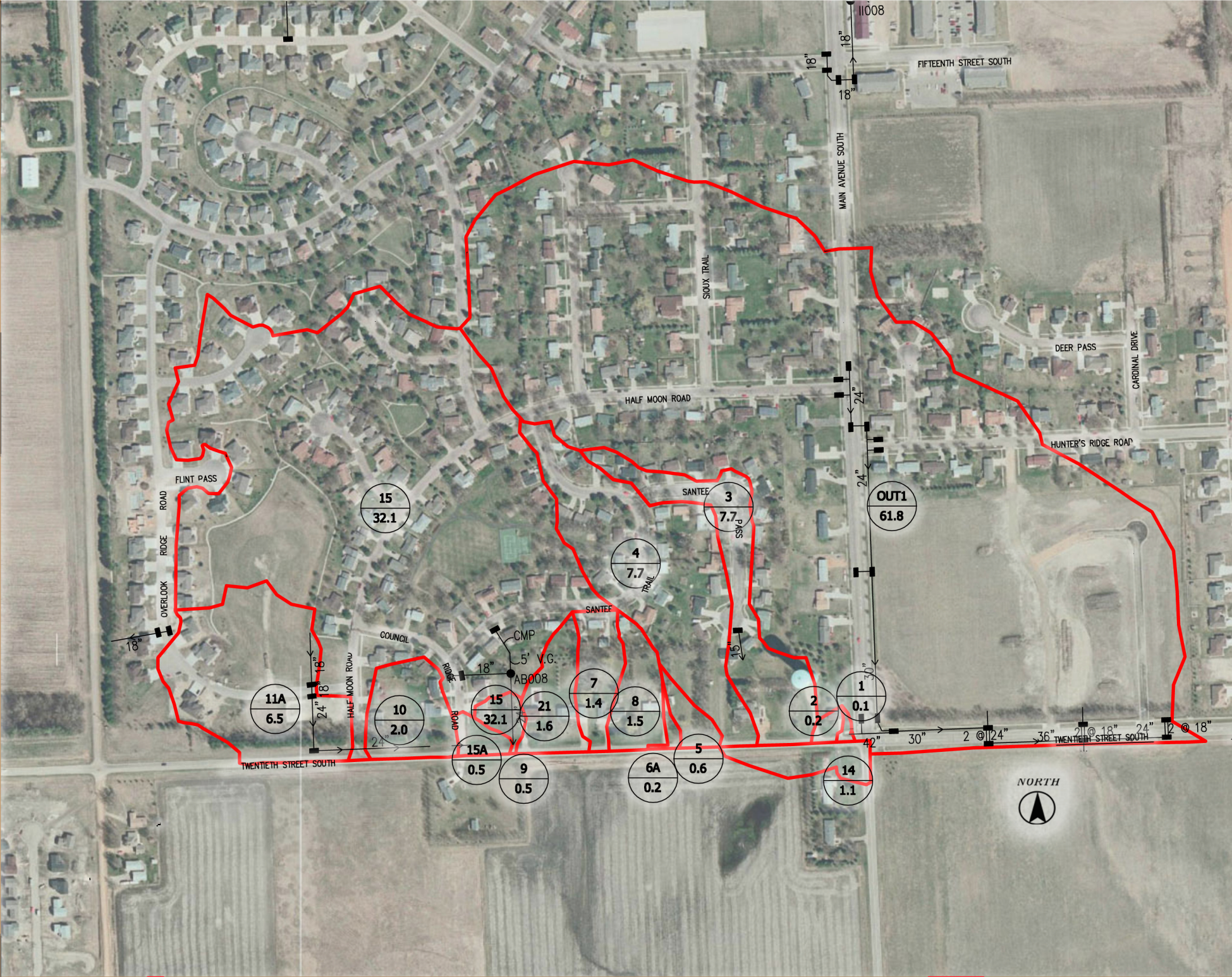
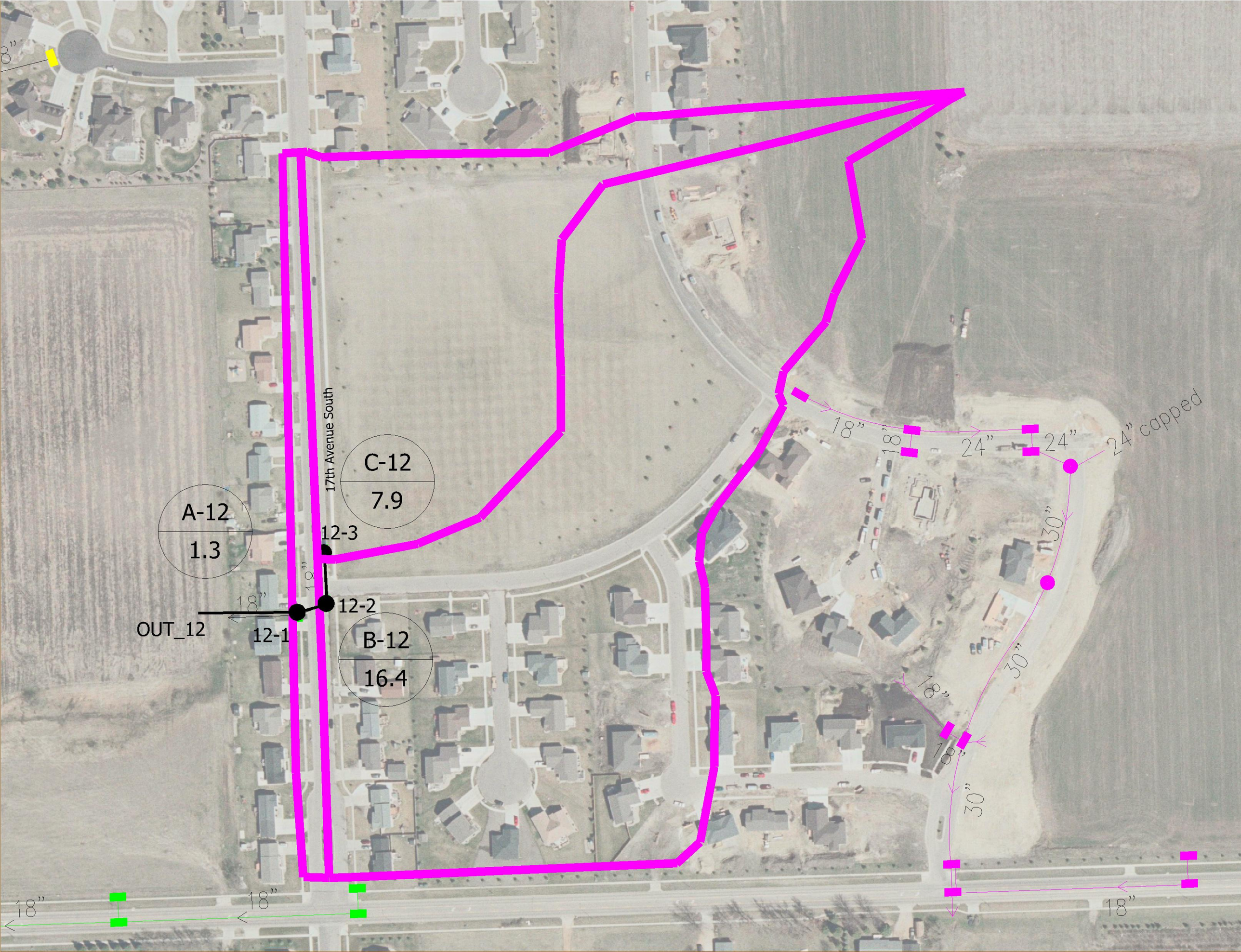
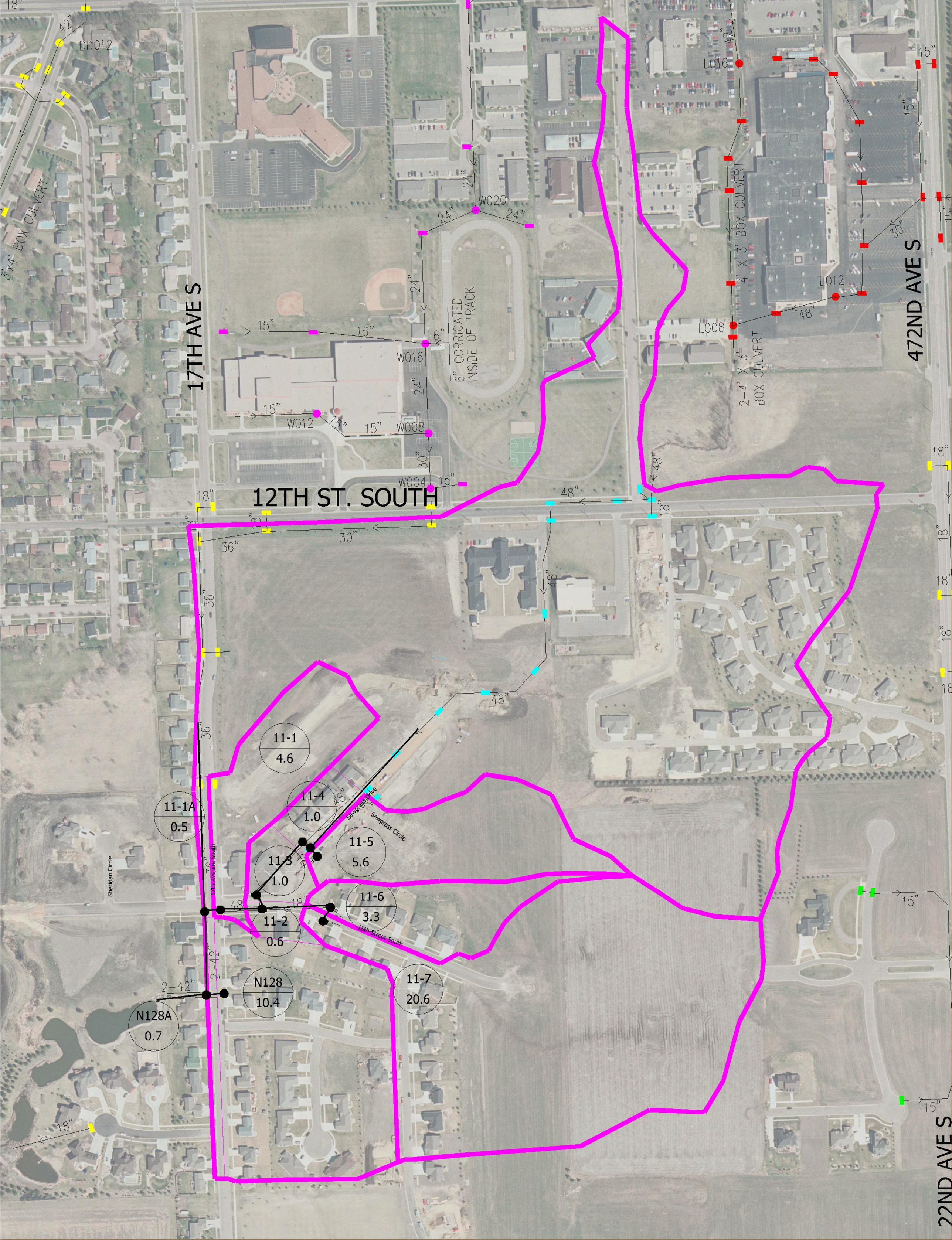
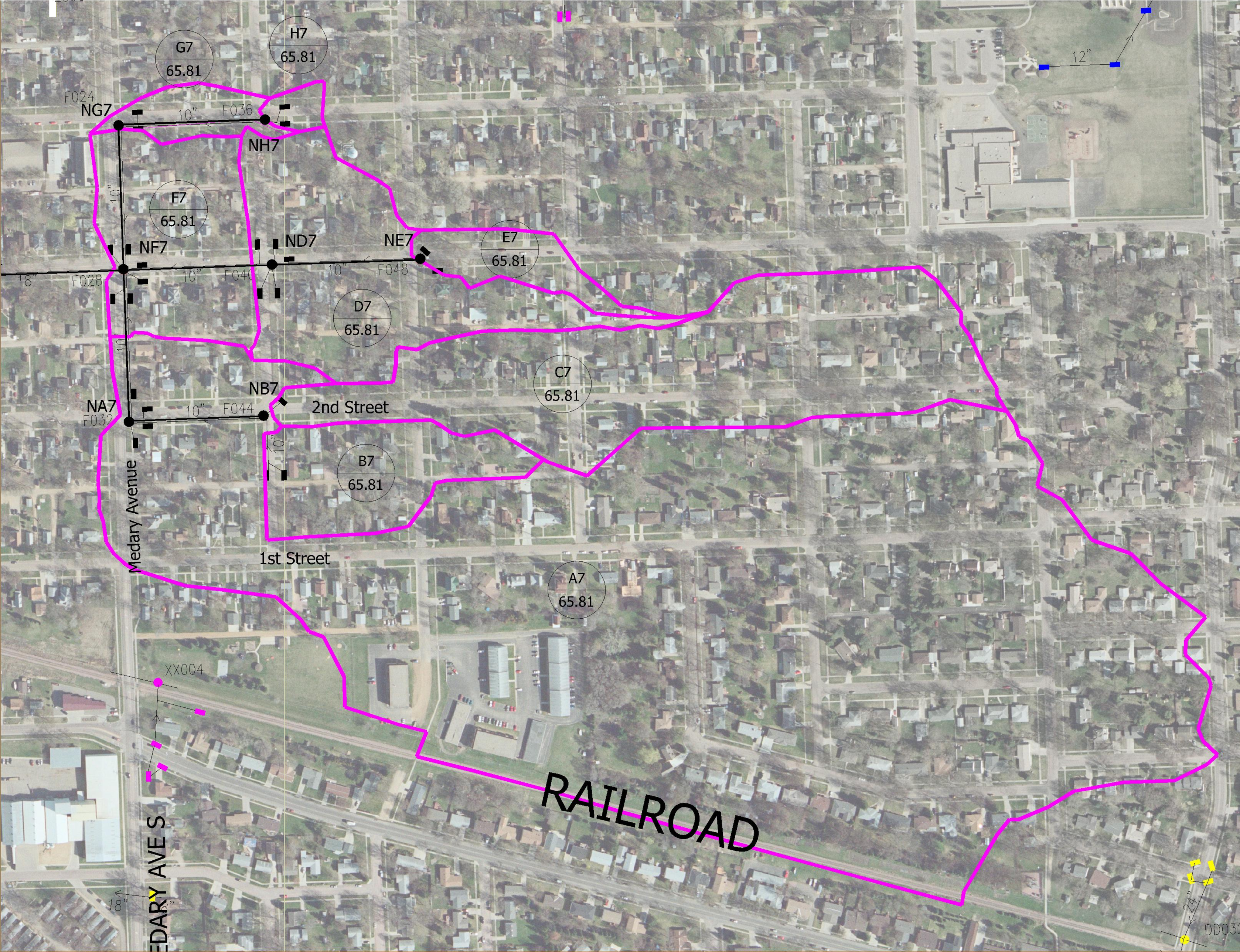
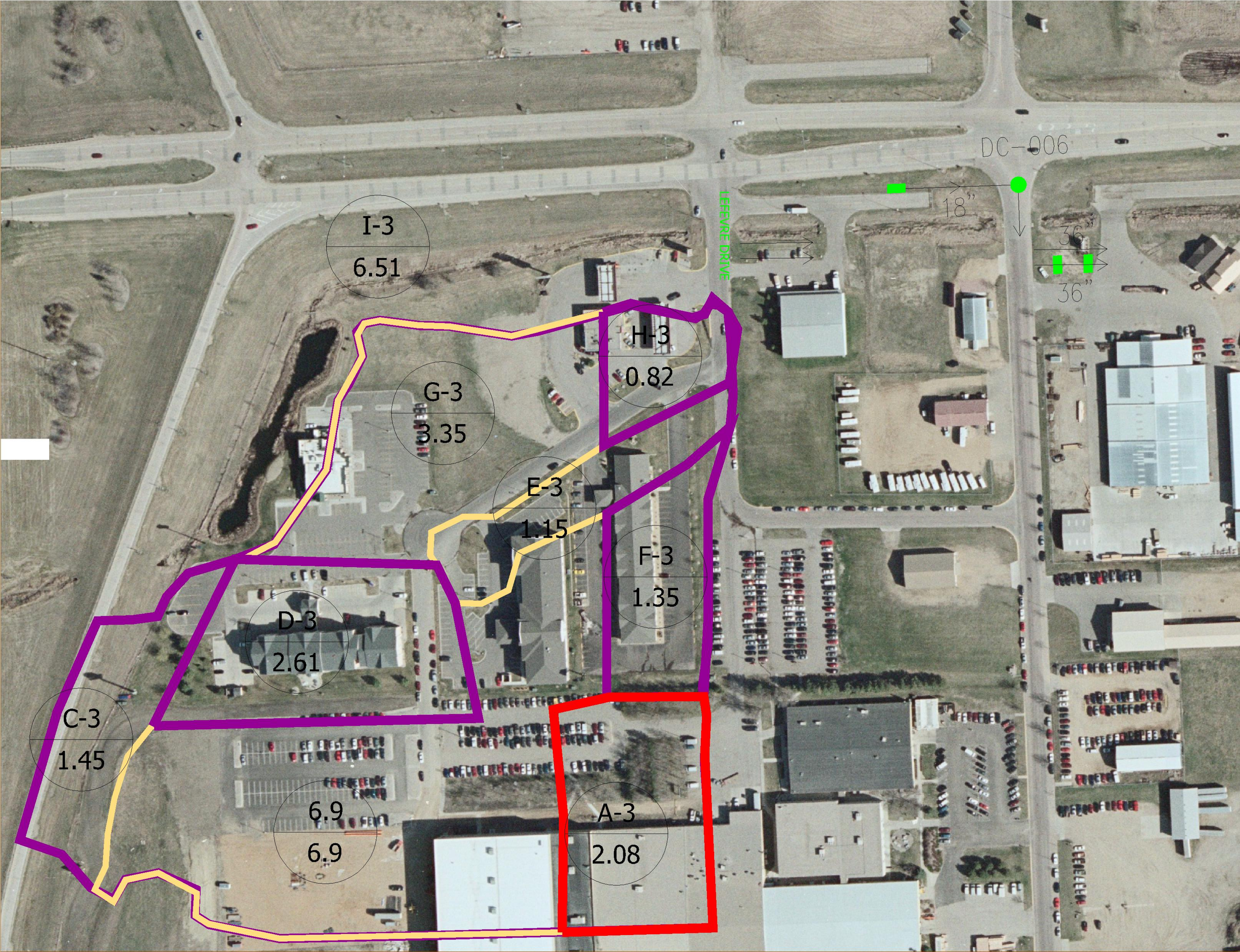
Appendix F - STUDY AREA CALCULATIONS – SEE DVD

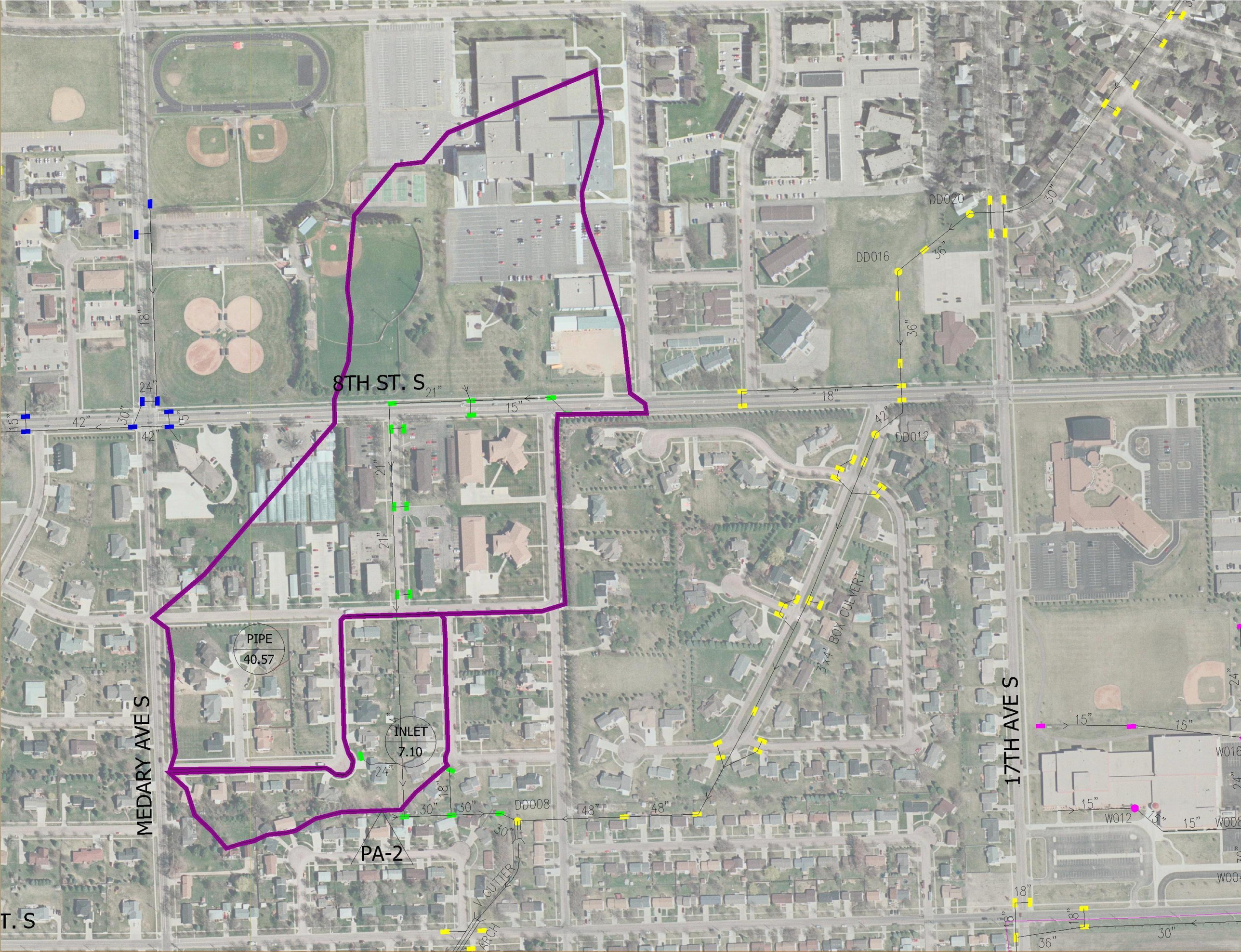

11008
18"
18"
18"
FIFTEENTH STREET SOUTH
MAIN AVENUE SOUTH
SIOUX TRAIL
DEER PASS
CARDINAL DRIVE
HALF MOON ROAD
24"
HUNTER'S RIDGE ROAD
24"
FLINT PASS
OVERLOOK RIDGE ROAD
18"
15
32.1
SANTEE
3
7.7
PASS
OUT1
61.8
4
7.7
TRAIL
SANTEE
COUNCIL
RIDGE
ROAD
HALF MOON ROAD
CMP
5' V.C.
18"
AB008
15"
30"
11A
6.5
24"
18"
10
2.0
24"
15
32.1
21
1.6
7
1.4
8
1.5
2
0.2
1
0.1
42"
30"
2 @ 24"
36"
2 @ 18"
24"
2 @ 18"
TWENTIETH STREET SOUTH
15A
0.5
9
0.5
6A
0.2
5
0.6
14
1.1
NORTH


8"
17th Avenue South
C-12
7.9
A-12
1.3
12-3
18"
18"
12-2
OUT_12
12-1
B-12
16.4
18"
18"
24"
24"
24" capped
30"
30"
18"
18"
30"
18"
18"
18"

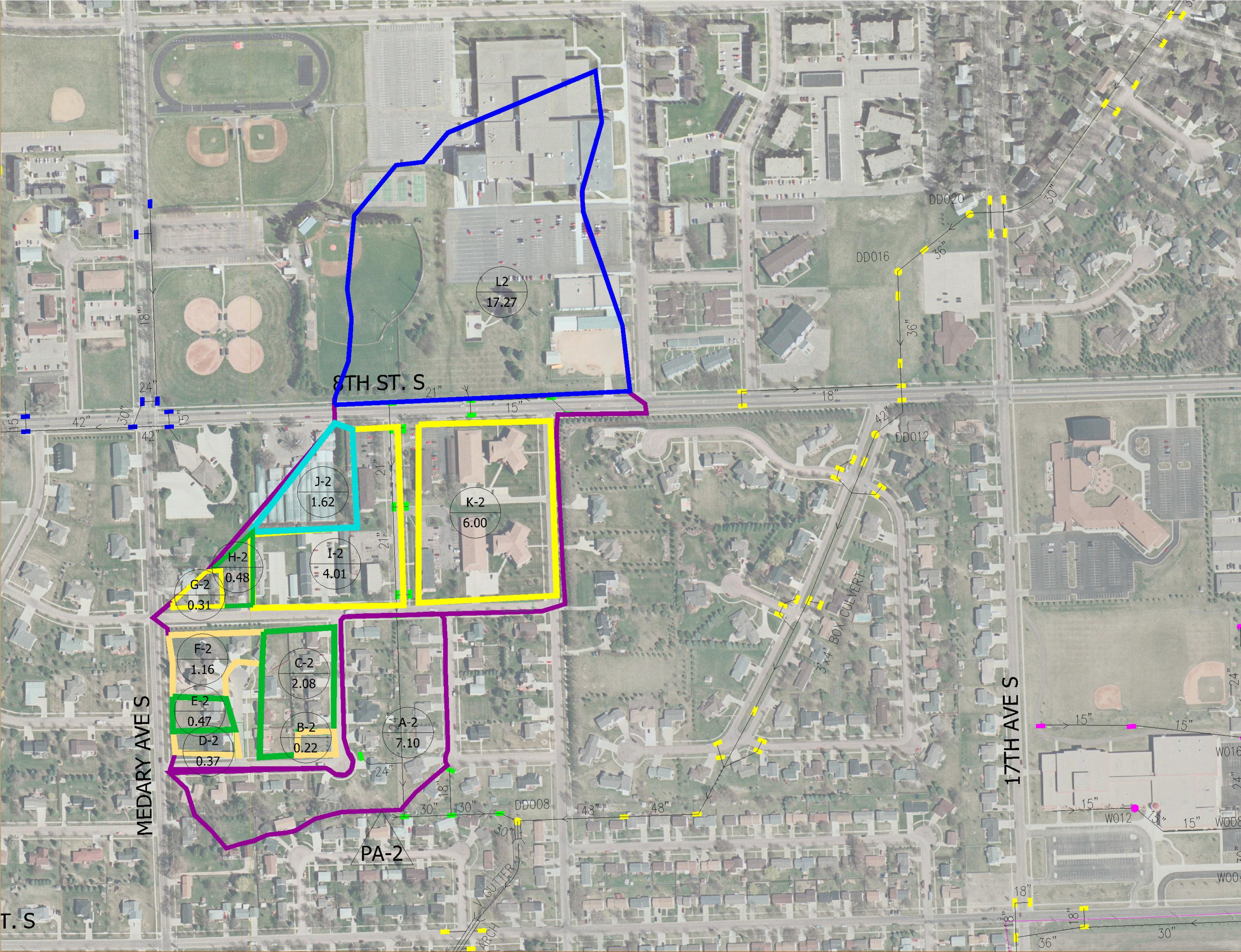

17TH AVE S
472ND AVE S
22ND AVE S
12TH ST. SOUTH
15th Street South
Sawgrass Drive
Sawgrass Circle
Sheridan Circle
17th Avenue South
3'x4' BOX CULVERT
4' X 3' BOX CULVERT
2-4' X 3' BOX CULVERT
6" CORRIGATED INSIDE OF TRACK
DD012
W020
W016
W012
W008
W004
L016
L012
L008
11-1
4.6
11-1A
0.5
11-4
1.0
11-3
1.0
11-5
5.6
11-6
3.3
11-2
0.6
N128
10.4
N128A
0.7
11-7
20.6


G7
65.81
H7
65.81
F024
NG7
10"
F036
NH7
F7
65.81
10"
NF7
ND7
NE7
E7
65.81
18"
F028
10"
F040
10"
F048
D7
65.81
C7
65.81
NB7
NA7
F032
10"
F044
2nd Street
10"
B7
65.81
Medary Avenue
1st Street
A7
65.81
12"
XX004
RAILROAD
MEDARY AVE S
18"
24"
DD03


DC-006
18"
36"
36"
LEFEVRE DRIVE
I-3
6.51
H-3
0.82
G-3
3.35
E-3
1.15
F-3
1.35
D-3
2.61
C-3
1.45
6.9
6.9
A-3
2.08



8TH ST. S
MEDARY AVE S
17TH AVE S
PIPE
40.57
INLET
7.10
PA-2
DD020
DD016
DD012
DD008
W012
3'x4' BOX CULVERT
V GUTTER



8TH ST. S
MEDARY AVE S
17TH AVE S
L2
17.27
J-2
1.62
K-2
6.00
I-2
4.01
H-2
0.48
G-2
0.31
F-2
1.16
C-2
2.08
E-2
0.47
B-2
0.22
D-2
0.37
A-2
7.10
PA-2
DD020
DD016
DD012
DD008
W012
3'x4' BOX CULVERT
V GUTTER

WEIGHTED PERCENT IMPERVIOUSNESS AND RUNOFF COEFFICIENT CALCULATIONS

Use this table to determine the average imperviousness "I" & runoff coefficients "C" of a basin according to instructions provided below

Basin ID SA-2 INLET LOCATED BEHIND HOUSES ON HAMMOND AVE. AND HORNER AVE., NOR

1	2	3	4	5
Subbasin ID	Subbasin Area (acres)	Subbasin Imperviousness "I"	Minor Storm (5-Yr) Subbasin Runoff Coefficient "C"	Major Storm (100-Yr) Subbasin Runoff Coefficient "C"
A-2	7.10	26	0.22	0.45
B-2	0.22	2	0.04	0.32
C-2	2.08	26	0.22	0.45
D-2	0.37	2	0.04	0.32
E-2	0.47	26	0.22	0.45
F-2	1.16	2	0.04	0.32
G-2	0.31	60	0.47	0.62
H-2	0.48	26	0.22	0.45
I-2	4.01	60	0.47	0.62
J-2	1.62	85	0.66	0.75
K-2	6.00	26	0.22	0.45
L-2	17.27	50	0.40	0.57
M-2	6.58	95	0.73	0.80

Total Area (acres)	**47.67**
Weighted Imperviousness "I"	**48.43**
Weighted Minor Storm Runoff Coefficient "C_5"	**0.39**
Weighted Major Storm Runoff Coefficient "C_{100}"	**0.56**

To Use This Sheet:

1. Enter subbasin ID in column 1
2. Enter area of each subbasin (in units of acres) in column 2
3. Enter the imperviousness of each subbasin in column 3.
   (This value is obtained from Table 2 and Figures 4 - 6 of Criteria Manual.)
4. Enter the runoff coefficient the 5-Year Storm of each subbasin in column 4.
   (This value is obtained from Tables 3 - 5 of the Criteria Manual and is dependent on soil type.)
5. Enter the runoff coefficient the 100-Year Storm of each subbasin in column 5.
   (This value is obtained from Tables 3 - 5 of the Criteria Manual and is dependent on soil type.)

Total Area, Weighted Imperviousness "I" and Weighted Runoff Coefficient "C" for the basin are calculated in "Yellow" Cells

TIME OF CONCENTRATION FOR INDIVIDUAL SUBBASINS

Use this spreadsheet to calculate the time-of-concentration (Tc) from each individual subbasin
This sheet provides the Tc at the downstream end of a individual subbasin.

1	2	3	4	5	6	7	8	9	10	11	12
Sub-Basin Data			Initial/Overland (Tov)			Channel Flow (Tt)					Time-of-Concentration Tc
Subbasin ID	Area (acres)	C_5	L (ft)	S (ft/ft)	Tov (min)	L (ft)	S (ft/ft)	Cv	Vel (fps)	Tt (min)	Tc (min)
PA-2 inlet only	7.1	0.4	300	0.012	19.2	330	0.012	15.0	1.64	3.3	22.6
PA-2 total	47.7	0.22	300	0.012	25.9	1500	0.050	20.0	4.47	5.6	31.5

To Use This Spreadsheet:

1. Enter subbasin IDs in column 1
2. Enter subbasin areas (acres) in column 2
3. Enter calculated C5 values for each subbasin in column 3
4. Enter the length (ft) of the overland flow in column 4. This is the distance before flows become channelized.
   (For undeveloped land the maximum length of overland flow is 500 feet, for developed flow the maximum length is 300 feet.)
5. Enter the average subbasin slope where overland flow occurs in column 5 (ft/ft)

Given this information, the overland flow time (Tov) is calculated in column 6 (minutes)

6. Enter the length (ft) of channelized flow in column 7. This is the total subbasin length minus the overland flow length.
7. Enter the average subbasin slope where channelized flow occurs in column 8.
8. Enter the conveyance coefficient (Cv) in column 9. This value can be found in Table 7 of the Criteria Manual

The average velocity in the channelized section is calculated in column 10 (fps)
The channel flow time (Tt) is calculated in column 11 (minutes).
The time-of-concentration (Tc) is calculated in column 12 (minutes).

NOTE
This spreadsheet provides calculations for computing Tc for each subbasin.
The Tc for any location within the overall basin should be determine by evaluating Tc for subbasins contributing flows to a particular point plus travel time from the downstream end of the subbason to the point of interest. Travel time downstream of the subbasin should be based on channelized flow (roads, swales, pipes etc)
The Tc should be calculated for every hydraulic structure (inlet, swale, road, pipe, detention pond etc) in the drainage system.

Minor Storm (5-Year) Peak Flow Calculation

Use this spreadsheet to calculate the peak 5-year flow at different hydraulic design points

1	2	3	4	5	6	7
Design Point	**Tributary Subbasin(s)**	**Tributary Area**	**C5**	**Tc**	**Rainfall Int. (i)**	**Qp**
		(acres)		**(min)**	**(inches/hr)**	**(cfs)**
PA-2 - inlet only	A-2	7.10	0.22	22.55	3.64	5.7
PA-2 - total	A-2:M-2	47.67	0.39	31.48	2.96	54.5
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0

To use this sheet:

1. Enter the design point ID in column 1.
2. Enter the names of the different subbasins that contribute flow to the design point in column 2.
3. Enter the total area (acres) of all subbasins tributary to the design point in column 3.
4. Enter the weighted C5 value for all subbasins tributary to the design point in column 4.
5. Enter the Tc (min) for the design point in column 5.
6. Enter the rainfall intensity (i) in inches per hour in column 6 that corresponds to the Tc in column 5. Note that the 5-year rainfall intensity should be used in this sheet.

The spreadsheet calculates the peak flow (cfs) in column 7.

Major Storm (100-Year) Peak Flow Calculation

Use this spreadsheet to calculate the peak 100-year flow at different hydraulic design points

1	2	3	4	5	6	7
Design Point	**Tributary Subbasin(s)**	**Tributary Area**	**C100**	**Tc**	**Rainfall Int. (i)**	**Qp**
		(acres)		**(min)**	**(inches/hr)**	**(cfs)**
PA-2 - inlet only	A-2	7.10	0.45	22.55	3.64	11.6
PA-2	A-2, B-2	47.7	0.56	31.48	2.96	79.4
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0

To use this sheet:

1. Enter the design point ID in column 1.
2. Enter the names of the different subbasins that contribute flow to the design point in column 2.
3. Enter the total area (acres) of all subbasins tributary to the design point in column 3.
4. Enter the weighted C100 value for all subbasins tributary to the design point in column 4.
5. Enter the Tc (min) for the design point in column 5.
6. Enter the rainfall intensity (i) in inches per hour in column 6 that corresponds to the Tc in column 5. Note that the 100-year rainfall intensity should be used in this sheet.

The spreadsheet calculates the peak flow (cfs) in column 7.