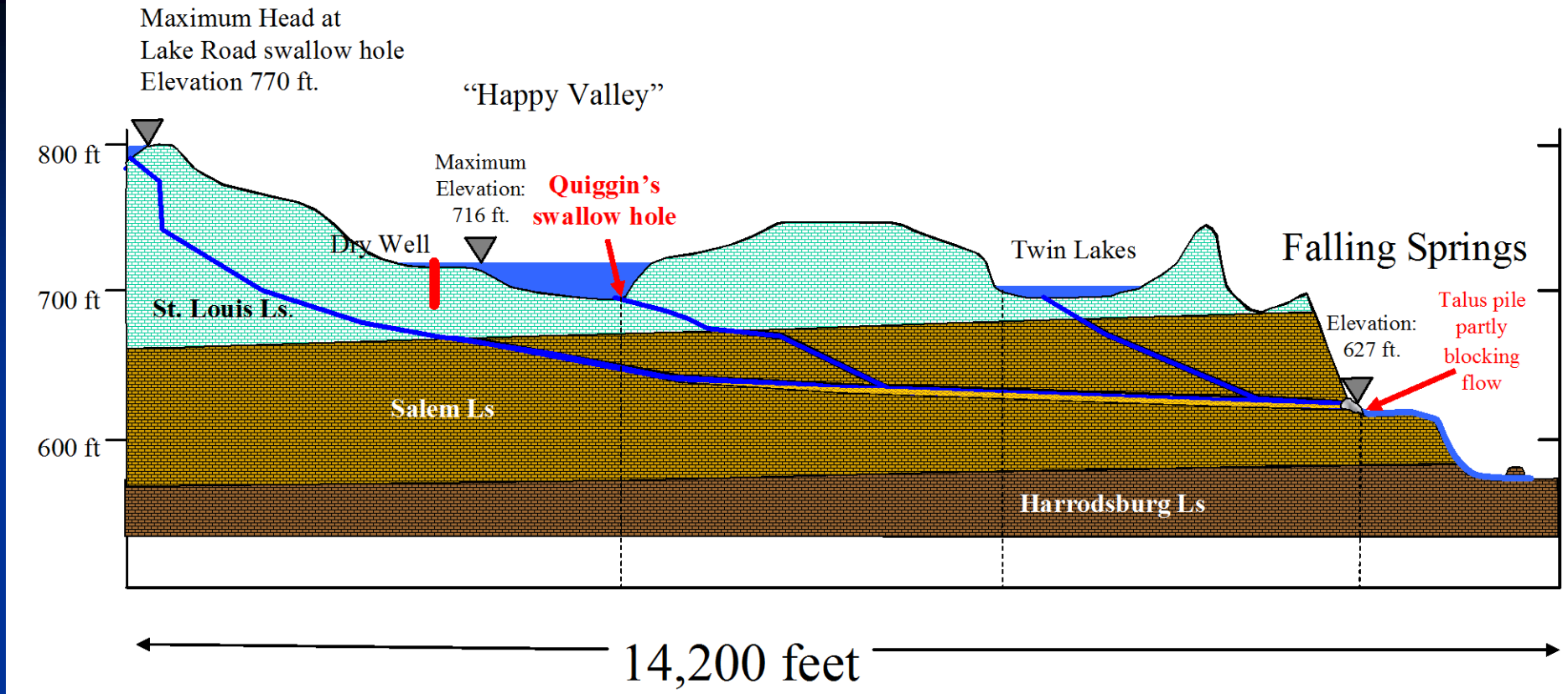
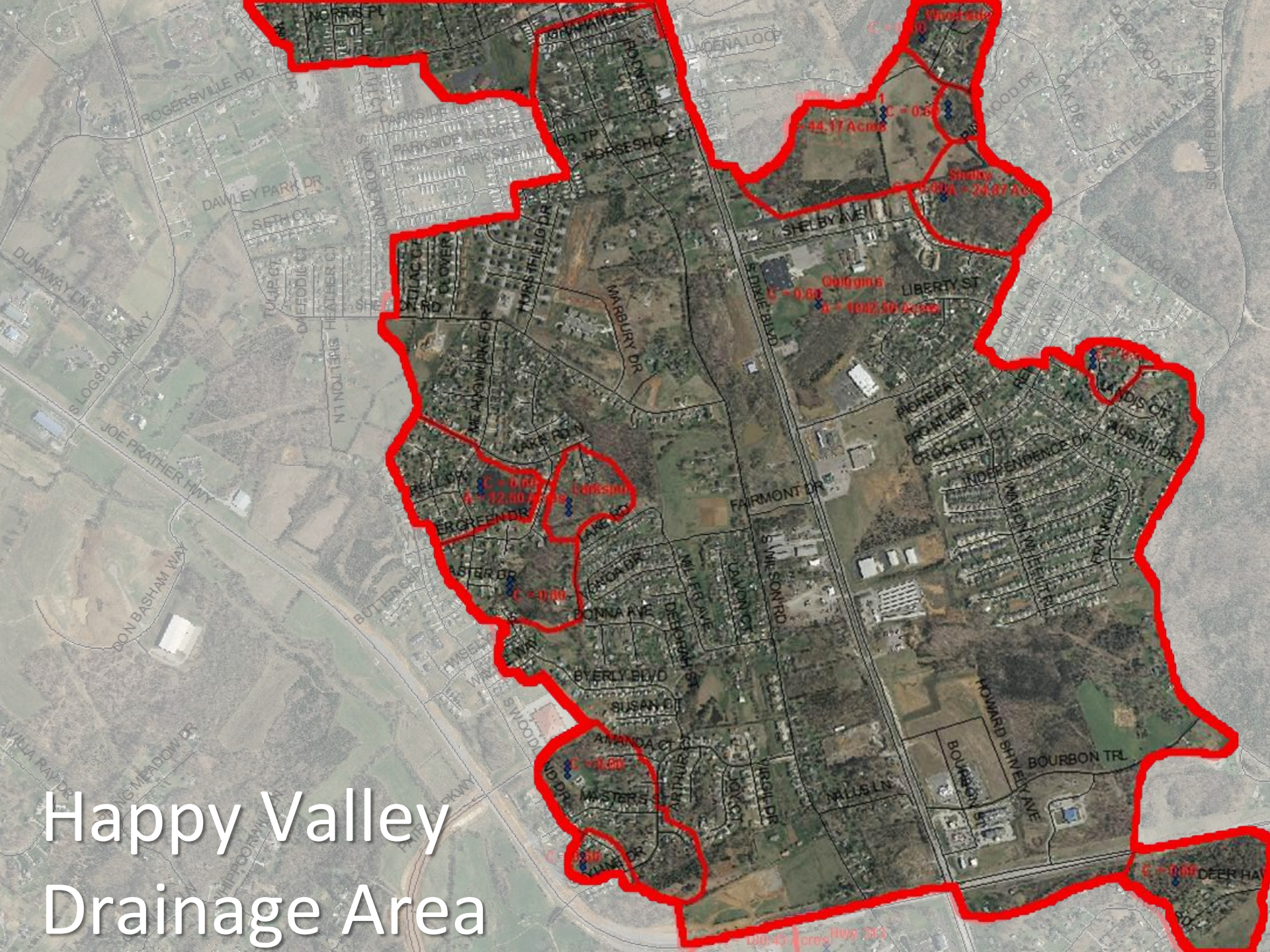
Happy Valley Flood Mitigation Project

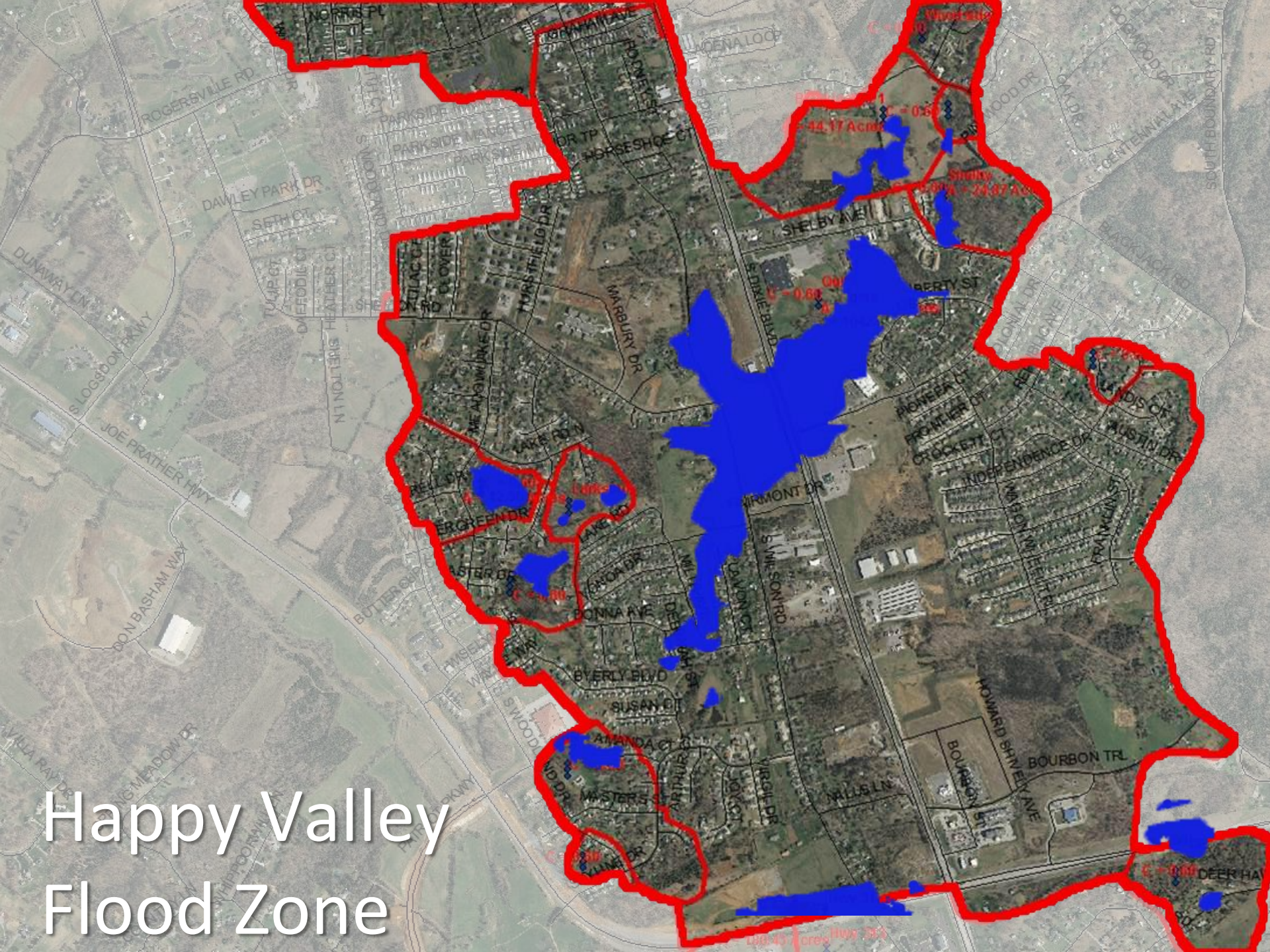
Toby Spalding, PE
City Engineer
City of Radcliff

Neal Crawford, PE
Project Manager
Qk4, Inc.



Quiggins Sink Hole


Happy Valley
Drainage Area


Happy Valley
Flood Zone

Happy Valley Flooding Problems

Happy Valley Flooding Problems

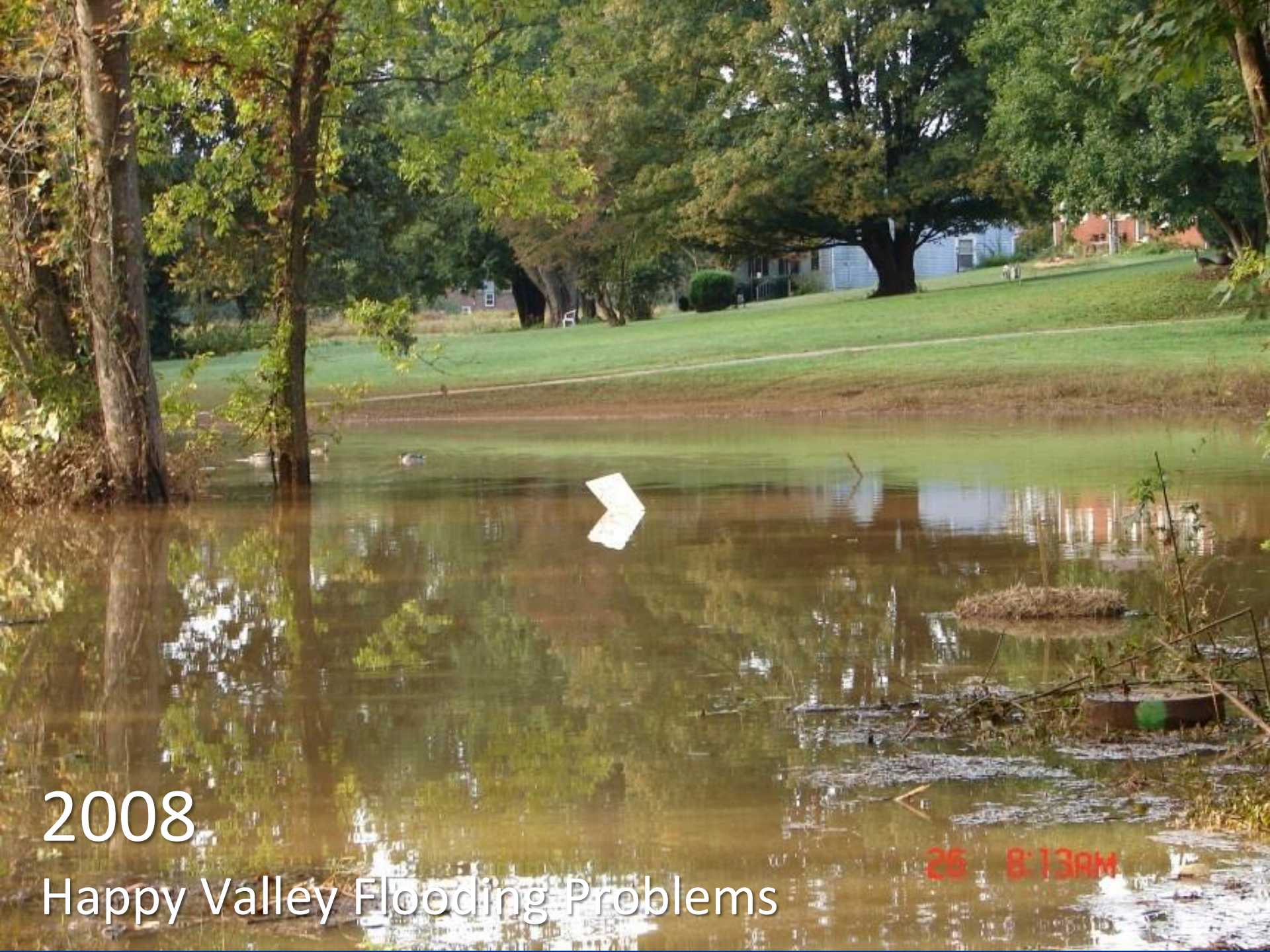

1997
Happy Valley Flooding Problems


1997
Happy Valley Flooding Problems


1997
Happy Valley Flooding Problems


1997
Happy Valley Flooding Problems


1997
Happy Valley Flooding Problems



2008

Happy Valley Flooding Problems

2008

Happy Valley Flooding Problems


2008
Happy Valley Flooding Problems
2006 4 4

2008

Happy Valley Flooding Problems

Liberty Street Acquisition Project

- Grant process 2009.
- 2970 & 2980 Liberty Street.
- Federal Grant award of $161,550 with a 12% State match & 13% local match.
- Purchased homes according to FEMA acquisition process.
- Fire Dept. burned the homes for training.
- Closed out in January 2012.

HAPPY VALLEY FLOOD CONTROL GRANT APPLICATION

December 2008

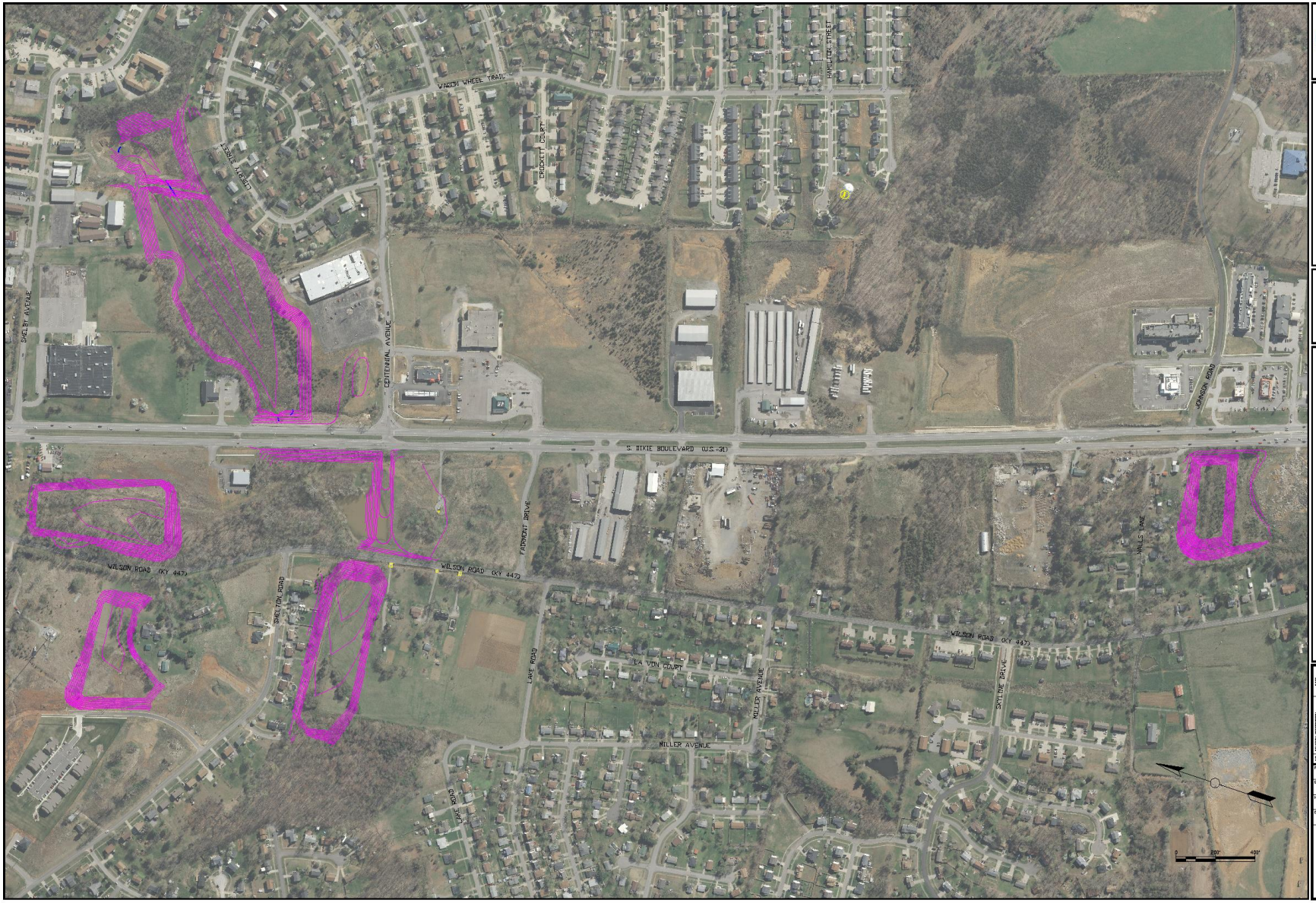
- Applied for grant
- Denied due to lack of supporting documentation

February 2009

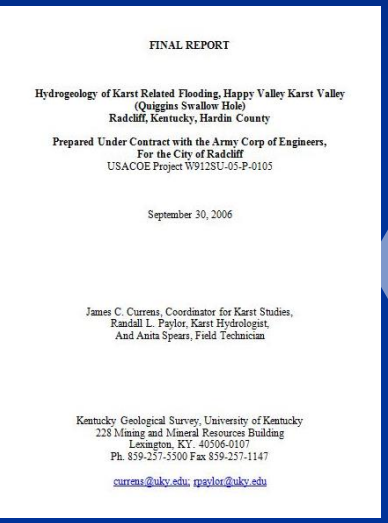
- Began hydraulic study / design
- Eventually led to award

April 2009

- Re-applied for grant



Radcliff Storm Water Utility



FINAL REPORT

Hydrogeology of Karst Related Flooding, Happy Valley Karst Valley (Quiggins Swallow Hole) Radcliff, Kentucky, Hardin County

Prepared Under Contract with the Army Corp of Engineers, For the City of Radcliff
USACOE Project W912SU-05-P-0105

September 30, 2006

James C. Currens, Coordinator for Karst Studies,
Randall L. Paylor, Karst Hydrologist,
And Anita Spears, Field Technician

Kentucky Geological Survey, University of Kentucky
228 Mining and Mineral Resources Building
Lexington, KY. 40506-0107
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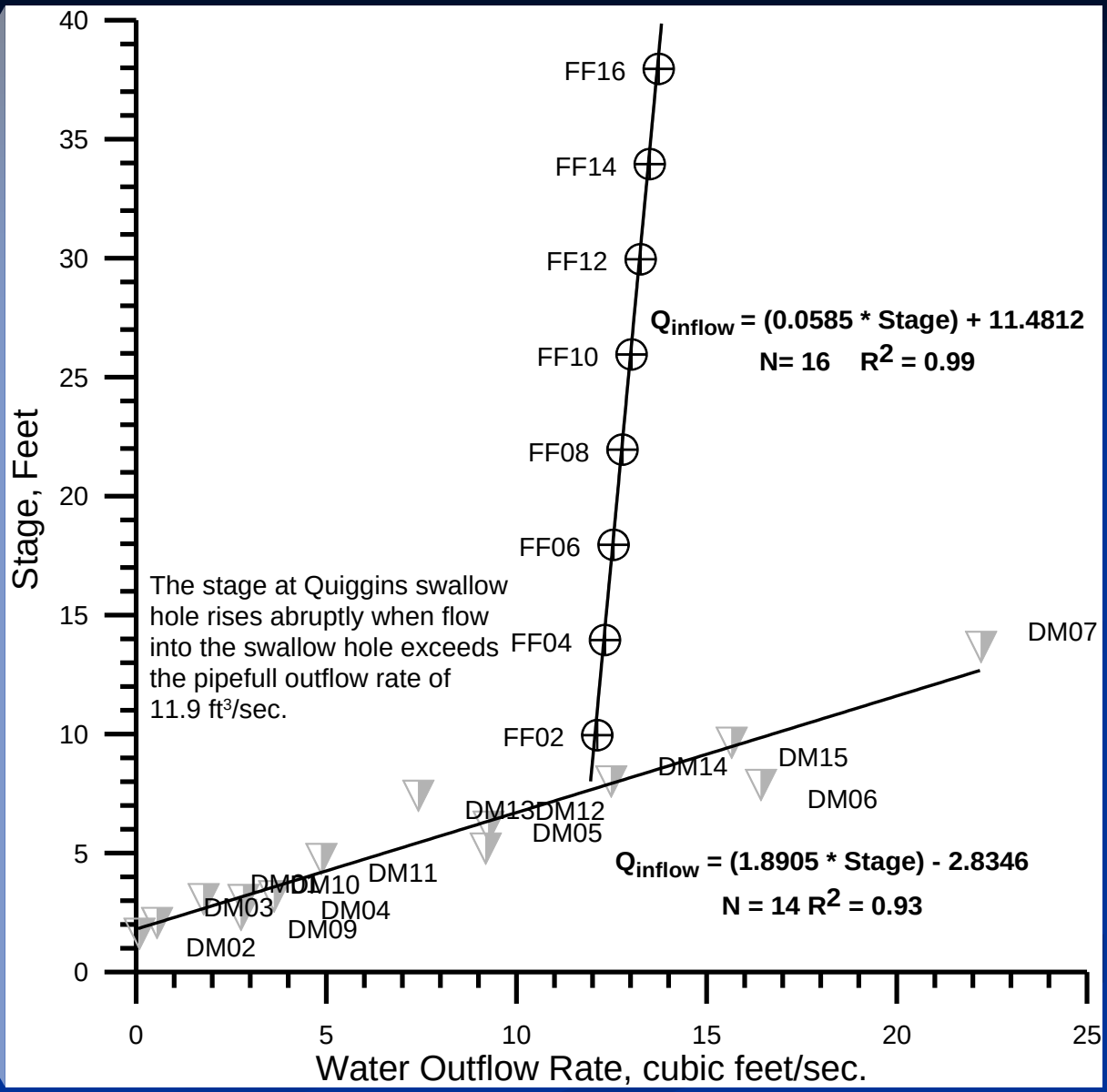
currens@uky.edu; rpaylor@uky.edu



Quiggins Sinkhole Analysis

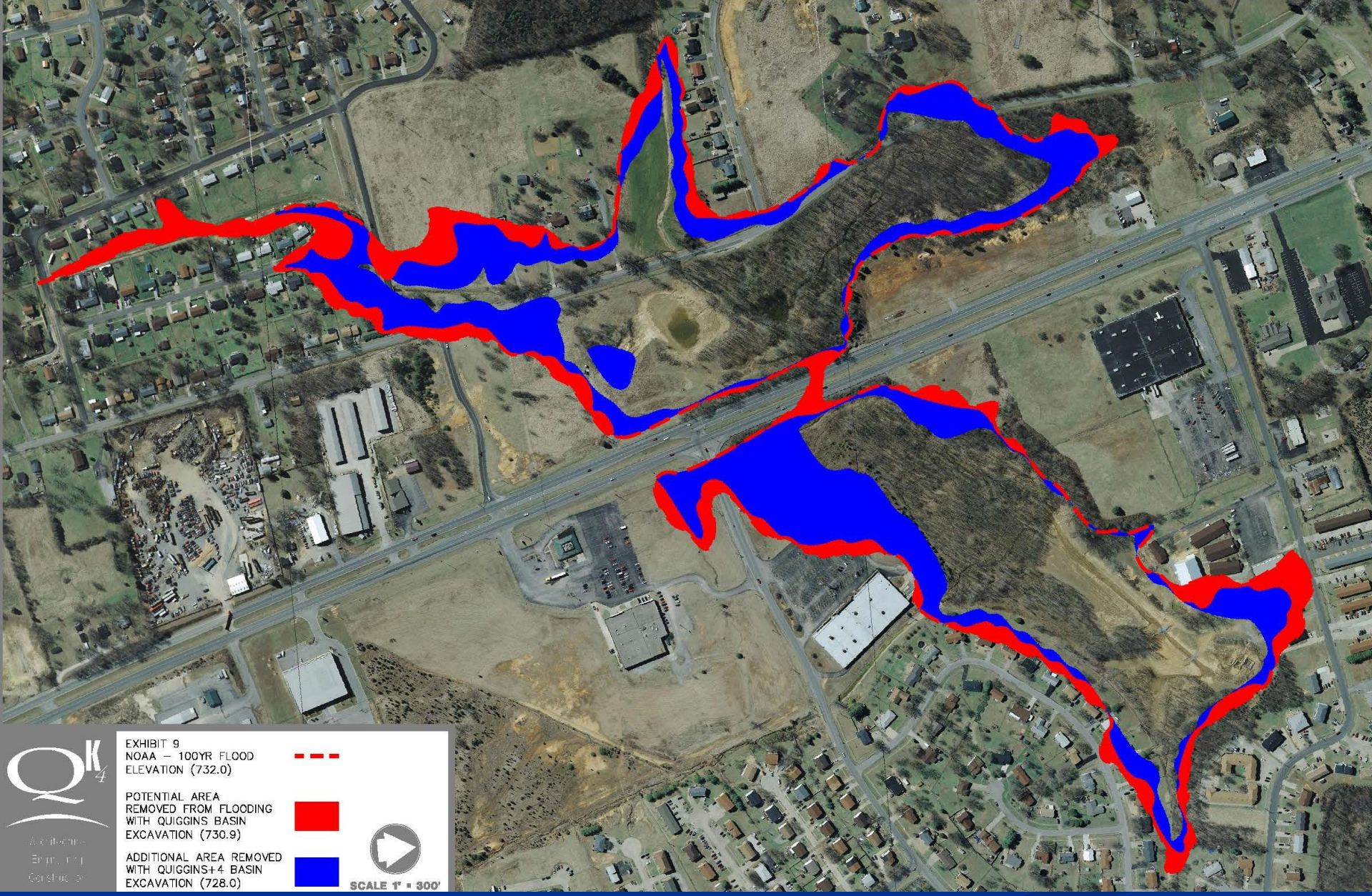
Hydraulic Study

Storage Volume with Associated Rainfall and South Wilson Road Closure Duration, Existing Conditions								
Elevation	Ex. Storage	Ex. Storage	Watershed	Net Rainfall	Runoff	Total Rainfall	Recession Time	Recession Time
Feet	Cu.Yd.	Ac.-Ft.	Acres	Inches	Ratio	Inches	Hours	Days
720.9	148933	92	1069.4	1.04	0.57	1.82	0	0.0
721.0	152957	95	1069.4	1.06	0.58	1.83	3	0.1
721.5	173075	107	1069.4	1.20	0.58	2.08	15	0.6
722.0	193194	120	1069.4	1.34	0.59	2.28	28	1.2
722.5	215724	134	1069.4	1.50	0.59	2.54	42	1.8
723.0	238253	148	1069.4	1.66	0.60	2.76	56	2.3
723.5	263438	163	1069.4	1.83	0.60	3.05	72	3.0
724.0	288622	179	1069.4	2.01	0.61	3.29	88	3.7
724.5	316460	196	1069.4	2.20	0.61	3.61	106	4.4
725.0	344297	213	1069.4	2.39	0.62	3.86	123	5.1
725.5	374859	232	1069.4	2.61	0.62	4.21	142	5.9
726.0	405421	251	1069.4	2.82	0.63	4.48	162	6.7
726.5	439190	272	1069.4	3.05	0.63	4.85	183	7.6
727.0	472959	293	1069.4	3.29	0.64	5.12	204	8.5
727.5	510344	316	1069.4	3.55	0.64	5.55	228	9.5
728.0	547729	340	1069.4	3.81	0.65	5.86	251	10.5
728.5	589087	365	1069.4	4.10	0.65	6.30	277	11.6
729.0	630445	391	1069.4	4.38	0.66	6.64	303	12.6
729.5	675762	419	1069.4	4.70	0.66	7.12	332	13.8
730.0	721079	447	1069.4	5.02	0.67	7.49	361	15.0
730.5	771697	478	1069.4	5.37	0.67	8.01	392	16.4
731.0	822314	510	1069.4	5.72	0.68	8.41	424	17.7
731.5	879128	545	1069.4	6.11	0.68	8.99	460	19.2
732.0	935942	580	1069.4	6.51	0.69	9.43	496	20.7
732.5	1000981	620	1069.4	6.96	0.69	10.09	537	22.4
733.0	1066019	661	1069.4	7.41	0.70	10.59	578	24.1
733.2	1094437	678	1069.4	7.61	0.70	10.93	596	24.8

NOAA Frequencies, Existing			
ARI	4-day	Elevation	Recession
Years	Inches	Feet	Days
1	3.86	725.0	5.1
2	4.61	726.2	7.1
5	5.62	727.6	9.7
10	6.43	728.7	12.0
25	7.56	730.1	15.2
50	8.47	731.1	17.8
100	9.42	732.0	20.6
200	10.41	732.8	23.5
*1997	10.93	733.2	24.8

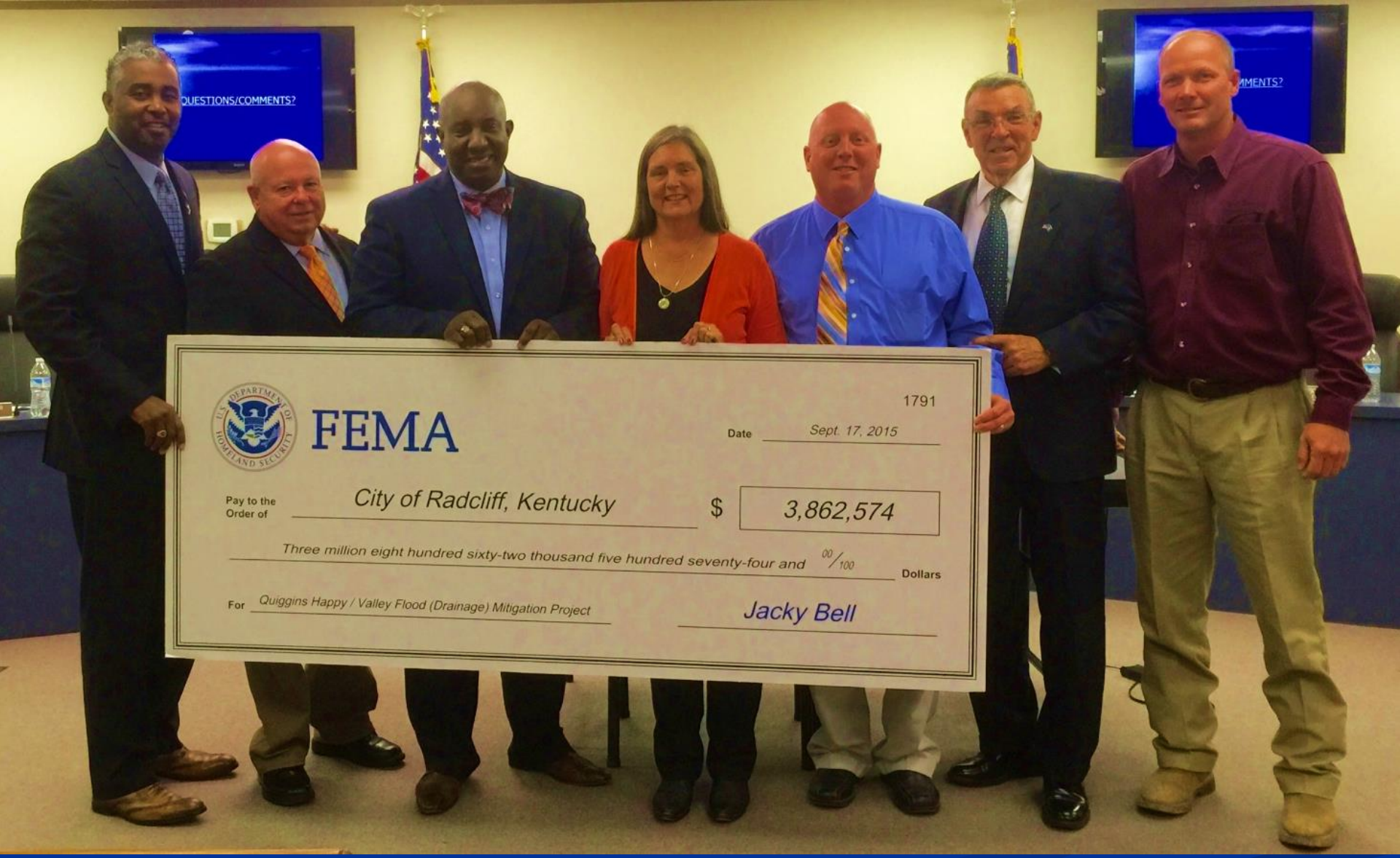
NOAA Freq., Post Quiggins +4			
ARI	4-day	Elevation	Recession
Years	Inches	Feet	Days
1	3.86	<720.9	N/A
2	4.61	<720.9	N/A
5	5.62	722.3	1.5
10	6.43	723.7	3.2
25	7.56	725.4	5.6
50	8.47	726.7	7.6
100	9.42	728.0	9.9
200	10.41	729.3	12.9
*1997	10.93	730.0	14.4

Evaluated Rainfall Data from 1993-2008.
Calibrated hydrologic model based on 1997 and 2008 known flood elevations and rainfall amounts.



Hydraulic Study

Grant Application



FEMA Grant Project

Project Scope

Acquire approximately 36 acres of undeveloped land to be utilized as detention basins, designating the area “greenspace” and increasing the storm-water run-off storage capacity for the Quiggins Sinkhole. The proposed design will alleviate flood hazards to homes and to the City’s two most critical transportation arteries, S. Wilson and US 31-W.

Projected Schedule

October 2015 – March 2016

- Update project costs
- FEMA approval of updated budget

April 2016 – November 2018

- Design & Acquisitions
- Construction
- FEMA project closeout

Current Status

- FEMA **approved funding** request for additional $1,231,569.14 (Updating 2008 construction and property acquisition values)
- FEMA currently evaluating proposal for scope change to include Alternate basin in lieu of the Cato Basin.
- Turner Lane Basin and Quiggins Basin designed and under construction.
- Wilson Road Basin designed and construction commencing soon
- Song Basin under design.

Turner Lane Basin

CITY OF RADCLIFF

Engineering Planning
Groundbreaking by Design.

TURNER LANE STORMWATER BASIN

HAPPY VALLEY FLOOD MITIGATION PROJECT

CONTRACTOR: PHILLIPS BROTHERS CONSTRUCTION, LLC

CONSTRUCTION COST: $616,581

FUNDED IN PART BY FEMA & KYEM

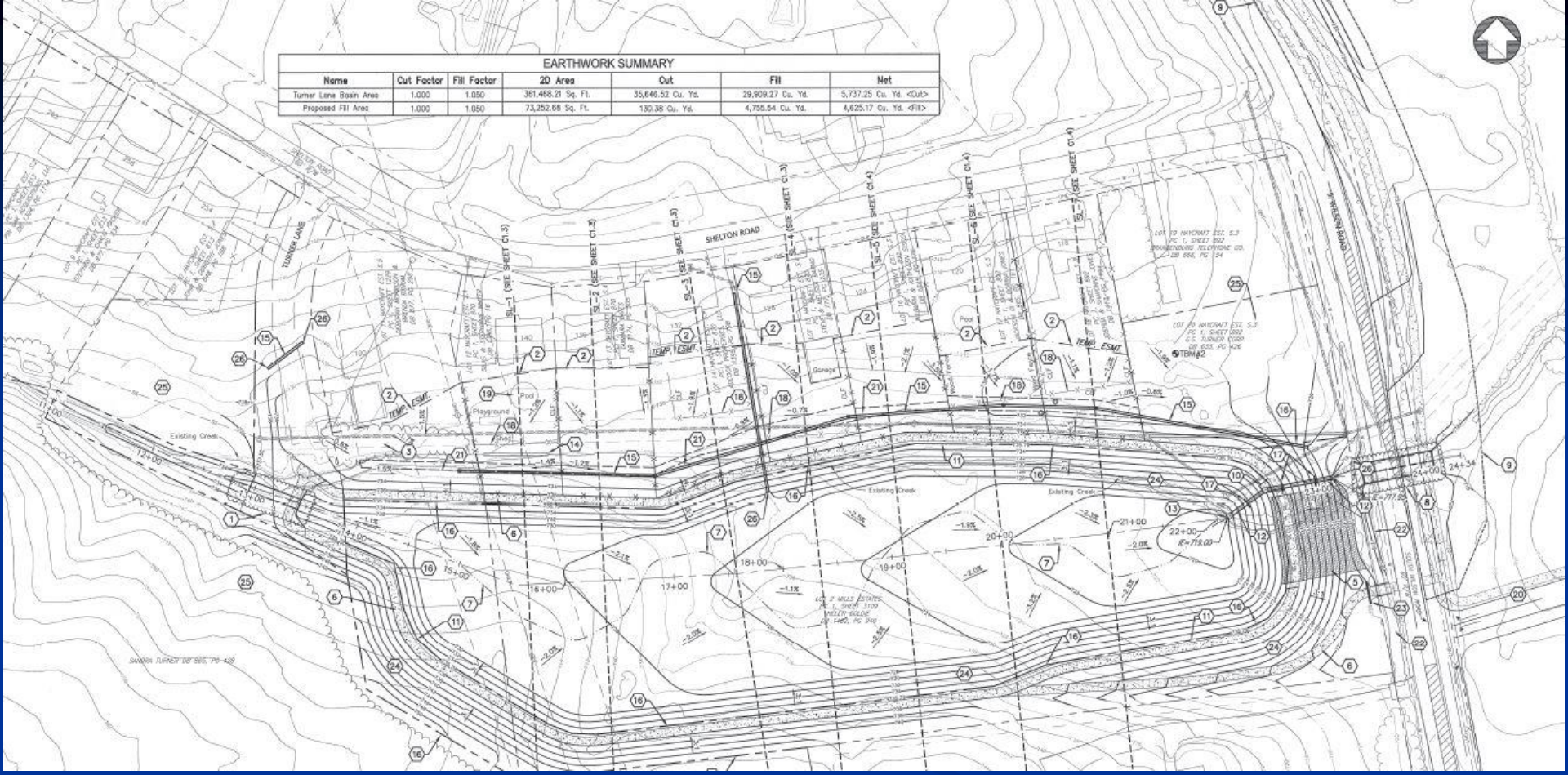
FEMA

For information call Radcliff City Hall at (270) 351-4714

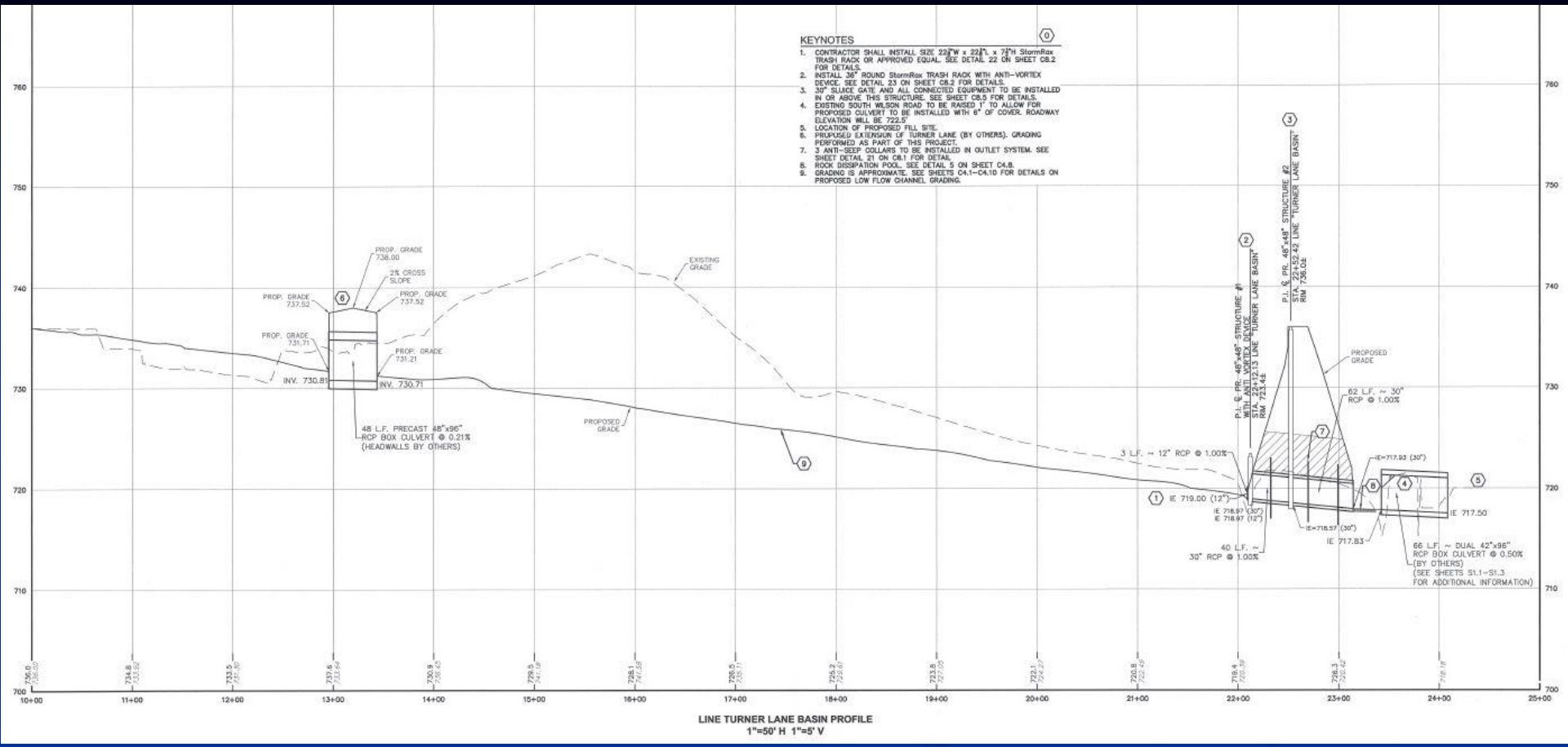
Turner Lane Basin

Turner Lane Basin

Turner Lane Basin

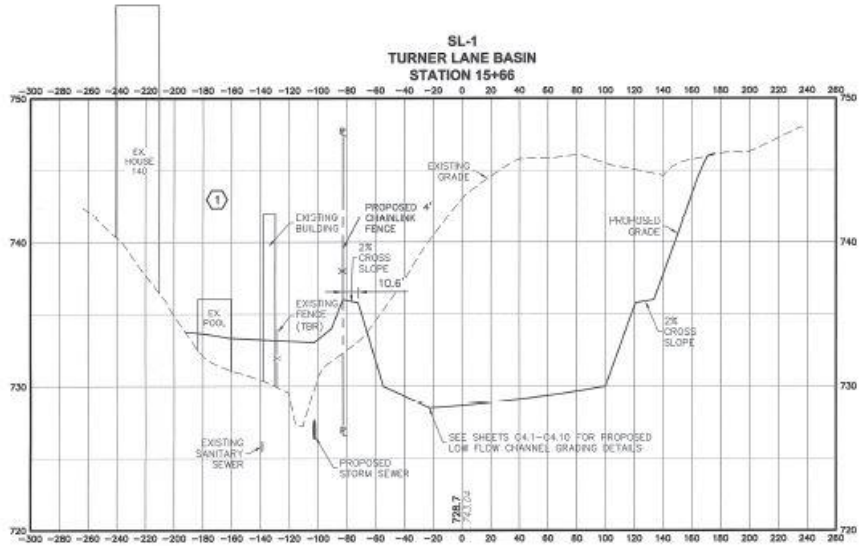


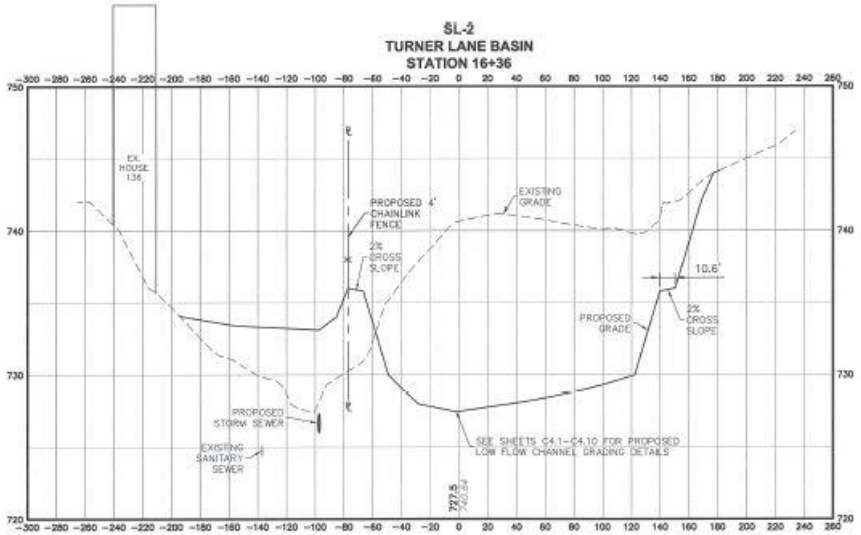
Turner Lane Basin

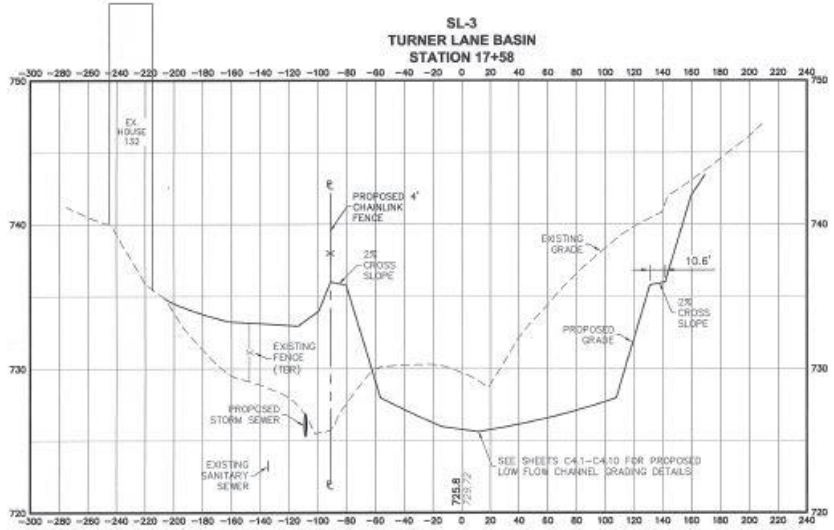


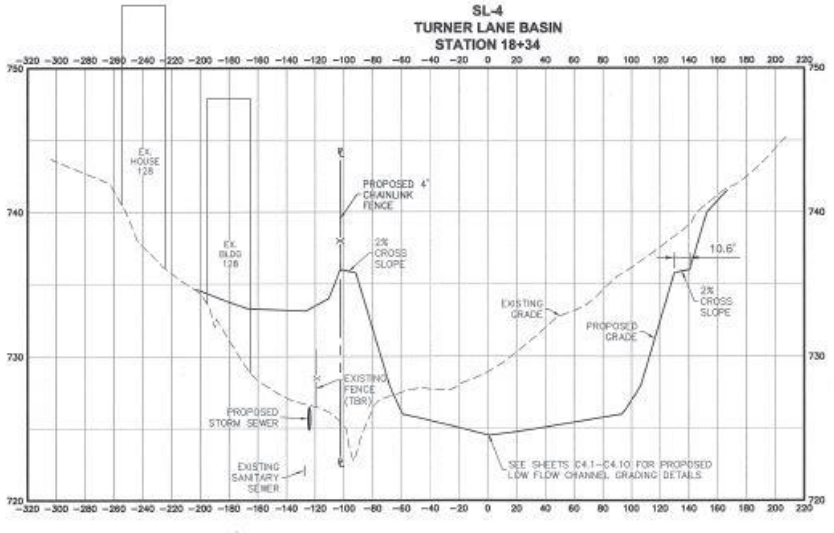
LINE TURNER LANE BASIN PROFILE
1"=50' H 1"=5' V

Turner Lane Basin









Turner Lane Basin

Turner Lane Basin

Turner Lane Basin Video

Quiggins Basin

CITY OF RADCLIFF

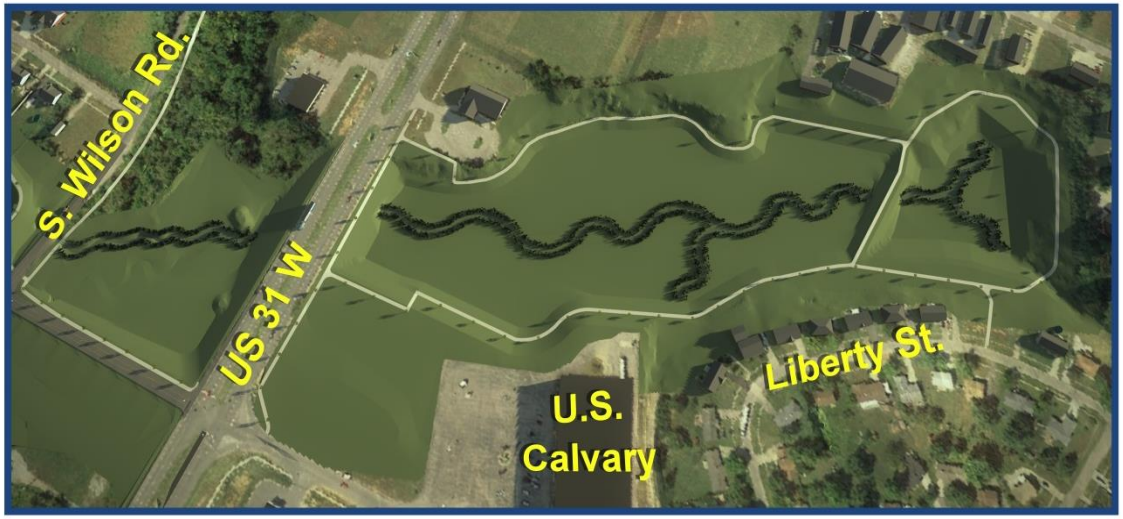
Engineering Planning
Groundbreaking by Design.

QUIGGINS STORMWATER BASIN

HAPPY VALLEY FLOOD MITIGATION PROJECT

CONTRACTOR: RAME CONTRACTING

CONSTRUCTION COST: $1,828,146

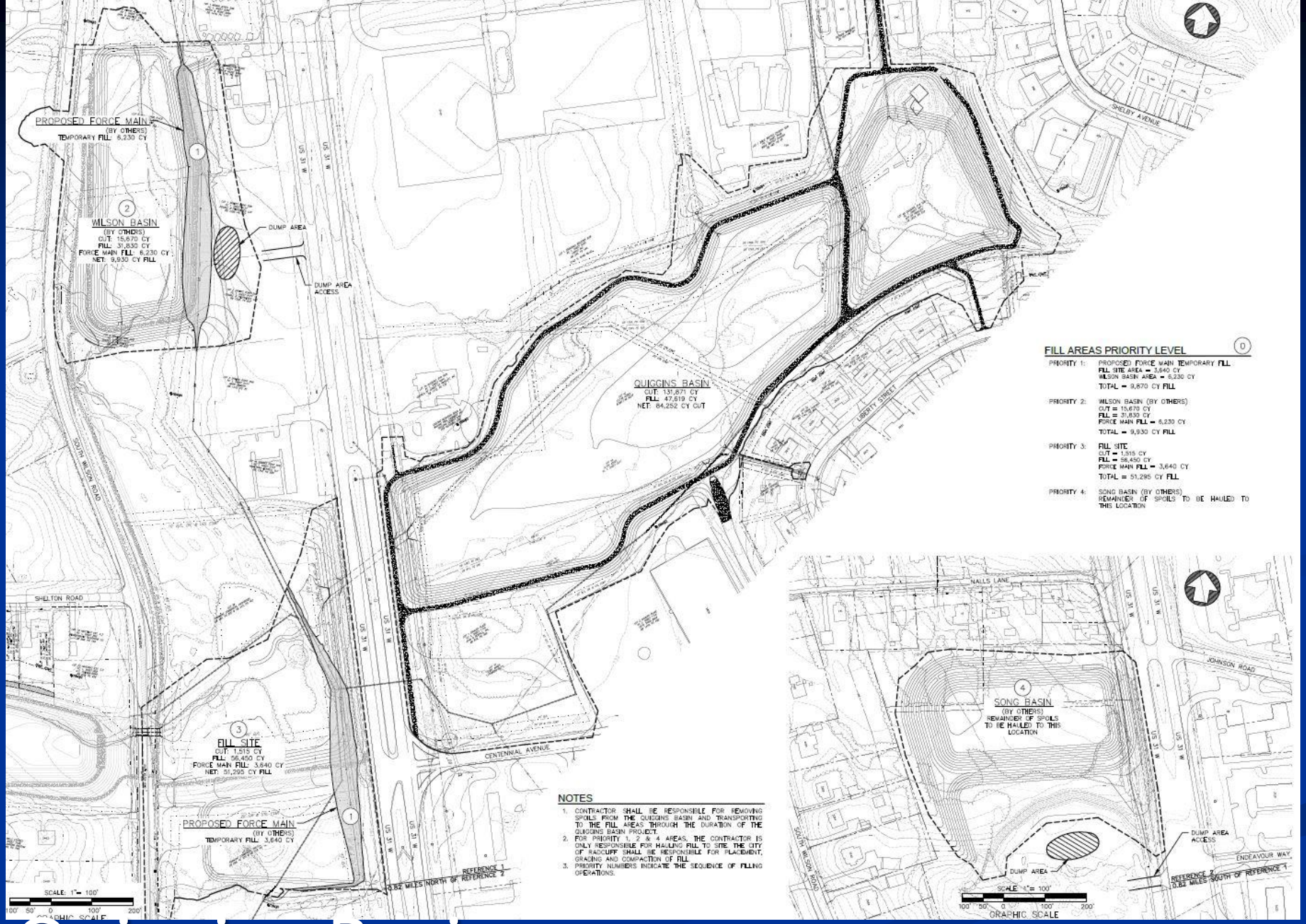


FUNDED IN PART BY FEMA & KYEM

FEMA

For information call Radcliff City Hall at (270) 351-4714

Quiggins Basin



Quiggins Basin

Quiggins Basin


Quiggins Basin


Quiggins Basin

Quiggins Basin


Quiggins Basin


Quiggins Basin


Quiggins Basin

Quiggins Basin


KYTC Hauling Permit

KYTC Hauling Permit Project Cost Savings

- Special KYTC hauling permit 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.
  - Allows contractor to reduce the hauling distance and number of trips required due to increased capacity of articulated trucks.
- Contractor in process of Hauling approx. 84,000 CY

KYTC Hauling Permit Cost Savings Realized

- Average Hauling Costs ~ $6 - $10 / CY
- Quiggins Basin Savings = $306,900
  - Actual Hauling Cost = $4.35 / CY

Stream Restoration

Rock Hauling

Rock Hauling Video

Stream Restoration Cost Savings Methods

- 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

Stream Restoration Cost Savings Realized

- 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 to Date = $391,800**


Road and
Box Culvert
2017 2 21


Road and
Box Culvert
2017 2 21

Road and Box Culvert

Road and Box Culvert

Wilson Road Basin

Wilson Road Basin

Song Basin


Alternate Basin

Summary

Proposed Basin	Top Elevation	Storage Below Top (Ac-Ft)	Storage Below Emergency Spillway (Ac-Ft)
Turner	736	33.1	29.2
Wilson	737	40.7	36.3
Song	784	28	23.2
Wal-Mart	780	63.4	63.4
Alternate	744	26.1	19.7
Subtotal		191.3	171.8
Quiggins Basin	728 (100 Yr. Floodplain)	375	
Total		566.3	

Questions?

Happy Valley Flood Mitigation Project

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City Engineer
City of Radcliff

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Project Manager
Qk4, Inc.