


Committee Meeting

October 8, 2014

ROBERT P. KELLY, P.E.
DIRECTOR OF ENGINEERING
CITY OF WESTLAKE
440-617-4145



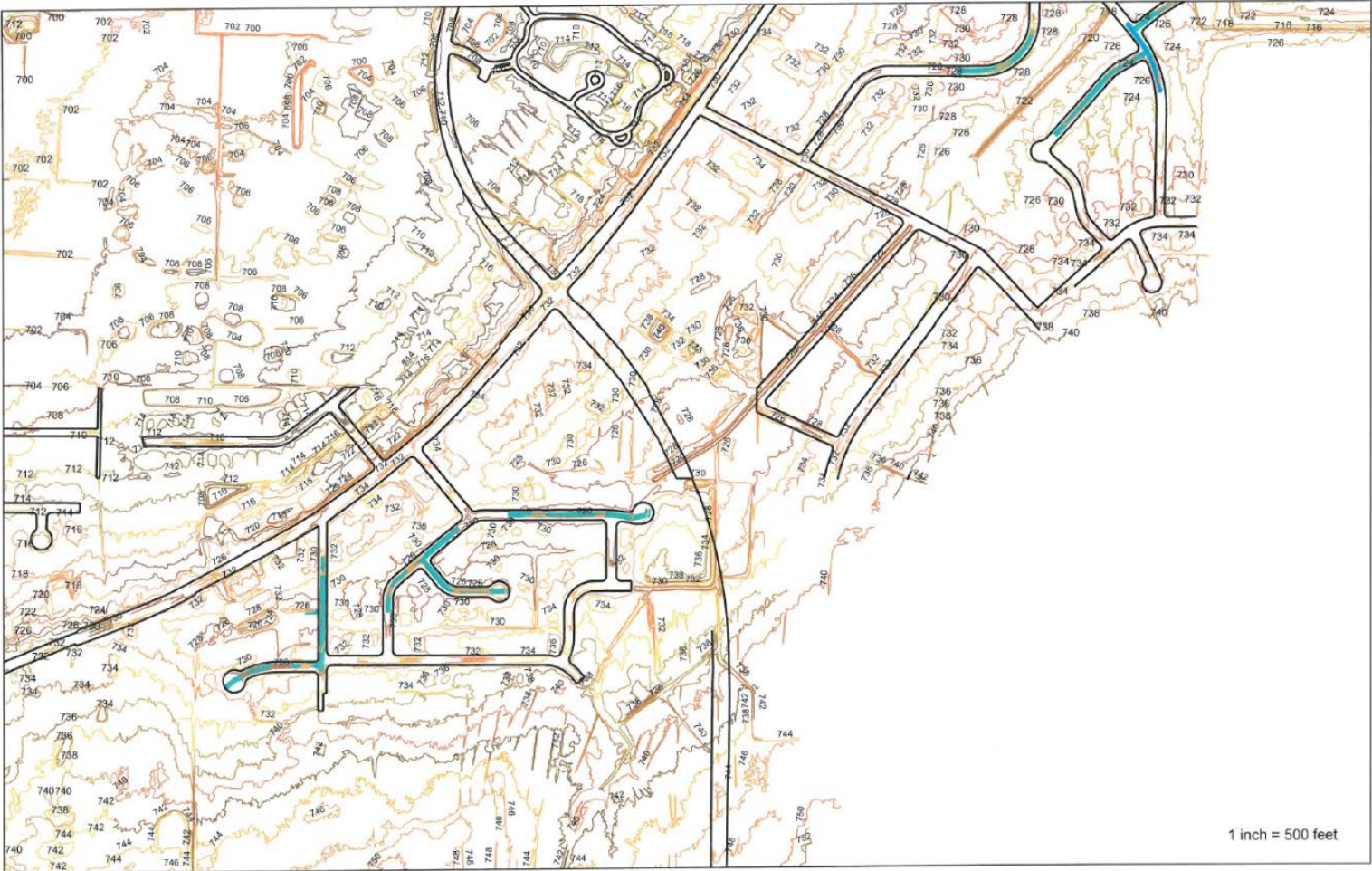


MAY 12, 2014

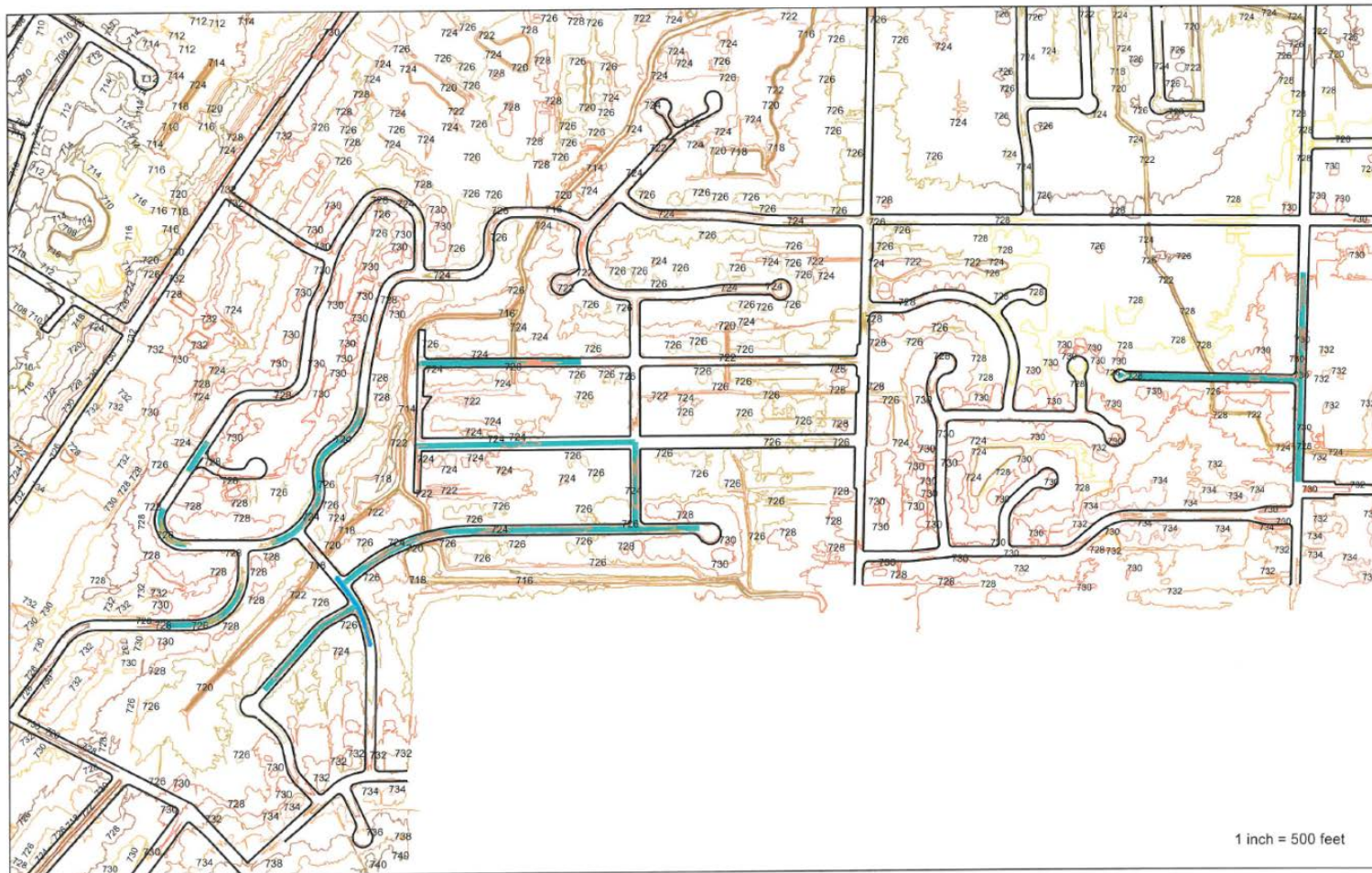
MAJOR RAIN EVENT

- OVER 4” OF RAIN IN THE SOUTHERN PART OF THE CITY
- MAJOR STREET FLOODING
 - HOLLYWOOD DRIVE
 - DUNFORD AVENUE
 - CANTERBURY RD/STRAWBERRY RD
 - SOUTHBRIDGE DRIVE
 - HARDING DRIVE
 - BREWSTER DRIVE
 - BRETTON WOODS SUBDIVISION

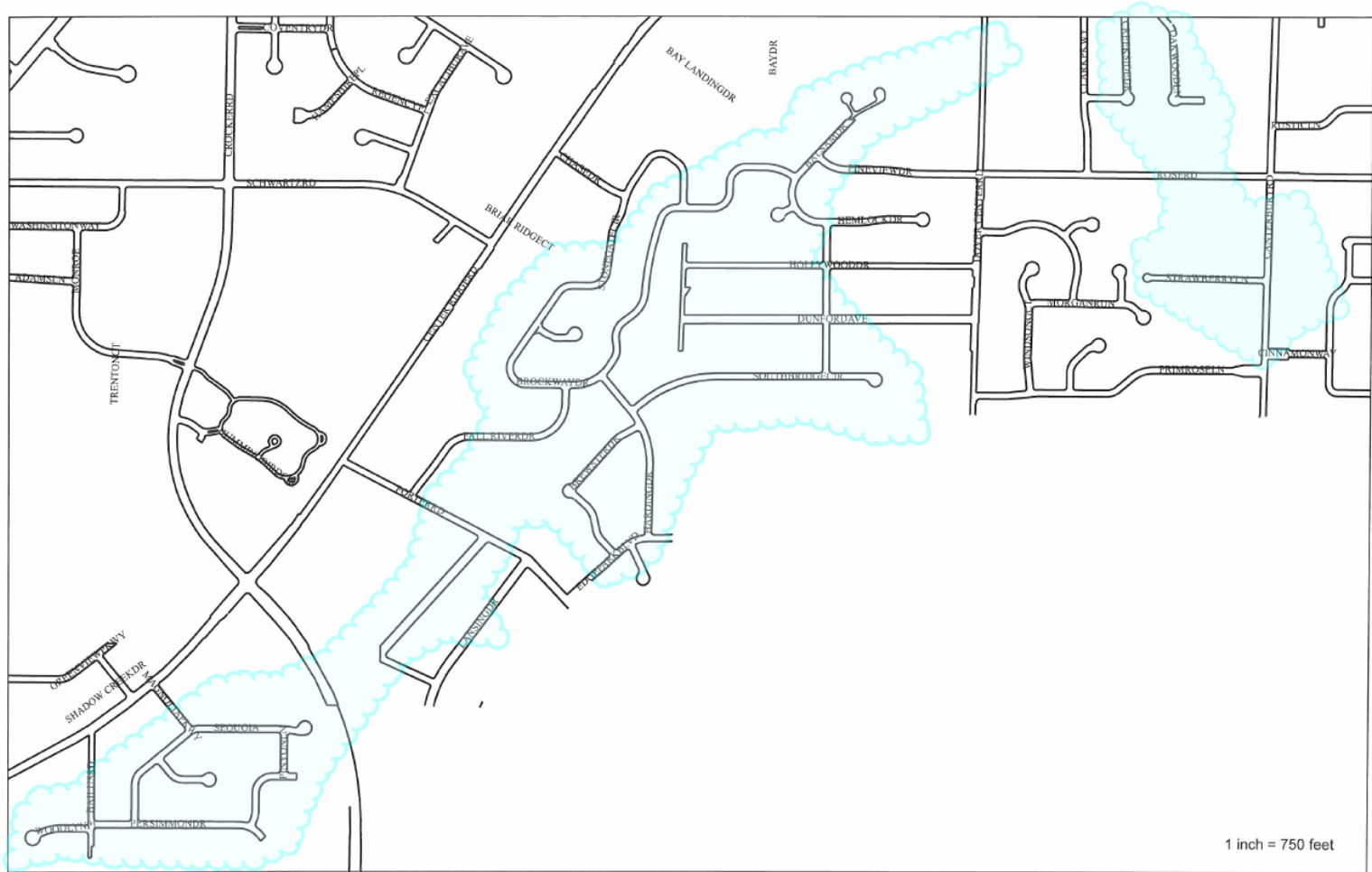
Flooded Area May 12, 2014



Flood Area May 12, 2014

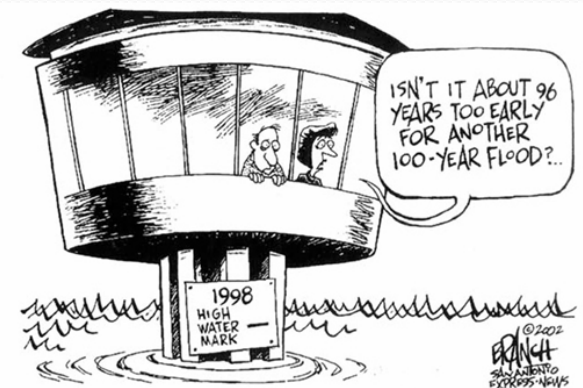


Flood Hazard Area



WHAT IS A 100 YEAR FLOOD EVENT?

1. The term “**100-year flood**” is a term often used to describe a flood that has a 1% chance of occurring in any year.
2. Phrase could be misleading, and often causes people to believe these floods happen every 100 years on average.
3. The truth is, these floods can happen quite close together, or not for long stretches of time, but the risk of such floods remains constant from year to year.



FLOOD RISK?

1. **Everyone is at risk.**
2. Floods can happen almost anywhere. They are not limited to coastal areas or near large rivers.
3. They happen more often and in more locations than you may realize.
4. In fact, floods are the most common natural disaster in the U.S. and cause the most property damage.



FEMA FLOOD RISK

1. HIGH RISK AREAS

1. 25% Chance of flooding during a 30-year mortgage.
2. Owners with mortgage required to buy flood insurance.
3. Flood map zones A and V.

2. MODERATE TO LOW RISK AREAS

1. Risk of flooding is reduced but not completely removed.
2. Flood insurance is not required for a mortgage, but is recommended by FEMA.
3. Nearly 20% of flood insurance claims come from this category.
4. Flood map zones B, C or X.

3. UNDETERMINED-RISK AREA

1. No flood-hazard analysis has been conducted in these areas, but a flood risk still exists.
2. Flood map zone D.



HISTORICAL RAIN EVENTS

- HURRICANE SANDY (2012)

THREE DAYS=4.51”

- 5-12-14 RAIN EVENT (3 HOURS)

4.7” @ Meadowood G.C.

4.44” @ North Olmsted

6.00” @ North Ridgeville

Rainfall (inches) for given recurrence interval

Duration	2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
10-day	1.70	2.05	2.36	2.78	3.19	3.47	4.29	5.34	6.17	7.30	8.19	9.14
5-day	1.37	1.64	1.86	2.15	2.47	2.69	3.34	4.23	4.95	5.96	6.82	7.74
72-hr	1.26	1.48	1.67	1.94	2.23	2.42	2.99	3.72	4.34	5.31	6.15	7.09
48-hr	1.18	1.38	1.53	1.78	2.04	2.22	2.75	3.42	3.99	4.87	5.66	6.55
24-hr	1.12	1.31	1.43	1.65	1.88	2.04	2.50	3.10	3.60	4.39	5.11	5.89
18-hr	1.06	1.23	1.34	1.56	1.77	1.92	2.35	2.91	3.38	4.13	4.80	5.54
12-hr	0.97	1.13	1.24	1.43	1.63	1.77	2.17	2.70	3.13	3.82	4.45	5.12
6-hr	0.84	0.98	1.07	1.24	1.41	1.53	1.88	2.32	2.70	3.29	3.83	4.42
3-hr	0.72	0.84	0.92	1.06	1.21	1.31	1.60	1.98	2.30	2.81	3.27	3.77
2-hr	0.65	0.76	0.83	0.96	1.09	1.18	1.45	1.80	2.09	2.55	2.96	3.42
1-hr	0.53	0.61	0.67	0.78	0.88	0.96	1.17	1.46	1.69	2.06	2.40	2.77
30-min	0.41	0.48	0.52	0.61	0.69	0.75	0.93	1.15	1.33	1.62	1.89	2.18
15-min	0.30	0.35	0.38	0.45	0.51	0.55	0.68	0.84	0.97	1.19	1.38	1.59
10-min	0.24	0.28	0.30	0.35	0.40	0.43	0.52	0.65	0.76	0.92	1.07	1.24
5-min	0.13	0.15	0.17	0.19	0.22	0.24	0.30	0.37	0.43	0.53	0.61	0.71

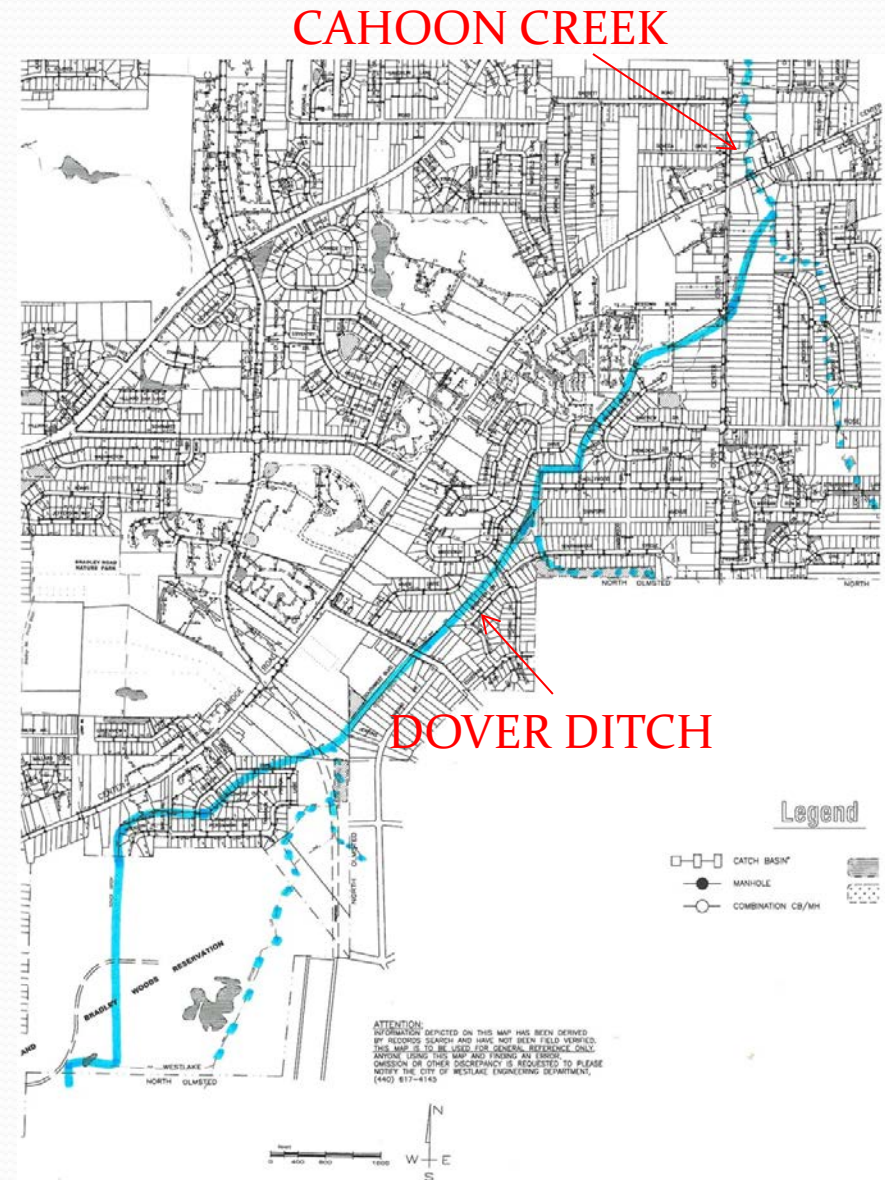
TOP RAIN EVENTS IN 100 YEARS

RANK	DATE	RAIN
1	9/7/1996	4.59
2	8/20/2005	3.55
3	8/13/1994	3.55
4	5/24/1955	3.36
5	10/15/1954	3.36
6	7/27/1928	3.38
7	9/12/1938	3.34
8	8/7/2007	3.33
9	2/28/2011	3.09*
10	2/6/2008	2.5*
11	05/12/2014	4.7

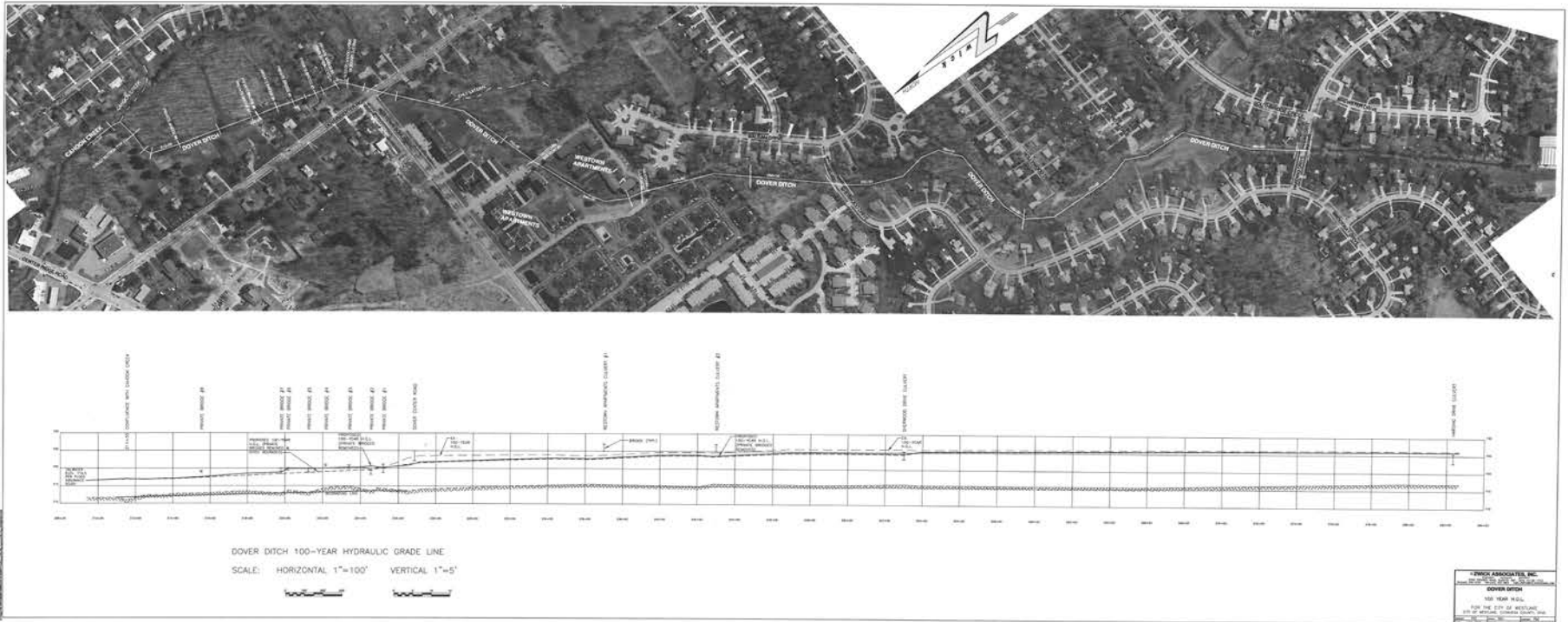
*SIGNIFICANT SNOW MELT

DOVER DITCH

- CONNECTS TO CAHOON CREEK
- TRIBUTARY AREA
 - 2,200 ACRES
 - 100 YEAR FLOW
 - 729 CFS
 - 330,000 GALLONS/MIN
 - VOLUME OF WATER IN OLYMPIC SIZE POOL - < 2 MINUTES
 - WESTLAKE & NORTH OLMSTED



2008 ZWICK STUDY-DOVER DITCH



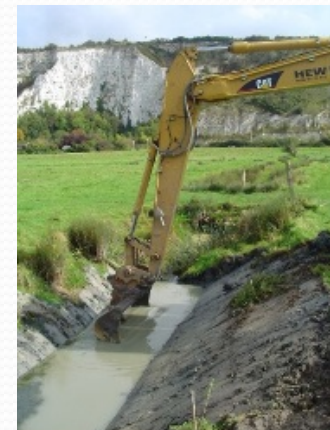
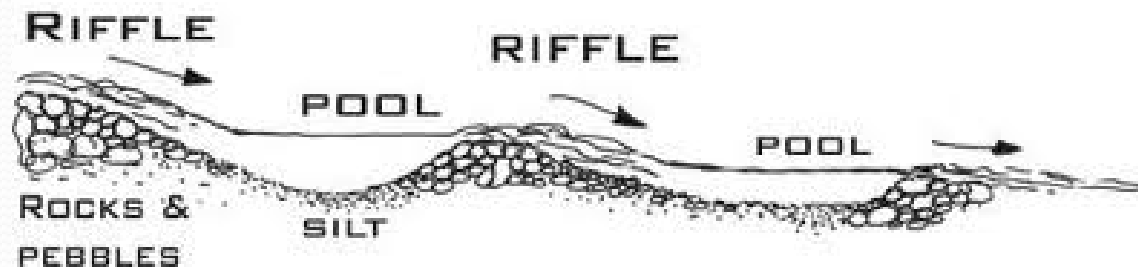
2008 ZWICK STUDY-DOVER DITCH

- PRIVATE BRIDGES ANALYZED
 - CAPACITY
 - HEIGHT
- CONCLUSION- IF THE BRIDGES ARE REMOVED THE WATER LEVEL (100 YEAR RAIN) WILL BE MINIMALLY LOWERED
 - DOVER CENTER
 - WESTOWN
 - SHERWOOD
 - HOLLYWOOD
 - HARDING



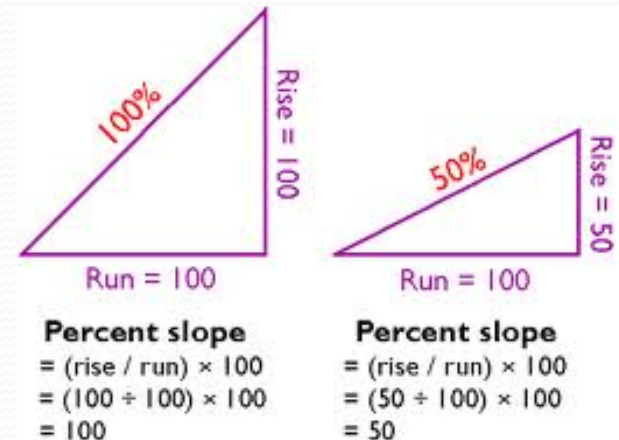
RE-GRADING OF DOVER DITCH

- THE EXISTING PROFILE OF THE DITCH IS NOT UNIFORM AND IS UNEVEN.
- HYDROSPHERE ENGINEERING & CUYAHOGA COUNTY ENGINEER
 - LEVELING OUT THE DITCH WILL NOT HELP WITH THE FLOODING
 - THE DITCH WAS HISTORICALLY STRAIGHTENED AND IS NOW NATURALLY REESTABLISHING IT'S RIFFLE POOL PROFILE



DOVER DITCH LOWERING

- DITCH **CAN NOT** BE LOWERED DUE TO FLAT SLOPE AND FEDERAL ENVIRONMENTAL REGULATIONS IN PLACE
- CAHOON CREEK TO HARDING- **FLAT**
 - DOWNSTREAM SECTION- 2,000 FEET
 - .15% SLOPE
 - TOTAL FALL OF 3 FEET
 - UPSTREAM SECTION-5,000 FEET
 - .04% SLOPE
 - TOTAL FALL OF 2 FEET



HOLLYWOOD / DUNFORD AREA

- DOVER DITCH
- EHLE LATERAL
 - 242 ACRES



PHOTO #1

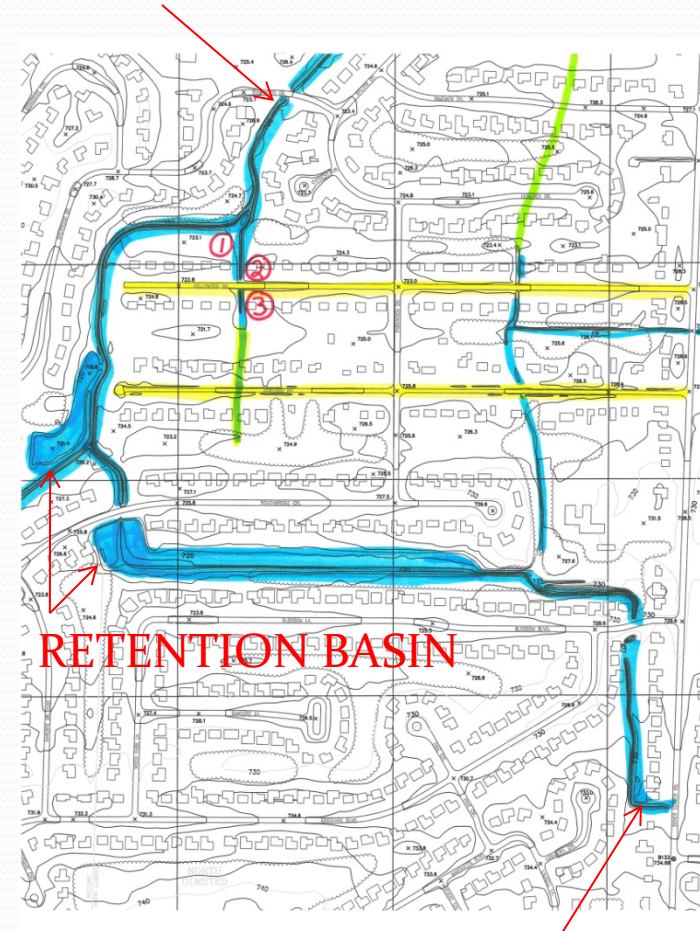


PHOTO #2



PHOTO #3

DOVER DITCH

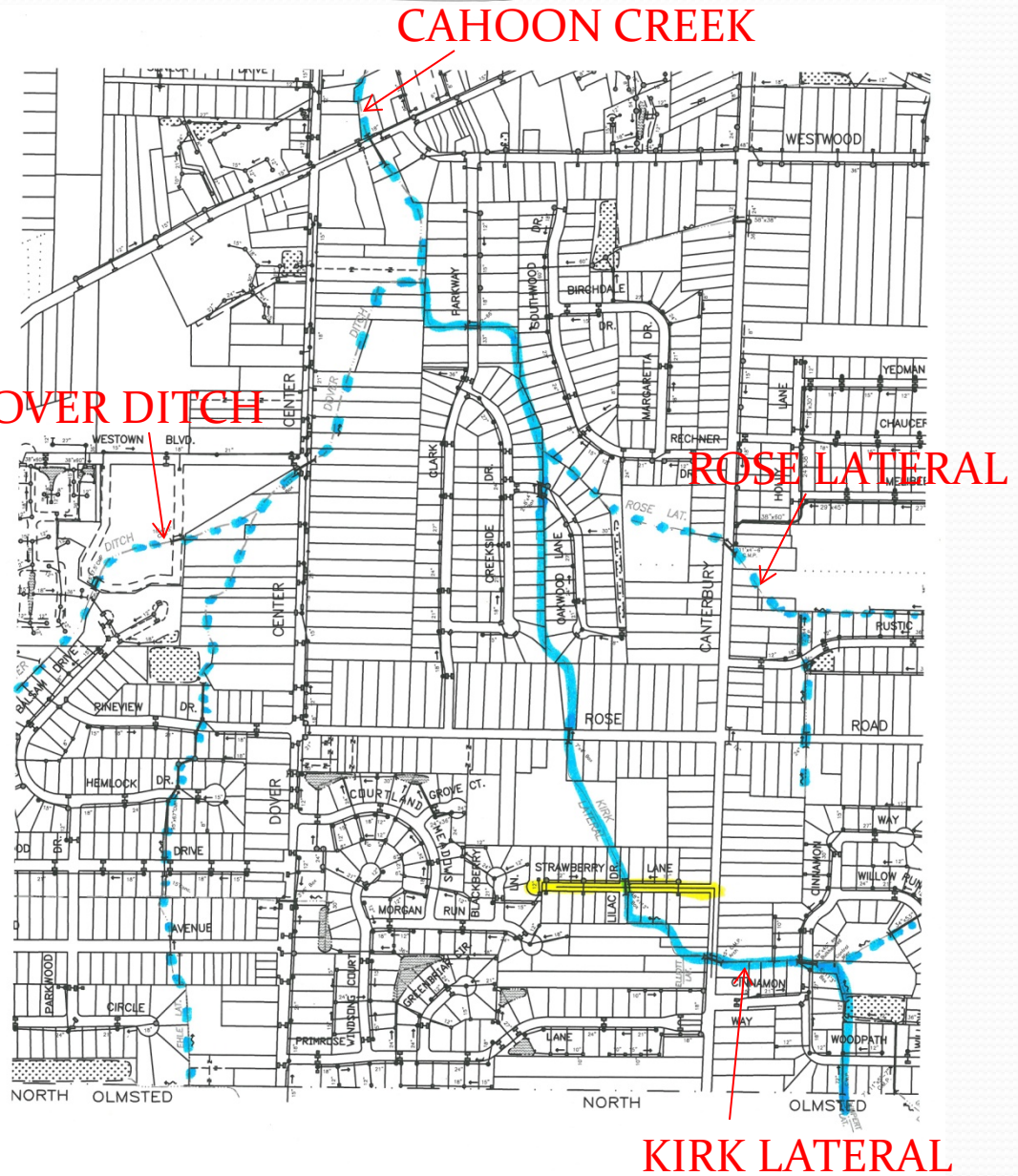


RETENTION BASIN

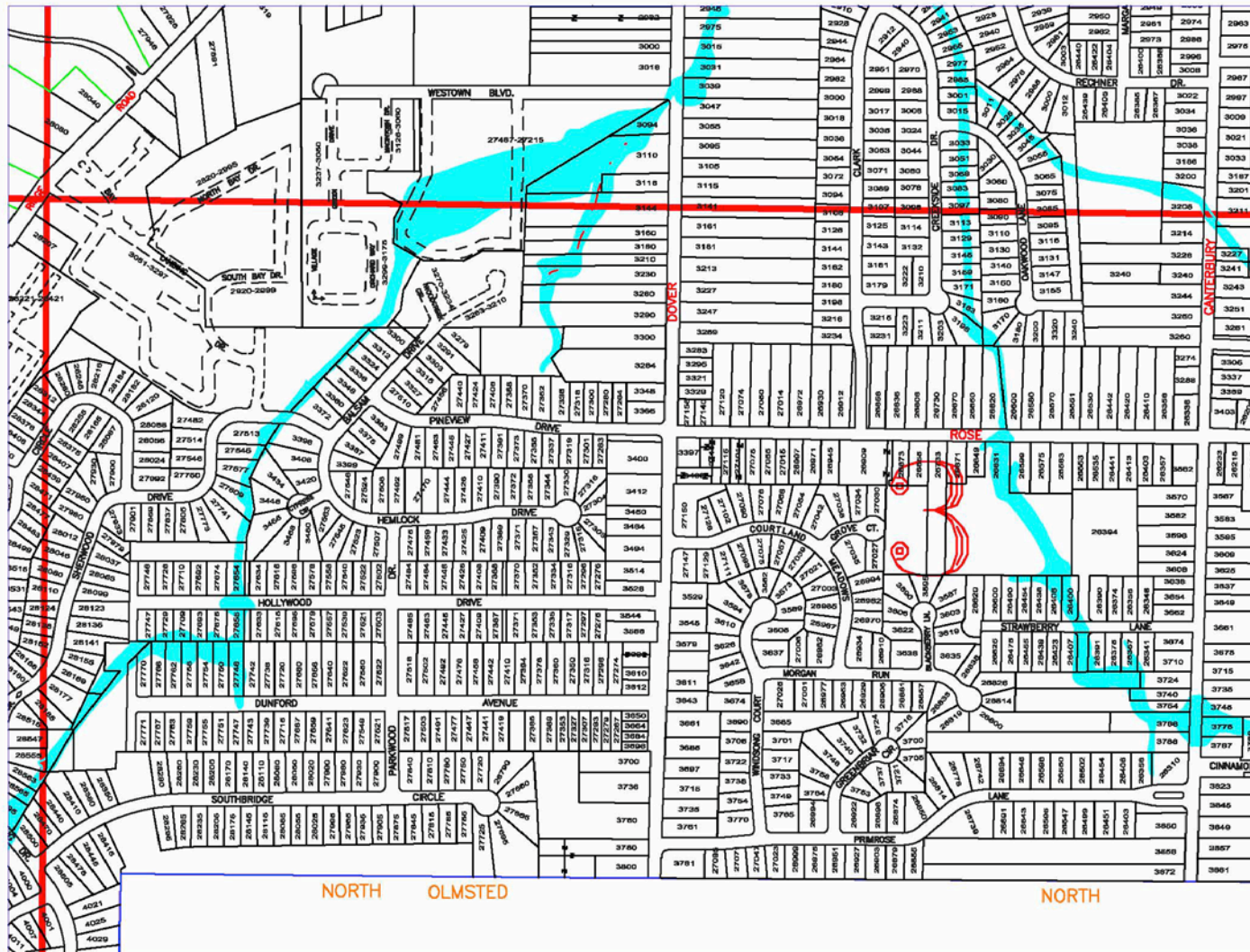
EHLE LATERAL

STRAWBERRY LANE AREA

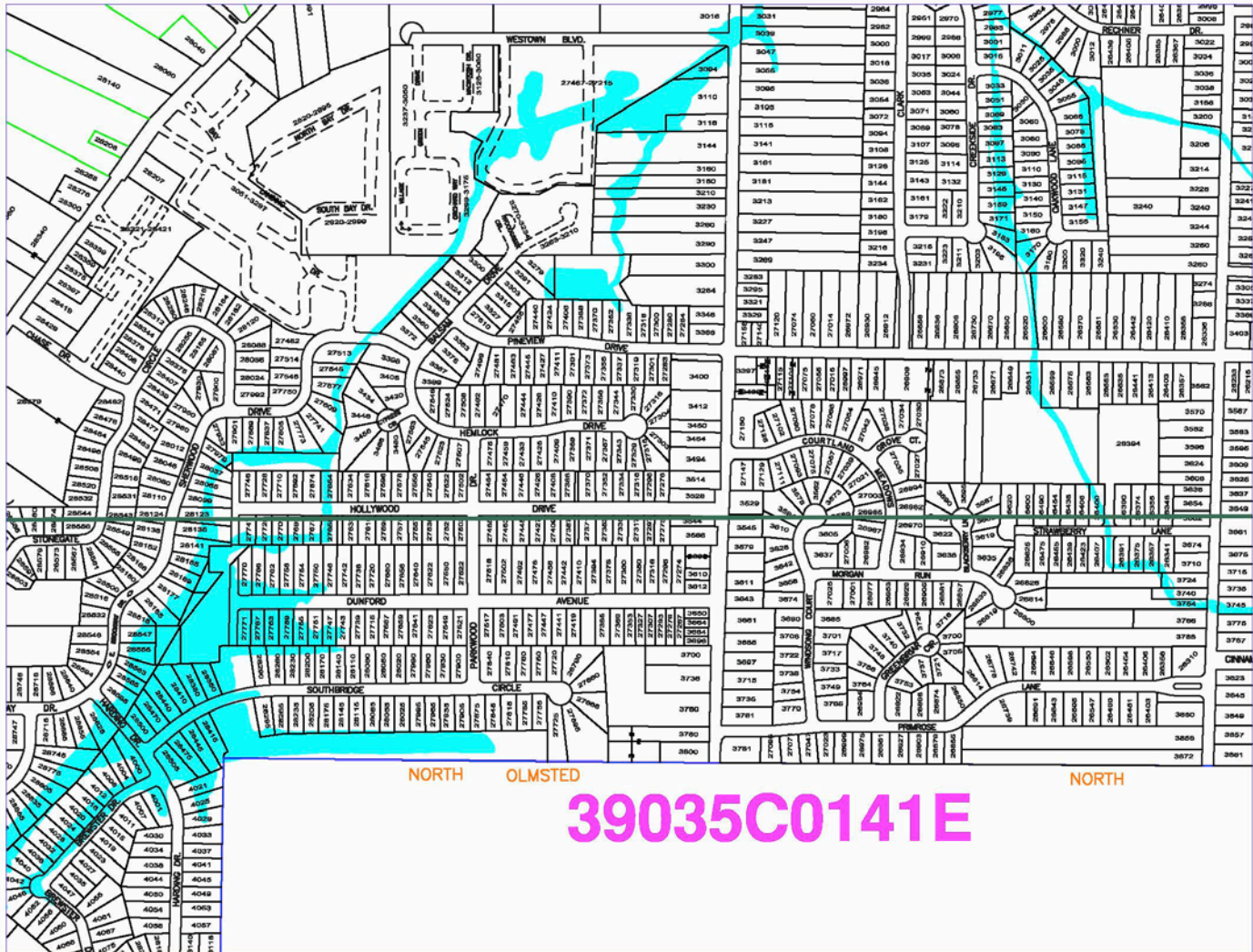
- KIRK LATERAL
 - CONNECTS TO CAHOON CREEK
- TRIBUTARY AREA
 - 615 ACRES
 - WESTLAKE & N.O



1978 FEMA FLOOD PLAIN MAP



2010 FEMA FLOOD PLAIN MAP

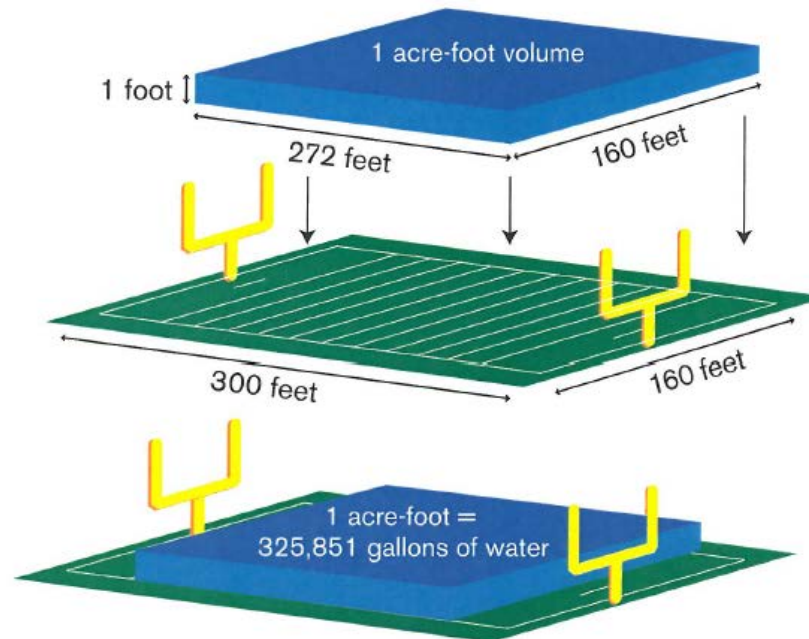


WOODRUFF DRAINAGE STUDY

- 3 PUBLISHED REPORTS
 - 1978
 - 1980
 - 1987
- REPORT ESTABLISHED ORDINANCES ON RETENTION
- SIX STREAMS WERE STUDIED ALONG WITH 14 PROPOSED RETARDING BASINS (#)
 - SCHWARTZ CREEK
 - PORTER CREEK (2)
 - **CAHOON CREEK (9)**
 - SPERRY CREEK (2)
 - WOLF CREEK
 - WISCHMEYER CREEK (1)

RETENTION BASIN VOLUMES

What is an
acre-foot?



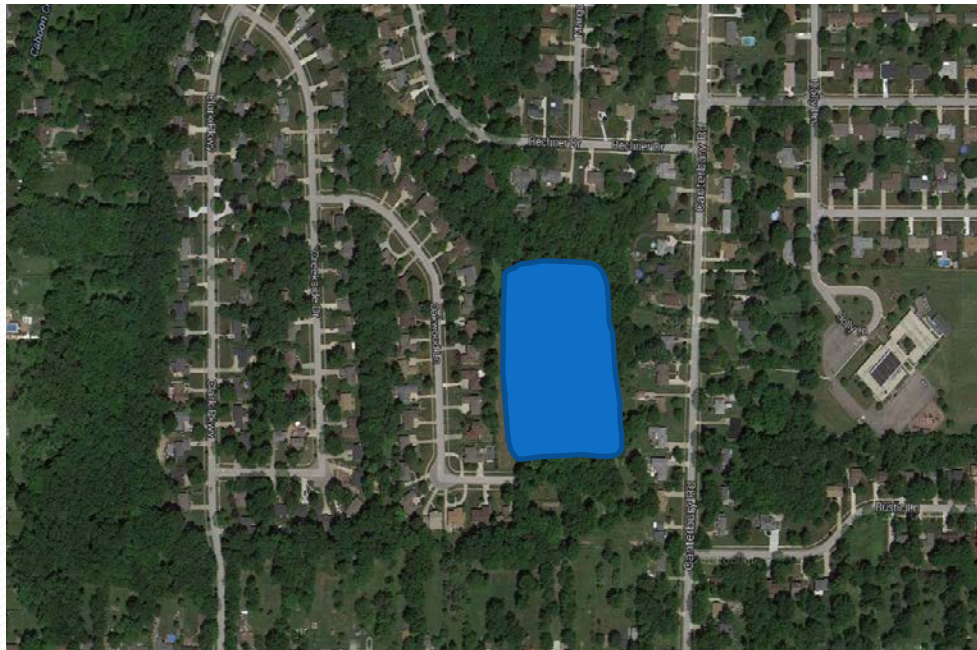
CAHOON CREEK

- MAJORITY OF ISSUES ARE WITHIN THE CAHOON CREEK WATERSHED
- CAHOON CREEK – 9 PROPOSED BASINS
 - BASINS COMPLETED TO WOODRUFF DESIGN
 - COOLEY (WESTCHESTER WOODS CONDOS)
 - PINEVIEW
 - BASINS PARTIALLY DEVELOPED WITH SUBDIVISION
 - ROSE (OAKWOOD LANE) 12% (1.4/13) ACRE-FT)
 - KIRK (WOODPATH) 22% (10/45)
 - SANDY RIDGE (SOUTHBRIDGE) 31% (15/49)
 - COSTELLO (BRETTON WOODS) 31% (14/45)*
 - WESTWOOD (SOUTHWOOD) 20% (2.8/14)

**EXPANDED EAST OF CROCKER ROAD*
 - BASINS THAT HAVE NOT BEEN BUILT
 - DETROIT (NORTH OF HIGH SCHOOL)
 - BRADLEY WOODS PARK LAKE RETENTION BASIN

ROSE

- NEW BASIN
- CITY OWNED PROPERTY
- ENVIRONMENTAL STUDY
 - POSSIBLE HARDWOOD WETLAND

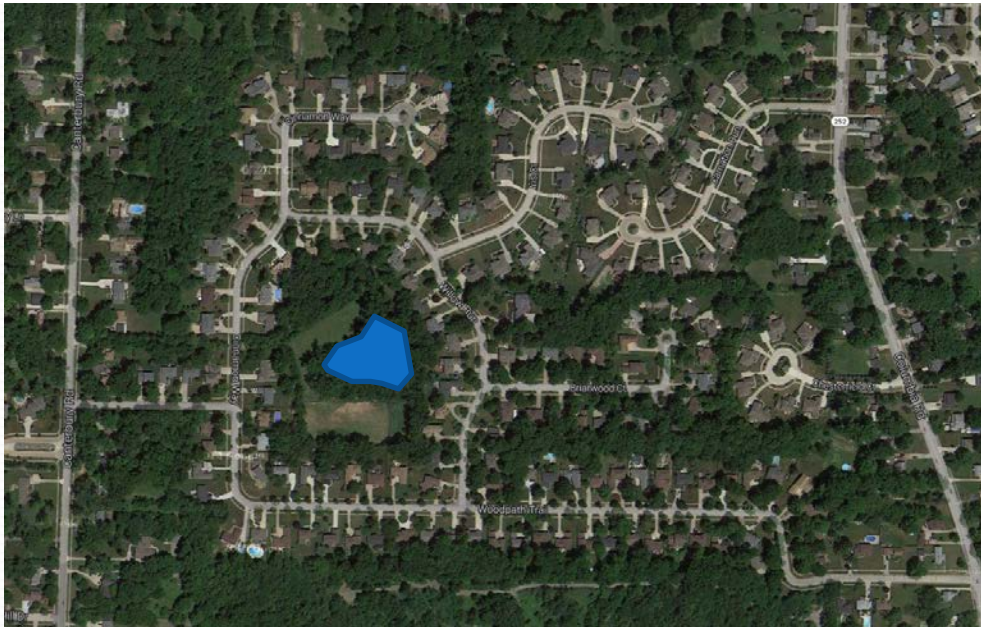


ROSE



KIRK (WOODPATH)

- EX. BASIN COULD BE EXPANDED
- CITY OWNED PROPERTY
- WETLAND MIX COULD BE USED FOR AESTHETICS-
NATURE PRESERVE



KIRK (WOODPATH)

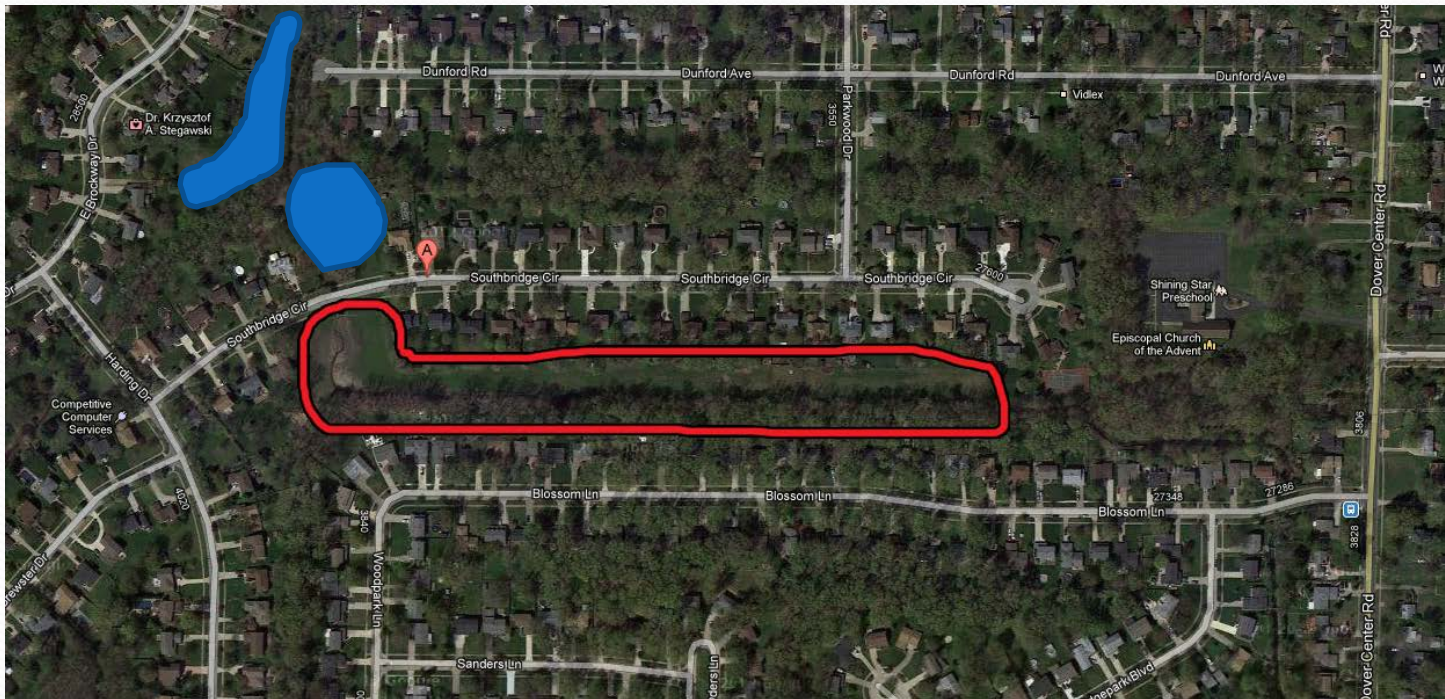


KIRK (WOODPATH)



SANDY RIDGE (SOUTHBRIDGE)

- BASIN COULD BE EXPANDED TO THE NORTH
- RECENT WORK WAS FOR WATER QUALITY NOT FOR VOLUME – WETLAND RESTORATION

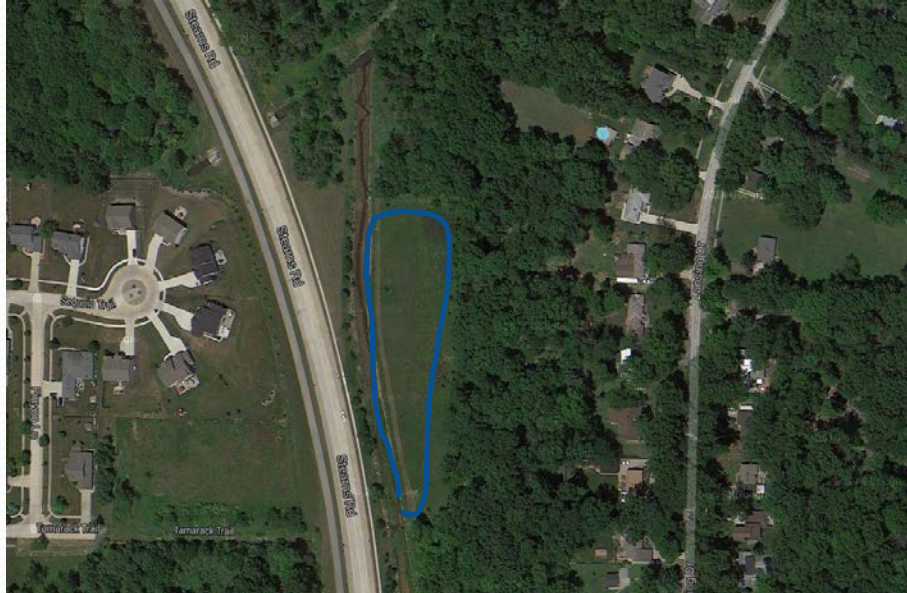


SANDY RIDGE (SOUTHBRIDGE)



COSTELLO (BRETTON WOODS)

- NEW BASIN CONSTRUCTED IN 1999

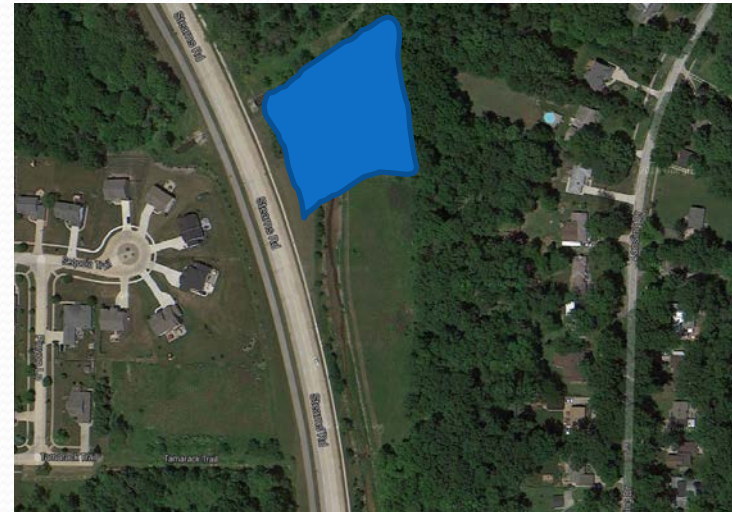


COSTELLO (BRETTON WOODS)



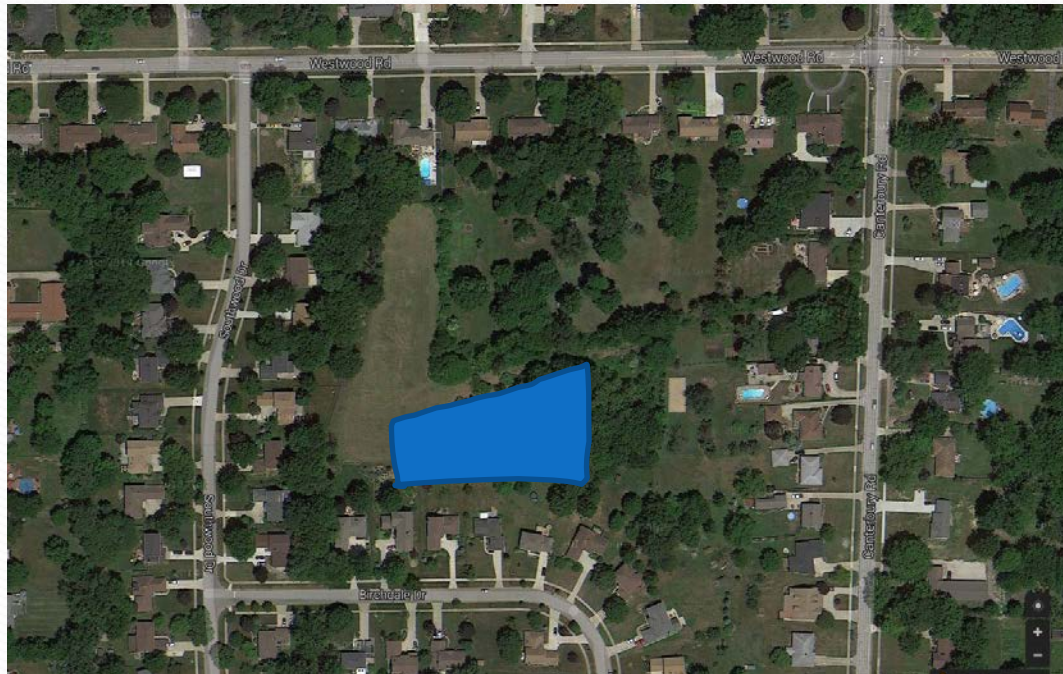
COSTELLO (BRETTON WOODS)

- POSSIBLE EXPANSION BEHIND THE CEMETERY
- POSSIBLE EXPANSION ALONG CROCKER



WESTWOOD (SOUTHWOOD)

- POSSIBLE EXPANSION TO THE EAST



WESTWOOD (SOUTHWOOD)



THE END

- QUESTIONS OR COMMENTS

