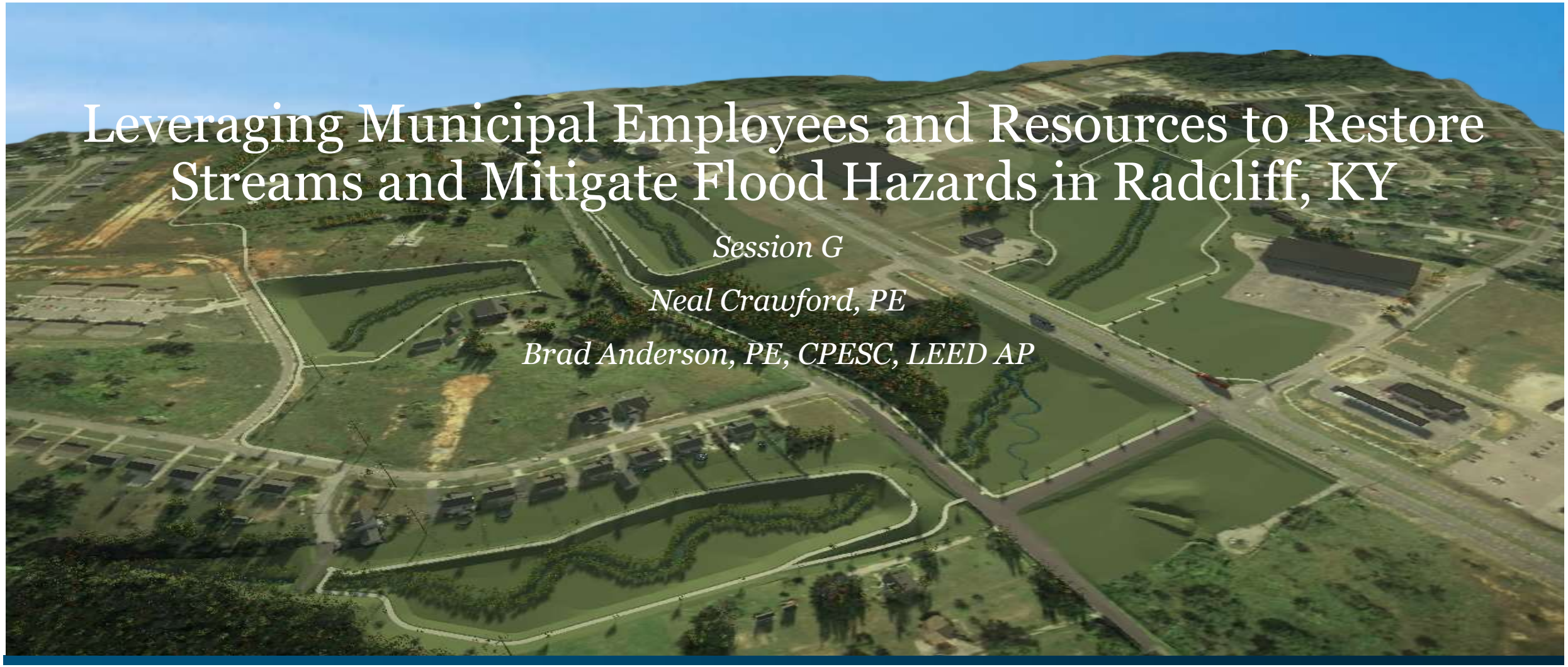

Leveraging Municipal Employees and Resources to Restore Streams and Mitigate Flood Hazards in Radcliff, KY

Session G

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QK4 Engineering Planning

Groundbreaking by Design.

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First National STREAM RESTORATION Conference

Project Team

Engineering Planning

Groundbreaking by Design.

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Presentation Agenda

- Project Background
- Completed Project Activities
- Implemented Cost Saving Measures
- Summary

Flooding Issues

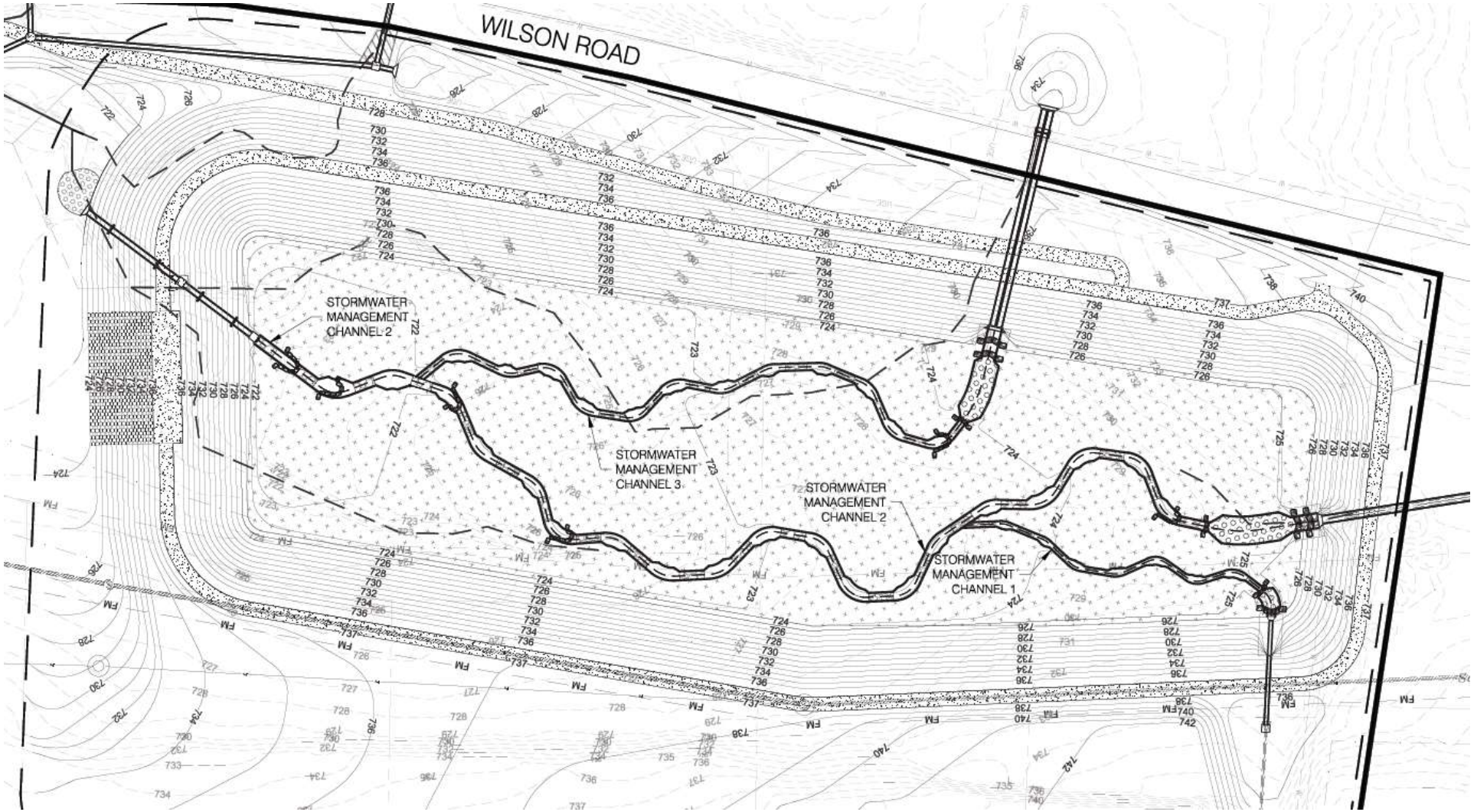
Project Goals

- Reduce flood frequency and extents
- Restore basins in an ecologically appropriate manner
- Improve water quality to Quiggins Sinkhole
- Provide opportunities for public recreation

Project Design/Permitting Activities

- Detailed Hydrologic and Hydraulic Model of Quiggins Sinkhole Watershed
  - Sinkhole outlet flow was 11.9 cfs for a 1,069-acre watershed
  - Only feasible solution was to establish storage/detention areas along the stream valleys draining to Quiggins Sinkhole
  - Identified the need for 5 storage/detention basins
- Basin and Stream Channel Designs
- Extensive Regulatory Permitting Required
  - Section 404/401 permitting with USACE and KDOW
  - Section 7 consultation with USFWS
  - Section 106 coordination with SHPO
  - State/local floodplain/stream construction permitting
  - State/local site disturbance permitting
- Onsite Compensatory Stream Mitigation Allowed

Stream Restoration Design



Stream Restoration Design

Completed Stream Restoration

Cost Savings Methods

- Rock Purchase and Hauling
- KYTC Hauling Permit for Quiggins Basin
- Stream Restoration Construction by City Employees

Rock Hauling

Stream Restoration Cost Savings – Rock Hauling

- City staff MSHA trained to select stone needed for project direct from the quarry.
- Special KYTC hauling permit acquired by City to allow articulated trucks (off-road trucks) to haul stone from quarry to site.
  - City provided temporary street closures and fire/police escort.
- 599 tons of boulders purchased($25/ton or $2.17 / LF)
- Hauling took 27 trucks ($6.76/ton or $0.59 / LF)
- City purchased all other stream stabilization stone required @ $5.32 / LF
- Average Stream Restoration Costs ~ $132 - $137 / LF
- Turner Lane Basin Savings = $74,030
  - Actual Stream Restoration Cost = $72.58 / LF
- Quiggins Basin Savings = $317,770
  - Actual Stream Restoration Cost = $61.10 / LF
- **Total Project Savings = $391,800**

KYTC Hauling Permit Cost Savings

- Special KYTC hauling permit was acquired by City to allow contractor to utilize articulated trucks (off-road trucks) to haul spoils across US 31 W.
  - City provided temporary signal modifications and guard rail removal.
  - Allowed contractor to reduce the hauling distance and number of trips required due to increased capacity of articulated trucks.
- Contractor completed Hauling of approx. 84,000 CY
- Average Hauling Costs ~ $6 - $10 / CY
- Quiggins Basin Savings = $306,900
  - Actual Hauling Cost = $4.35 / CY

Stream Restoration – City Constructed

- Estimated savings in excess of $300,000

Project Summary

Proposed Basin	Provided Flood Storage(Ac-Ft)	Stream Channel Restored (Linear Feet)
Quiggins Basin	375	3,691
Turner	33.1	1,186
Wilson	40.7	1,384
Song	28	461
Alternate	26.1	604
Total	502.9	7,326

Summary

- Projects successfully completed
- In monitoring years ranging 3rd to 5th
- Meeting all success criteria
- Saved over $1,000,000 with these innovative cost saving measures

Questions & Answers

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