Sinkhole Protection BMP

Presented by: Alex Godsey, City Engineer &
Tracy Smith, Stormwater Coordinator

Somerset Statistics:

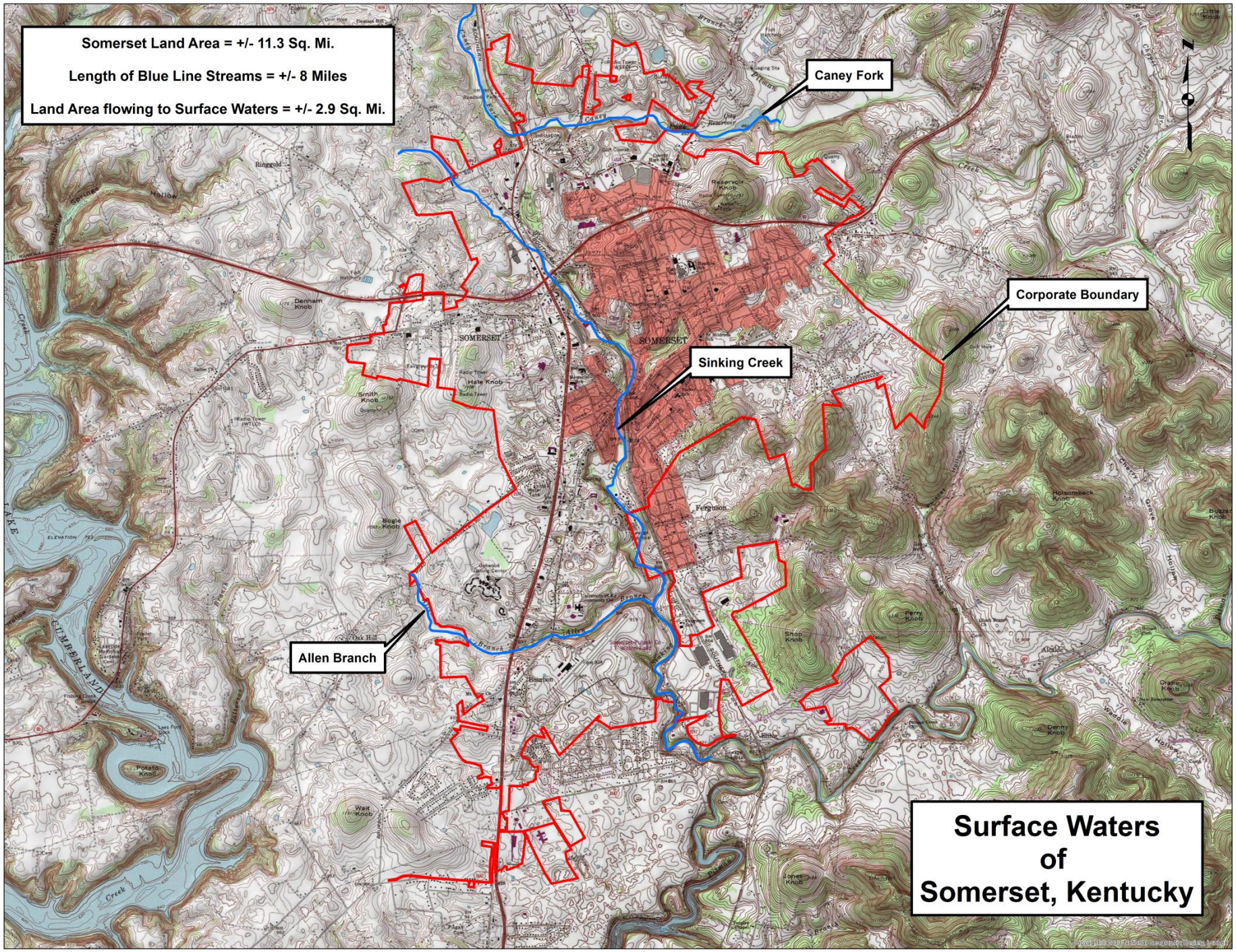
Total Area =11.3 Sq. Mi.

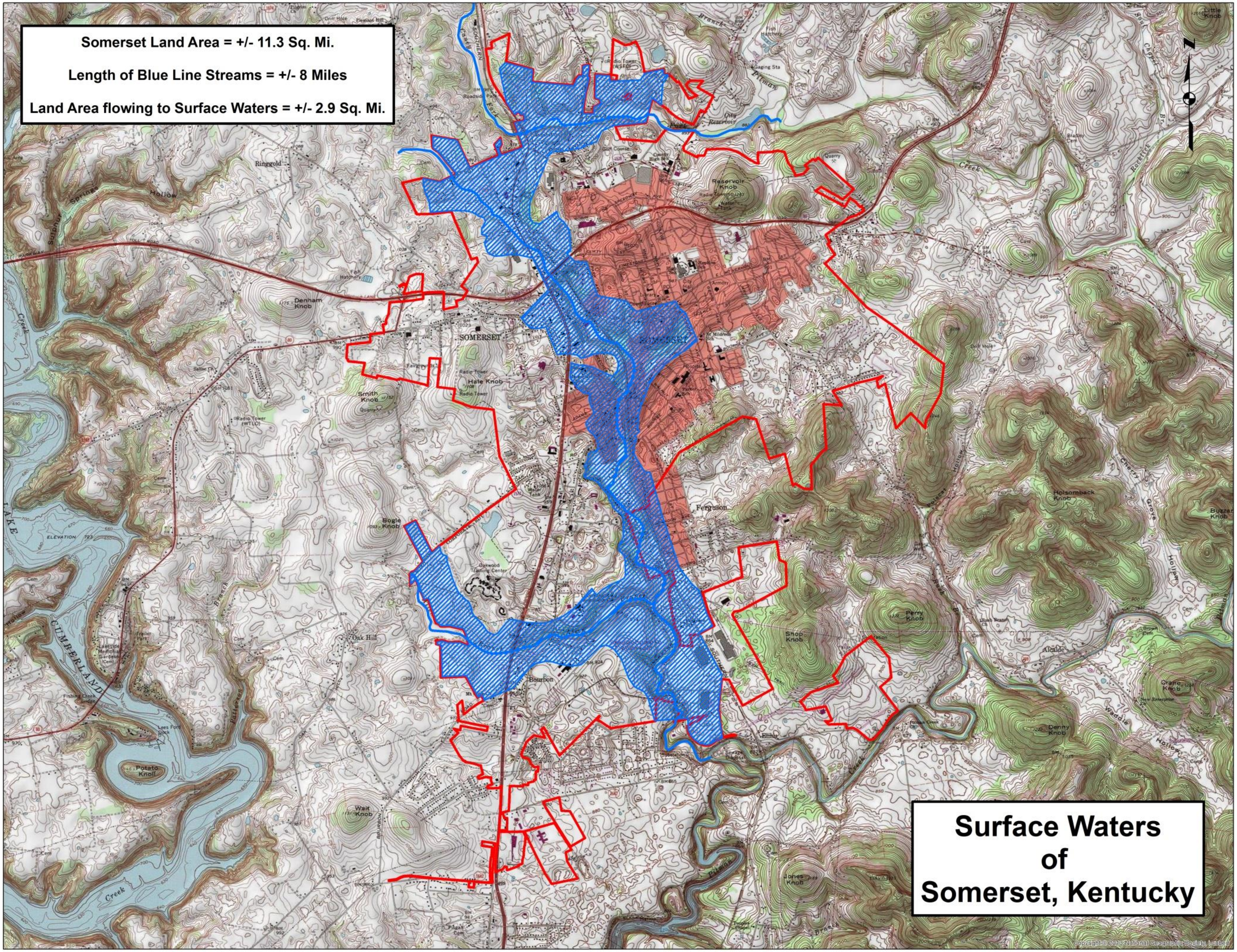
Three Blue Line Streams
Sinking Creek
Allen Branch
Caney Fork

Approx. 2.9 Sq. Mi. drains to surface waters

Approximately 75% of runoff from MS4 drains to Sinkholes!

Sinkholes are pretty important!


Somerset Land Area = +/- 11.3 Sq. Mi.
Length of Blue Line Streams = +/- 8 Miles
Land Area flowing to Surface Waters = +/- 2.9 Sq. Mi.
Caney Fork
Corporate Boundary
Sinking Creek
Allen Branch
Surface Waters
of
Somerset, Kentucky


Somerset Land Area = +/- 11.3 Sq. Mi.
Length of Blue Line Streams = +/- 8 Miles
Land Area flowing to Surface Waters = +/- 2.9 Sq. Mi.
Surface Waters
of
Somerset, Kentucky

Richards Court Project:

Total Area = 66.5 Acres

- Ponding Common in Heavy Events
- Water Over Roadway Once/Year
- Water Damage to Adjacent Homes
- Flooded Sewers and Backups
- Dangerous Open Hole and Ditch


CAT
CAT 316C

SINKHOLE REMEDIATION

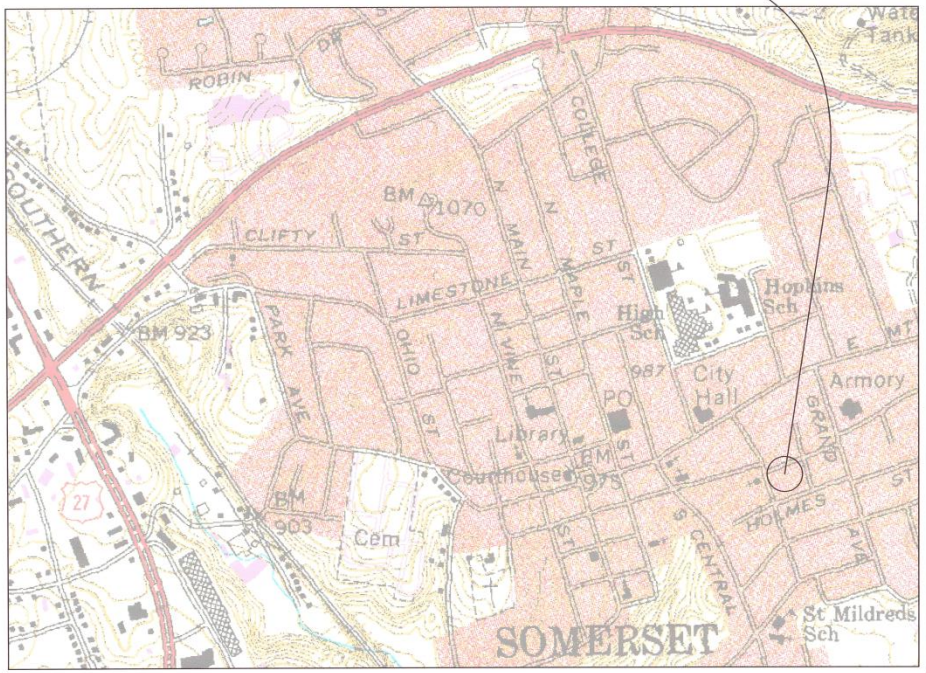
ROSE, CRAWFORD, AND HOLMES STREET
SOMERSET, KENTUCKY

SHEET INDEX

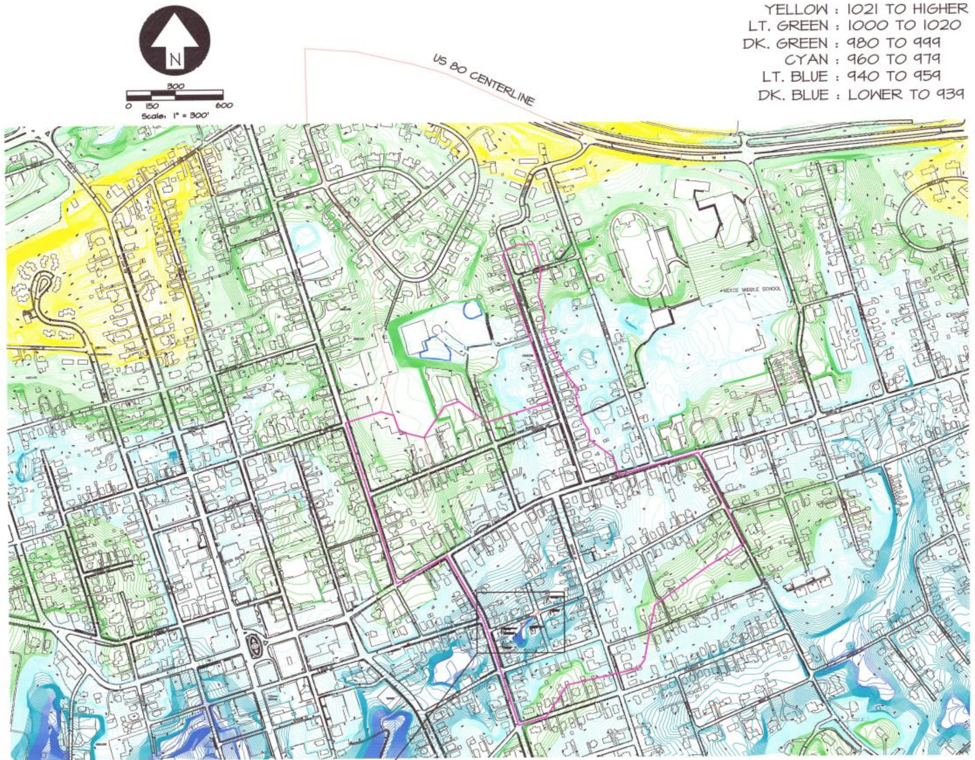
CLIFTY HEIGHTS
COMMUNITY DEVELOPMENT

PO BOX 609
SCIENCE HILL, KY 42553

SITE LOCATION
LAT. 37-05-29
LONG. 84-35-89



ACE ENGINEERING SERVICES, INC.
P.O. BOX 204
165 FOSTER LANE
STANFORD, KY. 40484
(606) 365-8362 FAX (606) 365-1097



ELEVATION COLOR CODE

YELLOW : 1021 TO HIGHER
LT. GREEN : 1000 TO 1020
DK. GREEN : 980 TO 999
CYAN : 960 TO 979
LT. BLUE : 940 TO 959
DK. BLUE : LOWER TO 939

SITE LOCATION
LAT: 37-05-29
LONG: 84-35-59

RUN-OFF CALCULATION FOR 100 YEAR STORM

RATIONAL METHOD (Q = C*I*A)

DRAINAGE AREA = 66.5 ACRES

URBAN AREA: RUN-OFF COEFFICIENT = 0.40

Tc CALCULATION: Tc = To + Tt

To = (.42 * L^0.8 * N^0.8) / (P2,24 * S^0.4)
L = 150 ft (OVER-LAND FLOW LENGTH)
N = 0.4 (OVERLAND FLOW COEFFICIENT) UNPAVED
P2,24 = 3.2 In (2 YR, 24 HR STORM PULASKI COUNTY)
S = 0.05 (AVERAGE OVERLAND SLOPE) ft /ft
To = 12 minutes

Tt = L / (60 * V) (L = 2,760 ft)
V = (1.49 /n) * R^.67 * S^.5 (n=.03 , R=.4, & S=.03)
Tt = 10 minutes

Tc = 22 minutes

INTENSITY - DURATION CURVE FOR LEXINGTON
I = 5.6 in/hr

Q = C * I * A
Q = .40 * 5.6 * 66.5
Q = 150 cfs

MAX FLOW THROUGH (2) 24" CULVERTS

(FROM INLET CONTROL NOMOGRAPH OF CMP CULVERTS)

MAXIMUM HEADWATER ON CULVERTS = 2.6 ft
Q = 18 cfs (EACH CULVERT)
36 cfs (BOTH CULVERTS)

FROM ABOVE CALCULATIONS:

TOTAL FLOW ARRIVING AT SINKHOLE = 150 cfs
FLOW CARRIED BY DITCH AND CULVERTS = 36 cfs

OVERFLOW ELEVATION AT ROSE STREET
ELEV. 941.67

SITE DETAIL

100
0 50 200
Scale: 1" = 100'

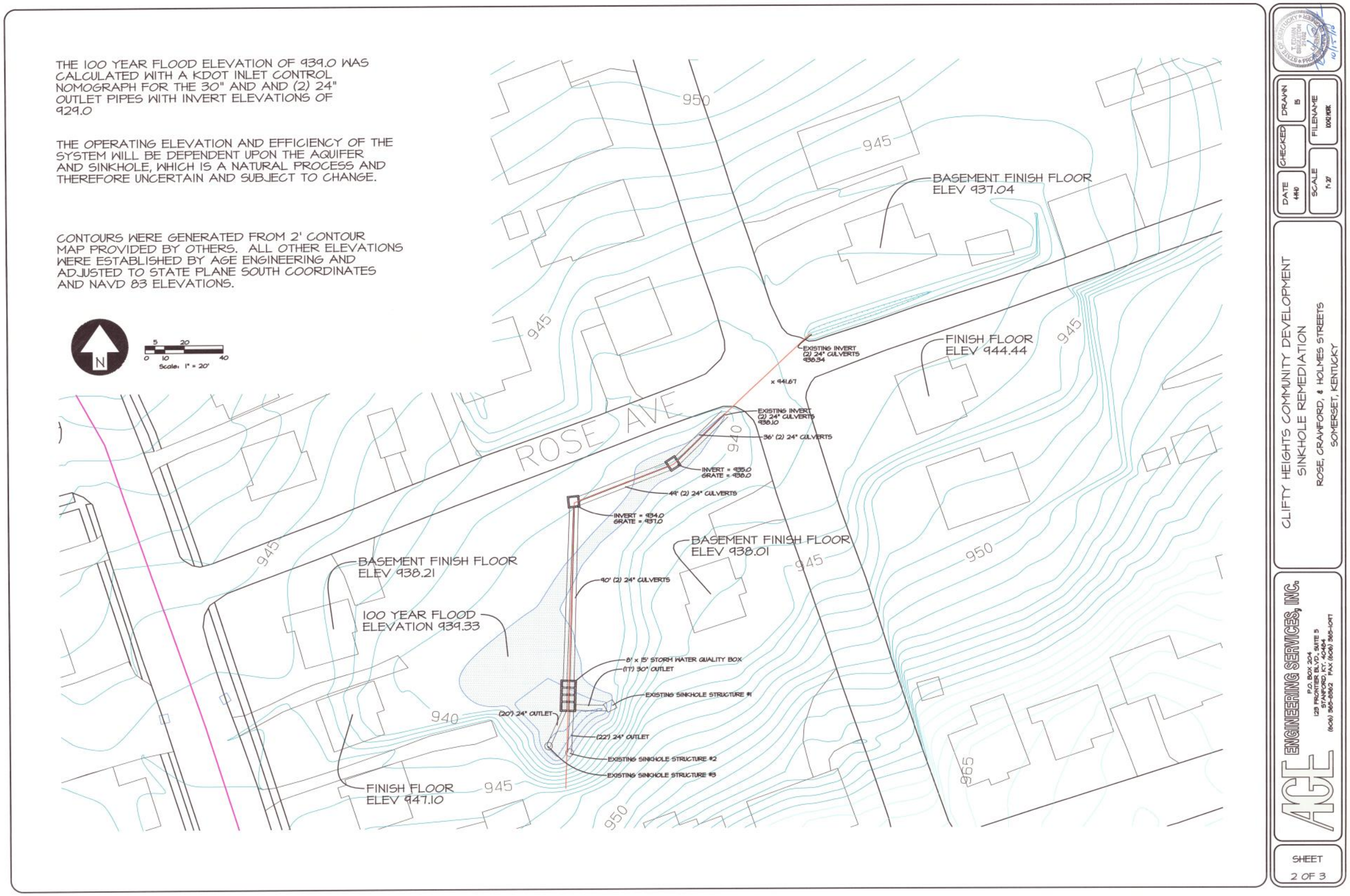
DIRECT RUN-OFF AREA USED IN CALCULATIONS = 66.5 ACRES (EXCLUDES UPPER SINK AREAS)
TOTAL DRAINAGE AREA INCLUDING UPPER SINK AREAS = 175 ACRES (REFERENCE ONLY)

ACE ENGINEERING SERVICES, INC.
P.O. BOX 204
123 FRONTIER BLVD., SUITE 5
STANFORD, KY. 40484
(606) 365-8362 FAX (606) 365-1097

CLIFTY HEIGHTS COMMUNITY DEVELOPMENT
SINKHOLE REMEDIATION
ROSE, CRAWFORD, & HOLMES STREETS
SOMERSET, KENTUCKY

DATE 4/4/10 | CHECKED | DRAWN IS
SCALE 1":300' | FILENAME 1002 WORK

SHEET 1 OF 3


THE 100 YEAR FLOOD ELEVATION OF 939.0 WAS CALCULATED WITH A KDOT INLET CONTROL NOMOGRAPH FOR THE 30" AND AND (2) 24" OUTLET PIPES WITH INVERT ELEVATIONS OF 929.0
THE OPERATING ELEVATION AND EFFICIENCY OF THE SYSTEM WILL BE DEPENDENT UPON THE AQUIFER AND SINKHOLE, WHICH IS A NATURAL PROCESS AND THEREFORE UNCERTAIN AND SUBJECT TO CHANGE.
CONTOURS WERE GENERATED FROM 2' CONTOUR MAP PROVIDED BY OTHERS. ALL OTHER ELEVATIONS WERE ESTABLISHED BY AGE ENGINEERING AND ADJUSTED TO STATE PLANE SOUTH COORDINATES AND NAVD 83 ELEVATIONS.
N
Scale: 1" = 20'
ROSE AVE
BASEMENT FINISH FLOOR ELEV 937.04
FINISH FLOOR ELEV 944.44
EXISTING INVERT (2) 24" CULVERTS 938.34
x 941.67
EXISTING INVERT (2) 24" CULVERTS 938.10
36' (2) 24" CULVERTS
INVERT = 935.0 GRATE = 938.0
49' (2) 24" CULVERTS
INVERT = 934.0 GRATE = 937.0
BASEMENT FINISH FLOOR ELEV 938.01
BASEMENT FINISH FLOOR ELEV 938.21
90' (2) 24" CULVERTS
100 YEAR FLOOD ELEVATION 939.33
8' x 15' STORM WATER QUALITY BOX
(17') 30" OUTLET
EXISTING SINKHOLE STRUCTURE #1
(20') 24" OUTLET
(22') 24" OUTLET
EXISTING SINKHOLE STRUCTURE #2
EXISTING SINKHOLE STRUCTURE #3
FINISH FLOOR ELEV 947.10
CLIFTY HEIGHTS COMMUNITY DEVELOPMENT
SINKHOLE REMEDIATION
ROSE, CRAWFORD, & HOLMES STREETS
SOMERSET, KENTUCKY
AGE ENGINEERING SERVICES, INC.
P.O. BOX 204
123 FRONTIER BLVD., SUITE 5
STANFORD, KY. 40484
DATE
CHECKED
DRAWN
SCALE
FILENAME
SHEET
2 OF 3

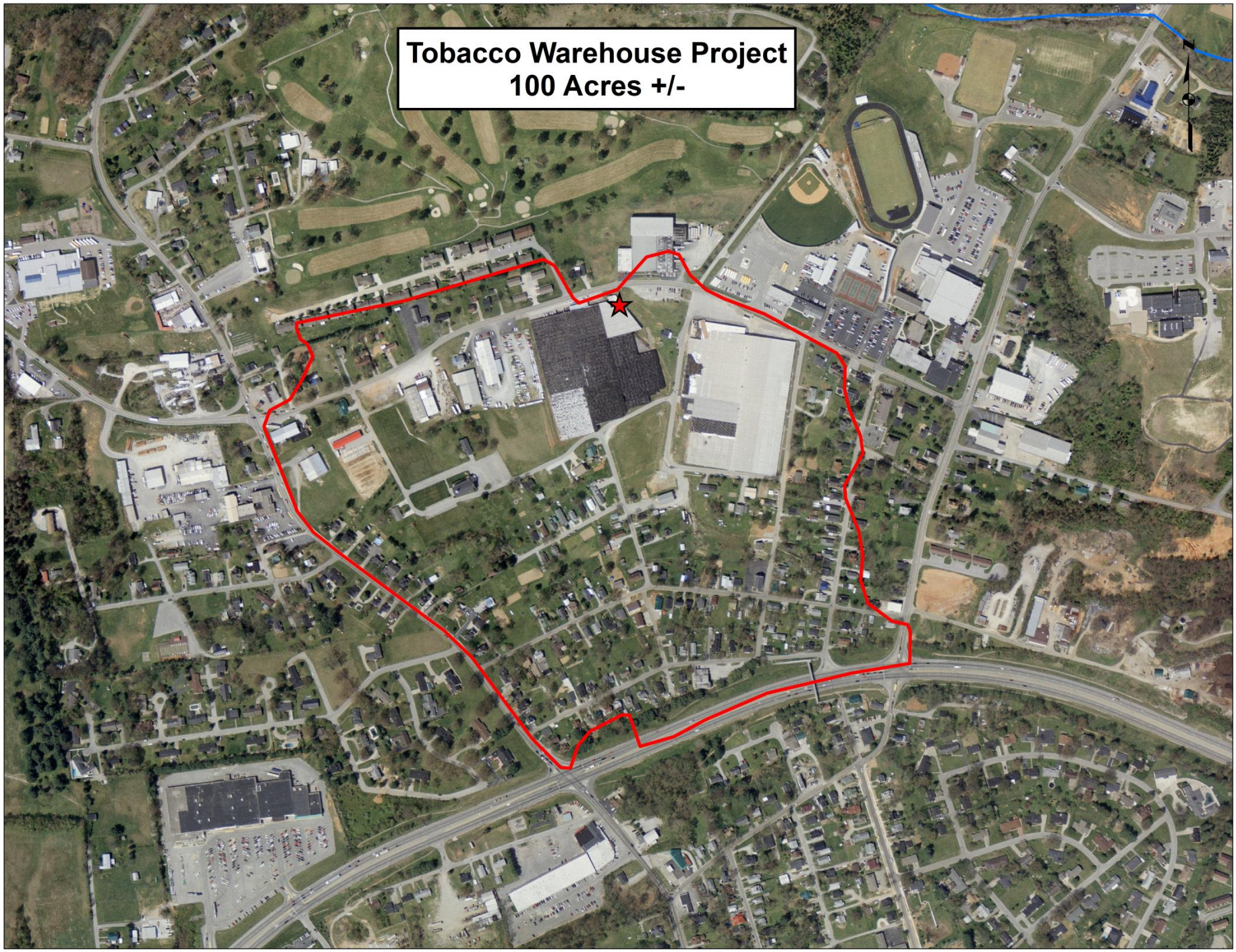

CAT
"HAULIN' ASPHALT"
STAY BACK 100 FEET
TAYLOR
CUTTRELL
CUTTRELL

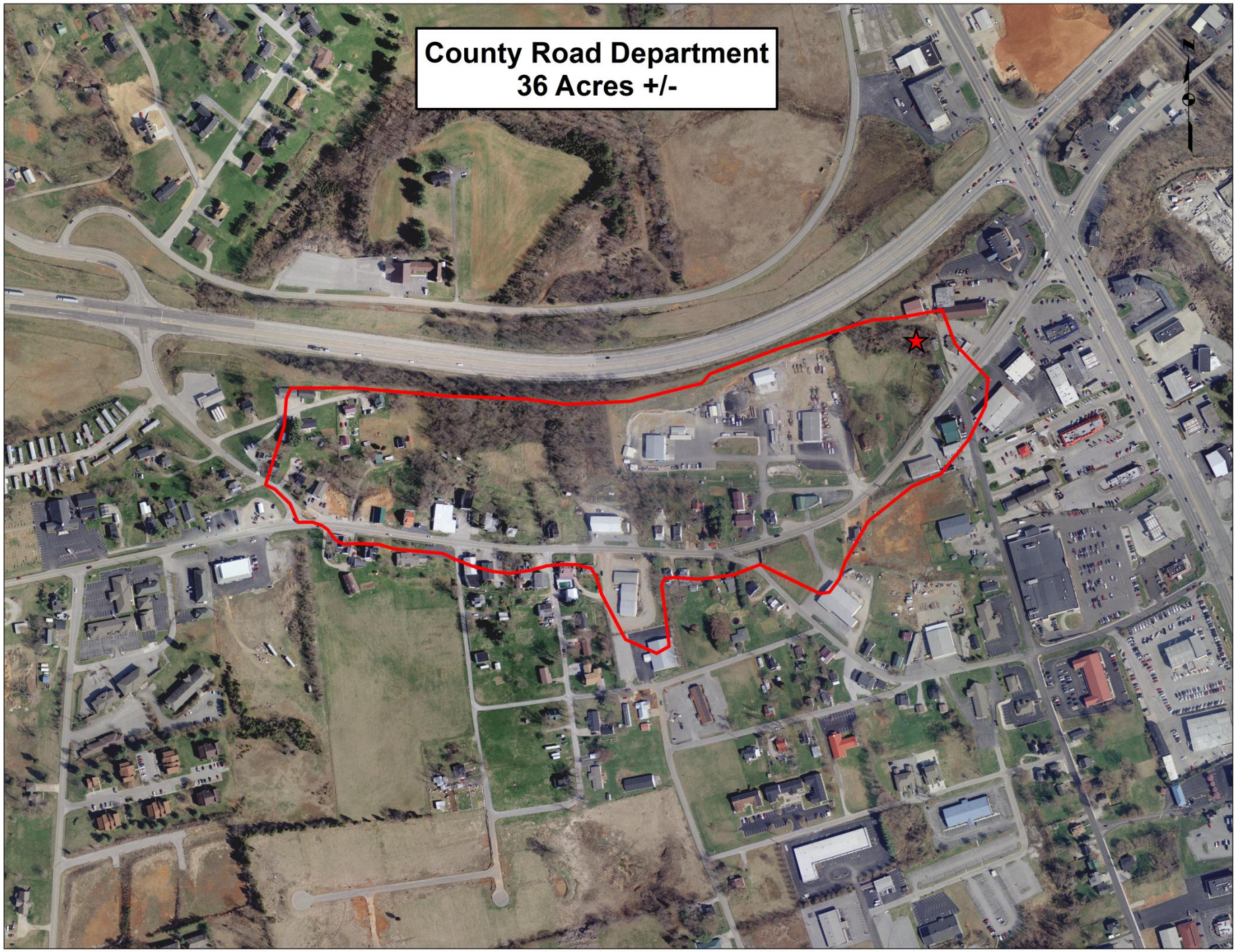

℄L
35'


CAT

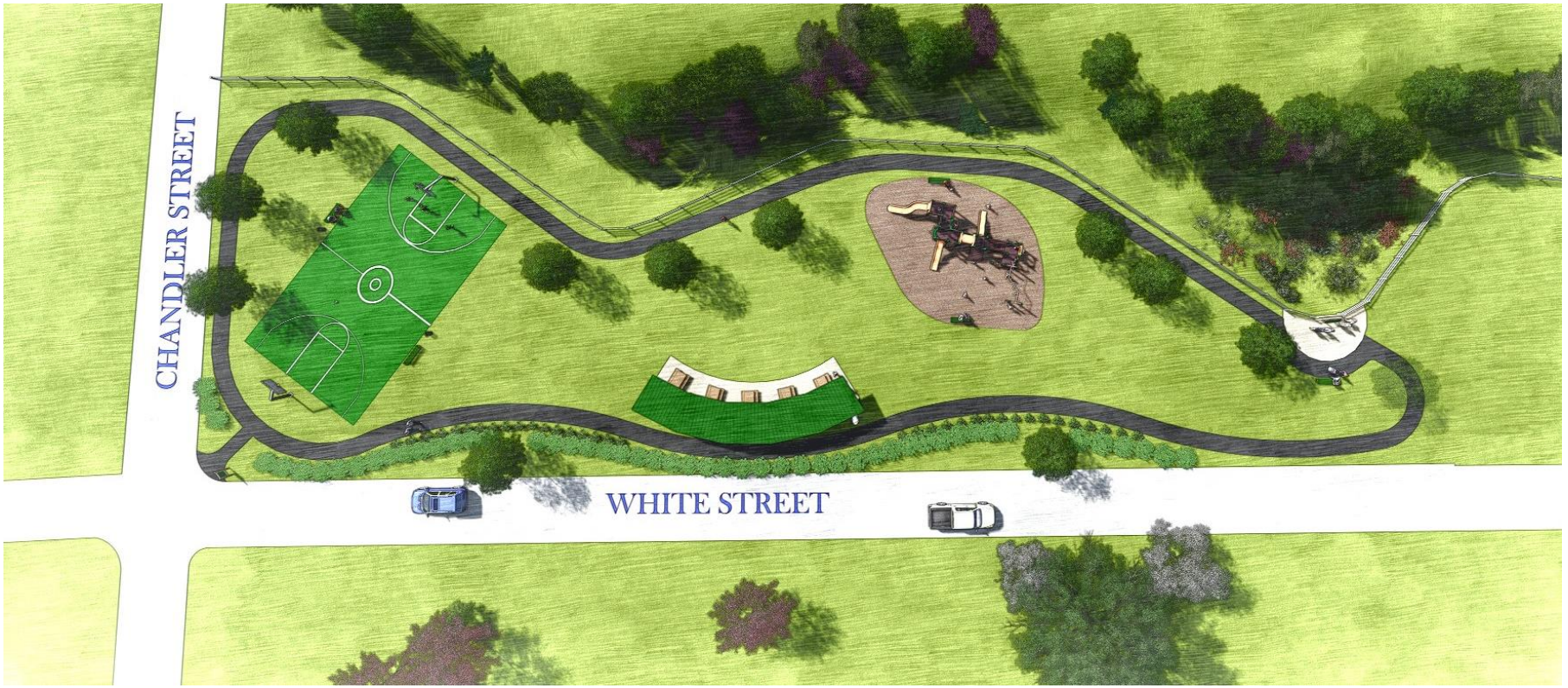
Richards Court Project:
Post Construction

- Over 350 CF of Material Captured Year 1
- No Ponding Since 2012
- No Hazardous Sink and No Open Ditch
- New Park for Residents
- $120k


Tobacco Warehouse Project
100 Acres +/-


County Road Department
36 Acres +/-
N


White Street Project
49 Acres +/-


CHANDLER STREET
WHITE STREET

The end……..