Tara Creek Addition
Wichita, Sedgwick County, Kansas
Drainage Analysis

November 2006

The site being studied is Tara Creek addition to Wichita, Sedgwick County, Kansas. Tara Creek Addition consists of 19.38 acres of cultivated farm land southwest of the intersection of Mt Vernon and 127th Street East. The site is to be platted into 46 – ¼ acre single family residential lots and 1 reserve that will contain a detention pond.

Existing soil complexes are Lesho (hydrologic group C) and Rosehill (hydrologic group D). The entire site drains to a pair of 36" concrete pipes that flow under Mt Vernon Street. The proposed development will consist of mass site grading, pond construction, storm sewer construction, sanitary sewer construction, water main construction, pavement construction and finally housing construction. The offsite runoff comes from Casa Bella addition to the southwest of Tara Creek. Casa Bella drainage was studied as part of the Casa Bella platting process.

The developed Casa Bella model will be employed to study the offsite drainage that reaches Tara Creek. Offsite runoff will be routed through a drainage channel into a detention pond. The detention pond outlet will be controlled by a concrete weir. Most onsite water will travel across grassed areas, along paved roadways and within storm sewer to the proposed pond. A small portion of the site will travel to the existing 36" RCP's undetained. Table 1 shows that for each return period the peak runoff has been reduced in the developed condition.

Storm Return Period	Peak Runoff Existing (cfs)	Peak Runoff Developed (cfs)
2-year	169.4	163.5
5-year	254.3	245.3
10-year	324.3	313.0
25-year	393.5	380.4
100-year	535.6	518.8

Table 1: Peak Runoff Results for each return period.

Existing Conditions

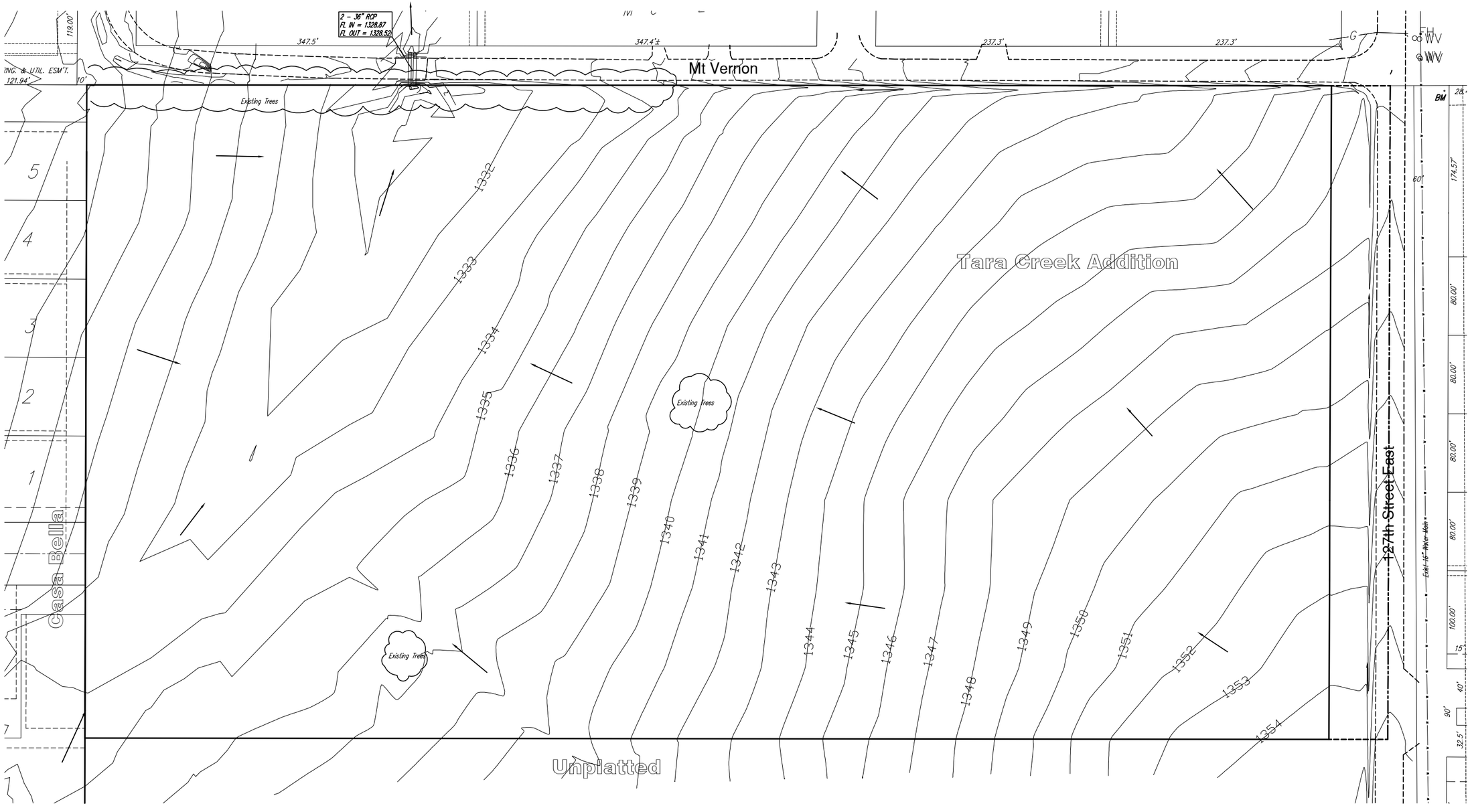
The existing site consists of 19.38 acres of cultivated farmland (0% impervious) with hydrologic group C and D soils. The time of concentration is determined to be 18 minutes using the velocity method. Considering the existing land use and soil types the curve number used is 86. The peak runoff from the Casa Bella existing model is 535.6 cfs. Using HEC-HMS, the existing peak runoff from the Tara Creek site for each return period is found in Table 1. Runoff from the site flows to 2 – 36" RCP's. For the existing conditions, the pipes are inadequately sized and future consideration should be given by the City of Wichita to upgrade to a more appropriate structure.

A review of the USGS maps, FEMA flood maps and a field visit of the site shows no evidence of floodways, wetland or riparian areas of the subject site.

Tc = 300'/0.45 ft/sec (overland flow) + 300'/1.5 ft/sec (sheet flow) + 600'/2.5 ft/sec (channel flow) = 1107 secs = 18 minutes

The following table gives the resulting elevation discharge data for the 2-36" RCPs under Mt Vernon. Mt Vernon overtops at an elevation of 1333.7. The table was generated using HY-8.

Elevation	Discharge (cfs)
1330.0	0
1331.4	60
1333.2	120
1334.2	180
1334.3	240
1334.5	300
1334.6	360
1334.7	420
1334.8	480
1334.9	600



SCALE 1" = 50'

BENCH MARK: SRB BRASS DISC 55.45' E. & 5.13' S. OF THE N.W. COR., SW1/4, SEC. 35, T27S, R2E

ELEV.=1348.35 (NGVD) = 160.95 (CITY DATUM)

TARA CREEK ADDITION

Existing Conditions

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DESIGN	CMB
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UTILITY	
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RB JOB	2929P
SHEET	2 OF 4
DRAWING FILE	Drainage Exhibits Existing [Existing Conditions]
PROJECT NUMBER	.

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TARA CREEK ADDITION

Aerial

WICHITA, KANSAS

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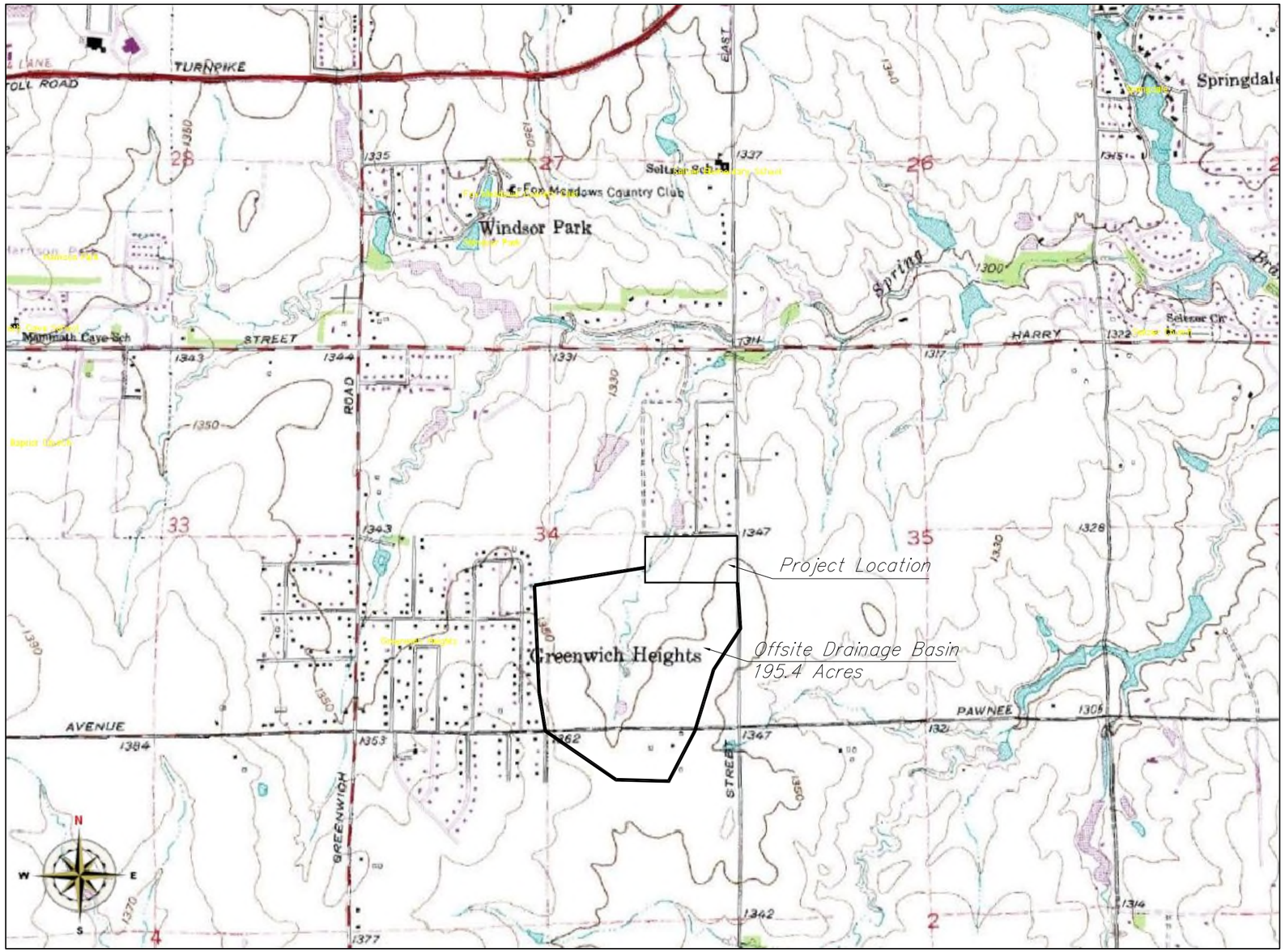

TARA CREEK ADDITION

USGS TOPO

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Developed Conditions

The developed condition of Tara Creek includes 46 lots for residential single family development, streets, a storm water system and a detention pond. The 100 year peak discharge is 533.7 cfs, an overall reduction in the peak runoff from the site. The Casa Bella drainage model considered as the existing condition, will be appended to include the developed Tara Creek model and ensure no negative impact on the Casa Bella subdivision. The total discharge from the site will be controlled ultimately by the 2 – 36" RCP's under Mt Vernon (Table 1A). In the event that improvements are made to Mt Vernon and the drainage structures under the roadway are improved, the outflow weir from the Tara Creek pond will be designed to mimic the drainage characteristics of the existing 36" pipes (Table 1B). HEC-HMS 3.0.1 was used to model the site using the SCS Unit Hydrograph.

Development of berms and swales will aide in prevention of offsite silt transport. The proposed pond will act as a sediment basin during and after construction.

Storm Return Period	Peak Runoff Existing (cfs)	Peak Runoff Developed (cfs)
2-year	169.4	136.8
5-year	254.3	241.2
10-year	324.3	318.0
25-year	393.5	390.7
100-year	535.6	533.7

Table 1A: Peak Runoff Results for each return period. 2-36" RCPs at Mt Vernon.

Storm Return Period	Peak Runoff Existing (cfs)	Peak Runoff Developed (cfs)
2-year	169.4	139.6
5-year	254.3	236.3
10-year	324.3	309.9
25-year	393.5	381.5
100-year	535.6	523.5

Table 1B: Peak Runoff Results for each return period. Pond weir control.

2-year	5-year	10-year	25-year	100-year
3.5 in	4.5 in	5.3 in	6.1 in	7.8 in

Table 2: SCS Rainfall intensities used for each return period.

Basin	Peak Discharge (cfs)				
	2-year	5-year	10-year	25-year	100-year
South Basin	4.9	7.5	9.7	11.8	16.5
Cherry Creek	9.7	12.9	15.4	17.9	23.2
Cherry Creek SWS	8.9	11.7	14.0	16.3	22.4
Pond	7.1	10.7	13.7	16.8	21.1
Undetained	10.4	15.1	18.9	22.7	30.9

Table 3: Computed peak discharge for each basin and each return period

Drainage Basins

South Basin (Basin A)
Rear yard drainage to the swale south of the double 10'x3' RCBC.
Area = 3.98 acres
CN = 80
Time of concentration = 24 minutes (300' / 0.3ft/sec + 300' / 1.5 ft/sec + 600 ft / 2.5 ft/sec)

Cherry Creek Basin (Basin B)
Front yard drainage including impervious areas of pavement and housing along Cherry Creek.
Area = 3.58 acres
CN = 94
Time of concentration = 15 minutes

Tara Creek SWS Basin (Basins C1,C2,C3)
Front yard drainage including impervious areas of pavement and housing along Cherry Creek Courts into proposed sws system.
Area = 3.23 acres
CN = 94
Time of Concentration = 15 minutes.

Pond Basin (Basin D)
Rear yard and reserve drainage the flows directly to the proposed pond.
Area = 4.35 acres
CN = 80
Time of Concentration = 15 minutes.

Undetained Basin (Basin E)
Rear yard drainage the flows directly to the RCP's under Mt Vernon and is not detained.
Area = 5.38 acres
CN = 84
Time of Concentration = 15 minutes (60' / 0.3ft/sec + 300' / 1.5 ft/sec + 1140 ft / 2.5 ft/sec = 14 minutes)

Drainage Structures

Double 10'x3' RCBC

The existing drainage from the Southeast, the South Basin and the Cherry Creek Basin flows to a double 10'X3' RCBC that conveys water under Cherry Creek Street to the detention pond.

Upstream Invert Elevation = 1332.45
Downstream Invert Elevation = 1332.15
Length = 90'

Elevation	Discharge (cfs)
1333.0	25
1333.5	65
1334.0	116
1334.5	160
1335.0	223
1335.5	293
1336.0	356
1336.5	430
1337.0	480
1337.5	525

Table4: Elevation-Discharge Rating Double 10'x3' RCBC

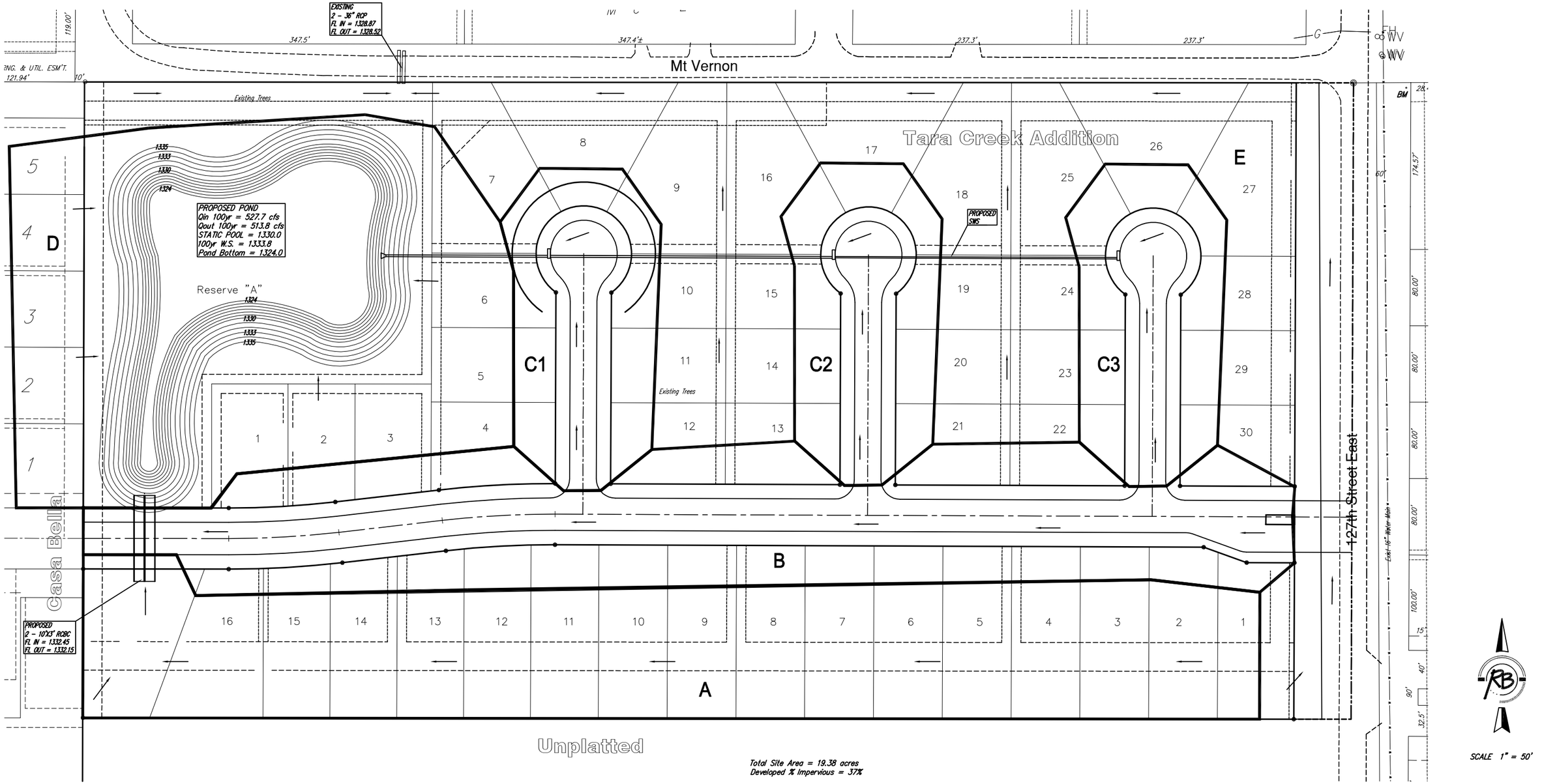
Peak runoff to the RCBC is 518.8 cfs. The resulting elevation peak at the RCBC is 1337.4.

Pond and Weir

The proposed pond has a static pool elevation of 1330.0 and a 100yr elevation of 1334.8. The pond outlet is controlled by a concrete weir with a top elevation of 1335.8, a 2' rectangular notch at an elevation of 1330.0, 8 – 18" circular openings at 1330.0 and a 446 weir notch at an elevation of 1333.0. The 100yr peak discharge of the pond is 518.2 cfs.

Elevation	Area (acres)	Discharge (cfs)	Storage (ac-ft)
1330.0	1.21	0.0	0
1330.5	1.28	24.5	0.64
1331.0	1.35	54.0	1.32
1331.5	1.42	77.8	2.03
1332.0	1.49	104.7	2.77
1332.5	1.56	125.5	3.55
1333.0	1.63	144.1	4.37
1333.5	1.70	211.2	5.22
1334.0	1.78	316.8	6.11
1334.5	1.85	443.7	7.02
1335.0	1.92	591.1	7.92

Table 5: Elevation-Area-Discharge Rating for the proposed Detention pond



Total Site Area = 19.38 acres
Developed % Impervious = 37%

LETTER	BASIN	AREA	CN
A	SOUTH	3.98	80
B	CHERRY CREEK	3.58	94
C1	CHERRY CREEK SWS	1.08	94
C2	CHERRY CREEK SWS	1.08	94
C3	CHERRY CREEK SWS	1.08	94
D	POND	4.35	80
E	UNDETAINED	5.38	84

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TARA CREEK ADDITION
Proposed Conditions
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SHEET: 4 OF 4
DRAWING FILE: Drainage Exhibits Existing [Existing Conditions]
PROJECT NUMBER: .

Mt Vernon

Tara Creek Addition

Reserve "A"

PROPOSED POND
Qin 100yr = 527.7 cfs
Qout 100yr = 513.8 cfs
STATIC POOL = 1330.0
100yr W.S. = 1333.8
Pond Bottom = 1324.0
Considering the RCP's Under Mt Vernon as the ponds out let control the 100 year W.S. = 1334.8

EXISTING
2 - 36" RCP
FL IN = 1328.87
FL OUT = 1328.52

PROPOSED
2 - 10'X3' RCBC
FL IN = 1332.45
FL OUT = 1332.15

PROPOSED SWS

Existing Trees

Casa Bella

127th Street East

Unplatted

SCALE 1" = 50'

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TARA CREEK ADDITION
4 Corner Lot Grading
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