



HISTORIC  
FRANKLIN  
TENNESSEE

ITEM #4  
CIC  
05-09-13

## MEMORANDUM

May 9, 2013

**TO:** Board of Mayor and Aldermen

**FROM:** Eric Stuckey, City Administrator  
David Parker, City Engineer/CIP Executive  
Paul P. Holzen, Director of Engineering  
William Banks, Staff Engineer

**SUBJECT:** Presentation and Discussion of the Battle Avenue Drainage Improvements Study

### Purpose

The purpose of this memorandum is bring forward to the Board of Mayor and Aldermen (BOMA) the presentation and discussion of the Battle Avenue Drainage Improvements Study.

### Background

For years there have been properties in the Battle Avenue area that have experienced localized flooding, adjacent to both Alicia Drive and Academy Street. During the May 2010 flood there were approximately 10 properties that reported damage. A professional service agreement (COF Contract No. 2012-0144) with Neel-Schaffer, Inc. was approved on July 24, 2012, that included the development of a hydrologic and hydraulic model to determine existing conditions, flows and elevations, the development of alternative options to improve the localized flooding, and a detailed structural inspection/report of the bridge over sharps branch.

The properties we specifically looked at include 109, 111, 113-115, 407, and 409-412 Battle Avenue. We know these properties were significantly affected during the May 2010 Flood. The City is also aware of the ongoing flooding in these areas.

Now that the study is nearing completion, we are ready to present findings of the study to the Board, discuss the drainage improvement alternatives that were evaluated, and to recommend alternatives that result in the most effective solution to improve drainage within the study areas. The recommended options are as follows:

### Project Alternative Options and Financial Impact

- Basin 1 – Alicia Drive Area by 407 and 409-412 Battle Avenue.

Multiple options were investigate to include removing a downstream pedestrian bridge, channel maintenance, Battle Avenue bridge replacement, construction of a detention basin and flood proofing. All of the alternates explored had no impact of removing structures from the 50 and 100 year storm event. For this reason staff does not recommend moving forward with any type of capital project within Basin 1.

- Basin 2 – Academy Street Area by 109, 111, and 113-115 Battle Avenue.



Alternative 1 –Expansion of existing detention basin  
Water quality swale  
Flood proofing by home owners

Engineer’s Estimate =Sub-Total	\$563,831
25% Contingency	\$140,958
Engineering (10%)	\$56,383
<u>Surveying (3%)</u>	<u>\$16,915</u>
Total	\$778,087

Alternative 2 –Storm Sewer System w/ minor road repair. The system does not include curb & gutter and paving the entire width of the roadways.

Bio-retention basin  
Flood proofing by home owners

Engineer’s Estimate = Sub-Total	\$714,478
25% Contingency	\$178,619
Engineering (10%)	\$71,448
<u>Surveying (3%)</u>	<u>\$21,434</u>
Total	\$985,979

*Add an additional \$1,000,000 to fully complete a roadway infrastructure project.*

For both study areas, a third alternative option could be investigated, that being a voluntary home buyback program. Only several of the properties looked at in the study have experienced repeated damage to the structures. Home values in this area range from \$190k - \$440k. A few of the significantly affected property owners have expressed a willingness to entertain this option.

Total project funding included as part of FY2012-2013 Stormwater Budgeted under Capital; 89410 Drainage; Eng-Battle Ave Design and Construction at \$1,100,000. Current expenditures include the already approved Neel-Schaffer Drainage Study – \$46,500.00 (Not to Exceed).

**Recommendation**

Staff is looking for Board feedback and direction within basin 2 for either Alternate 1 or Alternate 2.

**Battle Avenue Drainage Study Photos**

**May 1-2, 2010 Flooding**



Looking South from 109 Battle Avenue



Looking Southwest from 109 Battle Avenue

Saturday April 27, 2013 Flooding



113 Battle Ave Front Yard



113 & 115 Battle Ave Front Yards



115 Battle Ave Front Yard



115 Battle Ave Front and 113/115 Side Yard



115 Battle Ave Side Yard



112 & 114 Battle Ave Front Yards



115 Battle Ave Back Yard



111 Battle Ave Back Yard

**Monday April 29, 2013 - Flooding from Saturday April 27, 2013**



**109 Battle Avenue - City Pumping Operations**



**109 & 111 Battle Ave - City Pumping Operations**



**109 Battle Ave Back Yard**



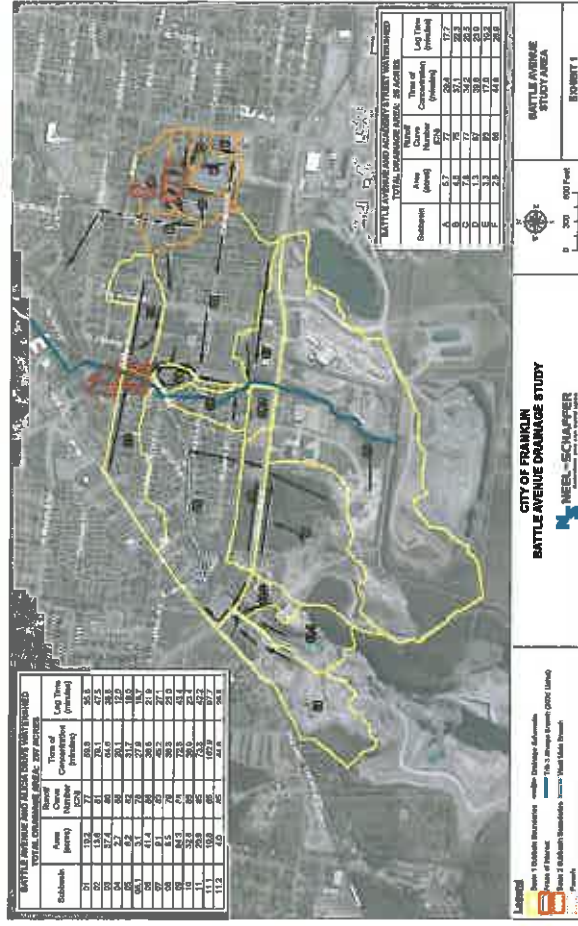
**109 Battle Ave Back Yard**



111 Battle Avenue Back Yard



111 Battle Ave Back Yard



**BATTLE AVENUE AND ALICIA DRIVE WATERSHED**  
TOTAL DRAINAGE AREA: 297 ACRES

Subbasin	Area (acres)	Runoff Curve Number (CN)	Time of Concentration (minutes)	Lag Time (minutes)
01	10.2	77	59.3	35.6
02	13.6	81	79.1	47.5
03	37.4	80	64.6	38.8
04	2.7	88	20.1	12.0
05	6.2	82	31.7	19.0
05.1	3.1	78	27.9	16.7
06	41.4	86	36.6	21.9
07	9.1	83	45.2	27.1
08	8.5	79	38.3	23.0
08	94.3	88	72.3	43.4
10	32.8	85	38.9	23.4
11	20.9	85	73.3	42.2
11.1	10.8	85	162.8	97.7
11.2	4.0	85	44.6	26.8



**BATTLE AVENUE AND ACADEMY STREET WATERSHED**  
TOTAL DRAINAGE AREA: 28 ACRES

Subbasin	Area (acres)	Runoff Curve Number (CN)	Time of Concentration (minutes)	Lag Time (minutes)
A	5.7	77	29.4	17.7
B	4.5	75	37.1	22.3
C	7.8	77	34.2	20.5
D	1.3	87	39.8	23.9
E	3.3	83	17.0	10.2
F	2.5	86	44.8	26.9

**CITY OF FRANKLIN**  
**BATTLE AVENUE DRAINAGE STUDY**

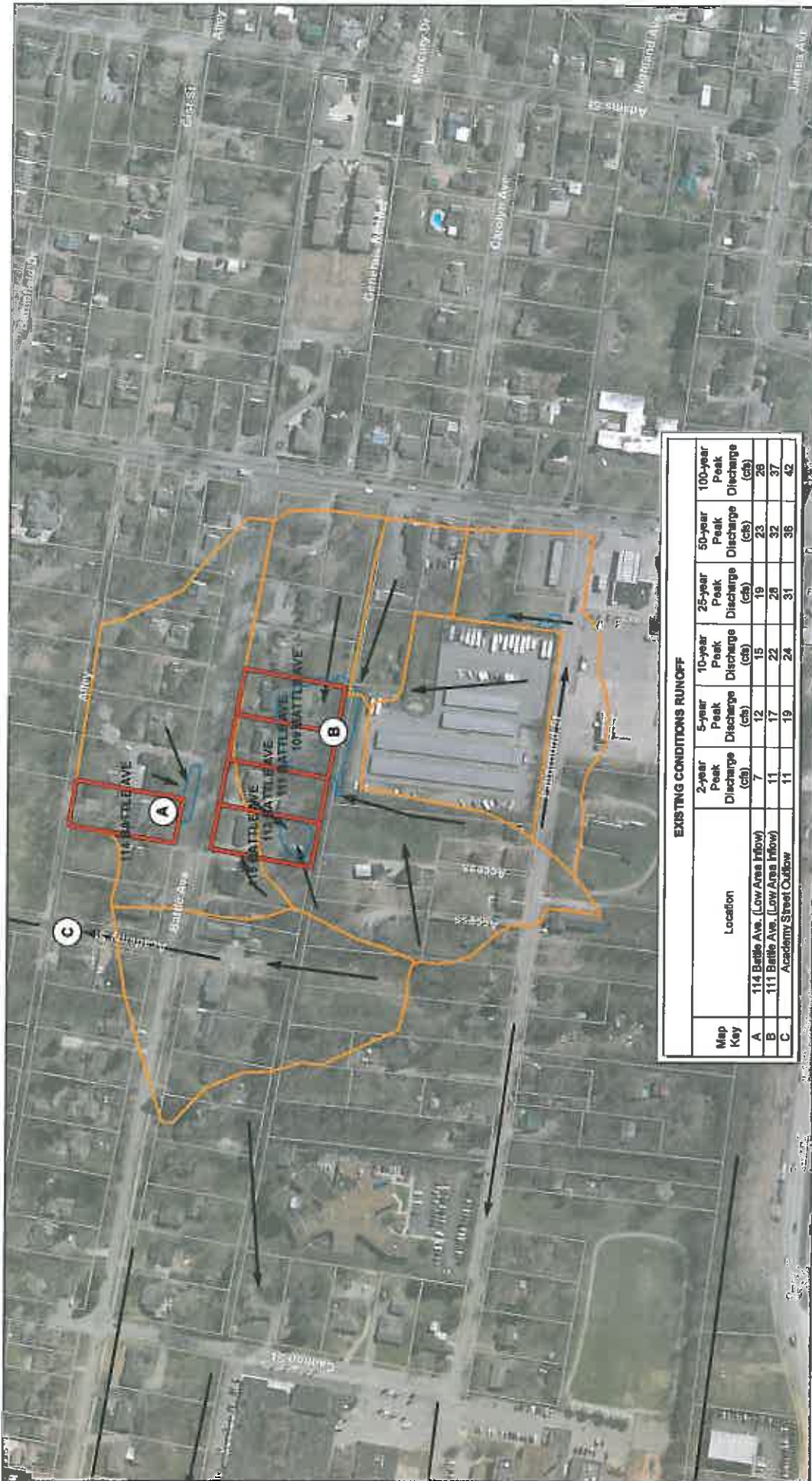
**BATTLE AVENUE STUDY AREA**

**EXHIBIT 1**

**Legend**

- Basin 1 Subbasin Boundaries
- Basin 2 Subbasin Boundaries
- Area of Interest
- Parcels
- Drainage Schematic
- Trib 3 Shrapa Branch (303d Listed)
- West Main Branch





**EXISTING CONDITIONS RUNOFF**

Map Key	Location	2-year		5-year		10-year		25-year		50-year		100-year	
		Peak Discharge (cfs)	Peak Discharge (cfs)	Peak Discharge (cfs)	Peak Discharge (cfs)	Peak Discharge (cfs)	Peak Discharge (cfs)	Peak Discharge (cfs)	Peak Discharge (cfs)	Peak Discharge (cfs)	Peak Discharge (cfs)		
A	114 Battle Ave. (Low Area Inflow)	7	12	15	19	23	28	32	37	42			
B	111 Battle Ave. (Low Area Inflow)	11	17	22	28	32	37	42					
C	Academy Street Outflow	11	19	24	31	36	42						

**Legend**

- Drainage Schematic
- Existing Low Areas
- Areas of Interest
- Basin 2 Subbasin Boundaries
- Parcels

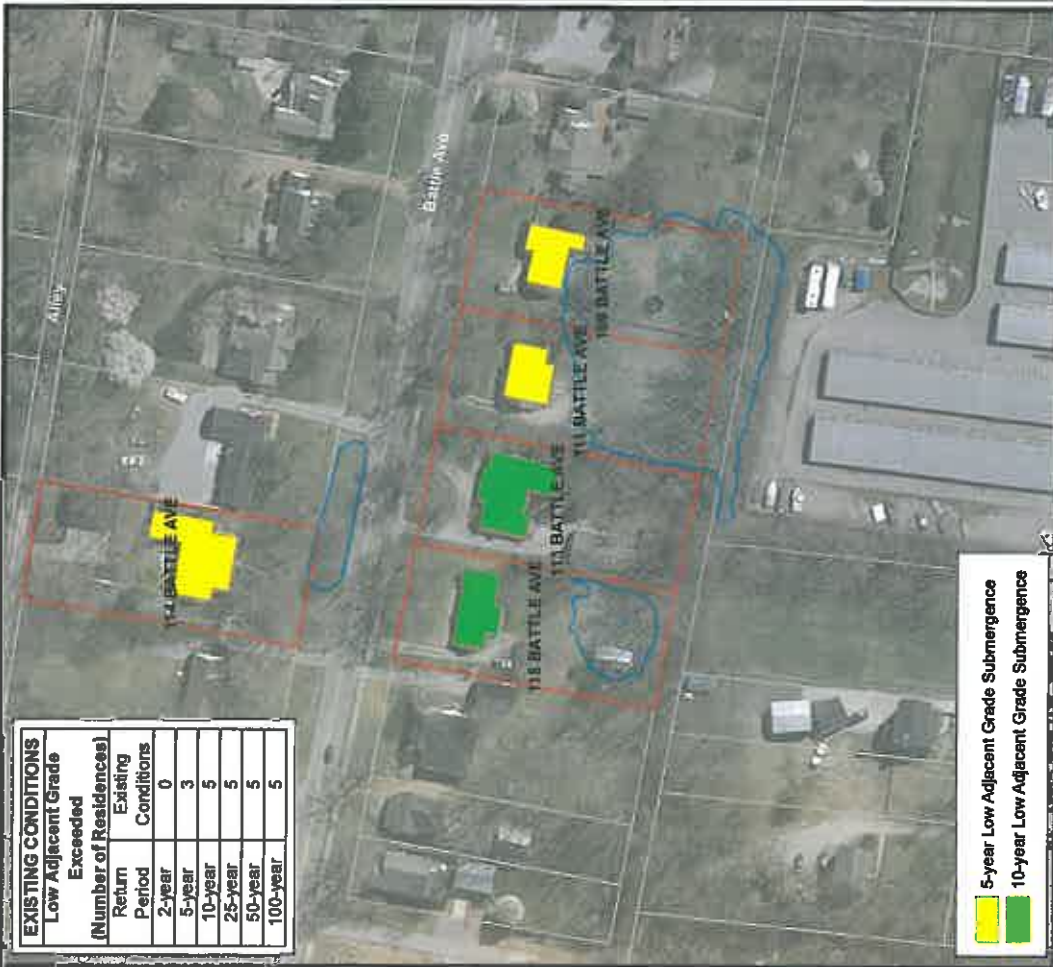
**CITY OF FRANKLIN**  
**BATTLE AVENUE DRAINAGE STUDY**

**NEEL-SCHAFFER**  
 ENGINEERS AND ARCHITECTS

0 50 100 200 Feet

**BASIN 2**  
**EXISTING CONDITIONS**  
**RUNOFF**

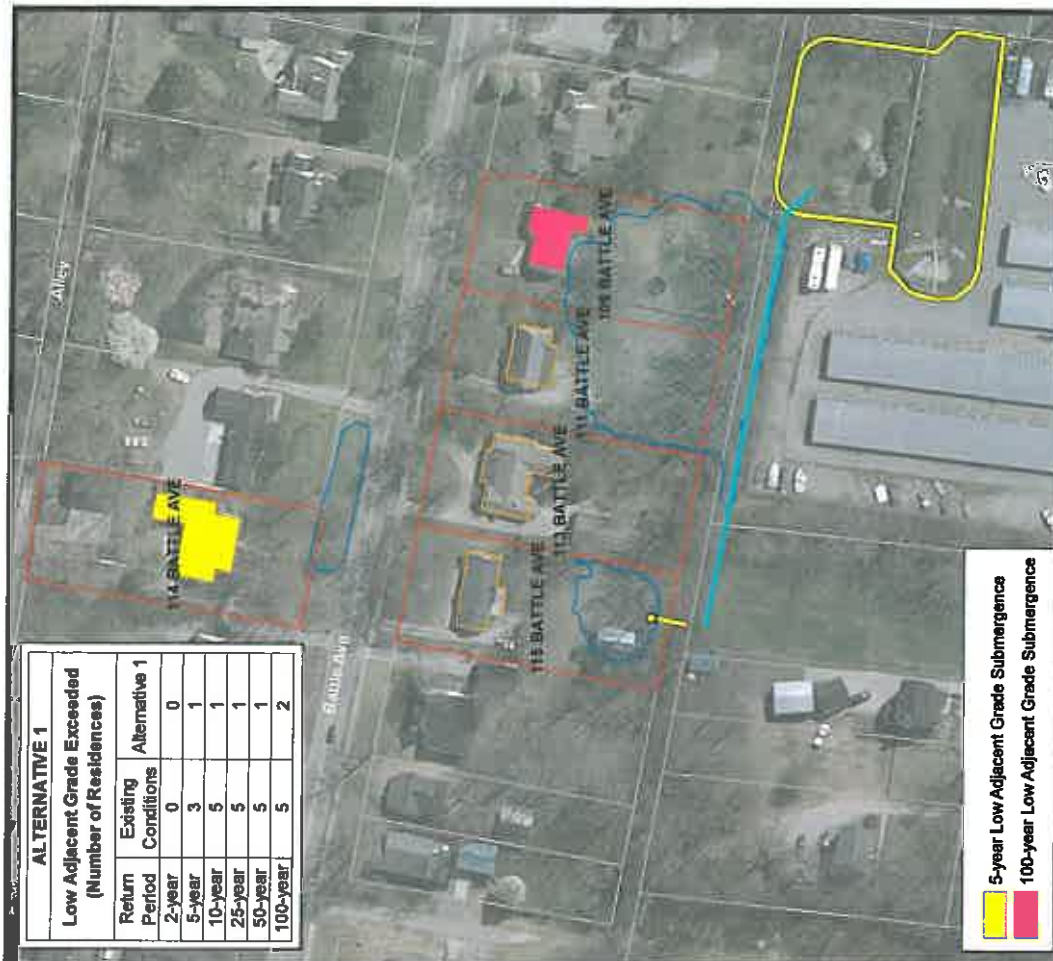
**EXHIBIT 19**



EXISTING CONDITIONS Low Adjacent Grade Exceeded (Number of Residences)	
Return Period	Existing Conditions
2-year	0
5-year	3
10-year	5
25-year	5
50-year	5
100-year	5

- 5-year Low Adjacent Grade Submergence
- 10-year Low Adjacent Grade Submergence

- Legend**
- Existing Low Areas
  - Study Area Structures
  - Areas of Interest
  - Parcels
  - Proposed Detention Basin
  - Water Quality Swale
  - Yard Drain



ALTERNATIVE 1 Low Adjacent Grade Exceeded (Number of Residences)		
Return Period	Existing Conditions	Alternative 1
2-year	0	0
5-year	3	1
10-year	5	1
25-year	5	1
50-year	5	1
100-year	5	2

- 5-year Low Adjacent Grade Submergence
- 100-year Low Adjacent Grade Submergence

**CITY OF FRANKLIN  
BATTLE AVENUE DRAINAGE STUDY**

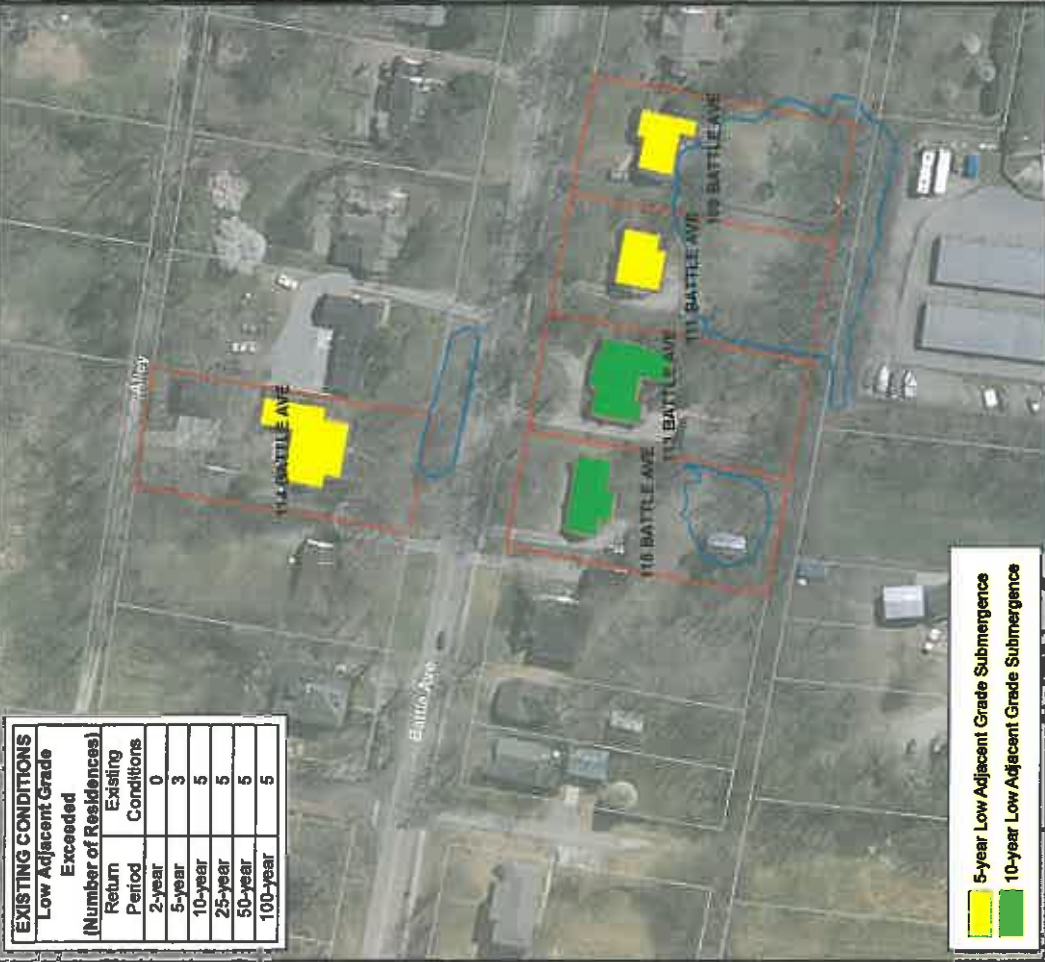


**BASIN 2  
IMPROVEMENT ALTERNATIVE 1  
LOW ADJACENT  
GRADE EXCEEDANCE  
EXHIBIT 21**

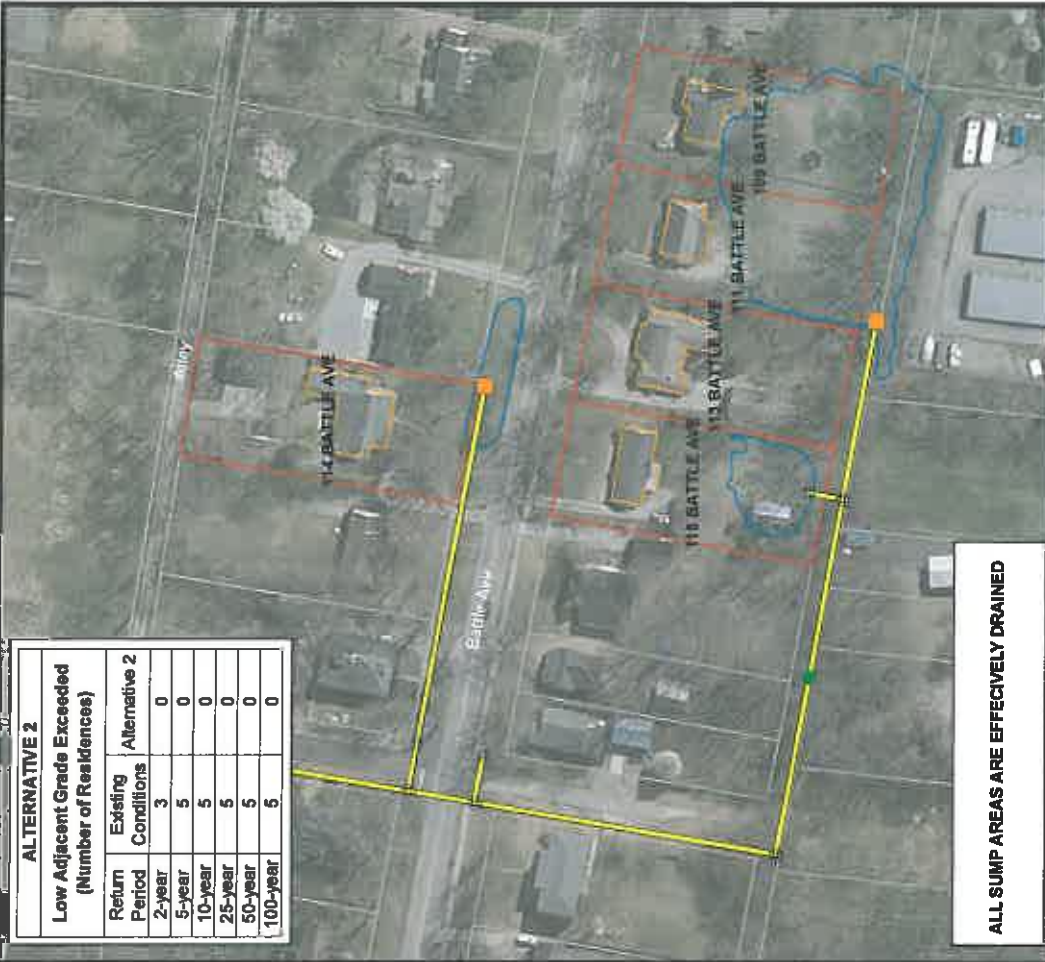


<p><b>Legend</b></p> <ul style="list-style-type: none"> <li><span style="color: blue;">—</span> Areas of Interest</li> <li><span style="border: 1px solid blue; display: inline-block; width: 10px; height: 10px; margin-right: 5px;"></span> Existing Low Area</li> <li><span style="border: 1px dashed blue; display: inline-block; width: 10px; height: 10px; margin-right: 5px;"></span> Parcel</li> <li><span style="border: 1px solid blue; display: inline-block; width: 10px; height: 10px; margin-right: 5px;"></span> This 3 Streets Block (2000 Lot)</li> <li><span style="border: 1px solid blue; display: inline-block; width: 10px; height: 10px; margin-right: 5px;"></span> West Main Street</li> <li><span style="color: yellow;">—</span> Storm Sewer</li> <li><span style="color: blue;">—</span> Storm Sewer Structures</li> <li><span style="color: blue;">—</span> Hook</li> <li><span style="color: blue;">—</span> Inlet</li> <li><span style="color: blue;">—</span> Manhole</li> <li><span style="border: 1px solid blue; display: inline-block; width: 10px; height: 10px; margin-right: 5px;"></span> Proposed Detention Basin</li> </ul>	<p><b>CITY OF FRANKLIN</b></p> <p><b>BATTLE AVENUE DRAINAGE STUDY</b></p>		<p><b>BASIN 2</b></p> <p><b>DRAINAGE IMPROVEMENTS</b></p> <p><b>ALTERNATIVE 2</b></p>	<p><b>EXHIBIT 22</b></p>
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EXISTING CONDITIONS Low Adjacent Grade Exceeded (Number of Residences)		Return Period	Existing Conditions
		2-year	0
		5-year	3
		10-year	5
		25-year	5
		50-year	5
		100-year	5



ALTERNATIVE 2 Low Adjacent Grade Exceeded (Number of Residences)		Return Period	Existing Conditions	Alternative 2
		2-year	3	0
		5-year	5	0
		10-year	5	0
		25-year	5	0
		50-year	5	0
		100-year	5	0



ALL SUMP AREAS ARE EFFECTIVELY DRAINED

**CITY OF FRANKLIN**  
**BATTLE AVENUE DRAINAGE STUDY**

**BASIN 2**  
**IMPROVEMENT ALTERNATIVE 2**  
**LOW ADJACENT**  
**GRADE EXCEEDANCE**

**EXHIBIT 23**

**Legend**

- Existing Low Areas
- Parcels
- Study Area Structures
- Storm Sewer
- Areas of Interest