RIVER PLANTATION MUNICIPAL UTILITY DISTRICT

NOTICE OF PUBLIC MEETING

Notice is hereby given to all interested members of the public that the Board of Directors of the captioned district will hold a public meeting at **610 River Plantation Drive, Conroe, Texas 77302.**

The meeting will be held at **6:30 p.m.** on **Thursday, March 28, 2024.**

The subject of the meeting is to consider and act on the following:

1. Minutes of the meeting of Board of Director(s)

2. Receive comments from the Public

3. Agreement to Lease Administration Building to Montgomery County ESD No. 9

4. Financial and bookkeeping matters including:
   a. Bookkeeper's report
   b. Tax Assessor-Collectors' report
   c. Review of investments
   d. Payment of District bills

5. Order Establishing Drought Contingency Plan

6. Order Adopting Water Conservation Plan

7. Resolution to Adopt the Verity Voting 2.5 System for use in May 4, 2024 Directors Election

8. Park Rules; Penalty for Operation of Prohibited Motor Vehicle

9. Park maintenance matters

10. Operator's Report

11. Engineer's Report

12. Executive (closed) Session Pursuant to Texas Government Code §§ 551.071, 551.072, and 551.076 as necessary

13. Pending business

RIVER PLANTATION MUNICIPAL UTILITY DISTRICT OF MONTGOMERY COUNTY TEXAS

J. Davis Bonham, Jr., Attorney for the District

09402-002 578831.1

River Plantation MUD
Cash Analysis
March 28, 2024

GENERAL OPERATING FUND - First Financial Bank

Ending Balance from last meeting	$	86,750.01
Add in voided check #23882 written to All Seasons Lawn Maintenance, lost in mail	+	11,625.00
Receipts		
Transfer from General Operating - Online Fund	+	60,000.00
Transfer from Capital Projects Fund - Texas Class, Series 2022	+	37,445.63
Interest earned on account	+	24.46
Withdrawals		
Payment to Centerpoint Energy, utility expense	-	221.21
Payment to Energy, utility expense	-	5,295.35
Bank charges/fees	-	25.00
Checks previously approved		
24017 - Centerpoint Energy, blank check for utility expense, holding		
24018 - Consolidated Communications, blank check for telephone expenses, holding		
24019 - Entergy, utility expense	-	2,441.75
24021 - Synaptic Integration's, surveillance	-	1,271.44
Checks presented for signatures on March 28, 2024		
24022 - Association of Water Board Directors, AWBD Annual Conference - Director Gilmer	-	435.00
24023 - Consolidated Communications, telephone expenses	-	332.31
24024 - Entergy, utility expense	-	4,851.95
24025 - L & S District Services, LLC., bookkeeping fees & expenses for February	-	4,319.64
24026 - Municipal Operations & Consulting, Inc., maintenance & operations for February	-	39,627.98
24027 - Prepared Publications, Inc., operations admin	-	210.00
24028 - River Plantation MUD - Joint Drainage, joint drainage expenses	-	833.11
24029 - River Plantation MUD - STP, February billing & January supplement	-	39,167.20
24030 - Smith, Murdaugh, Little & Bonham, LLP., legal fees	-	14,383.59
24031 - The Radich Law Firm, PLLC., legal fees	-	8,508.50
24032 - Vogler & Spencer Engineering, general engineering fees - $3,110.00, Emergency Preparedness Plan - $20.00	-	3,130.00
24033 - First Financial Bank, NA., safe deposit box rental	-	65.00
24034 - Heidi & Luke Lawler, refund	-	21.78
24035 - Charles H. Meyer Jr., refund	-	80.96
24036 - Josue Garcia, refund	-	198.01
24037 - Johnathan Johnson, refund	-	94.14
24038 - Dee Ginn, refund	-	65.95
24039 - Entergy, blank check for utility expense		
Total Disbursements	$	125,579.87
Ending Balance at March 28, 2024	$	70,265.23

GENERAL OPERATING FUND - ONLINE - First Financial

Ending Balance from last meeting	$	40,025.42
Receipts		
Accounts Receivable	+	63,074.42
Interest earned on account	+	31.88
Withdrawals		
Transfer to General Operating Fund	-	60,000.00
Customer returned NSF items	-	106.82
Total Disbursements	$	60,106.82
Ending Balance at March 28, 2024	$	43,024.90
Investments		
General Operating Fund - Texas Class	$	1,551,201.24
Total Operating Funds	$	1,664,491.37

TAX DEPOSIT ACCOUNT - First Financial Bank

Ending Balance from last meeting	$	291,917.65
Receipts		
Tax Collections	+	220,591.13
Interest earned on account	+	92.71
Withdrawals		
Transfer to General Operating Fund - Texas Class	-	305,643.78
Transfer to Debt Service Fund - Park	-	30,830.03
Transfer to Debt Service Fund	-	161,857.66
Total Disbursements	$	498,331.47
Ending Balance at March 28, 2024	$	14,270.02

2023 Levy - $1,448,345.17 (90.78% collected as of 2/29/24)
All Outstanding - $173,466.59

CAPITAL PROJECTS FUND - First Financial Bank

Ending Balance from last meeting	$	6,244.20
Receipts		
Transfer from Texas Class - Series 2022 WSD	+	10,000.00
Transfer from Texas Class - Series 2022 Park	+	76.51
Interest earned on account	+	3.28
Withdrawals		
Bank charges/fees	-	0.84
Checks presented for signatures on March 28, 2024		
2003 - River Plantation MUD - STP, Wastewater Treatment Facility Rehab Phase 1	-	3,970.38
2004 - Vogler & Spencer Engineering, Water Plant No. 2 Electrical Controls - $1,786.76, Sanitary Sewer Rehab Phase 2 - $1,161.60, Storm Sewer Rehab Phase 1 - $3,321.73	-	6,270.09
Total Disbursements	$	10,241.31
Ending Balance at March 28, 2024	$	6,082.68
Investments		
Texas Class - Series 2022 WSD	$	3,630,335.48
Total Capital Projects Funds	$	3,636,418.16

DEBT SERVICE FUND - Texas Class

Ending Balance from last meeting	$	624,544.84
Receipts		
Transfer from Tax Fund	+	161,857.66
Interest earned on account	+	2,627.51
Withdrawals		
Wire to Bank of New York Mellon, 3/1/24 debt service payment	-	150,206.25
Wire to Bank of New York Mellon, paying agent fee	-	750.00
Total Disbursements	$	150,956.25
Ending Balance at March 28, 2024	$	638,073.76

Next Debt Service payment due September 1, 2024 - $265,206.25

DEBT SERVICE FUND - PARK - Texas Class

Ending Balance from last meeting	$	52,201.89
Receipts		
Transfer from Tax Fund	+	30,830.03
Interest earned on account	+	210.91
Withdrawals		
Wire to Bank of New York Mellon, 3/1/24 debt service payment	-	23,990.63
Wire to Bank of New York Mellon, paying agent fee	-	750.00
Total Disbursements	$	24,740.63
Ending Balance at March 28, 2024	$	58,502.20

Next Park Debt Service payment due September 1, 2024 - $53,990.63

SEWER TREATMENT PLANT FUND - First Financial Bank

Ending Balance from last meeting	$	14,344.72
Receipts		
Accounts Receivable - River Plantation MUD	+	45,784.50
Accounts Receivable - East Plantation UD	+	14,097.55
Interest earned on account	+	18.34
Withdrawals		
Payment to Entergy, utility expense	-	8,724.38
Bank service charges	-	5.21
Checks previously approved		
2005 - Entergy, blank check for utility expense, holding		
2006 - Republic Services, garbage expense	-	200.51
Checks presented for signatures on March 28, 2024		
2007 - GFL Environmental, sludge removal	-	1,824.00
2008 - L & S District Services, LLC., bookkeeping fees & expenses for February	-	590.18
2009 - Municipal Operations & Consulting, operations & maintenance	-	51,774.10
2010 - Republic Services, garbage expense	-	202.72
2011 - Vogler & Spencer Engineering, Wastewater Treatment Facility Rehab Phase 1 - $6,566.40, Wastewater Discharge Permit - $371.25, WWTF General - $1,102.50	-	8,040.15
2012 - Republic Services, blank check for garbage expense		
Total Disbursements	$	71,361.25
Ending Balance at March 28, 2024	$	2,883.86

JOINT DRAINAGE FUND - First Financial Bank

Ending Balance from last meeting	$	15,992.76
Receipts		
Transfer from Capital Projects Fund - Series 2022, reimburse payment to Vogler & Spencer, Existing Conditions Drainage Assessment	+	11,327.50
Accounts Receivable - River Plantation MUD	+	275.45
Withdrawals		
Payment to Entergy, utility expense	-	32.82
Bank service charges	-	2.16
Checks presented for signatures on March 28, 2024		
2006 - L & S District Services, LLC., bookkeeping fees & expenses for February	-	441.23
2007 - Vogler & Spencer Engineering, 711 Holly Springs Storm Sewer Replacement	-	1,190.00
2008 - Entergy, blank check for utility expense		
Total Disbursements	$	1,666.21
Ending Balance at March 28, 2024	$	25,929.50

River Plantation MUD General Operating Fund
Profit & Loss Budget Performance
February 2024

	Feb 24	Budget	Oct '23 - Feb 24	YTD Budget	Annual Budget
Ordinary Income/Expense					
Income					
Water Revenue					
4100 · Customer Service Fees - Water	23,967.18	40,390.00	131,520.27	201,959.00	484,689.00
4110 · Water Tap Connection Fees	0.00	0.00	4,120.00	0.00	0.00
4150 · LSGCD Fees	500.72	1,083.00	3,033.29	5,419.00	13,000.00
Total Water Revenue	24,467.90	41,473.00	138,673.56	207,378.00	497,689.00
Sewer Revenue					
4200 · Customer Service Fees - Sewer	34,290.54	35,416.00	174,523.41	177,088.00	425,000.00
Total Sewer Revenue	34,290.54	35,416.00	174,523.41	177,088.00	425,000.00
Other Revenues					
4320 · Maintenance Taxes	303,721.02	304,000.00	820,948.93	822,000.00	855,828.00
4330 · Penalties and Interest	867.89	1,000.00	4,124.76	5,000.00	12,000.00
4380 · Termination/Reconnection/NSF Fe	2,176.21	1,083.00	14,331.31	5,419.00	13,000.00
4400 · Transfer/Connection Fees	150.00	83.00	977.95	419.00	1,000.00
4600 · TCEQ Assessment Fees	291.12	333.00	1,249.14	1,669.00	4,000.00
4800 · Customer Service Inspections	0.00	166.00	0.00	838.00	2,000.00
5380 · Miscellaneous Income	200.00	83.00	200.00	419.00	1,000.00
5385 · Bank Fees	0.00	4.00	0.00	22.00	50.00
5386 · Interest Temp Investments	0.00	66.00	0.00	338.00	800.00
5391 · Interest Income	5,549.17	1,666.00	22,589.41	8,338.00	20,000.00
Total Other Revenues	312,955.41	308,484.00	864,421.50	844,462.00	909,678.00
Total Income	371,713.85	385,373.00	1,177,618.47	1,228,928.00	1,832,367.00
Expense					
Water Expenses					
6124 · Laboratory Expense	507.50	2,200.00	3,992.79	11,000.00	26,400.00
6126 · Permit Fees	0.00	0.00	6,113.90	3,500.00	3,500.00
6127 · LSGWCD Fees	0.00	1,708.00	19,198.81	8,544.00	20,500.00
6130 · TCEQ Regulatory - Water	0.00	0.00	0.00	0.00	1,750.00
6132 · Operator Fees	7,844.40	52,850.00	47,237.38	264,250.00	634,200.00
6135 · Repairs & Maintenance	25,983.26	16,250.00	125,275.68	81,250.00	195,000.00
6136 · Landscape Services - Water	0.00	6,824.00	17,375.00	34,122.00	81,890.00
6142 · Chemicals	0.00	1,250.00	445.50	6,250.00	15,000.00
6152 · Utilities	5,586.10	5,833.00	22,466.09	29,169.00	70,000.00
6170 · Tap Connection Expense	0.00	166.00	4,845.00	838.00	2,000.00
Total Water Expenses	39,921.26	87,081.00	246,950.15	438,923.00	1,050,240.00

River Plantation MUD General Operating Fund
Profit & Loss Budget Performance
February 2024

	Feb 24	Budget	Oct '23 - Feb 24	YTD Budget	Annual Budget
Sewer Expenses					
6201 · Purchased Sewer Service	36,404.05	14,718.00	104,529.43	73,596.00	176,622.00
6224 · Laboratory Expense	0.00	166.00	0.00	838.00	2,000.00
6230 · TCEQ Regulatory - Wastewater	0.00	0.00	0.00	0.00	2,000.00
6232 · Operator Fees	3,665.40	2,291.00	22,848.36	11,463.00	27,500.00
6235 · Repair and Maintenance	1,404.67	6,250.00	19,340.90	31,250.00	75,000.00
6236 · Landscape Services - Wastewater	0.00	0.00	17,375.00	0.00	0.00
6240 · Purchased Drainage	833.11	833.00	13,223.28	4,169.00	10,000.00
6242 · Chemicals	222.75	0.00	222.75	0.00	0.00
6252 · Utilities	99.20	83.00	479.78	419.00	1,000.00
6271 · Tap Connection - Wastewater	0.00	416.00	2,200.00	2,088.00	5,000.00
6276 · Maintenance & Repairs - Park	0.00	3,333.00	33,152.86	16,669.00	40,000.00
Total Sewer Expenses	42,629.18	28,090.00	213,372.36	140,492.00	339,122.00
Other Expenses					
6310 · Director Fees	0.00	937.00	9,750.00	4,691.00	11,250.00
6314 · Payroll Taxes	0.00	93.00	745.89	474.00	1,125.00
6320 · Legal Fees	22,892.09	16,666.00	69,549.52	83,338.00	200,000.00
6321 · Auditing Fees	0.00	0.00	0.00	0.00	10,000.00
6322 · Engineering Fees	3,130.00	6,250.00	28,851.25	31,250.00	75,000.00
6326 · TCEQ Assessment Fees	0.00	0.00	4,076.88	0.00	0.00
6330 · Appraisal District Fees	0.00	375.00	3,610.00	1,875.00	4,500.00
6333 · Bookkeeping Fees	4,319.64	6,833.00	33,123.49	34,169.00	82,000.00
6335 · M&R - Park	2,350.00	0.00	2,350.00	0.00	0.00
6337 · Tax Assessor/Collector	0.00	66.00	0.00	338.00	800.00
6338 · Legal Notices/Other Publication	0.00	0.00	0.00	0.00	1,000.00
6340 · Office Expense	0.00	833.00	36.80	4,169.00	10,000.00
6341 · Delivery Expense	0.00	41.00	94.15	213.00	500.00
6350 · Postage	0.00	375.00	0.00	1,875.00	4,500.00
6353 · Insurance	0.00	0.00	34,156.92	32,000.00	32,000.00
6354 · Travel Expense	0.00	175.00	1,745.06	875.00	2,100.00
6356 · Registration/Membership Fees	435.00	0.00	965.00	30.00	30.00
6359 · Other Expenses	660.72	625.00	1,989.96	3,125.00	7,500.00
6360 · AWBD Expense	0.00	58.00	0.00	294.00	700.00
Total Other Expenses	33,787.45	33,327.00	191,044.92	198,716.00	443,005.00
Total Expense	116,337.89	148,498.00	651,367.43	778,131.00	1,832,367.00
Net Ordinary Income	255,375.96	236,875.00	526,251.04	450,797.00	0.00
Net Income	**255,375.96**	**236,875.00**	**526,251.04**	**450,797.00**	**0.00**

River Plantation MUD STP Fund
Profit & Loss Budget Performance
February 2024

	Feb 24	Budget	Oct '23 - Feb 24	YTD Budget	Annual Budget
Ordinary Income/Expense					
Income					
4203 · RP MUD Revenue	36,404.05	14,718.00	104,529.43	73,596.00	176,622.00
4204 · EPUD Revenue	26,398.66	9,812.00	86,806.75	49,064.00	117,748.00
4205 · RP CPF Revenue	3,970.38	0.00	28,233.81	0.00	0.00
5380 · Miscellaneous Income	0.00	0.00	3,730.50	0.00	0.00
5391 · Interest earned	7.47	4.00	56.90	22.00	50.00
Total Income	66,780.56	24,534.00	223,357.39	122,682.00	294,420.00
Expense					
6236 · Mowing - Wastewater	0.00	75.00	0.00	375.00	900.00
6397 · Garbage Expense	202.72	66.00	880.09	338.00	800.00
6224 · Laboratory Expense	222.75	1,083.00	5,116.65	5,419.00	13,000.00
6226 · Permit Fees	0.00	0.00	0.00	0.00	34,000.00
6232 · Operator Fees	1,500.00	2,083.00	6,093.27	10,419.00	25,000.00
6235 · Repair and Maintenance	49,265.01	5,833.00	94,157.29	29,169.00	70,000.00
6237 · Sludge Removal	1,824.00	2,500.00	10,032.00	12,500.00	30,000.00
6242 · Chemicals	786.34	583.00	5,281.56	2,919.00	7,000.00
6251 · Telephone	0.00	60.00	0.00	300.00	720.00
6252 · Utilities	4,347.15	3,750.00	21,079.21	18,750.00	45,000.00
6322 · Engineering Fees	8,040.15	4,100.00	74,021.65	21,300.00	50,000.00
6333 · Bookkeeping Fees	590.18	833.00	6,686.02	4,169.00	10,000.00
6353 · Insurance	0.00	0.00	0.00	0.00	5,000.00
6359 · Other Expenses	2.26	0.00	9.65	0.00	0.00
6395 · Security Service	0.00	250.00	0.00	1,250.00	3,000.00
Total Expense	66,780.56	21,216.00	223,357.39	106,908.00	294,420.00
Net Ordinary Income	0.00	3,318.00	0.00	15,774.00	0.00
Net Income	**0.00**	**3,318.00**	**0.00**	**15,774.00**	**0.00**

3:39 PM
03/22/24
Accrual Basis

River Plantation MUD Joint Drainage Fund
Profit & Loss Budget Performance
February 2024

	Feb 24	Budget	Oct '23 - Feb 24	YTD Budget	Annual Budget
Ordinary Income/Expense					
Income					
4203 · RP MUD Revenue	833.10	833.00	13,133.27	4,169.00	10,000.00
4204 · EPUD Revenue	833.11	833.00	13,133.29	4,169.00	10,000.00
4205 · RP CPF Revenue	0.00	0.00	0.00	0.00	0.00
5391 · Interest Earned on Checking	0.00	4.00	0.00	22.00	50.00
Total Income	1,666.21	1,670.00	26,266.56	8,360.00	20,050.00
Expense					
6235 · Repair and Maintenance	0.00	301.00	6,500.00	1,509.00	3,616.00
6252 · Utilities	32.82	29.00	145.31	147.00	350.00
6315 · Mowing	0.00	410.00	0.00	2,130.00	5,000.00
6322 · Engineering Fees	1,190.00	410.00	14,622.75	2,130.00	5,000.00
6333 · Bookkeeping Fees	441.23	500.00	4,962.05	2,500.00	6,000.00
6359 · Other Expenses	2.16	7.00	36.45	35.00	84.00
Total Expense	1,666.21	1,657.00	26,266.56	8,451.00	20,050.00
Net Ordinary Income	0.00	13.00	0.00	-91.00	0.00
Net Income	**0.00**	**13.00**	**0.00**	**-91.00**	**0.00**

River Plantation MUD
Comparison of TCEQ Approved Estimates
with Actual Costs - Series 2022 Bonds
March 28, 2024

CONSTRUCTION COSTS		Approved Estimates		District Expenditure	Over Under
District Items					
WWTF Rehab Phase 1	$	625,000	$	33,748.23	(591,251.77)
WWTF Electrical Upgrades		615,000		24,282.71	(590,717.29)
WP No. 3 Electrical Upgrades		72,500		71,888.90	(611.10)
WP No. 2 Recoating		178,500		110,604.56	(67,895.44)
Fire Hydrant & Valve Survey		50,757		0.00	(50,757.00)
Fire Hydrant & Valve Rehab		152,500		0.00	(152,500.00)
Sanitary Clean & Televise		326,177		156,698.73	(169,478.27)
Sanitary Sewer Rehab Phase 1		382,896		940,558.68	557,662.68
Sanitary Sewer Rehab Phase 2		367,898		524,334.73	156,436.73
Sanitary Sewer Rehab Phase 3		366,682		0.00	(366,682.00)
Sanitary Manhole Rehab Phase 1		390,785		22,616.88	(368,168.12)
Storm Sewer Clean & Televise		28,538		90,686.10	62,148.10
Channel Survey & Evaluation		50,000		0.00	(50,000.00)
Storm Sewer Rehab Phase 1		389,889		378,971.64	(10,917.36)
Storm Sewer Rehab Phase 2		390,847		77,841.00	(313,006.00)
Mosswood Ditch Rehab Phase 1		559,825		97,049.79	(462,775.21)
Contingency		954,015		70,945.25	(883,069.75)
NON-CONSTRUCTION COSTS					
Legal Fees		238,500		208,500.00	(30,000.00)
Financial Advisory Fee		139,000		139,000.00	0.00
Capitalized Interest		347,500		302,225.00	(45,275.00)
Bond Discount		208,500		130,578.50	(77,921.50)
Bond Issuance Expense		35,366		102,596.41	67,230.41
Bond Application Report Costs		55,000		55,000.00	0.00
Attorney General		6,950		6,950.00	0.00
TCEQ Bond Issuance Fee		17,375		17,375.00	0.00
Contingency		0		0.00	0.00
TOTAL	$	6,950,000	$	3,562,452.11	(3,387,547.89)

Proceeds from Bond Sale	$	6,950,000.00
Transfer to GOF, 1/25/24		(164,489.49)
Interest income/bank service charges		413,359.76
Expenditures		(3,562,452.11)
Total funds remaining - Series 2022	$	3,636,418.16

Tammy J. McRae
Montgomery County
Tax Assessor-Collector

Monthly Tax Collection Report
For the month of February 2024

River Plantation MUD

	MTD	YTD
2023 Base Tax	$ 110,663.02	$ 1,322,767.61
2023 Penalty & Interest	1,147.90	1,147.90
Prior Years Base Tax	1,160.47	18,421.79
Prior Years Penalty & Interest	280.20	4,435.39
Reversals (Refunds, Returned Items, Transfers)	(1,152.71)	(9,158.46)
Collection Fee	-	(472.00)
5% Rendition Fee	-	(0.36)
Total Collections	$ 112,098.88	$ 1,337,141.87

Tammy J. McRae
Montgomery County Tax Assessor-Collector

Sworn to and subscribed before me on the 4th day of March, 2024.

KIM ROE
NOTARY PUBLIC, STATE OF TEXAS
Notary ID #13017659-3
Expires April 01,2027

Notary Public in and for the State of Texas

TC298-D SELECTION: DEPOSIT DEPOSIT DISTRIBUTION INCLUDES AG ROLLBACK
RECEIPT DATE: ALL FROM: 02/01/2024 THRU 02/29/2024
LOCATION: ALL JURISDICTION: 0412 RIVER PLANTATION MUD

YEAR	FUND	TAX RATE	LEVY PAID	DISCOUNT GIVEN	PENALTY INTEREST	TIF AMOUNT	DISBURSE TOTAL	ATTORNEY	OTHER FEES	REFUND AMOUNT	PAYMENT AMOUNT
2023	M & O	.400000	67,390.84	.00	706.40	.00	68,097.24	.00	.00	.00	68,097.24
	I & S	.250000	42,119.47	.00	441.50	.00	42,560.97	.00	.00	.00	42,560.97
	TOTAL	.650000	109,510.31	.00	1,147.90	.00	110,658.21	.00	.00	.00	110,658.21
2022	M & O	.270000	602.56	.00	145.48	.00	748.04	288.14	.00	.00	1,036.18
	I & S	.250000	557.91	.00	134.72	.00	692.63	.00	.00	.00	692.63
	TOTAL	.520000	1,160.47	.00	280.20	.00	1,440.67	288.14	.00	.00	1,728.81
ALL	M & O		67,993.40	.00	851.88	.00	68,845.28	288.14	.00	.00	69,133.42
ALL	I & S		42,677.38	.00	576.22	.00	43,253.60	.00	.00	.00	43,253.60
ALL	TOTAL		110,670.78	.00	1,428.10	.00	112,098.88	288.14	.00	.00	112,387.02
DLQ	M & O		602.56	.00	145.48	.00	748.04	288.14	.00	.00	1,036.18
DLQ	I & S		557.91	.00	134.72	.00	692.63	.00	.00	.00	692.63
DLQ	TOTAL		1,160.47	.00	280.20	.00	1,440.67	288.14	.00	.00	1,728.81
CURR	M & O		67,390.84	.00	706.40	.00	68,097.24	.00	.00	.00	68,097.24
CURR	I & S		42,119.47	.00	441.50	.00	42,560.97	.00	.00	.00	42,560.97
CURR	TOTAL		109,510.31	.00	1,147.90	.00	110,658.21	.00	.00	.00	110,658.21

SUMMARY OF PAYMENTS AND REVERSALS
FROM: 02/01/2024 THRU 02/29/2024
JURISDICTION: 412 RIVER PLANTATION MUD

YEAR DEPOSIT	ACCOUNT NUMBER	EFF YR/MO	LEVY PAID	DISCOUNT GIVEN	PENALTY INTEREST	ATTORNEY	CAUSE /REV	REFUND AMOUNT	PAYMENT AMOUNT
	2022 TOTAL		1,160.47	0.00	280.20	288.14		0.00	1,728.81
	2023 TOTAL		110,663.02	0.00	1,147.90	0.00		0.00	111,810.92
	TOTAL PAYMENTS		111,823.49	0.00	1,428.10	288.14		0.00	113,539.73
	2023 TOTAL		1,152.71-	0.00	0.00	0.00		0.00	1,152.71-
	TOTAL REVERSALS		1,152.71-	0.00	0.00	0.00		0.00	1,152.71-
	TOTAL FOR UNIT		110,670.78	0.00	1,428.10	288.14		0.00	112,387.02

TC168 TAX COLLECTOR MONTHLY REPORT INCLUDES AG ROLLBACK
FROM 02/01/2024 TO 02/29/2024

FISCAL START: 10/01/2023 END: 09/30/2024 JURISDICTION: 0412 RIVER PLANTATION MUD

	CERT TAXABLE VALUE	ADJUSTMENTS	ADJ TAX VALUE		TAX RATE	TAX LEVY	PAID ACCTS
CURRENT YEAR	200,831,428	21,988,594	222,820,022	0	00.650000	1,448,345.17	1,137

YEAR	TAXES DUE	MONTH ADJ	ADJUSTMENT YTD	LEVY PAID	PAID YTD	BALANCE	COLL %	YTD UNCOLL
2023	1,305,419.11	.00	142,926.06	109,510.31	1,314,840.33	133,504.84	90.78	0.00
2022	37,688.59	.00	913.12-	1,160.47	12,916.38	23,859.09	35.12	0.00
2021	7,260.07	.00	0.00	0.00	1,885.51	5,374.56	25.97	0.00
2020	4,311.66	.00	0.00	0.00	1,250.33	3,061.33	29.00	0.00
2019	2,559.29	.00	0.00	0.00	509.28	2,050.01	19.90	0.00
2018	2,211.85	.00	0.00	0.00	509.28	1,702.57	23.03	0.00
2017	1,556.87	.00	0.00	0.00	140.97	1,415.90	9.05	0.00
2016	1,136.95	.00	0.00	0.00	0.00	1,136.95		0.00
2015	662.76	.00	0.00	0.00	0.00	662.76		0.00
2014	304.19	.00	0.00	0.00	0.00	304.19		0.00
2013	282.53	17.60-	17.60-	0.00	0.00	264.93		0.00
2012	12.80	.00	0.00	0.00	0.00	12.80		0.00
2011	16.00	.00	0.00	0.00	0.00	16.00		0.00
2010	12.40	.00	0.00	0.00	0.00	12.40		0.00
2009	12.40	.00	0.00	0.00	0.00	12.40		0.00
2008	12.44	.00	0.00	0.00	0.00	12.44		0.00
2007	12.62	.00	0.00	0.00	0.00	12.62		0.00
2006	13.54	.00	0.00	0.00	0.00	13.54		0.00
2005	18.02	.00	0.00	0.00	0.00	18.02		0.00
2004	19.24	.00	0.00	0.00	0.00	19.24		0.00
2003	67.70	67.70-	67.70-	0.00	0.00	0.00		0.00
2002	0.00	.00	0.00	0.00	0.00	0.00		0.00
****	1,363,591.03	85.30-	141,927.64	110,670.78	1,332,052.08	173,466.59		0.00
CURR	1,305,419.11	.00	142,926.06	109,510.31	1,314,840.33	133,504.84		0.00
DELQ	58,171.92	85.30-	998.42-	1,160.47	17,211.75	39,961.75		0.00

RIVER PLANTATION MUNICIPAL UTILITY DISTRICT

RESOLUTION FOR ADOPTION OF ORDER
FOR DROUGHT CONTINGENCY PLAN

The board of directors of River Plantation Municipal Utility District ("District") met at its regular meeting place on March 28, 2024, with a quorum of directors present, as follows:

Julie Gilmer, President
Timothy Goodman, Vice President
Betty Brown, Secretary
Karl Sakocius, Assistant Secretary
Thomas Vandever, Treasurer

and the following absent:

None

when the following business was transacted:

The order set out below was introduced for consideration of the board. It was duly moved and seconded that said order be adopted; and, after due discussion, said motion carried by the following vote:

Ayes: All directors present.

Noes: None.

The order thus adopted is as follows:

Any order and amendments thereto, heretofore adopted by the board of directors, providing for a drought contingency plan for customers within the District, is hereby revoked upon the effective date of this order.

The order hereinafter set forth shall become effective on May 1, 2024.

ORDER ESTABLISHING DROUGHT CONTINGENCY PLAN
FOR
RIVER PLANTATION MUNICIPAL UTILITY DISTRICT

WHEREAS, the board of directors ("Board") of River Plantation Municipal Utility District ("District") owns a water and sewer system designed to serve present and future inhabitants within the District and recognizes that the amount of water available to the District and its water utility customers may be limited and subject to depletion during periods of extended drought;

WHEREAS, the Board recognizes that natural limitations due to drought conditions and other acts of God occur, and the District cannot guarantee an uninterrupted water supply for all purposes;

WHEREAS, Section 11.1272 of the Texas Water Code, as amended, and applicable rules of the Texas Commission on Environmental Quality require all public water supply systems in Texas, such as the District, to prepare a drought contingency plan;

WHEREAS, the San Jacinto River Authority has required the District to adopt a drought contingency plan that meets or exceeds the minimum requirements adopted by the San Jacinto River Authority; and

WHEREAS, as authorized under law, and in the best interests of the customers of the District, the Board deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies; therefore,

BE IT ORDERED BY THE BOARD OF DIRECTORS OF RIVER PLANTATION MUNICIPAL UTILITY DISTRICT THAT:

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the District hereby adopts the following regulations and restrictions on the delivery and consumption of water.

Water uses regulated or prohibited under this Drought Contingency Plan ("Plan") are considered to be non-essential water use and continuation of such uses during times of water shortage or other emergency water supply condition are deemed to constitute a waste of water which subjects the offender(s) to penalties as defined in Section XI of this Plan.

Section II: Public Involvement

Opportunity for the public to provide input into the preparation of the Plan was provided by the District by means of scheduling and providing public notice of a public meeting to accept input on the Plan.

Section III: Public Education

The District will periodically provide the public with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the Drought Response Measures to be implemented in each stage. This information will be provided by means of utility bill inserts, signs posted in the subdivision, or other method reasonably calculated to provide notice to District customers.

Section IV: Coordination with Regional Water Planning Groups

The service area of the District is located within the Texas Water Development Board Region H Regional Water Planning Group and the District has provided a copy of this Plan to the Region H Regional Water Planning Group. The District has a Groundwater Reduction Planning, Alternative Water Supply, and Related Goods and Services contract with San Jacinto River Authority ("SJRA") and has provided a copy of this Plan to them.

Section V: Authorization

The Board of Directors of the District or its designee is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The Board of Directors of the District or its designee shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of this Plan shall apply to all persons, customers, and property utilizing water provided by the District. The terms "person" and "customer" as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

Section VII: Definitions

For the purposes of this Plan, the following definitions shall apply:

Aesthetic water use: water use for ornamental, scenic or decorative purposes such as fountains, reflecting pools, and water gardens.

Commercial and institutional water use: water use which is integral to the operations of commercial and non-profit establishments and governmental entities such as retail establishments, hotels and motels, restaurants, and office buildings.

Conservation: those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.

Customer: any person, company, or organization using water supplied by the District.

Domestic water use: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.

Even numbered address: street addresses, box numbers, or rural postal route numbers ending in 0, 2, 4, 6, or 8 and locations without addresses.

Industrial water use: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.

Landscape irrigation use: water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, athletic fields, and rights-of-way and medians.

Non-essential water use: water uses that are not essential nor required for the protection of public, health, safety, and welfare, including:

(a) landscape irrigation use, except otherwise provided under this Plan;
(b) use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;
(c) use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
(d) use of water to wash down buildings or structures for purposes other than immediate fire protection;
(e) flushing gutters or permitting water to run or accumulate in any gutter or street;
(f) use of water to fill, refill, or add to any indoor or outdoor swimming pools or jacuzzi-type pools;
(g) use of water in a fountain or pond for aesthetic water use except where necessary to support aquatic life;
(h) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and
(i) use of water from hydrants for construction purposes or any other purposes other than firefighting.

Odd numbered address: street addresses, box numbers, or rural postal route numbers ending in 1, 3, 5, 7, or 9.

Section VIII: Trigger Conditions for Initiation and Termination of Drought Response Stages

The Board or its designee, shall monitor water supply and/or demand conditions on a regular basis and shall determine when conditions warrant initiation or termination of each stage of the Plan. Notwithstanding any of the Trigger Conditions described herein, upon receipt of a notice of a declaration of a state of disaster due to drought conditions pursuant to Sections 418.014 or 418.108 of the Texas Gov't Code, the District shall implement the appropriate stage of this Plan. Public notification of the initiation or termination of drought response stages shall be in accordance with Subsection (f).

The triggering conditions ("Trigger Conditions") described below are based on the District's anticipated ability to provide water to its customers based the District's historical experience of operations in drought conditions.

A. Stage 1 - Mild Drought Conditions

This condition (herein "Mild Drought Condition") exists when any of the following conditions exist: (1) demand on the District's water supply reaches or exceeds 70% of the production capacity of such facilities for five (5) consecutive days, as determined by the District's operator; (2) the SJRA Lake Conroe Division initiates Stage 1 of its Drought Contingency Plan; or (3) the General Manager or designated representative of SJRA designates Stage 1 of the GRP Division's Drought Contingency Plan due to water demands/weather forecasts or equipment, pipeline or sample failure.

B. Stage 2 - Moderate Drought Conditions

This condition (herein "Moderate Drought Condition") exists when any of the following conditions exist: (1) demand on the District's water supply reaches or exceeds 80% of the production capacity of such facilities for three (3) consecutive days, as determined by the District's operator; (2) the SJRA Lake Conroe Division initiates Stage 2 of its Drought Contingency Plan; or (3) the General Manager or designated representative of the SJRA designates Stage 2 of the GRP Division's Drought Contingency Plan due to water demands/weather forecasts or equipment, pipeline or sample failure.

C. Stage 3 - Advanced Drought Conditions

This condition (herein "Advanced Drought Condition") exists when any of the following conditions exists: (1) demand on the District's water supply reaches or exceeds 90% of the production capacity of such facilities for five (5) consecutive days, as determined by the District's operator; (2) the SJRA Lake Conroe Division initiates Stage 3 of its Drought Contingency Plan; or (3) the General Manager or designated representative of the SJRA designates Stage 3 of the GRP Division's Drought Contingency Plan due to water demands/weather forecasts or equipment, pipeline or sample failure.

D. **Stage 4 – Severe Drought Conditions**

This condition (herein "Severe Drought Condition") exists when any of the following conditions exist: (1) demand on the District's water supply reaches 100% of the production capacity of such facilities for five (5) consecutive days, as determined by the District's operator ; (2) the SJRA Lake Conroe Division initiates Stage 4 of its Drought Contingency Plan; or (3) the General Manager or designated representative of the SJRA designates Stage 4 of the GRP Division's Drought Contingency Plan due to water demands/weather forecasts or equipment, pipeline or sample failure.

E. **Stage 5 – Emergency Water Shortage Conditions**

This condition (herein "Emergency Water Shortage Condition") exists when any of the following exist:

1. The SJRA Lake Conroe initiates an Emergency Water Supply Condition under its Drought Contingency Plan;
2. The General Manager or designated representative of the SJRA designates an Emergency Water Supply Condition pursuant to the GRP Division's Drought Contingency Plan due to anticipation of a drought condition beyond historical level of severity, system failure in the GRP Division system, contamination, equipment, pipeline or sample failure, or other factors at the General Manager's discretion.
3. Major water line breaks or pump or system failures of the District or the SJRA GRP Division occur, which cause unprecedented loss of capability to provide water service;
4. Natural or man-made contamination of the water supply source(s) occurs; or
5. An emergency water supply condition has been enacted by another governmental official or agency with jurisdiction.

E. Notice

Once one of the Trigger Conditions has occurred, Customers will be notified that such Trigger Condition has occurred and of the Drought Response Measures (as defined below) to be taken. The process for notifying Customers may include any of the following:

1. Mailing, prior to the commencement of the required Drought Response Measures, a written notice to each Customer;
2. Posting of signs at the entrances to the District;
3. Posting of notices at public places in the District;
4. Placing door-hangers at all residences and places of commercial water use;
5. Dissemination of press releases to the local news media and/or
6. Other means as may be appropriate.

The Board of Directors or its designee shall notify directly the following individuals and entities:

Texas Water Development Board Region H Regional Water Planning Group;
Texas Commission on Environmental Quality (Stages 2 – 5 only);
Fire chief(s);

Homeowners or property owners association(s);
County Emergency Management Coordinator; and
Critical water users (hospitals, schools, etc.).

Any notice issued shall contain (i) the date the Drought Response Measures will begin, (ii) the date the Drought Response Measures will terminate, if known, (iii) a list or summary of Drought Response Measures to be implemented, and (iv) an explanation of penalties for violations of such Drought Response Measures.

Section IX: Drought Response Stages and Drought Response Measures

The Board of Directors of the District or its designee, shall monitor water supply and/or demand conditions on a regular basis and, in accordance with the Trigger Conditions set forth in Section VIII of the Plan, shall determine that a mild, moderate, advanced, severe, or emergency condition exists and shall implement the following actions upon prior notification to District customers:

A. Stage 1 - Mild Drought Condition Measures

Target: Achieve a voluntary 5% reduction in daily water demand.

1. Water Customers will be asked to voluntarily reduce water use and will be informed of specific steps that can be taken to reduce water use.
2. All non-essential water use shall be limited to even-numbered days for Customers with even-numbered addresses, and odd-numbered days for water Customers with odd-numbered addresses, and outdoor water use shall be prohibited between the hours of 10:00 a.m. and 9:00 p.m. In the event no street address exists, only Customers living on the north and west side of a street may use water outdoors on even-numbered days and only Customers on the south and east side of a street may use water outdoors on odd-numbered days.

B. Stage 2 - Moderate Drought Condition Measures

Target: Achieve a 5% reduction in daily water demand (October through March).
Achieve a 10% reduction in daily water demand (April through September).

1. The Drought Response Measures established for Mild Drought Conditions shall continue to be implemented on a mandatory basis.

C. Stage 3 - Advanced Drought Condition Measures

Target: Achieve a 10% reduction in daily water demand (October through March).
Achieve a 20% reduction in daily water demand (April through September).

1. All non-essential water use must be conducted with a hand-held hose with a manual on-off nozzle.
2. The District shall recommend that the following public waer uses not essential for public health and safety be curtailed:

(a) Street washing;
(b) Fire hydrant flushing; and
(c) Filling of swimming pools.

D. Stage 4 - Severe Drought Condition Measures

Target: Achieve a 15% reduction in daily water demand (October through March).
Achieve a 30% reduction in daily water demand (April through September).

1. All non-essential water use shall be prohibited.
2. A surcharge equal to 200% of the applicable rate for all water used in excess of 10,000 gallons/month shall be imposed on all Customers.
3. The Board of Directors may prohibit water use by certain industrial or commercial Customers which water uses are not essential to the health and safety of the community so that remaining water is available for essential health and safety related uses.

E. Stage 5 – Emergency Water Shortage Conditions

See Section X of this Plan

F. Termination of Trigger Conditions Notification.

When a Trigger Condition based upon demand on the District's water supply occurs the District shall enforce the Drought Response Measures applicable to such Trigger Condition for a minimum of five (5) days after the last day the demand on the District's water supply facilities reaches or exceeds the limits of such Trigger Condition. After such five (5) day period, the Drought Response Measures prescribed may, in the discretion of the Board or its designee, be continued for an additional five (5) day period. After the expiration of ten (10) days, and assuming no other Trigger Conditions have occurred, the Drought Response Measures prescribed shall terminate and the District shall cease implementation and enforcement of such measures.

When a Trigger Condition occurs due to an Emergency Water Shortage Condition or due to receipt of notification by a third party, such as the SJRA Lake Conroe Division, the SJRA GRP Division, or other governmental entity with jurisdiction, the District shall enforce the Drought Response Measure applicable to the Trigger Condition until the emergency is over or until receipt of notification from the third party that restrictions have been lifted.

The District will notify Customers of the termination of the particular Drought Response Measures and may utilize the same manner of notification used to inform Customers of the occurrence of the Trigger Condition and implementation of the Drought Response Measures.

Section X: Emergency Contingency Plan

In the event of Stage 5 Water Shortage Conditions or a fire, flood, hurricane, lightning strike, tornado, windstorm, or any other act of God, riot, terrorist act, or any other act of civil disobedience, or any other similar occurrence which results in the inability of the District to provide potable water to Customers (or the likelihood thereof), the Board, in its discretion, may, without prior notice, invoke all of any of the Drought Response Measures set forth in this Plan as "Emergency Response Measures." The Board may establish any of the penalties set forth in Section XI for violations of the Emergency Response Measures.

Section XI: Enforcement

The following penalties shall apply to any person, entity or customer violating the terms of this Plan or the Drought Response Measures or Emergency Response Measures adopted pursuant hereto:

A. **<u>First Violation.</u>** Any person, entity or customer who violates this Plan shall receive written notification of such violation, which notice shall set forth (i) the date of the violation, (ii) the nature of the violation, (iii) the Drought Response Measures then in effect, and (iv) the penalties applicable for any further violations of this Plan; provided, however, that if such person, entity or customer has ever previously violated this Plan, the penalties set forth in Section B below, may, in the discretion of the Board, be imposed.

B. **<u>Subsequent Violations.</u>**

1. <u>Disconnection for Noncompliance.</u> If any person, entity or customer violates any provision of this Plan more than one time (which violation shall constitute an unauthorized use of District services and/or facilities), then in addition to any other remedies, penalties, sanctions and enforcement procedures provided for herein, the District shall have the right to terminate water service to such person, entity or customer after notice and any other procedural requirements in the District's rate order are satisfied.

2. <u>Monetary Penalties for Noncompliance.</u> If any person, entity or customer violates any provision of this Plan more than one time (which violation shall constitute an unauthorized use of District services and/or facilities), then, in addition to disconnection as provided in Subsection B1 of this Section, the Board of the District, after providing any legally required notice, may impose a penalty of up to the maximum amount permitted under Texas Water Code Ch. 49.004 for each violation of this Plan. Each day that a breach of any provision of this Plan continues shall be considered a separate violation. This penalty shall be in addition to any other legal rights and remedies of the District as may be allowed by law.

Section XII: Variances

The Board of Directors or its designee may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, or fire protection for the public or the person requesting such variance and if one or more of the following conditions are met:

(a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.

(b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Plan shall file a petition for variance with the District. All petitions for variances shall be reviewed by the Board of Directors or its designee and shall include the following:

(a) Name and address of the petitioner(s).
(b) Purpose of water use.
(c) Specific provision(s) of the Plan from which the petitioner is requesting relief.
(d) Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Plan.
(e) Description of the relief requested.
(f) Period of time for which the variance is sought.
(g) Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
(h) Other pertinent information.

Variances granted by the Board of Directors shall be subject to the following conditions, unless waived or modified by the Board of Directors or its designee:

(a) Variances granted shall include a timetable for compliance.
(b) Variances granted shall expire when the Plan is no longer in effect unless the petitioner has failed to meet specified requirements.

No variance shall justify any violation of this Plan occurring prior to the issuance of the variance.

Section XIII: Severability

It is hereby declared to be the intention of the Board of Directors that the sections, paragraphs, sentences, clauses, and phrases of this Plan are severable and, if any phrase, clause, sentence, paragraph, or section of this Plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by the Board of Directors without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.

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The President or Vice President is authorized to execute, and the Secretary or Assistant Secretary is authorized to attest this Order on behalf of the Board of Directors of the District.

JULIE GILMER

____

President

ATTEST:

BETTY BROWN

Secretary

I, the undersigned secretary of the board of directors of River Plantation Municipal Utility District, hereby certify that the foregoing is a true and correct copy of the order amending a drought contingency plan, adopted by said board at its regular meeting of March 28, 2024, together with excerpts from the minutes of said board's meeting on that date showing the adoption of said order, as same appear of record in the official minutes of the board, on file in the District's office.

I further certify that said meeting was open to the public, and that notice thereof was posted in compliance with the provisions of Tex. Gov't. Code Ann. § 551.001 et seq.

Witness my hand and the official seal of said District this March 28, 2024.

____
Secretary

RIVER PLANTATION MUNICIPAL UTILITY DISTRICT OF MONTGOMERY COUNTY TEXAS

RIVER PLANTATION MUNICIPAL UTILITY DISTRICT

ORDER ADOPTING WATER CONSERVATION PLAN; PROVIDING FOR IMPLEMENTATION AND ENFORCEMENT THEREOF; AND CONTAINING OTHER PROVISIONS RELATED TO THE SUBJECT

The Board of Directors ("Board") of River Plantation Municipal Utility District ("District") met at the Board's regular meeting place on March 28, 2024, with a quorum of Directors present, as follows:

Julie Gilmer, President
Timothy Goodman, Vice President
Betty Brown, Secretary
Karl Sakocius, Assistant Secretary
Thomas Vandever, Treasurer

and the following absent:

None

when the following business was transacted:

The order set out below was introduced and considered by the Board. It was then moved, seconded and unanimously carried that the following order be adopted:

WHEREAS, water conservation includes those practices, techniques and technologies that reduce the consumption of water, reduce the loss or waste of water, improve efficiency in the use of water, or increase recycling and reuse of water so that a water supply is made available for future or alternative uses;

WHEREAS, the District has previously adopted a Water Conservation Plan which is required to be reviewed and updated at regular intervals;

WHEREAS, the District desires to comply with the Texas Water Code and applicable rules of the Texas Commission on Environmental Quality;

WHEREAS, as authorized under law, and in the best interests of the customers of the District, the Board deems it expedient and necessary to establish certain rules and policies for the conservation of water;

WHEREAS, the Board of Directors of River Plantation Municipal Utility District has carefully considered the current water conditions in the District and area-wide and has determined that the adoption of this Water Conservation Plan (the "Plan") by the District is necessary to ensure that an adequate supply of water is maintained; and

WHEREAS, the Board of Directors of the District desires to evidence its approval of this Plan and to adopt such Plan as the official policy of the District;

NOW, THEREFORE, BE IT ORDERED BY THE BOARD OF DIRECTORS OF RIVER PLANTATION MUNICIPAL UTILITY DISTRICT THAT:

<u>Section 1.</u> <u>Approval of the Plan</u>. The Board of Directors of the District hereby approves and adopts this Plan as set forth in this Order, and the provisions of such Plan shall be implemented immediately and enforced as rules of the District.

<u>Section 2.</u> <u>Declaration of Policy, Purpose and Intent</u>. The purpose of the Plan is to promote the efficient and responsible use of water by (1) implementing structural programs that result in quantifiable water conservation results, (2) developing, maintaining and enforcing water conservation policies, (3) adhering to all applicable rules of the Texas Commission on Environmental Quality and/or the Texas Water Development Board and (4) supporting public education programs that educate customers about water and wastewater facilities operations, water quantity and quality, water conservation and non-point source protection.

<u>Section 3.</u> <u>Service Area</u>. The District's Utility Profile includes data on the District's service area, including population and customer data, water use data, water supply system data and

wastewater data. The District's operator will make any necessary updates to the District's Utility Profile and will submit the updated Utility Profile to the Texas Water Development Board's online portal by May 1, 2024. The District will instruct the District's operator to make any necessary updates to the District's Utility Profile at least once every five years.

Section 4. Five-year and Ten-year Targets. The District shall use reasonable efforts to reduce water loss and municipal use of water. In doing so, the District has identified the following goals for water savings:

A. Five-year Target: Within five (5) years of the date hereof, the District shall attempt to reduce the average daily municipal use of water in the District's service area by 10 gallons per day ("gpd") per connection and to keep the unaccounted water in the system below 10% annually.

B. Ten-year Target: Within ten (10) years of the date hereof, the District shall attempt to reduce the average municipal use of water in the District's service area by 40 gpd per connection and to keep the unaccounted water in the system below 10% annually.

C. Require customers to limit landscape irrigation during summer months (May through September) to early mornings or late evenings to reduce evaporation from sprinkler heads that causes water waste.

Notwithstanding the targets identified above, the District shall not be obligated to achieve any water savings in its service area, and the District's failure to do so shall not subject the District to any liability whatsoever.

Section 5. Metering Devices. The District will implement a plan of universal metering of all water delivered by the District, and all such metering devices will be calibrated regularly to ensure reasonable accuracy and replaced as needed.

Section 6. Unaccounted Water Usage. The District authorizes the District's operator to implement any reasonable program to determine unaccounted uses of water and to make recommendations to the District regarding measures to control such unaccounted uses of water. Such measures may include periodic visual inspections along distribution lines, annual or monthly audits of the water system to determine illegal connections, and investigation of abandoned service connections. The District's operator shall also establish a program of leak detection, repair, and water loss accounting for the water storage, delivery and distribution system in order to control unaccounted uses of water.

Section 7. Continuing Public Education and Information. The District hereby institutes an educational program, to be implemented immediately, to promote the Plan by the general public which may include any of the following:

A. Publications of articles in a newspaper or newsletter of general circulation in the District's service area, providing information regarding water conservation;

B. Direct distributions to all customers of the District of educational and informational material regarding water conservation; and

C. Additional educational activities consisting of: (i) conducting an informational school program in a school attended by students within the District's service area, or (ii) conducting an educational program for Users at a public place within or accessible to residents within the service area of the District, or (iii) conducting or engaging in such other informational or educational activity designed to further water conservation measures as, in the discretion of the Board of Directors, may be consistent with the purposes and policies of this Plan, or (iv) any combination of the foregoing.

Section 8. Cost-based Rate Structure. The District hereby acknowledges that it has adopted an increasing block water rate structure, as reflected in its Order for Adoption of Schedule of Water and Sewer Fees and Rates adopted September 7, 2023, 2024 (attached hereto as Appendix "A"), that is intended to encourage water conservation and discourage excessive use and waste of water.

Section 9. Reservoir Systems Operations Plan. The District does not own any reservoirs within a common watershed or river basin and is not required to establish a reservoir systems operation plan.

Section 10. Implementation and Enforcement. Without limitation to specific actions stated in this Plan to be taken by the District's operator, the District's operator will administer and enforce this Plan, and will oversee and be responsible for the execution and implementation of all elements of this Plan. The operator shall report to the Board of the District, at meetings of the Board, regarding actions taken and actions that need to be taken under this Plan.

Section 11. Record Management. The District authorizes the District's operator and/or general manager to establish a record management system to record water pumped, water delivery, water sales, and water losses, and which allows for the segregation of water sales and uses into residential, commercial, public and institutional, industrial, agricultural, and wholesale user classes.

Section 12. Wholesale Water Customers. The District shall require that each successive wholesale customer develop and implement a water conservation plan or water conservation measures in compliance with all applicable rules of the Texas Commission on Environmental Quality. This requirement will also extend to each successive wholesale customer in the resale of water.

Section 13. Five-year Review. The District shall review and update the Plan every five years, or more frequently, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information.

Section 14. Coordination with Regional Water Planning Group. The service area of the District is located within the Region H Regional Water Planning Group of the Texas Water Development Board, and the District has provided or will provide a copy of this water conservation plan to the San Jacinto River Authority.

Section 15. Effective Date. This Order shall become effective on May 1, 2024 and as further provided herein.

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Passed, ordered and approved, this March 28, 2024.

President

ATTEST:

Secretary

Appendix “A”
[Excerpt of the District’s Order for Adoption of Schedule of
Water and Sewer Fees and Rates Adopted September 7, 2023]

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Section 4.1 Monthly rates for water service	Residential Consumers First 3,000 gallons of water used 3,001 to 10,000 gallons 10,001 to 20,000 gallons 20,001 to 30,000 gallons 30,001 to 40,000 gallons 40,001 to 50,000 gallons over 50,001 gallons Monthly Fee for additional tap (e.g. sprinklers, swimming pools, etc.) Monthly fee for swimming pool backwash or overfill line Apartments Commercial Consumers and Nontaxable Entities	Minimum $15.00 for 3/4” meter $19.50 for 1” meter $25.35 for 1 ½”” meter $30.85 for 2” meter $3.35/1,000 gallons $3.70/1,000 gallons $4.18/1,000 gallons $4.70/1,000 gallons $5.59/1,000 gallons $7.06/1,000 gallons $9.80 $21.00 Same rates as Residential Consumers Same rates as Residential Consumers

I, the undersigned Secretary of the board of directors of River Plantation Municipal Utility District, hereby certify that the foregoing is a true and correct copy of the order adopting water conservation plan and minute entry showing its adoption at the Board's regular meeting held on March 28, 2024, the originals of which order and minute entry are on file in the minute book of the Board in the District's office.

I further certify that said meeting was open to the public and that notice thereof was posted in compliance with the provisions of Tex. Gov't. Code Ann. § 551.001 et seq.

Witness my hand and the seal of said District, this March 28, 2024.

____

Secretary

RIVER PLANTATION MUNICIPAL UTILITY DISTRICT

Resolution to Adopt the Verity Voting 2.5 System

At a meeting of the board of directors (the "Board") of River Plantation Municipal Utility District (the "District") held on March 28, 2024, at which a quorum of said Board was present, as follows:

Julie Gilmer, President
Timothy Goodman, Vice President
Betty Brown, Secretary
Karl Sakocius, Assistant Secretary
Thomas Vandever, Treasurer

and the following absent:

None

the following business was transacted:

It was duly moved, seconded and unanimously carried that the resolution set out below be passed and adopted, all directors present voting "aye" and no one voting "no." The resolution thus adopted is as follows:

WHEREAS, the Verity Voting 2.5 system by Hart InterCivic Inc. is an updated version of the Verity Voting 2.4 system, which the Office of the Texas Secretary of State certified in June 2020 for use in Texas elections. The updated version includes enhancements to the existing hardware and software components of the Verity voting system; and

WHEREAS, Section 123.035 of the Texas Election Code requires that use of new voting equipment must be approved by the Elections Division of the office of the Texas Secretary of State; and

WHEREAS, the Texas Secretary of State certified the Verity Voting 2.5 system for use in Texas elections as described in correspondence dated October 28, 2021; and

WHEREAS, the Montgomery County Office of Elections Administration has purchased the new ADA-compliant Verity Voting 2.5 system to be used for early and regular election day voting by Montgomery County for the May 4, 2024 election and all subsequent elections; and

WHEREAS, River Plantation Municipal Utility District will use Montgomery County's Verity Voting 2.5 system and pursuant to Section 123.001 (b) of the Texas Election Code must formally adopt said voting system.

NOW, THEREFORE, be it resolved by the Board of Directors of River Plantation Municipal Utility District that:

River Plantation Municipal Utility District does hereby adopt the Verity Voting 2.5 system, as certified by the State of Texas, to be used for early and regular election day voting by Montgomery County for the May 4, 2024 election and all subsequent elections.

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Passed, approved and adopted by the Board of Directors of River Plantation Municipal Utility District on this March 28, 2024.

JULIE GILMER

President

ATTEST:

BETTY BROWN

Secretary

I, the undersigned secretary of the board of directors of River Plantation Municipal Utility District, hereby certify that the foregoing is a true and correct copy of the Resolution to Adopt the Verity Voting 2.5 system adopted by said Board at its regular meeting on March 28, 2024, and a minute entry of that date showing the adoption thereof, the original of which resolution appears in the minute book of said Board, on file in an office and meeting place of the District.

I further certify that said meeting was open to the public, and that notice was given in compliance with the provisions of Tex. Gov't. Code Ann. § 551.001 et seq. as adopted.

Witness my hand and the official seal of said District, on this March 28, 2024.

____

Secretary

RIVER PLANTATION MUNICIPAL UTILITY DISTRICT

Order Adopting Rules and Regulations for District Parks, Recreational Areas
and District Property, Facilities, Easements and Rights-of-Way

On March 28, 2024, the Board of Directors ("Board") of River Plantation Municipal Utility District ("District") met at its regular meeting place, with a quorum of directors present, as follows:

Julie Gilmer, President
Timothy Goodman, Vice President
Betty Brown, Secretary
Karl Sakocius, Assistant Secretary
Thomas Vandever, Treasurer

and the following were absent:

None

when the following business was transacted:

The order set out below was introduced for the Board's consideration. It was duly moved and seconded that said order be adopted, and after due discussion, said motion carried by the following vote:

Ayes: All directors present

Noes: None

The order thus adopted is as follows:

The order hereinafter set forth shall become effective on March 28, 2024.

RIVER PLANTATION MUNICIPAL UTILITY DISTRICT

**RULES AND REGULATIONS FOR
DISTRICT PARKS, LAKES, RECREATIONAL AREAS AND
DISTRICT PROPERTY, FACILITIES, EASEMENTS AND RIGHTS-OF-WAY**

MISSION STATEMENT

In pursuit of an enhanced quality of life through a greater opportunity for recreational activity, River Plantation Municipal Utility District seeks to develop and maintain versatile parks and recreational facilities for its residents and further seeks to preserve the health and well-being of its residents.

RULES

Section 1: AUTHORITY. These rules and regulations ("Rules") have been adopted under the authority of Section 54.205 of the Texas Water Code and previous orders of the Board of Directors of River Plantation Municipal Utility District.

Section 2: ADMINISTRATION. The Board of Directors of River Plantation Municipal Utility District, along with the Montgomery County Sheriff, the Montgomery County Precinct 2 Constable and their respective deputies, shall enforce these Rules.

Section 3: AREA COVERED. These Rules apply to all existing and future parks and recreational facilities of the District, including the property comprising the former Charleston course, and related areas developed and maintained pursuant to the Texas Water Code, together with such additional land as may be designated as parks and recreational facilities by the District, and to all District property, facilities, easements and rights-of-way.

Section 4: DEFINITIONS. As used in these Rules:

a. "Alcoholic Beverage" means any beverage containing more than one-half of one percent (.5%) of alcohol by volume, which is suitable for use as a beverage, either alone or diluted;

b. "Board" means the Board of Directors of River Plantation Municipal Utility District;

c. "Cart Paths" means the asphalt or concrete paths approximately five feet in width within the Recreational Facilities and constructed for the purpose of the operation of a Golf Cart.

d. "County" means Montgomery County, Texas;

e. "District" means River Plantation Municipal Utility District;

f. "District Property" means any water plant site, wastewater treatment plant site, lift station site, detention pond, drainage facility, easement or right-of-way owned or used by the District in performing its responsibilities as a Texas municipal utility district, including facilities and improvements located thereon;

g. “Explosives” means any chemical compound or mixture that is commonly used or intended for the purpose of producing an explosion;

h. “Golf Cart” means a small motorized vehicle designed for the purpose of transporting golfers and their golf equipment with a dry weight of less than 1,000 pounds.

i. “Parks” means all existing and future park and recreational facilities of the District, including the property comprising the former Charleston course, and related areas and developed and maintained pursuant to the Texas Water Code, together with such additional land as may be designated as parks and recreational facilities by the District;

j. “Peace Officers” means sheriffs and their deputies, constables and deputy constables, and all other peace officers as defined in Article 2.12 of the Texas Code of Criminal Procedure, as amended;

k. “Pet” means a domesticated animal kept for pleasure rather than utility;

l. “Recreational Areas” means any Parks or other areas, whether within or outside the District’s boundaries, that have been designated by the District for recreational use by residents of the District and the public;

m. “Road” means any road maintained or controlled by the County or other entity for the public passage of vehicles;

n. “Special Event” means an organized activity intended for more than twenty five (25) persons to share a common purpose as a group;

o. “Vehicle” means every motor-driven device in, upon, or by which any person or property is or may transported or drawn upon a road except devices moved by human power;

p. “Weapon” means a rifle, handgun, pistol, bow and arrow, shotgun, gas gun or gas pistol, BB gun or BB pistol, pellet gun or pellet pistol, sling or sling shot; and

q. “Wildlife” means living things that are neither human nor domesticated.

Section 5: HOURS OPEN. Unless otherwise posted, the Recreational Areas shall be open from sunrise to sundown. No person shall enter into or remain within the Recreational Areas at any other time without prior written approval of the Board.

Section 6: MOTORIZED VEHICLES AND GOLF CARTS.

a. No person shall operate a Vehicle, other than a Golf Cart in the manner permitted herein, within the Recreational Areas or District Property except on any Road or associated parking lots. Operation of a Vehicle on the shoulder of a Road will be limited to driving thereon for the purpose of parking on the shoulder of the Road or driving a parked Vehicle from the shoulder of the Road to the paved portion of the Road. This provision does not apply to any Vehicle making deliveries of material, supplies and equipment purchased or rented by the District;

b. No person shall operate or cause or participate in the operation of a Vehicle other than a Golf Cart on a Cart Path within the Recreational Facilities other than on a designated Road or within designated Parking Areas.

c. No person shall operate or cause or participate in the operation of a Vehicle including a Golf Cart at a speed in excess of ten (10) miles per hour.

d. No person shall operate or cause or participate in the operation of a Vehicle including a Golf Cart in a manner which causes damage to District facilities or improvements.

e. No person shall operate or cause or participate in the operation of a Vehicle including a Golf Cart in a manner which is unsafe, reckless, or may cause harm to themselves or to others who are present on District property.

f. No person shall cause a Vehicle to be parked within the Recreational Areas except in a designated parking area. Vehicles parked on the shoulder of a Road in designated areas must be parked parallel to the Road. This provision does not apply to any Vehicle making deliveries of materials, supplies and equipment purchased or rented by the District; and

g. No person shall cause a Vehicle to remain within the Recreational Areas after hours unless one of the officers named in Section 2 above is notified; provided, however, that in no event shall any person cause a Vehicle to remain within the Recreational Areas in excess of twenty-four (24) hours at any given time. Vehicles remaining within the Recreational Areas for which notification has not been received will be towed and placed in storage by Peace Officers at the owner's expense.

h. No person shall operate a Vehicle including a Golf Cart within the Recreational Facilities who does not hold a valid driver's license, or learner's permit if accompanied by a licensed driver at least twenty-one (21) years of age.

i. The operation of a Golf Cart is permitted within the Recreational Facilities on Cart Paths only. Operation of a Golf Cart outside of the Cart Paths is prohibited. The operation of a Golf Cart within the Recreational Facilities is subject to all rules and regulations herein, including but not limited to Section 6 (a)-(h).

Section 7: GOLFING. No person shall play golf or otherwise strike a golf ball with a golf club within the Recreational Areas.

Section 8: WILDLIFE. No person shall willfully feed, harm, harass, trap, confine, catch, or possess any Wildlife within the Recreational Areas.

Section 9: PLANT LIFE. No person shall willfully destroy or remove any tree, shrub, vine, wildflower, grass, fern, moss, leaves, cones, or dead or downed wood within the Recreational Areas except with prior written approval of the Board.

Section 10: FIRES. No person may light, build or maintain a fire within the Recreational Areas other than within a camp stove and/or barbecue pit. If a burn ban has been enacted by the District, fire is prohibited in all areas.

Section 11: SMOKING. No person shall light, burn or smoke any cigar, pipe, cigarette, electronic cigarette (e-cigarette) or other device used for smoking or delivering tobacco or nicotine or any other legal substance within the Recreational Areas.

Section 12: WEAPONS. No person other than a Peace Officer or a person duly licensed by the State of Texas may carry or possess a weapon within the Recreational Areas. The unlawful possession or discharge of weapons within the Recreational Areas is prohibited.

Section 13: EXPLOSIVES. No person may possess gun powder or other combustibles, explosives or fireworks within the Recreational Areas. Provided, however, that this provision does not apply to gasoline and other petroleum products in fuel tanks of Vehicles or to petroleum products intended to be used as fuel for cooking.

Section 14: ANIMALS. No person may bring into or possess in the Recreational Areas any Pet or other animal other than a dog or domestic cat, except in areas clearly marked "off-leash." Any person bringing a dog or domestic cat into the Recreational Areas shall keep such dog or domestic cat confined to a vehicle or secured by a leash not exceeding fifteen (15) feet in length. Each person who brings a Pet or other animal of any kind into the Recreational Areas is responsible for the prompt clean up and disposal of any Pet or animal waste in an appropriate trash receptacle.

Section 15: GLASS BEVERAGE CONTAINERS. No person shall use any glass beverage containers in the Recreational Areas. This provision shall not apply to baby bottles, baby food jars, glass lined thermos bottles and glass lined picnic beverage coolers.

Section 16: ALCOHOLIC BEVERAGES. No person shall consume an Alcoholic Beverage in the Recreational Areas.

Section 17: USE OF LOUDSPEAKERS. No person shall use any loudspeaker, public address system or amplifier within the Recreational Areas without prior written permission from the Board.

Section 18: DUMPING AND LITTERING. All persons shall dispose of trash associated with use of the Recreational Areas in an appropriate trash receptacle. No person shall bring into the Recreational Areas or District Property any trash, refuse or waste material. Disposal of household or commercial waste, trash or refuse using any of the District's trash receptacles is prohibited.

Section 19: ADVERTISING. No person shall place, erect or attach any structure, sign, bulletin board, post, pole or advertising device of any kind whatsoever, or attach any notice, bill, poster, sign, wire, rod or cord to any tree, shrub, fence, railing, post or structure, in the Recreational Areas.

Section 20: SOLICITING AND SALES. No person shall solicit funds or donations, or sell or offer to sell services or goods or distribute circulars in the Recreational Areas. This rule does not apply to the following:

a. Persons soliciting donations or conducting fund-raising events for and on behalf of non-profit organizations who have secured prior written permission from the Board;

b. Concessionaires and persons employed by concessionaires when selling goods or services, or charging for amusements, pursuant to written authority of the Board; and

c. Fees, including reasonable security deposits, for the use of specific Recreational Areas as may be established by the Board from time to time.

Section 21: CAMPING. No person shall engage in overnight camping in the Recreational Areas except with prior written approval of the Board.

Section 22: SUPERVISION OF CHILDREN. Children under 13 years of age must be supervised by an adult at all times.

Section 23: NUISANCE: No person shall use profanity or vulgar language within the Recreational Areas. No person shall use any threatening, abusive, or insulting language or language otherwise constituting "fighting words." No person shall commit any obscene, lewd or indecent act or create a nuisance of any kind. No person shall disturb in any manner any picnic, meeting, service, concert, exercise or exhibition.

Section 24: SPECIAL EVENTS. No person or organization shall solicit for, hold or sponsor a Special Event in the Recreational Areas without submitting a completed Application for Use for Special Event form and the prior written permission of the Board, who may require the providing of liability insurance in the amounts of $100,000 for each person, $300,000 for each single occurrence for bodily injury or death and $100,000 for each single occurrence for injury to or destruction of property, naming the District as insured, and the furnishing of one or more Peace Officers. The opinion of the Board as to whether or not insurance will be required and as to the required number of Peace Officers shall be final and binding.

Section 25: EMERGENCY BURN BAN. The Board may, at its sole discretion, find and determine that drought conditions exist in the District, or in the vicinity of the District, and that such drought conditions create an elevated danger of fire in the Recreational Areas or District Property that constitutes a hazard to public health and safety and an emergency.

After making such findings, the Board may impose a temporary emergency burn ban to prohibit charcoal fires, open fires, fireworks, outdoor use of inflammable materials and other conduct that could result in a fire, such burn ban to be applicable to and effective on all Recreational Areas and District Property.

Imposition of a burn ban by the Board shall have the effect of an immediate, temporary suspension of any and all authority for fires, fireworks and use of combustible materials as provided in Sections 10, 11 and 13 of these Rules until termination of the burn ban by the Board.

Notice of a District emergency burn ban shall be provided by signs, flyers, public service announcements and any other means necessary to call public attention to the burn ban, the conditions that constitute an emergency, and penalties that may result from violations of the burn ban. Notice of termination of a burn ban shall be provided by the same means.

Section 26: VIOLATIONS; REWARDS. No person shall use any portion of the Recreational Areas or District Property for any purpose other than the purpose for which it was designed or designated. The District will pay a reward of up to $1,000 for information leading to the arrest of persons responsible for vandalism or destruction of any portion of the Recreational Areas or District Property.

Section 27: PENALTIES. Compliance with these Rules and state and federal law is a condition of the use of the Recreational Areas. Pursuant to the authority granted by Sections 49.004 and 54.205 of the Texas Water Code, as amended, the Board may seek reasonable penalties for the failure of any person to comply with these Rules and laws, which penalties shall not exceed the jurisdiction of a justice court as provided in Section 27.031 of the Texas Government Code, as amended, currently up to $20,000.00. Such penalties may be sought for each violation of these Rules and for each day of a continuing violation and shall be in addition to any other penalties provided by state or federal law and may be enforced by complaints filed in the appropriate court of jurisdiction in the County. In any suit to enforce these Rules, the District shall seek to recover reasonable fees for attorneys and expert witnesses and other costs incurred by the District. The Board may adopt a schedule of penalties solely for its own use and guidance in levying penalties prescribed herein.

Section 28: SANCTIONS. Compliance with these Rules and state and federal laws is a condition to the use of the Recreational Areas.

a. The authorities designated in Section 2 above to enforce these Rules are hereby authorized to notify any person who fails or refuses to comply with these Rules or applicable state or federal laws to depart from the Recreational Areas.

b. Any person who fails to depart upon such notification shall be subject to prosecution under Section 30.05 of the Texas Penal Code for criminal trespass, in addition to other punishment or prosecution for any other crime.

c. A person who fails to comply with these Rules is subject to civil penalties of currently up to $20,000, for each violation and for each day of a continuing violation, together with attorneys' fees, expert witness fees and costs, as provided in Section 49.004 of the Texas Water Code, as amended. These penalties shall be in addition to any other penalties provided by state or federal law and may be enforced by complaints filed in the appropriate court of jurisdiction in the County.

d. In the event of a violation of these Rules, a violation notice shall be issued to the person responsible for the violation, and the Board shall conduct a hearing on the violation and imposition of a penalty.

e. Any person witnessing any concerning action or discovery of any concerning situation should immediately notify a District constable or any other Peace Officers on duty, the District's General Manager or a member of the Board.

Section 29: APPLICABILITY AND WAIVER. The Board may, at its sole discretion, waive any portion of the Rules, for any reason, including but not limited to as necessary to perform District functions including for work being performed on behalf of the District by employees, contractors, or subcontractors of the District.

Section 30: EFFECT ON EXISTING LAW. These Rules are in addition to, and not in lieu of, all state and federal laws and other rules and regulations applicable within the Recreational Areas and District Property.

Section 31: SEVERABILITY. The provisions of these Rules are severable. If any word, phrase, clause, sentence, section, provision or part of these Rules should be held invalid or unconstitutional, it shall not affect the validity of the remaining provisions, and it is hereby declared to be the intent of the Board that these Rules would have been adopted as to the remaining portions, regardless of the invalidity of any part.

Section 32: AMENDMENTS. These Rules may be reviewed and amended from time to time by the Board.

Section 33: POSTING: A summary of these Rules shall be conspicuously posted at or near the entrances to the Recreational Areas, and a copy or an excerpt of these Rules shall be provided to any person who requests a copy and to any person who submits an Application for Use for Special Event of the Recreational Areas.

Section 34: EFFECTIVE DATE: These Rules shall become effective and enforceable five days after the first publication of the notice of adoption or any amendment of these Rules, as provided in Sections 54.207 and 54.208 of the Texas Water Code.

The President or any Vice President is authorized to execute and the Secretary or Assistant Secretary is authorized to attest this order on behalf of the Board and the District.

Passed and adopted this 28th day of March, 2024.

JULIE GILMER

____

President

ATTEST:

BETTY BROWN

____

Secretary

I, the undersigned secretary of the Board of Directors of River Plantation Municipal Utility District, hereby certify that the foregoing is a true and correct copy of the Order Adopting Rules and Regulations for District Parks, Recreational Areas and District Property, Facilities, Easements and Rights-of-Way adopted by said Board at its meeting of March 28, 2024, and a minute entry of that date showing the adoption thereof, the original of which resolution appears in the minute book of said Board, on file in the District's office.

I further certify that said meeting was open to the public, and that notice thereof was posted in compliance with the provisions of Tex. Gov't. Code Ann. § 551.001 et seq.

Witness my hand and seal of said District this 28th day of March, 2024.

____

Secretary

MOC | Municipal Operations & Consulting, Inc.

MONTHLY OPERATIONS REPORT FOR RIVER PLANTATION MUD

February, 2024

Connections: 977
Vacant: 11

REVENUE:	Water	LSGCD	Sewer	TCEQ	Taps	Deposits	Penalty	Misc.	TOTAL
	$ 21,112.14	$ 465.58	$ 33,116.32	$ 274.59	$ -	$ 1,150.00	$ 794.66	$ 6,121.48	$ 63,034.77

BILLED CONS:	Residential	Builder/Temp	Multi Family	Irrigation	STP/LS	Commercial	Total
	5,798,000	0	0	58,000	60,000	44,000	5,960,000

WATER:	01/18/24 - 02/19/24		LSGCD - Well Permit	
Gallons pumped from Well No.2	4,672,000		Permit Expires:	12/31/2024
Gallons pumped from Well No.3	1,978,000		Permitted Authorization:	225,868,339
Total Pumpage	6,650,000		February Withdrawal:	6,289,000
Total Gallons Billed	5,960,000		Y-T-D Withdrawal:	13,145,000
Leaks, Construction, Flushing	200,000		Amount Remaining:	212,723,339
Pumped vs. Billed	90%			
Pumped vs. Accounted	93%			
Leaks repaired in District	3			
Bacteriological samples:	6	Good		

WASTEWATER TREATMENT PLANT

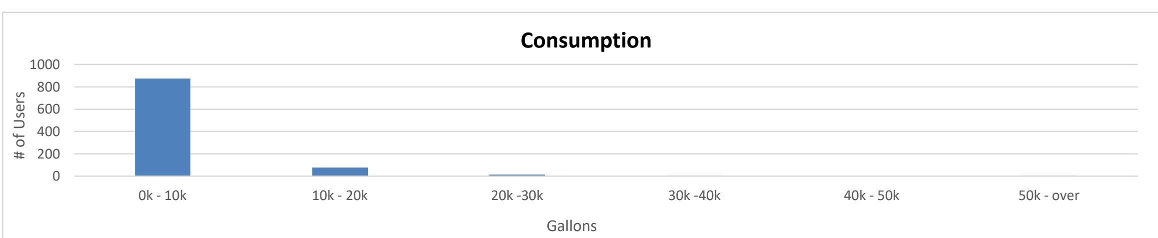
T.C.E.Q. Permit Number: WQ0010978001
Permit expiration date: January 2, 2029

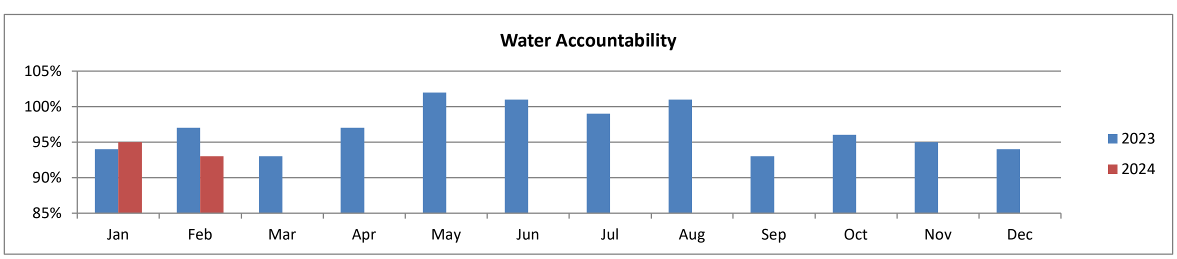
	February, 2024			Measured by:
Average daily flow	407,000	Permitted Daily Flow	600,000	gal.per day
Average CBOD	2.10	Permitted CBOD	10	mg/l
Average Total Suspended Solids	1.43	Permitted T.S.S.	15	mg/l
Average Ammonia Nitrogen	0.85	Permitted Ammonia Nitrogen	3	mg/l
Average PH	7.29	Permitted PH	6.00 - 9.00	STD UNIT
Average Dissolved Oxygen	9.09	Permitted Dissolved Oxygen (Min.)	6.0	mg/l
Maximum Chlorine Residual	3.89	Permitted Chlorine Maximum	4.0	mg/l
Minimum Chlorine Residual	1.59	Permitted Chlorine Minimum	1.0	mg/l
Average E. coli	10.21	Permitted E. coli	63.0	mpn/100 ml
Total Rainfall	1.35"			

Sewer Treatment plant is currently operating at 68**%** of the permitted capacity.

Total gallons of Reuse for the month of February - 0.000 MG

Aged Receivables:	Current	30 day	60 day	90 day	120 day	Total
	$ 59,882.00	$ (514.20)	$ 950.18	$ 148.62	$ 335.00	$ 60,801.60





Edit DMR

Collapse Header

Permit

Permit ID:	TX0025674	**Major:**	☐
Permittee:	RIVER PLANTATION MUD	**Permittee Address:**	2727 ALLEN PKWY SUTIE 1100 HOUSTON, TX 77019
Facility:	RIVER PLANTATION MUD WWTF	**Facility Location:**	623 RIVER PLANTATION DR CONROE, TX 77302
Permitted Feature:	001 - External Outfall	**Discharge:**	A - DOMESTIC FACILITY - 001

Report Dates & Status

Monitoring Period:	From 02/01/24 to 02/29/24	**DMR Due Date:**	03/20/24
Status:	**NetDMR Validated**		

Principal Executive Officer

First Name:		**Last Name:**	
Title:		**Telephone:**	

No Data Indicator (NODI)

Form NODI:

Parameter		NODI	Quantity or Loading			Quality or Concentration				# of Ex.	Freq. of Analysis	Smpl. Type
Code	Name		Value 1	Value 2	Units	Value 1	Value 2	Value 3	Units			
00300 1 - Effluent Gross	**Oxygen, dissolved [DO]**	**Smpl.**				= 9.09			mg/L	0	01/07	GR
Season: 0		**Req.**				>= 6.0 Monthly Minimum			Milligrams per Liter		Weekly	GRAB
NODI:		**NODI**										
00400 1 - Effluent Gross	**pH**	**Smpl.**				= 7.06		= 7.52	SU	0	01/07	GR
Season: 0		**Req.**				>= 6.0 Minimum		<= 9.0 Maximum	Standard Units		Twice Per Month	GRAB
NODI:		**NODI**										
00530 1 - Effluent Gross	**Solids, total suspended**	**Smpl.**	= 2.71		lb/d		= 1.43	= 1.89	mg/L	0	01/07	CS
Season: 0		**Req.**	<= 75.0 Daily Average		Pounds per Day		<= 15.0 Daily Average	<= 40.0 Daily Maximum	Milligrams per Liter		Weekly	COMPOS
NODI:		**NODI**										
00610 1 - Effluent Gross	**Nitrogen, ammonia total [as N]**	**Smpl.**	= 1.4		lb/d		= 0.849	= 2.24	mg/L	0	01/07	CS
Season: 0		**Req.**	<= 15.0 Daily Average		Pounds per Day		<= 3.0 Daily Average	<= 10.0 Daily Maximum	Milligrams per Liter		Weekly	COMPOS
NODI:		**NODI**										

Parameter		NODI	Quantity or Loading			Quality or Concentration				# of Ex.	Freq. of Analysis	Smpl. Type
Code	Name		Value 1	Value 2	Units	Value 1	Value 2	Value 3	Units			
50050	Flow, in conduit or thru treatment plant	Smpl.	= 0.407	= 0.75	MGD					0	99/99	TM
1 - Effluent Gross												
Season: 0		Req.	<= 0.6 Daily Average	Req Mon Daily Maximum	Million Gallons per Day						Continuous	TOTALZ
NODI:		NODI										
50060	Chlorine, total residual	Smpl.				= 1.59		= 3.89	mg/L	0	01/01	GR
1 - Effluent Gross												
Season: 0		Req.				>= 1.0 Monthly Minimum		<= 4.0 Monthly Maximum	Milligrams per Liter		Daily	GRAB
NODI:		NODI										
51040	E. coli	Smpl.					= 10.213	= 104.3	MPN/100mL	0	02/30	GR
1 - Effluent Gross												
Season: 0		Req.					<= 63.0 Daily Average	<= 200.0 Daily Maximum	Most Probable Number (MPN) per 100ml		Twice Per Month	GRAB
NODI:		NODI										
80082	BOD, carbonaceous [5 day, 20 C]	Smpl.	= 3.86		lb/d		= 2.1	= 2.4	mg/L	0	01/07	CS
1 - Effluent Gross												
Season: 0		Req.	<= 50.0 Daily Average		Pounds per Day		<= 10.0 Daily Average	<= 25.0 Daily Maximum	Milligrams per Liter		Weekly	COMPOS
NODI:		NODI										

Edit Check Errors

No results.

DMR Comments

Comments

Attachments

No results.

Report Last Saved By

User: deena@nwdls.com

Name: Deena Higginbotham

E-Mail: deena@nwdls.com

Date/Time: 03/14/24 4:31 CDT

RIVER PLANTATION MUNICIPAL UTILITY DISTRICT
ENGINEER'S REPORT
VSE Project No. 32000-000-0-DST
March 28, 2024, 6:30 p.m.

Engineering Representative: **Taylor J. Reed, P.E.**

Directors: **Julie Gilmer, President**
Tim Goodman, Vice President
Tom Vandever, Treasurer
Betty Brown, Secretary
Karl Sakocius, Asst. Secretary

11. Items for Discussion:

I. Permits

A. **WWTF Discharge Permit Renewal (Expires September 2028)**
   1. No update

B. **Storm Water Quality Management Plan – MS4 Permit (Expires January 2024)**
   1. Finalizing the 2023 annual report and will be submitting on April 5, 2024

C. **Water Plant No. 1 – Water Well No. 1 Testing**
   1. Testing and Inspection due January 12, 2026

D. **Emergency Operation Information**
   1. Update as necessary

II. Design Projects

A. **Joint Projects**
   1. **East Ditch FEMA Work**
      a) Under review with FEMA. We continue to receive updates that it is progressing through the system. Quarterly report has been submitted as required.

2. **East Ditch Maintenance**
   a) No update. The next maintenance will be scheduled for April.

3. **WWTP Rehabilitation and Electrical Upgrades**
   a) Project has been advertised. Expected bids on 4/5/2024. We will present bids at the April meeting.

4. **Holly Springs Drainage Issue**
   a) We received 3 bids. AR TurnKee was the low bidder in the amount of $87,165. We recommend awarding the contract to them and proceeding with the work.

B. District Projects

1. **District Wide Drainage Study**
   a) We have identified 3 areas within the District that become heavily inundated during rain events. Attached is the entire study performed. We will discuss it during the meeting.

2. **Sanitary Sewer Rehabilitation Phase 2**
   a) We received 4 bids. Insituform Technologies was the low bidder in the amount of $692,620.00. Attached is our Recommendation of Award and bid tab.

3. **Sanitary Sewer Manhole Rehabilitation Phase 1**
   a) After review of the manholes, we find the interiors to be in acceptable condition. From the initial videos. We are conducting more inspections with the Sanitary Sewer Rehabilitation Phase 2 project.

VOGLER & SPENCER
ENGINEERING

C. **Charleston Park Irrigation**

1. We are waiting for the maintenance proposal from the contractor for the irrigation system. The sprinkler heads were marked in anticipation for a site walk with directors. The site walk was rescheduled to 4/1/24 due to weather. The I spoke with the mowing contractor, and they are going to avoid them and ensure they do not get destroyed and the surveyor will be out next week to survey all the head locations.
2. They provided a proposal in the amount of $15,600 for maintenance of the irrigation system. This includes 24 visits per year, checking for leaks, coverage, reprogram as needed, minor repairs and adjustments.
3. Received the attached proposal for 20 additional sprinkler heads to keep in storage along with necessary fittings.

D. **Storm Sewer Phase 1 Rehabilitation**

1. A site walk was performed with the contractor. Attached is change order no. 3 for performing pipe on a 54" where the pipe repair goes underneath an existing driveway and too close to the house to safely work on.

E. **Water Plant No. 2 Electrical Upgrades**

1. Construction underway. The contractor is waiting on the Motor Control Center to be delivered. They have been working on the conduits and new service connection. No pay application this month.

F. **Plantation Village Drainage Improvements**

1. Using the drainage study, we were able to put together an exhibit and size a potential swale to capture the flow of the property, channelize it and direct it to the front of the lots. Attached is an exhibit of the proposed plan and cost estimate.

III. Other Matters

A. **10 Year CIP**

1. I have shared the new 10-year CIP with the FA and we are discussing the next bond issue for more District repairs.

IV. Questions/Answers

A. **592 Stone Wall Jackson Bend**

1. MOC is filling in the hole, and we are working to address the underlying cause in the storm sewer located next to the problem area.

B. Stonewall Jackson Manhole Sinkhole

1. MOC has prepared a price to replace the manhole.

C. Robert E. Lee Dr. Storm Sewer Issue

1. MOC has prepared a price to fix the area.

VOGLER & SPENCER
ENGINEERING

777 North Eldridge Parkway, Suite 500
Houston, TX 77079
713.782.0042 | Fax 713.782.5337
info@vs-eng.com
vs-eng.com

March 27, 2024

River Plantation Municipal Utility District
c/o Smith, Murdaugh, Little, & Bonham, LLP
2727 Allen Parkway, Suite 1100
Houston, TX 77019

Re: Recommendation of Award
711 Holly Springs Storm Sewer Replacement
Within River Plantation Municipal Utility District
VSE Project No.: 32000-812-1-UTL (c&e)

Dear Directors:

Enclosed please find the Bid Tabulation of bids received for construction of the above referenced project. A total of **Three (3)** bids were received.

We recommend that a construction contract be awarded to **AR TurnKee** based on their low bid of **Eighty-Seven Thousand, One Hundred Sixty-Five and 00/100 Dollars ($87,165.00)**

Sincerely,

Taylor J. Reed, P.E.
Project Manager
Vogler & Spencer Engineering, Inc.
Texas Registered Engineering Firm No. F-148

Enclosure

TJR;amw

xc: AR TurnKee
File

BID TABULATION
711 HOLLY SPRINGS STORM SEWER REPLACEMENT
WITHIN RIVER PLANTATION MUNICIPAL UTILITY DISTRICT
Bid Date: Wednesday, March 27, 2024
VSE Project No.: 32000-501-1-STP (c&e)

				1. AR TurnKee		2. Wright Solutions		3. ICS LLC.	
ITEM No.	DESCRIPTION	UNIT	BID QTY.	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT
STORM SEWER REPLACEMENT ITEMS									
1.	MOBILIZATION Including Bonds, Insurance, Move-In/Move-Out (Max 3% of total cost)	LS	1	$7,000.00	$7,000.00	$3,250.00	$3,250.00	$9,500.00	$9,500.00
2.	REMOVE & DISPOSE 36" ACMP (includes excavation and disposal of debris and pipe)	LF	200	$40.00	$8,000.00	$50.00	$10,000.00	$45.00	$9,000.00
3.	INSTALL 36" HDPE (includes excavation, disposal of debris, funishing of pipe, installation, backfilling, cement stabilized sand, and site restoration)	LF	180	$173.00	$31,140.00	$225.00	$40,500.00	$285.00	$51,300.00
4.	REMOVE AND DISPOSE TYPE E-INLET AND MANHOLE (2). REPLACE w/ 36" CONCRETE HEADWALL w/ FLARED WINGWALLS STRUCTURE (w/ 30° SKEW) (includes excavation, disposal of debris and structures, furninshing of structure, installation, backfilling, cement stabilized sand, and site restoration)	EA	1	$11,000.00	$11,000.00	$15,500.00	$15,500.00	$16,500.00	$16,500.00
5.	CLEARING (includes removal and disposal of debris and trees)	LS	1	$7,500.00	$7,500.00	$8,500.00	$8,500.00	$12,650.00	$12,650.00
6.	REMOVE & DISPOSE (2) MANHOLES. REPLACE w/ 8'X5' JB w/ E-INLET TOP & TIE IN EXIST. 36" CMP & 24" RCP (includes excavation, removal, disposal of debris and structures, furnishing of junction box, installatiion, existing pipe and swale tie-ins, backfill, cement stabilized sand, and site restoration)	EA	1	$9,000.00	$9,000.00	$9,800.00	$9,800.00	$9,500.00	$9,500.00
7.	TYPE "C" MANHOLE w/ PRECAST BASE (includes excavation, backfill, cement stabilized sand, furnishing of manhole, installation, and site restoration)	EA	1	$5,000.00	$5,000.00	$7,000.00	$7,000.00	$6,500.00	$6,500.00
8.	DRIVEWAY REPLACEMENT (includes removal, disposal, backfilling, grading, forming, and concrete, and placement)(to be used only with Engineer's approval)	SY	25	$101.00	$2,525.00	$300.00	$7,500.00	$175.00	$4,375.00
9.	36" CMP STORM SEWER POINT REPAIR W/ HDPE UNDER TURF - ALL DEPTHS (includes excavation, furnishing of material, concrete collar, backfill, cement stabilized sand, site restoration, and post repair video)	EA	1	$6,000.00	$6,000.00	$12,500.00	$12,500.00	$6,750.00	$6,750.00
	TOTAL PROJECT BID				**$87,165.00**		**$114,550.00**		**$126,075.00**
ALTERNATE BID ITEMS									
A1	INSTALL 42" HDPE (includes excavation, disposal of debris, funishing of pipe, installation, backfilling, cement stabilized sand, and site restoration) (in lieu of 36" HDPE)	LF	180	$195.00	$35,100.00	$250.00	$45,000.00	$350.00	$63,000.00
A2	REMOVE AND DISPOSE TYPE E-INLET AND MANHOLE (2). REPLACE w/ 42" CONCRETE HEADWALL w/ FLARED WINGWALLS STRUCTURE (w/ 30° SKEW) (includes excavation, disposal of debris and structures, furninshing of structure, installation, backfilling, cement stabilized sand, and site restoration) (in lieu of 36" HDPE)	EA	1	$12,000.00	$12,000.00	$17,500.00	$17,500.00	$22,500.00	$22,500.00
A3	INSTALL 2' X 4' RCB (includes excavation, disposal of debris, funishing of pipe, installation, backfilling, cement stabilized sand, and site restoration) (in lieu of 36" HDPE)	LF	180	$475.00	$85,500.00	$420.00	$75,600.00	$850.00	$153,000.00

Rank	Additional Bidders	Base Bid	Days
	NO ADDITIONAL BIDDERS		

VOGLER & SPENCER
ENGINEERING

777 North Eldridge Parkway, Suite 500
Houston, TX 77079
713.782.0042 | Fax 713.782.5337
info@vs-eng.com
vs-eng.com

February 23, 2024

River Plantation Municipal Utility District
c/o Smith, Murdaugh, Little, & Bonham, LLP.
2727 Allen Parkway, Suite 1100
Houston, TX 77019

Re: Recommendation of Award
Sanitary Sewer Rehabilitation Phase No. 2
Within River Plantation Municipal Utility District
VSE Project No.: 32000-808-2-UTL (c&e)

Dear Directors:

Enclosed please find the Bid Tabulation of bids received for construction of the above referenced project. A total of **Four (4)** bids were received.

We recommend that a construction contract be awarded to **Insituform Technologies, LLC.** based on their low bid of **Six Hundred Ninety-Two Thousand, Six Hundred Twenty and 00/100 Dollars ($692,620.00)** with a contract time of **One Hundred Eighty (180) calendar days to Substantial Completion and an additional Thirty (30) calendar days to Final Completion**.

Sincerely,

Peitao Long, E.I.T.
Engineer in Training
Vogler & Spencer Engineering, Inc.
Texas Registered Engineering Firm No. F-148

Enclosure

PL;amw

xc: Insituform Technologies, LLC
File

BID TABULATION
Vogler & Spencer Engineering, Inc.
SANITARY SEWER REHABILIATION PHASE No. 2
WITHIN RIVER PLANTATION MUNICIPAL UTILITY DISTRICT
MONTGOMERY COUNTY, TEXAS
Bid Date: Friday, February 23, 2024
VSE Project No.: 32000-808-2-UTL (c&e)

				1. Insituform Technologies, LLC		2. Texas Pride Utilities, LLC		3. Cruz Tec	
ITEM No.	**DESCRIPTION**	**UNIT**	**BID QTY.**	**UNIT PRICE**	**AMOUNT**	**UNIT PRICE**	**AMOUNT**	**UNIT PRICE**	**AMOUNT**
A) GENERAL ITEMS									
1.	Mobilization/Demobilization/Payment/Performance Bonds/Permits & Fees (Refer to the Special Conditions Part A for insurance requirements. Requirements must be strictly adhered to - this includes the Contractor's Pollution Liability (CPL) Insurance in the amount of $1,000,000.00 (II.C.vi - page 5). (Maximum amount not to exceed 3% of the Base Bid amount).	LS	1	$20,000.00	$20,000.00	$22,000.00	$22,000.00	$45,000.00	$45,000.00
	A. GENERAL ITEMS SUBTOTAL				**$ 20,000.00**		**$ 22,000.00**		**$ 45,000.00**
B) CIVIL SITE WORK									
1.	Temporary Traffic Control Plan	LS	1	$5,000.00	$5,000.00	$8,800.00	$8,800.00	$5,000.00	$5,000.00
2.	Manhole Cleaning & Inspections (Including GPS location of all Manholes)	EA	225	$425.00	$95,625.00	$400.00	$90,000.00	$700.00	$157,500.00
3.	Relocate Unknown Pipe (Coordinate w/ Local Dry Utility to Safely Relocate Unknown Protruding Piping.)	EA	2	$3,250.00	$6,500.00	$4,000.00	$8,000.00	$7,500.00	$15,000.00
4.	Obstruction Removal At Service Lead by Remote Cutting Application	EA	4	$315.00	$1,260.00	$400.00	$1,600.00	$850.00	$3,400.00
5.	Sanitary Sewer Point Repair - all Depths (Includes Excavation, Backfill, Landscape Repairs, and Provide Post Repair Videos)	EA	4	$3,000.00	$12,000.00	$3,200.00	$12,800.00	$3,250.00	$13,000.00
6.	Obstruction Removal Within Sanitary Sewer Mains (To Differentiate From Service Lead Obstruction Removals).	EA	4	$315.00	$1,260.00	$600.00	$2,400.00	$1,200.00	$4,800.00
7.	Heavy Grease Removal and Cleaning at Desginated Locations	EA	12	$315.00	$3,780.00	$200.00	$2,400.00	$150.00	$1,800.00
8.	8" Cured-In-Place-Pipe Sanitary Sewer Rehab.	LF	11,873	$35.00	$415,555.00	$36.00	$427,428.00	$32.50	$385,872.50
9.	15" Cured-In-Place-Pipe Sanitary Sewer Rehab.	LF	1,135	$63.00	$71,505.00	$84.00	$95,340.00	$70.00	$79,450.00
10.	Remove and Replace Exist. 8" Sanitary Sewer w/ SDR 26 PVC Pipes (Includes Excavation, Backfill, & Provide Post Repair Videos)	LF	40	$85.00	$3,400.00	$100.00	$4,000.00	$150.00	$6,000.00
11.	OSHA Trench Safety System (All Depths)	LF	40	$11.50	$460.00	$100.00	$4,000.00	$25.00	$1,000.00
12.	Site Restoration to Equal or Better Condition (Includes Fence Replacement and Sodding)	LS	1	$5,000.00	$5,000.00	$6,000.00	$6,000.00	$15,000.00	$15,000.00
13.	All Necessary Bypass Pumping for the Duration of the Project.	LS	1	$5,000.00	$5,000.00	$18,000.00	$18,000.00	$15,000.00	$15,000.00
14.	Post Cleaning and Televising of all Repaired and CIPP Sanitary Sewer Lines for Verification of Work.	LS	1	$1,000.00	$1,000.00	$26,016.00	$26,016.00	$30,000.00	$30,000.00
	B. CIVIL SITE WORK SUBTOTAL				**$ 627,345.00**		**$706,784.00**		**$ 732,822.50**
C) ADDITIONAL WORK ITEMS (AS AUTHORIZED BY ENGINEER)									
1.	Extra Length of Point Repair for 8" Pipe	LF	50	$160.00	$8,000.00	$100.00	$5,000.00	$65.00	$3,250.00
2.	Extra 8" Sanitary Sewer Replacement	LF	50	$85.00	$4,250.00	$240.00	$12,000.00	$150.00	$7,500.00
3.	Remove & Replace Cleanouts.	EA	5	$2,000.00	$10,000.00	$400.00	$2,000.00	$1,500.00	$7,500.00
4.	External Service Reconnection.	EA	5	$950.00	$4,750.00	$1,200.00	$6,000.00	$2,800.00	$14,000.00
5.	Extra Cement Stabilized Sand.	CY	50	$68.00	$3,400.00	$40.00	$2,000.00	$85.00	$4,250.00
6.	Extra Manhole Cleaning & Inspections (Including GPS location of all Manholes)	EA	35	$425.00	$14,875.00	$400.00	$14,000.00	$700.00	$24,500.00
	C. ADDITIONAL WORK ITEMS SUBTOTAL				**$ 45,275.00**		**$41,000.00**		**$ 61,000.00**
	TOTAL BASE BID (A-C)			**$**	**692,620.00**	**$**	**769,784.00**	**$**	**838,822.50**
	SUBSTANTIAL COMPLETION CALENDAR DAYS			**180**		**240**		**270**	
	FINAL COMPLETION CALENDAR DAYS			**30**		**10**		**45**	

Rank	Additional Bidders	Base Bid	Days
4.	AR TurnKee Construction Company, Inc.	$1,499,012.00	180/30

River Plantation M.UD.

Annual Maintenance

Total Bid Package Summary Sheet

Facility	UNIT	NUMBER OF MOWS	UNIT PRICE	AMOUNT
RP MUD Park - 71.45 acres				
Park Maintenance (Mowing, edging, trimming, including blowing along the trail/walkway)(Bi-monthly April - October, Monthly November - March.)	LS	19	$3,720.00	$70,680.00
		RP MUD Park Subtotal		$70,680.00
District Facilities				
Water Plant No. 1 - 0.34 Acres (Mowing, edging, trimming, etc) (Bi-monthly April - October, Monthly November - March.)	LS	19	$100.00	$1,900.00
Water Plant No. 2 - 0.73 Acres (Mowing, edging, trimming, etc) (Bi-monthly April - October, Monthly November - March.)	LS	19	$125.00	$2,375.00
Water Plant No. 3 - 0.46 Acres (Mowing, edging, trimming, etc) (Bi-monthly April - October, Monthly November - March.)	LS	19	$110.00	$2,090.00
WWTP - 3.64 Acres (Mowing, edging, trimming, etc)	LS	19	$225.00	$4,275.00
District Administration Building - 4.93 Acres (Mowing, edging, trimming, etc) (Bi-monthly April - October, Monthly November - March.)	LS	19	$275.00	$5,225.00
		District Facilities Subtotal		$15,865.00
Drainage Facilities				
North Ditch - 1.41 Acres (Mowing, edging, trimming, etc.)	LS	4	$600.00	$2,400.00
Mosswood Easement - 1.41 Acres (Mowing, edging, trimming, etc.)	LS	6	$500.00	$3,000.00

Drainage Facilities Subtotal	$5,400.00
Annual Maintenance Total	$91,945.00

Extra Work Items (not included as part of total bid amount)

East Concrete Ditch - 7000LF (Debris removal and minor desilting)(to be performed at direction of the Board of Directors)	LS	1	Bid / Quote	Upon Request
Mosswood Ditch - 1.82 acres (Mowing, edging trimming, and minor clearing, etc)(to be performed at direction of the Board of Directors)	LS	4	$1,800.00	$7,200.00
Annual Overseading (to be performed at direction of the Board of Directors)	LS	1	Bid / Quote	Upon Request
Annual Wildflower Planting (to be performed at direction of the Board of Directors)	LS	1	Bid / Quote	Upon Request

Irrigation System Maintenance Quote

24 Visits per year at $650.00 per visit $15,600.00

Includes: run through entire system. Check for leaks. Check coverage. Reprogram controllers as needed. Minor repairs and head adjustments. Monthly updates. Quotes provided for equipment replacements or repairs.

TEXAS IRRIGATION SUPPLY CON
501 Hickerson, Building #1
Conroe, TX 77301
Phone 936-494-0046
Fax 936-494-2276

Quotation

EXPIRATION DATE	QUOTE NUMBER
03/25/2024	S5362326

TEXAS IRRIGATION SUPPLY CON
501 Hickerson, Building #1
Conroe, TX 77301
Phone 936-494-0046
Fax 936-494-2276

QUOTE TO:

HANSEN LANDSCAPE CONSTRUCTION, INC
9240 LANTERN CREEK COURT
CONROE, TX 77303

SHIP TO:

CHARLESTON PARK RIVER PLN GOLF CLUB
550 COUNTRY CLUB DRIVE
CONROE, TX 77302

CUSTOMER NUMBER	CUSTOMER PO NUMBER	JOB NAME / RELEASE NUMBER	SALESPERSON
52690	CHARLESTON PARK		ANDREW BAKER

WRITER	SHIP VIA	TERMS	SHIP DATE	FREIGHT ALLOWED
ANDREW BAKER	PK PICK-UP TX	Net Due 60 Days	03/26/2024	No

ORDER QTY	DESCRIPTION	UNIT PRICE	EXT PRICE
20ea	D70E5080A 1 1/4 IN FULL CIRCLE ROTOR ELECTRIC VIH #50-BLACK NOZZLE 80 PSI WEATHERMATIC SPECIAL ORDER - NON-RETURNABLE	245.950/ea	4919.00
20ea	ADPT150N INLET BUSHING ADAPTER - 1-1/4 IN MALE ACME X 1-1/2 IN IN FEMALE NPT WEATHERMATIC SPECIAL ORDER - NON-RETURNABLE	18.917/ea	378.33

The pricing on this bid is good for 30 days from the date generated.
Taxes are not included in totals.

Subtotal	5297.33
S&H Charges	0.00
Amount Due	5297.33

Change Order

2058-CO3

2/28/2023

From: **AR TurnKee Construction Company Inc.**
PO Box 925985
Houston, TX 77292
713-469-5952

To: **River Plantation Municipal Utility District**
c/o Vogler & Spencer Engineering, Inc
777 North Eldridge Parkway , Suite 500
Houston, TX 77079

Re: Westlawn and Highland Drainage Improvements

AR TurnKee Construction Company proposes the following work to be performed for the above referenced job:

Change Order:	Unit	Quantity	Price$	Total Price
* Inspect, prep, clean, and televise 54" storm sewer	LS	1	$5,000.00	$ 5,000.00
* Geopolymer lining of 54" storm sewer	LF	185	$369.00	$ 68,265.00
* Post tv of lines	LF	185	$7.00	$ 1,295.00
Total Cost for Work This Proposal				**$ 74,560.00**

Includes:
* All material, equipment, and labor necessary to complete proposed work

Excludes:
* Any demolition or removal of debris not shown on plans or mentioned in proposal
* Handling of any hazardous waste encountered
* Haul off of material not mentioned in proposal
* Import of fill
* Extra work caused by obstructions not shown on plans

Thanks for your consideration.

Adam Turner
AR TurnKee Construction Company

PRELIMINARY COST ESTIMATE
PLANTATION VILLAGE DRAINAGE IMPROVEMENTS
WITHIN RIVER PLANTATION
MUNICIPAL UTILITY DISTRICT
PROJECT NO. 32000-813-1-UTL

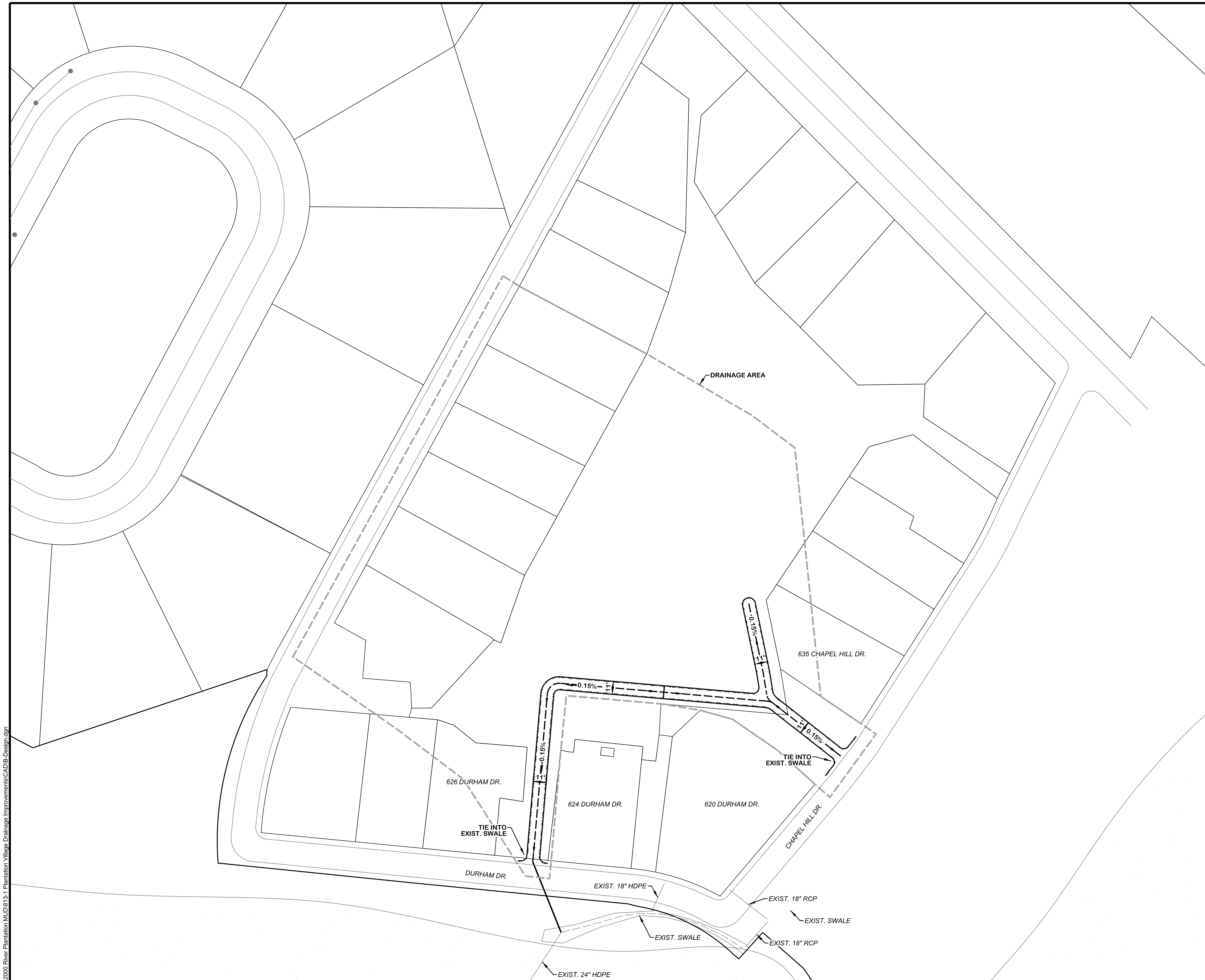
ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
STORM SEWER ITEMS					
1.	MOBILIZATION Including Bonds, Insurance, Move-In/Move-Out (Max 3% of total cost)	LS	1	$ 3,000.00	$ 3,000.00
1.	EXCAVATION AND GRADING OF PROPOSED SWALES (includes excavation, haul off & disposal of spoils, grading as specified within plans, and site restoration)	LF	500	$ 20.00	$ 10,000.00
2.	INSTALL 24" HDPE (includes excavation, disposal of debris, funishing of pipe, installation, backfilling, cement stabilized sand, and site restoration)	LF	65	$ 200.00	$ 13,000.00
				STORM SEWER ITEMS SUB-TOTAL	**$ 26,000.00**
CIVIL SITE ITEMS					
3.	CLEARING (includes removal, haul off and disposal, and site restoration) TO BE USED ONLY WITH ENGINEER'S APPROVAL	EA	2	$ 4,000.00	$ 8,000.00

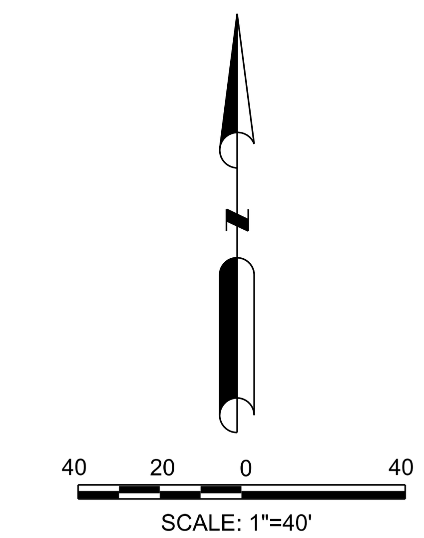
PRELIMINARY COST ESTIMATE
PLANTATION VILLAGE DRAINAGE IMPROVEMENTS
WITHIN RIVER PLANTATION
MUNICIPAL UTILITY DISTRICT
PROJECT NO. 32000-813-1-UTL

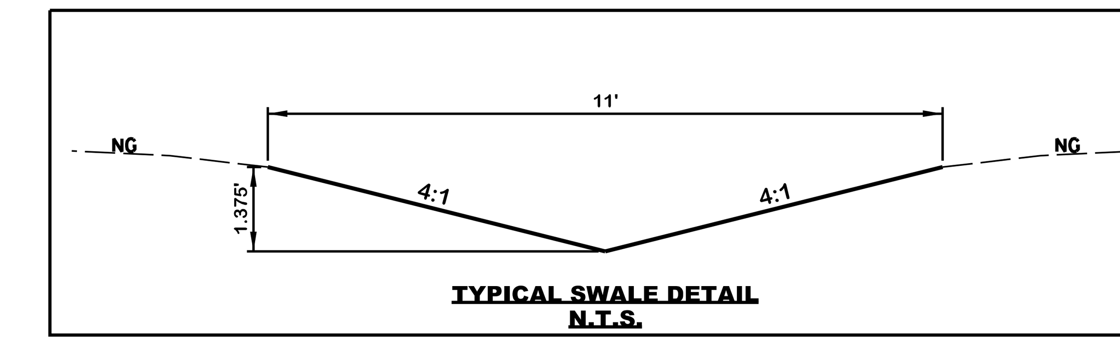
ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
4.	FULL DEPTH REMOVE AND REPLACE ASPHALT PAVEMENT (includes sawcut, removal, haul off and disposal, excavation, subgrade, backfilling, cement stabilized sand, compaction, testing, furnishing, bituminous concrete base course, 1 1/2" bituminous concrete surface course, and site restoration)	SY	30	$ 200.00	$ 6,000.00
			CIVIL SITE ITEMS SUB-TOTAL		**$ 14,000.00**

STORMWATER POLLUTION PREVENTION ITEMS

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
1.	Reinforced Filter Fabric Fence (includes disposal upon project completion	LF	425	$ 2.00	$ 850.00
2.	ROCK FILTER DAM (includes disposal upon project completion)	EA	2	$ 300.00	$ 600.00
	STORMWATER POLLUTION PREVENTION ITEMS SUB-TOTAL				**$ 1,450.00**
	TOTAL PROJECT COST (Storm Sewer Items, Civil Site Items, & SWPPP)				**$ 41,450.00**
	CONTINGENCY (20%)				**$ 8,290.00**
	TOTAL COST ESTIMATE				**$ 49,740.00**







RIVER PLANTATION MUD
PLANTATION VILLAGE DRAINAGE IMPROVEMENTS

EXHIBIT

VOGLER & SPENCER ENGINEERING
777 North Eldridge Parkway, Suite 500
Houston, Texas 77079
713-782-0042
www.vs-eng.com
Texas P. E. Firm Registration No. F148

LukeV
11:27:33 AM 3/26/2024
F:\32000 River Plantation MUD\813-1 Plantation Village Drainage Improvements\CAD\B-Design.dgn

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vs-eng.com

RIVER PLANTATION MUD EXISTING CONDTIONS

DRAINAGE ASSESSMENT

Prepared By:
Vogler & Spencer Engineering, Inc.
Consulting Engineers
Firm Registration No. F-148

February 2024

VSE Project No. 32000-607-1-RPT

Table of Contents

List of Exhibits

List of Appendices

EXECUTIVE SUMMARY

River Plantation Municipal Utility District (The District) contracted Vogler & Spencer Engineering, Inc. (VSE) to analyze the existing drainage conditions and ponding levels for the River Plantation Development using the Atlas 14 rainfall values for the 10%, 1%, and 0.2% annual exceedance probability (AEP) rain events. The report includes three (3) annual exceedance probability model analysis for the entire District boundary (Exhibit 2) up to the project limits at the West Fork San Jacinto River. The report does not include assessments for regional storm events.

The District drainage assessment addresses the existing hydrologic and hydraulic conditions during specific storm events. The purpose of this evaluation is to develop an independent unsteady 1D/2D integrated hydrologic and hydraulic existing conditions model to identify the current storm sewer system inadequacies, natural depressions, and the resulting impacted areas during localized storms.

River Plantation experiences local and regional flooding during extreme rain events. This drainage analysis report provides a detailed description of the existing drainage conditions, based on the performed modeling using LiDAR 2018 data, site visits, and historic drawings. VSE analyzed all 10, 100, and 500-year extreme rain events, as per the Drainage Criteria Manual for Montgomery County, using 1D/2D integrated hydraulic models to identify natural depressions and analyze the existing drainage system.

SECTION 1.0 – INTRODUCTION

1.1 Project Name & Purpose

The District boundary includes approximately 894 acres of land, presently platted into single family residential lots, and includes an 18-hole golf course, club house, recreational facilities, and municipal facilities. Three main drainage channels run through The District from north to south; the East Ditch, Mosswood Ditch, and Stewarts Creek. Running along the southern boundary of The District is the West Fork San Jacinto River. Since East Ditch is an un-studied channel, the tailwater condition was set as a free outfall. It is noted that during regional extreme rain events, the West Fork San Jacinto River water surface elevations tend to surpass its existing banks, causing regional flooding within The District.

1.2 Project Limits

The District is located within Montgomery County, Texas, just South of the City of Conroe. The District is bounded by I-45 to the West, Sunset Heights Lane to the North, the East Plantation Municipal Utility District and a power transmission right of way to the East, and the West Fork San Jacinto River to the South, as shown in Exhibits 1 & 2.

1.3 Project Objectives

The District contracted with VSE to perform a hydrologic and hydraulic study analysis of The District's drainage to determine the existing drainage conditions and to further analyze areas with high ponding potential. This analysis will establish the current conditions within the study area for the 10, 100, and 500-year storm events.

1.4 Assumptions and Constraints

The modeling performed considered the area's topography using 2018 LiDAR, the existing drainage system by use of record drawings and field visits. Initially a 2-dimensional (2D) grid surface was developed to highlight flooded areas and street ponding due to overland runoff only. The District's overland flow characteristics were then analyzed to manually delineate drainage sub-areas for the overall drainage boundary. The existing storm sewer location and flowlines were estimated based on field visits and record drawings. The regional flooding within The District due to the West Fork San Jacinto River water surface levels during extreme rain events is not part of this study's scope of work for analyzation or proposed solutions, but is depicted in Exhibits 11, 12, & 13 to provide a full assessment of The District's flooding issues.

1.5 Project Datum

The project vertical datum is tied to the North American Vertical Datum (NAVD) 1988, 2001 Adjustment.

SECTION 2.0 – EXISTING CONDITIONS

The existing drainage system, as per record drawings and field visits, consists of grate inlets, type “E” inlets, and drainage swales (including roadside ditches) connecting to reinforced concrete pipe (RCP) and/or corrugated metal pipe (CMP), ranging from 18" to 60" in diameter, as shown in Exhibits 5, 6, & 7. The natural drainage pattern conveys stormwater from the Northeast through the East Ditch of River Plantation, which outfalls to the West Fork San Jacinto River; from the central region of the district towards the West through Mosswood Ditch which outfalls to the West Fork San Jacinto River; and from the Northwest through Stewart’s Creek and Mosswood Ditch, which outfalls to the West Fork San Jacinto River. The overall drainage sub-areas are shown in Exhibit 4. After modeling the overall drainage sub-areas over the terrain using XPSTORM/XPSWMM, three (3) high ponding areas were observed.

Ponding Area 1:

The area deemed as “Ponding Area 1” is located in the Northwestern region of The District, as shown in Exhibits 8, 9, & 10. This area was analyzed by further delineating sub-areas corresponding to the existing inlets and culverts of the existing drainage system described by the record drawings and site visits. The existing storm sewer layout for Ponding Area 1 is shown in Exhibit 5. Modeling reveals that various storm sewer components in the system are undersized, resulting in a high risk of potential localized flooding in Ponding Area 1. Inundations for the 10%, 1%, and 0.2% events are shown in Exhibits 8, 9, & 10.

Ponding Area 2:

The area deemed as “Ponding Area 2” is located in the central region of The District, as shown in Exhibits 8, 9, & 10. As with Ponding Area 1, Ponding Area 2 was analyzed by further delineating sub-areas corresponding to the existing inlets and culverts of the existing drainage system described by the record drawings and site visits. The existing storm sewer layout for Ponding Area 2 is shown in Exhibit 6. Modeling revealed that most of the localized flooding was a result of water backing up and spilling out of the inlets and culverts at various points within the area. It can be observed that the existing storm sewer layout is deficiently conveying stormwater runoff resulting in a high risk of potentially flooding during local storm events. Inundations for the 10%, 1%, and 0.2% events are shown in Exhibits 8, 9, & 10.

Ponding Area 3:

The area deemed as “Ponding Area 3” is located in the Eastern region of The District, as shown in Exhibits 8, 9, & 10. As with Ponding areas 1 and 2, Ponding Area 3 was analyzed by further delineating sub-areas corresponding to the existing inlets and culverts of the existing drainage system described by the record drawings and site visits. The existing storm sewer layout for Ponding Area 3 is shown in Exhibit 7. Stormwater overwhelms the existing storm sewer system causing localized flooding in the area. Results reveal that various residential lots pose a high potential risk of localized flooding. Inundations for the 10%, 1%, and 0.2% events are shown in Exhibits 8, 9, & 10.

In all areas previously mentioned, the existing drainage system performs as needed to convey the 2-year storm event flows within The District. However, during the 10-year event and more severe events, overland flow overwhelms the existing system due to its limited conveyance capacity and the lack of detention basins. As a result, the severe rain events cause localized flooding conditions within natural depressions, especially in the specified areas of the Northwestern, Central, and Eastern regions of the River Plantation District. Exhibits 8, 9, & 10 show the inundations within the River Plantation District for the 10%, 1% and 0.2% AEP events, respectively.

The primary flooding concern for The District is due to regional flooding caused by the limited capacity of West Fork Jacinto River and the low natural ground elevations along its banks and within The District. During the extreme events, the West Fork San Jacinto River backs into its tributaries, including the East Ditch, Mosswood Ditch, and Stewart's Creek, causing overtopping of their banks. Exhibits 11, 12, & 13 show the inundations The District during regional 10%, 1%, and 0.2% AEP events, respectively.

2.1 Land Use

The existing land use within The District boundary consist of roadways/major thoroughfares, single-family residential homes, open space characterization, heavily wooded areas, recreational areas, municipal facilities, and water bodies.

2.2 Right-of ways, Pipelines, and Utilities

Various private and public utilities conflicting with the existing storm sewer system are located throughout The District boundary both within and outside the right-of-way. Some of the utilities located outside of the right-of-way do not have an easement.

2.3 FEMA Floodplain Information

The West Fork San Jacinto River watershed has studied limits to establish flood hazard zones due to riverine flooding by the Federal Emergency Management Agency (FEMA). The floodplain limits are described within the Flood Insurance Rate Maps (FIRMs) for the area. The District lies partially within the Federal Emergency Management Agency (FEMA) Zone AE (base flood elevations determined). The floodplain is shown on the FEMA FIRMs below:

- 48339C0390G dated 08/18/2014.
- 48339C0395G dated 08/18/2014.
- 48339C0530G dated 08/18/2014.
- 48339C0535G dated 08/14/2014.

The FEMA FIRMs were merged and are shown in Exhibit 3.

SECTION 3.0 – HYDROLOGY & HYDRAULICS

3.1 Analysis Objective

This report aims to document existing conditions during the 10-year, 100-year, and 500-year local rain events to identify natural depressions, storm sewer deficiencies, and conveyance capacities.

3.2 Digital Terrain Model (DTM)

The same Digital Terrain Model (DTM) was used to model the various storm event scenarios. The DTM developed utilized 2018 LiDAR.

3.3 Subsurface (1D) Model

The physical subsurface model (1D) was developed using the available record drawings for The District and field visits to verify some pipe sizes at particular locations. The flowlines provided were estimated based on multiple field visits, the DTM elevations, and record drawings.

3.4 Drainage Areas

The drainage area map included in this study was delineated manually using an overall Rain-On Grid model integrated with the developed DTM. The drainage area includes the entire District boundary and off-site drainage areas, as shown on Exhibit 4.

3.5 Hydrologic and Hydraulic Methodologies

Peak runoff rate and runoff hydrograph computations of existing conditions for the 10%, 1%, and 0.2% exceedance probability events (AEPs) used the Rational Method based on runoff coefficients, intensity, and sub-area acreages, as per the Montgomery County Drainage Criteria Manual.

3.5.1 Runoff Coefficient

The runoff coefficient represents the existing conditions per drainage sub-area and was obtained by using table 3.5.1 Runoff Coefficients from the Montgomery Country Drainage Criteria Manual.

TABLE 2.2 Rational Method Runoff Coefficients for 5-10 Year Frequency Storms

Description of Area	Basin Slope < 1%	Basin Slope 1%-3.5%	Basin Slope 3.5%-5.5%
Single Family Residential Districts			
Lots greater than 1/2 acre	0.30	0.35	0.40
Lots 1/4 - 1/2 acre	0.40	0.45	0.50
Lots less than 1/4 acre	0.50	0.55	0.60
Multi-Family Residential Districts	0.60	0.65	0.70
Apartment Dwelling Areas	0.75	0.80	0.85
Business Districts			
Downtown	0.85	0.87	0.90
Neighborhood	0.75	0.80	0.85
Industrial Districts			
Light	0.50	0.65	0.80
Heavy	0.60	0.75	0.90
Railroad Yard Areas	0.20	0.30	0.40
Cemeteries	0.10	0.18	0.25
Playgrounds	0.20	0.28	0.35
Streets			
Asphalt	0.80	0.80	0.80
Concrete	0.85	0.85	0.85
Concrete Drives and Walks	0.85	0.85	0.85
Roofs	0.85	0.85	0.85
Lawn Areas			
Sandy Soil	0.05	0.08	0.12
Clay Soil	0.15	0.18	0.22
Woodlands			
Sandy Soil	0.15	0.18	0.25
Clay Soil	0.18	0.20	0.30
Pasture			
Sandy Soil	0.25	0.35	0.40
Clay Soil	0.30	0.40	0.50
Cultivated			
Sandy Soil	0.30	0.55	0.70
Clay Soil	0.35	0.60	0.80

Table 3.5.1 Runoff Coefficients

3.5.2 Time of Concentration

The time of concentration was calculated for each sub-drainage area using the combination of the inlet time and the travel time in a conduit, channel, or overland as per the Montgomery County Drainage Criteria Manual. The components in calculating the time of concentration are the longest flow path, land use, slope, and velocity. The 2-year, 24-hour duration, precipitation depth (4.89in), as seen in the National Oceanic and Atmospheric Administration Atlas 14 (NOAA Atlas 14) table 3.5.4, which specifies precipitation depth for the subject region of study, was utilized when calculating the time of concentration, as per equation 2.3 of the Montgomery County Drainage Criteria Manual.

3.5.3 Intensity

As per the Montgomery County Drainage Criteria Manual, intensity duration frequency (IDF curves) were used to obtain rainfall intensity per sub-area (Figures 3.5.3 & 3.5.3.1). The design rainfall duration was set equal to the time of concentration for all portions of the drainage sub-areas under consideration that contribute flow to the point of interest. The IDF curves did not include the 0.2% AEP event, therefore, NOAA Atlas 14 precipitation intensity values were utilized or interpolated based on the sub-areas' time of concentration (Figure 3.5.3.2).

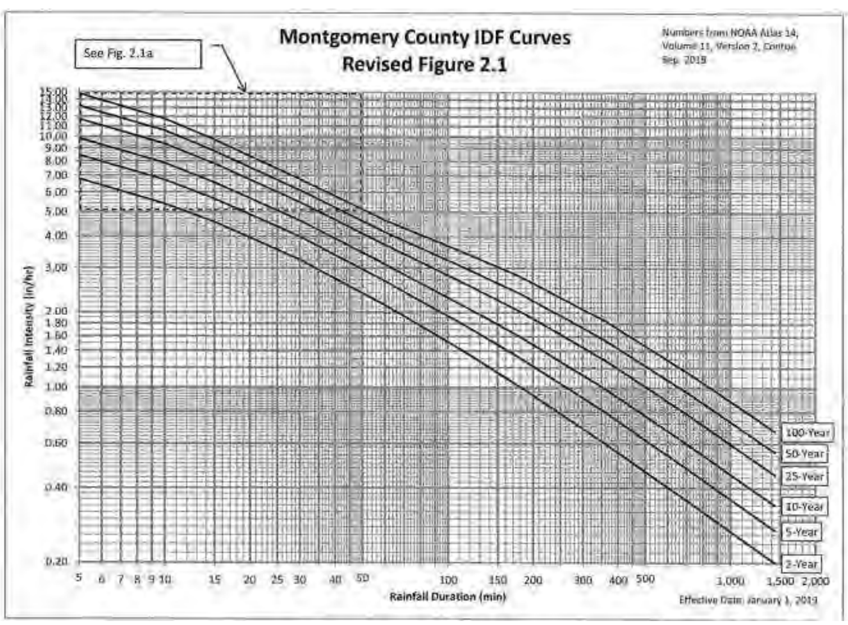

Table 3.5.3

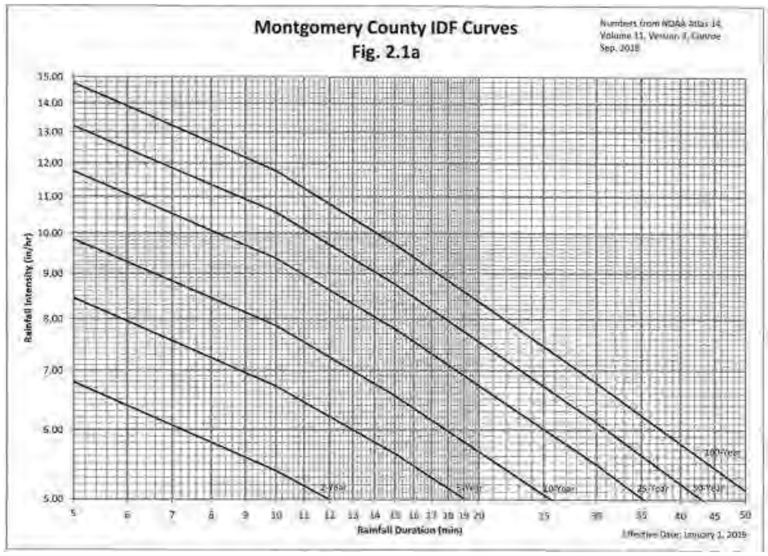

Table 3.5.3.1

NOAA Atlas 14, Volume 11, Version 2
Location name: Conroe, Texas, USA*
Latitude: 30.2536°, Longitude: -95.4413°
Elevation: 120 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	5.83 (4.42-7.70)	6.86 (5.24-8.95)	8.54 (6.50-11.2)	9.95 (7.46-13.2)	11.9 (8.63-16.3)	13.4 (9.46-18.9)	14.9 (10.9-21.6)	16.5 (11.1-24.6)	18.7 (12.1-28.8)	20.4 (12.9-32.9)
10-min	4.62 (3.50-6.10)	5.45 (4.16-7.12)	6.80 (5.18-8.93)	7.93 (5.95-10.6)	9.49 (6.91-13.0)	10.7 (7.88-15.1)	11.9 (8.21-17.3)	13.1 (8.81-19.5)	14.7 (9.55-22.6)	15.9 (10.0-25.1)
15-min	3.92 (2.96-5.18)	4.60 (3.51-6.01)	5.70 (4.34-7.49)	6.62 (4.97-8.82)	7.89 (5.79-10.8)	8.86 (6.26-12.5)	9.84 (6.79-14.3)	10.9 (7.32-16.2)	12.3 (8.00-19.0)	13.4 (8.50-21.2)
30-min	2.80 (2.12-3.70)	3.27 (2.50-4.28)	4.04 (3.06-5.31)	4.67 (3.50-6.22)	5.53 (4.01-7.57)	6.18 (4.36-8.70)	6.85 (4.73-9.94)	7.61 (5.12-11.3)	8.70 (5.66-13.4)	9.59 (6.07-15.2)
60-min	1.84 (1.39-2.43)	2.17 (1.66-2.83)	2.70 (2.06-3.54)	3.14 (2.36-4.16)	3.75 (2.72-5.13)	4.21 (2.97-5.92)	4.70 (3.24-6.82)	5.27 (3.55-7.86)	6.12 (3.96-9.46)	6.84 (4.33-10.8)
2-hr	1.11 (0.847-1.46)	1.36 (1.03-1.75)	1.74 (1.33-2.27)	2.08 (1.57-2.73)	2.57 (1.86-3.51)	2.97 (2.11-4.18)	3.42 (2.36-4.93)	3.94 (2.65-5.83)	4.72 (3.07-7.25)	5.38 (3.42-8.47)
3-hr	0.811 (0.618-1.06)	1.02 (0.768-1.29)	1.33 (1.01-1.72)	1.61 (1.22-2.13)	2.04 (1.50-2.79)	2.40 (1.71-3.37)	2.81 (1.95-4.05)	3.29 (2.22-4.86)	4.01 (2.62-6.14)	4.62 (2.94-7.25)
6-hr	0.468 (0.358-0.611)	0.611 (0.455-0.754)	0.811 (0.621-1.04)	1.01 (0.764-1.32)	1.31 (0.965-1.78)	1.57 (1.13-2.20)	1.87 (1.31-2.65)	2.22 (1.51-3.27)	2.75 (1.80-4.20)	3.20 (2.04-5.00)
12-hr	0.265 (0.204-0.345)	0.353 (0.265-0.430)	0.474 (0.364-0.606)	0.595 (0.454-0.780)	0.783 (0.582-1.07)	0.952 (0.688-1.33)	1.16 (0.803-1.64)	1.37 (0.932-2.01)	1.71 (1.12-2.60)	1.99 (1.26-3.10)
24-hr	0.150 (0.116-0.194)	0.203 (0.151-0.244)	0.275 (0.212-0.350)	0.348 (0.266-0.454)	0.462 (0.346-0.625)	0.566 (0.412-0.792)	0.687 (0.465-0.978)	0.822 (0.561-1.20)	1.02 (0.673-1.54)	1.19 (0.764-1.84)
2-day	0.082 (0.064-0.106)	0.114 (0.084-0.135)	0.156 (0.121-0.197)	0.199 (0.153-0.250)	0.267 (0.202-0.384)	0.331 (0.242-0.462)	0.403 (0.284-0.572)	0.480 (0.328-0.695)	0.588 (0.356-0.864)	0.674 (0.436-1.04)
3-day	0.059 (0.046-0.076)	0.082 (0.061-0.097)	0.112 (0.087-0.142)	0.143 (0.111-0.186)	0.192 (0.146-0.261)	0.238 (0.175-0.302)	0.289 (0.204-0.409)	0.342 (0.234-0.495)	0.415 (0.275-0.629)	0.474 (0.306-0.731)
4-day	0.048 (0.037-0.061)	0.065 (0.049-0.078)	0.089 (0.070-0.113)	0.114 (0.088-0.147)	0.151 (0.115-0.205)	0.186 (0.137-0.255)	0.225 (0.159-0.317)	0.265 (0.182-0.382)	0.320 (0.212-0.485)	0.364 (0.236-0.561)
7-day	0.032 (0.025-0.041)	0.043 (0.033-0.052)	0.058 (0.045-0.073)	0.072 (0.055-0.093)	0.094 (0.071-0.127)	0.114 (0.084-0.157)	0.136 (0.096-0.191)	0.158 (0.109-0.226)	0.190 (0.126-0.284)	0.215 (0.140-0.331)
10-day	0.026 (0.020-0.033)	0.033 (0.026-0.040)	0.044 (0.034-0.055)	0.054 (0.042-0.070)	0.070 (0.053-0.094)	0.084 (0.062-0.115)	0.099 (0.070-0.139)	0.115 (0.079-0.165)	0.137 (0.091-0.204)	0.154 (0.100-0.237)
20-day	0.017 (0.013-0.021)	0.021 (0.016-0.026)	0.027 (0.021-0.034)	0.032 (0.025-0.042)	0.041 (0.031-0.054)	0.047 (0.036-0.065)	0.054 (0.039-0.076)	0.062 (0.043-0.089)	0.073 (0.049-0.109)	0.082 (0.053-0.125)
30-day	0.013 (0.010-0.017)	0.016 (0.013-0.020)	0.021 (0.016-0.026)	0.024 (0.019-0.031)	0.030 (0.023-0.040)	0.034 (0.026-0.047)	0.039 (0.029-0.055)	0.044 (0.031-0.063)	0.051 (0.034-0.076)	0.057 (0.037-0.087)
45-day	0.011 (0.009-0.014)	0.013 (0.010-0.016)	0.016 (0.013-0.021)	0.019 (0.015-0.025)	0.023 (0.017-0.030)	0.026 (0.019-0.035)	0.029 (0.021-0.041)	0.032 (0.022-0.048)	0.037 (0.025-0.054)	0.040 (0.026-0.061)
60-day	0.010 (0.008-0.012)	0.011 (0.009-0.014)	0.014 (0.011-0.018)	0.016 (0.013-0.021)	0.019 (0.015-0.026)	0.022 (0.016-0.029)	0.024 (0.017-0.033)	0.026 (0.018-0.037)	0.029 (0.020-0.043)	0.031 (0.020-0.048)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Table 3.5.3.2

3.5.4 Precipitation

To reflect the most up to date Atlas 14 data, the precipitation was considered for each sub-area using the NOAA Atlas 14 database. Table 3.5.4 summarizes the point rainfall depths for various AEP events. These depths were utilized to obtain volumes per rain event per drainage sub-area.

NOAA Atlas 14, Volume 11, Version 2
Location name: Conroe, Texas, USA*
Latitude: 30.2536°, Longitude: -95.4413°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.486 (0.368-0.642)	0.572 (0.437-0.747)	0.712 (0.542-0.935)	0.829 (0.622-1.10)	0.990 (0.719-1.36)	1.11 (0.788-1.57)	1.24 (0.655-1.80)	1.37 (0.924-2.05)	1.56 (1.01-2.40)	1.70 (1.08-2.69)
10-min	0.770 (0.583-1.02)	0.908 (0.693-1.19)	1.13 (0.863-1.49)	1.32 (0.991-1.76)	1.58 (1.15-2.17)	1.78 (1.26-2.52)	1.99 (1.37-2.88)	2.19 (1.47-3.25)	2.45 (1.59-3.77)	2.64 (1.67-4.18)
15-min	0.979 (0.741-1.29)	1.15 (0.876-1.50)	1.43 (1.09-1.87)	1.66 (1.24-2.21)	1.97 (1.43-2.70)	2.21 (1.57-3.12)	2.46 (1.70-3.57)	2.72 (1.83-4.05)	3.08 (2.00-4.74)	3.36 (2.12-5.30)
30-min	1.40 (1.06-1.85)	1.64 (1.25-2.14)	2.02 (1.54-2.65)	2.34 (1.75-3.11)	2.77 (2.00-3.78)	3.09 (2.18-4.35)	3.43 (2.36-4.97)	3.81 (2.56-5.67)	4.35 (2.83-6.71)	4.80 (3.04-7.58)
60-min	1.84 (1.39-2.43)	2.17 (1.66-2.83)	2.70 (2.06-3.54)	3.14 (2.36-4.18)	3.75 (2.72-5.13)	4.21 (2.97-5.92)	4.70 (3.24-6.82)	5.27 (3.55-7.86)	6.12 (3.98-9.46)	6.84 (4.33-10.8)
2-hr	2.23 (1.70-2.93)	2.73 (2.07-3.49)	3.49 (2.66-4.54)	4.16 (3.14-5.52)	5.15 (3.75-7.03)	5.94 (4.22-8.35)	6.83 (4.73-9.86)	7.87 (5.31-11.7)	9.43 (6.15-14.5)	10.8 (6.84-16.9)
3-hr	2.44 (1.86-3.20)	3.07 (2.31-3.87)	3.99 (3.04-5.17)	4.85 (3.56-6.41)	6.13 (4.49-8.37)	7.21 (5.14-10.1)	8.44 (5.86-12.2)	9.87 (6.57-14.6)	12.0 (7.85-18.5)	13.9 (8.63-21.8)
6-hr	2.80 (2.15-3.66)	3.66 (2.73-4.52)	4.86 (3.72-6.25)	6.03 (4.58-7.94)	7.82 (5.78-10.7)	9.40 (6.76-13.2)	11.2 (7.82-16.1)	13.3 (9.02-19.6)	16.5 (10.5-25.2)	19.2 (12.2-30.0)
12-hr	3.20 (2.46-4.16)	4.26 (3.17-5.19)	5.72 (4.40-7.31)	7.17 (5.47-9.40)	9.44 (7.02-12.9)	11.5 (8.30-16.1)	13.8 (9.68-19.8)	16.5 (11.2-24.2)	20.6 (13.5-31.3)	24.0 (15.4-37.4)
24-hr	3.61 (2.79-4.67)	4.89 (3.62-5.88)	6.61 (5.10-8.40)	8.36 (6.40-10.9)	11.1 (8.32-15.1)	13.6 (9.90-19.0)	16.5 (11.6-23.5)	19.7 (13.5-28.8)	24.5 (15.2-37.1)	28.5 (18.3-44.2)
2-day	3.98 (3.09-5.13)	5.50 (4.08-6.53)	7.51 (5.82-9.49)	9.58 (7.37-12.4)	12.9 (9.72-17.5)	15.9 (11.7-22.2)	19.4 (13.7-27.5)	23.1 (15.8-33.4)	28.2 (18.7-42.5)	32.4 (20.9-50.1)
3-day	4.29 (3.34-5.51)	5.93 (4.42-7.04)	8.13 (6.31-10.2)	10.4 (8.00-13.4)	13.9 (10.5-18.9)	17.2 (12.6-23.9)	20.9 (14.8-29.5)	24.7 (16.9-35.6)	29.9 (19.8-44.9)	34.1 (22.1-52.7)
4-day	4.62 (3.60-5.91)	6.32 (4.74-7.53)	8.64 (6.73-10.9)	11.0 (8.47-14.2)	14.6 (11.1-19.7)	17.9 (13.2-24.9)	21.6 (15.3-30.5)	25.5 (17.5-36.7)	30.8 (20.4-46.1)	35.0 (22.7-53.9)
7-day	5.51 (4.32-7.03)	7.28 (5.56-8.78)	9.78 (7.66-12.3)	12.2 (9.46-15.7)	15.9 (12.1-21.4)	19.2 (14.1-26.5)	22.9 (16.3-32.1)	26.7 (18.4-38.4)	32.0 (21.3-47.8)	36.2 (23.6-55.6)
10-day	6.24 (4.90-7.95)	8.07 (6.21-9.80)	10.7 (8.40-13.4)	13.2 (10.2-16.9)	16.9 (12.8-22.6)	20.2 (14.9-27.8)	23.8 (17.0-33.4)	27.6 (19.1-39.7)	32.9 (22.0-49.1)	37.2 (24.2-56.9)
20-day	8.27 (6.52-10.5)	10.2 (8.01-12.6)	13.2 (10.4-16.5)	15.8 (12.4-20.2)	19.7 (14.9-26.1)	22.9 (16.9-31.2)	26.4 (18.9-36.8)	30.1 (20.9-43.1)	35.3 (23.7-52.5)	39.5 (25.9-60.3)
30-day	9.96 (7.87-12.6)	12.0 (9.51-14.9)	15.2 (12.1-19.1)	18.0 (14.1-22.9)	22.0 (16.7-28.9)	25.2 (18.5-34.1)	28.5 (20.4-39.7)	32.2 (22.4-46.0)	37.2 (25.1-55.2)	41.3 (27.1-62.9)
45-day	12.5 (9.90-15.7)	14.7 (11.8-18.3)	18.3 (14.6-23.0)	21.3 (16.8-27.1)	25.5 (19.4-33.4)	28.7 (21.2-38.7)	32.0 (23.0-44.4)	35.4 (24.8-50.5)	40.1 (27.0-59.3)	43.7 (28.7-66.4)
60-day	14.8 (11.7-18.6)	17.2 (13.6-21.5)	21.2 (17.0-26.5)	24.4 (19.2-31.0)	28.8 (21.9-37.6)	32.0 (23.7-43.1)	35.2 (25.3-48.7)	38.4 (26.9-54.7)	42.6 (28.8-62.9)	45.8 (30.1-69.4)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Table 3.5.4

3.5.5 Small Watershed Hydrograph Development

The Malcom, H.R Small Watershed Hydrograph Method was used to develop curvilinear design hydrographs for each drainage sub-area within the study limits. The assigned hydrograph peaks at a designated flow rate, obtained using the rational formula, and contains a runoff volume consistent with the design rainfall as updated by NOAA Atlas 14. The precipitation depths for the 10-year, 100-year, and 500-year, 24-hour duration, AEP storm events are provided in Table 3.5.4.

3.6 Hydrologic and Hydraulic Analysis

3.6.1 Hydrologic Analysis

Th District's overall drainage area was divided into smaller subareas based on overland drainage patterns and offsite flow. Each sub-area represents the area contributing flow at a specific point of interest and are shown in Exhibit 4. Each subarea was then assigned a specific hydrograph (Appendix A) to model the existing overland conditions more accurately. Once the drainage patterns were analyzed, VSE focused on areas portraying a high potential flood risk. A more detailed model consisting of an integrated 1D subsurface network with a 2D DTM was created and analyzed for the high ponding areas.

3.6.2 Hydraulic Analysis

A XPSTORM/XPSWMM 1D/2D integrated model was developed to analyze The District. The storm sewer pipes are modeled as links while manholes and inlets are modeled as nodes. The District's network consists of inlets, storm sewer pipes, and drainage swales. The DTM acknowledged the drainage swales and were therefore integrated in the 2D portion of the model. The elevations used in the model are obtained from the 2018 LiDAR DTM and record drawings. The overall drainage pattern for Th District was first modeled using a rain-on-grid method, which involves directly applying a rainfall hydrograph to the DTM, which resulted in obtaining the overland flow pattern of The District. The District drainage boundary was then delineated into sub-drainage areas allowing for rain and area-specific hydrographs to be developed and applied as rain-on-grid over each drainage sub-areas for a more accurate representation of drainage within The District. Once the high ponding areas were identified, separate 1D/2D integrated models were created for each high ponding area. These models further broke down each high ponding area by applying rain and area-specific hydrographs to inlets which allowed for the models to account for infiltration and dynamically connect the underground stormwater drainage network and the DTM. The integrated 1D/2D models were utilized to portray the most accurate representation of local inundation within each of the designated high ponding areas and can be observed in Exhibits 8, 9, & 10.

SECTION 4.0 – SUMMARY & CONCLUSION

In general, the lack of conveyance capacity, whether due to undersized storm sewers or the condition of the existing storm sewers plus the lack of detention, are some of the factors that cause localized flooding within The District. VSE's analysis concludes that the following designated high ponding areas are the main areas of concern for local storm event flooding within The District.

Ponding Area 1:

This area is located in the Northwestern region of The District. After analyzing the area, modeling by use of XPSTORM/XPSWMM revealed that the existing storm sewer system lacks the capacity to convey the contributing stormwater runoff, as seen in Exhibits 8, 9, & 10. The first step in possibly resolving the local flooding issues of this area would be to explore the possibility of implementing a detention pond in place of the existing amenity pond within the abandoned portion of the golf course and upsizing various storm sewer pipes. The potential areas to be explored for improvements are highlighted in Exhibit 17. This recommendation should not be utilized for anything other than preliminary design discussions.

Ponding Area 2:

The subject area is located in the central region of The District. Upon analyzing the area, assumptions were made regarding the existing storm sewer network's pipe sizes and swale slopes. The most conservative approach was taken. Modeling by use of XPSMM/XPSTORM revealed that the upstream portions of the network within the area lack the capacity to convey runoff efficiently, causing localized flooding in the area, seen in Exhibits 8, 9, & 10. A potential solution would be to investigate utilizing the existing wooded areas on both sides of River Planation Drive, just South and Southeast of the intersection of River Plantation Drive and Robert E. Lee Drive, for detention purposes during the localized extreme rain events. The potential detention basin locations are highlighted in Exhibit 18. Exploration of this solution would be to determine if the overwhelming runoff could be routed to the potential detention basins and if the potential detention basin areas would provide enough storage to achieve a positive impact to the localized flooding within the subject region. This recommendation should not be utilized for anything other than preliminary design discussions.

Ponding Area 3:

The area is located in the Eastern region of the District. It can be observed that the existing drainage network is overwhelmed, and the existing amenity pond overtops its banks causing localized flooding in the area, as seen in Exhibits 8, 9, & 10. After analyzing the drainage network, it was determined that the existing weir structure does not provide enough capacity to restrict the amenity pond's water surface to reside within its banks. Potential solutions to positively impact the localized flooding would be to further analyze the existing weir structure and investigate reconstruction to increase its capacity, increasing the outlet's pipe size, or excavation of an extreme event overflow swale that routes the overflow safely and provides temporary detention during the localized extreme rain events. The areas of potential improvements are highlighted in Exhibit 19. This recommendation should not be utilized for anything other than preliminary design discussions.

EXHIBITS

EXHIBIT 1

Vicinity Map

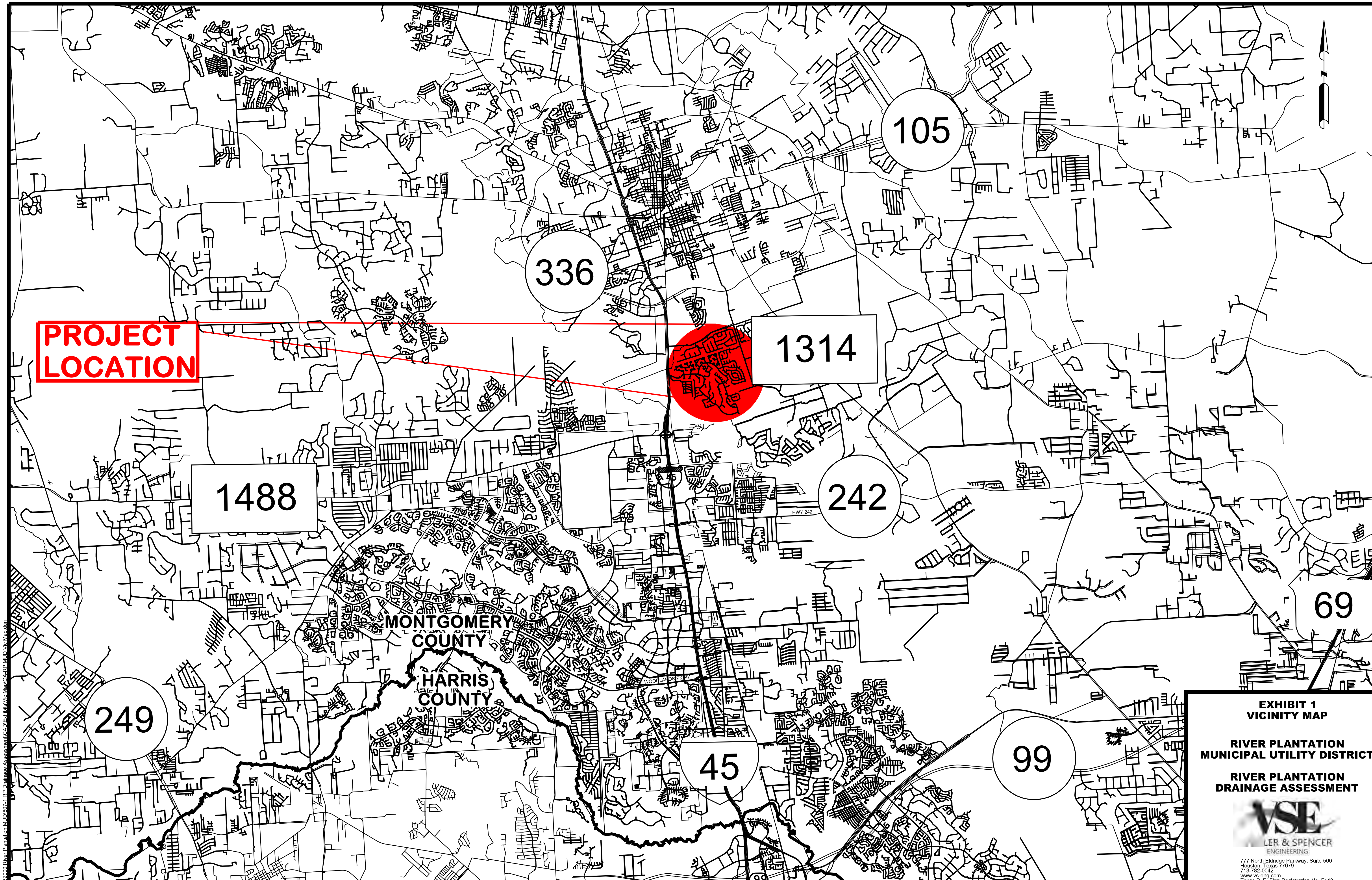

EXHIBIT 1
VICINITY MAP

RIVER PLANTATION
MUNICIPAL UTILITY DISTRICT

RIVER PLANTATION
DRAINAGE ASSESSMENT

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EXHIBIT 2

Project Location

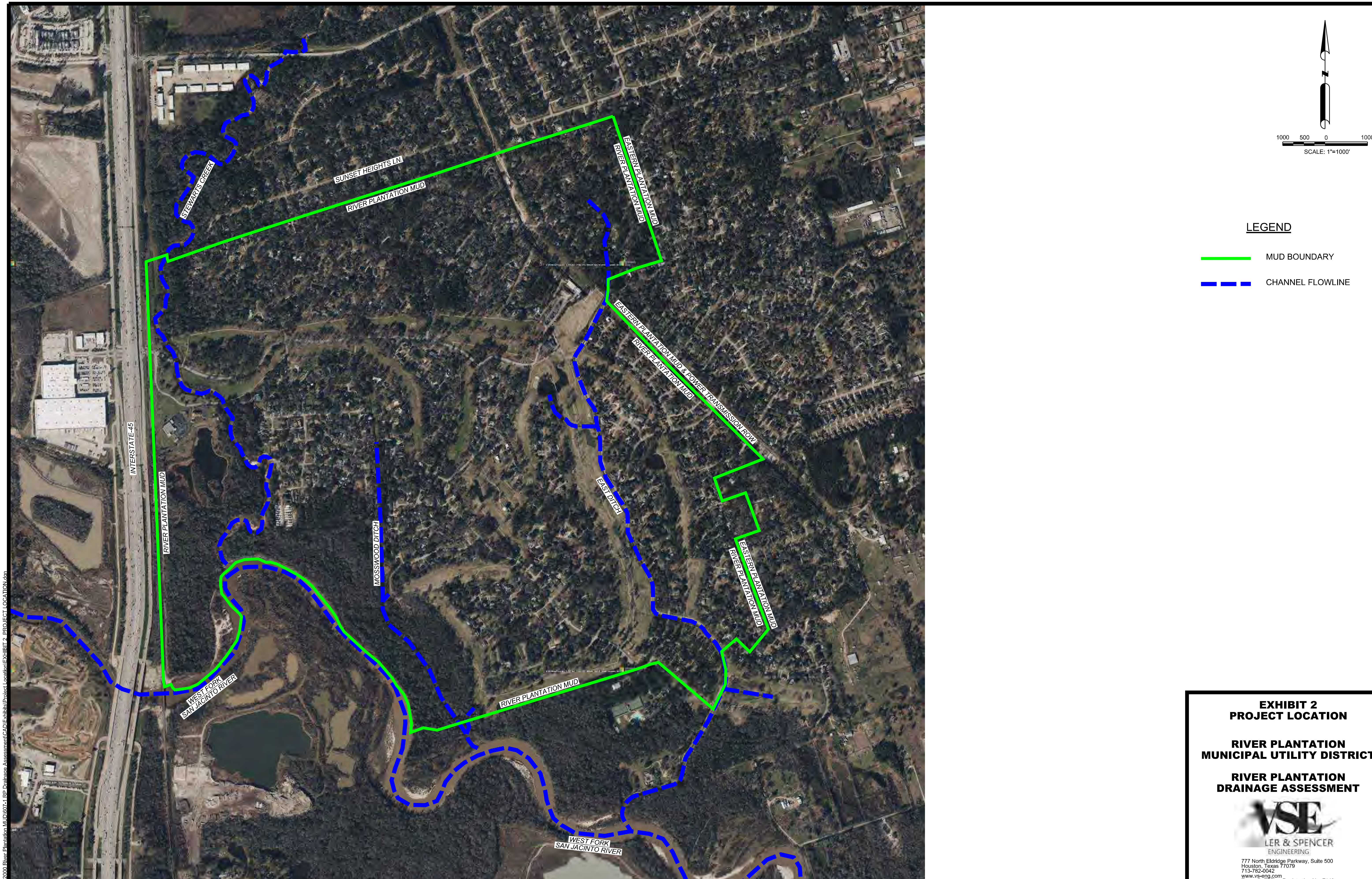

EXHIBIT 2
PROJECT LOCATION

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EXHIBIT 3

FEMA FIRMs

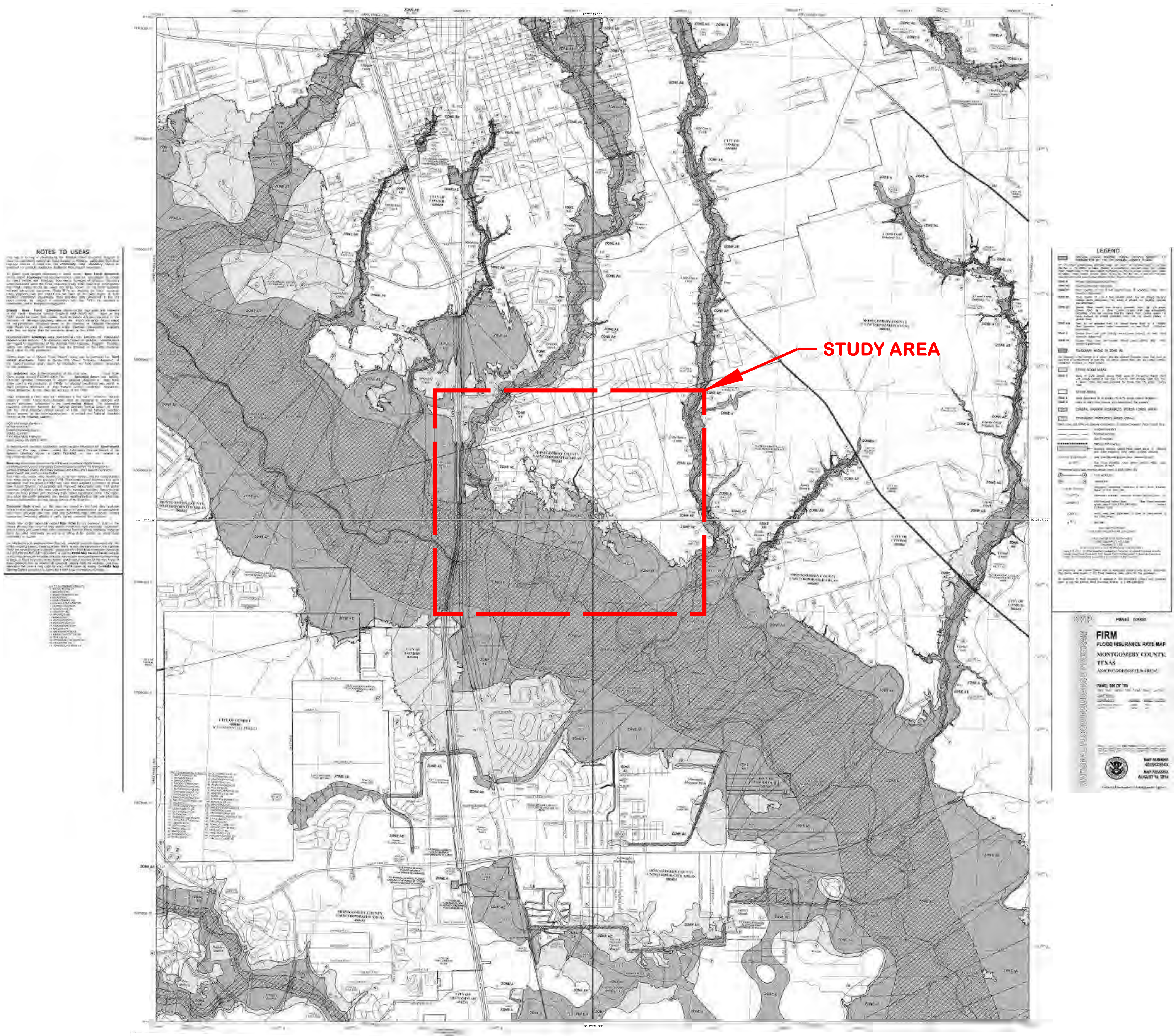

EXHIBIT 3
FEMA FIRMs

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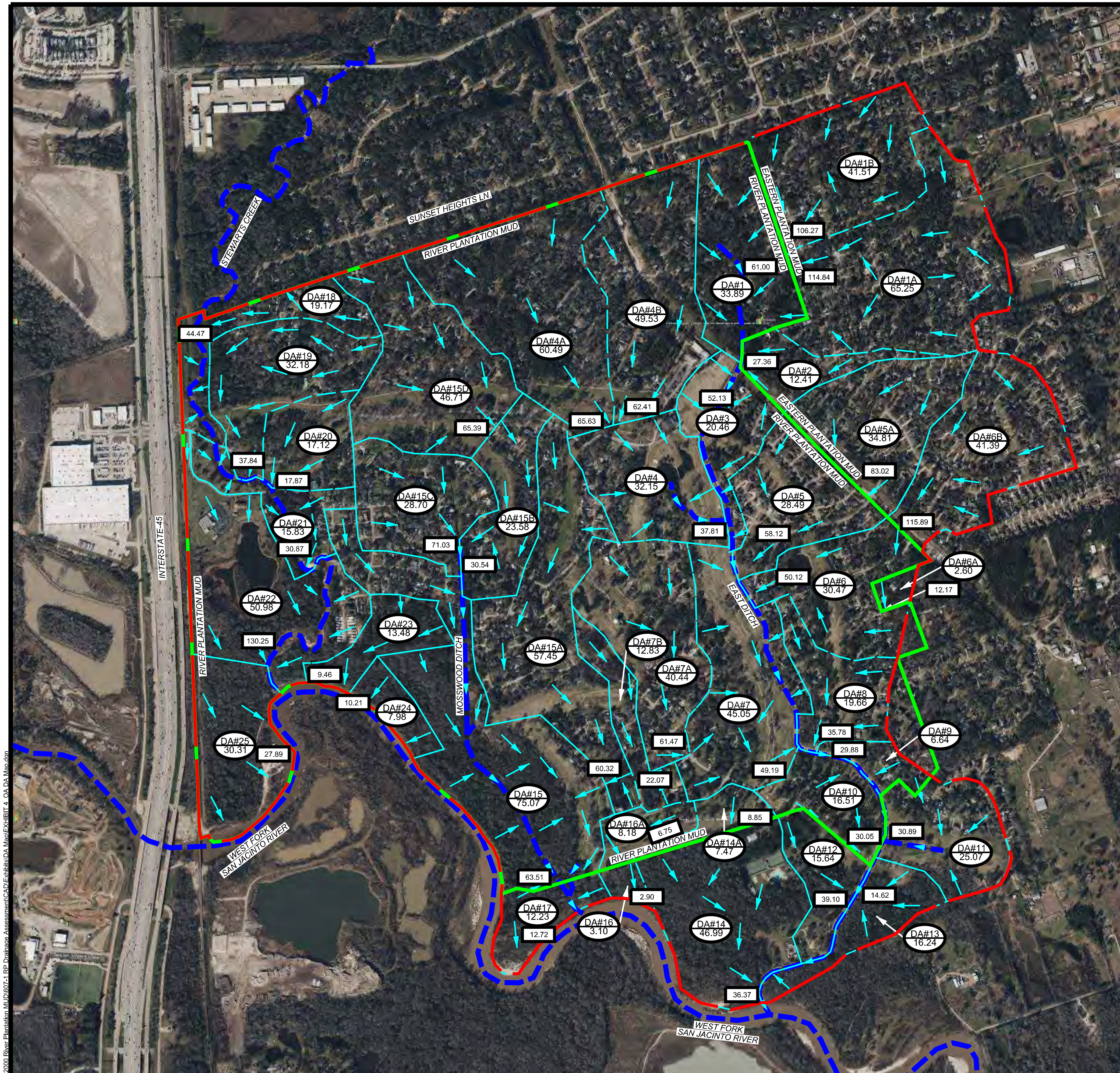
EXHIBIT 4

Overall Existing Drainage Area Map



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LEGEND

- EXIST.CONTOUR LINE
- DRAINAGE AREA LIMITS
- DRAINAGE SUBAREA ID / DRAINAGE SUBAREA (AC)
- DRAINAGE AREA'S PEAK 100-YR FLOW RATE (CFS)
- SHEET FLOW
- MUD BOUNDARY
- CHANNEL FLOWLINE
- OVERALL DRAINAGE AREA

EXHIBIT 4
OVERALL EXISTING DRAINAGE AREA MAP

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EXHIBIT 5

Existing Storm Sewer Layout (1 of 3)

N

300 150 0 300

SCALE: 1"=300'

LEGEND

96	EXIST.CONTOUR LINE
	MUD BOUNDARY
	OVERALL DRAINAGE AREA
	EXIST.STORM SEWER, MANHOLE & INLETS
	CHANNEL FLOWLINE

EXHIBIT 5
EXISTING STORM SEWER LAYOUT
(1 OF 3)

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EXHIBIT 6

Existing Storm Sewer Layout (2 of 3)

N

300 150 0 300

SCALE: 1"=300'

LEGEND

96	EXIST.CONTOUR LINE
	MUD BOUNDARY
	OVERALL DRAINAGE AREA
	EXIST.STORM SEWER, MANHOLE & INLETS
	CHANNEL FLOWLINE

EXHIBIT 6
EXISTING STORM SEWER LAYOUT
(2 OF 3)

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EXHIBIT 7

Existing Storm Sewer Layout (3 of 3)

300 150 0 300

SCALE: 1"=300'

LEGEND

96	EXIST.CONTOUR LINE
	MUD BOUNDARY
	OVERALL DRAINAGE AREA
	EXIST.STORM SEWER, MANHOLE & INLETS
	CHANNEL FLOWLINE

EXHIBIT 7
EXISTING STORM SEWER LAYOUT
(3 OF 3)

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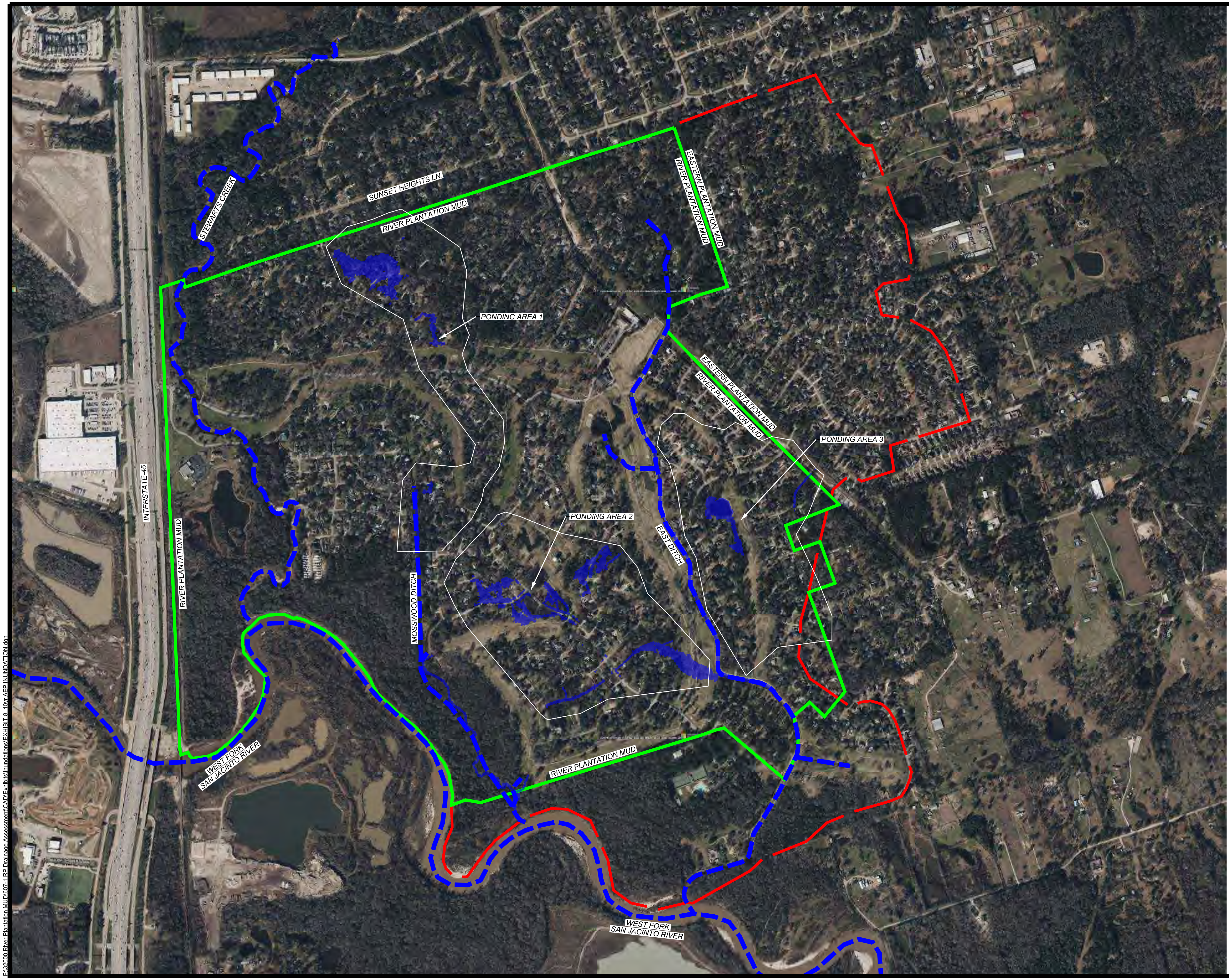
EXHIBIT 8

Local Storm 10% AEP Inundation Layout



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SCALE: 1"=1000'

LEGEND

MUD BOUNDARY

CHANNEL FLOWLINE

OVERALL DRAINAGE AREA

10% AEP LOCAL INUNDATION

EXHIBIT 8
EXIST. 10% AEP LOCAL INUNDATION

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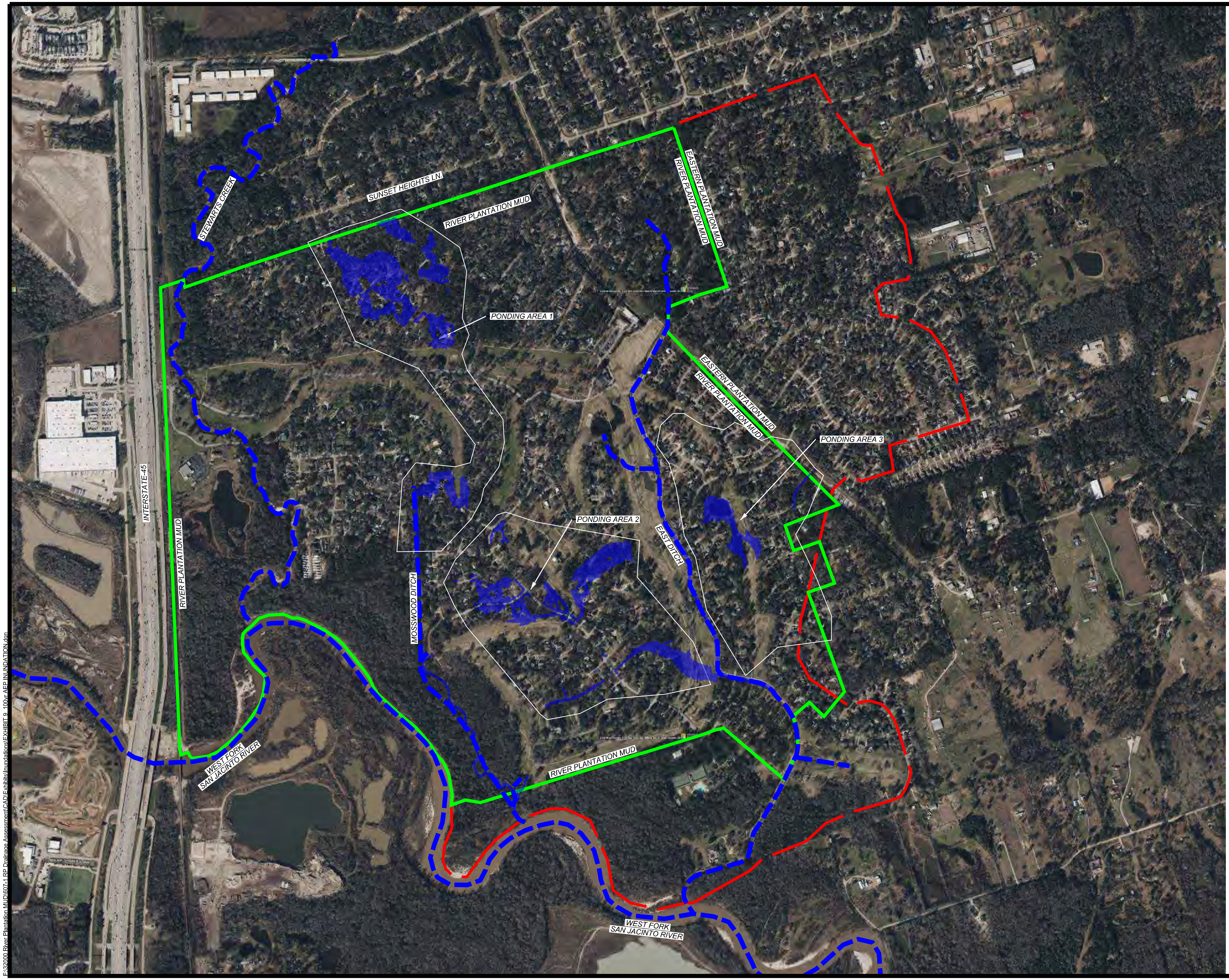
EXHIBIT 9

Local Storm 1% AEP Inundation Layout



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SCALE: 1"=1000'

LEGEND

- MUD BOUNDARY
- CHANNEL FLOWLINE
- OVERALL DRAINAGE AREA
- 1% AEP LOCAL INUNDATION

EXHIBIT 9
EXIST. 1% AEP LOCAL INUNDATION

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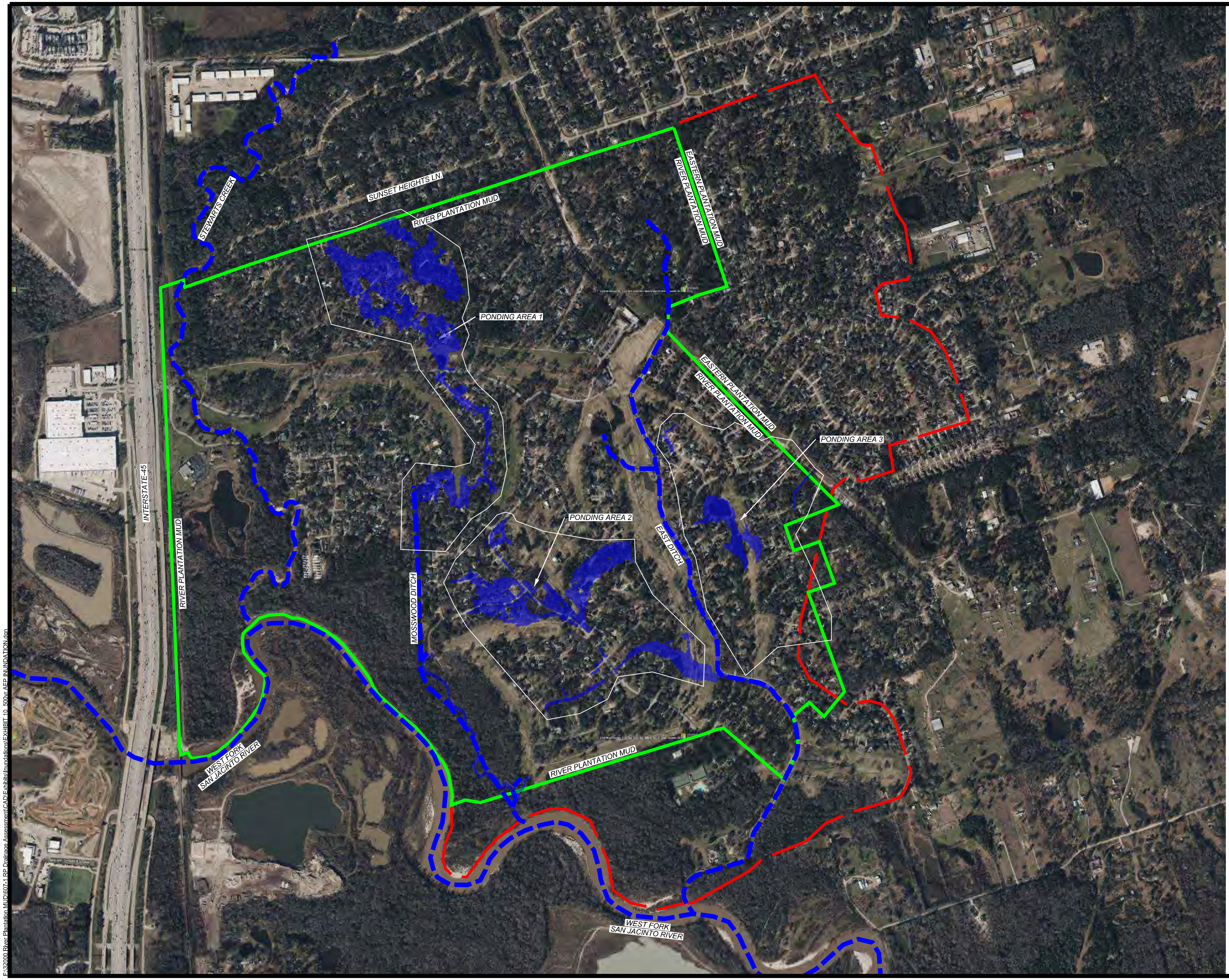
EXHIBIT 10

Local Storm 0.2% AEP Inundation Layout



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SCALE: 1"=1000'

LEGEND

- MUD BOUNDARY
- CHANNEL FLOWLINE
- OVERALL DRAINAGE AREA
- 0.2% AEP LOCAL INUNDATION

EXHIBIT 10
EXIST. 0.2% AEP LOCAL INUNDATION

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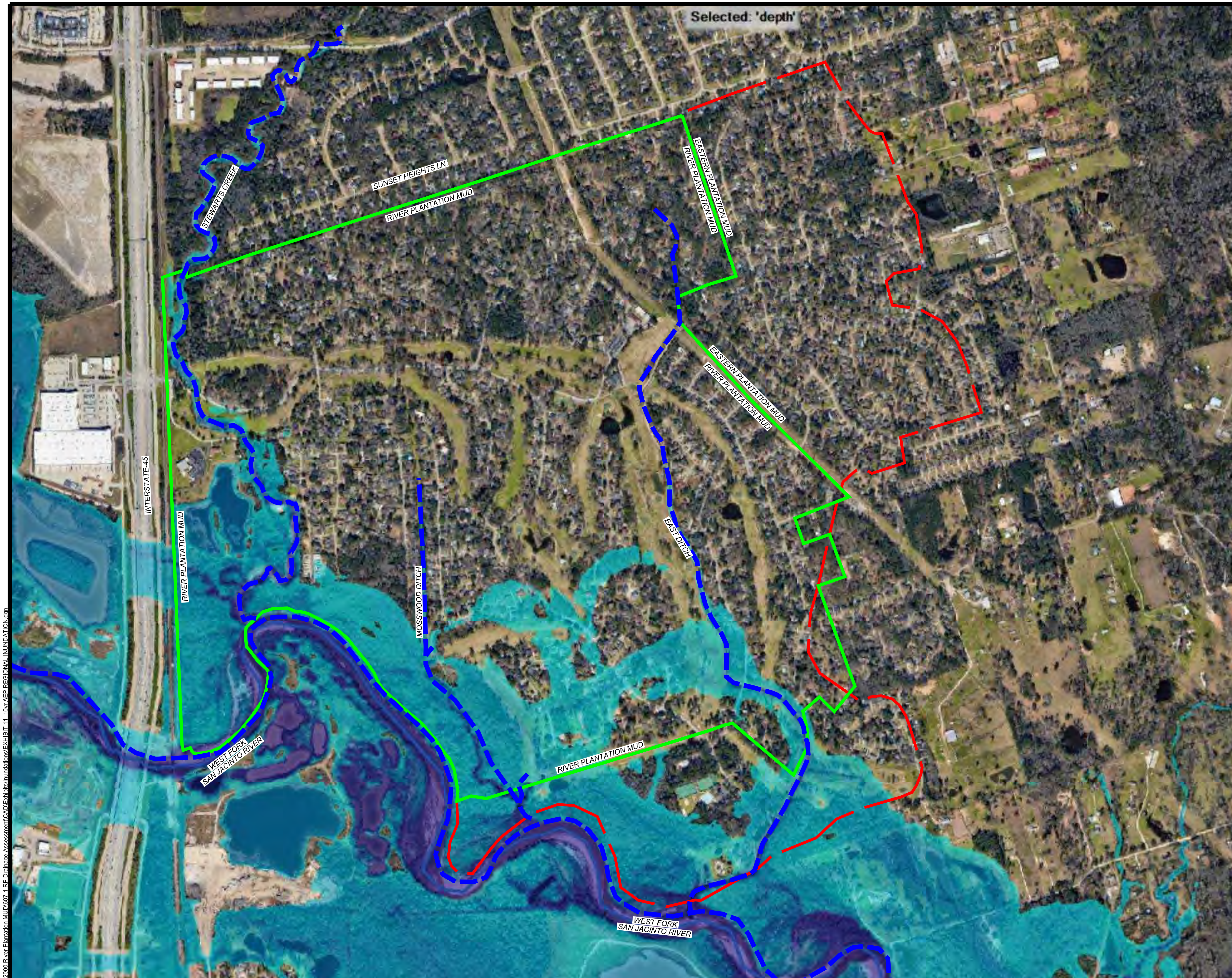
EXHIBIT 11

Regional Storm 10% AEP Inundation Layout



LEGEND

- MUD BOUNDARY
- CHANNEL FLOWLINE
- OVERALL DRAINAGE AREA
- 10% AEP REGIONAL INUNDATION

NOTES

REGIONAL INUNDATION AS PER:
"SAN JACINTO REGIONAL WATERSHED MASTER DRAINAGE PLAN"

PREPARED FOR:
HARRIS COUNTY FLOOD CONTROL DISTRICT, SAN JACINTO RIVER AUTHORITY, MONTGOMERY COUNTY, & CITY OF HOUSTON.

PREPARED BY:
HALFF ASSOCIATES, INC. TBPE FIRM REGISTRATION No. 312
FREESE AND NICHOLS, INC. TBPE FIRM REGISTRATION No. 2144.

DATED:
DECEMBER 2020

EXHIBIT 11
EXIST. 10% AEP REGIONAL INUNDATION

RIVER PLANTATION MUNICIPAL UTILITY DISTRICT

RIVER PLANTATION DRAINAGE ASSESSMENT

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EXHIBIT 12

Regional Storm 1% AEP Inundation Layout

N

LEGEND

- MUD BOUNDARY
- CHANNEL FLOWLINE
- OVERALL DRAINAGE AREA
- 1% AEP REGIONAL INUNDATION

NOTES

REGIONAL INUNDATION AS PER:
"SAN JACINTO REGIONAL WATERSHED MASTER DRAINAGE PLAN"

PREPARED FOR:
HARRIS COUNTY FLOOD CONTROL DISTRICT, SAN JACINTO RIVER AUTHORITY, MONTGOMERY COUNTY, & CITY OF HOUSTON.

PREPARED BY:
HALFF ASSOCIATES, INC. TBPE FIRM REGISTRATION No. 312
FREESE AND NICHOLS, INC. TBPE FIRM REGISTRATION No. 2144.

DATED:
DECEMBER 2020

EXHIBIT 12
EXIST. 1% AEP REGIONAL INUNDATION

RIVER PLANTATION MUNICIPAL UTILITY DISTRICT

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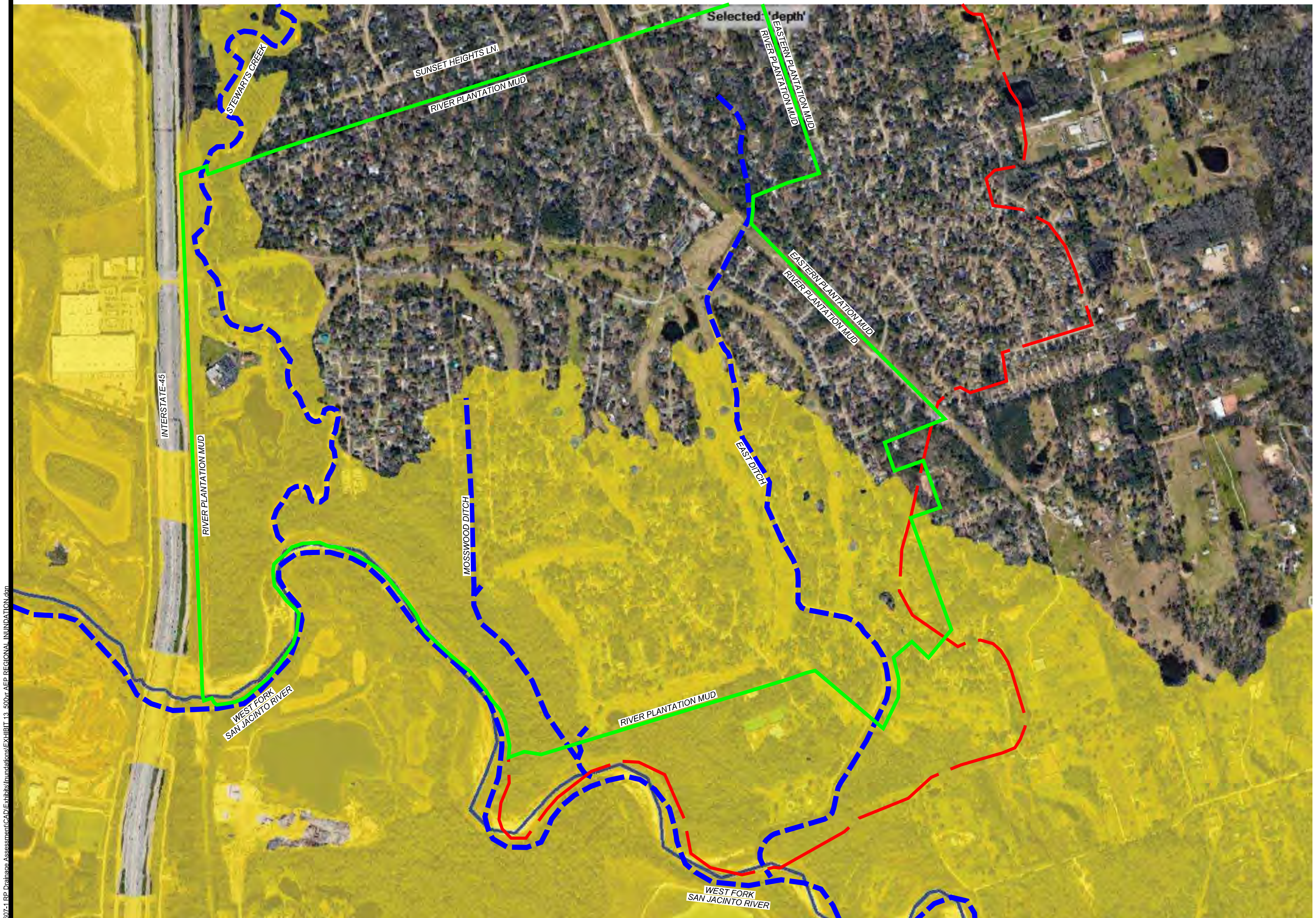
EXHIBIT 13

Regional Storm 0.2% AEP Inundation Layout



LEGEND

- MUD BOUNDARY
- CHANNEL FLOWLINE
- OVERALL DRAINAGE AREA
- 0.2% AEP REGIONAL INUNDATION

NOTES

REGIONAL INUNDATION AS PER:
"SAN JACINTO REGIONAL WATERSHED MASTER DRAINAGE PLAN"

PREPARED FOR:
HARRIS COUNTY FLOOD CONTROL DISTRICT, SAN JACINTO RIVER AUTHORITY, MONTGOMERY COUNTY, & CITY OF HOUSTON.

PREPARED BY:
HALFF ASSOCIATES, INC. TBPE FIRM REGISTRATION No. 312
FREESE AND NICHOLS, INC. TBPE FIRM REGISTRATION No. 2144.

DATED:
DECEMBER 2020

EXHIBIT 13
EXIST. 0.2% AEP REGIONAL INUNDATION

RIVER PLANTATION MUNICIPAL UTILITY DISTRICT

RIVER PLANTATION DRAINAGE ASSESSMENT

VSE
LER & SPENCER ENGINEERING
777 North Eldridge Parkway, Suite 500
Houston, Texas 77079
713-782-0042
www.vs-eng.com
Texas P. E. Firm Registration No. F148

LukeV
12:39:50 PM 12/28/2023
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EXHIBIT 14

XPSWMM/XPSTORM Model Layout Area 1

EXHIBIT 14
XPSWMM/XPSTORM MODEL
LAYOUT AREA 1

RIVER PLANTATION
MUNICIPAL UTILITY DISTRICT

RIVER PLANTATION
DRAINAGE ASSESSMENT

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ENGINEERING

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EXHIBIT 15

XPSWMM/XPSTORM Model Layout Area 2

EXHIBIT 15
XPSWMM/XPSTORM MODEL
LAYOUT AREA 2

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7:55:48 AM 2/6/2024
F:\32000 River Plantation MUD\607-1 RP Drainage Assessment\CAD\Exhibits\SWMM Model Layout\SWMM Layout Area 2.dgn

EXHIBIT 16

XPSWMM/XPSTORM Model Layout Area 3

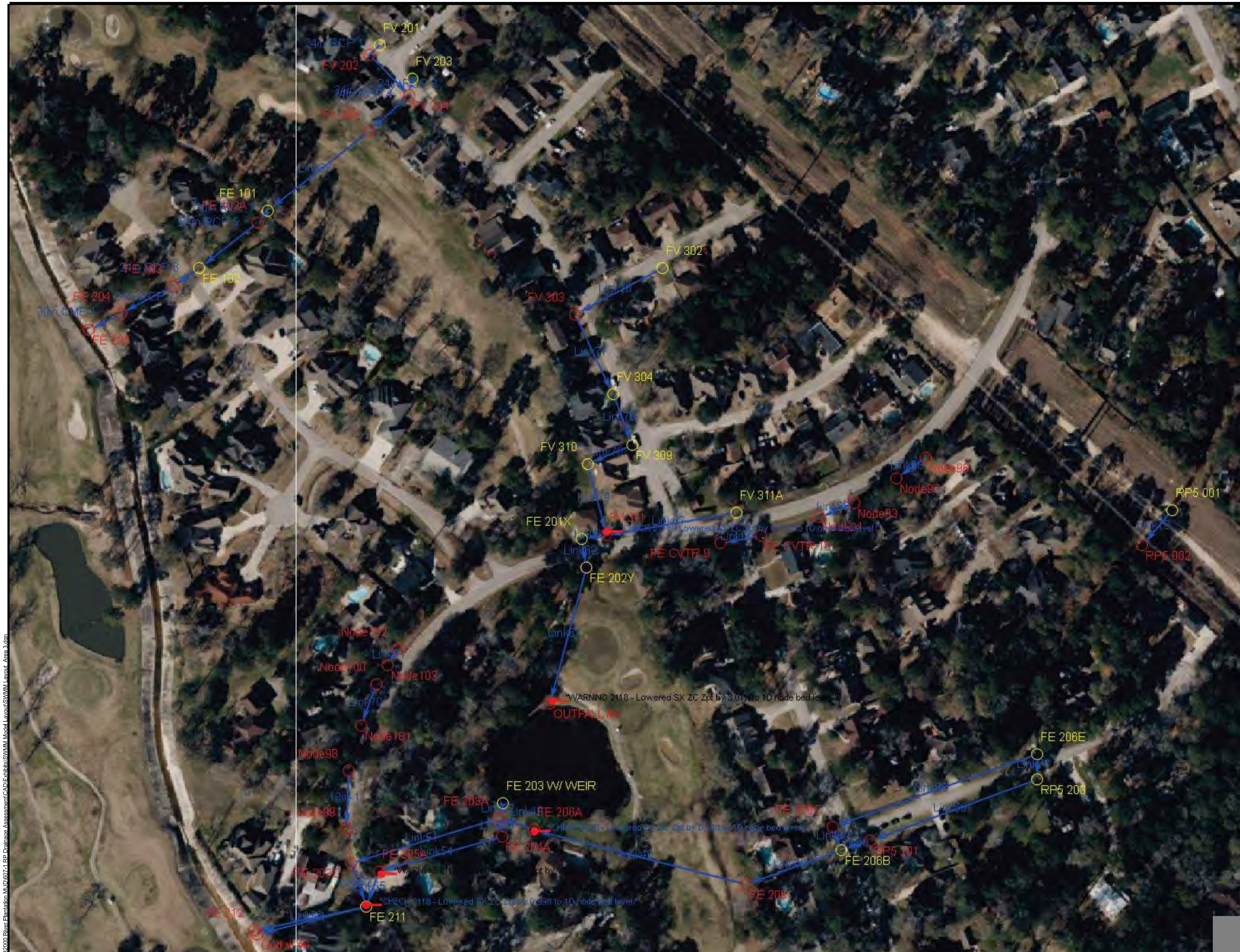

EXHIBIT 16
XPSWMM/XPSTORM MODEL
LAYOUT AREA 3

RIVER PLANTATION
MUNICIPAL UTILITY DISTRICT

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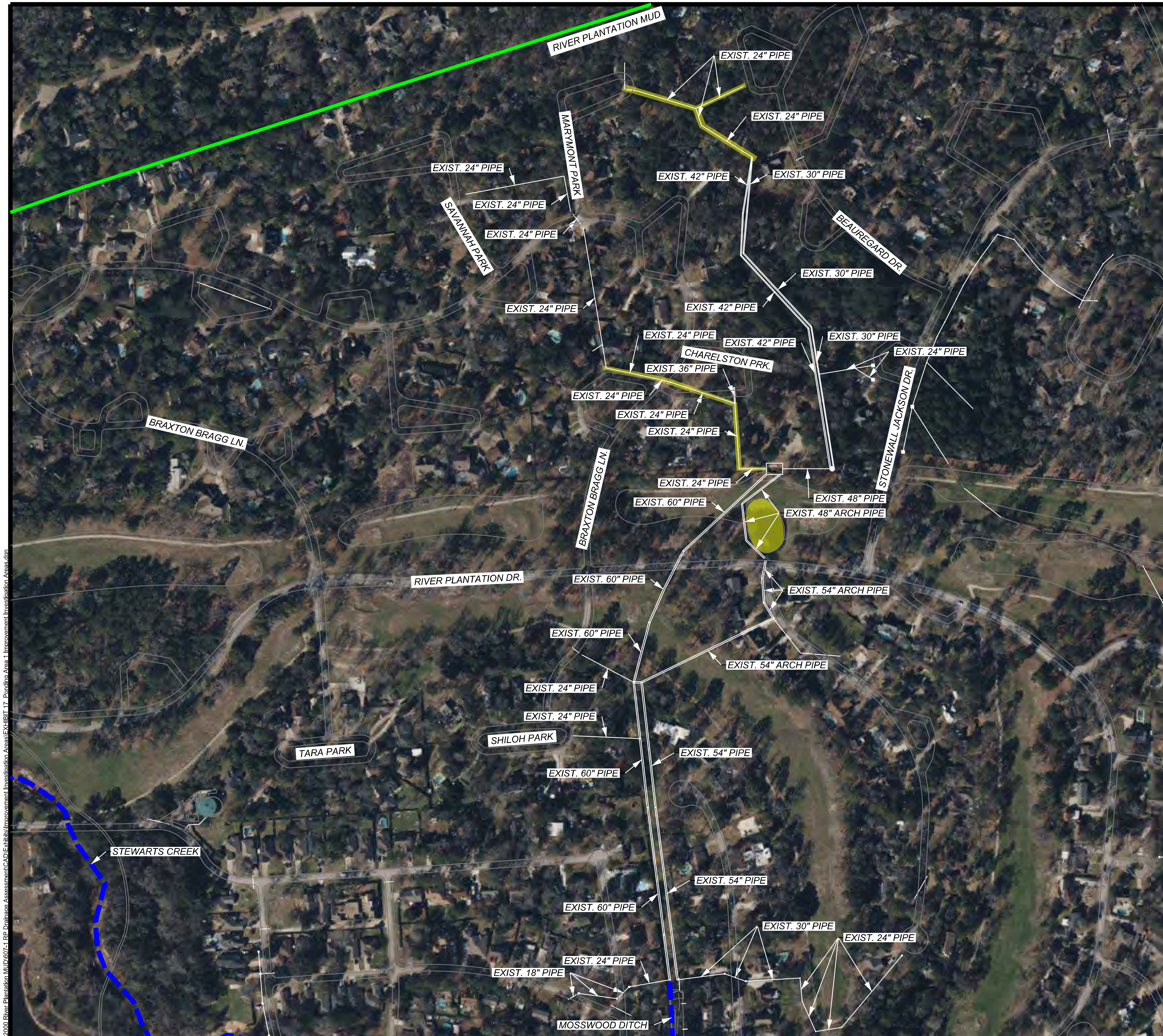
EXHIBIT 17

Ponding Area 1 Improvement Investigation Areas



300 150 0 300

SCALE: 1"=300'

LEGEND

- 96 — EXIST.CONTOUR LINE
- MUD BOUNDARY
- OVERALL DRAINAGE AREA
- EXIST.STORM SEWER, MANHOLE & INLETS
- CHANNEL FLOWLINE
- PONDING AREA 1 IMPROVMENT INVESTIGATION AREAS

EXHIBIT 17
PONDING AREA 1 IMPROVMENT INVESTIGATION AREAS

RIVER PLANTATION MUNICIPAL UTILITY DISTRICT

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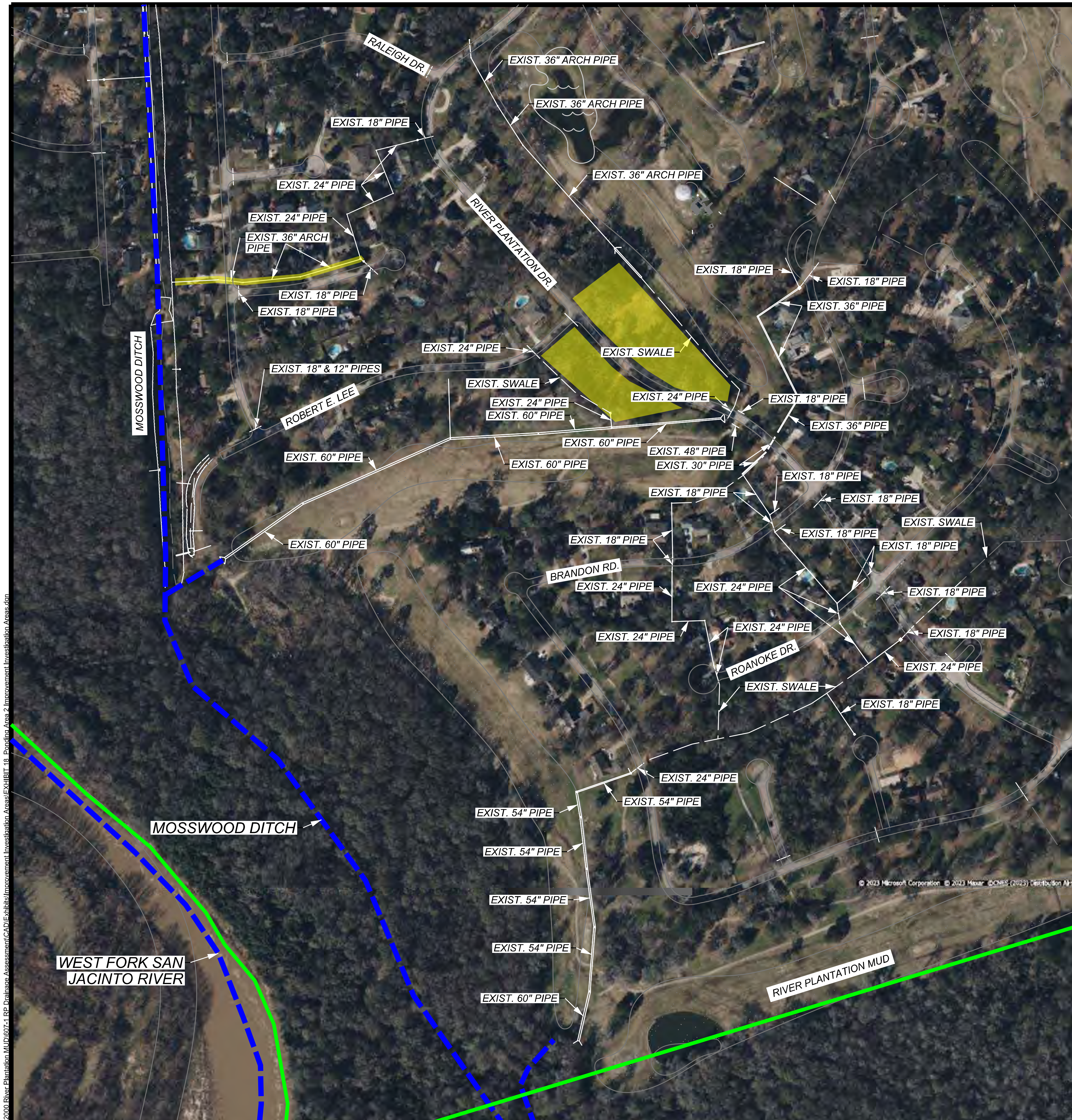
EXHIBIT 18

Ponding Area 2 Improvement Investigation Areas



300 150 0 300

SCALE: 1"=300'

LEGEND

- EXIST. CONTOUR LINE
- MUD BOUNDARY
- OVERALL DRAINAGE AREA
- EXIST. STORM SEWER, MANHOLE & INLETS
- CHANNEL FLOWLINE
- PONDING AREA 2 IMPROVMENT INVESTIGATION AREAS

EXHIBIT 18
PONDING AREA 2 IMPROVEMENT INVESTIGATION AREAS

RIVER PLANTATION MUNICIPAL UTILITY DISTRICT

RIVER PLANTATION DRAINAGE ASSESSMENT

VSE
[illegible]LER & SPENCER ENGINEERING

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EXHIBIT 19

Ponding Area 3 Improvement Investigation Areas

300 150 0 300

SCALE: 1"=300'

LEGEND

96	EXIST.CONTOUR LINE
	MUD BOUNDARY
	OVERALL DRAINAGE AREA
	EXIST.STORM SEWER, MANHOLE & INLETS
	CHANNEL FLOWLINE
	PONDING AREA 3 IMPROVMENT INVESTIGATION AREAS

EXHIBIT 19
PONDING AREA 3 IMPROVEMENT INVESTIGATION AREAS

RIVER PLANTATION MUNICIPAL UTILITY DISTRICT

RIVER PLANTATION DRAINAGE ASSESSMENT

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LukeV
12:05:00 PM 2/1/2024
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APPENDICES

APPENDIX A

Peak Runoff Rate Calculations

OA ROG EXISTING CALCULATIONS

Area =	1839.49 ac.		
Volume (100yr) =	1.38*area*43560 =	110576894.5	cft
Volume (10yr)=	0.70*area*43560=	56089729.08	cft
Volume (2yr)=	0.41*area*43560=	32852555.6	cft
Volume (50yr)=	1.13*area*43560=	90544848.37	cft

The equation for the Site Runoff Curves

Q = bA^m

where	Q	peak discharge (cfs)
	A	drainage area (acres)
	m	1 for 1 to 20 acres
		0.786 for 20 to 640 acres
	b	variable dependent on impervious cover.

Tp = time to Qp in seconds

Tp = $\dfrac{\mathbf{V}}{\mathbf{1.39\ Qp}}$

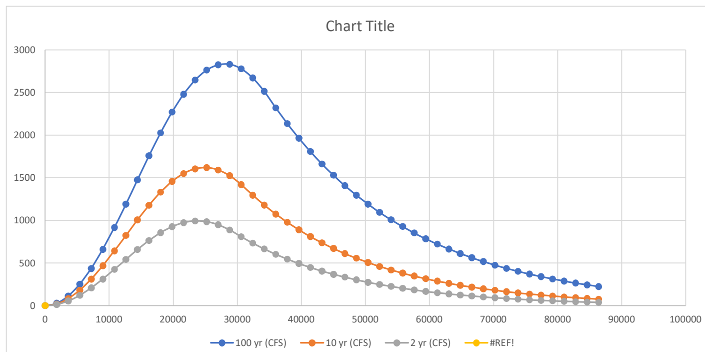
$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

	Existing Conditions		
	10 yrs	100 yrs	2 yrs
b=	4.4	7.7	2.7
Qp=	1619.96	2834.93	994.07
Tp=	24909.42397	28061.23	23775.98
1.25*Tp=	31136.77997	35076.54	29719.97

@ 30% Imp.

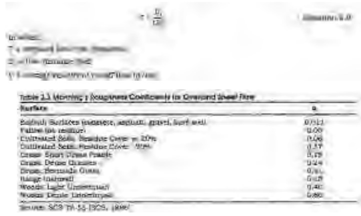
ti (sec)	100 yr (CFS)	10 yr (CFS)	2 yr (CFS)	ti (hr)
0	0	0	0	0
1800.00	28.68428894	20.7824274	13.99186691	0.5
3600.00	113.5762278	82.06324196	55.17970501	1
5400.00	251.2400186	180.6977675	121.2445786	1.5
7200.00	436.1040489	311.6244909	208.4669383	2
9000.00	660.6863895	468.1247978	311.9360374	2.5
10800.00	915.8976077	642.1677444	425.8264138	3
12600.00	1191.40864	824.8221713	543.7258722	3.5
14400.00	1476.068838	1006.715014	658.9965001	4
16200.00	1758.35726	1178.512289	765.148392	4.5
18000.00	2026.848959	1331.398076	856.2050408	5
19800.00	2270.677376	1457.526913	927.0398235	5.5
21600.00	2479.974139	1550.426393	973.6646378	6
23400.00	2646.268462	1605.329302	993.4544384	6.5
25200.00	2762.829981	1619.418251	985.2950305	7
27000.00	2824.941148	1591.970254	949.6458006	7.5
28800.00	2830.088161	1524.393828	888.5138528	8
30600.00	2778.062708	1420.156713	809.6179065	8.5
32400.00	2670.970394	1296.088411	733.7319395	9
34200.00	2513.145525	1179.877317	664.9588093	9.5
36000.00	2321.262749	1074.086051	602.6318254	10
37800.00	2135.545777	977.7803404	546.1467866	10.5
39600.00	1964.68744	890.1096828	494.9561241	11
41400.00	1807.498943	810.2998339	448.5635928	11.5
43200.00	1662.886606	737.6459705	406.519461	12
45000.00	1529.84425	671.5064659	368.4161506	12.5
46800.00	1407.446197	611.2972236	333.8842861	13
48600.00	1294.840829	556.4865188	302.5891137	13.5
50400.00	1191.244665	506.5903028	274.2272565	14
52200.00	1095.936905	461.1679282	248.5237729	14.5
54000.00	1008.254422	419.818257	225.2294922	15
55800.00	927.5871391	382.1761189	204.1185982	15.5
57600.00	853.3737936	347.9090854	184.9864408	16
59400.00	785.0980257	316.7145348	167.6475519	16.5
61200.00	722.2847884	288.3169792	151.9338473	17
63000.00	664.4970417	262.4656319	137.6929976	17.5
64800.00	611.332712	238.9321924	124.7869512	18
66600.00	562.4218939	217.5088301	113.0905962	18.5
68400.00	517.4242774	198.0063495	102.4905475	19
70200.00	476.0267794	180.2525185	92.88404764	19.5
72000.00	437.9413658	164.0905482	84.17797072	20
73800.00	402.903047	149.3777076	76.28791955	20.5
75600.00	370.6680345	135.9840636	69.13740757	21
77400.00	341.0120445	123.791333	62.65711732	21.5
79200.00	313.7287374	112.6918384	56.78422851	22
81000.00	288.6282825	102.5875571	51.46180907	22.5
82800.00	265.5360364	93.38925542	46.63826316	23
84600.00	244.2913287	85.01570044	42.26683106	23.5
86400.00	224.7463437	77.392943	38.3051359	24

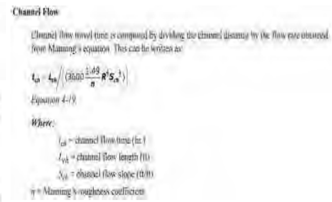


OA DA DRAINAGE CALCULATIONS

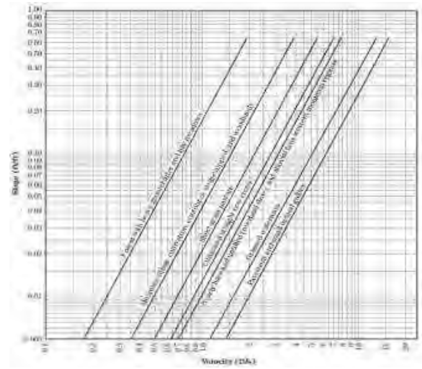
Time of Concentration:

Tc= $T_{OL} + T_1 + \dots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=		T=		
n=	0.15	D=	1247.23 (ft)	L_{ch}= 8603.79	(ft)	avg. slope of East Ditch Channel
L=	100 (ft)	S=	0.0056 (ft/ft)	S_{ch}= 0.0023	(ft/ft)	
P_2=	4.89 (in)	V=	0.4125 (ft/s)	R= 5.2763819	(ft/s)	
S=	0.0056 (ft/ft)			n= 0.015		
T_{OL}=	13.19 (min)	T_1=	50.39 (min)	T_{CH}=	9.93 (min)	



Tc= 73.51 (min)

Intensity:

	SEE FIG. 2.1-2.1a	
I (500-YrR)=	7.17 (in/hr)	NOAA ATLAS 14
I (100-YR)=	4.2 (in/hr)	
I (10-YR)=	2.7 (in/hr)	
I (2-YR)=	1.8 (in/hr)	

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4 - 1/2 acre; sub-basin slope <1%

I (500- YR)	i (100-YR)	i (10-YR)	i (2-YR)
7.17	4.2	2.7	1.8

A= 1147.16 (Ac)

Q (500-YR)=	**3291.29 (cfs)**
Q (100-YR)=	**1927.24 (cfs)**
Q (10-YR)=	**1238.94 (cfs)**
Q (2-YR)=	**825.96 (cfs)**

OA DA EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	101939797.94	cft
Volume (100-yr) =	1.38*area*43560 =	68959275.08	cft
Volume (10-yr)=	0.70*area*43560=	34979342.43	cft
Volume (2-yr)=	0.41*area*43560=	20487900.57	cft
	A=	1147.16 Ac	

Tp = time to Qp in seconds

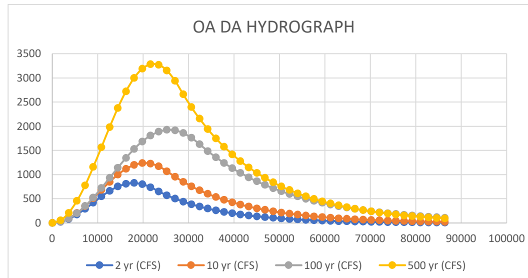
Tp = $\frac{V}{1.39\ Qp}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

OA DA Existing Conditions				
	2 - Year	10 - Year	100 - Year	500- Year
Qp=	825.96	1238.94	1927.24	3291.29
Tp=	17845.324	20311.751	25742.035	22282.432
1.25*Tp=	22306.655	25389.688	32177.544	27853.041

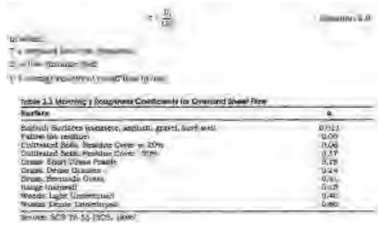
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	20.56160279	23.85242803	23.15724275	52.71009394	0.5
3600.00	80.19894988	93.57285365	91.515962	207.4637634	1
5400.00	172.9735374	203.7921566	201.7906254	454.3474775	1.5
7200.00	289.6471567	346.0224271	348.6810902	777.545848	2
9000.00	418.6018071	509.3106133	525.1273445	1156.354765	2.5
10800.00	546.9965806	681.0820087	722.6488334	1566.507701	3
12600.00	662.0463197	848.1086205	931.7520607	1981.730232	3.5
14400.00	752.2947247	997.5278486	1142.386876	2375.423173	4
16200.00	808.7551366	1117.833025	1344.429516	2722.366526	4.5
18000.00	825.8054009	1199.759533	1528.169184	3000.335075	5
19800.00	801.7477047	1236.998272	1684.77478	3191.522136	5.5
21600.00	738.9776395	1226.681513	1806.719355	3283.680252	6
23400.00	651.8214147	1169.603741	1888.141871	3270.905767	6.5
25200.00	571.7168387	1070.160476	1925.128912	3154.017017	7
27000.00	501.4565897	955.1039958	1915.902764	2940.501902	7.5
28800.00	439.8308643	851.1734956	1860.906865	2661.545587	8
30600.00	385.7785363	758.5522862	1762.784489	2396.217702	8.5
32400.00	338.3688849	676.009737	1628.61047	2157.340196	9
34200.00	296.7855686	602.4491295	1487.096074	1942.276245	9.5
36000.00	260.3125691	536.8930857	1357.878248	1748.65189	10
37800.00	228.321862	478.4705818	1239.888512	1574.329831	10.5
39600.00	200.2626029	426.4053751	1132.151224	1417.385834	11
41400.00	175.6516427	380.0056908	1033.775523	1276.087489	11.5
43200.00	154.0652081	338.6550298	943.9479541	1148.875092	12
45000.00	135.1316047	301.8039782	861.9257473	1034.344423	12.5
46800.00	118.5248169	268.9629069	787.0306732	931.2312475	13
48600.00	103.9588944	239.6954663	718.6434359	838.3973626	13.5
50400.00	91.18302827	213.6127886	656.1985518	754.818032	14
52200.00	79.97723225	190.3683209	599.1796737	679.5706748	14.5
54000.00	70.14855505	169.6532208	547.115321	611.8246815	15
55800.00	61.52775781	151.192253	499.5749817	550.8322457	15.5
57600.00	53.96639999	134.7401321	456.1655519	495.9201093	16
59400.00	47.33428344	120.0782634	416.5280855	446.4821308	16.5
61200.00	41.51721052	107.0118392	380.3348265	401.9725948	17
63000.00	36.41501769	95.36724968	347.2864983	361.9001877	17.5
64800.00	31.9398509	84.98977664	317.1098292	325.8225749	18
66600.00	28.01465275	75.74153767	289.5552931	293.3415177	18.5
68400.00	24.5718357	67.49965413	264.3950456	264.0984776	19
70200.00	21.55211828	60.15461856	241.4210405	237.7706587	19.5
72000.00	18.90350432	53.60883965	220.4433092	214.0674442	20
73800.00	16.58038765	47.77534555	201.2883901	192.727189	20.5
75600.00	14.54276677	42.57662836	183.797894	173.514331	21
77400.00	12.75555613	37.94361426	167.8271947	156.2167914	21.5
79200.00	11.18798196	33.81474575	153.244233	140.6436331	22
81000.00	9.81305237	30.13516378	139.9284245	126.6229536	22.5
82800.00	8.607092607	26.85597883	127.7696629	113.9999872	23
84600.00	7.549337387	23.93362134	116.6674091	102.6353968	23.5
86400.00	6.621573346	21.32926281	106.5298604	92.40373563	24

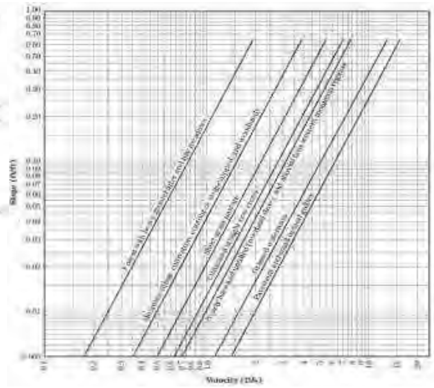


DA#1 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1247.23 (ft)
L=	100 (ft)	S=	0.0056 (ft/ft)
P_2=	4.89 (in)	V=	0.4125 (ft/s)
S=	0.0056 (ft/ft)		
T_{OL}=	13.19 (min)	T_1=	50.39 (min)

Tc= 63.58 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	4.5 (in/hr)
I (10-YR)=	3 (in/hr)
I (2-YR)=	2.1 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4 - 1/2 acre; sub-basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
4.5	3	2.1

A= 33.89 (Ac)

Q (100-YR)=	**61.00 (cfs)**
Q (10-YR)=	**40.67 (cfs)**
Q (2-YR)=	**28.47 (cfs)**

DA#1 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =		2037222.79	cft
Volume (10-yr)= 0.70*area*43560=		1033373.88	cft
Volume (2-yr)= 0.41*area*43560=		605261.844	cft
A=	33.89 Ac		

Tp = time to Qp in seconds

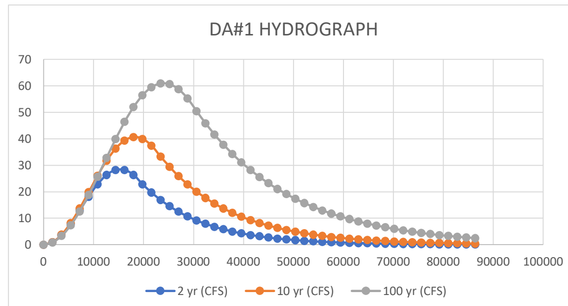
$$T_p = \frac{V}{1.39\,Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.340 Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#1 Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	28.47	40.67	61.00
Tp=	15295.992	18280.576	24025.899
1.25*Tp=	19119.990	22850.719	30032.374

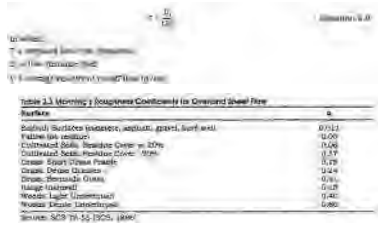
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.961674837	0.965143654	0.840937515	0.5
3600.00	3.716752532	3.768954445	3.317379388	1
5400.00	7.89295177	8.145269279	7.292770566	1.5
7200.00	12.92596144	13.67864874	12.54790147	2
9000.00	18.13569349	19.84381438	18.7929956	2.5
10800.00	22.81818013	26.05551288	25.68368824	3
12600.00	26.34069792	31.72407359	32.84001533	3.5
14400.00	28.22726479	36.31138543	39.86736529	4
16200.00	28.2229574	39.38197925	46.37823855	4.5
18000.00	26.3283578	40.64436649	52.0136149	5
19800.00	22.79947475	39.97870992	56.46275048	5.5
21600.00	19.70487173	37.44819971	59.48031267	6
23400.00	16.90965309	33.29305477	60.89990817	6.5
25200.00	14.51094792	29.40750091	60.64325814	7
27000.00	12.45250914	25.87416686	58.7245147	7.5
28800.00	10.68606853	22.76536563	55.24948049	8
30600.00	9.170204916	20.03008928	50.40977459	8.5
32400.00	7.869372913	17.62345851	45.86364897	9
34200.00	6.753069382	15.5059863	41.60739619	9.5
36000.00	5.795118186	13.64293001	37.74613351	10
37800.00	4.973056382	12.00372138	34.24320494	10.5
39600.00	4.26760749	10.56146494	31.06535626	11
41400.00	3.662229481	9.292496735	28.18241929	11.5
43200.00	3.142726879	8.175996042	25.56702554	12
45000.00	2.696917899	7.193643773	23.19434639	12.5
46800.00	2.314348791	6.329321891	21.04185735	13
48600.00	1.986048715	5.568848954	19.08912428	13.5
50400.00	1.704319381	4.899747431	17.31760936	14
52200.00	1.462554533	4.311038975	15.71049513	14.5
54000.00	1.255085042	3.793064297	14.25252481	15
55800.00	1.077045969	3.337324678	12.92985752	15.5
57600.00	0.924262484	2.936342528	11.72993681	16
59400.00	0.793151977	2.583538695	10.64137152	16.5
61200.00	0.680640044	2.273124516	9.653827612	17
63000.00	0.584088401	2.000006841	8.757930063	17.5
64800.00	0.501233013	1.759704467	7.945173881	18
66600.00	0.43013101	1.54827461	7.207843353	18.5
68400.00	0.369115123	1.362248214	6.538938805	19
70200.00	0.316754596	1.198573034	5.932110148	19.5
72000.00	0.271821629	1.054563554	5.381596595	20
73800.00	0.233262591	0.927856925	4.882171973	20.5
75600.00	0.200173315	0.816374195	4.429095113	21
77400.00	0.171777891	0.718286202	4.018064834	21.5
79200.00	0.147410477	0.631983558	3.645179116	22
81000.00	0.126499683	0.556050243	3.306898057	22.5
82800.00	0.108555173	0.489240375	3.000010262	23
84600.00	0.093156167	0.430457764	2.721602365	23.5
86400.00	0.079941574	0.37873793	2.469031366	24

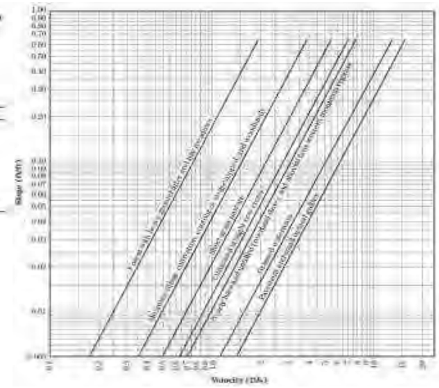


DA#1A DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	2177.48 (ft)
L=	100 (ft)	S=	0.0093 (ft/ft)
P_2=	4.89 (in)	V=	0.675 (ft/s)
S=	0.0093 (ft/ft)		
T_{OL}=	10.77 (min)	T_1=	53.76 (min)

Tc= 64.53 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	4.4 (in/hr)
I (10-YR)=	2.9 (in/hr)
I (2-YR)=	2 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4 - 1/2 acre; sub-basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
4.4	2.9	2

A= 65.25 (Ac)

Q (100-YR)=	**114.84 (cfs)**
Q (10-YR)=	**75.69 (cfs)**
Q (2-YR)=	**52.20 (cfs)**

DA#1A EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 = 3922360.20 cft

Volume (10-yr)= 0.70*area*43560= 1989603 cft

Volume (2-yr)= 0.41*area*43560= 1165338.9 cft

A= 65.25 Ac

Tp = time to Qp in seconds

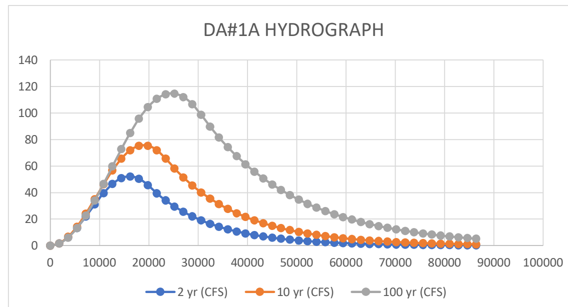
$$Tp = \frac{V}{1.39\ Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#1A Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	52.20	75.69	114.84
Tp=	16060.791	18910.940	24571.942
1.25*Tp=	20075.989	23638.675	30714.928

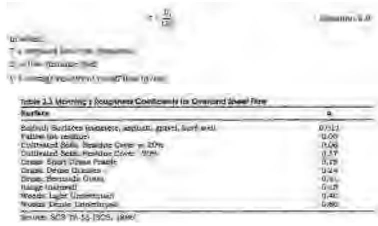
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	1.601143208	1.679416881	1.513844815	0.5
3600.00	6.208123821	6.56861528	5.975555989	1
5400.00	13.25569772	14.23366721	13.14987269	1.5
7200.00	21.87917717	23.99428108	22.65850158	2
9000.00	31.02052189	34.9841792	34.00006373	2.5
10800.00	39.55815318	46.22798197	46.57653181	3
12600.00	46.44456375	56.72777516	59.72476332	3.5
14400.00	50.83483944	65.55167713	72.75146735	4
16200.00	52.19032431	71.91654561	84.96976098	4.5
18000.00	50.34470991	75.25748339	95.73538785	5
19800.00	45.52444014	75.27797428	104.480689	5.5
21600.00	39.43286702	71.97619967	110.7445349	6
23400.00	34.08656181	65.64519991	114.1966403	6.5
25200.00	29.46510826	58.10140354	114.6549797	7
27000.00	25.47023105	51.3390629	112.0953853	7.5
28800.00	22.016979	45.36378157	106.6528216	8
30600.00	19.0319186	40.08395484	98.6142687	8.5
32400.00	16.45157248	35.41863971	89.77118156	9
34200.00	14.22106949	31.29631405	81.61666256	9.5
36000.00	12.29297793	27.65378007	74.20287326	10
37800.00	10.62629689	24.4351955	67.46252821	10.5
39600.00	9.185584337	21.59121747	61.33445394	11
41400.00	7.940203487	19.07824603	55.7630338	11.5
43200.00	6.863671282	16.85775581	50.69770314	12
45000.00	5.933095234	14.89570532	46.09249046	12.5
46800.00	5.128686618	13.16201513	41.90560016	13
48600.00	4.433339663	11.6301067	38.09903322	13.5
50400.00	3.832267798	10.27649494	34.6382423	14
52200.00	3.312689211	9.080428144	31.49181825	14.5
54000.00	2.863555051	8.023569884	28.63120501	15
55800.00	2.475314468	7.089717869	26.03044048	15.5
57600.00	2.139711514	6.264555578	23.66592084	16
59400.00	1.849609584	5.535432765	21.5161864	16.5
61200.00	1.598839653	4.891171531	19.56172677	17
63000.00	1.38206909	4.321894955	17.78480382	17.5
64800.00	1.194688265	3.81887568	16.16929071	18
66600.00	1.032712517	3.374402111	14.7005255	18.5
68400.00	0.89269743	2.981660195	13.3651781	19
70200.00	0.771665578	2.634628958	12.15112926	19.5
72000.00	0.667043216	2.327988199	11.04736063	20
73800.00	0.576605546	2.057036927	10.04385471	20.5
75600.00	0.498429408	1.817621292	9.131503965	21
77400.00	0.430852386	1.606070906	8.302028167	21.5
79200.00	0.372437451	1.419142572	7.547899222	22
81000.00	0.321942409	1.253970564	6.862272872	22.5
82800.00	0.278293481	1.108022694	6.238926565	23
84600.00	0.240562471	0.979061491	5.672202987	23.5
86400.00	0.207947029	0.865109901	5.156958716	24

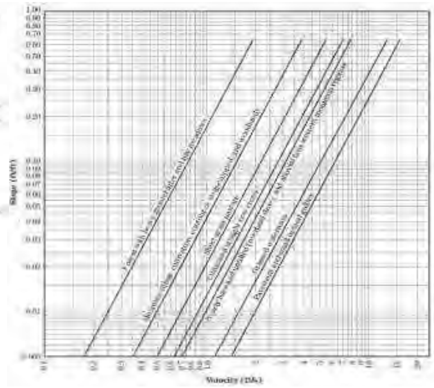


DA#1B DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + ...T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.011	D=	2435.42 (ft)
L=	100 (ft)	S=	0.0090 (ft/ft)
P_2=	4.89 (in)	V=	1.28 (ft/s)
S=	0.0090 (ft/ft)		
T_{OL}=	1.35 (min)	T_1=	31.71 (min)

Tc= 33.06 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	6.4 (in/hr)
I (10-YR)=	4.2 (in/hr)
I (2-YR)=	3 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4 - 1/2 acre; sub-basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
6.4	4.2	3

A= 41.51 (Ac)

Q (100-YR)=	**106.27 (cfs)**
Q (10-YR)=	**69.74 (cfs)**
Q (2-YR)=	**49.81 (cfs)**

DA#1B EXISTING CALCULATIONS

Volume (100-yr) =	1.38*area*43560 =		2495282.33 cft
Volume (10-yr)=	0.70*area*43560=		1265722.92 cft
Volume (2-yr)=	0.41*area*43560=		741351.996 cft
	A=	41.51 Ac	

Tp = time to Qp in seconds

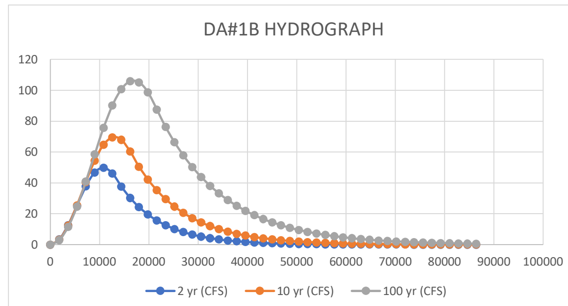
Tp = $\dfrac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.340 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA#1B Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	49.81	69.74	106.27
Tp=	10707.194	13057.554	16893.210
1.25*Tp=	13383.993	16321.942	21116.513

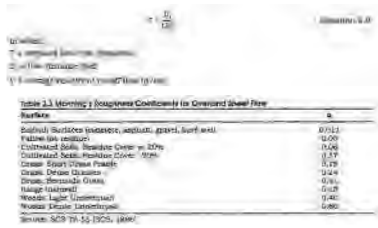
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	3.39350928	3.219028019	2.949130438	0.5
3600.00	12.64928764	12.28175493	11.46913941	1
5400.00	25.24508585	25.51485062	24.61422251	1.5
7200.00	37.74848135	40.4749735	40.92514686	2
9000.00	46.75223181	54.39990594	58.59124021	2.5
10800.00	49.80276695	64.71856652	75.65139326	3
12600.00	46.06879958	69.52573117	90.21176204	3.5
14400.00	37.62892667	67.93381125	100.6560031	4
16200.00	30.24190159	60.2367368	105.8247034	4.5
18000.00	24.30504117	50.42748622	105.1440868	5
19800.00	19.53366009	42.15400831	98.68970813	5.5
21600.00	15.69896031	35.23793372	87.4974558	6
23400.00	12.61705966	29.45655757	76.17950999	6.5
25200.00	10.14017434	24.62371349	66.32555985	7
27000.00	8.149532333	20.58377883	57.74623505	7.5
28800.00	6.549678044	17.20666345	50.27666061	8
30600.00	5.263894998	14.38362069	43.77328842	8.5
32400.00	4.230527113	12.02374561	38.11113857	9
34200.00	3.400022163	10.05104776	33.1813975	9.5
36000.00	2.732555636	8.402004196	28.88932688	10
37800.00	2.196121069	7.023513986	25.15244296	10.5
39600.00	1.764995261	5.871188298	21.89893137	11
41400.00	1.418504797	4.907921034	19.06626707	11.5
43200.00	1.140034709	4.102693979	16.60001276	12
45000.00	0.916231754	3.429577975	14.45277267	12.5
46800.00	0.736364095	2.866897982	12.58328176	13
48600.00	0.591806689	2.396535113	10.95561271	13.5
50400.00	0.475627695	2.003343189	9.538485435	14
52200.00	0.382256078	1.674661019	8.304666002	14.5
54000.00	0.307214469	1.399904691	7.230443226	15
55800.00	0.246904457	1.170226763	6.295173007	15.5
57600.00	0.19843405	0.978231366	5.480881593	16
59400.00	0.159478984	0.817736045	4.771920169	16.5
61200.00	0.128171281	0.683572682	4.154664119	17
63000.00	0.103009669	0.571421078	3.617251197	17.5
64800.00	0.082787593	0.477669832	3.149353557	18
66600.00	0.066535362	0.399300056	2.741979279	18.5
68400.00	0.053473645	0.333788161	2.387299562	19
70200.00	0.042976105	0.279024595	2.078498273	19.5
72000.00	0.034539363	0.233245914	1.80964096	20
73800.00	0.027758857	0.194977995	1.575560802	20.5
75600.00	0.022309449	0.162988573	1.371759313	21
77400.00	0.017929828	0.136247555	1.194319895	21.5
79200.00	0.01440998	0.11389385	1.039832571	22
81000.00	0.011581122	0.095207647	0.905328446	22.5
82800.00	0.009307604	0.07958723	0.788222661	23
84600.00	0.007480406	0.066529605	0.686264709	23.5
86400.00	0.00601191	0.055614304	0.597495193	24

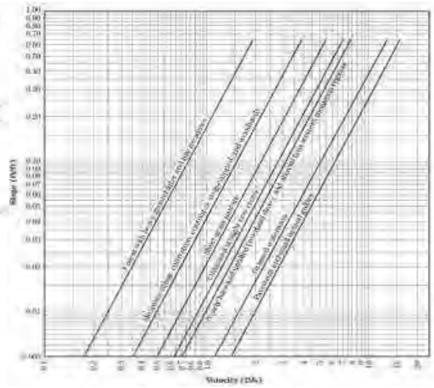


DA#2 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	2057.4 (ft)
L=	100 (ft)	S=	0.0131 (ft/ft)
P_2=	4.89 (in)	V=	0.775 (ft/s)
S=	0.0131 (ft/ft)		
T_{OL}=	9.39 (min)	T_1=	44.25 (min)

Tc= 53.63 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	4.9 (in/hr)
I (10-YR)=	3.3 (in/hr)
I (2-YR)=	2.3 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.45 Single family residential districts; lots 1/4 - 1/2 acre; sub-basin slope 1-3.5%

i (100-YR)	i (10-YR)	i (2-YR)
4.9	3.3	2.3

A= 12.41 (Ac)

Q (100-YR)=	**27.36 (cfs)**
Q (10-YR)=	**18.43 (cfs)**
Q (2-YR)=	**12.84 (cfs)**

DA#2 EXISTING CALCULATIONS

Volume (100-yr) =	1.38*area*43560 =	745999.85	cft
Volume (10-yr)=	0.70*area*43560=	378405.72	cft
Volume (2-yr)=	0.41*area*43560=	221637.636	cft
	A=	12.41	Ac

Tp = time to Qp in seconds

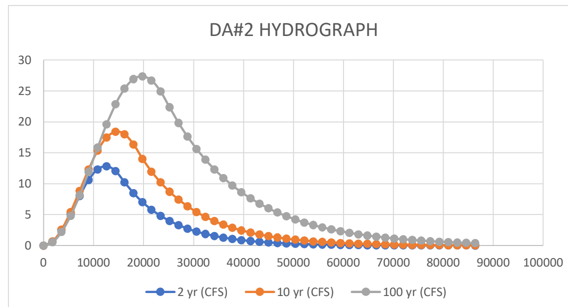
Tp = $\dfrac{V}{1.39\,Qp}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#2 Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	12.84	18.43	27.36
Tp=	12414.138	14772.182	19612.979
1.25*Tp=	15517.673	18465.228	24516.224

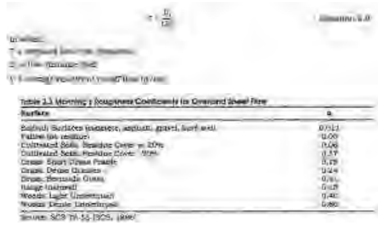
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.65484897	0.666935359	0.56476445	0.5
3600.00	2.485850105	2.571196558	2.212433287	1
5400.00	5.119600559	5.437124697	4.806982086	1.5
7200.00	8.018989844	8.849850956	8.134216103	2
9000.00	10.59273476	12.31535258	11.91945327	2.5
10800.00	12.31596198	15.33196711	15.85020074	3
12600.00	12.83724738	17.46301251	19.60195299	3.5
14400.00	12.0502833	18.40000083	22.86498154	4
16200.00	10.21978494	18.00729462	25.36990486	4.5
18000.00	8.464075395	16.34174161	26.90992729	5
19800.00	7.009988242	14.00378197	27.35791123	5.5
21600.00	5.805706218	11.95227444	26.67687306	6
23400.00	4.808314012	10.20130594	24.92303635	6.5
25200.00	3.982268956	8.706848513	22.34900861	7
27000.00	3.298134439	7.431324133	19.83549904	7.5
28800.00	2.731530919	6.342659837	17.6046745	8
30600.00	2.262267138	5.413481243	15.62474247	8.5
32400.00	1.873620602	4.620424226	13.86748601	9
34200.00	1.551741658	3.943547428	12.30786163	9.5
36000.00	1.285159958	3.365830831	10.92364237	10
37800.00	1.064375703	2.872747797	9.69510109	10.5
39600.00	0.881521113	2.451899789	8.60472926	11
41400.00	0.730080056	2.092704616	7.63698748	11.5
43200.00	0.604655838	1.786130342	6.778084006	12
45000.00	0.500778894	1.524468181	6.015778199	12.5
46800.00	0.414747506	1.301138658	5.339206081	13
48600.00	0.343495894	1.110526167	4.738725503	13.5
50400.00	0.284484963	0.947837773	4.205778735	14
52200.00	0.235611824	0.808982688	3.7327705	14.5
54000.00	0.195134854	0.690469412	3.312959735	15
55800.00	0.161611631	0.589317937	2.940363521	15.5
57600.00	0.133847536	0.502984817	2.609671811	16
59400.00	0.110853178	0.429299213	2.316171764	16.5
61200.00	0.091809139	0.366408304	2.055680572	17
63000.00	0.076036773	0.312730705	1.824485851	17.5
64800.00	0.062974024	0.266916696	1.619292738	18
66600.00	0.052155392	0.227814287	1.437176928	18.5
68400.00	0.043195348	0.194440251	1.275543004	19
70200.00	0.035774597	0.1659554	1.132087444	19.5
72000.00	0.029628694	0.141643485	1.004765795	20
73800.00	0.024538628	0.120893185	0.891763536	20.5
75600.00	0.020323011	0.103182735	0.79147022	21
77400.00	0.016831616	0.088066807	0.702456519	21.5
79200.00	0.013940026	0.075165313	0.623453856	22
81000.00	0.011545197	0.064153844	0.553336328	22.5
82800.00	0.009561788	0.054755519	0.491104657	23
84600.00	0.007919119	0.046734017	0.435871949	23.5
86400.00	0.006558653	0.039887639	0.386851058	24

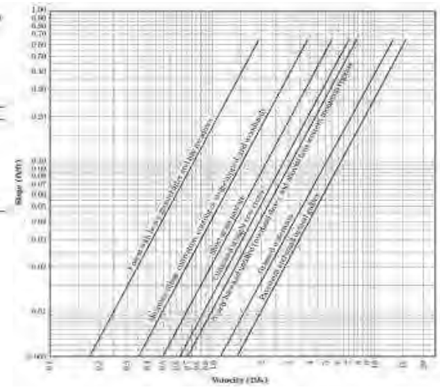


DA#3 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	**T=**	
n=	0.15	D=	505.56 (ft)
L=	100 (ft)	S=	0.0199 (ft/ft)
P_2=	4.89 (in)	V=	0.975 (ft/s)
S=	0.0199 (ft/ft)		
T_{OL}=	7.94 (min)	T_1=	8.64 (min)

Tc= 16.58 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	9.1 (in/hr)
I (10-YR)=	6.15 (in/hr)
I (2-YR)=	4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.28 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope 1-3.5%; and MOSTLY golf course

i (100-YR)	i (10-YR)	i (2-YR)
9.1	6.15	4

A= 20.46 (Ac)

Q (100-YR)=	**52.13 (cfs)**
Q (10-YR)=	**35.23 (cfs)**
Q (2-YR)=	**22.92 (cfs)**

DA#3 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 = 1229907.89 cft

Volume (10-yr)= 0.70*area*43560= 623866.32 cft

Volume (2-yr)= 0.41*area*43560= 365407.416 cft

A= 20.46 Ac

Tp = time to Qp in seconds

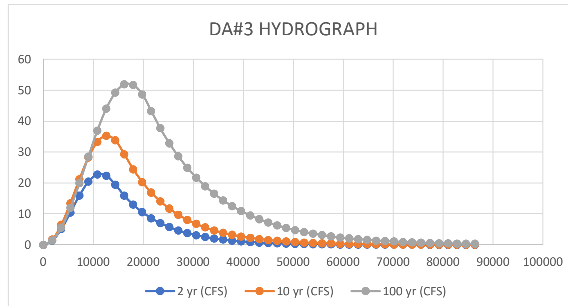
Tp = $\frac{V}{1.39\ Qp}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#3 Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	22.92	35.23	52.13
Tp=	11471.994	12739.077	16972.770
1.25*Tp=	14339.992	15923.846	21215.963

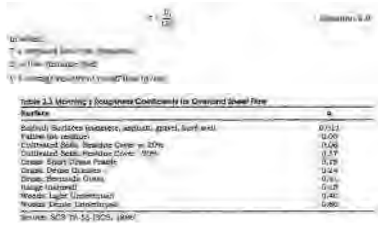
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	1.364014745	1.707279062	1.433386311	0.5
3600.00	5.131290054	6.49819074	5.575899793	1
5400.00	10.40484592	13.4441025	11.97194212	1.5
7200.00	15.92906023	21.1986736	19.9180693	2
9000.00	20.38862964	28.25881914	28.54035727	2.5
10800.00	22.72174044	33.25605619	36.89051702	3
12600.00	22.37288404	35.22175974	44.05018852	3.5
14400.00	19.45053845	33.77491331	49.23194299	4
16200.00	15.86157866	29.27258823	51.86588518	4.5
18000.00	12.93484385	24.36054331	51.66233117	5
19800.00	10.54814208	20.27275708	48.64366804	5.5
21600.00	8.601827954	16.87091599	43.26050897	6
23400.00	7.014642348	14.039916	37.68915162	6.5
25200.00	5.72031986	11.68396792	32.83530831	7
27000.00	4.664822193	9.723356344	28.60657312	7.5
28800.00	3.804082048	8.0917424	24.92244075	8
30600.00	3.102163304	6.733919107	21.71277385	8.5
32400.00	2.529760675	5.603943415	18.91646782	9
34200.00	2.062976202	4.663581683	16.48028746	9.5
36000.00	1.682321514	3.881016009	14.35785356	10
37800.00	1.371904181	3.229767653	12.5087599	10.5
39600.00	1.1187642	2.687801098	10.89780401	11
41400.00	0.912332911	2.236778468	9.494317045	11.5
43200.00	0.743991754	1.861439047	8.271579857	12
45000.00	0.606712445	1.549082923	7.206314367	12.5
46800.00	0.494763535	1.289141272	6.278240391	13
48600.00	0.40347113	1.07281876	5.469689553	13.5
50400.00	0.329023748	0.892795938	4.76526892	14
52200.00	0.268313192	0.742981589	4.151567956	14.5
54000.00	0.218804781	0.618306623	3.616903219	15
55800.00	0.178431525	0.514552562	3.151095931	15.5
57600.00	0.145507832	0.428208803	2.745278202	16
59400.00	0.118659127	0.356353836	2.391724204	16.5
61200.00	0.096764472	0.296556388	2.083703088	17
63000.00	0.078909758	0.246793167	1.815350847	17.5
64800.00	0.064349547	0.205380391	1.581558677	18
66600.00	0.052475946	0.170916828	1.377875716	18.5
68400.00	0.042793229	0.142236373	1.200424313	19
70200.00	0.03489714	0.118368601	1.045826205	19.5
72000.00	0.028458016	0.098505927	0.911138203	20
73800.00	0.023207021	0.08197628	0.793796159	20.5
75600.00	0.018924925	0.068220368	0.691566154	21
77400.00	0.01543295	0.056772746	0.602501964	21.5
79200.00	0.012585305	0.047246076	0.524908015	22
81000.00	0.010263099	0.039318016	0.457307096	22.5
82800.00	0.00836938	0.032720312	0.398412245	23
84600.00	0.006825085	0.027229727	0.347102238	23.5
86400.00	0.005565739	0.022660482	0.302400254	24

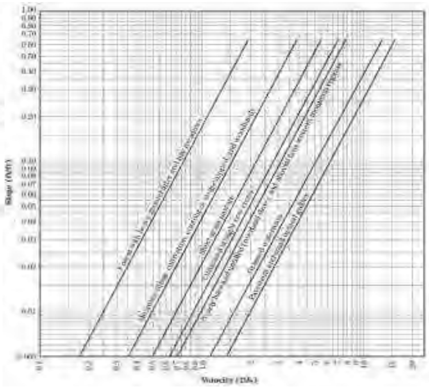


DA#4 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	2099.3 (ft)
L=	100 (ft)	S=	0.0059 (ft/ft)
P_2=	4.89 (in)	V=	0.55 (ft/s)
S=	0.0059 (ft/ft)		
T_{OL}=	12.92 (min)	T_1=	63.62 (min)

Tc= 76.53 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	4.2 (in/hr)
I (10-YR)=	2.7 (in/hr)
I (2-YR)=	1.8 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.28 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and MOSTLY golf course

i (100-YR)	i (10-YR)	i (2-YR)
4.2	2.7	1.8

A= 32.15 (Ac)

Q (100-YR)=	**37.81 (cfs)**
Q (10-YR)=	**24.31 (cfs)**
Q (2-YR)=	**16.20 (cfs)**

DA#4 EXISTING CALCULATIONS

Volume (100-yr) =	1.38*area*43560 =	1932626.52	cft
Volume (10-yr)=	0.70*area*43560=	980317.8	cft
Volume (2-yr)=	0.41*area*43560=	574186.14	cft
	A=	32.15	Ac

Tp = time to Qp in seconds

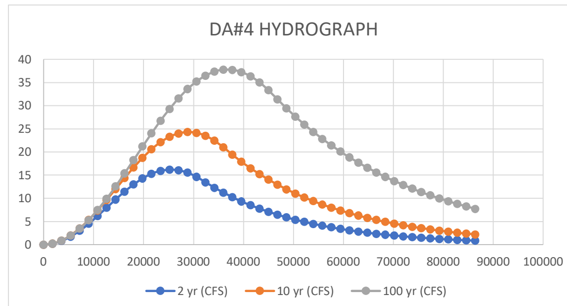
$$T_p = \frac{V}{1.39\,Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#4 Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	16.20	24.31	37.81
Tp=	25493.320	29016.787	36774.336
1.25*Tp=	31866.650	36270.983	45967.920

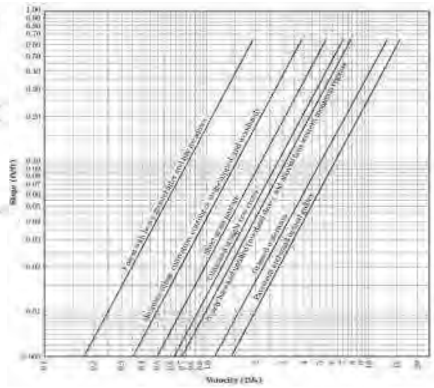
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.198500702	0.230045614	0.223062955	0.5
3600.00	0.784275951	0.911473117	0.886987691	1
5400.00	1.728621804	2.018484225	1.976106047	1.5
7200.00	2.985263777	3.509168408	3.464715591	2
9000.00	4.492624363	5.327089589	5.317686179	2.5
10800.00	6.176840437	7.403422766	7.491289	3
12600.00	7.955382668	9.659559673	9.934228544	3.5
14400.00	9.741099586	12.01008482	12.58885315	4
16200.00	11.44648815	14.36600927	15.39251552	4.5
18000.00	12.98798155	16.63813964	18.2790512	5
19800.00	14.29004409	18.74045496	21.18033995	5.5
21600.00	15.28887258	20.59336329	24.02791339	6
23400.00	15.9355228	22.12671506	26.75457077	6.5
25200.00	16.19830783	23.28245881	29.29596489	7
27000.00	16.06435079	24.01683905	31.59212062	7.5
28800.00	15.54021578	24.30205275	33.58885028	8
30600.00	14.65158627	24.12730194	35.23903247	8.5
32400.00	13.47599894	23.49920254	36.50372402	9
34200.00	12.29412486	22.4415339	37.3530791	9.5
36000.00	11.21590368	20.99433846	37.76705352	10
37800.00	10.23224481	19.396069	37.73587779	10.5
39600.00	9.334854945	17.89331969	37.26028762	11
41400.00	8.516168096	16.50699889	36.3515066	11.5
43200.00	7.769281845	15.22808608	35.03098134	12
45000.00	7.087899124	14.04825959	33.32987531	12.5
46800.00	6.466275132	12.95984253	31.37435965	13
48600.00	5.8991689	11.95575276	29.44015782	13.5
50400.00	5.381799105	11.02945686	27.62519785	14
52200.00	4.909803753	10.17492759	25.92212856	14.5
54000.00	4.479203408	9.386604688	24.32405201	15
55800.00	4.086367639	8.659358682	22.82449548	15.5
57600.00	3.727984411	7.988457516	21.4173853	16
59400.00	3.401032163	7.369535763	20.09702223	16.5
61200.00	3.102754331	6.798566213	18.85805839	17
63000.00	2.830636105	6.271833673	17.69547558	17.5
64800.00	2.582383233	5.785910792	16.60456499	18
66600.00	2.355902671	5.33763576	15.58090808	18.5
68400.00	2.149284942	4.924091734	14.62035873	19
70200.00	1.960788032	4.54258786	13.7190264	19.5
72000.00	1.788822706	4.190641764	12.87326042	20
73800.00	1.631939109	3.865963396	12.07963518	20.5
75600.00	1.48881454	3.566440135	11.33493623	21
77400.00	1.358242304	3.29012304	10.63614733	21.5
79200.00	1.239121534	3.035214164	9.98043815	22
81000.00	1.130447911	2.800054865	9.365152868	22.5
82800.00	1.031305199	2.583115004	8.787799385	23
84600.00	0.940857516	2.382982993	8.246039239	23.5
86400.00	0.858342289	2.198356611	7.737678133	24



DA#4A DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	3917.48 (ft)
L=	100 (ft)	S=	0.0035 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0035 (ft/ft)		
T_{OL}=	15.92 (min)	T_1=	130.58 (min)

Tc= 146.50 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	3.1 (in/hr)
I (10-YR)=	1.8 (in/hr)
I (2-YR)=	1.2 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (100-YR)	i (10-YR)	i (2-YR)
3.1	1.8	1.2

A= 60.49 (Ac)

Q (100-YR)=	**65.63 (cfs)**
Q (10-YR)=	**38.11 (cfs)**
Q (2-YR)=	**25.41 (cfs)**

DA#4A EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 = 3636223.27 cft
Volume (10-yr)= 0.70*area*43560= 1844461.08 cft
Volume (2-yr)= 0.41*area*43560= 1080327.204 cft
A= 60.49 Ac

Tp = time to Qp in seconds

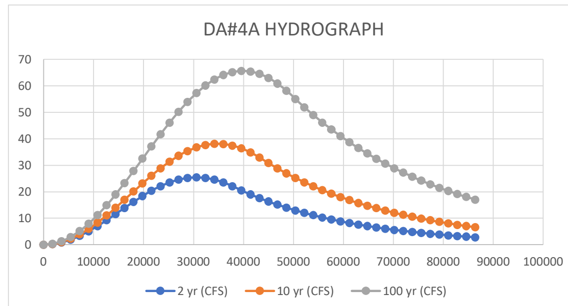
$$Tp = \frac{V}{1.39\,Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA#4A Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	25.41	38.11	65.63
Tp=	30591.984	34820.144	39858.635
1.25*Tp=	38239.979	43525.180	49823.293

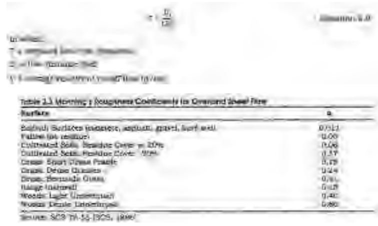
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.216404059	0.250722345	0.329704346	0.5
3600.00	0.858243005	0.996291236	1.312192228	1
5400.00	1.903648358	2.217085872	2.92772131	1.5
7200.00	3.317001485	3.880979155	5.143828782	2
9000.00	5.050147186	5.944183161	7.915983674	2.5
10800.00	7.044034414	8.352401483	11.18848167	3
12600.00	9.230728243	11.04225813	14.89556445	3.5
14400.00	11.53572452	13.94296537	18.96274104	4
16200.00	13.88048833	16.97818661	23.30828467	4.5
18000.00	16.18512982	20.06804529	27.84487499	5
19800.00	18.37112617	23.13122701	32.48135271	5.5
21600.00	20.36399699	26.08711941	37.1245514	6
23400.00	22.09584199	28.85793361	41.68116955	6.5
25200.00	23.50765443	31.37075133	46.05964544	7
27000.00	24.5513316	33.55944391	50.17199698	7.5
28800.00	25.19131376	35.36641251	53.93558963	8
30600.00	25.4057957	36.74410396	57.2747969	8.5
32400.00	25.18746966	37.65626216	60.12251999	9
34200.00	24.54377436	38.07888228	62.42153611	9.5
36000.00	23.49664154	38.00084241	64.1256483	10
37800.00	22.08174868	37.42419629	65.20061375	10.5
39600.00	20.49248126	36.36411924	65.62483184	11
41400.00	18.98344767	34.84850885	65.38977825	11.5
43200.00	17.5855369	32.91725074	64.5001762	12
45000.00	16.29056605	30.82280898	62.97390154	12.5
46800.00	15.09095478	28.8195071	60.8416236	13
48600.00	13.97968098	26.9464081	58.14618886	13.5
50400.00	12.9502396	25.19504956	55.04345471	14
52200.00	11.99660464	23.55751905	51.90501839	14.5
54000.00	11.11319383	22.02641843	48.94552765	15
55800.00	10.29483599	20.59483036	46.15477946	15.5
57600.00	9.536740706	19.25628713	43.52315256	16
59400.00	8.834470352	18.00474137	41.04157426	16.5
61200.00	8.183914065	16.83453874	38.70148918	17
63000.00	7.581263704	15.74039242	36.49482973	17.5
64800.00	7.022991554	14.71735919	34.41398834	18
66600.00	6.505829672	13.76081713	32.45179117	18.5
68400.00	6.026750766	12.86644469	30.60147344	19
70200.00	5.582950465	12.03020122	28.85665608	19.5
72000.00	5.17183091	11.24830867	27.21132371	20
73800.00	4.790985541	10.51723455	25.65980397	20.5
75600.00	4.438185018	9.833675969	24.1967479	21
77400.00	4.111364162	9.194544684	22.81711152	21.5
79200.00	3.808609871	8.596953185	21.51613847	22
81000.00	3.528149923	8.038201631	20.28934355	22.5
82800.00	3.268342598	7.515765651	19.13249733	23
84600.00	3.027667069	7.027284947	18.0416115	23.5
86400.00	2.804714502	6.570552625	17.01292519	24

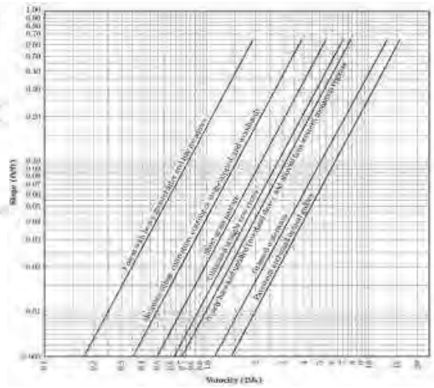


DA#4B DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	2974.28 (ft)
L=	100 (ft)	S=	0.0061 (ft/ft)
P_2=	4.89 (in)	V=	0.55 (ft/s)
S=	0.0061 (ft/ft)		
T_{OL}=	12.74 (min)	T_1=	90.13 (min)

Tc= 102.87 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	3.6 (in/hr)
I (10-YR)=	2.2 (in/hr)
I (2-YR)=	1.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (100-YR)	i (10-YR)	i (2-YR)
3.6	2.2	1.5

A= 49.53 (Ac)

Q (100-YR)=	**62.41 (cfs)**
Q (10-YR)=	**38.14 (cfs)**
Q (2-YR)=	**26.00 (cfs)**

DA#4B EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =		2977386.98	cft
Volume (10-yr)= 0.70*area*43560=		1510268.76	cft
Volume (2-yr)= 0.41*area*43560=		884585.988	cft
A=	49.53 Ac		

Tp = time to Qp in seconds

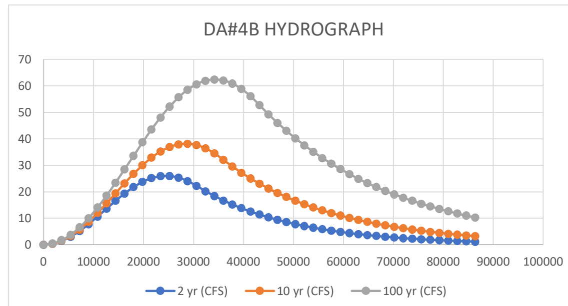
Tp = $\dfrac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#4B Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	26.00	38.14	62.41
Tp=	24473.587	28489.209	34322.713
1.25*Tp=	30591.984	35611.511	42903.392

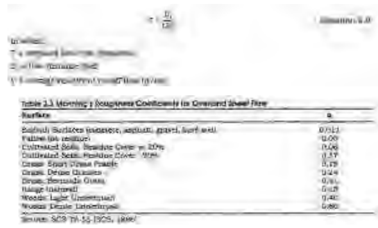
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.345528667	0.37441797	0.422549702	0.5
3600.00	1.363749262	1.482968597	1.678754836	1
5400.00	3.00054172	3.282119427	3.734593432	1.5
7200.00	5.16890788	5.70121834	6.534386936	2
9000.00	7.753595586	8.645268039	10.00230817	2.5
10800.00	10.61722452	11.99865657	14.04443495	3
12600.00	13.60758818	15.62969735	18.55129382	3.5
14400.00	16.56574392	19.39580048	23.40082492	4
16200.00	19.334461	23.14907223	28.46168775	4.5
18000.00	21.76657762	26.74212271	33.59681828	5
19800.00	23.73282289	30.0338539	38.66714108	5.5
21600.00	25.12868768	32.89500049	43.53533593	6
23400.00	25.87997953	35.21320611	48.06955684	6.5
25200.00	25.94676608	36.8974355	52.14700292	7
27000.00	25.3254975	37.88154948	55.65724413	7.5
28800.00	24.04919523	38.12690218	58.50521214	8
30600.00	22.21283016	37.62385868	60.61377506	8.5
32400.00	20.18736217	36.39217334	61.9258264	9
34200.00	18.34658566	34.48021408	62.40583169	9.5
36000.00	16.67365962	32.02000481	62.04079088	10
37800.00	15.15327867	29.49511022	60.84059043	10.5
39600.00	13.77153305	27.1693128	58.83773552	11
41400.00	12.51578134	25.02691303	56.08646974	11.5
43200.00	11.37453485	23.05344932	52.73768768	12
45000.00	10.33735246	21.23560045	49.26204508	12.5
46800.00	9.394745132	19.56109561	46.01546242	13
48600.00	8.538089073	18.01863162	42.98284365	13.5
50400.00	7.759546852	16.59779655	40.15008763	14
52200.00	7.051995691	15.28899953	37.50402252	14.5
54000.00	6.408962299	14.08340595	35.0323446	15
55800.00	5.824563647	12.97287784	32.72356099	15.5
57600.00	5.293453152	11.94991893	30.56693624	16
59400.00	4.810771754	11.00762408	28.55244242	16.5
61200.00	4.372103465	10.13963262	26.67071249	17
63000.00	3.973434968	9.340085471	24.91299674	17.5
64800.00	3.611118898	8.60358554	23.27112208	18
66600.00	3.281840472	7.925161325	21.7374541	18.5
68400.00	2.982587168	7.300233343	20.30486149	19
70200.00	2.710621156	6.724583219	18.96668296	19.5
72000.00	2.463454255	6.194325216	17.7166962	20
73800.00	2.238825169	5.705879997	16.549089	20.5
75600.00	2.034678796	5.255950471	15.45843218	21
77400.00	1.849147428	4.841499536	14.43965438	21.5
79200.00	1.680533663	4.459729574	13.48801846	22
81000.00	1.527294876	4.108063571	12.59909948	22.5
82800.00	1.388029107	3.78412772	11.76876412	23
84600.00	1.261462231	3.485735397	10.99315147	23.5
86400.00	1.146436304	3.2108724	10.26865505	24

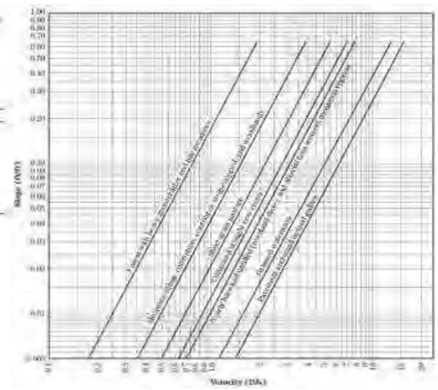


DA#5 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1638.56 (ft)
L=	100 (ft)	S=	0.0113 (ft/ft)
P_2=	4.89 (in)	V=	0.7 (ft/s)
S=	0.0113 (ft/ft)		
T_{OL}=	9.96 (min)	T_1=	39.01 (min)

Tc= 48.97 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	5.1 (in/hr)
I (10-YR)=	3.5 (in/hr)
I (2-YR)=	2.4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope 1-3.5%; and golf course

i (100-YR)	i (10-YR)	i (2-YR)
5.1	3.5	2.4

A= 28.49 (Ac)

Q (100-YR)=	**58.12 (cfs)**
Q (10-YR)=	**39.89 (cfs)**
Q (2-YR)=	**27.35 (cfs)**

DA#5 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =	1712613.67	cft
Volume (10-yr)= 0.70*area*43560=	868717.08	cft
Volume (2-yr)= 0.41*area*43560=	508820.004	cft
A=	28.49	Ac

Tp = time to Qp in seconds

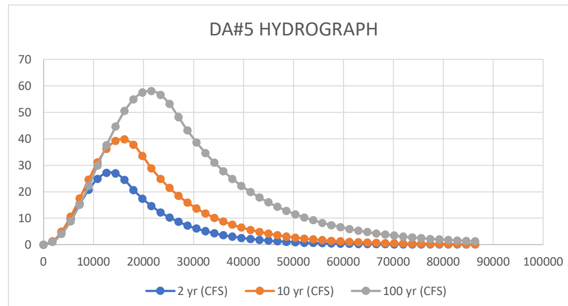
$$Tp = \frac{V}{1.39\ Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#5 Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	27.35	39.89	58.12
Tp=	13383.993	15669.065	21199.323
1.25*Tp=	16729.991	19586.331	26499.154

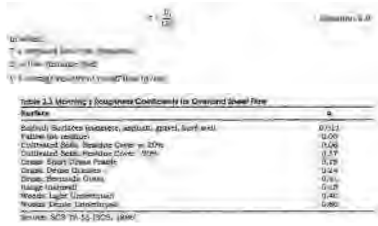
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	1.202560033	1.284695713	1.027748176	0.5
3600.00	4.59874039	4.973266826	4.038296657	1
5400.00	9.591239275	10.5904898	8.818699331	1.5
7200.00	15.30200304	17.41265985	15.03082241	2
9000.00	20.7266535	24.56083072	22.23526175	2.5
10800.00	24.91113254	31.11405525	29.9224234	3
12600.00	27.11949665	36.22803727	37.54856882	3.5
14400.00	26.96335072	39.24390791	44.57427538	4
16200.00	24.47015686	39.77311219	50.50259146	4.5
18000.00	20.66100931	37.74746913	54.91418756	5
19800.00	17.34687886	33.48750756	57.49701679	5.5
21600.00	14.5643517	28.84202767	58.06838704	6
23400.00	12.22815598	24.84098163	56.58788341	6.5
25200.00	10.26669788	21.3949718	53.16022684	7
27000.00	8.619867584	18.42700199	48.16651381	7.5
28800.00	7.2371972	15.87075719	43.13277554	8
30600.00	6.076314144	13.66912176	38.6250982	8.5
32400.00	5.101642605	11.77290329	34.58850473	9
34200.00	4.283313313	10.13973351	30.97376357	9.5
36000.00	3.596248181	8.733121567	27.73678819	10
37800.00	3.019391773	7.521638732	24.83809943	10.5
39600.00	2.535066052	6.478216155	22.24234396	11
41400.00	2.128428628	5.579540051	19.91786313	11.5
43200.00	1.787017905	4.805530787	17.83630684	12
45000.00	1.500371189	4.138894234	15.97228777	12.5
46800.00	1.259704057	3.564735351	14.30307175	13
48600.00	1.057641152	3.070225381	12.80830051	13.5
50400.00	0.887990158	2.644315205	11.46974334	14
52200.00	0.745552043	2.277488469	10.27107477	14.5
54000.00	0.625961722	1.961548954	9.197675475	15
55800.00	0.525554294	1.689437445	8.236453925	15.5
57600.00	0.441252726	1.455073999	7.375686764	16
59400.00	0.370473556	1.2532221	6.604875804	16.5
61200.00	0.311047722	1.079371656	5.914619992	17
63000.00	0.261154094	0.929638228	5.29650075	17.5
64800.00	0.219263655	0.800676236	4.742979301	18
66600.00	0.184092655	0.689604208	4.247304722	18.5
68400.00	0.154563262	0.593940401	3.803431611	19
70200.00	0.129770532	0.511547342	3.405946351	19.5
72000.00	0.108954682	0.440584076	3.050001087	20
73800.00	0.0914778	0.379465032	2.731254597	20.5
75600.00	0.076804298	0.326824591	2.44581935	21
77400.00	0.0644845	0.281486577	2.190214086	21.5
79200.00	0.05414086	0.242437979	1.961321364	22
81000.00	0.045456392	0.208806311	1.756349535	22.5
82800.00	0.038164956	0.17984012	1.572798699	23
84600.00	0.032043104	0.1548922	1.408430212	23.5
86400.00	0.026903228	0.133405125	1.261239384	24

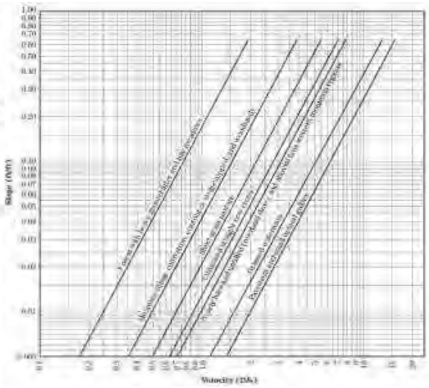


DA#5A DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1740.15 (ft)
L=	100 (ft)	S=	0.0124 (ft/ft)
P_2=	4.89 (in)	V=	0.775 (ft/s)
S=	0.0124 (ft/ft)		
T_{OL}=	9.60 (min)	T_1=	37.42 (min)

Tc= 47.02 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	5.3 (in/hr)
I (10-YR)=	3.5 (in/hr)
I (2-YR)=	2.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.45 Single family residential districts; lots 1/4-1/2 acre; basin slope 1-3.5%

i (100-YR)	i (10-YR)	i (2-YR)
5.3	3.5	2.5

A= 34.81 (Ac)

Q (100-YR)=	**83.02 (cfs)**
Q (10-YR)=	**54.83 (cfs)**
Q (2-YR)=	**39.16 (cfs)**

DA#5A EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =		2092526.57 cft
Volume (10-yr)= 0.70*area*43560=		1061426.52 cft
Volume (2-yr)= 0.41*area*43560=		621692.676 cft
A=	34.81 Ac	

Tp = time to Qp in seconds

$$Tp = \frac{V}{1.39\ Qp}$$

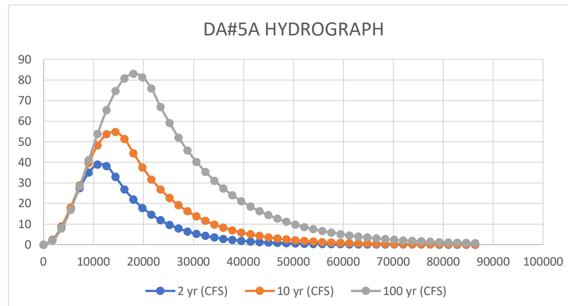
$$q_i = \left(\frac{Q_p}{2}\right)\left[1 - \cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#5A Existing Conditions

	2 - Year	10 - Year	100 - Year
Qp=	39.16	54.83	83.02
Tp=	11421.007	13928.058	18132.754
1.25*Tp=	14276.259	17410.072	22665.943

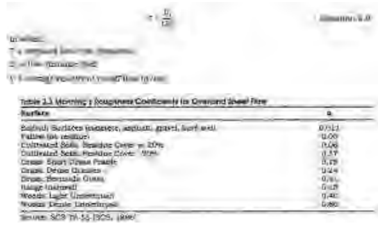
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	2.351483557	2.228508274	2.002289858	0.5
3600.00	8.841143786	8.551703415	7.815997527	1
5400.00	17.9102634	17.941507	16.88027172	1.5
7200.00	27.38057837	28.87124551	28.32067736	2
9000.00	34.97746364	39.56386985	41.0335528	2.5
10800.00	38.8762634	48.2808829	53.79248057	3
12600.00	38.14054547	53.60499913	65.36660053	3.5
14400.00	32.94701807	54.67057879	74.63935152	4
16200.00	26.8856212	51.30437094	80.71618663	4.5
18000.00	21.90480476	44.34377503	83.01087052	5
19800.00	17.84673183	37.48594791	81.30203389	5.5
21600.00	14.54045541	31.6886934	75.75452906	6
23400.00	11.84669807	26.78799244	66.90352661	6.5
25200.00	9.651984841	22.64519177	59.16338323	7
27000.00	7.863863063	19.14308104	52.00056504	7.5
28800.00	6.407007811	16.18257666	45.70493803	8
30600.00	5.220048818	13.67991844	40.17151274	8.5
32400.00	4.252985242	11.56429983	35.30801058	9
34200.00	3.46507937	9.775864615	31.03332501	9.5
36000.00	2.823140537	8.264013416	27.27616893	10
37800.00	2.300126964	6.98597213	23.97388586	10.5
39600.00	1.874006618	5.905581724	21.07140503	11
41400.00	1.52682911	4.992275212	18.52032301	11.5
43200.00	1.243969529	4.220212836	16.2780965	12
45000.00	1.01351237	3.567550991	14.30733284	12.5
46800.00	0.825749586	3.015824218	12.57516645	13
48600.00	0.67277164	2.549422765	11.05271073	13.5
50400.00	0.54813431	2.155150952	9.714576346	14
52200.00	0.446587228	1.821853829	8.538447795	14.5
54000.00	0.363852706	1.540101575	7.504711287	15
55800.00	0.29644554	1.301922702	6.59612764	15.5
57600.00	0.241526191	1.100578527	5.797544793	16
59400.00	0.196781172	0.930372511	5.095645121	16.5
61200.00	0.160325593	0.786489095	4.478723343	17
63000.00	0.130623755	0.664857452	3.936491319	17.5
64800.00	0.106424465	0.562036312	3.459906478	18
66600.00	0.086708323	0.475116607	3.041021017	18.5
68400.00	0.070644783	0.401639156	2.672849363	19
70200.00	0.057557167	0.339525096	2.349251675	19.5
72000.00	0.046894156	0.287017063	2.064831452	20
73800.00	0.038206568	0.242629471	1.814845541	20.5
75600.00	0.031128439	0.205106482	1.595125032	21
77400.00	0.0253616	0.173386477	1.402005742	21.5
79200.00	0.020663123	0.146572014	1.232267101	22
81000.00	0.016835084	0.123904446	1.083078452	22.5
82800.00	0.013716225	0.10474245	0.95195184	23
84600.00	0.011175164	0.088543883	0.836700521	23.5
86400.00	0.009104859	0.074850447	0.735402499	24

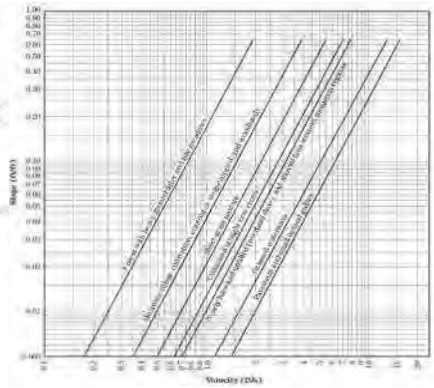


DA#6 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	2888.24 (ft)
L=	100 (ft)	S=	0.0051 (ft/ft)
P_2=	4.89 (in)	V=	0.525 (ft/s)
S=	0.0051 (ft/ft)		
T_{OL}=	13.69 (min)	T_1=	91.69 (min)

Tc= 105.38 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	4.7 (in/hr)
I (10-YR)=	2.2 (in/hr)
I (2-YR)=	1.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (100-YR)	i (10-YR)	i (2-YR)
4.7	2.2	1.5

A= 30.47 (Ac)

Q (100-YR)=	**50.12 (cfs)**
Q (10-YR)=	**23.46 (cfs)**
Q (2-YR)=	**16.00 (cfs)**

DA#6 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 = 1831637.02 cft

Volume (10-yr)= 0.70*area*43560= 929091.24 cft

Volume (2-yr)= 0.41*area*43560= 544182.012 cft

A= 30.47 Ac

Tp = time to Qp in seconds

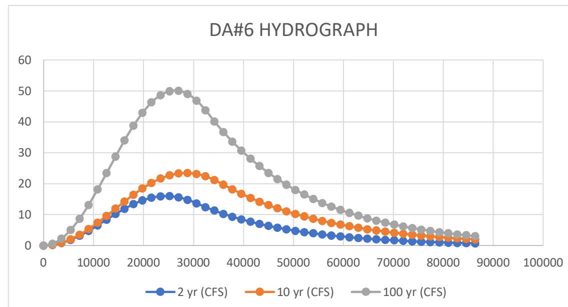
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#6 Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	16.00	23.46	50.12
Tp=	24473.587	28489.209	26289.738
1.25*Tp=	30591.984	35611.511	32862.172

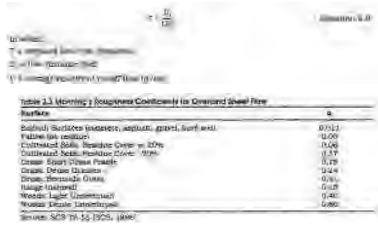
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.212563264	0.230335464	0.577531269	0.5
3600.00	0.838954977	0.912296652	2.283507245	1
5400.00	1.845881409	2.019103148	5.039301229	1.5
7200.00	3.179822796	3.507290992	8.717901475	2
9000.00	4.769878003	5.318419486	13.14976503	2.5
10800.00	6.531533031	7.381366153	18.13063182	3
12600.00	8.371153075	9.615119688	23.43093873	3.5
14400.00	10.19095936	11.93196125	28.80640001	4
16200.00	11.89422626	14.24090916	34.00926611	4.5
18000.00	13.39042237	16.45129172	38.79974222	5
19800.00	14.60002248	18.47630786	42.95704015	5.5
21600.00	15.45873438	20.2364358	46.28955427	6
23400.00	15.92091614	21.66255583	48.64369239	6.5
25200.00	15.96200207	22.69866464	49.91095467	7
27000.00	15.57980838	23.30407455	50.03293427	7.5
28800.00	14.79464928	23.4550113	49.00400929	8
30600.00	13.66494922	23.14554763	46.87160184	8.5
32400.00	12.41891632	22.38783609	43.73399239	9
34200.00	11.28650242	21.2116318	40.09305572	9.5
36000.00	10.25734724	19.69815358	36.67865691	10
37800.00	9.322035153	18.14488206	33.55503463	10.5
39600.00	8.472009124	16.71409168	30.6974258	11
41400.00	7.699492377	15.39612437	28.08317623	11.5
43200.00	6.997417259	14.1820836	25.69156098	12
45000.00	6.359360579	13.06377439	23.50362011	12.5
46800.00	5.779484841	12.03364796	21.50200834	13
48600.00	5.252484838	11.08475076	19.67085753	13.5
50400.00	4.77353912	10.21067759	17.99565091	14
52200.00	4.338265874	9.405528282	16.46310798	14.5
54000.00	3.942682844	8.663867946	15.06107925	15
55800.00	3.583170893	7.980690242	13.77844987	15.5
57600.00	3.256440895	7.351383602	12.60505159	16
59400.00	2.959503641	6.771700093	11.53158208	16.5
61200.00	2.689642491	6.237726751	10.54953121	17
63000.00	2.444388522	5.745859162	9.651113616	17.5
64800.00	2.221497937	5.292777133	8.829206924	18
66600.00	2.01893154	4.875422281	8.077295327	18.5
68400.00	1.834836079	4.490977386	7.389417913	19
70200.00	1.667527289	4.136847379	6.760121412	19.5
72000.00	1.515474483	3.81064182	6.184416966	20
73800.00	1.377286552	3.510158762	5.657740575	20.5
75600.00	1.251699231	3.233369894	5.17591692	21
77400.00	1.13756354	2.978406841	4.735126259	21.5
79200.00	1.033835266	2.743548559	4.331874146	22
81000.00	0.939565412	2.527209712	3.962963729	22.5
82800.00	0.853891518	2.327929974	3.625470406	23
84600.00	0.776029763	2.144364174	3.316718639	23.5
86400.00	0.705267801	1.975273209	3.034260743	24

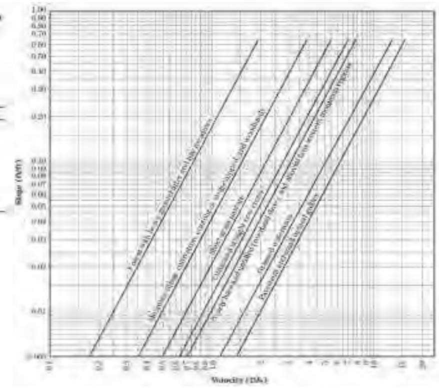


DA#6A DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	**T=**	
n=	0.15	D=	416.48 (ft)
L=	100 (ft)	S=	0.0264 (ft/ft)
P_2=	4.89 (in)	V=	1.15 (ft/s)
S=	0.0264 (ft/ft)		
T_{OL}=	7.09 (min)	T_1=	6.04 (min)

Tc= 13.13 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	10.4 (in/hr)
I (10-YR)=	7 (in/hr)
I (2-YR)=	4.8 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.45 Single family residential districts; lots 1/4-1/2 acre; basin slope 1-3.5%

i (100-YR)	i (10-YR)	i (2-YR)
10.4	7	4.8

A= 2.6 (Ac)

Q (100-YR)=	**12.17 (cfs)**
Q (10-YR)=	**8.19 (cfs)**
Q (2-YR)=	**5.62 (cfs)**

DA#6A EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =		156293.28	cft
Volume (10-yr)= 0.70*area*43560=		79279.2	cft
Volume (2-yr)= 0.41*area*43560=		46434.96	cft
A=	2.60 Ac		

Tp = time to Qp in seconds

$$Tp = \frac{V}{1.39\,Qp}$$

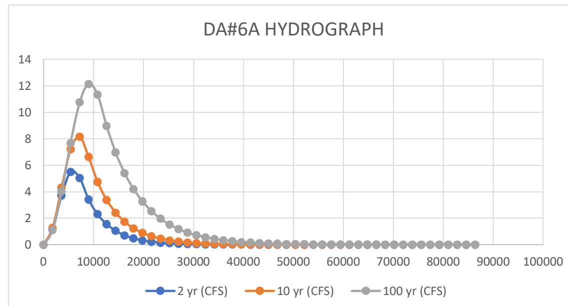
$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#6A Existing Conditions

	2 - Year	10 - Year	100 - Year
Qp=	5.62	8.19	12.17
Tp=	5948.441	6964.029	9240.730
1.25*Tp=	7435.552	8705.036	11550.913

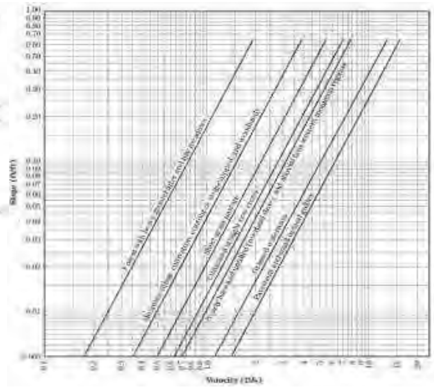
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	1.176111617	1.27747365	1.104067984	0.5
3600.00	3.719233836	4.312854831	4.015559866	1
5400.00	5.499027921	7.212312297	7.677774473	1.5
7200.00	5.024584684	8.166820158	10.76154221	2
9000.00	3.409590447	6.624177826	12.14763586	2.5
10800.00	2.300696294	4.733731849	11.33298453	3
12600.00	1.552445527	3.38279222	8.971893684	3.5
14400.00	1.047546832	2.417391515	6.964807949	4
16200.00	0.70685531	1.727502417	5.40672365	4.5
18000.00	0.476966198	1.234497839	4.197195506	5
19800.00	0.321843454	0.882189743	3.258248666	5.5
21600.00	0.217170963	0.630425359	2.529351885	6
23400.00	0.146540893	0.450510943	1.963515255	6.5
25200.00	0.098881697	0.321941538	1.524260891	7
27000.00	0.066722604	0.23006401	1.183271307	7.5
28800.00	0.045022548	0.164407019	0.918563872	8
30600.00	0.030379956	0.117487598	0.713073648	8.5
32400.00	0.020499545	0.083958312	0.553553262	9
34200.00	0.01383252	0.059997806	0.429718886	9.5
36000.00	0.009333798	0.042875287	0.333587269	10
37800.00	0.006298186	0.030639291	0.258961078	10.5
39600.00	0.00424984	0.021895274	0.201029375	11
41400.00	0.002867673	0.015646674	0.156057465	11.5
43200.00	0.001935025	0.011181336	0.121146138	12
45000.00	0.001305701	0.007990342	0.09404476	12.5
46800.00	0.000881051	0.005710012	0.073006181	13
48600.00	0.000594508	0.004080456	0.056674103	13.5
50400.00	0.000401158	0.002915952	0.043995644	14
52200.00	0.00027069	0.002083781	0.03415346	14.5
54000.00	0.000182654	0.0014891	0.026513053	15
55800.00	0.00012325	0.001064132	0.020581867	15.5
57600.00	8.31655E-05	0.000760444	0.015977535	16
59400.00	5.61178E-05	0.000543424	0.012403231	16.5
61200.00	3.78667E-05	0.000388338	0.009628527	17
63000.00	2.55514E-05	0.000277512	0.007474547	17.5
64800.00	1.72414E-05	0.000198314	0.00580243	18
66600.00	1.1634E-05	0.000141718	0.004504379	18.5
68400.00	7.85029E-06	0.000101274	0.003496713	19
70200.00	5.29716E-06	7.23717E-05	0.00271447	19.5
72000.00	3.57437E-06	5.17178E-05	0.002107221	20
73800.00	2.41189E-06	3.69583E-05	0.001635818	20.5
75600.00	1.62747E-06	2.64109E-05	0.001269872	21
77400.00	1.09817E-06	1.88736E-05	0.000985792	21.5
79200.00	7.41017E-07	1.34874E-05	0.000765262	22
81000.00	5.00018E-07	9.63826E-06	0.000594067	22.5
82800.00	3.37398E-07	6.88764E-06	0.000461169	23
84600.00	2.27667E-07	4.92201E-06	0.000358002	23.5
86400.00	1.53623E-07	3.51734E-06	0.000277914	24



DA#6B DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.011	D=	2803.91 (ft)
L=	100 (ft)	S=	0.0073 (ft/ft)
P_2=	4.89 (in)	V=	1.75 (ft/s)
S=	0.0073 (ft/ft)		
T_{OL}=	1.47 (min)	T_1=	26.70 (min)

Tc= 28.17 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	7 (in/hr)
I (10-YR)=	4.7 (in/hr)
I (2-YR)=	3.3 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4-1/2 acre; basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
7	4.7	3.3

A= 41.39 (Ac)

Q (100-YR)=	**115.89 (cfs)**
Q (10-YR)=	**77.81 (cfs)**
Q (2-YR)=	**54.63 (cfs)**

DA#6B EXISTING CALCULATIONS

Volume (100-yr) =	1.38*area*43560 =	2488068.79	cft
Volume (10-yr)=	0.70*area*43560=	1262063.88	cft
Volume (2-yr)=	0.41*area*43560=	739208.844	cft
	A=	41.39	Ac

Tp = time to Qp in seconds

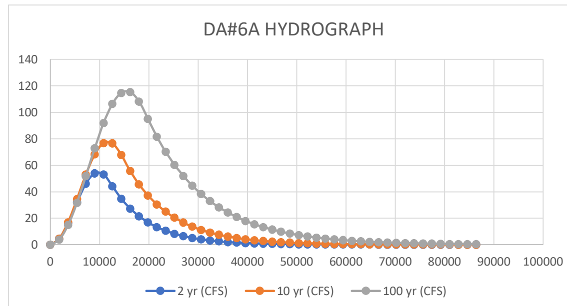
Tp = $\dfrac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA#6B Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	54.63	77.81	115.89
Tp=	9733.813	11668.452	15445.221
1.25*Tp=	12167.266	14585.566	19306.526

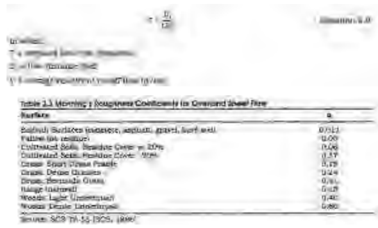
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	4.481660118	4.480172869	3.84054823	0.5
3600.00	16.45612883	16.88888973	14.85310478	1
5400.00	31.99437197	34.36837341	31.57788797	1.5
7200.00	45.99801821	52.89302884	51.79792557	2
9000.00	53.87222448	68.19655372	72.83292801	2.5
10800.00	53.03332498	76.75448499	91.89457716	3
12600.00	44.06878016	76.59589684	106.4561349	3.5
14400.00	34.65189749	67.75731274	114.5873778	4
16200.00	27.24727109	55.55196243	115.2104599	4.5
18000.00	21.42490991	45.45751306	108.2427878	5
19800.00	16.84670597	37.19734467	95.01152088	5.5
21600.00	13.24680026	30.43814668	81.65434089	6
23400.00	10.41614411	24.90717501	70.17497799	6.5
25200.00	8.190359626	20.38124638	60.30943955	7
27000.00	6.440194195	16.67773257	51.83084631	7.5
28800.00	5.064014667	13.64719108	44.54421478	8
30600.00	3.981905478	11.16733486	38.28197323	8.5
32400.00	3.131027906	9.138097884	32.90010793	9
34200.00	2.461970983	7.477597292	28.27485134	9.5
36000.00	1.935882179	6.118829321	24.29983573	10
37800.00	1.522211202	5.006965579	20.88364708	10.5
39600.00	1.196935934	4.097140645	17.94772278	11
41400.00	0.941167446	3.352641675	15.42454495	11.5
43200.00	0.740053111	2.743426984	13.25608768	12
45000.00	0.5819141	2.244913815	11.39248264	12.5
46800.00	0.457567186	1.836986393	9.790872227	13
48600.00	0.359791471	1.503184213	8.414423967	13.5
50400.00	0.28290906	1.230037842	7.231483473	14
52200.00	0.222455346	1.006525401	6.214846486	14.5
54000.00	0.174919746	0.823627817	5.341133253	15
55800.00	0.13754184	0.67396489	4.590250859	15.5
57600.00	0.108151071	0.551497489	3.944931151	16
59400.00	0.085040698	0.451283865	3.390333615	16.5
61200.00	0.066868689	0.369280243	2.913704087	17
63000.00	0.052579784	0.30217765	2.504081448	17.5
64800.00	0.041344219	0.247268393	2.152045544	18
66600.00	0.032509537	0.202336798	1.849500554	18.5
68400.00	0.025562703	0.165569806	1.589488804	19
70200.00	0.02010031	0.135483812	1.366030766	19.5
72000.00	0.015805155	0.110864799	1.173987542	20
73800.00	0.012427814	0.090719352	1.008942685	20.5
75600.00	0.009772164	0.074234572	0.867100633	21
77400.00	0.007683989	0.060745271	0.745199425	21.5
79200.00	0.006042028	0.049707136	0.640435679	22
81000.00	0.004750931	0.040674761	0.550400128	22.5
82800.00	0.003735723	0.033283675	0.473022211	23
84600.00	0.002937451	0.027235637	0.406522456	23.5
86400.00	0.002309759	0.022286599	0.34937156	24

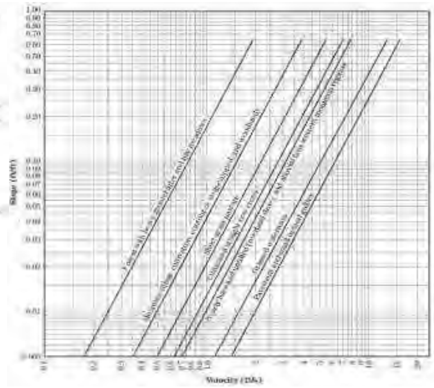


DA#7 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	2354.93 (ft)
L=	100 (ft)	S=	0.0053 (ft/ft)
P_2=	4.89 (in)	V=	0.525 (ft/s)
S=	0.0053 (ft/ft)		
T_{OL}=	13.48 (min)	T_1=	74.76 (min)

Tc= 88.24 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	3.9 (in/hr)
I (10-YR)=	2.5 (in/hr)
I (2-YR)=	1.6 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.28 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and MOSTLY golf course

i (100-YR)	i (10-YR)	i (2-YR)
3.9	2.5	1.6

A= 45.05 (Ac)

Q (100-YR)=	**49.19 (cfs)**
Q (10-YR)=	**31.54 (cfs)**
Q (2-YR)=	**20.18 (cfs)**

DA#7 EXISTING CALCULATIONS

Volume (100-yr) =	1.38*area*43560 =	2708081.64	cft
Volume (10-yr)=	0.70*area*43560=	1373664.6	cft
Volume (2-yr)=	0.41*area*43560=	804574.98	cft
	A=	45.05	Ac

Tp = time to Qp in seconds

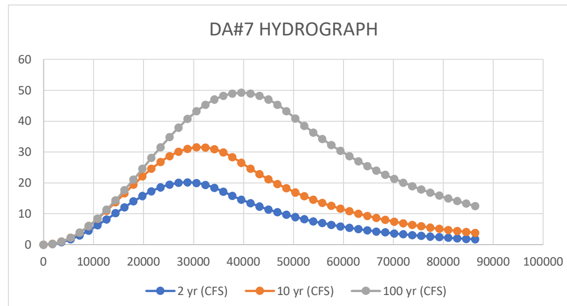
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.340 Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#7 Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	20.18	31.54	49.19
Tp=	28679.985	31338.129	39603.131
1.25*Tp=	35849.981	39172.662	49503.913

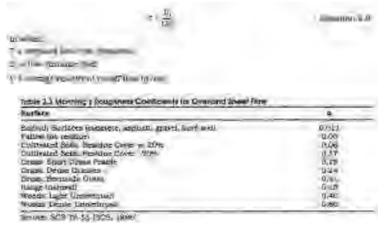
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.195520502	0.256007515	0.250325533	0.5
3600.00	0.774505453	1.015716776	0.996207031	1
5400.00	1.714518784	2.254457889	2.222462893	1.5
7200.00	2.979134326	3.932005449	3.904134026	2
9000.00	4.51934735	5.993884774	6.006991859	2.5
10800.00	6.275473531	8.373140847	8.488235026	3
12600.00	8.179461761	10.99251254	11.29736054	3.5
14400.00	10.15753117	13.76694149	14.37719174	4
16200.00	12.13303021	16.6063342	17.66504204	4.5
18000.00	14.02940691	19.41848761	21.09399084	5
19800.00	15.77317535	22.11208318	24.59424566	5.5
21600.00	17.29676331	24.59965232	28.09456265	6
23400.00	18.54113069	26.80041665	31.52369669	6.5
25200.00	19.45805739	28.64291118	34.81185153	7
27000.00	20.01201186	30.06730493	37.89210036	7.5
28800.00	20.18152799	31.02734383	40.70174812	8
30600.00	19.9600369	31.49185272	43.1836075	8.5
32400.00	19.35612154	31.4457477	45.28716297	9
34200.00	18.39318403	30.89052592	46.96959897	9.5
36000.00	17.1309239	29.844217	48.19667136	10
37800.00	15.78871183	28.34079752	48.94340443	10.5
39600.00	14.5516624	26.47617086	49.19459924	11
41400.00	13.4115361	24.57121643	48.945143	11.5
43200.00	12.36073897	22.80332304	48.20011312	12
45000.00	11.39227205	21.16262917	46.97467386	12.5
46800.00	10.49968475	19.63998285	45.2937677	13
48600.00	9.677031888	18.22689058	43.19160764	13.5
50400.00	8.918834077	16.91546998	40.82291431	14
52200.00	8.220041249	15.69840579	38.48071902	14.5
54000.00	7.575999009	14.56890909	36.27290607	15
55800.00	6.982417637	13.52067942	34.19176534	15.5
57600.00	6.43534351	12.54786963	32.23002906	16
59400.00	5.931132774	11.64505329	30.38084648	16.5
61200.00	5.466427073	10.80719437	28.63775986	17
63000.00	5.038131177	10.02961921	26.99468201	17.5
64800.00	4.643392369	9.307990406	25.44587497	18
66600.00	4.279581443	8.638282628	23.98592999	18.5
68400.00	3.944275191	8.016760172	22.60974867	19
70200.00	3.635240267	7.439956114	21.31252509	19.5
72000.00	3.350418304	6.904652976	20.0897291	20
73800.00	3.087912212	6.407864776	18.93709045	20.5
75600.00	2.845973536	5.946820374	17.85058389	21
77400.00	2.622990814	5.51894801	16.82641513	21.5
79200.00	2.417478843	5.121860965	15.86100757	22
81000.00	2.228068786	4.753344242	14.9509898	22.5
82800.00	2.053499052	4.411342213	14.09318387	23
84600.00	1.8926069	4.093947151	13.28459415	23.5
86400.00	1.744320687	3.799388592	12.52239688	24

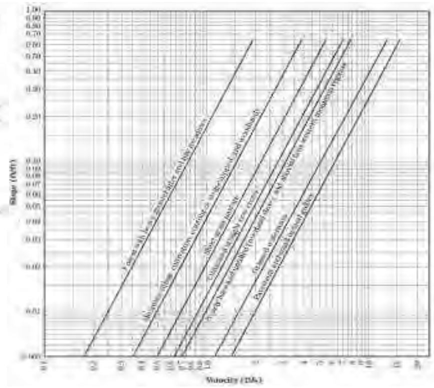


DA#7A DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	2388.94 (ft)
L=	100 (ft)	S=	0.0051 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0051 (ft/ft)		
T_{OL}=	13.69 (min)	T_1=	79.63 (min)

Tc= 93.32 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	3.8 (in/hr)
I (10-YR)=	2.4 (in/hr)
I (2-YR)=	1.6 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4-1/2 acre; basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
3.8	2.4	1.6

A= 40.44 (Ac)

Q (100-YR)=	**61.47 (cfs)**
Q (10-YR)=	**38.82 (cfs)**
Q (2-YR)=	**25.88 (cfs)**

DA#7A EXISTING CALCULATIONS			
Volume (100-yr) = 1.38*area*43560 =		2430961.63	cft
Volume (10-yr)= 0.70*area*43560=		1233096.48	cft
Volume (2-yr)= 0.41*area*43560=		722242.224	cft
A=	40.44 Ac		

Tp = time to Qp in seconds

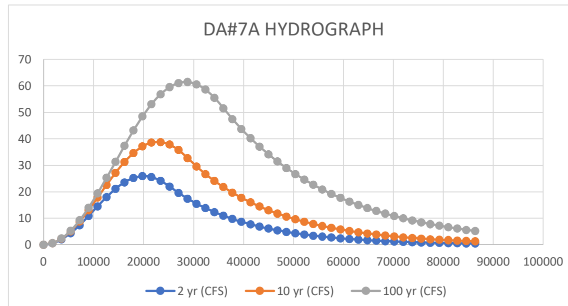
Tp = $\dfrac{V}{1.39\ Qp}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#7A Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	25.88	38.82	61.47
Tp=	20075.989	22850.719	28451.723
1.25*Tp=	25094.987	28563.399	35564.654

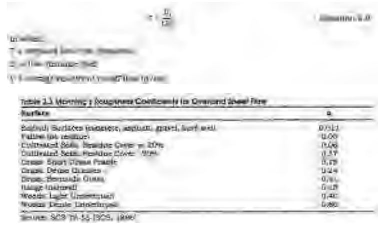
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.509974752	0.591357156	0.605051353	0.5
3600.00	1.999704547	2.329397541	2.396382781	1
5400.00	4.351773988	5.108223259	5.303464356	1.5
7200.00	7.380801022	8.758521905	9.211835823	2
9000.00	10.84804812	13.05788268	13.96761323	2.5
10800.00	14.48023875	17.74434778	19.38354779	3
12600.00	17.99109609	22.53237331	25.24639842	3.5
14400.00	21.10390641	27.13022738	31.32532762	4
16200.00	23.57332865	31.25776513	37.38099029	4.5
18000.00	25.20473142	34.66349783	43.17495736	5
19800.00	25.86953316	37.13991596	48.47910352	5.5
21600.00	25.51533645	38.53613266	53.08458909	6
23400.00	24.17005788	38.76707716	56.81008273	6.5
25200.00	21.96843388	37.81867814	59.5089009	7
27000.00	19.55145002	35.74872107	61.0747833	7.5
28800.00	17.40038457	32.733902	61.44607657	8
30600.00	15.48598099	29.5477477	60.60816183	8.5
32400.00	13.78220154	26.67171773	58.5940302	9
34200.00	12.26587321	24.07562613	55.48298392	9.5
36000.00	10.91637248	21.73222511	51.49642941	10
37800.00	9.715344853	19.61691901	47.43061438	10.5
39600.00	8.6464552	17.70750624	43.68580902	11
41400.00	7.695165601	15.98394615	40.23666855	11.5
43200.00	6.84853761	14.42814878	37.05984923	12
45000.00	6.095056277	13.02378494	34.1338504	12.5
46800.00	5.424473535	11.75611486	31.43886896	13
48600.00	4.827668818	10.61183344	28.95666529	13.5
50400.00	4.296525011	9.57893065	26.67043989	14
52200.00	3.823818051	8.646565452	24.56471962	14.5
54000.00	3.403118672	7.804952019	22.62525299	15
55800.00	3.028704959	7.045257028	20.83891373	15.5
57600.00	2.695484528	6.359506948	19.19361192	16
59400.00	2.398925264	5.740504351	17.67821218	16.5
61200.00	2.134993676	5.18175237	16.2824583	17
63000.00	1.900100043	4.677386512	14.99690386	17.5
64800.00	1.691049586	4.222113104	13.81284823	18
66600.00	1.504999021	3.811153733	12.72227775	18.5
68400.00	1.33941788	3.440195091	11.71781144	19
70200.00	1.192054103	3.105343708	10.79265111	19.5
72000.00	1.060903401	2.803085083	9.940535272	20
73800.00	0.944181999	2.530246802	9.155696825	20.5
75600.00	0.840302375	2.283965234	8.432823993	21
77400.00	0.747851667	2.061655482	7.767024385	21.5
79200.00	0.665572456	1.860984249	7.153791879	22
81000.00	0.592345666	1.679845351	6.588976126	22.5
82800.00	0.527175344	1.516337606	6.068754463	23
84600.00	0.469175111	1.368744888	5.589606037	23.5
86400.00	0.417556107	1.235518107	5.148287978	24

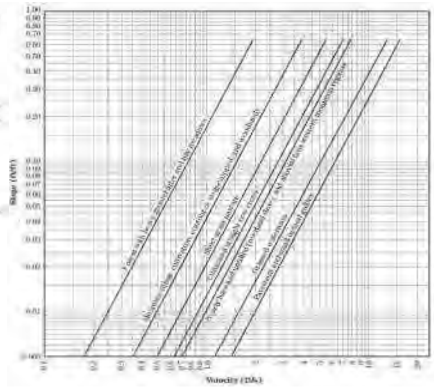


DA#7B DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + ...T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1655.54 (ft)
L=	100 (ft)	S=	0.0040 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0040 (ft/ft)		
T_{OL}=	15.09 (min)	T_1=	55.18 (min)

Tc= 70.27 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	4.3 (in/hr)
I (10-YR)=	2.8 (in/hr)
I (2-YR)=	1.9 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4-1/2 acre; basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
4.3	2.8	1.9

A= 12.83 (Ac)

Q (100-YR)=	**22.07 (cfs)**
Q (10-YR)=	**14.37 (cfs)**
Q (2-YR)=	**9.75 (cfs)**

DA#7B EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =	771247.22	cft
Volume (10-yr)= 0.70*area*43560=	391212.36	cft
Volume (2-yr)= 0.41*area*43560=	229138.668	cft
A= 12.83 Ac		

Tp = time to Qp in seconds

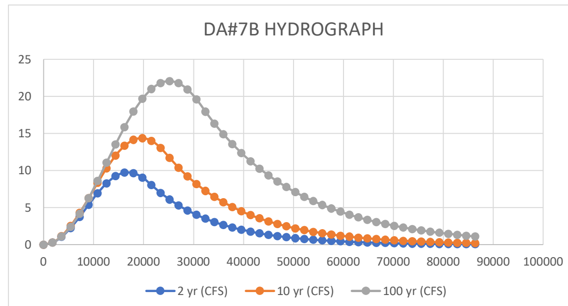
Tp = $\dfrac{V}{1.39\ Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#7B Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	9.75	14.37	22.07
Tp=	16906.096	19586.331	25143.383
1.25*Tp=	21132.620	24482.914	31429.229

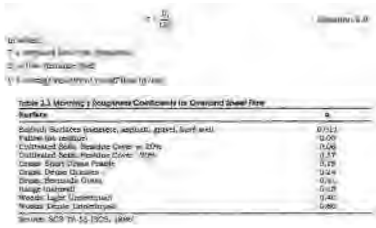
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.270200057	0.297374964	0.277882403	0.5
3600.00	1.050850655	1.16488348	1.097532868	1
5400.00	2.255422757	2.530714137	2.417666175	1.5
7200.00	3.750398929	4.281804958	4.171788129	2
9000.00	5.370072706	6.273202552	6.271544831	2.5
10800.00	6.934915867	8.34006119	8.611173003	3
12600.00	8.271477736	10.31128856	11.07282721	3.5
14400.00	9.231610842	12.02370862	13.53251564	4
16200.00	9.708891909	13.33556908	15.8663455	4.5
18000.00	9.650418047	14.13827556	17.95676343	5
19800.00	9.06267063	14.36538091	19.69847651	5.5
21600.00	8.038836464	13.99808558	21.00375589	6
23400.00	6.999738168	13.06679388	21.80685555	6.5
25200.00	6.094953497	11.70942614	22.06732392	7
27000.00	5.307121101	10.39082387	21.77204139	7.5
28800.00	4.621123753	9.220709823	20.93588113	8
30600.00	4.023798277	8.1823627	19.60095996	8.5
32400.00	3.503682965	7.260944183	17.93568994	9
34200.00	3.050797648	6.443286905	16.34180165	9.5
36000.00	2.656452191	5.717706277	14.8895572	10
37800.00	2.313079744	5.073833519	13.56636914	10.5
39600.00	2.014091547	4.502467481	12.36076863	11
41400.00	1.753750501	3.995443158	11.26230605	11.5
43200.00	1.527061083	3.545515009	10.26146037	12
45000.00	1.329673491	3.146253414	9.349556702	12.5
46800.00	1.157800178	2.791952797	8.518691039	13
48600.00	1.008143173	2.477550087	7.761661792	13.5
50400.00	0.8778308	2.198552368	7.071907349	14
52200.00	0.764362577	1.950972673	6.443449212	14.5
54000.00	0.665561232	1.731273008	5.870840171	15
55800.00	0.579530929	1.536313793	5.349117092	15.5
57600.00	0.504620884	1.363308999	4.8737579	16
59400.00	0.439393695	1.20978633	4.440642383	16.5
61200.00	0.382597759	1.073551899	4.046016478	17
63000.00	0.333143254	0.952658872	3.686459734	17.5
64800.00	0.290081228	0.845379647	3.358855666	18
66600.00	0.25258539	0.750181171	3.06036474	18.5
68400.00	0.219936256	0.665703026	2.788399762	19
70200.00	0.191507342	0.590737993	2.540603456	19.5
72000.00	0.166753144	0.524214796	2.314828027	20
73800.00	0.145198668	0.465182798	2.10911655	20.5
75600.00	0.126430319	0.412798412	1.921686003	21
77400.00	0.110087963	0.366313049	1.75091182	21.5
79200.00	0.095858016	0.325062418	1.5953138	22
81000.00	0.083467429	0.288457033	1.453543286	22.5
82800.00	0.072678447	0.255973793	1.324371471	23
84600.00	0.063284046	0.227148501	1.206678749	23.5
86400.00	0.055103964	0.201569235	1.099445008	24

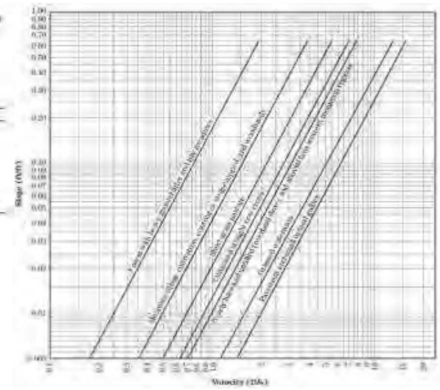


DA#8 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1371.65 (ft)
L=	100 (ft)	S=	0.0081 (ft/ft)
P_2=	4.89 (in)	V=	0.625 (ft/s)
S=	0.0081 (ft/ft)		
T_{OL}=	11.38 (min)	T_1=	36.58 (min)

Tc= 47.96 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	5.2 (in/hr)
I (10-YR)=	3.5 (in/hr)
I (2-YR)=	2.4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; and golf course; sub-basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
5.2	3.5	2.4

A= 19.66 (Ac)

Q (100-YR)=	**35.78 (cfs)**
Q (10-YR)=	**24.08 (cfs)**
Q (2-YR)=	**16.51 (cfs)**

DA#8 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =		1181817.65 cft
Volume (10-yr)= 0.70*area*43560=		599472.72 cft
Volume (2-yr)= 0.41*area*43560=		351119.736 cft
A=	19.66 Ac	

Tp = time to Qp in seconds

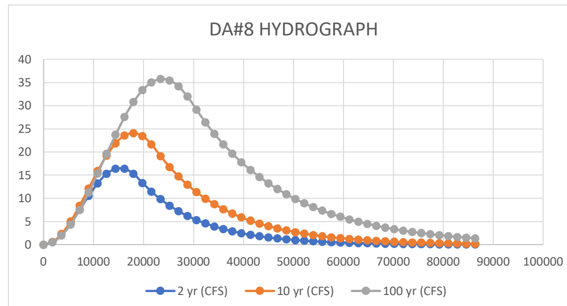
$$Tp = \frac{V}{1.39\,Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#8 Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	16.51	24.08	35.78
Tp=	15295.992	17907.503	23761.878
1.25*Tp=	19119.990	22384.378	29702.348

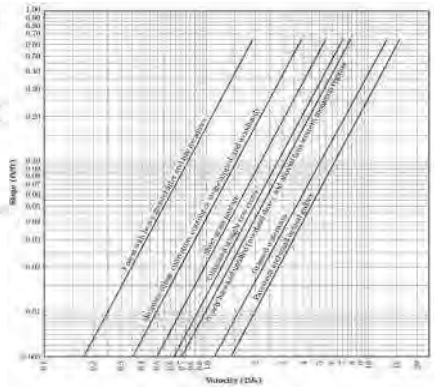
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.557879236	0.595418596	0.504228603	0.5
3600.00	2.156133219	2.322792027	1.988492058	1
5400.00	4.578797044	5.011296242	4.369125414	1.5
7200.00	7.498506993	8.395058689	7.511937148	2
9000.00	10.52073573	12.13945108	11.23977327	2.5
10800.00	13.23710302	15.87418158	15.34250314	3
12600.00	15.28055831	19.22991384	19.58886412	3.5
14400.00	16.37497863	21.87479154	23.73949736	4
16200.00	16.37247986	23.54725647	27.56044	4.5
18000.00	15.27339966	24.0819146	30.83631317	5
19800.00	13.32062098	23.42589232	33.38246247	5.5
21600.00	11.43103506	21.64406523	35.05536659	6
23400.00	9.809494827	19.11879663	35.76072728	6.5
25200.00	8.417976871	16.77685873	35.45878476	7
27000.00	7.223851569	14.72179418	34.16655894	7.5
28800.00	6.199117946	12.9184627	31.95688999	8
30600.00	5.319747083	11.33602851	29.11306059	8.5
32400.00	4.565118662	9.94743302	26.38273523	9
34200.00	3.917537446	8.728932146	23.90846941	9.5
36000.00	3.36181834	7.65969032	21.66624894	10
37800.00	2.884930318	6.721424204	19.63431181	10.5
39600.00	2.47569086	5.898090058	17.7929369	11
41400.00	2.124503735	5.175609407	16.12425261	11.5
43200.00	1.823133976	4.541628301	14.61206342	12
45000.00	1.56451478	3.985306078	13.24169265	12.5
46800.00	1.342581801	3.49712999	11.99984008	13
48600.00	1.152130945	3.068752544	10.87445281	13.5
50400.00	0.988696342	2.692848766	9.85460833	14
52200.00	0.848445622	2.362990945	8.930408454	14.5
54000.00	0.728090054	2.073538729	8.092883298	15
55800.00	0.624807428	1.819542673	7.3339042	15.5
57600.00	0.536175876	1.596659611	6.646104836	16
59400.00	0.460117081	1.401078386	6.022809717	16.5
61200.00	0.394847544	1.229454688	5.457969411	17
63000.00	0.338836765	1.078853864	4.946101817	17.5
64800.00	0.29077135	0.946700737	4.482238969	18
66600.00	0.249524215	0.830735576	4.061878813	18.5
68400.00	0.214128159	0.728975451	3.680941513	19
70200.00	0.183753182	0.639680331	3.335729854	19.5
72000.00	0.157687023	0.561323328	3.02289336	20
73800.00	0.135318458	0.492564587	2.739395775	20.5
75600.00	0.116122968	0.43222838	2.482485591	21
77400.00	0.099650438	0.379282996	2.24966935	21.5
79200.00	0.085514606	0.332823105	2.038687435	22
81000.00	0.073384	0.292054271	1.847492147	22.5
82800.00	0.062974172	0.256279374	1.674227827	23
84600.00	0.054041022	0.224886688	1.517212845	23.5
86400.00	0.046375077	0.197339418	1.374923281	24



DA#9 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	419.46 (ft)
L=	100 (ft)	S=	0.0236 (ft/ft)
P_2=	4.89 (in)	V=	1.125 (ft/s)
S=	0.0236 (ft/ft)		
T_{OL}=	7.42 (min)	T_1=	6.21 (min)

Tc= 13.63 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	10 (in/hr)
I (10-YR)=	6.7 (in/hr)
I (2-YR)=	4.7 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.45 Single family residential district; lots 1/4-1/2 acre; basin slope 1-3.5%

i (100-YR)	i (10-YR)	i (2-YR)
10	6.7	4.7

A= 6.64 (Ac)

Q (100-YR)=	**29.88 (cfs)**
Q (10-YR)=	**20.02 (cfs)**
Q (2-YR)=	**14.04 (cfs)**

DA#9 EXISTING CALCULATIONS

Volume (100-yr) =	1.38*area*43560 =	399148.99	cft
Volume (10-yr)=	0.70*area*43560=	202466.88	cft
Volume (2-yr)=	0.41*area*43560=	118587.744	cft
	A=	6.64	Ac

Tp = time to Qp in seconds

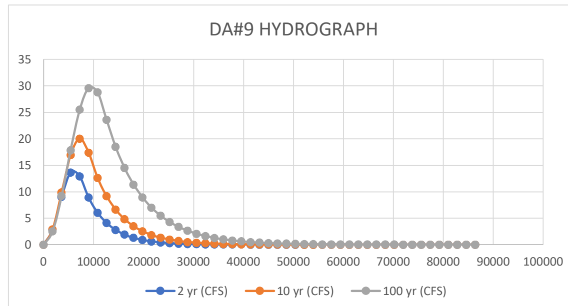
Tp = $\frac{V}{1.39\ Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#9 Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	14.04	20.02	29.88
Tp=	6075.004	7275.851	9610.360
1.25*Tp=	7593.755	9094.814	12012.950

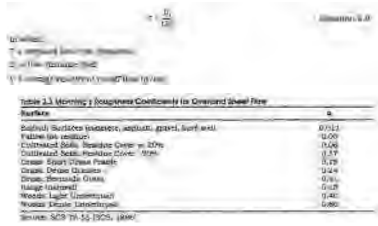
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	2.828668498	2.874087222	2.512576034	0.5
3600.00	9.035667051	9.845890864	9.205185217	1
5400.00	13.62012942	16.91182009	17.82673124	1.5
7200.00	12.88843736	20.01423202	25.47730916	2
9000.00	8.882796347	17.37155209	29.58360455	2.5
10800.00	6.04318668	12.61535786	28.76444214	3
12600.00	4.111329791	9.145876152	23.58599257	3.5
14400.00	2.797039632	6.630572952	18.48881134	4
16200.00	1.902895438	4.807029631	14.49318462	4.5
18000.00	1.294586965	3.484998061	11.36105488	5
19800.00	0.880739623	2.52655224	8.905811352	5.5
21600.00	0.599189011	1.831698644	6.981171788	6
23400.00	0.407643146	1.327944013	5.47246709	6.5
25200.00	0.277329743	0.96273222	4.289809355	7
27000.00	0.188674303	0.697961148	3.362736405	7.5
28800.00	0.128359808	0.506007542	2.636013676	8
30600.00	0.087326361	0.366845108	2.066343377	8.5
32400.00	0.05941029	0.265955192	1.619784826	9
34200.00	0.040418294	0.192812069	1.269732277	9.5
36000.00	0.027497568	0.139784802	0.995329768	10
37800.00	0.018707277	0.10134112	0.78022853	10.5
39600.00	0.012727025	0.073470237	0.611612933	11
41400.00	0.008658511	0.053264417	0.479436941	11.5
43200.00	0.0058906	0.038615612	0.375825572	12
45000.00	0.004007521	0.027995528	0.294605711	12.5
46800.00	0.002726416	0.020296185	0.230938316	13
48600.00	0.001854848	0.014714318	0.181030115	13.5
50400.00	0.001261899	0.01066758	0.141907602	14
52200.00	0.000858501	0.007733777	0.111239876	14.5
54000.00	0.00058406	0.00560683	0.087199768	15
55800.00	0.00039735	0.004064837	0.06835498	15.5
57600.00	0.000270327	0.002946923	0.05358275	16
59400.00	0.00018391	0.002136459	0.042002953	16.5
61200.00	0.000125119	0.001548889	0.032925673	17
63000.00	8.51214E-05	0.001122913	0.025810089	17.5
64800.00	5.79102E-05	0.000814089	0.020232257	18
66600.00	3.93978E-05	0.000590198	0.015859853	18.5
68400.00	2.68033E-05	0.000427881	0.012432372	19
70200.00	1.82349E-05	0.000310205	0.009745606	19.5
72000.00	1.24057E-05	0.000224892	0.007639478	20
73800.00	8.43989E-06	0.000163042	0.005988506	20.5
75600.00	5.74187E-06	0.000118202	0.004694327	21
77400.00	3.90633E-06	8.56943E-05	0.003679833	21.5
79200.00	2.65758E-06	6.21266E-05	0.002884583	22
81000.00	1.80801E-06	4.50405E-05	0.002261194	22.5
82800.00	1.23004E-06	3.26535E-05	0.001772526	23
84600.00	8.36825E-07	2.36731E-05	0.001389465	23.5
86400.00	5.69313E-07	1.71625E-05	0.001089187	24

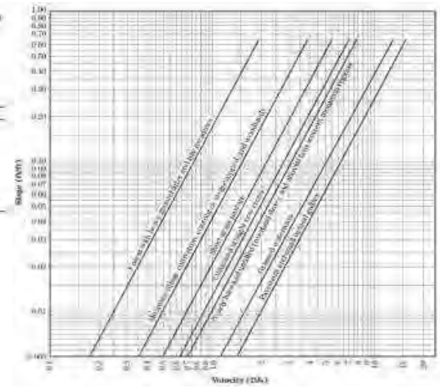


DA#10 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + ...T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1215.26 (ft)
L=	100 (ft)	S=	0.0065 (ft/ft)
P_2=	4.89 (in)	V=	0.575 (ft/s)
S=	0.0065 (ft/ft)		
T_{OL}=	12.43 (min)	T_1=	35.22 (min)

Tc= 47.65 (min)

Intensity:

SEE FIG. 2.1-2.1a	
I (100-YR)=	5.2 (in/hr)
I (10-YR)=	3.5 (in/hr)
I (2-YR)=	2.4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Single family residential district; lots 1/4-1/2 acre; basin slope <1%; and golf course

i (100-YR)	i (10-YR)	i (2-YR)
5.2	3.5	2.4

A= 16.51 (Ac)

Q (100-YR)=	**30.05 (cfs)**
Q (10-YR)=	**20.22 (cfs)**
Q (2-YR)=	**13.87 (cfs)**

DA#10 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =	992462.33	cft
Volume (10-yr)= 0.70*area*43560=	503422.92	cft
Volume (2-yr)= 0.41*area*43560=	294861.996	cft
A=	16.51	Ac

Tp = time to Qp in seconds

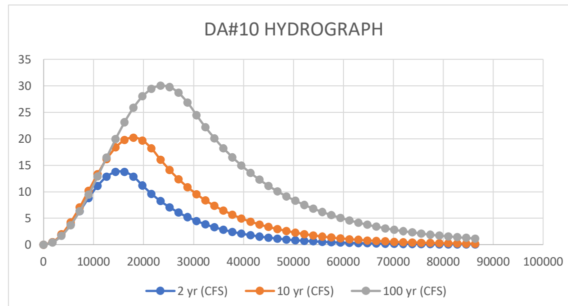
$$T_p = \frac{V}{1.39\,Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA#10 Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	13.87	20.22	30.05
Tp=	15295.992	17907.503	23761.878
1.25*Tp=	19119.990	22384.378	29702.348

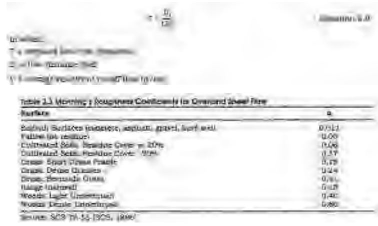
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.468493702	0.500018363	0.423439178	0.5
3600.00	1.810669351	1.950625451	1.669888295	1
5400.00	3.84516476	4.208367292	3.669087517	1.5
7200.00	6.297067673	7.049970445	6.308345997	2
9000.00	8.835063425	10.19442204	9.438894033	2.5
10800.00	11.11620401	13.33075981	12.88426892	3
12600.00	12.83224912	16.14882388	16.45026178	3.5
14400.00	13.75131725	18.36992922	19.93586477	4
16200.00	13.74921885	19.77442545	23.14460144	4.5
18000.00	12.82623745	20.22341862	25.89560175	5
19800.00	11.18634041	19.67250672	28.03379733	5.5
21600.00	9.599511133	18.17617075	29.43866238	6
23400.00	8.237780244	16.05551029	30.03100749	6.5
25200.00	7.069216589	14.08880659	29.77744336	7
27000.00	6.066418586	12.3630123	28.69226287	7.5
28800.00	5.205871683	10.84861746	26.83663549	8
30600.00	4.467396965	9.519726894	24.44845525	8.5
32400.00	3.833677981	8.353617455	22.15559302	9
34200.00	3.289854692	7.330349427	20.07776347	9.5
36000.00	2.823175015	6.432425594	18.1948001	10
37800.00	2.422695806	5.644492045	16.48842767	10.5
39600.00	2.079026251	4.953075629	14.94208485	11
41400.00	1.784107664	4.346353576	13.54076351	11.5
43200.00	1.531024514	3.813951335	12.27086302	12
45000.00	1.313842269	3.346765175	11.12005827	12.5
46800.00	1.127468237	2.936806517	10.07718004	13
48600.00	0.967532142	2.577065336	9.132106609	13.5
50400.00	0.830283652	2.261390291	8.27566549	14
52200.00	0.712504436	1.984383546	7.499544434	14.5
54000.00	0.611432696	1.741308465	6.796210745	15
55800.00	0.524698405	1.528008623	6.158838166	15.5
57600.00	0.450267737	1.340836733	5.581240632	16
59400.00	0.386395371	1.176592276	5.05781223	16.5
61200.00	0.331583568	1.032466781	4.583472786	17
63000.00	0.284547049	0.905995793	4.153618566	17.5
64800.00	0.244182858	0.795016743	3.764077588	18
66600.00	0.209544496	0.697631961	3.411069136	18.5
68400.00	0.179819731	0.612176231	3.091167059	19
70200.00	0.154311548	0.537188315	2.801266525	19.5
72000.00	0.132421808	0.471385969	2.538553885	20
73800.00	0.11363722	0.413644015	2.300479361	20.5
75600.00	0.097517304	0.362975105	2.084732305	21
77400.00	0.083684066	0.318512832	1.889218767	21.5
79200.00	0.07181313	0.27949692	1.712041178	22
81000.00	0.061626137	0.245260224	1.551479926	22.5
82800.00	0.052884211	0.215217318	1.405976675	23
84600.00	0.045382364	0.188854488	1.274119231	23.5
86400.00	0.038944685	0.165720946	1.154627842	24

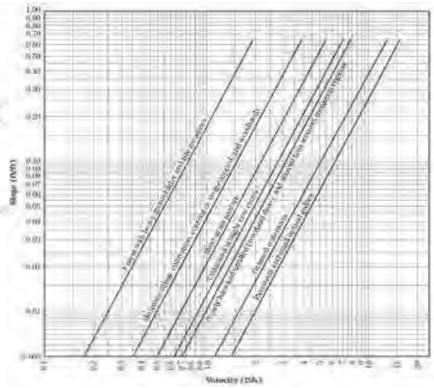


DA#11 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1842.54 (ft)
L=	100 (ft)	S=	0.0063 (ft/ft)
P_2=	4.89 (in)	V=	0.575 (ft/s)
S=	0.0063 (ft/ft)		
T_{OL}=	12.58 (min)	T_1=	53.41 (min)

Tc= 65.99 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	4.4 (in/hr)
I (10-YR)=	2.9 (in/hr)
I (2-YR)=	2 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.28 Mixed use area. Single family residential district; lots 1/4-1/2 acre; basin slope <1%; and MOSTLY golf course

i (100-YR)	i (10-YR)	i (2-YR)
4.4	2.9	2

A= 25.07 (Ac)

Q (100-YR)=	**30.89 (cfs)**
Q (10-YR)=	**20.36 (cfs)**
Q (2-YR)=	**14.04 (cfs)**

DA#11 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =	1507027.90	cft
Volume (10-yr)= 0.70*area*43560=	764434.44	cft
Volume (2-yr)= 0.41*area*43560=	447740.172	cft
A=	25.07	Ac

Tp = time to Qp in seconds

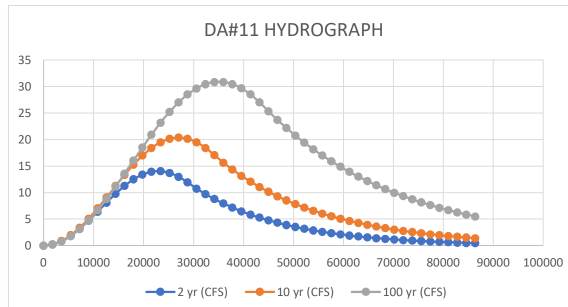
$$T_p = \frac{V}{1.39\,Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#11 Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	14.04	20.36	30.89
Tp=	22943.988	27015.629	35102.775
1.25*Tp=	28679.985	33769.536	43878.469

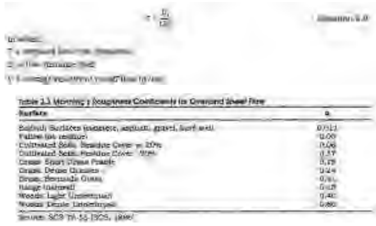
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.212123993	0.222166563	0.1999528	0.5
3600.00	0.8356757	0.878967699	0.794633343	1
5400.00	1.832969135	1.941731127	1.768642146	1.5
7200.00	3.143730246	3.364062516	3.096756872	2
9000.00	4.688739738	5.083870799	4.744585474	2.5
10800.00	6.374620899	7.026078725	6.669456788	3
12600.00	8.099483069	9.105900313	8.821525524	3.5
14400.00	9.759079665	11.23254214	11.14506302	4
16200.00	11.2531086	13.31316686	13.57990038	4.5
18000.00	12.49127432	15.256946	16.06298654	5
19800.00	13.398745	16.97902497	18.53002101	5.5
21600.00	13.92067529	18.40422741	20.91711897	6
23400.00	14.02552094	19.47033691	23.16246561	6.5
25200.00	13.70694533	20.13081308	25.20791679	7
27000.00	12.98420242	20.35682319	27.00050475	7.5
28800.00	11.91654445	20.13850091	28.49380974	8
30600.00	10.76112628	19.48537697	29.64916205	8.5
32400.00	9.717736487	18.42596313	30.43664337	9
34200.00	8.775512894	17.04023431	30.83586157	9.5
36000.00	7.924646512	15.62638361	30.83647874	10
37800.00	7.156279422	14.32984197	30.4384789	10.5
39600.00	6.462412561	13.1408761	29.65216841	11
41400.00	5.835822451	12.05056029	28.49790908	11.5
43200.00	5.269985992	11.05070942	27.00559091	12
45000.00	4.759012563	10.1338175	25.32140818	12.5
46800.00	4.29758269	9.293001309	23.68847906	13
48600.00	3.880892671	8.521948744	22.16085442	13.5
50400.00	3.504604567	7.814871426	20.73174336	14
52200.00	3.164801043	7.166461245	19.39479294	14.5
54000.00	2.857944584	6.571850512	18.14405989	15
55800.00	2.58084067	6.026575414	16.97398421	15.5
57600.00	2.33060452	5.52654251	15.87936448	16
59400.00	2.104631057	5.067997995	14.85533468	16.5
61200.00	1.900567792	4.647499523	13.8973426	17
63000.00	1.71629033	4.261890363	13.00112959	17.5
64800.00	1.549880257	3.908275703	12.16271164	18
66600.00	1.399605165	3.584000918	11.37836166	18.5
68400.00	1.26390062	3.286631639	10.64459291	19
70200.00	1.141353874	3.01393548	9.958143503	19.5
72000.00	1.030689158	2.763865282	9.315961901	20
73800.00	0.930754401	2.534543737	8.715193361	20.5
75600.00	0.840509233	2.324249303	8.153167233	21
77400.00	0.759014162	2.131403276	7.627385093	21.5
79200.00	0.685420784	1.954557937	7.135509637	22
81000.00	0.618962959	1.792385689	6.675354287	22.5
82800.00	0.558948829	1.643669087	6.244873474	23
84600.00	0.504753618	1.507291696	5.842153544	23.5
86400.00	0.45581313	1.382229718	5.465404251	24

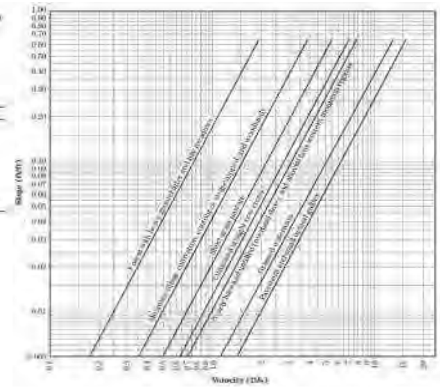


DA#12 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	**T=**	
n=	0.011	D=	903.51 (ft)
L=	100 (ft)	S=	0.0110 (ft/ft)
P_2=	4.89 (in)	V=	2.125 (ft/s)
S=	0.0110 (ft/ft)		
T_{OL}=	1.24 (min)	T_1=	7.09 (min)

Tc= 8.33 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	12.5 (in/hr)
I (10-YR)=	8.3 (in/hr)
I (2-YR)=	5.7 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.2 Woodlands; basin slope 1-3.5%

i (100-YR)	i (10-YR)	i (2-YR)
12.5	8.3	5.7

A= 15.64 (Ac)

Q (100-YR)=	**39.10 (cfs)**
Q (10-YR)=	**25.96 (cfs)**
Q (2-YR)=	**17.83 (cfs)**

DA#12 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =		940164.19 cft
Volume (10-yr)= 0.70*area*43560=		476894.88 cft
Volume (2-yr)= 0.41*area*43560=		279324.144 cft
A=	15.64 Ac	

Tp = time to Qp in seconds

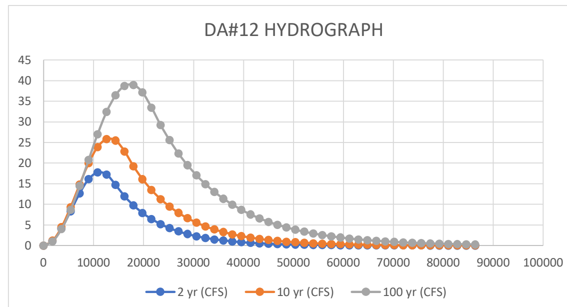
$$Tp = \frac{V}{1.39\ Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA#12 Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	17.83	25.96	39.10
Tp=	11270.731	13214.874	17298.647
1.25*Tp=	14088.413	16518.592	21623.309

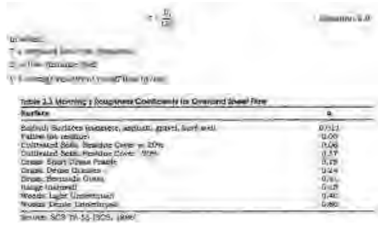
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	1.09873382	1.170486314	1.035300289	0.5
3600.00	4.124101161	4.470864892	4.031549321	1
5400.00	8.330359342	9.305959949	8.671405153	1.5
7200.00	12.68068014	14.80383166	14.4634464	2
9000.00	16.1027244	19.97301798	20.79422016	2.5
10800.00	17.75296993	23.88133054	26.99321475	3
12600.00	17.22463687	25.8239614	32.40387559	3.5
14400.00	14.69922864	25.45058504	36.45314296	4
16200.00	11.94338541	22.82853451	38.71214652	4.5
18000.00	9.704213641	19.1785351	38.94162825	5
19800.00	7.884846646	16.06621292	37.11728305	5.5
21600.00	6.406578516	13.45896318	33.43233291	6
23400.00	5.205459297	11.27482193	29.23825138	6.5
25200.00	4.229528511	9.445126481	25.53901134	7
27000.00	3.436567344	7.912356826	22.30780124	7.5
28800.00	2.792272253	6.628327389	19.48540566	8
30600.00	2.268771003	5.552672224	17.02010115	8.5
32400.00	1.8434169	4.651576033	14.86670837	9
34200.00	1.497809106	3.896711119	12.98576405	9.5
36000.00	1.21699661	3.264346844	11.34279786	10
37800.00	0.988831449	2.734603617	9.907700687	10.5
39600.00	0.803443187	2.290827935	8.654172814	11
41400.00	0.652811918	1.919068854	7.559241994	11.5
43200.00	0.530421325	1.607639408	6.602842438	12
45000.00	0.430976786	1.346749212	5.767447092	12.5
46800.00	0.350176325	1.128196678	5.037746437	13
48600.00	0.284524509	0.945111186	4.400367919	13.5
50400.00	0.231181238	0.791737089	3.843630891	14
52200.00	0.187838878	0.663252776	3.357332545	14.5
54000.00	0.152622438	0.555619095	2.93256094	15
55800.00	0.124008453	0.465452374	2.561531677	15.5
57600.00	0.10075908	0.389918046	2.237445246	16
59400.00	0.081868549	0.326641546	1.954362413	16.5
61200.00	0.066519656	0.273633653	1.707095379	17
63000.00	0.054048407	0.229227963	1.49111271	17.5
64800.00	0.043915295	0.192028497	1.30245629	18
66600.00	0.03568196	0.160865817	1.137668786	18.5
68400.00	0.028992229	0.134760265	0.99373029	19
70200.00	0.023556703	0.112891162	0.868002974	19.5
72000.00	0.019140241	0.09457101	0.758182749	20
73800.00	0.015551787	0.079223881	0.66225704	20.5
75600.00	0.012636105	0.066367308	0.578467906	21
77400.00	0.01026706	0.055597119	0.505279821	21.5
79200.00	0.00834217	0.046574733	0.441351533	22
81000.00	0.006778162	0.039016514	0.385511489	22.5
82800.00	0.005507377	0.032684854	0.336736358	23
84600.00	0.004474842	0.027380706	0.294132284	23.5
86400.00	0.003635889	0.022937322	0.256918502	24

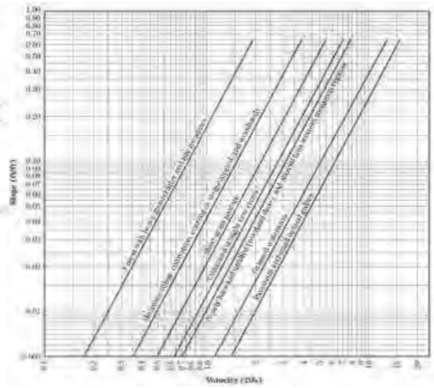


DA#13 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.8	D=	408.8 (ft)
L=	100 (ft)	S=	0.0110 (ft/ft)
P_2=	4.89 (in)	V=	0.2625 (ft/s)
S=	0.0110 (ft/ft)		
T_{OL}=	38.42 (min)	T_1=	25.96 (min)

Tc= 64.37 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	4.5 (in/hr)
I (10-YR)=	3 (in/hr)
I (2-YR)=	2 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.2 Woodlands; basin slope 1-3.5%

i (100-YR)	i (10-YR)	i (2-YR)
4.5	3	2

A= 16.24 (Ac)

Q (100-YR)=	**14.62 (cfs)**
Q (10-YR)=	**9.74 (cfs)**
Q (2-YR)=	**6.50 (cfs)**

DA#13 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =		976231.87	cft
Volume (10-yr)= 0.70*area*43560=		495190.08	cft
Volume (2-yr)= 0.41*area*43560=		290039.904	cft
A=	16.24 Ac		

Tp = time to Qp in seconds

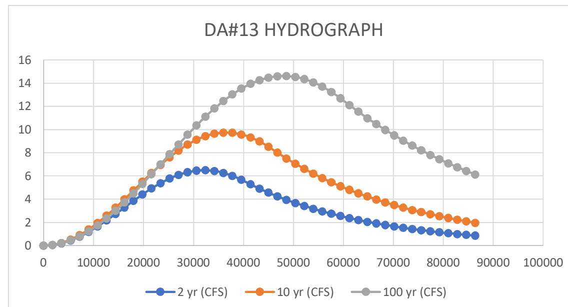
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#13 Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	6.50	9.74	14.62
Tp=	32121.583	36561.151	48051.799
1.25*Tp=	40151.978	45701.439	60064.748

ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.050201302	0.058158924	0.05054669	0.5
3600.00	0.199253377	0.231247166	0.201487537	1
5400.00	0.442548709	0.515132286	0.450734537	1.5
7200.00	0.77256652	0.903036592	0.794839794	2
9000.00	1.179105256	1.385698961	1.229043217	2.5
10800.00	1.649597939	1.951595944	1.747338359	3
12600.00	2.169500636	2.587216883	2.342555517	3.5
14400.00	2.722742048	3.27738648	3.006460902	4
16200.00	3.292220302	4.005627097	3.729870547	4.5
18000.00	3.860331613	4.754552162	4.502777347	5
19800.00	4.409514448	5.506281267	5.314489489	5.5
21600.00	4.922792396	6.242867057	6.153778357	6
23400.00	5.384298941	6.946723719	7.00903386	6.5
25200.00	5.779767933	7.601046843	7.868425037	7
27000.00	6.096974581	8.190214619	8.720063714	7.5
28800.00	6.326113352	8.700160805	9.552168963	8
30600.00	6.460101079	9.118710556	10.35323006	8.5
32400.00	6.494795914	9.435871097	11.11216574	9
34200.00	6.429125368	9.644070294	11.81847745	9.5
36000.00	6.265119455	9.738337441	12.4623946	10
37800.00	6.00784795	9.716421931	13.03500973	10.5
39600.00	5.665263661	9.578846993	13.52840171	11
41400.00	5.278025033	9.328897195	13.93574532	11.5
43200.00	4.907201229	8.97254003	14.25140569	12
45000.00	4.562430787	8.518283441	14.4710162	12.5
46800.00	4.241883247	8.008189183	14.59153893	13
48600.00	3.943856756	7.511703753	14.61130665	13.5
50400.00	3.666769028	7.045999038	14.53004592	14
52200.00	3.409148947	6.609166718	14.34888083	14.5
54000.00	3.169628753	6.199416786	14.07031748	15
55800.00	2.946936783	5.815070208	13.69820931	15.5
57600.00	2.73989072	5.454552048	13.23770379	16
59400.00	2.547391311	5.11638501	12.69517121	16.5
61200.00	2.368416537	4.799183387	12.11298367	17
63000.00	2.202016184	4.501647381	11.53724456	17.5
64800.00	2.047306797	4.222557779	10.98887075	18
66600.00	1.903466992	3.960770955	10.46656156	18.5
68400.00	1.769733092	3.715214185	9.969078106	19
70200.00	1.645395077	3.484881251	9.495240415	19.5
72000.00	1.529792809	3.268828318	9.043924582	20
73800.00	1.422312533	3.066170065	8.614060125	20.5
75600.00	1.322383613	2.876076059	8.204627446	21
77400.00	1.229475504	2.697767352	7.814655406	21.5
79200.00	1.14309494	2.530513288	7.443219027	22
81000.00	1.062783306	2.373628511	7.089437295	22.5
82800.00	0.988114212	2.226470153	6.752471072	23
84600.00	0.918691223	2.088435204	6.431521103	23.5
86400.00	0.85414576	1.958958037	6.125826125	24



DA#14 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$

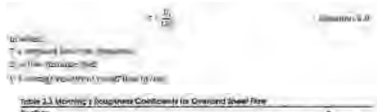
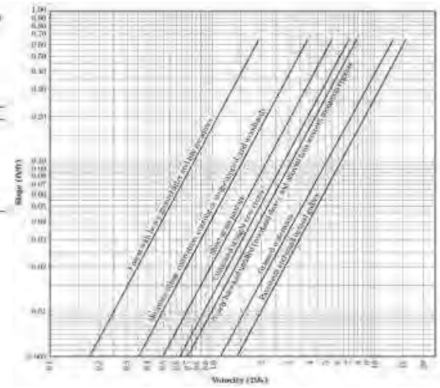


Table 3.3 Manning's Roughness Coefficients for Overland Sheet Flow

Surface	n
Smooth Surfaces (concrete, asphalt, gravel, bare soil)	0.011
Fallow (no residue)	0.05
Cultivated Soils: Residue Cover ≤ 20%	0.06
Cultivated Soils: Residue Cover > 20%	0.17
Grass: Short Grass Prairie	0.15
Grass: Dense Grasses	0.24
Grass: Bermuda Grass	0.41
Range (natural)	0.13
Woods: Light Underbrush	0.40
Woods: Dense Underbrush	0.80

Source: SCS TR-55 (SCS, 1986)



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.8	D=	2180.62 (ft)
L=	100 (ft)	S=	0.0065 (ft/ft)
P_2=	4.89 (in)	V=	1.625 (ft/s)
S=	0.0065 (ft/ft)		
T_{OL}=	47.41 (min)	T_1=	22.37 (min)

Tc= 69.78 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	4.3 (in/hr)
I (10-YR)=	3.8 (in/hr)
I (2-YR)=	1.9 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.18 Mixed use area. MUD facilities; and MOSTLY woodlands; basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
4.3	3.8	1.9

A= 46.99 (Ac)

Q (100-YR)=	**36.37 (cfs)**
Q (10-YR)=	**32.14 (cfs)**
Q (2-YR)=	**16.07 (cfs)**

DA#14 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =	2824700.47	cft
Volume (10-yr)= 0.70*area*43560=	1432819.08	cft
Volume (2-yr)= 0.41*area*43560=	839222.604	cft
A=	46.99	Ac

Tp = time to Qp in seconds

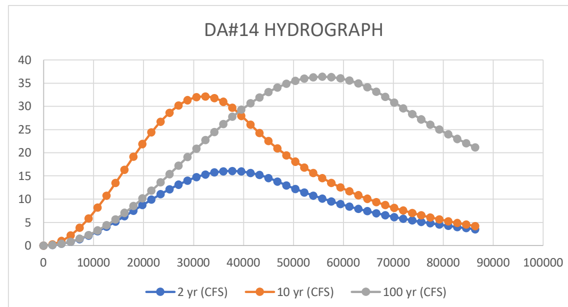
$$Tp = \frac{V}{1.39\ Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#14 Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	16.07	32.14	36.37
Tp=	37569.103	32071.185	55874.184
1.25*Tp=	46961.378	40088.981	69842.730

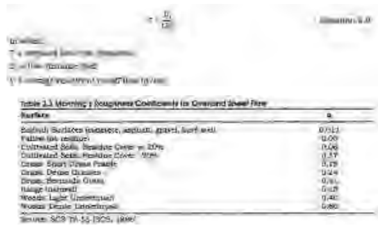
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.090852016	0.249167177	0.093054642	0.5
3600.00	0.361353605	0.988942257	0.371266233	1
5400.00	0.805387847	2.196385473	0.831787516	1.5
7200.00	1.412913683	3.834055088	1.469905447	2
9000.00	2.17019298	5.851168429	2.279089434	2.5
10800.00	3.060101189	8.185176609	3.251058171	3
12600.00	4.062514594	10.76370412	4.375864386	3.5
14400.00	5.154765368	13.50679311	5.641996648	4
16200.00	6.312154169	16.32938285	7.036497174	4.5
18000.00	7.508508673	19.14394735	8.545094441	5
19800.00	8.716775417	21.86320946	10.15234924	5.5
21600.00	9.909631559	24.4028473	11.8418127	6
23400.00	11.06010274	26.68410896	13.5961946	6.5
25200.00	12.14217308	28.63625456	15.39754033	7
27000.00	13.13137343	30.19874979	17.22741467	7.5
28800.00	14.00533477	31.32314308	19.0670904	8
30600.00	14.74429399	31.97456798	20.89774002	8.5
32400.00	15.33154081	32.13282441	22.7006284	9
34200.00	15.75379568	31.79300495	24.4573045	9.5
36000.00	16.00151004	30.96564712	26.14979025	10
37800.00	16.06908227	29.67640655	27.76076449	10.5
39600.00	15.95498433	27.96526142	29.2737403	11
41400.00	15.66179635	26.04614799	30.67323364	11.5
43200.00	15.19614827	24.21342413	31.9449219	12
45000.00	14.5685699	22.50965894	33.07579043	12.5
46800.00	13.79325283	20.92577833	34.05426577	13
48600.00	12.97680523	19.45334666	34.87033404	13.5
50400.00	12.19319887	18.08452189	35.51564349	14
52200.00	11.45691069	16.81201377	35.98358993	14.5
54000.00	10.76508338	15.62904503	36.26938432	15
55800.00	10.11503218	14.52931529	36.37010181	15.5
57600.00	9.504234415	13.50696746	36.28471163	16
59400.00	8.930319767	12.55655662	36.01408768	16.5
61200.00	8.391061043	11.67302094	35.56099956	17
63000.00	7.88436554	10.85165481	34.93008425	17.5
64800.00	7.408266921	10.08808368	34.12779863	18
66600.00	6.960917591	9.378240836	33.1623534	18.5
68400.00	6.540581518	8.718345725	32.04362907	19
70200.00	6.145627504	8.104883794	30.82460773	19.5
72000.00	5.774522847	7.534587799	29.56033761	20
73800.00	5.425827403	7.004420389	28.34792149	20.5
75600.00	5.098187986	6.511557937	27.18523256	21
77400.00	4.790333125	6.053375499	26.07023128	21.5
79200.00	4.501068127	5.627432833	25.00096173	22
81000.00	4.22927044	5.231461405	23.97554823	22.5
82800.00	3.973885298	4.863352304	22.99219203	23
84600.00	3.733921627	4.521145011	22.04916815	23.5
86400.00	3.508448199	4.203016959	21.14482235	24

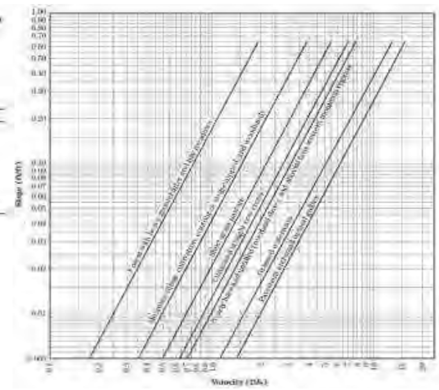


DA#14A DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	289.47 (ft)
L=	100 (ft)	S=	0.0058 (ft/ft)
P_2=	4.89 (in)	V=	0.55 (ft/s)
S=	0.0058 (ft/ft)		
T_{OL}=	13.00 (min)	T_1=	8.77 (min)

Tc= 21.78 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	7.9 (in/hr)
I (10-YR)=	5.4 (in/hr)
I (2-YR)=	3.7 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.15 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
7.9	5.4	3.7

A= 7.47 (Ac)

Q (100-YR)=	**8.85 (cfs)**
Q (10-YR)=	**6.05 (cfs)**
Q (2-YR)=	**4.15 (cfs)**

DA#14A EXISTING CALCULATIONS

Volume (100-yr) =	1.38*area*43560 =	449042.62	cft
Volume (10-yr)=	0.70*area*43560=	227775.24	cft
Volume (2-yr)=	0.41*area*43560=	133411.212	cft
	A=	7.47	Ac

Tp = time to Qp in seconds

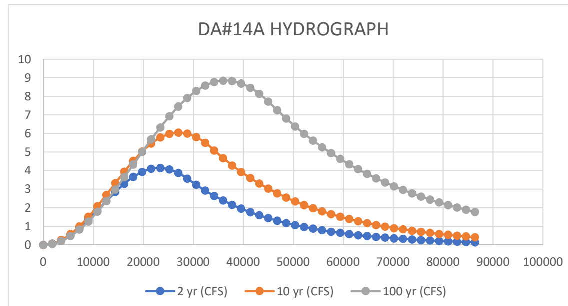
$$T_p = \frac{V}{1.39\,Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#14A Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	4.15	6.05	8.85
Tp=	23150.690	27082.334	36495.037
1.25*Tp=	28938.363	33852.918	45618.796

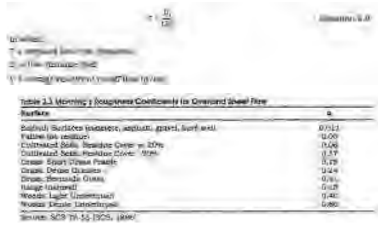
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.061533278	0.065711252	0.053025773	0.5
3600.00	0.24247997	0.259990483	0.210832532	1
5400.00	0.532097534	0.574398119	0.469639043	1.5
7200.00	0.913191793	0.995276158	0.823243998	2
9000.00	1.363137733	1.504341477	1.263174608	2.5
10800.00	1.855222716	2.079480059	1.778889621	3
12600.00	2.360232369	2.695707639	2.3580319	3.5
14400.00	2.848184998	3.326255024	2.986724519	4
16200.00	3.290111565	3.943730965	3.649903265	4.5
18000.00	3.659775527	4.521312043	4.331677599	5
19800.00	3.935230471	5.033907887	5.01571141	5.5
21600.00	4.100123035	5.459251113	5.685614445	6
23400.00	4.144663787	5.77886463	6.325335043	6.5
25200.00	4.066208408	5.978864288	6.91954475	7
27000.00	3.869414678	6.050562016	7.454005604	7.5
28800.00	3.565965957	5.990843234	7.915911298	8
30600.00	3.227393628	5.802302152	8.29419403	8.5
32400.00	2.917123375	5.493129076	8.579789702	9
34200.00	2.636681412	5.085471502	8.765855108	9.5
36000.00	2.383200151	4.664518257	8.847931902	10
37800.00	2.154087685	4.278409694	8.824053429	10.5
39600.00	1.947001284	3.924261521	8.694791845	11
41400.00	1.759823441	3.599428196	8.463244408	11.5
43200.00	1.590640215	3.301483162	8.134959267	12
45000.00	1.437721669	3.028200725	7.717802517	12.5
46800.00	1.299504174	2.77753942	7.25315194	13
48600.00	1.174574421	2.54762677	6.802687925	13.5
50400.00	1.061654974	2.336745291	6.380200413	14
52200.00	0.959591206	2.143319664	5.983951897	14.5
54000.00	0.867339488	1.965904971	5.612312778	15
55800.00	0.783956525	1.803175895	5.263754665	15.5
57600.00	0.708589707	1.653916826	4.936844092	16
59400.00	0.640468389	1.517012774	4.630236615	16.5
61200.00	0.578896015	1.391441045	4.342671293	17
63000.00	0.523242992	1.276263599	4.072965493	17.5
64800.00	0.472940254	1.170620041	3.820010032	18
66600.00	0.427473444	1.073721198	3.582764615	18.5
68400.00	0.386377653	0.984843221	3.360253554	19
70200.00	0.349232667	0.903322176	3.151561758	19.5
72000.00	0.315658669	0.828549089	2.955830967	20
73800.00	0.285312357	0.759965394	2.772256227	20.5
75600.00	0.257883432	0.697058759	2.600082573	21
77400.00	0.233091427	0.639359263	2.438601931	21.5
79200.00	0.210682839	0.58643588	2.2871502	22
81000.00	0.190428533	0.537893265	2.145104525	22.5
82800.00	0.172121405	0.493368796	2.011880734	23
84600.00	0.155574259	0.45252987	1.886930935	23.5
86400.00	0.140617898	0.415071413	1.769741265	24

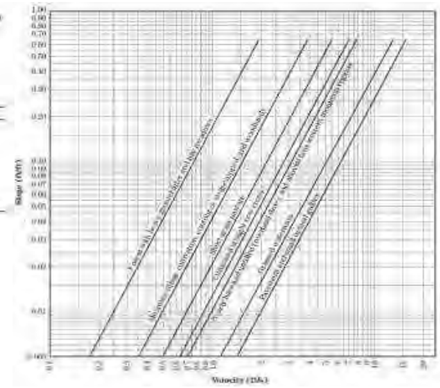


DA#15 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	**T=**	
n=	0.15	D=	4872.04 (ft)
L=	100 (ft)	S=	0.0076 (ft/ft)
P_2=	4.89 (in)	V=	1.75 (ft/s)
S=	0.0076 (ft/ft)		
T_{OL}=	11.67 (min)	T_1=	46.40 (min)

Tc= 58.07 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	4.7 (in/hr)
I (10-YR)=	3.2 (in/hr)
I (2-YR)=	2.2 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.18 Mixed use area. Lots 1/4-1/2 acre; golf course; and MOSTLY woodlands; basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
4.7	3.2	2.2

A= 75.07 (Ac)

Q (100-YR)=	**63.51 (cfs)**
Q (10-YR)=	**43.24 (cfs)**
Q (2-YR)=	**29.73 (cfs)**

DA#15 EXISTING CALCULATIONS

Volume (100-yr) =	1.38*area*43560 =	4512667.90	cft
Volume (10-yr)=	0.70*area*43560=	2289034.44	cft
Volume (2-yr)=	0.41*area*43560=	1340720.172	cft
A=	75.07 Ac		

Tp = time to Qp in seconds

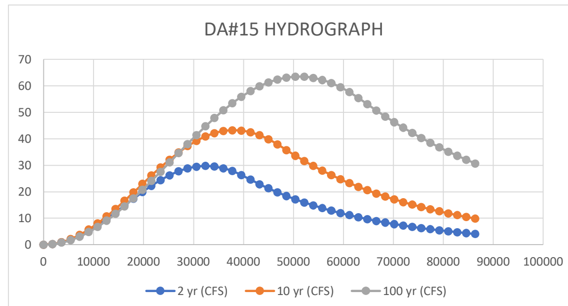
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#15 Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	29.73	43.24	63.51
Tp=	32446.043	38084.532	51118.935
1.25*Tp=	40557.554	47605.665	63898.668

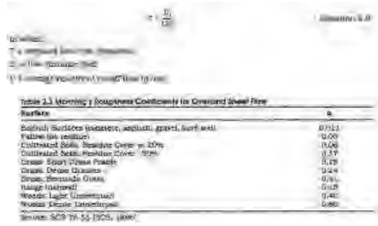
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.225176614	0.23789119	0.194095306	0.5
3600.00	0.893883933	0.946329625	0.774008465	1
5400.00	1.985861103	2.109725109	1.732650214	1.5
7200.00	3.468022813	3.702475471	3.058301443	2
9000.00	5.295461729	5.689529972	4.734756462	2.5
10800.00	7.412809124	8.02716065	6.741521111	3
12600.00	9.755912468	10.66392462	9.054063291	3.5
14400.00	12.25377915	13.54179613	11.64411287	4
16200.00	14.83072747	16.59744354	14.48000725	4.5
18000.00	17.40867966	19.76362296	17.5270785	5
19800.00	19.90952753	22.97065813	20.74807705	5.5
21600.00	22.25749905	26.14797366	24.10362719	6
23400.00	24.38145412	29.22564821	27.5527083	6.5
25200.00	26.21704	32.13595317	31.0531564	7
27000.00	27.70864113	34.81484315	34.56217956	7.5
28800.00	28.81106416	37.20336535	38.03688102	8
30600.00	29.4909073	39.24895694	41.4347836	8.5
32400.00	29.72757229	40.90660178	44.71434896	9
34200.00	29.51388853	42.13982103	47.83548537	9.5
36000.00	28.85633032	42.92147594	50.7600379	10
37800.00	27.77482072	43.2343651	53.45225475	10.5
39600.00	26.30212788	43.07160291	55.87922439	11
41400.00	24.56199702	42.43677121	58.01127783	11.5
43200.00	22.85296065	41.34384037	59.82235135	12
45000.00	21.26283991	39.81686188	61.29030514	12.5
46800.00	19.78336059	37.88943907	62.39719388	13
48600.00	18.40682419	35.7198493	63.12948619	13.5
50400.00	17.12606791	33.59120478	63.47823003	14
52200.00	15.93442731	31.58941207	63.4391621	14.5
54000.00	14.82570167	29.70691172	63.01276	15
55800.00	13.79412174	27.93659477	62.20423636	15.5
57600.00	12.83431966	26.27177589	61.02347514	16
59400.00	11.94130111	24.70616818	59.4849108	16.5
61200.00	11.11041924	23.23385935	57.60735183	17
63000.00	10.33735056	21.84928947	55.41375082	17.5
64800.00	9.618072403	20.54722994	53.04484952	18
66600.00	8.948841985	19.32276373	50.67142647	18.5
68400.00	8.326176963	18.17126685	48.40419915	19
70200.00	7.746837293	17.08839085	46.23841599	19.5
72000.00	7.207808376	16.07004642	44.16953798	20
73800.00	6.706285367	15.11238795	42.19322924	20.5
75600.00	6.239658586	14.211799	40.30534788	21
77400.00	5.805499937	13.36487862	38.50193732	21.5
79200.00	5.401550269	12.56842858	36.77921803	22
81000.00	5.025707627	11.81944119	35.13357958	22.5
82800.00	4.676016309	11.11508803	33.56157309	23
84600.00	4.350656693	10.45270922	32.05990399	23.5
86400.00	4.047935765	9.829803399	30.62542513	24

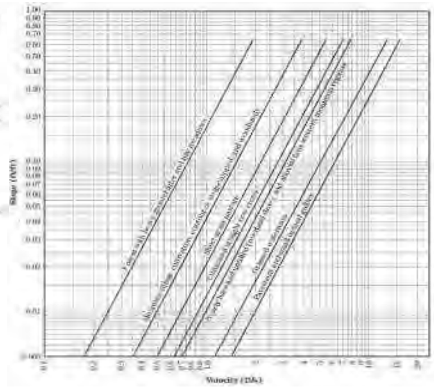


DA#15A DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	4161.67 (ft)
L=	100 (ft)	S=	0.0039 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0039 (ft/ft)		
T_{OL}=	15.24 (min)	T_1=	138.72 (min)

Tc= 153.96 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	3 (in/hr)
I (10-YR)=	1.8 (in/hr)
I (2-YR)=	1.15 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
3	1.8	1.15

A= 57.45 (Ac)

Q (100-YR)=	**60.32 (cfs)**
Q (10-YR)=	**36.19 (cfs)**
Q (2-YR)=	**23.12 (cfs)**

DA#15A EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =		3453480.36 cft
Volume (10-yr)= 0.70*area*43560=		1751765.4 cft
Volume (2-yr)= 0.41*area*43560=		1026034.02 cft
A=	57.45 Ac	

Tp = time to Qp in seconds

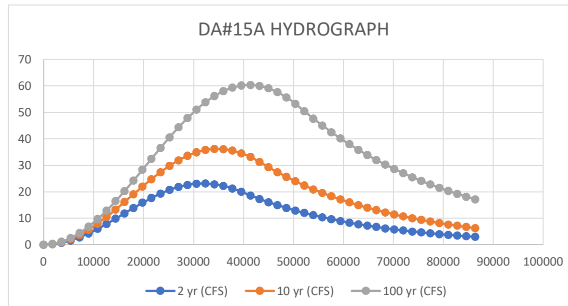
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.340 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA#15A Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	23.12	36.19	60.32
Tp=	31922.070	34820.144	41187.256
1.25*Tp=	39902.587	43525.180	51484.070

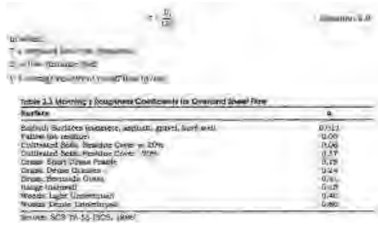
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.180935004	0.238121983	0.283828536	0.5
3600.00	0.71807698	0.946221383	1.129972279	1
5400.00	1.594614068	2.105663471	2.522506178	1.5
7200.00	2.783111774	3.685935733	4.435221714	2
9000.00	4.246371633	5.645450861	6.832120162	2.5
10800.00	5.938595476	7.932641184	9.668090118	3
12600.00	7.80681885	10.48731575	12.88975653	3.5
14400.00	9.792568743	13.24224435	16.43648524	4
16200.00	11.83369371	16.12492677	20.24152419	4.5
18000.00	13.86630915	19.05950077	24.23325973	5
19800.00	15.82679677	21.9687385	28.33656444	5.5
21600.00	17.65379582	24.77607886	32.47421109	6
23400.00	19.29012355	27.40764235	36.56832609	6.5
25200.00	20.68456498	29.7941753	40.54185518	7
27000.00	21.79347588	31.87287242	44.32001358	7.5
28800.00	22.58214874	33.58902957	47.83169357	8
30600.00	23.02589912	34.89748342	51.01080271	8.5
32400.00	23.11083818	35.76379999	53.79750782	9
34200.00	22.83430745	36.16518081	56.13936105	9.5
36000.00	22.20496198	36.09106293	57.99228699	10
37800.00	21.24249949	35.54339687	59.32141218	10.5
39600.00	19.97704382	34.53659531	60.10172153	11
41400.00	18.592314	33.0971538	60.31852901	11.5
43200.00	17.2781855	31.26295347	59.96775416	12
45000.00	16.05694128	29.27377047	59.05599882	12.5
46800.00	14.92201616	27.37114702	57.60042289	13
48600.00	13.867309	25.59218293	55.62842141	13.5
50400.00	12.88714989	23.92884108	53.17710889	14
52200.00	11.97626967	22.3736067	50.39956273	14.5
54000.00	11.12977164	20.91945344	47.61599855	15
55800.00	10.34310516	19.55981161	44.98617042	15.5
57600.00	9.612041278	18.28853853	42.5015875	16
59400.00	8.932649924	17.09989075	40.15422792	16.5
61200.00	8.301278819	15.9884981	37.93651284	17
63000.00	7.714533829	14.94933947	35.84128199	17.5
64800.00	7.169260725	13.97772005	33.8617706	18
66600.00	6.66252822	13.06925019	31.99158748	18.5
68400.00	6.191612216	12.21982555	30.22469443	19
70200.00	5.753981157	11.42560853	28.55538676	19.5
72000.00	5.347282419	10.68301096	26.97827483	20
73800.00	4.969329668	9.988677884	25.48826667	20.5
75600.00	4.6180911	9.339472383	24.08055156	21
77400.00	4.291678523	8.732461433	22.75058445	21.5
79200.00	3.988337204	8.164902637	21.49407133	22
81000.00	3.706436436	7.634231835	20.30695534	22.5
82800.00	3.444460775	7.138051523	19.18540367	23
84600.00	3.201001888	6.674120023	18.12579522	23.5
86400.00	2.974750986	6.240341351	17.12470887	24

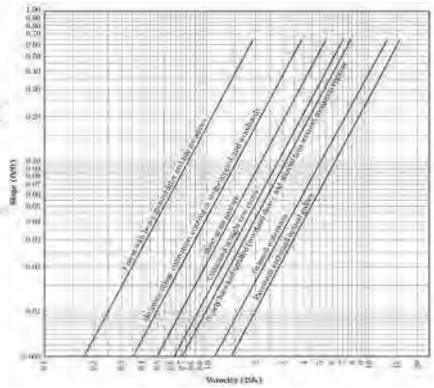


DA#15B DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	2378.48 (ft)
L=	100 (ft)	S=	0.0049 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0049 (ft/ft)		
T_{OL}=	13.91 (min)	T_1=	79.28 (min)

Tc= 93.19 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	3.7 (in/hr)
I (10-YR)=	2.3 (in/hr)
I (2-YR)=	1.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; golf course; basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
3.7	2.3	1.5

A= 23.58 (Ac)

Q (100-YR)=	**30.54 (cfs)**
Q (10-YR)=	**18.98 (cfs)**
Q (2-YR)=	**12.38 (cfs)**

DA#15B EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =		1417459.82	cft
Volume (10-yr)= 0.70*area*43560=		719001.36	cft
Volume (2-yr)= 0.41*area*43560=		421129.368	cft
A=	23.58 Ac		

Tp = time to Qp in seconds

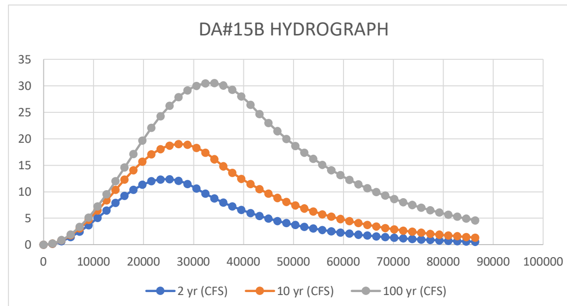
Tp = $\dfrac{V}{1.39\ Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#15B Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	12.38	18.98	30.54
Tp=	24473.587	27250.547	33395.072
1.25*Tp=	30591.984	34063.184	41743.840

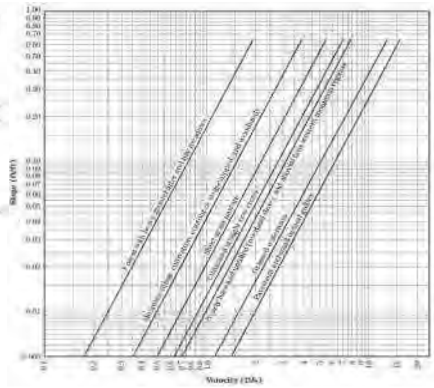
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.164497597	0.203617433	0.218371311	0.5
3600.00	0.649247075	0.805732977	0.867238731	1
5400.00	1.428483217	1.780511236	1.928041406	1.5
7200.00	2.460788367	3.086126713	3.370435071	2
9000.00	3.69129384	4.666558448	5.153160052	2.5
10800.00	5.054596287	6.453993744	7.225221493	3
12600.00	6.478233985	8.371737858	9.527348071	3.5
14400.00	7.886538293	10.33750479	11.99368745	4
16200.00	9.204655568	12.26694801	14.55368997	4.5
18000.00	10.36252575	14.07727953	17.13412677	5
19800.00	11.29860617	15.69082217	19.66118444	5.5
21600.00	11.96314265	17.03834255	22.06257648	6
23400.00	12.320814	18.06202164	24.26961107	6.5
25200.00	12.35260941	18.71793574	26.21915597	7
27000.00	12.05683891	18.97794106	27.85544445	7.5
28800.00	11.44922317	18.83088139	29.13167047	8
30600.00	10.57497547	18.28306672	30.01132758	8.5
32400.00	9.610700583	17.35800251	30.46925319	9
34200.00	8.734352713	16.11633546	30.49234832	9.5
36000.00	7.937914272	14.79018149	30.07995236	10
37800.00	7.214098749	13.57315185	29.24386187	10.5
39600.00	6.556284055	12.4562671	28.00799324	11
41400.00	5.958451928	11.4312867	26.40769849	11.5
43200.00	5.415132884	10.49064816	24.6579338	12
45000.00	4.921356169	9.627411304	22.98929077	12.5
46800.00	4.472604284	8.835207037	21.43356756	13
48600.00	4.06477166	8.108190345	19.98312271	13.5
50400.00	3.69412709	7.440997182	18.63083185	14
52200.00	3.357279596	6.828704892	17.37005274	14.5
54000.00	3.051147406	6.266795881	16.19459264	15
55800.00	2.772929756	5.751124297	15.09867785	15.5
57600.00	2.520081271	5.277885431	14.07692543	16
59400.00	2.290288673	4.84358765	13.12431668	16.5
61200.00	2.081449621	4.445026637	12.23617253	17
63000.00	1.891653474	4.079261743	11.40813057	17.5
64800.00	1.719163812	3.743594298	10.63612356	18
66600.00	1.562402551	3.435547692	9.916359546	18.5
68400.00	1.419935502	3.152849108	9.245303148	19
70200.00	1.290459254	2.89341275	8.619658242	19.5
72000.00	1.172789246	2.655324457	8.036351758	20
73800.00	1.06584893	2.436827573	7.492518586	20.5
75600.00	0.968659923	2.236309995	6.985487501	21
77400.00	0.880333058	2.05229227	6.512768045	21.5
79200.00	0.800060242	1.883416688	6.072038294	22
81000.00	0.72710707	1.728437255	5.661133453	22.5
82800.00	0.660806104	1.586210511	5.278035219	23
84600.00	0.600550765	1.455687082	4.920861874	23.5
86400.00	0.545789785	1.335903946	4.587859039	24



DA#15A DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1630.41 (ft)
L=	100 (ft)	S=	0.0128 (ft/ft)
P_2=	4.89 (in)	V=	0.8 (ft/s)
S=	0.0128 (ft/ft)		
T_{OL}=	9.48 (min)	T_1=	33.97 (min)

Tc= 43.44 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	5.5 (in/hr)
I (10-YR)=	3.7 (in/hr)
I (2-YR)=	2.6 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.45 Single family residential district; lots 1/4-1/2 acre; basin slope 1-3.5%

i (100-YR)	i (10-YR)	i (2-YR)
5.5	3.7	2.6

A= 28.7 (Ac)

Q (100-YR)=	**71.03 (cfs)**
Q (10-YR)=	**47.79 (cfs)**
Q (2-YR)=	**33.58 (cfs)**

DA#15A EXISTING CALCULATIONS

Volume (100-yr) =	1.38*area*43560 =	1725237.36	cft
Volume (10-yr)=	0.70*area*43560=	875120.4	cft
Volume (2-yr)=	0.41*area*43560=	512570.52	cft
	A= 28.70 Ac		

Tp = time to Qp in seconds

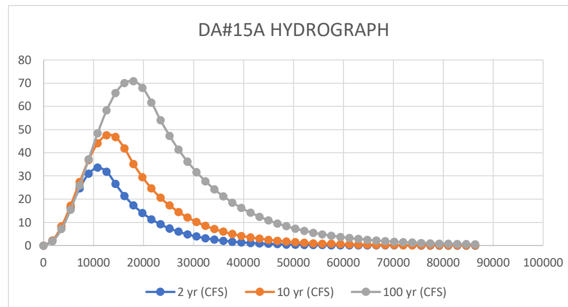
Tp = $\dfrac{V}{1.39\ Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.340 Q_p e^{\left(-1.3t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA#15A Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	33.58	47.79	71.03
Tp=	10981.738	13175.190	17473.381
1.25*Tp=	13727.172	16468.987	21841.727

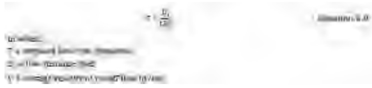
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	2.177172077	2.167154292	1.843716597	0.5
3600.00	8.144040371	8.275480529	7.183444664	1
5400.00	16.3531021	17.21688647	15.46479317	1.5
7200.00	24.67534329	27.36933981	25.82796077	2
9000.00	30.95239697	36.89111593	37.19700369	2.5
10800.00	33.55631402	44.05489939	48.39154432	3
12600.00	31.8117705	47.56113079	58.24932255	3.5
14400.00	26.49952911	46.77375571	65.74686606	4
16200.00	21.41402179	41.8356094	70.10575115	4.5
18000.00	17.30447086	35.11158275	70.87342166	5
19800.00	13.98358116	29.39793743	67.97017511	5.5
21600.00	11.30000124	24.61406343	61.69743766	6
23400.00	9.131425381	20.60866073	54.05910972	6.5
25200.00	7.379019502	17.25505008	47.2834381	7
27000.00	5.96291669	14.44716651	41.35701697	7.5
28800.00	4.818577244	12.09620484	36.17340281	8
30600.00	3.893847233	10.12781097	31.63949354	8.5
32400.00	3.146581555	8.47973033	27.6738563	9
34200.00	2.542723144	7.099838917	24.2052649	9.5
36000.00	2.054750807	5.944494776	21.17142051	10
37800.00	1.660424922	4.977157729	18.51783273	10.5
39600.00	1.34177386	4.167233717	16.19684086	11
41400.00	1.084274915	3.489107197	14.16675795	11.5
43200.00	0.876192424	2.921330997	12.39112197	12
45000.00	0.708042909	2.445948007	10.83804102	12.5
46800.00	0.572162857	2.047923245	9.479620445	13
48600.00	0.462359457	1.714668343	8.29146186	13.5
50400.00	0.373628355	1.435643417	7.252224937	14
52200.00	0.301925582	1.202023721	6.343244101	14.5
54000.00	0.243983241	1.006420542	5.548193289	15
55800.00	0.197160576	0.84264752	4.852792716	15.5
57600.00	0.159323619	0.70552499	4.244552401	16
59400.00	0.128747927	0.590716165	3.712547834	16.5
61200.00	0.104039997	0.494589975	3.247223763	17
63000.00	0.084073749	0.41410623	2.840222574	17.5
64800.00	0.067939211	0.346719461	2.484234183	18
66600.00	0.054901041	0.29029842	2.172864736	18.5
68400.00	0.044365018	0.243058675	1.900521777	19
70200.00	0.035850957	0.20350617	1.662313794	19.5
72000.00	0.028970823	0.170389974	1.453962371	20
73800.00	0.023411051	0.142662717	1.271725342	20.5
75600.00	0.018918252	0.119447467	1.112329573	21
77400.00	0.015287662	0.100009993	0.972912184	21.5
79200.00	0.012353817	0.083735545	0.85096912	22
81000.00	0.009983004	0.070109409	0.744310181	22.5
82800.00	0.008067172	0.05870063	0.651019681	23
84600.00	0.006519007	0.049148381	0.569422044	23.5
86400.00	0.005267948	0.041150552	0.498051709	24

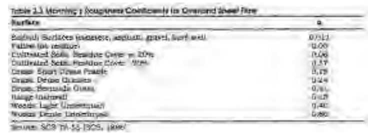


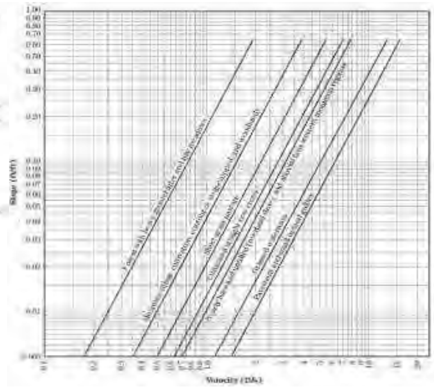
DA#15A DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$







T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	2064.26 (ft)
L=	100 (ft)	S=	0.0026 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0026 (ft/ft)		
T_{OL}=	17.93 (min)	T_1=	68.81 (min)

Tc= 86.73 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	4 (in/hr)
I (10-YR)=	2.5 (in/hr)
I (2-YR)=	1.7 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
4	2.5	1.7

A= 46.71 (Ac)

Q (100-YR)=	**65.39 (cfs)**
Q (10-YR)=	**40.87 (cfs)**
Q (2-YR)=	**27.79 (cfs)**

DA#15A EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =		2807868.89 cft
Volume (10-yr)= 0.70*area*43560=		1424281.32 cft
Volume (2-yr)= 0.41*area*43560=		834221.916 cft
A=	46.71 Ac	

Tp = time to Qp in seconds

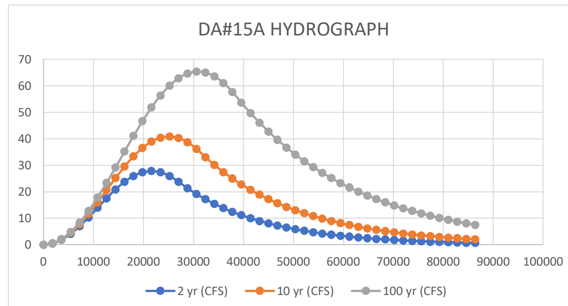
$$T_p = \frac{V}{1.39\ Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#15A Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	27.79	40.87	65.39
Tp=	21594.341	25070.504	30890.442
1.25*Tp=	26992.927	31338.129	38613.052

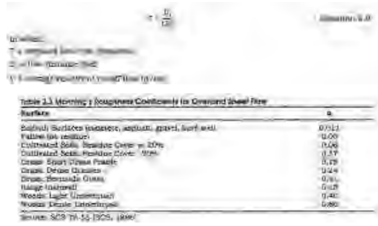
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.473749154	0.517647952	0.546337808	0.5
3600.00	1.862694569	2.044367073	2.167093595	1
5400.00	4.072132579	4.502811747	4.808104584	1.5
7200.00	6.951415166	7.768433901	8.381112881	2
9000.00	10.30422172	11.67579278	12.7667149	2.5
10800.00	13.90194493	16.02693639	17.81835162	3
12600.00	17.49927814	20.60143002	23.36720632	3.5
14400.00	20.85094126	25.16752375	29.22784614	4
16200.00	23.72840496	29.49389321	35.20441891	4.5
18000.00	25.93547264	33.36135876	41.09719821	5
19800.00	27.32165791	36.57398948	46.70925781	5.5
21600.00	27.79244529	38.96902922	51.85305266	6
23400.00	27.31573469	40.42514209	56.35668628	6.5
25200.00	25.92403006	40.86855947	60.06965525	7
27000.00	23.74122356	40.27681726	62.86787874	7.5
28800.00	21.30307027	38.67989389	64.65784509	8
30600.00	19.11530809	36.15869164	65.37973682	8.5
32400.00	17.15222261	33.05719511	65.00942957	9
34200.00	15.39074019	30.11135881	63.55929837	9.5
36000.00	13.81015679	27.42803575	61.07780403	10
37800.00	12.39189462	24.98383251	57.64787366	10.5
39600.00	11.11928377	22.75744032	53.6118403	11
41400.00	9.977366287	20.72944933	49.70066722	11.5
43200.00	8.952720342	18.88217934	46.07482802	12
45000.00	8.033302499	17.19952571	42.71350659	12.5
46800.00	7.208306143	15.66681893	39.59740544	13
48600.00	6.468034468	14.27069673	36.70863486	13.5
50400.00	5.803786499	12.99898761	34.03061031	14
52200.00	5.207754828	11.8406047	31.5479571	14.5
54000.00	4.672933843	10.78544914	29.24642221	15
55800.00	4.193037388	9.824321996	27.11279243	15.5
57600.00	3.762424877	8.948844077	25.13481847	16
59400.00	3.376034994	8.151382898	23.30114469	16.5
61200.00	3.029326206	7.424986131	21.60124389	17
63000.00	2.718223384	6.763320989	20.02535686	17.5
64800.00	2.439069899	6.160619022	18.56443636	18
66600.00	2.18858465	5.611625827	17.21009516	18.5
68400.00	1.963823493	5.111555236	15.95455794	19
70200.00	1.762144641	4.656047594	14.79061659	19.5
72000.00	1.58117761	4.241131749	13.71158888	20
73800.00	1.418795356	3.863190432	12.71128004	20.5
75600.00	1.273089278	3.518928718	11.78394727	21
77400.00	1.142346783	3.205345308	10.9242667	21.5
79200.00	1.025031154	2.919706356	10.12730286	22
81000.00	0.919763493	2.659521638	9.388480354	22.5
82800.00	0.825306508	2.422522844	8.703557555	23
84600.00	0.740549976	2.206643798	8.068602294	23.5
86400.00	0.664497689	2.01000245	7.479969261	24

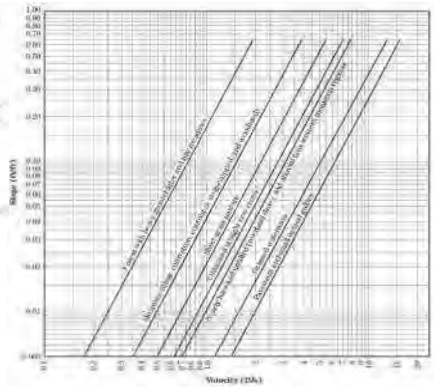


DA#16 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.8	D=	297.95 (ft)
L=	100 (ft)	S=	0.0098 (ft/ft)
P_2=	4.89 (in)	V=	1.2 (ft/s)
S=	0.0098 (ft/ft)		
T_{OL}=	40.23 (min)	T_1=	4.14 (min)

Tc= 44.37 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	5.2 (in/hr)
I (10-YR)=	3.6 (in/hr)
I (2-YR)=	2.4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.18 Woodlands; basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
5.2	3.6	2.4

A= 3.1 (Ac)

Q (100-YR)=	**2.90 (cfs)**
Q (10-YR)=	**2.01 (cfs)**
Q (2-YR)=	**1.34 (cfs)**

DA#16 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =		186349.68 cft
Volume (10-yr)= 0.70*area*43560=		94525.2 cft
Volume (2-yr)= 0.41*area*43560=		55364.76 cft
A=	3.10 Ac	

Tp = time to Qp in seconds

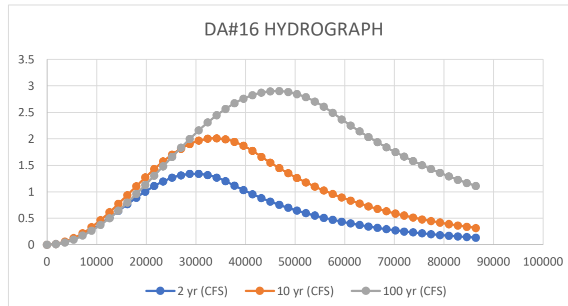
$$\textbf{Tp} = \frac{V}{1.39\ Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.340 Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#16 Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	1.34	2.01	2.90
Tp=	29742.206	33852.918	46203.652
1.25*Tp=	37177.758	42316.147	57754.566

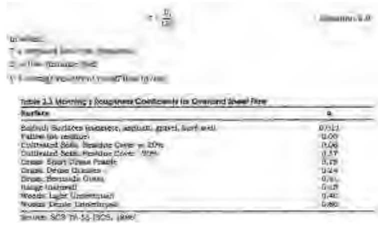
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.012066329	0.013980386	0.010852443	0.5
3600.00	0.047830441	0.055532355	0.043247411	1
5400.00	0.106003382	0.123499171	0.096700257	1.5
7200.00	0.184488577	0.215988755	0.170411291	2
9000.00	0.280457386	0.330426355	0.26327775	2.5
10800.00	0.390451054	0.463626225	0.373910293	3
12600.00	0.510505364	0.611880309	0.500653786	3.5
14400.00	0.63629351	0.771061467	0.641612068	4
16200.00	0.763282036	0.93673837	0.794676313	4.5
18000.00	0.886894222	1.104298857	0.957556583	5
19800.00	1.002675036	1.26907833	1.127816087	5.5
21600.00	1.10645169	1.426489614	1.302907634	6
23400.00	1.194484029	1.572150646	1.480211745	6.5
25200.00	1.263599333	1.702006475	1.657075837	7
27000.00	1.311306658	1.812442137	1.830853913	7.5
28800.00	1.335886612	1.900383292	1.998946141	8
30600.00	1.336453324	1.963381809	2.158837757	8.5
32400.00	1.312986369	1.999683918	2.30813668	9
34200.00	1.266331505	2.008279031	2.444609304	9.5
36000.00	1.198170194	1.988927874	2.566213912	10
37800.00	1.113768408	1.942169151	2.671131223	10.5
39600.00	1.029499904	1.869304543	2.757791607	11
41400.00	0.951607215	1.772362477	2.824898571	11.5
43200.00	0.879607941	1.659424197	2.87144815	12
45000.00	0.813056183	1.548595084	2.896743935	12.5
46800.00	0.751539779	1.445167992	2.900407484	13
48600.00	0.694677748	1.348648557	2.882383989	13.5
50400.00	0.64211794	1.258575432	2.842943092	14
52200.00	0.593534843	1.174518084	2.782674854	14.5
54000.00	0.548627578	1.096074731	2.702480926	15
55800.00	0.507118028	1.022870429	2.603561059	15.5
57600.00	0.46874912	0.954555274	2.487395158	16
59400.00	0.433283231	0.89080273	2.36751342	16.5
61200.00	0.400500716	0.831308071	2.250595545	17
63000.00	0.370198549	0.775786924	2.139451571	17.5
64800.00	0.342189065	0.723973905	2.033796359	18
66600.00	0.316298799	0.675621359	1.933358851	18.5
68400.00	0.292367409	0.630498168	1.837881373	19
70200.00	0.270246684	0.58838865	1.74711898	19.5
72000.00	0.249799629	0.54909153	1.660838819	20
73800.00	0.230899613	0.512418974	1.578819539	20.5
75600.00	0.213429585	0.478195693	1.50085072	21
77400.00	0.197281352	0.446258106	1.426732332	21.5
79200.00	0.182354906	0.416453557	1.356274225	22
81000.00	0.168557805	0.388639585	1.28929564	22.5
82800.00	0.155804602	0.362683244	1.225624741	23
84600.00	0.144016316	0.338460467	1.165098182	23.5
86400.00	0.13311994	0.315855474	1.107560682	24

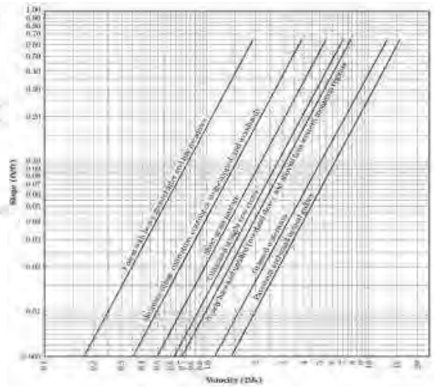


DA#16A DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	**T=**	
n=	0.15	D=	1034.24 (ft)
L=	100 (ft)	S=	0.0058 (ft/ft)
P_2=	4.89 (in)	V=	0.55 (ft/s)
S=	0.0058 (ft/ft)		
T_{OL}=	13.00 (min)	T_1=	31.34 (min)

Tc= 44.35 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	5.5 (in/hr)
I (10-YR)=	3.7 (in/hr)
I (2-YR)=	2.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.15 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
5.5	3.7	2.5

A= 8.18 (Ac)

Q (100-YR)=	**6.75 (cfs)**
Q (10-YR)=	**4.54 (cfs)**
Q (2-YR)=	**3.07 (cfs)**

DA#16A EXISTING CALCULATIONS

Volume (100-yr) =	1.38*area*43560 =	491722.70	cft
Volume (10-yr)=	0.70*area*43560=	249424.56	cft
Volume (2-yr)=	0.41*area*43560=	146091.528	cft
A=	8.18	Ac	

Tp = time to Qp in seconds

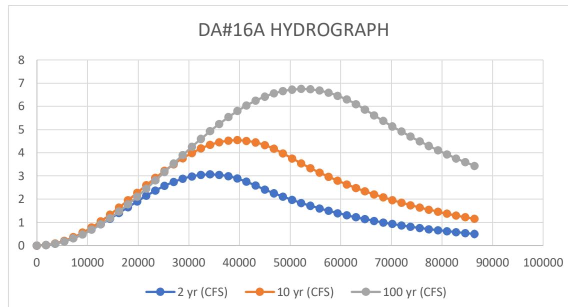
$$Tp = \frac{V}{1.39\,Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#16A Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	3.07	4.54	6.75
Tp=	34263.022	39525.569	52420.144
1.25*Tp=	42828.777	49406.961	65525.180

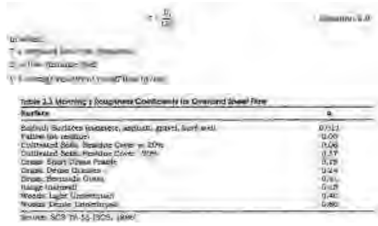
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.020841644	0.023191769	0.019614371	0.5
3600.00	0.082800155	0.092293184	0.078229451	1
5400.00	0.184191664	0.205892243	0.175163784	1.5
7200.00	0.322260617	0.361667695	0.30929042	2
9000.00	0.493254662	0.556436467	0.479050015	2.5
10800.00	0.692526632	0.786218708	0.682468959	3
12600.00	0.914660839	1.046319108	0.917182319	3.5
14400.00	1.15362026	1.331422849	1.180461339	4
16200.00	1.402910607	1.635704197	1.469245158	4.5
18000.00	1.655756824	1.95294555	1.780176402	5
19800.00	1.905287216	2.276664487	2.109640209	5.5
21600.00	2.144720205	2.600246221	2.453806261	6
23400.00	2.367548632	2.917078772	2.808673314	6.5
25200.00	2.567716607	3.220688071	3.170115714	7
27000.00	2.739784091	3.504870247	3.533931361	7.5
28800.00	2.879074742	3.7638184	3.895890566	8
30600.00	2.981803008	3.992241254	4.251785223	8.5
32400.00	3.045177005	4.185471278	4.59747773	9
34200.00	3.067474393	4.339560063	4.928949096	9.5
36000.00	3.04808919	4.451359	5.242345662	10
37800.00	2.987548233	4.518583622	5.534023908	10.5
39600.00	2.887496866	4.539860277	5.800592806	11
41400.00	2.750654223	4.514754206	6.03895325	11.5
43200.00	2.584810981	4.443778417	6.246334081	12
45000.00	2.414173956	4.328383212	6.420324307	12.5
46800.00	2.254801582	4.170926544	6.558901134	13
48600.00	2.10595022	3.974625841	6.660453477	13.5
50400.00	1.966925322	3.755112243	6.7238007	14
52200.00	1.837078193	3.539254077	6.748206331	14.5
54000.00	1.715802958	3.335804261	6.733386634	15
55800.00	1.602533742	3.144049516	6.679513901	15.5
57600.00	1.496742026	2.963317565	6.587214452	16
59400.00	1.397934179	2.792974775	6.457561352	16.5
61200.00	1.30564916	2.632423939	6.292061937	17
63000.00	1.219456363	2.481102176	6.092640289	17.5
64800.00	1.138953608	2.338478965	5.861614867	18
66600.00	1.063765264	2.20405428	5.615549621	18.5
68400.00	0.993540501	2.077356838	5.370387895	19
70200.00	0.927951644	1.957942448	5.135929356	19.5
72000.00	0.866692655	1.845392453	4.911706727	20
73800.00	0.809477695	1.73931226	4.697273131	20.5
75600.00	0.756039797	1.639329961	4.492201204	21
77400.00	0.706129617	1.545095026	4.296082235	21.5
79200.00	0.659514271	1.456277074	4.108525361	22
81000.00	0.615976251	1.372564716	3.929156781	22.5
82800.00	0.575312405	1.293664464	3.757619011	23
84600.00	0.537332994	1.219299699	3.593570179	23.5
86400.00	0.501860805	1.149209705	3.436683333	24

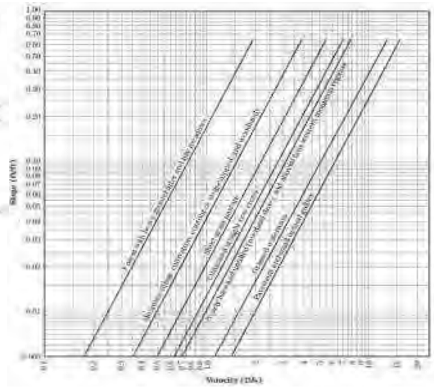


DA#17 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	**T=**	
n=	0.8	D=	625.34 (ft)
L=	100 (ft)	S=	0.0175 (ft/ft)
P_2=	4.89 (in)	V=	0.65 (ft/s)
S=	0.0175 (ft/ft)		
T_{OL}=	31.90 (min)	T_1=	16.03 (min)

Tc= 47.94 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	5.2 (in/hr)
I (10-YR)=	3.6 (in/hr)
I (2-YR)=	2.4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.2 Woodlands; basin slope 1-3.5%

i (100-YR)	i (10-YR)	i (2-YR)
5.2	3.6	2.4

A= 12.23 (Ac)

Q (100-YR)=	**12.72 (cfs)**
Q (10-YR)=	**8.81 (cfs)**
Q (2-YR)=	**5.87 (cfs)**

DA#17 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =		735179.54 cft
Volume (10-yr)= 0.70*area*43560=		372917.16 cft
Volume (2-yr)= 0.41*area*43560=		218422.908 cft
A=	12.23 Ac	

Tp = time to Qp in seconds

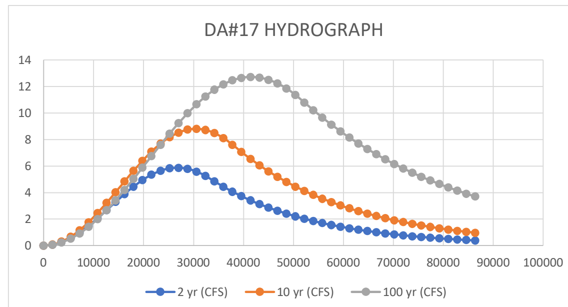
Tp = $\dfrac{V}{1.39\ Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA#17 Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	5.87	8.81	12.72
Tp=	26767.986	30467.626	41583.287
1.25*Tp=	33459.982	38084.532	51979.109

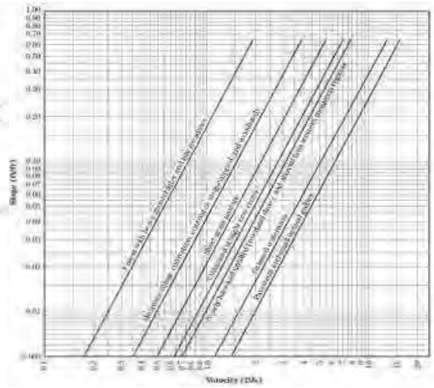
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.065253726	0.075616994	0.058713442	0.5
3600.00	0.258113535	0.299870568	0.233769652	1
5400.00	0.570004323	0.665057725	0.521936303	1.5
7200.00	0.987058529	1.158634467	0.917892541	2
9000.00	1.490732719	1.763646679	1.414327228	2.5
10800.00	2.058632087	2.459312494	2.002073942	3
12600.00	2.665506192	3.221736136	2.67028023	3.5
14400.00	3.28437166	4.024728734	3.406607991	4
16200.00	3.88771195	4.840707891	4.197461296	4.5
18000.00	4.448700813	5.641645131	5.028237427	5
19800.00	4.942395068	6.400028657	5.883596513	5.5
21600.00	5.346843646	7.089808374	6.747744769	6
23400.00	5.644063596	7.687290691	7.604726123	6.5
25200.00	5.820839663	8.171952389	8.438716836	7
27000.00	5.869311874	8.52714558	9.23431768	7.5
28800.00	5.787325015	8.740669555	9.976838278	8
30600.00	5.578524457	8.805189871	10.65256835	8.5
32400.00	5.252194076	8.718490287	11.24903088	9
34200.00	4.839724492	8.483548892	11.75521247	9.5
36000.00	4.43461116	8.108435806	12.16176673	10
37800.00	4.063408191	7.606035974	12.46118685	10.5
39600.00	3.723277088	7.054035703	12.64794416	11
41400.00	3.411616953	6.532547957	12.7185903	11.5
43200.00	3.1260446	6.049612535	12.67182081	12
45000.00	2.864376329	5.602379356	12.50849927	12.5
46800.00	2.624611226	5.188209042	12.23164133	13
48600.00	2.40491587	4.804657335	11.84635904	13.5
50400.00	2.203610303	4.449460674	11.35976645	14
52200.00	2.019155194	4.120522841	10.79498197	14.5
54000.00	1.850140059	3.815902584	10.20429577	15
55800.00	1.695272482	3.533802163	9.645931098	15.5
57600.00	1.55336823	3.272556743	9.118119348	16
59400.00	1.423342197	3.030624562	8.619188714	16.5
61200.00	1.304200105	2.806577841	8.14755886	17
63000.00	1.195030905	2.59909435	7.701735927	17.5
64800.00	1.094999808	2.40694961	7.280307796	18
66600.00	1.0033419	2.229009665	6.881939619	18.5
68400.00	0.919356297	2.064224388	6.505369586	19
70200.00	0.842400782	1.911621287	6.149404935	19.5
72000.00	0.771886895	1.770299763	5.812918167	20
73800.00	0.707275433	1.639425796	5.494843481	20.5
75600.00	0.64807233	1.518227024	5.194173393	21
77400.00	0.593824874	1.405988184	4.909955549	21.5
79200.00	0.544118249	1.302046888	4.641289704	22
81000.00	0.498572359	1.20578972	4.387324875	22.5
82800.00	0.456838928	1.116648612	4.147256644	23
84600.00	0.41859883	1.034097489	3.920324608	23.5
86400.00	0.383559652	0.95764917	3.705809973	24



DA#18 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1652.63 (ft)
L=	100 (ft)	S=	0.0081 (ft/ft)
P_2=	4.89 (in)	V=	0.625 (ft/s)
S=	0.0081 (ft/ft)		
T_{OL}=	11.38 (min)	T_1=	44.07 (min)

Tc= 55.45 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	5.8 (in/hr)
I (10-YR)=	3.2 (in/hr)
I (2-YR)=	2.2 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4-1/2 acre; basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
5.8	3.2	2.2

A= 19.17 (Ac)

Q (100-YR)= 44.47 (cfs)
Q (10-YR)= 24.54 (cfs)
Q (2-YR)= 16.87 (cfs)

DA#18 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =		1152362.38	cft
Volume (10-yr)= 0.70*area*43560=		584531.64	cft
Volume (2-yr)= 0.41*area*43560=		342368.532	cft
A=	19.17 Ac		

Tp = time to Qp in seconds

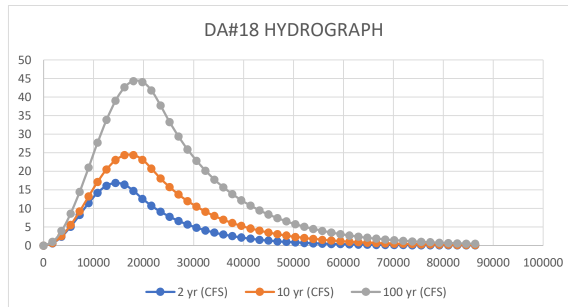
$$Tp = \frac{V}{1.39\ Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#18 Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	16.87	24.54	44.47
Tp=	14600.719	17138.040	18640.784
1.25*Tp=	18250.899	21422.549	23300.980

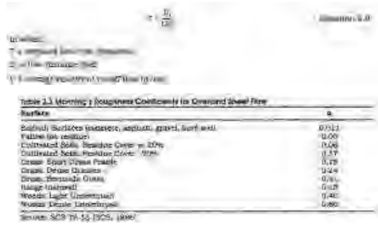
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.62474889	0.661836504	1.01539117	0.5
3600.00	2.406447739	2.575940898	3.968835449	1
5400.00	5.081162755	5.535801679	8.590613517	1.5
7200.00	8.252672276	9.222081356	14.45864772	2
9000.00	11.45116147	13.23706956	21.03704772	2.5
10800.00	14.20281886	17.14759179	27.72505002	3
12600.00	16.10002484	20.53174427	33.91188181	3.5
14400.00	16.86173484	23.02441297	39.03253901	4
16200.00	16.37511218	24.35666545	42.61938449	4.5
18000.00	14.71224321	24.38476583	44.34485442	5
19800.00	12.55929092	23.10568238	44.05137259	5.5
21600.00	10.69947451	20.68938019	41.76574083	6
23400.00	9.115065131	18.04885348	37.74611186	6.5
25200.00	7.765279713	15.74532968	33.29313675	7
27000.00	6.615374454	13.73579806	29.36548693	7.5
28800.00	5.635750519	11.98273725	25.90118885	8
30600.00	4.801192152	10.4534146	22.84558011	8.5
32400.00	4.090217621	9.119275044	20.1504469	9
34200.00	3.484526271	7.955407924	17.77326328	9.5
36000.00	2.968527462	6.940081852	15.6765202	10
37800.00	2.528939261	6.054338957	13.82713357	10.5
39600.00	2.154446563	5.281640907	12.19592234	11
41400.00	1.835409835	4.60756011	10.75714796	11.5
43200.00	1.563616996	4.019510326	9.488108319	12
45000.00	1.332072032	3.506511663	8.368779515	12.5
46800.00	1.134814922	3.058985559	7.381499896	13
48600.00	0.96676822	2.668575938	6.510691388	13.5
50400.00	0.823606364	2.327993186	5.742613689	14
52200.00	0.701644332	2.030878041	5.065147466	14.5
54000.00	0.597742794	1.771682857	4.467603122	15
55800.00	0.509227298	1.545568016	3.940552135	15.5
57600.00	0.433819435	1.348311569	3.475678278	16
59400.00	0.369578189	1.176230401	3.065646407	16.5
61200.00	0.314849973	1.026111462	2.703986715	17
63000.00	0.268226071	0.895151777	2.384992653	17.5
64800.00	0.228506373	0.780906103	2.103630881	18
66600.00	0.194668483	0.68124128	1.855461851	18.5
68400.00	0.165841406	0.594296394	1.636569757	19
70200.00	0.141283127	0.518448037	1.443500748	19.5
72000.00	0.12036151	0.452279989	1.27320843	20
73800.00	0.102538027	0.394556781	1.123005795	20.5
75600.00	0.087353897	0.344200622	0.990522829	21
77400.00	0.074418277	0.300271277	0.873669111	21.5
79200.00	0.063398202	0.261948508	0.770600831	22
81000.00	0.054010011	0.228516766	0.679691698	22.5
82800.00	0.046012051	0.199351821	0.599507274	23
84600.00	0.039198453	0.173909116	0.528782348	23.5
86400.00	0.033393831	0.15171359	0.466400966	24

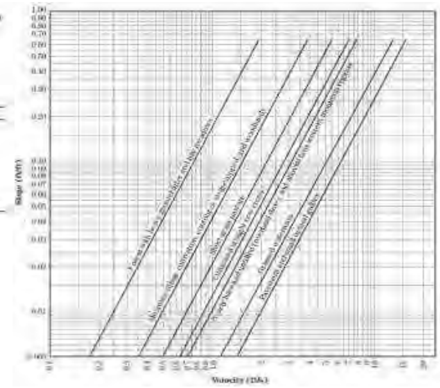


DA#19 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.24	D=	2594.29 (ft)
L=	100 (ft)	S=	0.0104 (ft/ft)
P_2=	4.89 (in)	V=	0.7 (ft/s)
S=	0.0104 (ft/ft)		
T_{OL}=	15.00 (min)	T_1=	61.77 (min)

Tc= 76.76 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	4.2 (in/hr)
I (10-YR)=	2.6 (in/hr)
I (2-YR)=	1.8 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.28 Single family residential districts; lots 1/4-1/2 acre; MOSTLY golf course; and woodlands; basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
4.2	2.6	1.8

A= 32.18 (Ac)

Q (100-YR)= 37.84 (cfs)
Q (10-YR)= 23.43 (cfs)
Q (2-YR)= 16.22 (cfs)

DA#19 EXISTING CALCULATIONS		
Volume (100-yr) = 1.38*area*43560 =		1934429.90 cft
Volume (10-yr)= 0.70*area*43560=		981232.56 cft
Volume (2-yr)= 0.41*area*43560=		574721.928 cft
A=	32.18 Ac	

Tp = time to Qp in seconds

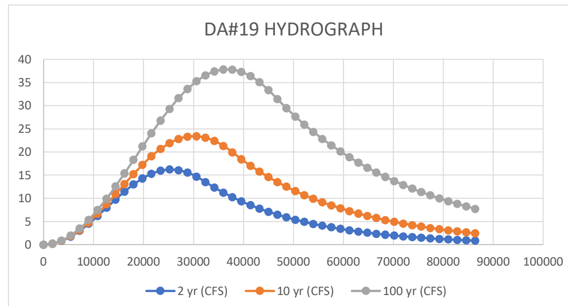
$$Tp = \frac{V}{1.39\ Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA#19 Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	16.22	23.43	37.84
Tp=	25493.320	30132.817	36774.336
1.25*Tp=	31866.650	37666.021	45967.920

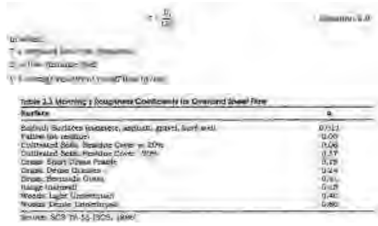
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.198685928	0.20565902	0.223271101	0.5
3600.00	0.785007779	0.815414403	0.887815362	1
5400.00	1.730234826	1.807854704	1.977950003	1.5
7200.00	2.988049404	3.148130568	3.467948607	2
9000.00	4.496816547	4.789178464	5.32264825	2.5
10800.00	6.182604208	6.673373303	7.498279316	3
12600.00	7.962806042	8.734551941	9.943498431	3.5
14400.00	9.750189259	10.90033648	12.60060013	4
16200.00	11.45716917	13.0946758	15.40687868	4.5
18000.00	13.00010097	15.2405161	18.29610786	5
19800.00	14.3033785	17.2625066	21.20010388	5.5
21600.00	15.30313902	19.08964548	24.05033446	6
23400.00	15.95039265	20.65777311	26.77953616	6.5
25200.00	16.2134229	21.91182498	29.32330171	7
27000.00	16.07934085	22.80776531	31.62160005	7.5
28800.00	15.55471676	23.3141333	33.62019291	8
30600.00	14.66525805	23.41314795	35.27191492	8.5
32400.00	13.48857375	23.10133238	36.53778659	9
34200.00	12.30559683	22.38963593	37.38793423	9.5
36000.00	11.22636953	21.30304969	37.80229494	10
37800.00	10.24179279	19.9052814	37.77109012	10.5
39600.00	9.34356554	18.41800825	37.29505616	11
41400.00	8.524114754	17.04186045	36.38542714	11.5
43200.00	7.776531564	15.768535	35.06366966	12
45000.00	7.094513026	14.59034925	33.36097629	12.5
46800.00	6.472308981	13.50019462	31.40363588	13
48600.00	5.904673568	12.49149364	29.4676292	13.5
50400.00	5.386821001	11.55816028	27.65097564	14
52200.00	4.914385218	10.69456327	25.94631717	14.5
54000.00	4.483383069	9.895492085	24.34674941	15
55800.00	4.090180735	9.156125512	22.84579361	15.5
57600.00	3.73146309	8.472002571	21.43737042	16
59400.00	3.404205755	7.838995596	20.11577528	16.5
61200.00	3.105649591	7.253285329	18.87565533	17
63000.00	2.833277445	6.711337878	17.71198769	17.5
64800.00	2.584792922	6.209883393	16.62005914	18
66600.00	2.358101025	5.74589634	15.59544703	18.5
68400.00	2.151290496	5.316577247	14.63400136	19
70200.00	1.962617694	4.91933581	13.73182798	19.5
72000.00	1.790491903	4.551775265	12.8852728	20
73800.00	1.633461913	4.211677931	12.090907	20.5
75600.00	1.490203792	3.896991824	11.34551316	21
77400.00	1.359509715	3.605818281	10.64607219	21.5
79200.00	1.24027779	3.336400501	9.989751156	22
81000.00	1.131502762	3.087112948	9.373891735	22.5
82800.00	1.032267537	2.856451542	8.795999509	23
84600.00	0.941735454	2.643024583	8.253733833	23.5
86400.00	0.85914323	2.445544355	7.744898361	24

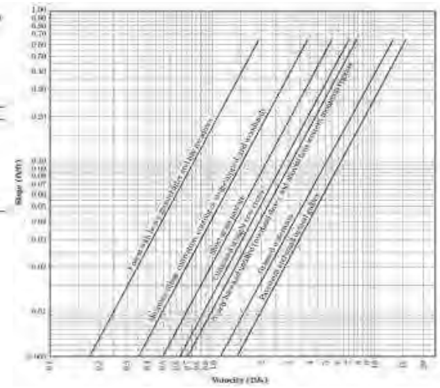


DA#20 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.41	D=	1316.52 (ft)
L=	100 (ft)	S=	0.0202 (ft/ft)
P_2=	4.89 (in)	V=	0.975 (ft/s)
S=	0.0202 (ft/ft)		
T_{OL}=	17.65 (min)	T_1=	22.50 (min)

Tc= 40.15 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	5.8 (in/hr)
I (10-YR)=	3.9 (in/hr)
I (2-YR)=	2.7 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.18 Lawn areas clay soil; woodlands; basin slope 1-3.5%

i (100-YR)	i (10-YR)	i (2-YR)
5.8	3.9	2.7

A= 17.12 (Ac)

Q (100-YR)=	**17.87 (cfs)**
Q (10-YR)=	**12.02 (cfs)**
Q (2-YR)=	**8.32 (cfs)**

DA#20 EXISTING CALCULATIONS

Volume (100-yr) =	1.38*area*43560 =	1029131.14	cft
Volume (10-yr)=	0.70*area*43560=	522023.04	cft
Volume (2-yr)=	0.41*area*43560=	305756.352	cft
	A=	17.12	Ac

Tp = time to Qp in seconds

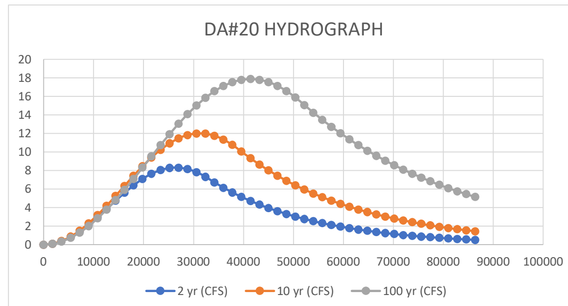
Tp = $\dfrac{V}{1.39\ Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#20 Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	8.32	12.02	17.87
Tp=	26437.517	31248.847	41423.964
1.25*Tp=	33046.896	39061.059	51779.955

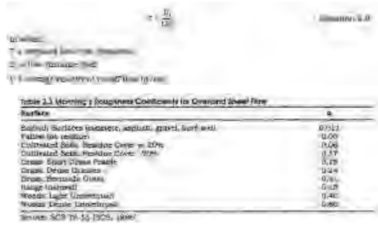
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.094804085	0.098123301	0.083140218	0.5
3600.00	0.374895441	0.389288679	0.331013916	1
5400.00	0.827508308	0.86398722	0.739009009	1.5
7200.00	1.432013887	1.506716157	1.299534097	2
9000.00	2.160860548	2.296485169	2.002159717	2.5
10800.00	2.980829547	3.207501879	2.833812399	3
12600.00	3.854549049	4.210014188	3.77901792	3.5
14400.00	4.742197422	5.271281922	4.820189223	4
16200.00	5.603318197	6.356646065	5.937953656	4.5
18000.00	6.398663958	7.430660659	7.11151343	5
19800.00	7.091985124	8.458250397	8.319032594	5.5
21600.00	7.651682103	9.405856125	9.538043329	6
23400.00	8.052245511	10.24253082	10.745864	6.5
25200.00	8.275418817	10.94095024	11.92002116	7
27000.00	8.311030419	11.47830533	13.03866777	7.5
28800.00	8.157457245	11.83704707	14.08098961	8
30600.00	7.821698718	12.00545963	15.02759262	8.5
32400.00	7.31905775	11.97804298	15.86086375	9
34200.00	6.718561005	11.75569248	16.56529865	9.5
36000.00	6.14945471	11.34566969	17.1277902	10
37800.00	5.628555461	10.76136519	17.53787233	10.5
39600.00	5.151779803	10.04303204	17.78791483	11
41400.00	4.715390178	9.318449964	17.87326524	11.5
43200.00	4.315965624	8.646144848	17.79233549	12
45000.00	3.950374957	8.022345027	17.54663141	12.5
46800.00	3.615752222	7.443550955	17.14072471	13
48600.00	3.309474234	6.906515567	16.58216793	13.5
50400.00	3.029140005	6.40822607	15.88135391	14
52200.00	2.772551929	5.945887034	15.07441643	14.5
54000.00	2.53769855	5.516904716	14.24648187	15
55800.00	2.322738796	5.118872502	13.4640201	15.5
57600.00	2.125987547	4.749557414	12.72453359	16
59400.00	1.945902422	4.406887575	12.02566202	16.5
61200.00	1.781071692	4.088940591	11.36517469	17
63000.00	1.630203208	3.793932764	10.7409634	17.5
64800.00	1.492114277	3.520209085	10.15103577	18
66600.00	1.365722387	3.266233951	9.593508827	18.5
68400.00	1.25003672	3.030582549	9.066603025	19
70200.00	1.14415039	2.811932864	8.568636554	19.5
72000.00	1.047233329	2.60905826	8.098019974	20
73800.00	0.95852578	2.4208206	7.653251143	20.5
75600.00	0.877332344	2.246163862	7.23291042	21
77400.00	0.803016525	2.084108213	6.835656138	21.5
79200.00	0.734995746	1.933744513	6.460220315	22
81000.00	0.672736773	1.794229214	6.105404613	22.5
82800.00	0.615751545	1.66477963	5.770076511	23
84600.00	0.56359334	1.54466954	5.453165686	23.5
86400.00	0.515853278	1.433225122	5.153660605	24

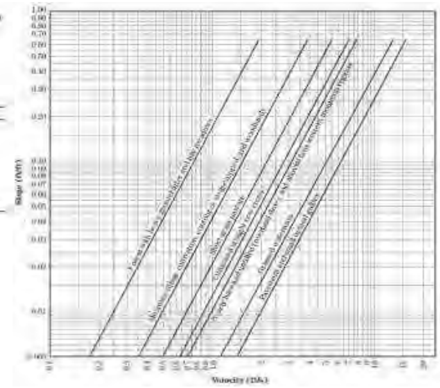


DA#21 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.24	D=	1049.5 (ft)
L=	100 (ft)	S=	0.0281 (ft/ft)
P_2=	4.89 (in)	V=	0.8 (ft/s)
S=	0.0281 (ft/ft)		
T_{OL}=	10.08 (min)	T_1=	21.86 (min)

Tc= 31.94 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	6.5 (in/hr)
I (10-YR)=	4.4 (in/hr)
I (2-YR)=	3.1 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.3 Single family residential districts; lots 1/4-1/2 acre; MOSTLY woodlands; basin slope 1-3.5%

i (100-YR)	i (10-YR)	i (2-YR)
6.5	4.4	3.1

A= 15.83 (Ac)

Q (100-YR)=	**30.87 (cfs)**
Q (10-YR)=	**20.90 (cfs)**
Q (2-YR)=	**14.72 (cfs)**

DA#21 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =	951585.62	cft
Volume (10-yr)= 0.70*area*43560=	482688.36	cft
Volume (2-yr)= 0.41*area*43560=	282717.468	cft
A=	15.83	Ac

Tp = time to Qp in seconds

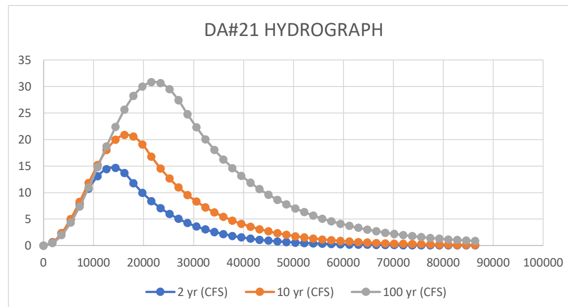
$$\textbf{Tp} = \frac{V}{1.39\,Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA#21 Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	14.72	20.90	30.87
Tp=	13815.735	16618.705	22177.753
1.25*Tp=	17269.668	20773.381	27722.191

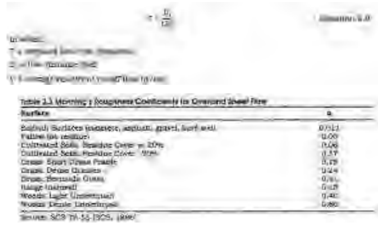
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.608035604	0.599033099	0.49901198	0.5
3600.00	2.331691444	2.327440299	1.963780341	1
5400.00	4.886209676	4.987022338	4.299588855	1.5
7200.00	7.849569221	8.272800622	7.355397279	2
9000.00	10.73220606	11.80798962	10.93360806	2.5
10800.00	13.05789205	15.18720346	14.80284358	3
12600.00	14.44241049	18.02294221	18.71290769	3.5
14400.00	14.657031	19.9900271	22.41096416	4
16200.00	13.66629703	20.8628893	25.65788579	4.5
18000.00	11.74572689	20.54143629	28.24371708	5
19800.00	9.915680597	19.06252961	30.0012506	5.5
21600.00	8.370765186	16.73915559	30.81683904	6
23400.00	7.066555756	14.54061002	30.63774408	6.5
25200.00	5.965549044	12.6308247	29.47554651	7
27000.00	5.036084993	10.97187342	27.40539744	7.5
28800.00	4.251436351	9.530811267	24.76502485	8
30600.00	3.589040112	8.279020356	22.28516545	8.5
32400.00	3.029848705	7.191641523	20.05362813	9
34200.00	2.557782273	6.247080642	18.04554703	9.5
36000.00	2.159266285	5.42657979	16.23854624	10
37800.00	1.822841193	4.713844738	14.61249047	10.5
39600.00	1.538832907	4.094721368	13.14926068	11
41400.00	1.299074612	3.55691458	11.83255222	11.5
43200.00	1.096671926	3.089744135	10.64769309	12
45000.00	0.925804647	2.68393255	9.581480475	12.5
46800.00	0.781559393	2.331420862	8.622033649	13
48600.00	0.659788311	2.025208582	7.75866156	13.5
50400.00	0.556989808	1.759214678	6.981743711	14
52200.00	0.470207854	1.528156809	6.282622959	14.5
54000.00	0.396946986	1.327446424	5.653509048	15
55800.00	0.335100549	1.153097638	5.087391805	15.5
57600.00	0.282890114	1.001648081	4.577963024	16
59400.00	0.23881434	0.870090134	4.119546175	16.5
61200.00	0.201605804	0.755811204	3.70703315	17
63000.00	0.170194555	0.656541837	3.335827343	17.5
64800.00	0.143677344	0.570310657	3.001792435	18
66600.00	0.121291655	0.495405208	2.701206296	18.5
68400.00	0.102393775	0.430337952	2.430719515	19
70200.00	0.086440284	0.373816726	2.187318078	19.5
72000.00	0.072972431	0.324719082	1.968289777	20
73800.00	0.061602941	0.282069995	1.771193996	20.5
75600.00	0.052004877	0.245022503	1.59383451	21
77400.00	0.043902243	0.212840884	1.434235013	21.5
79200.00	0.037062041	0.184886046	1.2906171	22
81000.00	0.03128758	0.160602838	1.161380446	22.5
82800.00	0.026412809	0.139509022	1.045084975	23
84600.00	0.022297554	0.1211857	0.940434815	23.5
86400.00	0.018823477	0.10526899	0.846263857	24

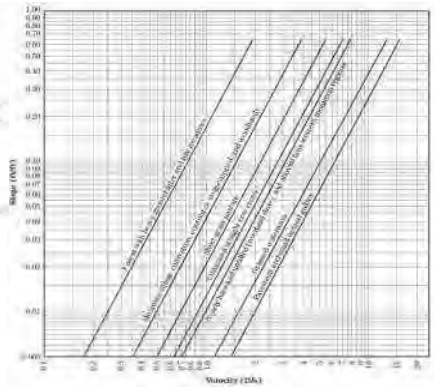


DA#22 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1277.78 (ft)
L=	100 (ft)	S=	0.0240 (ft/ft)
P_2=	4.89 (in)	V=	1.125 (ft/s)
S=	0.0240 (ft/ft)		
T_{OL}=	7.37 (min)	T_1=	18.93 (min)

Tc= 26.30 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	7.3 (in/hr)
I (10-YR)=	4.9 (in/hr)
I (2-YR)=	3.3 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 MOSTLY woodlands; buisness (neighborhood); basin slope 1-3.5%

i (100-YR)	i (10-YR)	i (2-YR)
7.3	4.9	3.3

A= 50.98 (Ac)

Q (100-YR)=	**130.25 (cfs)**
Q (10-YR)=	**87.43 (cfs)**
Q (2-YR)=	**58.88 (cfs)**

DA#22 EXISTING CALCULATIONS		
Volume (100-yr) = 1.38*area*43560 =		3064550.54 cft
Volume (10-yr)= 0.70*area*43560=		1554482.16 cft
Volume (2-yr)= 0.41*area*43560=		910482.408 cft
A=	50.98 Ac	

Tp = time to Qp in seconds

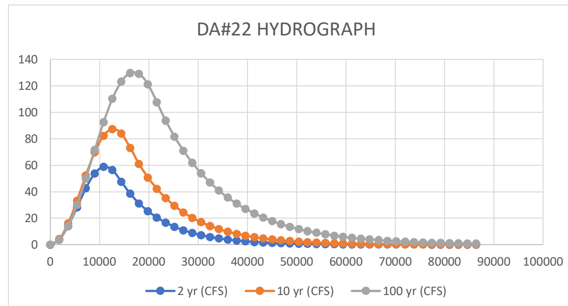
$$\mathbf{Tp} = \frac{\mathbf{V}}{\mathbf{1.39\ Qp}}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#22 Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	58.88	87.43	130.25
Tp=	11124.358	12791.073	16926.270
1.25*Tp=	13905.447	15988.842	21157.837

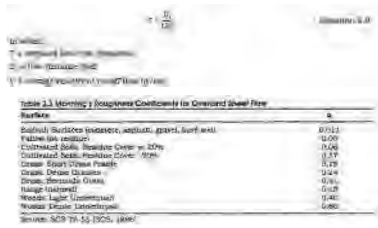
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	3.722584919	4.202906209	3.600889147	0.5
3600.00	13.94895439	16.0034684	14.00536804	1
5400.00	28.09301465	33.13261377	30.062903	1.5
7200.00	42.57794732	52.29666211	49.9978419	2
9000.00	53.74073256	69.81065161	71.6057669	2.5
10800.00	58.75847126	82.30690225	92.49726033	3
12600.00	56.36225337	87.38257066	110.362128	3.5
14400.00	47.49451827	84.06168122	123.2248617	4
16200.00	38.48486609	73.13156533	129.6630926	4.5
18000.00	31.18433395	60.90528796	128.964877	5
19800.00	25.26870384	50.72302343	121.2074241	5.5
21600.00	20.47526155	42.24304969	107.5978015	6
23400.00	16.59112941	35.18077446	93.7051892	6.5
25200.00	13.4438124	29.29918414	81.60633734	7
27000.00	10.89353759	24.40088954	71.06964247	7.5
28800.00	8.8270468	20.32150135	61.89340492	8
30600.00	7.15256679	16.92411322	53.90196769	8.5
32400.00	5.795733596	14.09470705	46.94235395	9
34200.00	4.696290003	11.7383265	40.88133864	9.5
36000.00	3.805409519	9.775890239	35.6028982	10
37800.00	3.083527976	8.14153789	31.00598959	10.5
39600.00	2.498586481	6.780419746	27.00261605	11
41400.00	2.024607673	5.646855982	23.51614263	11.5
43200.00	1.640542068	4.702803613	20.47982918	12
45000.00	1.329333239	3.916579755	17.83555279	12.5
46800.00	1.077160345	3.261798332	15.53269515	13
48600.00	0.872824342	2.716484541	13.52717358	13.5
50400.00	0.707250629	2.262337371	11.78059721	14
52200.00	0.573086047	1.884115408	10.25953203	14.5
54000.00	0.464372323	1.569125328	8.93486091	15
55800.00	0.37628146	1.306795903	7.781226202	15.5
57600.00	0.304901326	1.088323222	6.776544349	16
59400.00	0.247061917	0.906375228	5.901583134	16.5
61200.00	0.200194572	0.754845654	5.139593529	17
63000.00	0.162217906	0.628649089	4.475989077	17.5
64800.00	0.131445367	0.523550311	3.898066667	18
66600.00	0.106510342	0.436022152	3.394763365	18.5
68400.00	0.08630546	0.36312712	2.95644464	19
70200.00	0.069933419	0.302418822	2.574719934	19.5
72000.00	0.056667135	0.251859855	2.242282048	20
73800.00	0.045917449	0.209753434	1.952767256	20.5
75600.00	0.037206965	0.174686447	1.700633495	21
77400.00	0.030148849	0.145482027	1.481054271	21.5
79200.00	0.024429649	0.121160059	1.289826268	22
81000.00	0.019795374	0.100904284	1.123288885	22.5
82800.00	0.016040216	0.08403491	0.978254166	23
84600.00	0.012997407	0.06998579	0.851945769	23.5
86400.00	0.010531814	0.05828543	0.741945824	24

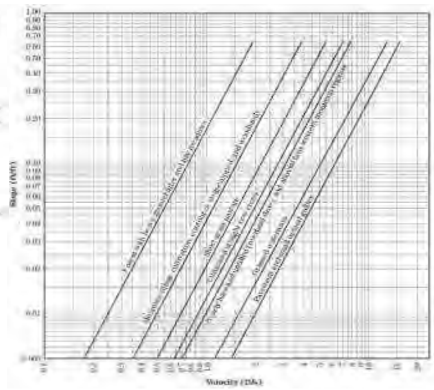


DA#23 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.8	D=	1216.78 (ft)
L=	100 (ft)	S=	0.0081 (ft/ft)
P_2=	4.89 (in)	V=	0.45 (ft/s)
S=	0.0081 (ft/ft)		
T_{OL}=	43.42 (min)	T_1=	45.07 (min)

Tc= 88.48 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	3.9 (in/hr)
I (10-YR)=	2.5 (in/hr)
I (2-YR)=	1.6 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.18 Woodlands; basin slope <1%

i (100-YR)	i (10-YR)	i (2-YR)
3.9	2.5	1.6

A= 13.48 (Ac)

Q (100-YR)=	**9.46 (cfs)**
Q (10-YR)=	**6.07 (cfs)**
Q (2-YR)=	**3.88 (cfs)**

DA#23 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 =		810320.54 cft
Volume (10-yr)= 0.70*area*43560=		411032.16 cft
Volume (2-yr)= 0.41*area*43560=		240747.408 cft
A=	13.48 Ac	

Tp = time to Qp in seconds

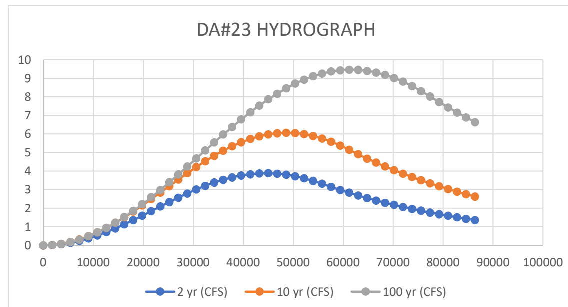
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA#23 Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	3.88	6.07	9.46
Tp=	44613.309	48748.201	61604.870
1.25*Tp=	55766.637	60935.252	77006.087

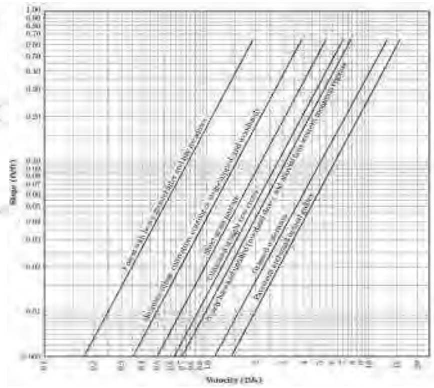
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.015572442	0.020383695	0.019919421	0.5
3600.00	0.062039912	0.081260798	0.079509964	1
5400.00	0.138656848	0.181813043	0.178269879	1.5
7200.00	0.244193948	0.32068888	0.315367613	2
9000.00	0.376957888	0.496021639	0.489648808	2.5
10800.00	0.534818498	0.705454625	0.699646025	3
12600.00	0.715242936	0.946172791	0.943591097	3.5
14400.00	0.915336328	1.214940578	1.219430019	4
16200.00	1.131888215	1.508145404	1.524840238	4.5
18000.00	1.361424066	1.821846222	1.857250216	5
19800.00	1.600261022	2.151826492	2.213861075	5.5
21600.00	1.844566992	2.493650859	2.59167017	6
23400.00	2.090422137	2.842724766	2.987496363	6.5
25200.00	2.333881758	3.194356216	3.398006818	7
27000.00	2.571039595	3.543818832	3.819745056	7.5
28800.00	2.798090498	3.88641539	4.249160059	8
30600.00	3.011391479	4.217540957	4.682636175	8.5
32400.00	3.207520167	4.532744782	5.116523552	9
34200.00	3.383329716	4.827790123	5.547168881	9.5
36000.00	3.535999297	5.098711194	5.970946148	10
37800.00	3.663079357	5.341866471	6.384287166	10.5
39600.00	3.762530922	5.553987635	6.783711626	11
41400.00	3.83275831	5.732223509	7.165856389	11.5
43200.00	3.872634738	5.874178374	7.527503817	12
45000.00	3.881520396	5.977944175	7.865608853	12.5
46800.00	3.859272715	6.042126169	8.17732467	13
48600.00	3.806248656	6.065861667	8.460026634	13.5
50400.00	3.723298978	6.048831633	8.711334409	14
52200.00	3.611754592	5.991264974	8.929131993	14.5
54000.00	3.473405207	5.893935458	9.111585543	15
55800.00	3.314525485	5.758151318	9.257158806	15.5
57600.00	3.145156832	5.585737667	9.364626064	16
59400.00	2.984442734	5.379011963	9.433082447	16.5
61200.00	2.831940951	5.147512277	9.461951555	17
63000.00	2.687231844	4.906259181	9.450990311	17.5
64800.00	2.549917215	4.676313112	9.40029101	18
66600.00	2.419619214	4.457144133	9.310280536	18.5
68400.00	2.2959793	4.248247144	9.181716773	19
70200.00	2.178657251	4.049140717	9.015682224	19.5
72000.00	2.067330231	3.859365992	8.81357489	20
73800.00	1.961691901	3.678485609	8.577096506	20.5
75600.00	1.861451576	3.50608271	8.308238209	21
77400.00	1.766333421	3.341759973	8.020069968	21.5
79200.00	1.676075702	3.185138698	7.721148605	22
81000.00	1.590430054	3.035857933	7.433368538	22.5
82800.00	1.509160805	2.893573644	7.156314514	23
84600.00	1.432044327	2.757957922	6.889586755	23.5
86400.00	1.358868417	2.628698223	6.632800384	24



DA#24 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	**T=**	
n=	0.8	D=	329.64 (ft)
L=	100 (ft)	S=	0.0280 (ft/ft)
P_2=	4.89 (in)	V=	0.8 (ft/s)
S=	0.0280 (ft/ft)		
T_{OL}=	26.44 (min)	T_1=	6.87 (min)

Tc= 33.30 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	6.4 (in/hr)
I (10-YR)=	4.3 (in/hr)
I (2-YR)=	3 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.2 Woodlands; basin slope 1-3.5%

i (100-YR)	i (10-YR)	i (2-YR)
6.4	4.3	3

A= 7.98 (Ac)

Q (100-YR)=	**10.21 (cfs)**
Q (10-YR)=	**6.86 (cfs)**
Q (2-YR)=	**4.79 (cfs)**

DA#24 EXISTING CALCULATIONS

Volume (100-yr) = 1.38*area*43560 = 479700.14 cft
Volume (10-yr)= 0.70*area*43560= 243326.16 cft
Volume (2-yr)= 0.41*area*43560= 142519.608 cft
A= 7.98 Ac

Tp = time to Qp in seconds

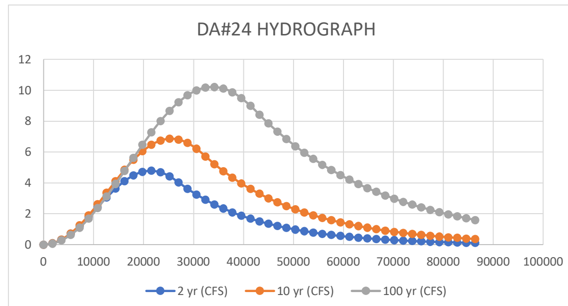
$$Tp = \frac{V}{1.39\ Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.340 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA#24 Existing Conditions			
	2 - Year	10 - Year	100 - Year
Qp=	4.79	6.86	10.21
Tp=	21414.388	25507.780	33786.421
1.25*Tp=	26767.986	31884.725	42233.026

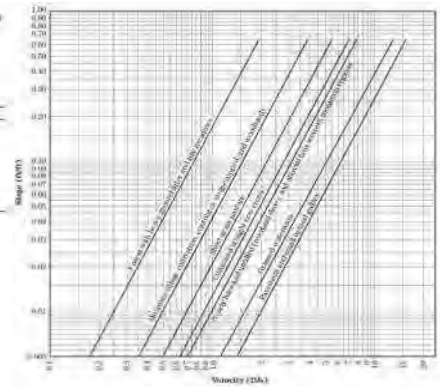
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.082985534	0.083977194	0.071367287	0.5
3600.00	0.326188919	0.331798402	0.283474595	1
5400.00	0.712749369	0.731333689	0.63039401	1.5
7200.00	1.215867446	1.263027274	1.102429926	2
9000.00	1.800663017	1.900854715	1.686390018	2.5
10800.00	2.426593413	2.61359671	2.365953934	3
12600.00	3.050264175	3.366367162	3.122129417	3.5
14400.00	3.628437499	4.122320732	3.933783088	4
16200.00	4.121029825	4.844456278	4.778231082	4.5
18000.00	4.493890747	5.497427925	5.631873005	5
19800.00	4.721170588	6.049275117	6.470851516	5.5
21600.00	4.787112506	6.472986966	7.271719082	6
23400.00	4.687144885	6.747824339	8.012093284	6.5
25200.00	4.428198273	6.860334959	8.671282355	7
27000.00	4.03458027	6.805011846	9.230863464	7.5
28800.00	3.616945734	6.584562862	9.6751976	8
30600.00	3.242542115	6.209778172	9.991866637	8.5
32400.00	2.906894419	5.712912416	10.1720204	9
34200.00	2.605990876	5.212148919	10.210624	9.5
36000.00	2.336234986	4.755279684	10.10659856	10
37800.00	2.09440254	4.338457176	9.862851346	10.5
39600.00	1.877603078	3.95817111	9.486194542	11
41400.00	1.683245341	3.611218896	8.987154843	11.5
43200.00	1.509006303	3.294678668	8.410379394	12
45000.00	1.352803401	3.00588467	7.847601874	12.5
46800.00	1.212769647	2.742404818	7.32248241	13
48600.00	1.087231312	2.502020207	6.832501127	13.5
50400.00	0.974687921	2.282706432	6.375306765	14
52200.00	0.873794319	2.082616535	5.9487054	14.5
54000.00	0.783344592	1.900065454	5.550649912	15
55800.00	0.702257655	1.733515829	5.179230165	15.5
57600.00	0.629564331	1.581565057	4.832663836	16
59400.00	0.564395766	1.442933482	4.509287869	16.5
61200.00	0.505973044	1.316453612	4.207550489	17
63000.00	0.453597876	1.201060295	3.926003758	17.5
64800.00	0.406644259	1.095781742	3.663296625	18
66600.00	0.364550986	0.999731346	3.418168445	18.5
68400.00	0.326814947	0.912100217	3.18944293	19
70200.00	0.292985106	0.832150367	2.976022501	19.5
72000.00	0.262657119	0.759208494	2.776883023	20
73800.00	0.235468495	0.692660318	2.591068891	20.5
75600.00	0.211094268	0.631945401	2.417688446	21
77400.00	0.189243109	0.576552431	2.255909691	21.5
79200.00	0.169653845	0.526014913	2.104956303	22
81000.00	0.152092339	0.479907245	1.964103907	22.5
82800.00	0.13634869	0.43784113	1.832676599	23
84600.00	0.122234726	0.399462307	1.710043702	23.5
86400.00	0.109581751	0.364447567	1.595616741	24



DA#25 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.8	D=	763.95 (ft)
L=	100 (ft)	S=	0.0126 (ft/ft)
P_2=	4.89 (in)	V=	0.55 (ft/s)
S=	0.0126 (ft/ft)		
T_{OL}=	36.38 (min)	T_1=	23.15 (min)

Tc= 59.53 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (100-YR)=	4.6 (in/hr)
I (10-YR)=	3.1 (in/hr)
I (2-YR)=	2.2 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.2 Woodlands; basin slope 1-3.5%

i (100-YR)	i (10-YR)	i (2-YR)
4.6	3.1	2.2

A= 30.31 (Ac)

Q (100-YR)=	**27.89 (cfs)**
Q (10-YR)=	**18.79 (cfs)**
Q (2-YR)=	**13.34 (cfs)**

DA#25 EXISTING CALCULATIONS

Volume (100-yr) =	1.38*area*43560 =	1822018.97	cft
Volume (10-yr)=	0.70*area*43560=	924212.52	cft
Volume (2-yr)=	0.41*area*43560=	541324.476	cft
	A=	30.31	Ac

Tp = time to Qp in seconds

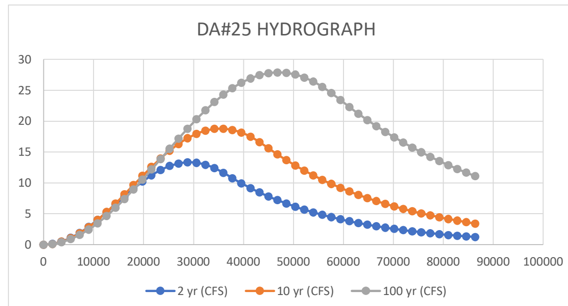
Tp = $\dfrac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA#25 Existing Conditions			
	2 - Year	**10 - Year**	**100 - Year**
Qp=	13.34	18.79	27.89
Tp=	29201.439	35381.759	47007.194
1.25*Tp=	36501.799	44227.199	58758.993

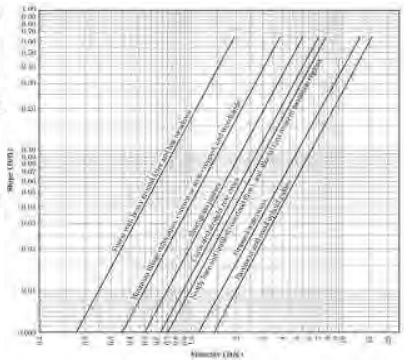
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	ti (hrs)
0	0	0	0	0
1800.00	0.12463995	0.119750928	0.100764154	0.5
3600.00	0.493900335	0.475951322	0.401600155	1
5400.00	1.093976952	1.059521814	0.898159678	1.5
7200.00	1.902436906	1.855587484	1.583265381	2
9000.00	2.889057224	2.843857021	2.447014651	2.5
10800.00	4.016954697	3.999139931	3.476922732	3
12600.00	5.2439647	5.291988635	4.658103189	3.5
14400.00	6.524217441	6.689449071	5.973483072	4
16200.00	7.809852738	8.155900675	7.404049696	4.5
18000.00	9.052809189	9.653964336	8.929125448	5
19800.00	10.20662087	11.14545517	10.52666667	5.5
21600.00	11.2281544	12.59235581	12.17358227	6
23400.00	12.07922139	13.95778551	13.8460675	6.5
25200.00	12.72800607	15.20694014	15.51994803	7
27000.00	13.15025468	16.30797938	17.17102935	7.5
28800.00	13.33018214	17.2328383	18.7754465	8
30600.00	13.26106214	17.9579427	20.31000899	8.5
32400.00	12.94547862	18.46481005	21.75253607	9
34200.00	12.39522917	18.74052054	23.08217722	9.5
36000.00	11.63088397	18.77804646	24.27971364	10
37800.00	10.75722579	18.5764313	25.32783595	10.5
39600.00	9.928849972	18.14081411	26.21139446	11
41400.00	9.164264436	17.48229856	26.91761809	11.5
43200.00	8.458556922	16.61766988	27.43629897	12
45000.00	7.807193441	15.61015877	27.75994003	12.5
46800.00	7.205989153	14.61116748	27.8838633	13
48600.00	6.651081476	13.67610786	27.80627759	13.5
50400.00	6.138905271	12.80088854	27.52830433	14
52200.00	5.66616994	11.98167995	27.05396137	14.5
54000.00	5.229838282	11.21489762	26.39010496	15
55800.00	4.827106977	10.49718646	25.54633055	15.5
57600.00	4.455388582	9.825406118	24.53483418	16
59400.00	4.112294903	9.196617181	23.41186997	16.5
61200.00	3.795621652	8.608068365	22.27496814	17
63000.00	3.503334285	8.057184454	21.19327531	17.5
64800.00	3.233554932	7.541555035	20.16411047	18
66600.00	2.98455033	7.058923954	19.18492281	18.5
68400.00	2.754720691	6.607179443	18.2532854	19
70200.00	2.542589416	6.184344876	17.36688916	19.5
72000.00	2.34679362	5.788570127	16.52353713	20
73800.00	2.166075363	5.41812347	15.72113905	20.5
75600.00	1.999273579	5.071384001	14.95770615	21
77400.00	1.845316608	4.746834551	14.23134625	21.5
79200.00	1.703215319	4.443055042	13.54025906	22
81000.00	1.572056745	4.158716275	12.88273169	22.5
82800.00	1.450998229	3.892574117	12.25713445	23
84600.00	1.339261999	3.643464054	11.66191678	23.5
86400.00	1.236130181	3.410296095	11.09560343	24



DA RP1 401 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	389 (ft)
L=	100 (ft)	S=	0.0035 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0035 (ft/ft)		
T_{OL}=	15.92 (min)	T_1=	12.97 (min)

Tc= 28.88 (min)

Intensity:

SEE FIG. 2.1-2.1a	
I (500-YR)=	8.70 (in/hr)
I (100-YR)=	6.9 (in/hr)
I (10-YR)=	4.6 (in/hr)
I (2-YR)=	3.2 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
8.70	6.9	4.6	3.2

A RP1 401=	4.19 (Ac)
Q (500-YR)=	**12.75 (cfs)**
Q (100-YR)=	**10.11 (cfs)**
Q (10-YR)=	**6.74 (cfs)**
Q (2-YR)=	**4.69 (cfs)**

DA RP1 401 EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	372177.15	cft
Volume (100-yr) =	1.38*area*43560 =	251766.90	cft
Volume (10-yr)=	0.70*area*43560=	127707.8464	cft
Volume (2-yr)=	0.41*area*43560=	74800.31005	cft
A=	4.19 Ac		

Tp = time to Qp in seconds

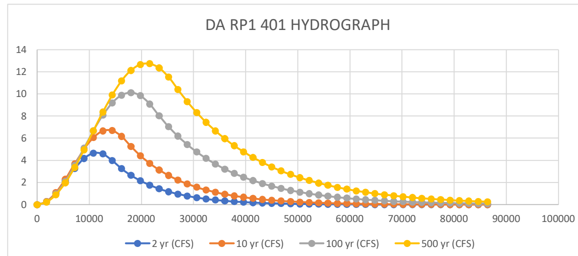
$$Tp = \frac{V}{1.39\ Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 401 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	4.69	6.74	10.11	12.75
Tp=	11471.994	13625.274	17907.503	20995.003
1.25*Tp=	14339.992	17031.592	22384.378	26243.754

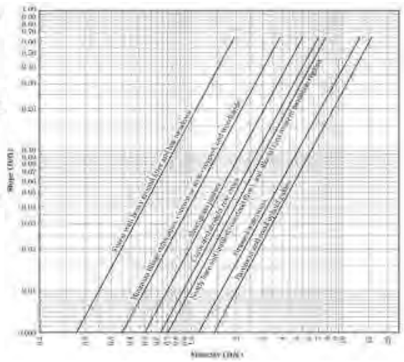
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.279219089	0.286225949	0.250064244	0.229903052	0.5
3600.00	1.050394902	1.096305566	0.97552753	0.903034269	1
5400.00	2.129912166	2.292695641	2.104647074	1.970855249	1.5
7200.00	3.260740181	3.672261412	3.525761569	3.356367146	2
9000.00	4.173631272	5.000766762	5.098333636	4.959662937	2.5
10800.00	4.651228067	6.052645111	6.666847897	6.665131553	3
12600.00	4.579815815	6.649298305	8.076190259	8.349794411	3.5
14400.00	3.981600381	6.689420752	9.186987516	9.892173194	4
16200.00	3.246926444	6.166200071	9.889390296	11.18104946	4.5
18000.00	2.647812518	5.254015724	10.11393632	12.12348443	5
19800.00	2.159245444	4.424923608	9.83841971	12.65152063	5.5
21600.00	1.760827421	3.726663559	9.090086946	12.72708224	6
23400.00	1.435924394	3.138590067	8.02952319	12.34472062	6.5
25200.00	1.17097158	2.643315516	7.045954765	11.53200726	7
27000.00	0.954907128	2.226196084	6.182867573	10.40024865	7.5
28800.00	0.778710295	1.874898768	5.425503384	9.303350672	8
30600.00	0.635024816	1.579036732	4.760911765	8.322140807	8.5
32400.00	0.517851785	1.329862201	4.177728633	7.444417613	9
34200.00	0.4222992	1.120007811	3.665981936	6.659266514	9.5
36000.00	0.344377715	0.94326878	3.21692114	5.956924075	10
37800.00	0.280834087	0.794419452	2.822867597	5.328656597	10.5
39600.00	0.229015355	0.669058788	2.47708325	4.766651508	11
41400.00	0.186758072	0.563480237	2.173655411	4.263920218	11.5
43200.00	0.152297987	0.474562151	1.907395662	3.814211212	12
45000.00	0.124196382	0.399675482	1.673751135	3.411932312	12.5
46800.00	0.101280008	0.336606049	1.468726661	3.05208114	13
48600.00	0.082592099	0.283489074	1.288816456	2.730182909	13.5
50400.00	0.067352433	0.238754043	1.130944171	2.442234781	14
52200.00	0.054924747	0.201078272	0.992410294	2.184656093	14.5
54000.00	0.044790184	0.169347798	0.870845986	1.954243827	15
55800.00	0.036525623	0.142624443	0.764172577	1.748132783	15.5
57600.00	0.029786015	0.120118077	0.67056602	1.563759948	16
59400.00	0.024289982	0.101163252	0.588425705	1.398832629	16.5
61200.00	0.019808061	0.085199528	0.516347086	1.251299936	17
63000.00	0.016153132	0.071754906	0.453097665	1.119327286	17.5
64800.00	0.013172601	0.060431867	0.397595919	1.001273586	18
66600.00	0.010742029	0.050895621	0.348892804	0.895670824	18.5
68400.00	0.008759939	0.04286421	0.306155529	0.801205821	19
70200.00	0.007143579	0.036100169	0.268653313	0.716703895	19.5
72000.00	0.005825466	0.030403504	0.235744894	0.641114254	20
73800.00	0.004750567	0.025605783	0.206867558	0.573496935	20.5
75600.00	0.003874005	0.021565149	0.181527523	0.513011109	21
77400.00	0.003159185	0.018162134	0.159291491	0.458904629	21.5
79200.00	0.002576261	0.01529612	0.139779239	0.410504674	22
81000.00	0.002100896	0.012882368	0.12265712	0.367209387	22.5
82800.00	0.001713244	0.010849509	0.107632359	0.328480387	23
84600.00	0.001397121	0.009137439	0.094448041	0.293836073	23.5
86400.00	0.001139328	0.007695537	0.082878722	0.262845642	24



DA RP1 402 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	929 (ft)
L=	100 (ft)	S=	0.0035 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0035 (ft/ft)		
T_{OL}=	15.92 (min)	T_1=	30.97 (min)

Tc= 46.88 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	7.25 (in/hr)
I (100-YR)=	5.3 (in/hr)
I (10-YR)=	4.5 (in/hr)
I (2-YR)=	2.4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
7.25	5.3	4.5	2.4

A RP1 402= 9.36 (Ac)

Q (500-YR)= 23.74 (cfs)
Q (100-YR)= 17.36 (cfs)
Q (10-YR)= 14.74 (cfs)
Q (2-YR)= 7.86 (cfs)

DA RP1 402 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		831752.06 cft
Volume (100-yr) = 1.38*area*43560 =		562655.81 cft
Volume (10-yr)= 0.70*area*43560=		285405.12 cft
Volume (2-yr)= 0.41*area*43560=		167165.856 cft
A=	9.36 Ac	

Tp = time to Qp in seconds

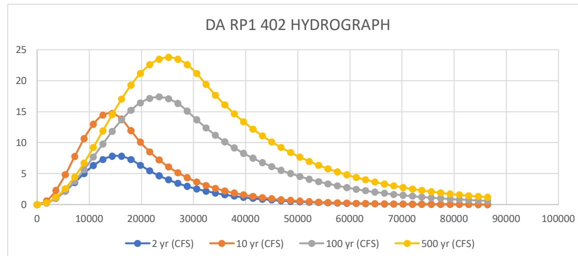
$$Tp = \frac{V}{1.39\,Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 402 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	7.86	14.74	17.36	23.74
Tp=	15295.992	13928.058	23313.541	25200.714
1.25*Tp=	19119.990	17410.072	29141.926	31500.893

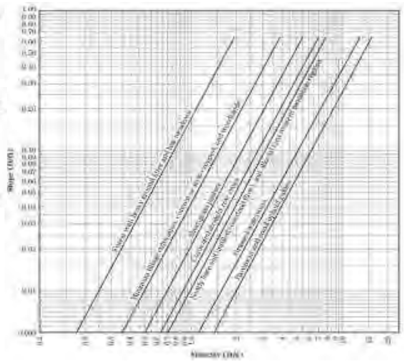
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.265602729	0.599219691	0.254131045	0.2976475	0.5
3600.00	1.026521207	2.29945257	1.0016458	1.175665555	1
5400.00	2.179935927	4.824260428	2.198780192	2.590029157	1.5
7200.00	3.569991122	7.763138696	3.775446675	4.46982021	2
9000.00	5.008854855	10.63825975	5.639337579	6.720783462	2.5
10800.00	6.302099912	12.98216214	7.681329367	9.230052585	3
12600.00	7.274975878	14.41375443	9.781871387	11.87180945	3.5
14400.00	7.796022378	14.70027628	11.8179851	14.5135928	4
16200.00	7.794832732	13.79514255	13.670464	17.02294007	4.5
18000.00	7.271567691	11.92352009	15.23085267	19.27402922	5
19800.00	6.341862277	10.07953095	16.40779645	21.15398759	5.5
21600.00	5.442242532	8.520717328	17.13238987	22.56855155	6
23400.00	4.670237619	7.202976421	17.36221081	23.44679295	6.5
25200.00	4.007744838	6.089025996	17.08380415	23.74467559	7
27000.00	3.439229435	5.14734957	16.31346953	23.44726324	7.5
28800.00	2.951360324	4.351304727	15.09630701	22.56946854	8
30600.00	2.532697492	3.678369337	13.67952018	21.1553053	8.5
32400.00	2.173423738	3.10950435	12.37315225	19.37244033	9
34200.00	1.865114471	2.628615133	11.19153995	17.65461006	9.5
36000.00	1.600540166	2.22209611	10.12276936	16.08910654	10
37800.00	1.373496835	1.878445824	9.15606431	14.66242235	10.5
39600.00	1.178660552	1.587941538	8.281677737	13.36224785	11
41400.00	1.011462613	1.342364148	7.490793404	12.17736492	11.5
43200.00	0.867982402	1.134765646	6.775437007	11.09755021	12
45000.00	0.74485546	0.959272545	6.128395773	10.11348691	12.5
46800.00	0.639194591	0.810919698	5.543145736	9.216684355	13
48600.00	0.548522159	0.685509827	5.013785954	8.399404803	13.5
50400.00	0.470711992	0.579494769	4.534979016	7.654596634	14
52200.00	0.403939523	0.489875089	4.101897221	6.975833527	14.5
54000.00	0.346639008	0.414115218	3.710173907	6.357259006	15
55800.00	0.297466812	0.350071718	3.355859418	5.793535915	15.5
57600.00	0.255269898	0.295932635	3.035381283	5.279800361	16
59400.00	0.219058793	0.250166237	2.745508194	4.811619754	16.5
61200.00	0.187984385	0.211477677	2.48331743	4.384954558	17
63000.00	0.161318012	0.178772357	2.24616538	3.996123438	17.5
64800.00	0.138434376	0.151124961	2.031660896	3.641771499	18
66600.00	0.11879688	0.127753273	1.837641179	3.318841336	18.5
68400.00	0.101945044	0.10799605	1.662149972	3.024546657	19
70200.00	0.087483712	0.091294309	1.503417839	2.756348242	19.5
72000.00	0.075073781	0.077175516	1.35984432	2.511932032	20
73800.00	0.064424251	0.065240214	1.229981797	2.289189166	20.5
75600.00	0.055285401	0.055150723	1.112520895	2.086197784	21
77400.00	0.047442935	0.046621586	1.006277284	1.901206443	21.5
79200.00	0.040712956	0.039411493	0.910179735	1.732619011	22
81000.00	0.034937652	0.03331645	0.823259316	1.578980887	22.5
82800.00	0.0299816	0.028164014	0.744639631	1.438966459	23
84600.00	0.025728584	0.02380841	0.673527975	1.311367659	23.5
86400.00	0.022078877	0.020126406	0.609207346	1.195083545	24



DA RP1 403 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T_1=	
n=	0.15	D=	262 (ft)
L=	100 (ft)	S=	0.0035 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0035 (ft/ft)		
T_{OL}=	15.92 (min)	T_1=	8.73 (min)

Tc= 24.65 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	9.98 (in/hr)
I (100-YR)=	7.4 (in/hr)
I (10-YR)=	5.1 (in/hr)
I (2-YR)=	3.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
9.98	7.4	5.1	3.5

A RP1 403=	0.86 (Ac)
Q (500-YR)=	**3.01 (cfs)**
Q (100-YR)=	**2.23 (cfs)**
Q (10-YR)=	**1.54 (cfs)**
Q (2-YR)=	**1.05 (cfs)**

DA RP1 403 EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	76421.66	cft
Volume (100-yr) =	1.38*area*43560 =	51697.01	cft
Volume (10-yr)=	0.70*area*43560=	26223.12	cft
Volume (2-yr)=	0.41*area*43560=	15359.256	cft
A=	0.86 Ac		

Tp = time to Qp in seconds

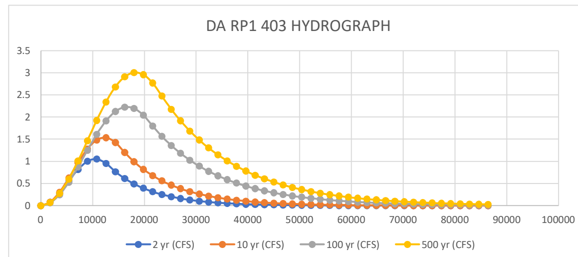
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 403 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	1.05	1.54	2.23	3.01
Tp=	10488.680	12289.463	16697.536	18294.740
1.25*Tp=	13110.850	15361.828	20871.920	22868.425

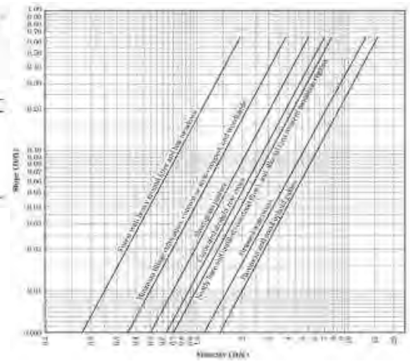
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.074719208	0.079832437	0.063259144	0.071211025	0.5
3600.00	0.277679072	0.302723095	0.245850226	0.278094483	1
5400.00	0.551300093	0.622306514	0.527030575	0.601041282	1.5
7200.00	0.817956279	0.972103318	0.874857609	1.00944146	2
9000.00	1.001997553	1.279349174	1.249817559	1.464585508	2.5
10800.00	1.051211601	1.480131151	1.609314315	1.923333375	3
12600.00	0.951636449	1.532682811	1.912508408	2.34220343	3.5
14400.00	0.767367854	1.426072419	2.124956455	2.681493793	4
16200.00	0.613922455	1.200582254	2.222523981	2.909045408	4.5
18000.00	0.491160503	0.992428435	2.194127144	3.003290183	5
19800.00	0.392946434	0.820363783	2.042991873	2.955295291	5.5
21600.00	0.314371573	0.678131251	1.798627911	2.769609843	6
23400.00	0.2515088	0.560558625	1.563432409	2.47304504	6.5
25200.00	0.201216273	0.463370433	1.358991975	2.176122409	7
27000.00	0.160980406	0.383032477	1.181284959	1.914849372	7.5
28800.00	0.128790235	0.316623305	1.026815596	1.684945709	8
30600.00	0.103036916	0.261727983	0.89254524	1.482645102	8.5
32400.00	0.082433316	0.216350268	0.775832592	1.30463343	9
34200.00	0.065949679	0.178840023	0.674381739	1.147994475	9.5
36000.00	0.052762164	0.147833207	0.58619699	1.010162154	10
37800.00	0.042211668	0.122202271	0.509543618	0.888878473	10.5
39600.00	0.033770884	0.10101516	0.442913735	0.782156546	11
41400.00	0.027017947	0.083501415	0.384996632	0.688248034	11.5
43200.00	0.02161535	0.069024158	0.334652992	0.605614514	12
45000.00	0.017293073	0.05705693	0.29089248	0.53290227	12.5
46800.00	0.013835094	0.047164548	0.252854261	0.468920118	13
48600.00	0.011068583	0.038987282	0.219790065	0.412619892	13.5
50400.00	0.008855273	0.032227769	0.191049471	0.363079272	14
52200.00	0.007084543	0.026640202	0.166067108	0.319486677	14.5
54000.00	0.005667895	0.022021393	0.144351534	0.281127964	15
55800.00	0.004534524	0.018203382	0.125475572	0.247374735	15.5
57600.00	0.003627785	0.015047327	0.109067904	0.21767404	16
59400.00	0.002902362	0.012438461	0.094805766	0.191539316	16.5
61200.00	0.002321996	0.010281913	0.082408599	0.168542421	17
63000.00	0.001857682	0.008499262	0.071632534	0.148306615	17.5
64800.00	0.001486214	0.007025682	0.062265588	0.130500393	18
66600.00	0.001189026	0.005807587	0.054123501	0.114832049	18.5
68400.00	0.000951264	0.004800683	0.047046103	0.101044903	19
70200.00	0.000761046	0.003968353	0.040894174	0.08891309	19.5
72000.00	0.000608865	0.00328033	0.035546695	0.078237867	20
73800.00	0.000487114	0.002711595	0.030898472	0.068844349	20.5
75600.00	0.000389709	0.002241466	0.026858069	0.06057865	21
77400.00	0.000311782	0.001852846	0.023346005	0.053305361	21.5
79200.00	0.000249437	0.001531605	0.020293191	0.046905329	22
81000.00	0.000199559	0.001266059	0.017639576	0.041273707	22.5
82800.00	0.000159654	0.001046553	0.015332957	0.036318238	23
84600.00	0.000127729	0.000865104	0.013327961	0.031957741	23.5
86400.00	0.000102188	0.000715115	0.011585145	0.02812078	24



DA RP1 404 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	964 (ft)
L=	100 (ft)	S=	0.0035 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0035 (ft/ft)		
T_{OL}=	15.92 (min)	T_1=	32.13 (min)

Tc= 48.05 (min)

Intensity:

SEE FIG. 2.1-2.1a

I (500-YR)=	7.15 (in/hr)
I (100-YR)=	5.2 (in/hr)
I (10-YR)=	3.4 (in/hr)
I (2-YR)=	2.4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
7.15	5.2	3.4	2.4

A RP1 404=	3.62 (Ac)
Q (500-YR)=	**9.06 (cfs)**
Q (100-YR)=	**6.59 (cfs)**
Q (10-YR)=	**4.31 (cfs)**
Q (2-YR)=	**3.04 (cfs)**

DA RP1 404 EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	321681.89	cft
Volume (100-yr) =	1.38*area*43560 =	217608.34	cft
Volume (10-yr)=	0.70*area*43560=	110381.04	cft
Volume (2-yr)=	0.41*area*43560=	64651.752	cft
A=	3.62 Ac		

Tp = time to Qp in seconds

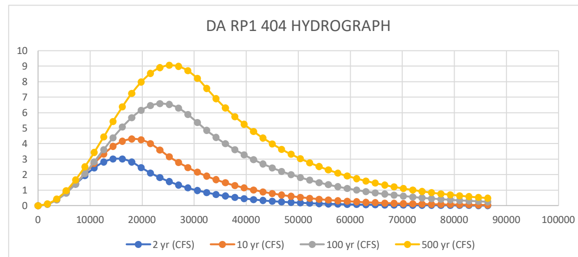
$$T_p = \frac{V}{1.39\,Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 404 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	3.04	4.31	6.59	9.06
Tp=	15295.992	18434.194	23761.878	25554.458
1.25*Tp=	19119.990	23042.742	29702.348	31943.073

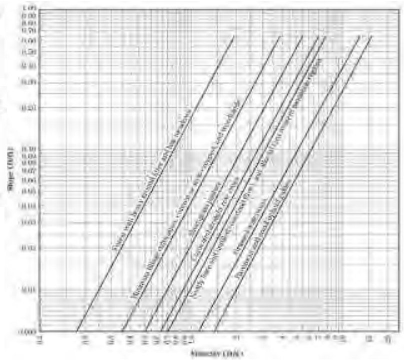
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.102722423	0.100550371	0.09284372	0.110413862	0.5
3600.00	0.39700927	0.392813511	0.366141467	0.43627074	1
5400.00	0.843094878	0.849502018	0.804487996	0.961679117	1.5
7200.00	1.380701695	1.427976774	1.383174592	1.661015671	2
9000.00	1.937185318	2.074227982	2.069581853	2.50017488	2.5
10800.00	2.437350607	2.727917837	2.825018382	3.438232296	3
12600.00	2.813612466	3.328014019	3.606901736	4.429440365	3.5
14400.00	3.015128313	3.818488027	4.371158721	5.42545946	4
16200.00	3.014668215	4.15354633	5.074709705	6.377715328	4.5
18000.00	2.812294342	4.301905919	5.677896931	7.239767979	5
19800.00	2.452728787	4.249715073	6.146719947	7.969576489	5.5
21600.00	2.104798928	4.001846634	6.45475214	8.531549268	6
23400.00	1.806224378	3.5898394	6.584630353	8.898279806	6.5
25200.00	1.55000388	3.161888418	6.529033613	9.051883243	7
27000.00	1.330129333	2.784954214	6.291095797	8.984868585	7.5
28800.00	1.141444912	2.452954991	5.88422898	8.700504031	8
30600.00	0.979526167	2.160533971	5.360594065	8.212657583	8.5
32400.00	0.840576275	1.902972969	4.857858674	7.561558037	9
34200.00	0.721337007	1.67611626	4.402271579	6.899908218	9.5
36000.00	0.619012329	1.476303533	3.989411046	6.29615394	10
37800.00	0.531202836	1.300310828	3.615270028	5.745229237	10.5
39600.00	0.455849487	1.145298518	3.276217273	5.242511429	11
41400.00	0.391185327	1.008765495	2.968962079	4.783782326	11.5
43200.00	0.335694048	0.88850881	2.690522359	4.365192838	12
45000.00	0.288074441	0.782588134	2.438195696	3.983230677	12.5
46800.00	0.247209874	0.689294445	2.209533117	3.634690887	13
48600.00	0.212142117	0.607122458	2.00231532	3.316648949	13.5
50400.00	0.182048869	0.534746337	1.814531137	3.026436249	14
52200.00	0.156224474	0.470998298	1.644358017	2.761617678	14.5
54000.00	0.134063377	0.414849774	1.490144331	2.519971205	15
55800.00	0.115045925	0.365394813	1.350393347	2.299469228	15.5
57600.00	0.098726179	0.321835463	1.223748703	2.098261569	16
59400.00	0.084721456	0.283468899	1.10898124	1.914659938	16.5
61200.00	0.072703363	0.24967608	1.004977074	1.747123777	17
63000.00	0.062390086	0.219911761	0.910726784	1.59424733	17.5
64800.00	0.053539791	0.193695699	0.825315619	1.454747844	18
66600.00	0.045944947	0.170604899	0.747914614	1.327454813	18.5
68400.00	0.039427464	0.150266793	0.677772547	1.211300148	19
70200.00	0.033834513	0.132353228	0.614208651	1.105309224	19.5
72000.00	0.029034945	0.11657517	0.556606	1.008592695	20
73800.00	0.024916217	0.102678042	0.504405529	0.920339035	20.5
75600.00	0.021381747	0.090437614	0.457100602	0.839807728	21
77400.00	0.018348656	0.079656389	0.414232098	0.766323053	21.5
79200.00	0.015745823	0.070160413	0.375383953	0.699268419	22
81000.00	0.013512212	0.061796468	0.340179124	0.638081185	22.5
82800.00	0.011595448	0.054429604	0.308275928	0.582247943	23
84600.00	0.009950585	0.047940957	0.279364725	0.531300209	23.5
86400.00	0.008539053	0.042225832	0.253164918	0.484810493	24



DA RP1 405 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	835 (ft)
L=	100 (ft)	S=	0.0035 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0035 (ft/ft)		
T_{OL}=	15.92 (min)	T_1=	27.83 (min)

Tc= 43.75 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	7.52 (in/hr)
I (100-YR)=	5.5 (in/hr)
I (10-YR)=	3.7 (in/hr)
I (2-YR)=	2.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
7.52	5.5	3.7	2.5

A RP1 405= 5.62 (Ac)

Q (500-YR)=	**14.79 (cfs)**
Q (100-YR)=	**10.82 (cfs)**
Q (10-YR)=	**7.28 (cfs)**
Q (2-YR)=	**4.92 (cfs)**

DA RP1 405 EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	499406.69	cft
Volume (100-yr) =	1.38*area*43560 =	337833.94	cft
Volume (10-yr)=	0.70*area*43560=	171365.04	cft
Volume (2-yr)=	0.41*area*43560=	100370.952	cft
	A=	5.62 Ac	

Tp = time to Qp in seconds

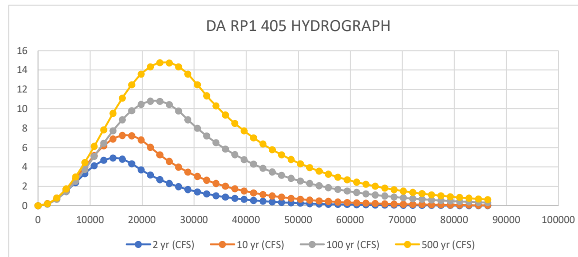
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 405 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	4.92	7.28	10.82	14.79
Tp=	14684.152	16939.529	22465.776	24297.392
1.25*Tp=	18355.190	21174.412	28082.220	30371.741

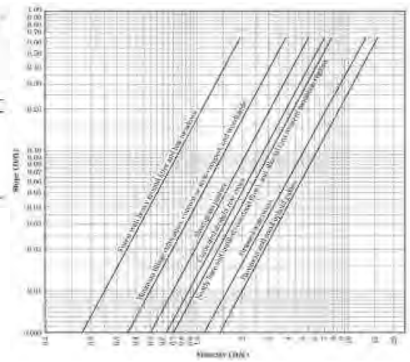
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.180076693	0.200886732	0.170456964	0.199335248	0.5
3600.00	0.693929454	0.781367191	0.671084935	0.78659248	1
5400.00	1.466290033	1.677351007	1.47033221	1.730105742	1.5
7200.00	2.384024406	2.789913349	2.517826827	2.978999122	2
9000.00	3.312704453	3.996217126	3.747551224	4.465930067	2.5
10800.00	4.11629875	5.163075334	5.082002941	6.110720616	3
12600.00	4.677098214	6.161656123	6.437079159	7.824680739	3.5
14400.00	4.912957924	6.881707013	7.727377215	9.515390658	4
16200.00	4.789329563	7.243727778	8.871577039	11.09168429	4.5
18000.00	4.324321997	7.207748006	9.797566295	12.46856507	5
19800.00	3.697897518	6.777740193	10.4469852	13.57178915	5.5
21600.00	3.153172053	6.019809114	10.77890463	14.34186872	6
23400.00	2.688688355	5.243121989	10.77240559	14.73727972	6.5
25200.00	2.292626267	4.566644502	10.42789769	14.73670088	7
27000.00	1.954906818	3.977447416	9.767093275	14.34016342	7.5
28800.00	1.666935743	3.46426965	8.869310553	13.56904935	8
30600.00	1.421384766	3.017303046	7.991980755	12.48352297	8.5
32400.00	1.212005119	2.628004917	7.201434203	11.3373545	9
34200.00	1.033468518	2.288934767	6.48908652	10.29642091	9.5
36000.00	0.881231574	1.993612086	5.847202471	9.351060134	10
37800.00	0.751420167	1.736392495	5.268811971	8.492497185	10.5
39600.00	0.640730864	1.512359861	4.747634398	7.712762768	11
41400.00	0.546346848	1.317232339	4.278010394	7.004619279	11.5
43200.00	0.46586624	1.147280539	3.854840411	6.361493633	12
45000.00	0.397240973	0.99925624	3.473529334	5.77741625	12.5
46800.00	0.338724675	0.870330316	3.129936585	5.246965642	13
48600.00	0.288828225	0.758038657	2.820331163	4.765218093	13.5
50400.00	0.246281863	0.66023508	2.541351128	4.327701957	14
52200.00	0.210002869	0.575050305	2.289967093	3.930356148	14.5
54000.00	0.179068017	0.50085623	2.063449332	3.569492447	15
55800.00	0.15269008	0.436234815	1.859338135	3.241761268	15.5
57600.00	0.130197792	0.379950976	1.675417103	2.944120565	16
59400.00	0.111018772	0.330928985	1.509689075	2.673807595	16.5
61200.00	0.094664951	0.288231903	1.360354444	2.428313277	17
63000.00	0.08072016	0.251043679	1.225791619	2.205358897	17.5
64800.00	0.068829531	0.21865355	1.104539408	2.002874964	18
66600.00	0.058690473	0.190442457	0.995281159	1.818981992	18.5
68400.00	0.050044967	0.165871212	0.896830461	1.651973063	19
70200.00	0.042673003	0.144470195	0.808118257	1.500297975	19.5
72000.00	0.036386979	0.125830378	0.72818124	1.36254886	20
73800.00	0.031026929	0.109595506	0.656151391	1.237447112	20.5
75600.00	0.026456452	0.095455287	0.591246552	1.123831519	21
77400.00	0.022559236	0.083139466	0.532761937	1.020647486	21.5
79200.00	0.019236107	0.072412655	0.480062471	0.926937243	22
81000.00	0.016402498	0.063069838	0.432575904	0.84183096	22.5
82800.00	0.013986298	0.054932448	0.389786588	0.764538668	23
84600.00	0.011926021	0.04784496	0.351229883	0.694342929	23.5
86400.00	0.010169237	0.041671913	0.316487111	0.630592177	24



DA RP1 406 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	905 (ft)
L=	100 (ft)	S=	0.0035 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0035 (ft/ft)		
T_{OL}=	15.92 (min)	T_1=	30.17 (min)

Tc= 46.08 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	7.32 (in/hr)
I (100-YR)=	5.4 (in/hr)
I (10-YR)=	3.6 (in/hr)
I (2-YR)=	2.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
7.32	5.4	3.6	2.5

A RP1 406=	4.02 (Ac)
Q (500-YR)=	**10.29 (cfs)**
Q (100-YR)=	**7.60 (cfs)**
Q (10-YR)=	**5.07 (cfs)**
Q (2-YR)=	**3.52 (cfs)**

DA RP1 406 EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	357226.85 cft
Volume (100-yr) =	1.38*area*43560 =	241653.46 cft
Volume (10-yr)=	0.70*area*43560=	122577.84 cft
Volume (2-yr)=	0.41*area*43560=	71795.592 cft
A=	4.02 Ac	

Tp = time to Qp in seconds

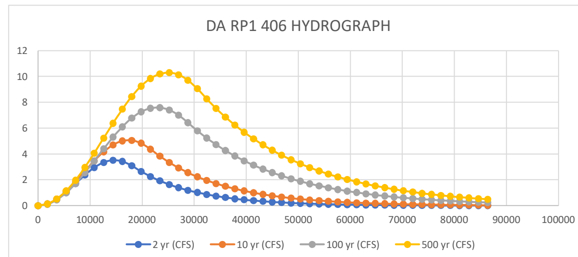
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 406 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	3.52	5.07	7.60	10.29
Tp=	14684.152	17410.072	22881.809	24963.753
1.25*Tp=	18355.190	21762.590	28602.261	31204.692

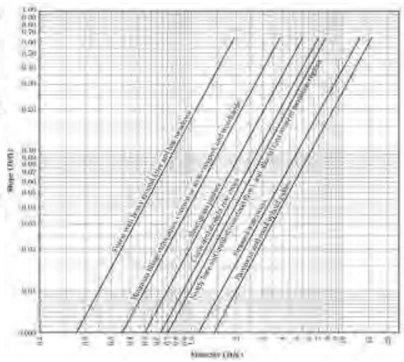
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.128809307	0.132421583	0.115419824	0.131500237	0.5
3600.00	0.496369467	0.515838526	0.454665827	0.519282118	1
5400.00	1.048840913	1.110155529	0.99712377	1.143532442	1.5
7200.00	1.705298596	1.853222708	1.709831269	1.972355969	2
9000.00	2.369585747	2.667334834	2.549480749	2.963405059	2.5
10800.00	2.94439875	3.46735725	3.465051022	4.066043375	3
12600.00	3.345540004	4.169628711	4.400907584	5.223933076	3.5
14400.00	3.514251042	4.700710144	5.300183236	6.377913325	4
16200.00	3.425819367	5.005064437	6.108233613	7.469023032	4.5
18000.00	3.093198297	5.050864159	6.775957643	8.441513396	5
19800.00	2.645115307	4.833319866	7.262781166	9.245696312	5.5
21600.00	2.255471824	4.375180955	7.539122414	9.840483121	6
23400.00	1.923225478	3.83053128	7.58818955	10.19548398	6.5
25200.00	1.63992128	3.348788204	7.407001015	10.29256059	7
27000.00	1.398349717	2.927631082	7.006566707	10.12675296	7.5
28800.00	1.192363289	2.55944038	6.420518003	9.706532801	8
30600.00	1.016720064	2.237554826	5.796383321	9.053370705	8.5
32400.00	0.866950281	1.956150899	5.232920396	8.266989578	9
34200.00	0.739242606	1.710137466	4.724231361	7.527285772	9.5
36000.00	0.63034714	1.495063675	4.264991681	6.853768299	10
37800.00	0.537492717	1.307038433	3.850394413	6.240515017	10.5
39600.00	0.458316383	1.142660003	3.476099895	5.682133678	11
41400.00	0.390803261	0.998954469	3.138190321	5.173714517	11.5
43200.00	0.333235282	0.873321923	2.833128733	4.710787077	12
45000.00	0.284147457	0.763489433	2.557721999	4.289280905	12.5
46800.00	0.242290604	0.66746992	2.309087386	3.905489759	13
48600.00	0.206599549	0.583526208	2.084622394	3.556039017	13.5
50400.00	0.17616603	0.510139597	1.881977509	3.237856011	14
52200.00	0.150215575	0.445982382	1.699031611	2.948143004	14.5
54000.00	0.128087799	0.389893837	1.533869773	2.68435259	15
55800.00	0.109219594	0.340859215	1.384763218	2.4441653	15.5
57600.00	0.093130805	0.297991384	1.250151221	2.2254692	16
59400.00	0.079412004	0.260514785	1.128624775	2.026341329	16.5
61200.00	0.067714075	0.227751394	1.018911841	1.845030783	17
63000.00	0.057739331	0.199108459	0.919864036	1.679943326	17.5
64800.00	0.049233935	0.174067776	0.830444608	1.529627366	18
66600.00	0.041981441	0.15217631	0.749717589	1.392761198	18.5
68400.00	0.035797289	0.133038003	0.676837994	1.268141377	19
70200.00	0.030524105	0.116306606	0.611042981	1.15467214	19.5
72000.00	0.026027697	0.101679418	0.551643862	1.051355767	20
73800.00	0.02219364	0.088891804	0.498018895	0.957283813	20.5
75600.00	0.018924366	0.077712412	0.449606778	0.871629117	21
77400.00	0.016136678	0.067938985	0.405900775	0.79363853	21.5
79200.00	0.013759635	0.059394704	0.366443405	0.722626291	22
81000.00	0.011732748	0.051924987	0.330821663	0.657968	22.5
82800.00	0.010004434	0.045394691	0.298662689	0.599095126	23
84600.00	0.008530713	0.039685671	0.269629869	0.545490009	23.5
86400.00	0.007274081	0.034694641	0.243419312	0.496681306	24



DA RP1 406L DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	778 (ft)
L=	100 (ft)	S=	0.0035 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0035 (ft/ft)		
T_{OL}=	15.92 (min)	T_1=	25.93 (min)

Tc= 41.85 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	7.68 (in/hr)
I (100-YR)=	5.6 (in/hr)
I (10-YR)=	3.8 (in/hr)
I (2-YR)=	2.6 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
7.68	5.6	3.8	2.6

A RP1 406L=	3.02 (Ac)
Q (500-YR)=	**8.12 (cfs)**
Q (100-YR)=	**5.92 (cfs)**
Q (10-YR)=	**4.02 (cfs)**
Q (2-YR)=	**2.75 (cfs)**

DA RP1 406L EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	268364.45	cft
Volume (100-yr) =	1.38*area*43560 =	181540.66	cft
Volume (10-yr)=	0.70*area*43560=	92085.84	cft
Volume (2-yr)=	0.41*area*43560=	53935.992	cft
A=	3.02 Ac		

Tp = time to Qp in seconds

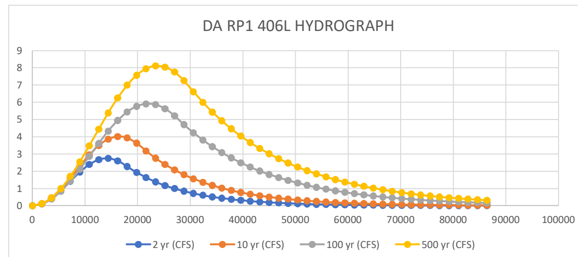
$$T_p = \frac{V}{1.39\,Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 406L Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	2.75	4.02	5.92	8.12
Tp=	14119.377	16493.752	22064.601	23780.503
1.25*Tp=	17649.221	20617.190	27580.752	29725.629

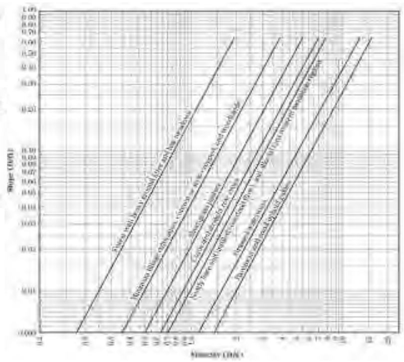
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.108739932	0.116881593	0.096666759	0.114231109	0.5
3600.00	0.417749374	0.453921525	0.380352358	0.450495491	1
5400.00	0.878121165	0.971888841	0.83252526	0.989868138	1.5
7200.00	1.416991907	1.610492902	1.423647629	1.701993075	2
9000.00	1.949074114	2.295401127	2.115104867	2.546791806	2.5
10800.00	2.390154726	2.946891201	2.861728078	3.476718931	3
12600.00	2.670423576	3.48913063	3.614744695	4.439438013	3.5
14400.00	2.745522297	3.859003538	4.324964505	5.380767078	4
16200.00	2.603564957	4.013457257	4.945992963	6.247727986	4.5
18000.00	2.273961772	3.934513601	5.43726188	6.991528048	5
19800.00	1.92667148	3.631361496	5.766679502	7.570306084	5.5
21600.00	1.632421019	3.176713945	5.912726887	7.951488381	6
23400.00	1.383109893	2.756537632	5.865863603	8.113621942	6.5
25200.00	1.171874751	2.391937029	5.629150959	8.047581866	7
27000.00	0.992900448	2.075561271	5.218052019	7.757084898	7.5
28800.00	0.841259954	1.801031774	4.707891313	7.258480252	8
30600.00	0.71277872	1.562813633	4.234172366	6.614416383	8.5
32400.00	0.603919753	1.356104033	3.808120118	5.994555441	9
34200.00	0.511686247	1.176735414	3.424938235	5.432783915	9.5
36000.00	0.433539082	1.021091451	3.080313003	4.923658036	10
37800.00	0.367326925	0.886034141	2.770364762	4.462244189	10.5
39600.00	0.311227005	0.768840536	2.491604231	4.044071107	11
41400.00	0.263694931	0.667147847	2.240893232	3.66508654	11.5
43200.00	0.223422183	0.578905806	2.015409356	3.321617992	12
45000.00	0.189300082	0.502335328	1.81261419	3.010337126	12.5
46800.00	0.16038927	0.435892642	1.630224744	2.728227519	13
48600.00	0.135893855	0.378238171	1.466187748	2.472555426	13.5
50400.00	0.115139497	0.328209518	1.318656535	2.240843292	14
52200.00	0.097554844	0.284798034	1.185970255	2.030845742	14.5
54000.00	0.082655803	0.247128483	1.066635176	1.840527824	15
55800.00	0.070032214	0.214441393	0.95930787	1.668045288	15.5
57600.00	0.05933656	0.186077746	0.862780086	1.511726716	16
59400.00	0.050274398	0.16146569	0.775965152	1.370057324	16.5
61200.00	0.042596252	0.140109011	0.697885738	1.241664285	17
63000.00	0.036090749	0.121577129	0.627662855	1.125303423	17.5
64800.00	0.030578798	0.105496415	0.564505963	1.019847159	18
66600.00	0.025908658	0.091542658	0.507704063	0.924273584	18.5
68400.00	0.021951764	0.079434531	0.456617702	0.837656555	19
70200.00	0.018599186	0.068927916	0.410671769	0.759156722	19.5
72000.00	0.015758629	0.059810987	0.369349023	0.688013393	20
73800.00	0.013351896	0.051899931	0.332184267	0.623537163	20.5
75600.00	0.011312731	0.045035252	0.298759116	0.565103235	21
77400.00	0.009584997	0.039078548	0.26869728	0.512145362	21.5
79200.00	0.00812113	0.033909722	0.241660336	0.464150363	22
81000.00	0.006880833	0.029424565	0.217343913	0.42065315	22.5
82800.00	0.005829959	0.025532648	0.195474264	0.381232218	23
84600.00	0.00493958	0.022155506	0.17580519	0.345505564	23.5
86400.00	0.004185184	0.019225051	0.158115264	0.313126985	24



DA RP1 407 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	359 (ft)
L=	100 (ft)	S=	0.0035 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0035 (ft/ft)		
T_{OL}=	15.92 (min)	T_1=	11.97 (min)

Tc= 27.88 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	9.21 (in/hr)
I (100-YR)=	7 (in/hr)
I (10-YR)=	4.7 (in/hr)
I (2-YR)=	3.3 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
9.21	7	4.7	3.3

A RP1 407=	1.96 (Ac)
Q (500-YR)=	**6.32 (cfs)**
Q (100-YR)=	**4.80 (cfs)**
Q (10-YR)=	**3.22 (cfs)**
Q (2-YR)=	**2.26 (cfs)**

DA RP1 407 EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	174170.30	cft
Volume (100-yr) =	1.38*area*43560 =	117821.09	cft
Volume (10-yr)=	0.70*area*43560=	59764.32	cft
Volume (2-yr)=	0.41*area*43560=	35004.816	cft
A=	1.96	Ac	

Tp = time to Qp in seconds

Tp = $\dfrac{V}{1.39\,Q_p}$

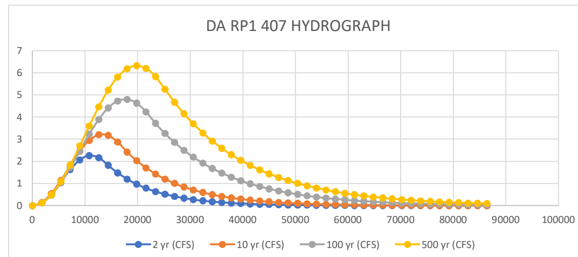
$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 407 Existing Conditions

	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	2.26	3.22	4.80	6.32
Tp=	11124.358	13335.374	17651.681	19836.504
1.25*Tp=	13905.447	16669.218	22064.601	24795.629

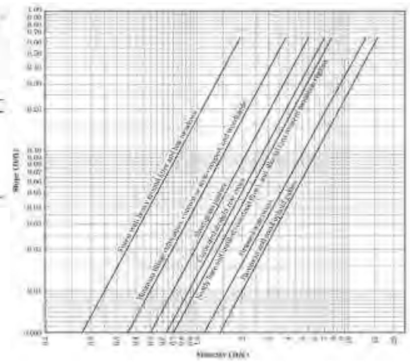
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.143120173	0.14278372	0.122156703	0.127469286	0.5
3600.00	0.536287772	0.545842168	0.476196775	0.499588055	1
5400.00	1.080076672	1.137777559	1.02609492	1.086319558	1.5
7200.00	1.636970905	1.813734441	1.715896332	1.840303895	2
9000.00	2.066140365	2.453973792	2.475410368	2.700680823	2.5
10800.00	2.259054603	2.945083595	3.227352788	3.598002284	3
12600.00	2.166928533	3.200068647	3.8952098	4.459838122	3.5
14400.00	1.825995602	3.173760886	4.41102371	5.216622516	4
16200.00	1.479606464	2.870820472	4.72230795	5.807269209	4.5
18000.00	1.198926923	2.420145835	4.797387836	6.184102275	5
19800.00	0.971491948	2.030647403	4.628623626	6.316704433	5.5
21600.00	0.787201111	1.703834875	4.233187896	6.194372281	6
23400.00	0.637870021	1.429619577	3.719384662	5.826980245	6.5
25200.00	0.516866856	1.199536508	3.257607284	5.257100302	7
27000.00	0.418817844	1.006483023	2.853161526	4.672130903	7.5
28800.00	0.33936861	0.844499578	2.498929423	4.152252368	8
30600.00	0.274990799	0.70858576	2.188676738	3.69022189	8.5
32400.00	0.22282538	0.594545921	1.91694324	3.279602584	9
34200.00	0.180555677	0.498859661	1.678946608	2.914673813	9.5
36000.00	0.146304485	0.418573154	1.470498267	2.590351489	10
37800.00	0.118550703	0.351207963	1.287929671	2.302117241	10.5
39600.00	0.096061779	0.29468453	1.128027741	2.045955468	11
41400.00	0.077838977	0.247257982	0.987978313	1.818297392	11.5
43200.00	0.063073018	0.207464266	0.865316616	1.615971343	12
45000.00	0.051108143	0.174074953	0.757883889	1.43615857	12.5
46800.00	0.041412991	0.146059319	0.66378939	1.276353969	13
48600.00	0.033556997	0.122552522	0.581377123	1.134331187	13.5
50400.00	0.027191276	0.102828911	0.509196687	1.008111599	14
52200.00	0.022033124	0.086279619	0.445977759	0.89593675	14.5
54000.00	0.017853467	0.072393772	0.390607729	0.796243848	15
55800.00	0.014466686	0.060742713	0.342112123	0.707644001	15.5
57600.00	0.011722373	0.050966777	0.299637452	0.628902858	16
59400.00	0.009498654	0.042764181	0.262436192	0.55892342	16.5
61200.00	0.007696771	0.03588171	0.229853626	0.496730751	17
63000.00	0.006236703	0.030106906	0.201316324	0.441458401	17.5
64800.00	0.005053608	0.025261498	0.176322048	0.39233633	18
66600.00	0.004094944	0.021195911	0.154430918	0.348680182	18.5
68400.00	0.003318139	0.01778464	0.135257665	0.309881753	19
70200.00	0.002688692	0.014922379	0.118464852	0.275400512	19.5
72000.00	0.00217865	0.01252077	0.103756938	0.244756076	20
73800.00	0.001765363	0.010505676	0.090875075	0.217521516	20.5
75600.00	0.001430476	0.008814892	0.079592549	0.193317407	21
77400.00	0.001159116	0.007396223	0.069710796	0.171806543	21.5
79200.00	0.000939233	0.006205874	0.061055905	0.152689242	22
81000.00	0.000761062	0.0052071	0.053475556	0.135699166	22.5
82800.00	0.000616689	0.004369069	0.046836339	0.120599614	23
84600.00	0.000499704	0.003665911	0.041021409	0.107180223	23.5
86400.00	0.000404911	0.003075919	0.035928427	0.095254038	24



DA RP1 408 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	283 (ft)
L=	100 (ft)	S=	0.0035 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0035 (ft/ft)		
T_{OL}=	15.92 (min)	T_1=	9.43 (min)

Tc= 25.35 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	9.82 (in/hr)
I (100-YR)=	7.3 (in/hr)
I (10-YR)=	4.9 (in/hr)
I (2-YR)=	3.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
9.82	7.3	4.9	3.5

A RP1 408=	1.17 (Ac)
Q (500-YR)=	**4.02 (cfs)**
Q (100-YR)=	**2.99 (cfs)**
Q (10-YR)=	**2.01 (cfs)**
Q (2-YR)=	**1.43 (cfs)**

DA RP1 408 EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	103969.01	cft
Volume (100-yr) =	1.38*area*43560 =	70331.98	cft
Volume (10-yr)=	0.70*area*43560=	35675.64	cft
Volume (2-yr)=	0.41*area*43560=	20895.732	cft
A=	1.17	Ac	

Tp = time to Qp in seconds

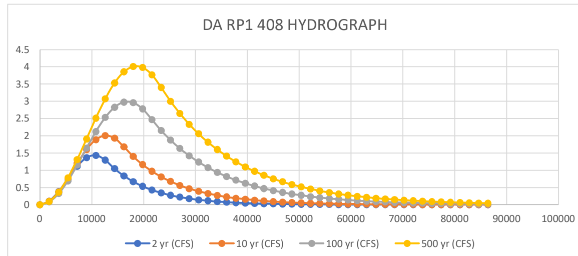
$$Tp = \frac{V}{1.39\ Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 408 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	1.43	2.01	2.99	4.02
Tp=	10488.680	12791.073	16926.270	18607.849
1.25*Tp=	13110.850	15988.842	21157.837	23259.812

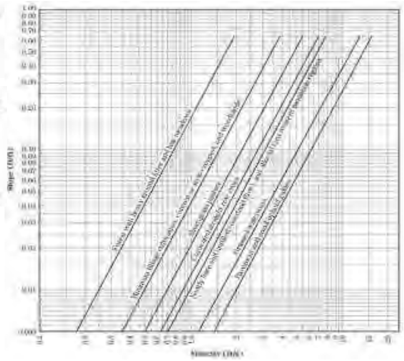
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.101652876	0.096457439	0.082641042	0.092095916	0.5
3600.00	0.37777269	0.367282425	0.321425669	0.359943558	1
5400.00	0.750024545	0.760399335	0.689948931	0.778996106	1.5
7200.00	1.112800985	1.200217628	1.147459298	1.310849607	2
9000.00	1.363182718	1.602166779	1.643364992	1.906762495	2.5
10800.00	1.430136713	1.888957937	2.122828454	2.512122502	3
12600.00	1.294668193	2.005445423	2.53283032	3.071451582	3.5
14400.00	1.043977197	1.929230424	2.828032331	3.533490176	4
16200.00	0.835220084	1.678382335	2.975790866	3.85589489	4.5
18000.00	0.66820673	1.397787111	2.959766694	4.009119032	5
19800.00	0.534589916	1.164102342	2.78173178	3.979120421	5.5
21600.00	0.427691559	0.969485448	2.469388539	3.76864827	6
23400.00	0.342168949	0.807404985	2.150550635	3.401736306	6.5
25200.00	0.273747721	0.672421449	1.872879849	2.999760934	7
27000.00	0.219008227	0.560004723	1.631060841	2.645286068	7.5
28800.00	0.175214622	0.466382044	1.420464569	2.332698684	8
30600.00	0.14017813	0.388411386	1.237059674	2.057049033	8.5
32400.00	0.11214765	0.323476015	1.07733531	1.81397227	9
34200.00	0.089722237	0.269396665	0.938233939	1.599619329	9.5
36000.00	0.071781084	0.224358407	0.817092799	1.410595984	10
37800.00	0.057427502	0.186849732	0.711592935	1.243909094	10.5
39600.00	0.04594411	0.15561183	0.619714805	1.096919211	11
41400.00	0.036756975	0.129596342	0.539699625	0.967298785	11.5
43200.00	0.029406929	0.107930173	0.470015695	0.852995307	12
45000.00	0.023526623	0.089886197	0.409329085	0.752198809	12.5
46800.00	0.018822162	0.074858848	0.356478096	0.663313202	13
48600.00	0.015058421	0.0623438	0.310451022	0.584931003	13.5
50400.00	0.012047289	0.051921042	0.270366786	0.515811049	14
52200.00	0.009638274	0.043240781	0.235458071	0.454858841	14.5
54000.00	0.007710973	0.036011703	0.205056635	0.401109215	15
55800.00	0.006169061	0.029991197	0.178580515	0.35371106	15.5
57600.00	0.004935476	0.02497721	0.155522889	0.311913836	16
59400.00	0.003948562	0.020801471	0.135442375	0.275055694	16.5
61200.00	0.003158994	0.017323841	0.117954579	0.242552993	17
63000.00	0.002527311	0.014427608	0.10272474	0.213891063	17.5
64800.00	0.002021942	0.012015572	0.089461318	0.188616047	18
66600.00	0.001617628	0.010006785	0.077910419	0.166327721	18.5
68400.00	0.001294162	0.008333832	0.067850926	0.146673156	19
70200.00	0.001035377	0.006940565	0.059090277	0.129341126	19.5
72000.00	0.000828339	0.005780228	0.051460769	0.114057182	20
73800.00	0.000662702	0.004813878	0.044816353	0.100579306	20.5
75600.00	0.000530186	0.004009085	0.039029839	0.088694081	21
77400.00	0.000424168	0.003338838	0.033990457	0.078213305	21.5
79200.00	0.00033935	0.002780645	0.029601741	0.068971018	22
81000.00	0.000271493	0.002315771	0.025779678	0.060820871	22.5
82800.00	0.000217204	0.001928616	0.022451106	0.053633808	23
84600.00	0.000173771	0.001606186	0.019552306	0.047296024	23.5
86400.00	0.000139023	0.001337661	0.017027788	0.041707162	24



DA RP1 409 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	350 (ft)
L=	100 (ft)	S=	0.0035 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0035 (ft/ft)		
T_{OL}=	15.92 (min)	T_1=	11.67 (min)

Tc= 27.58 (min)

Intensity:

SEE FIG. 2.1-2.1a	
I (500-YR)=	9.28 (in/hr)
I (100-YR)=	7 (in/hr)
I (10-YR)=	4.7 (in/hr)
I (2-YR)=	3.3 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
9.28	7	4.7	3.3

A RP1 409=	2.82 (Ac)
Q (500-YR)=	**9.16 (cfs)**
Q (100-YR)=	**6.91 (cfs)**
Q (10-YR)=	**4.64 (cfs)**
Q (2-YR)=	**3.26 (cfs)**

DA RP1 409 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =	250591.97	cft
Volume (100-yr) = 1.38*area*43560 =	169518.10	cft
Volume (10-yr)= 0.70*area*43560=	85987.44	cft
Volume (2-yr)= 0.41*area*43560=	50364.072	cft
A= 2.82 Ac		

Tp = time to Qp in seconds

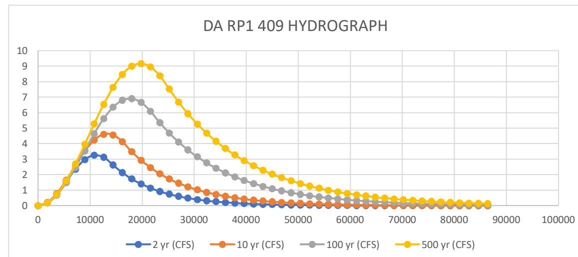
$$T_p = \frac{V}{1.39\,Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p\, e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 409 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	3.26	4.64	6.91	9.16
Tp=	11124.358	13335.374	17651.681	19682.601
1.25*Tp=	13905.447	16669.218	22064.601	24603.252

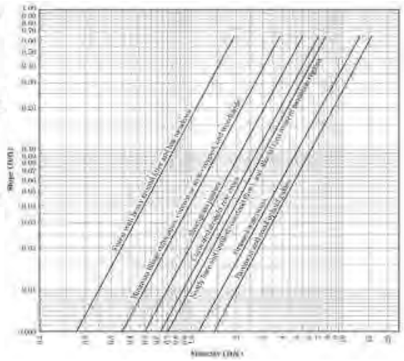
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.205917801	0.20543372	0.175756073	0.187715545	0.5
3600.00	0.771597713	0.785344344	0.685140259	0.73547388	1
5400.00	1.553987864	1.637006488	1.476320243	1.59837159	1.5
7200.00	2.355233649	2.609556695	2.468789621	2.705671178	2
9000.00	2.972712158	3.530717394	3.561559816	3.966599887	2.5
10800.00	3.250272439	4.237314152	4.643436154	5.277790957	3
12600.00	3.117723706	4.6041804	5.604332467	6.531757283	3.5
14400.00	2.627197754	4.566329438	6.346472889	7.625702856	4
16200.00	2.128821545	4.130466189	6.79434103	8.46994964	4.5
18000.00	1.724986695	3.482046558	6.902364131	8.995289077	5
19800.00	1.397758824	2.921645754	6.659550318	9.158655579	5.5
21600.00	1.13260568	2.451435892	6.090607075	8.946656902	6
23400.00	0.917751764	2.056901637	5.351359565	8.376671994	6.5
25200.00	0.743655374	1.725863751	4.686965582	7.525124729	7
27000.00	0.602584857	1.448103124	4.10505893	6.681621258	7.5
28800.00	0.488275245	1.215045311	3.595398456	5.932667463	8
30600.00	0.395650026	1.019495838	3.149014491	5.267665117	8.5
32400.00	0.320595699	0.85541811	2.758050988	4.677203965	9
34200.00	0.259779086	0.717747063	2.415627262	4.152928565	9.5
36000.00	0.21049931	0.602232803	2.115716894	3.687420047	10
37800.00	0.170567848	0.505309416	1.85304167	3.274091136	10.5
39600.00	0.138211335	0.423984885	1.622978688	2.907092935	11
41400.00	0.111992814	0.355748729	1.421479002	2.581232159	11.5
43200.00	0.090747914	0.298494505	1.244996356	2.291897648	12
45000.00	0.073533145	0.25045478	1.090424779	2.034995113	12.5
46800.00	0.059583997	0.210146571	0.955043918	1.8068892	13
48600.00	0.048280986	0.176325568	0.836471166	1.604352051	13.5
50400.00	0.039122142	0.147947719	0.732619724	1.42451762	14
52200.00	0.031700719	0.124137003	0.641661878	1.264841123	14.5
54000.00	0.025687131	0.104158386	0.561996835	1.123063024	15
55800.00	0.020814314	0.087395128	0.492222545	0.997177063	15.5
57600.00	0.016865864	0.073329751	0.431111029	0.885401864	16
59400.00	0.01366643	0.061528056	0.377586766	0.786155729	16.5
61200.00	0.011073925	0.051625726	0.330707768	0.698034254	17
63000.00	0.008973215	0.043317078	0.289648996	0.619790459	17.5
64800.00	0.007271007	0.036345625	0.253687845	0.550317139	18
66600.00	0.005891706	0.030496158	0.222191423	0.488631195	18.5
68400.00	0.004774056	0.025588104	0.194605416	0.43385973	19
70200.00	0.003868424	0.021469953	0.170444328	0.385227687	19.5
72000.00	0.003134588	0.018014577	0.149282942	0.342046889	20
73800.00	0.002539961	0.01511531	0.130748832	0.303706297	20.5
75600.00	0.002058133	0.012682651	0.11451581	0.269663364	21
77400.00	0.001667708	0.010641504	0.100298186	0.239436359	21.5
79200.00	0.001351346	0.00892886	0.087845741	0.212597548	22
81000.00	0.001094997	0.007491849	0.07693932	0.188767143	22.5
82800.00	0.000887278	0.00628611	0.067386977	0.167607927	23
84600.00	0.000718962	0.005274423	0.059020598	0.148820482	23.5
86400.00	0.000582576	0.004425557	0.051692941	0.132138952	24



DA RP1 409A DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	142 (ft)
L=	100 (ft)	S=	0.0026 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0026 (ft/ft)		
T_{OL}=	17.93 (min)	T_1=	4.73 (min)

Tc= 22.66 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	10.46 (in/hr)
I (100-YR)=	7 (in/hr)
I (10-YR)=	5.3 (in/hr)
I (2-YR)=	3.7 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
10.46	7	5.3	3.7

A RP1 409A=	0.69 (Ac)
Q (500-YR)=	**2.53 (cfs)**
Q (100-YR)=	**1.69 (cfs)**
Q (10-YR)=	**1.28 (cfs)**
Q (2-YR)=	**0.89 (cfs)**

DA RP1 409A EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	61315.06	cft
Volume (100-yr) =	1.38*area*43560 =	41477.83	cft
Volume (10-yr)=	0.70*area*43560=	21039.48	cft
Volume (2-yr)=	0.41*area*43560=	12323.124	cft
A=	0.69 Ac		

Tp = time to Qp in seconds

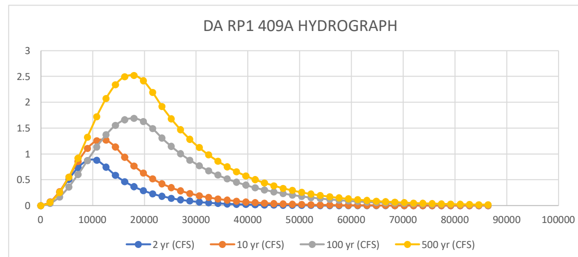
$$\mathbf{Tp} = \frac{\mathbf{V}}{\mathbf{1.39\ Qp}}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 409A Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	0.89	1.28	1.69	2.53
Tp=	9921.724	11825.709	17651.681	17459.365
1.25*Tp=	12402.155	14782.137	22064.601	21824.206

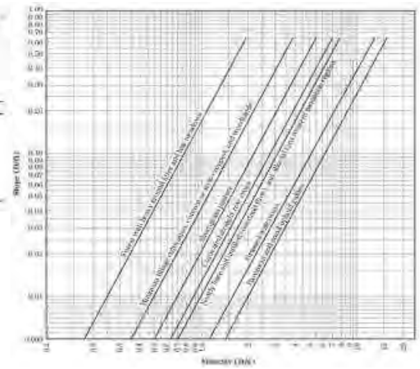
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.070622151	0.071784729	0.043004146	0.065682833	0.5
3600.00	0.260161981	0.271035014	0.167640702	0.255901033	1
5400.00	0.508698007	0.553051834	0.361227293	0.55087397	1.5
7200.00	0.737657576	0.854568654	0.604065546	0.919927665	2
9000.00	0.874656972	1.107944382	0.871445487	1.324684541	2.5
10800.00	0.876384945	1.256337713	1.13615991	1.723054279	3
12600.00	0.744084009	1.266458672	1.371272838	2.073610752	3.5
14400.00	0.587753619	1.136036765	1.552860388	2.339899896	4
16200.00	0.464267895	0.935971418	1.662445146	2.49423053	4.5
18000.00	0.366726246	0.767939514	1.68887633	2.520553946	5
19800.00	0.28967788	0.630073832	1.62946444	2.416132794	5.5
21600.00	0.228817203	0.516958726	1.490254923	2.19182574	6
23400.00	0.180743219	0.424150808	1.309375213	1.920121435	6.5
25200.00	0.142769472	0.348004393	1.146810728	1.679276318	7
27000.00	0.112773925	0.285528297	1.004429313	1.468640942	7.5
28800.00	0.089080375	0.234268331	0.879725154	1.284426031	8
30600.00	0.070364787	0.192210899	0.770503546	1.123317607	8.5
32400.00	0.055581302	0.157703902	0.674842263	0.982417373	9
34200.00	0.043903794	0.129391834	0.591057734	0.859190569	9.5
36000.00	0.034679705	0.106162539	0.51767541	0.751420379	10
37800.00	0.027393576	0.087103523	0.453403813	0.657168043	10.5
39600.00	0.021638247	0.071466111	0.397111807	0.574737989	11
41400.00	0.0170921	0.058636033	0.347808692	0.50264732	11.5
43200.00	0.013501088	0.048109297	0.304626768	0.439599145	12
45000.00	0.010664539	0.039472391	0.266806063	0.384459243	12.5
46800.00	0.008423943	0.032386041	0.233680959	0.336235662	13
48600.00	0.006654092	0.026571881	0.204668477	0.294060873	13.5
50400.00	0.005256082	0.021801517	0.179258017	0.257176161	14
52200.00	0.004151791	0.017887562	0.157002374	0.224917981	14.5
54000.00	0.003279509	0.014676266	0.137509864	0.196706017	15
55800.00	0.002590491	0.012041484	0.120437431	0.172032742	15.5
57600.00	0.002046235	0.009879715	0.105484613	0.150454292	16
59400.00	0.001616325	0.008106042	0.092388251	0.131582474	16.5
61200.00	0.001276739	0.006650791	0.080917858	0.115077791	17
63000.00	0.001008499	0.005456796	0.070871563	0.100643326	17.5
64800.00	0.000796616	0.004477155	0.062072558	0.088019409	18
66600.00	0.000629248	0.003673386	0.054365987	0.076978938	18.5
68400.00	0.000497045	0.003013915	0.047616219	0.067323298	19
70200.00	0.000392617	0.002472837	0.041704463	0.058878787	19.5
72000.00	0.000310129	0.002028896	0.036526677	0.051493489	20
73800.00	0.000244971	0.001664655	0.031991735	0.045034546	20.5
75600.00	0.000193504	0.001365805	0.028019826	0.039385762	21
77400.00	0.000152849	0.001120607	0.024541046	0.034445518	21.5
79200.00	0.000120736	0.000919428	0.021494171	0.03012494	22
81000.00	9.53694E-05	0.000754366	0.018825578	0.026346302	22.5
82800.00	7.53325E-05	0.000618937	0.016488303	0.023041626	23
84600.00	5.95053E-05	0.000507821	0.01444121	0.020151464	23.5
86400.00	4.70034E-05	0.000416654	0.012648273	0.017623821	24



DA RP1 501 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	584 (ft)
L=	100 (ft)	S=	0.0026 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0026 (ft/ft)		
T_{OL}=	17.93 (min)	T_1=	19.47 (min)

Tc= 37.39 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	8.06 (in/hr)
I (100-YR)=	6 (in/hr)
I (10-YR)=	4.1 (in/hr)
I (2-YR)=	2.8 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
8.06	6	4.1	2.8

A=	9.47 (Ac)
Q (500-YR)=	**26.73 (cfs)**
Q (100-YR)=	**19.89 (cfs)**
Q (10-YR)=	**13.59 (cfs)**
Q (2-YR)=	**9.28 (cfs)**

DA RP1 501 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =	841526.93	cft
Volume (100-yr) = 1.38*area*43560 =	569268.22	cft
Volume (10-yr)= 0.70*area*43560=	288759.24	cft
Volume (2-yr)= 0.41*area*43560=	169130.412	cft
A=	9.47 Ac	

Tp = time to Qp in seconds

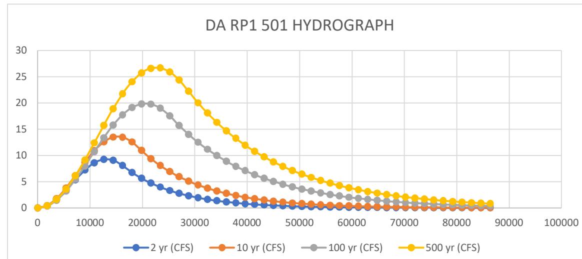
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 501 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	9.28	13.59	19.89	26.73
Tp=	13110.850	15286.892	20593.628	22650.163
1.25*Tp=	16388.563	19108.616	25742.035	28312.703

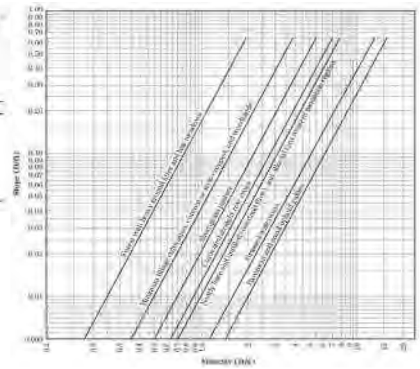
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.424967772	0.459610813	0.372526979	0.414349689	0.5
3600.00	1.622032324	1.776264988	1.462194939	1.631705915	1
5400.00	3.371934619	3.771839497	3.187356429	3.576583307	1.5
7200.00	5.35415569	6.176363851	5.418747265	6.128384632	2
9000.00	7.205624154	8.664542942	7.989172138	9.128878745	2.5
10800.00	8.587217787	10.89976447	10.70603234	12.39201212	3
12600.00	9.245878482	12.57963739	13.36575695	15.71544561	3.5
14400.00	9.060963362	13.47690078	15.76905616	18.89310098	4
16200.00	8.066342206	13.47016871	17.73585375	21.72793937	4.5
18000.00	6.75997542	12.56035195	19.11878008	24.04417916	5
19800.00	5.655005739	10.95036348	19.8142142	25.69819583	5.5
21600.00	4.730651804	9.396152866	19.77004811	26.58742773	6
23400.00	3.957390588	8.062534989	18.98959112	26.6567357	6.5
25200.00	3.310524832	6.918200606	17.53132189	25.90182211	7
27000.00	2.76939423	5.936284269	15.69794626	24.36949736	7.5
28800.00	2.316715564	5.093733607	14.01183755	22.21245827	8
30600.00	1.938030688	4.370768124	12.50683295	20.03223644	8.5
32400.00	1.62124475	3.750414817	11.16348016	18.06601016	9
34200.00	1.356239897	3.2181097	9.964416232	16.2927751	9.5
36000.00	1.134552114	2.76135589	8.894143172	14.69358857	10
37800.00	0.949100894	2.369430212	7.938827617	13.25136717	10.5
39600.00	0.793963095	2.03313146	7.086122037	11.95070429	11
41400.00	0.664183755	1.744564373	6.325005145	10.77770551	11.5
43200.00	0.555617841	1.496954285	5.645639445	9.719840209	12
45000.00	0.464797856	1.284488074	5.039244081	8.765807676	12.5
46800.00	0.388823091	1.102177688	4.497981346	7.905416401	13
48600.00	0.325266984	0.94574304	4.014855376	7.129475205	13.5
50400.00	0.272099608	0.811511526	3.58362173	6.42969505	14
52200.00	0.227622846	0.696331804	3.198706677	5.798600492	14.5
54000.00	0.190416151	0.597499808	2.855135162	5.229449827	15
55800.00	0.159291175	0.512695267	2.548466495	4.716163069	15.5
57600.00	0.133253814	0.439927233	2.274736959	4.253257003	16
59400.00	0.111472459	0.377487336	2.030408578	3.835786605	16.5
61200.00	0.093251433	0.323909678	1.812323389	3.459292225	17
63000.00	0.078008773	0.277936423	1.617662622	3.119751939	17.5
64800.00	0.065257643	0.238488258	1.443910274	2.813538588	18
66600.00	0.054590782	0.204639064	1.288820579	2.537381029	18.5
68400.00	0.045667501	0.175594165	1.150388993	2.288329193	19
70200.00	0.038202799	0.150671676	1.026826276	2.063722568	19.5
72000.00	0.031958259	0.129286493	0.916535369	1.861161783	20
73800.00	0.026734437	0.11093656	0.818090755	1.678482968	20.5
75600.00	0.022364489	0.095191076	0.730220028	1.513734646	21
77400.00	0.018708842	0.081680384	0.651787453	1.365156885	21.5
79200.00	0.015650739	0.070087297	0.581779282	1.231162493	22
81000.00	0.013092506	0.060139644	0.519290655	1.110320067	22.5
82800.00	0.010952436	0.051603884	0.463513901	1.0013387	23
84600.00	0.009162176	0.044279624	0.4137281	0.903054194	23.5
86400.00	0.007664549	0.037994914	0.369289768	0.814416617	24



DA RP1 416 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	509 (ft)
L=	100 (ft)	S=	0.0026 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0026 (ft/ft)		
T_{OL}=	17.93 (min)	T_1=	16.97 (min)

Tc= 34.89 (min)

Intensity:

SEE FIG. 2.1-2.1a

I (500-YR)=	8.28	(in/hr)
I (100-YR)=	6.2	(in/hr)
I (10-YR)=	4.2	(in/hr)
I (2-YR)=	3	(in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
8.28	6.2	4.2	3

A= 3.02 (Ac)

Q (500-YR)=	**8.75**	**(cfs)**
Q (100-YR)=	**6.55**	**(cfs)**
Q (10-YR)=	**4.44**	**(cfs)**
Q (2-YR)=	**3.17**	**(cfs)**

DA RP1 416 EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	268364.45	cft
Volume (100-yr) =	1.38*area*43560 =	181540.66	cft
Volume (10-yr)=	0.70*area*43560=	92085.84	cft
Volume (2-yr)=	0.41*area*43560=	53935.992	cft
	A=	3.02 Ac	

Tp = time to Qp in seconds

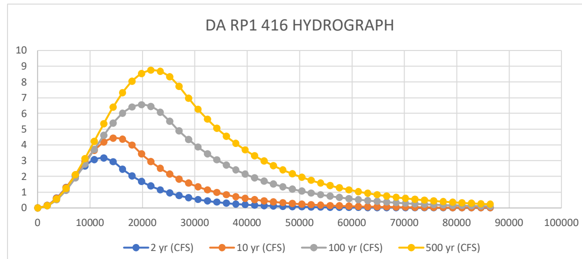
Tp = $\dfrac{V}{1.39\ Qp}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1 - \cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 416 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	3.17	4.44	6.55	8.75
Tp=	12236.793	14922.919	19929.317	22061.971
1.25*Tp=	15295.992	18653.649	24911.647	27577.464

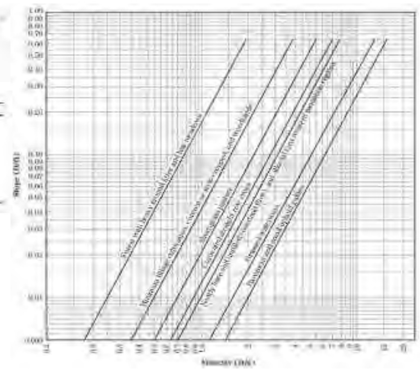
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.16630417	0.15747021	0.131023988	0.142949623	0.5
3600.00	0.630329166	0.6075383	0.513617554	0.562458205	1
5400.00	1.294731195	1.286346707	1.11718349	1.231115183	1.5
7200.00	2.020131098	2.097583225	1.893452734	2.105230711	2
9000.00	2.6543535	2.926146188	2.780344601	3.127690344	2.5
10800.00	3.064350365	3.654475578	3.706931566	4.231686876	3
12600.00	3.164111995	4.179232945	4.599111563	5.345085507	3.5
14400.00	2.93271026	4.425963494	5.38553416	6.395137105	4
16200.00	2.461774026	4.359660051	6.003306675	7.313231616	4.5
18000.00	2.033291018	3.98973003	6.403023901	8.039381019	5
19800.00	1.679387434	3.433327625	6.552719199	8.526138933	5.5
21600.00	1.387082384	2.935049031	6.440420966	8.74170074	6
23400.00	1.145654363	2.509085574	6.075110044	8.671981699	6.5
25200.00	0.946247991	2.144942163	5.496155835	8.321537229	7
27000.00	0.781549208	1.83364686	4.887270408	7.713265267	7.5
28800.00	0.645517001	1.567529822	4.345839667	6.958913235	8
30600.00	0.53316182	1.34003433	3.86439072	6.258612097	8.5
32400.00	0.440362571	1.145555243	3.436278551	5.628784849	9
34200.00	0.363715455	0.979300892	3.055594307	5.062339443	9.5
36000.00	0.30040912	0.837175024	2.717083737	4.552897529	10
37800.00	0.248121541	0.715675872	2.416074679	4.094722637	10.5
39600.00	0.204934854	0.611809884	2.14841257	3.682655576	11
41400.00	0.169265007	0.523017959	1.910403106	3.312056346	11.5
43200.00	0.13980366	0.4471124	1.698761252	2.978751884	12
45000.00	0.115470195	0.382223009	1.510565902	2.678989082	12.5
46800.00	0.09537208	0.326751011	1.343219562	2.409392517	13
48600.00	0.078772134	0.27932966	1.194412497	2.16692645	13.5
50400.00	0.065061485	0.238790566	1.062090856	1.948860639	14
52200.00	0.053737236	0.204134908	0.944428318	1.752739596	14.5
54000.00	0.044384025	0.174508824	0.839800891	1.576354937	15
55800.00	0.036658783	0.14918237	0.746764497	1.417720518	15.5
57600.00	0.030278154	0.127531544	0.664035034	1.275050067	16
59400.00	0.025008103	0.1090229	0.590470661	1.14673707	16.5
61200.00	0.020655329	0.093200414	0.525056035	1.031336684	17
63000.00	0.017060174	0.079674245	0.466888294	0.927549465	17.5
64800.00	0.014090773	0.068111127	0.415164601	0.834206737	18
66600.00	0.01163821	0.058226164	0.369171059	0.750257432	18.5
68400.00	0.009612526	0.049775805	0.328272859	0.674756256	19
70200.00	0.007939422	0.042551846	0.291905521	0.606853042	19.5
72000.00	0.00655753	0.0363763	0.259567097	0.545783179	20
73800.00	0.005416162	0.03109701	0.230811249	0.490859002	20.5
75600.00	0.004473454	0.026583903	0.205241085	0.441462048	21
77400.00	0.003694829	0.022725783	0.182503683	0.397036092	21.5
79200.00	0.003051727	0.019427592	0.162285218	0.357080884	22
81000.00	0.00252056	0.016608067	0.144306633	0.321146516	22.5
82800.00	0.002081845	0.014197739	0.128319785	0.288828356	23
84600.00	0.00171949	0.012137222	0.114104023	0.259762492	23.5
86400.00	0.001420205	0.010375748	0.101463137	0.233621633	24



DA RP1 415A DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	512 (ft)
L=	100 (ft)	S=	0.0026 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0026 (ft/ft)		
T_{OL}=	17.93 (min)	T_1=	17.07 (min)

Tc= 34.99 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	8.27 (in/hr)
I (100-YR)=	6.2 (in/hr)
I (10-YR)=	4.2 (in/hr)
I (2-YR)=	2.9 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
8.27	6.2	4.2	2.9

A= 3.03 (Ac)

Q (500-YR)=	**8.77 (cfs)**
Q (100-YR)=	**6.58 (cfs)**
Q (10-YR)=	**4.45 (cfs)**
Q (2-YR)=	**3.08 (cfs)**

DA RP1 415A EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	269253.07	cft
Volume (100-yr) =	1.38*area*43560 =	182141.78	cft
Volume (10-yr)=	0.70*area*43560=	92390.76	cft
Volume (2-yr)=	0.41*area*43560=	54114.588	cft
A=	3.03 Ac		

Tp = time to Qp in seconds

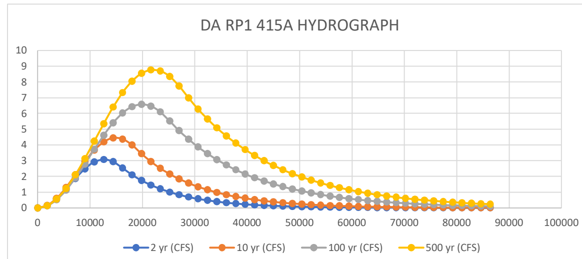
Tp = $\frac{V}{1.39\ Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 415A Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	3.08	4.45	6.58	8.77
Tp=	12658.752	14922.919	19929.317	22084.911
1.25*Tp=	15823.440	18653.649	24911.647	27606.139

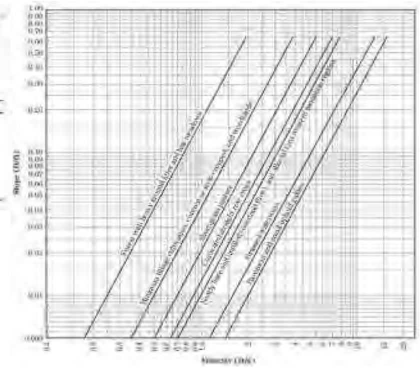
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.150895912	0.157991634	0.131457843	0.142978119	0.5
3600.00	0.57396902	0.609550016	0.515318274	0.56258962	1
5400.00	1.18618757	1.290606133	1.120882773	1.231473832	1.5
7200.00	1.86739838	2.104528865	1.899722445	2.106016315	2
9000.00	2.483907939	2.935835413	2.78955104	3.129192727	2.5
10800.00	2.914720917	3.666576491	3.719206174	4.234287086	3
12600.00	3.075286544	4.193071465	4.61434041	5.34924197	3.5
14400.00	2.934092426	4.440619002	5.403367055	6.401357003	4
16200.00	2.528571314	4.374096012	6.023185173	7.322029266	4.5
18000.00	2.101816765	4.002941057	6.424225967	8.051226537	5
19800.00	1.747086859	3.444696259	6.574416944	8.541401677	5.5
21600.00	1.45222578	2.944767737	6.461746863	8.760592927	6
23400.00	1.207129289	2.517393805	6.095226302	8.694507973	6.5
25200.00	1.003398465	2.152044621	5.514355027	8.34745587	7
27000.00	0.834051903	1.839718538	4.903453423	7.74206607	7.5
28800.00	0.693286467	1.572720318	4.360229864	6.987009284	8
30600.00	0.576278435	1.34447153	3.877186715	6.284573096	8.5
32400.00	0.479018199	1.149348473	3.447656957	5.652756049	9
34200.00	0.398172863	0.982543611	3.065712169	5.084458476	9.5
36000.00	0.330972037	0.839947126	2.726080703	4.573294473	10
37800.00	0.275112896	0.71804566	2.424074926	4.113520139	10.5
39600.00	0.228681269	0.613835744	2.155526519	3.699969034	11
41400.00	0.190086047	0.524749806	1.916728944	3.327994125	11.5
43200.00	0.158004656	0.448592904	1.704386289	2.993415564	12
45000.00	0.131337737	0.383488648	1.515567776	2.692473725	12.5
46800.00	0.109171474	0.327832968	1.347667309	2.421786954	13
48600.00	0.090746278	0.280254593	1.198367506	2.17831357	13.5
50400.00	0.075430757	0.239581263	1.065607713	1.959317685	14
52200.00	0.062700082	0.204810852	0.947555564	1.762338464	14.5
54000.00	0.052118002	0.175086667	0.842581689	1.58516247	15
55800.00	0.04332189	0.149676352	0.749237227	1.425798794	15.5
57600.00	0.036010325	0.127953834	0.666233825	1.282456681	16
59400.00	0.029932755	0.109383903	0.592425862	1.153525411	16.5
61200.00	0.024880914	0.093509025	0.526794631	1.037556194	17
63000.00	0.020681688	0.079938067	0.468434282	0.933245896	17.5
64800.00	0.017191178	0.068336661	0.416539318	0.839422393	18
66600.00	0.014289771	0.058418966	0.37039348	0.755031398	18.5
68400.00	0.011878044	0.049940626	0.329359856	0.679124618	19
70200.00	0.009873351	0.042692746	0.292872095	0.610849095	19.5
72000.00	0.008206996	0.036496751	0.26042659	0.549437625	20
73800.00	0.006821876	0.03119998	0.231575524	0.494200133	20.5
75600.00	0.005670528	0.026671929	0.205920691	0.44451592	21
77400.00	0.004713496	0.022801034	0.183107999	0.399826689	21.5
79200.00	0.003917985	0.019491922	0.162822586	0.359630273	22
81000.00	0.003256735	0.01666306	0.14478447	0.323474987	22.5
82800.00	0.002707086	0.014244752	0.128744685	0.290954558	23
84600.00	0.002250203	0.012177412	0.114481851	0.261703558	23.5
86400.00	0.00187043	0.010410105	0.101799108	0.235393295	24



DA RP1 415 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	485 (ft)
L=	100 (ft)	S=	0.0026 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0026 (ft/ft)		
T_{OL}=	17.93 (min)	T_1=	16.17 (min)

Tc= 34.09 (min)

Intensity:

SEE FIG. 2.1-2.1a	
I (500-YR)=	8.35 (in/hr)
I (100-YR)=	6.2 (in/hr)
I (10-YR)=	4.2 (in/hr)
I (2-YR)=	2.9 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
8.35	6.2	4.2	2.9

A= 0.92 (Ac)

Q (500-YR)=	**2.69 (cfs)**
Q (100-YR)=	**2.00 (cfs)**
Q (10-YR)=	**1.35 (cfs)**
Q (2-YR)=	**0.93 (cfs)**

DA RP1 415 EXISTING CALCULATIONS		
Volume (500-yr) = 2.04*area*43560 =	81753.41	cft
Volume (100-yr) = 1.38*area*43560 =	55303.78	cft
Volume (10-yr)= 0.70*area*43560=	28052.64	cft
Volume (2-yr)= 0.41*area*43560=	16430.832	cft
A=	0.92 Ac	

Tp = time to Qp in seconds

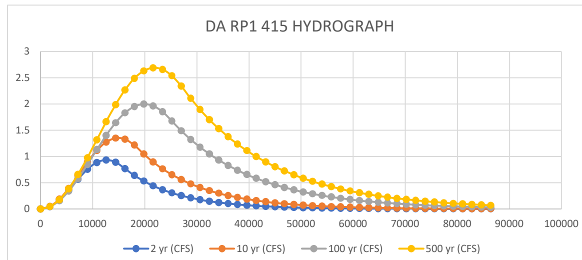
Tp = $\dfrac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 415 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	0.93	1.35	2.00	2.69
Tp=	12658.752	14922.919	19929.317	21880.148
1.25*Tp=	15823.440	18653.649	24911.647	27350.185

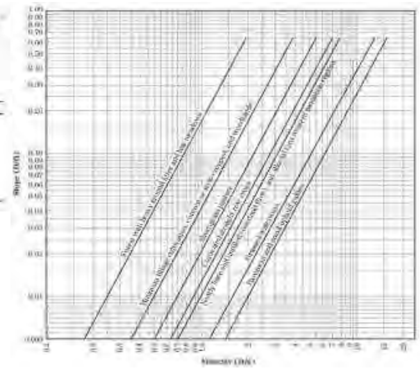
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.04581658	0.047971057	0.039914592	0.044638163	0.5
3600.00	0.174274422	0.185077893	0.156466275	0.175587602	1
5400.00	0.360162563	0.391867209	0.340334043	0.384150123	1.5
7200.00	0.566998848	0.638998863	0.576813416	0.656472153	2
9000.00	0.754189869	0.891408772	0.846992395	0.974464955	2.5
10800.00	0.88499777	1.113283951	1.129263921	1.317006152	3
12600.00	0.93375037	1.273143811	1.401053854	1.661342763	3.5
14400.00	0.890879549	1.34830676	1.6406263	1.984602548	4
16200.00	0.767751026	1.32810836	1.828821901	2.265313275	4.5
18000.00	0.638175387	1.215414446	1.950590063	2.484828996	5
19800.00	0.530468617	1.045914376	1.996192604	2.628568582	5.5
21600.00	0.440939841	0.894120897	1.961982546	2.686984264	6
23400.00	0.366521104	0.764357195	1.850695775	2.656195835	6.5
25200.00	0.30466224	0.65342609	1.674325619	2.538248388	7
27000.00	0.253243482	0.558594408	1.488837343	2.340976473	7.5
28800.00	0.210502822	0.477525641	1.323898177	2.107617582	8
30600.00	0.17497563	0.408222379	1.17723161	1.893850281	8.5
32400.00	0.14544447	0.348977094	1.046813333	1.701764551	9
34200.00	0.120897371	0.298330073	0.930843299	1.529161315	9.5
36000.00	0.10049316	0.255033451	0.827720873	1.374064541	10
37800.00	0.083532628	0.218020464	0.73602275	1.234698619	10.5
39600.00	0.069434577	0.18637917	0.654483299	1.10946803	11
41400.00	0.057715895	0.159329974	0.581977105	0.996939083	11.5
43200.00	0.047975011	0.136206426	0.517503428	0.895823502	12
45000.00	0.039878125	0.116438797	0.460172394	0.804963673	12.5
46800.00	0.033147774	0.099540043	0.409192714	0.723319397	13
48600.00	0.027553325	0.085093804	0.363860761	0.649955976	13.5
50400.00	0.022903068	0.072744146	0.323550857	0.584033517	14
52200.00	0.019037649	0.062186793	0.28770664	0.524797311	14.5
54000.00	0.015824608	0.053161628	0.255833384	0.471569199	15
55800.00	0.013153841	0.045446285	0.227491171	0.423739804	15.5
57600.00	0.010933828	0.038850669	0.202288818	0.380761554	16
59400.00	0.009088493	0.033212274	0.17987848	0.342142418	16.5
61200.00	0.007554601	0.028392179	0.159950845	0.307440268	17
63000.00	0.006279588	0.024271624	0.142230871	0.27625782	17.5
64800.00	0.005219763	0.020749085	0.126473984	0.248238084	18
66600.00	0.004338808	0.017737772	0.112462707	0.223060279	18.5
68400.00	0.003606535	0.01516349	0.100003653	0.200436158	19
70200.00	0.002997849	0.012962814	0.088924861	0.180106713	19.5
72000.00	0.002491893	0.011081522	0.07907342	0.161839203	20
73800.00	0.002071329	0.009473261	0.070313361	0.145424493	20.5
75600.00	0.001721744	0.008098408	0.062523774	0.130674663	21
77400.00	0.00143116	0.006923086	0.055597148	0.11742085	21.5
79200.00	0.001189619	0.005918339	0.049437881	0.105511318	22
81000.00	0.000988844	0.005059411	0.043960961	0.094809723	22.5
82800.00	0.000821954	0.004325139	0.039090796	0.085193549	23
84600.00	0.00068323	0.003697432	0.034760166	0.076552705	23.5
86400.00	0.000567919	0.003160824	0.0309093	0.068788267	24



DA RP1 414 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + ... T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	**T=**	
n=	0.15	D=	892 (ft)
L=	100 (ft)	S=	0.0026 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0026 (ft/ft)		
T_{OL}=	17.93 (min)	T_1=	29.73 (min)

Tc= 47.66 (min)

Intensity:

SEE FIG. 2.1-2.1a	
I (500-YR)=	7.18 (in/hr)
I (100-YR)=	5.2 (in/hr)
I (10-YR)=	3.5 (in/hr)
I (2-YR)=	2.4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
7.18	5.2	3.5	2.4

A=	4.63 (Ac)
Q (500-YR)=	**11.64 (cfs)**
Q (100-YR)=	**8.43 (cfs)**
Q (10-YR)=	**5.67 (cfs)**
Q (2-YR)=	**3.89 (cfs)**

DA RP1 414 EXISTING CALCULATIONS		
Volume (500-yr) = 2.04*area*43560 =	411432.91	cft
Volume (100-yr) = 1.38*area*43560 =	278322.26	cft
Volume (10-yr)= 0.70*area*43560=	141177.96	cft
Volume (2-yr)= 0.41*area*43560=	82689.948	cft
A= 4.63 Ac		

Tp = time to Qp in seconds

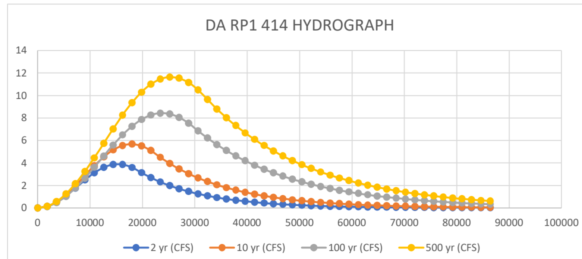
Tp = $\dfrac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 414 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	3.89	5.67	8.43	11.64
Tp=	15295.992	17907.503	23761.878	25434.971
1.25*Tp=	19119.990	22384.378	29702.348	31793.713

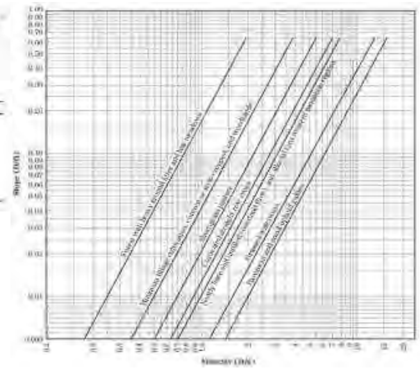
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.131382546	0.140223199	0.118747631	0.143214053	0.5
3600.00	0.50777705	0.547025793	0.46829696	0.565806387	1
5400.00	1.078323007	1.180178108	1.028944591	1.246974565	1.5
7200.00	1.765925095	1.977066212	1.769087945	2.153187548	2
9000.00	2.477670724	2.858883952	2.647006625	3.239836292	2.5
10800.00	3.117384892	3.738426283	3.613214118	4.453429661	3
12600.00	3.598625888	4.528713178	4.613247248	5.734227572	3.5
14400.00	3.85636577	5.151591295	5.590736154	7.019181742	4
16200.00	3.855777302	5.54546274	6.490581749	8.245039296	4.5
18000.00	3.596940001	5.671376632	7.262061544	9.351456435	5
19800.00	3.137053669	5.51688105	7.861688772	10.28396891	5.5
21600.00	2.692049458	5.097254426	8.255663648	10.99667306	6
23400.00	2.310170959	4.50254468	8.421778601	11.45448547	6.5
25200.00	1.982463526	3.951009966	8.350670063	11.63486996	7
27000.00	1.701242765	3.467034946	8.046346281	11.52894696	7.5
28800.00	1.459914349	3.042343962	7.525961376	11.14193063	8
30600.00	1.252819379	2.669675077	6.856229426	10.49287213	8.5
32400.00	1.075101699	2.342655894	6.213228084	9.641761251	9
34200.00	0.922594017	2.0556946	5.630529672	8.79430607	9.5
36000.00	0.791720189	1.803884343	5.102478769	8.02133731	10
37800.00	0.679411362	1.582919332	4.62395034	7.316308043	10.5
39600.00	0.583034012	1.389021209	4.190299993	6.673246782	11
41400.00	0.500328194	1.218874443	3.797318902	6.086706894	11.5
43200.00	0.429354543	1.069569635	3.441192961	5.551720479	12
45000.00	0.368448801	0.938553771	3.118465766	5.063756282	12.5
46800.00	0.316182794	0.823586564	2.826005064	4.618681323	13
48600.00	0.27133094	0.72270215	2.560972356	4.212725885	13.5
50400.00	0.232841509	0.634175472	2.320795349	3.842451587	14
52200.00	0.199811965	0.556492781	2.103142988	3.504722263	14.5
54000.00	0.1714678	0.488325754	1.905902832	3.196677399	15
55800.00	0.147144374	0.428508778	1.727160552	2.9157079	15.5
57600.00	0.126271328	0.376019023	1.565181352	2.659434	16
59400.00	0.108359211	0.329958949	1.418393133	2.425685096	16.5
61200.00	0.092988003	0.289540957	1.285371229	2.212481372	17
63000.00	0.079797265	0.254073926	1.164824589	2.018017026	17.5
64800.00	0.068477688	0.222951394	1.055583236	1.840644973	18
66600.00	0.058763841	0.195641186	0.956586923	1.678862901	18.5
68400.00	0.050427944	0.171676314	0.866874832	1.531300539	19
70200.00	0.043274529	0.150646996	0.785576258	1.396708057	19.5
72000.00	0.037135855	0.132193642	0.711902149	1.273945478	20
73800.00	0.031867979	0.116000714	0.645137459	1.161973021	20.5
75600.00	0.027347372	0.101791323	0.584634196	1.059842297	21
77400.00	0.023468033	0.089322496	0.529805142	0.966688275	21.5
79200.00	0.020138994	0.078381026	0.48011815	0.881721953	22
81000.00	0.017282193	0.068779821	0.435090979	0.804223681	22.5
82800.00	0.014830642	0.060354705	0.394286614	0.73353706	23
84600.00	0.012726853	0.052961616	0.357309027	0.669063385	23.5
86400.00	0.010921496	0.046474136	0.323799328	0.610256574	24



DA RP1 412 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	**T=**	
n=	0.15	D=	253 (ft)
L=	100 (ft)	S=	0.0026 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0026 (ft/ft)		
T_{OL}=	17.93 (min)	T_1=	8.43 (min)

Tc= 26.36 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	9.57 (in/hr)
I (100-YR)=	7.3 (in/hr)
I (10-YR)=	4.9 (in/hr)
I (2-YR)=	3.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
9.57	7.3	4.9	3.5

A= 1.98 (Ac)

Q (500-YR)=	**6.63 (cfs)**
Q (100-YR)=	**5.06 (cfs)**
Q (10-YR)=	**3.40 (cfs)**
Q (2-YR)=	**2.43 (cfs)**

DA RP1 412 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		175947.55	cft
Volume (100-yr) = 1.38*area*43560 =		119023.34	cft
Volume (10-yr)= 0.70*area*43560=		60374.16	cft
Volume (2-yr)= 0.41*area*43560=		35362.008	cft
A=	1.98 Ac		

Tp = time to Qp in seconds

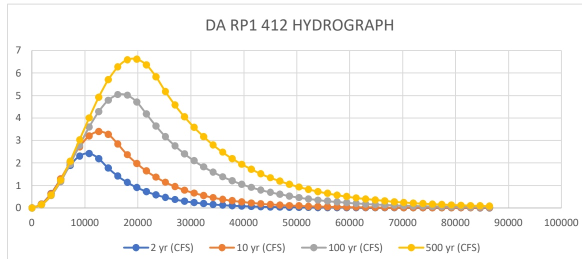
Tp = $\frac{V}{1.39\,Qp}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 412 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	2.43	3.40	5.06	6.63
Tp=	10488.680	12791.073	16926.270	19078.774
1.25*Tp=	13110.850	15988.842	21157.837	23848.468

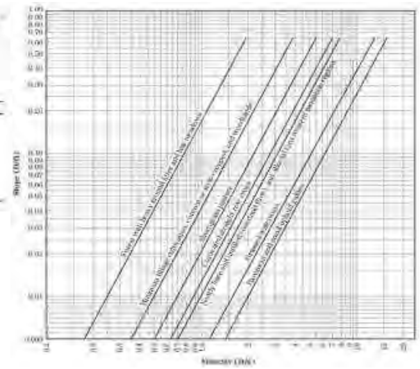
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.172027944	0.163235667	0.13985407	0.144650531	0.5
3600.00	0.63930763	0.621554873	0.543951132	0.565987274	1
5400.00	1.269272307	1.286829644	1.167605883	1.227265808	1.5
7200.00	1.883201667	2.031137524	1.941854197	2.070816593	2
9000.00	2.3069246	2.711359164	2.781079216	3.02307428	2.5
10800.00	2.420231361	3.196698047	3.592478922	4.000993281	3
12600.00	2.190976941	3.393830716	4.286328234	4.919290111	3.5
14400.00	1.76673064	3.264851487	4.785900867	5.697880879	4
16200.00	1.413449373	2.840339336	5.035953772	6.268865346	4.5
18000.00	1.13081139	2.36548588	5.008835945	6.582448438	5
19800.00	0.904690627	1.970019349	4.70754609	6.611282841	5.5
21600.00	0.723785715	1.640667681	4.17896522	6.352853931	6
23400.00	0.579055144	1.366377666	3.639393382	5.829699073	6.5
25200.00	0.463265374	1.13794399	3.169488975	5.171116863	7
27000.00	0.370629307	0.9477003	2.760256808	4.574234238	7.5
28800.00	0.296517052	0.78926192	2.403863118	4.046247535	8
30600.00	0.237224527	0.657311577	2.093485603	3.579204357	8.5
32400.00	0.189788331	0.547420948	1.823182833	3.166070222	9
34200.00	0.151837632	0.455902049	1.587780512	2.800622611	9.5
36000.00	0.12147568	0.379683458	1.382772429	2.477357246	10
37800.00	0.097185004	0.316207239	1.204234197	2.191405191	10.5
39600.00	0.077751571	0.263343097	1.048748132	1.938459508	11
41400.00	0.062204111	0.219316886	0.913337827	1.714710397	11.5
43200.00	0.049765573	0.182651062	0.795411177	1.516787807	12
45000.00	0.039814285	0.152115102	0.69271076	1.341710679	12.5
46800.00	0.03185289	0.126684204	0.603270624	1.186842048	13
48600.00	0.025483481	0.105504892	0.525378652	1.049849321	13.5
50400.00	0.020387721	0.087866379	0.457543791	0.928669152	14
52200.00	0.016310925	0.073176707	0.398467505	0.821476354	14.5
54000.00	0.013049339	0.060942883	0.347018921	0.72665642	15
55800.00	0.01043995	0.050754333	0.302213179	0.642781195	15.5
57600.00	0.008352343	0.042269125	0.263192582	0.568587372	16
59400.00	0.006682181	0.03520249	0.229210173	0.502957464	16.5
61200.00	0.00534599	0.029317269	0.199615441	0.44490297	17
63000.00	0.004276989	0.024415951	0.173841867	0.393549489	17.5
64800.00	0.003421748	0.020334045	0.151396077	0.348123548	18
66600.00	0.002737524	0.01693456	0.131848401	0.307940952	18.5
68400.00	0.00219012	0.014103407	0.114824645	0.272396483	19
70200.00	0.001752176	0.011745572	0.09999893	0.240954779	19.5
72000.00	0.001401805	0.009781925	0.087087455	0.213142272	20
73800.00	0.001121496	0.008146563	0.075843059	0.188540059	20.5
75600.00	0.000897238	0.006784605	0.066050497	0.166777587	21
77400.00	0.000717823	0.005650342	0.057522312	0.147527076	21.5
79200.00	0.000574285	0.004705706	0.050095253	0.130498579	22
81000.00	0.000459449	0.003918997	0.043627148	0.115435617	22.5
82800.00	0.000367576	0.003263812	0.037994179	0.102111317	23
84600.00	0.000294074	0.002718161	0.033088518	0.09032499	23.5
86400.00	0.00023527	0.002263734	0.028816256	0.079899116	24



DA RP1 411 BOX DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1355 (ft)
L=	100 (ft)	S=	0.0026 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0026 (ft/ft)		
T_{OL}=	17.93 (min)	T_1=	45.17 (min)

Tc= 63.09 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	6.05 (in/hr)
I (100-YR)=	4.7 (in/hr)
I (10-YR)=	3.1 (in/hr)
I (2-YR)=	2.1 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
6.05	4.7	3.1	2.1

A= 10.42 (Ac)

Q (500-YR)=	**22.06 (cfs)**
Q (100-YR)=	**17.14 (cfs)**
Q (10-YR)=	**11.31 (cfs)**
Q (2-YR)=	**7.66 (cfs)**

DA RP1 411 BOX EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		925946.21	cft
Volume (100-yr) = 1.38*area*43560 =		626375.38	cft
Volume (10-yr)= 0.70*area*43560=		317726.64	cft
Volume (2-yr)= 0.41*area*43560=		186097.032	cft
A=	10.42 Ac		

Tp = time to Qp in seconds

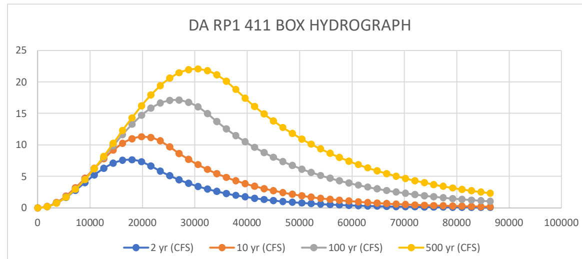
Tp = $\dfrac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 411 BOX Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	7.66	11.31	17.14	22.06
Tp=	17481.133	20218.148	26289.738	30201.932
1.25*Tp=	21851.417	25272.685	32862.172	37752.415

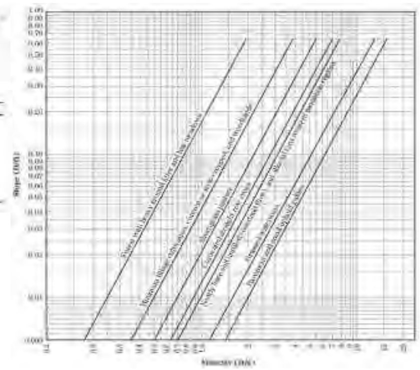
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.198614166	0.219667832	0.197501668	0.19274469	0.5
3600.00	0.773853906	0.861598893	0.78090402	0.764241417	1
5400.00	1.66604812	1.875902738	1.723318635	1.694513657	1.5
7200.00	2.782647206	3.183748359	2.98131058	2.951043977	2
9000.00	4.007823468	4.683490883	4.496900284	4.489910678	2.5
10800.00	5.214486217	6.25857134	6.200235757	6.25732306	3
12600.00	6.277465221	7.786575546	8.012811997	8.191501669	3.5
14400.00	7.086494932	9.14874805	9.851089207	10.22483778	4
16200.00	7.557652615	10.23922173	11.63034306	12.28625663	4.5
18000.00	7.642063872	10.97324572	13.26856954	14.30370186	5
19800.00	7.330972504	11.29377216	14.69026447	16.20665417	5.5
21600.00	6.656648822	11.17588996	15.82990336	17.92859634	6
23400.00	5.833136466	10.62876085	16.63496143	19.40933831	6.5
25200.00	5.102324631	9.694907319	17.06833435	20.59712113	7
27000.00	4.463073476	8.646177553	17.11004841	21.45042614	7.5
28800.00	3.903911705	7.701227398	16.75818106	21.93942629	8
30600.00	3.41480522	6.859551875	16.0289495	22.04702868	8.5
32400.00	2.986977055	6.109863985	14.95596327	21.76947212	9
34200.00	2.61274988	5.442110301	13.71085135	21.11645852	9.5
36000.00	2.285408227	4.847336144	12.54320988	20.1108138	10
37800.00	1.999077984	4.317565501	11.47500692	18.81082714	10.5
39600.00	1.748620986	3.845694069	10.4977741	17.40842228	11
41400.00	1.529542808	3.425393979	9.603764236	16.11057101	11.5
43200.00	1.337912114	3.051028943	8.785889905	14.90947853	12
45000.00	1.170290113	2.717578669	8.037667266	13.79793117	12.5
46800.00	1.023668845	2.420571539	7.353164651	12.76925309	13
48600.00	0.895417207	2.156024641	6.726955545	11.81726611	13.5
50400.00	0.783233737	1.920390362	6.154075565	10.93625267	14
52200.00	0.685105314	1.710508809	5.629983104	10.1209215	14.5
54000.00	0.599271033	1.52356544	5.150523327	9.366375756	15
55800.00	0.524190609	1.357053315	4.711895231	8.668083717	15.5
57600.00	0.458516729	1.208739481	4.310621515	8.021851491	16
59400.00	0.401070884	1.076635028	3.943521012	7.423797859	16.5
61200.00	0.350822214	0.958968414	3.607683467	6.870330959	17
63000.00	0.306869012	0.854161712	3.300446468	6.358126715	17.5
64800.00	0.268422542	0.760809449	3.01937434	5.884108868	18
66600.00	0.234792887	0.677659757	2.762238835	5.445430505	18.5
68400.00	0.205376565	0.603597584	2.527001466	5.039456959	19
70200.00	0.179645704	0.537629747	2.311797345	4.663749987	19.5
72000.00	0.157138566	0.478871607	2.114920406	4.316053122	20
73800.00	0.137451263	0.426535208	1.934809872	3.994278124	20.5
75600.00	0.120230509	0.379918711	1.770037883	3.696492439	21
77400.00	0.105167278	0.338396982	1.619298182	3.420907591	21.5
79200.00	0.091991264	0.301413207	1.481395753	3.165868438	22
81000.00	0.080466023	0.26847143	1.35523735	2.929843236	22.5
82800.00	0.070384736	0.239129895	1.23982283	2.711414437	23
84600.00	0.061566496	0.212995129	1.134237224	2.509270175	23.5
86400.00	0.05385306	0.189716659	1.037643484	2.322196387	24



DA RP1 707A DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	920 (ft)
L=	100 (ft)	S=	0.0026 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0026 (ft/ft)		
T_{OL}=	17.93 (min)	T_1=	30.67 (min)

Tc= 48.59 (min)

Intensity:

SEE FIG. 2.1-2.1a	
I (500-YR)=	7.10 (in/hr)
I (100-YR)=	5.2 (in/hr)
I (10-YR)=	3.5 (in/hr)
I (2-YR)=	2.4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
7.10	5.2	3.5	2.4

A= 6.39 (Ac)

Q (500-YR)=	**15.88 (cfs)**
Q (100-YR)=	**11.63 (cfs)**
Q (10-YR)=	**7.83 (cfs)**
Q (2-YR)=	**5.37 (cfs)**

DA RP1 707A EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =		567830.74	cft
Volume (100-yr) =	1.38*area*43560 =		384120.79	cft
Volume (10-yr)=	0.70*area*43560=		194843.88	cft
Volume (2-yr)=	0.41*area*43560=		114122.844	cft
	A=	#REF! Ac		from DA#15D
	A=	6.39 Ac		from DA RP1 707A

Tp = time to Qp in seconds

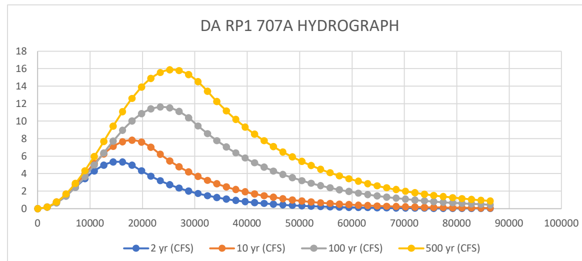
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 707A Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	5.37	7.83	11.63	15.88
Tp=	15295.992	17907.503	23761.878	25722.475
1.25*Tp=	19119.990	22384.378	29702.348	32153.093

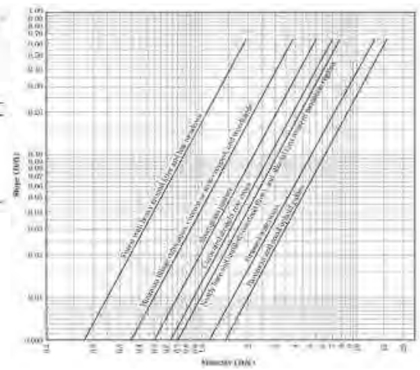
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.18132494	0.193526187	0.16388712	0.19111764	0.5
3600.00	0.700798132	0.754966483	0.646310491	0.755270935	1
5400.00	1.488225489	1.628798728	1.420076877	1.665303838	1.5
7200.00	2.437205477	2.72860758	2.441570619	2.877411063	2
9000.00	3.41950668	3.945630336	3.653212167	4.333246694	2.5
10800.00	4.302395132	5.159512731	4.986703718	5.962732722	3
12600.00	4.96657007	6.25021106	6.366879031	7.68743231	3.5
14400.00	5.322284508	7.109863579	7.715940394	9.424325431	4
16200.00	5.321472346	7.653457215	8.957843926	11.08980511	4.5
18000.00	4.964243328	7.827234704	10.02258602	12.60370192	5
19800.00	4.329540593	7.614010779	10.8501493	13.89314302	5.5
21600.00	3.715377113	7.034871659	11.39388568	14.89605997	6
23400.00	3.188335297	6.214095141	11.62314584	15.56417641	6.5
25200.00	2.736056572	5.452905763	11.52500685	15.86533193	7
27000.00	2.347935479	4.784957517	11.10500059	15.78503013	7.5
28800.00	2.014870991	4.198828924	10.38680198	15.32713641	8
30600.00	1.729053096	3.684497568	9.462485104	14.51369193	8.5
32400.00	1.483779667	3.233168718	8.575059925	13.40396204	9
34200.00	1.273299302	2.837124945	7.770860606	12.23840929	9.5
36000.00	1.092676459	2.489594158	7.04208193	11.17420816	10
37800.00	0.937675724	2.184633808	6.381650686	10.20254552	10.5
39600.00	0.804662492	1.917029271	5.783157009	9.315374632	11
41400.00	0.690517745	1.682204685	5.240792177	8.505348427	11.5
43200.00	0.592564909	1.476144702	4.74929223	7.765758729	12
45000.00	0.508507093	1.295325831	4.303886878	7.090480673	12.5
46800.00	0.43637323	1.136656187	3.900253209	6.473921986	13
48600.00	0.374471859	0.997422622	3.534473727	5.910976676	13.5
50400.00	0.321351456	0.875244334	3.202998333	5.396982747	14
52200.00	0.275766405	0.768032154	2.902609869	4.927683591	14.5
54000.00	0.236647785	0.673952822	2.630392893	4.499192736	15
55800.00	0.203078305	0.591397644	2.383705384	4.107961663	15.5
57600.00	0.174270796	0.51895498	2.160153098	3.750750415	16
59400.00	0.149549753	0.455386108	1.957566332	3.424600771	16.5
61200.00	0.128335494	0.399604042	1.773978867	3.126811742	17
63000.00	0.110130566	0.350654944	1.607608882	2.854917207	17.5
64800.00	0.094508084	0.307701816	1.456841659	2.60666549	18
66600.00	0.081101716	0.27001019	1.320213917	2.380000708	18.5
68400.00	0.069597098	0.236935561	1.196399607	2.173045753	19
70200.00	0.059724458	0.207912376	1.084197038	1.984086739	19.5
72000.00	0.051252293	0.182444357	0.982517221	1.811558814	20
73800.00	0.04398194	0.160096018	0.890373296	1.6540332	20.5
75600.00	0.037742918	0.140485216	0.806870953	1.510205358	21
77400.00	0.032388927	0.12327662	0.731199753	1.378884186	21.5
79200.00	0.027794422	0.108175973	0.662625265	1.258982156	22
81000.00	0.023851666	0.094925066	0.600481934	1.149506308	22.5
82800.00	0.020468208	0.083297314	0.544166623	1.049550024	23
84600.00	0.017564707	0.073093893	0.493132761	0.958285522	23.5
86400.00	0.015073079	0.06414033	0.446885034	0.874957002	24



DA RP1 702 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	329 (ft)
L=	100 (ft)	S=	0.0026 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0026 (ft/ft)		
T_{OL}=	17.93 (min)	T_1=	10.97 (min)

Tc= 28.89 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	8.97 (in/hr)
I (100-YR)=	6.9 (in/hr)
I (10-YR)=	4.7 (in/hr)
I (2-YR)=	3.3 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
8.97	6.9	4.7	3.3

A= 2.19 (Ac)

Q (500-YR)=	**6.87 (cfs)**
Q (100-YR)=	**5.29 (cfs)**
Q (10-YR)=	**3.60 (cfs)**
Q (2-YR)=	**2.53 (cfs)**

DA RP1 702 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		194608.66	cft
Volume (100-yr) = 1.38*area*43560 =		131647.03	cft
Volume (10-yr)= 0.70*area*43560=		66777.48	cft
Volume (2-yr)= 0.41*area*43560=		39112.524	cft
A=	2.19 Ac		

Tp = time to Qp in seconds

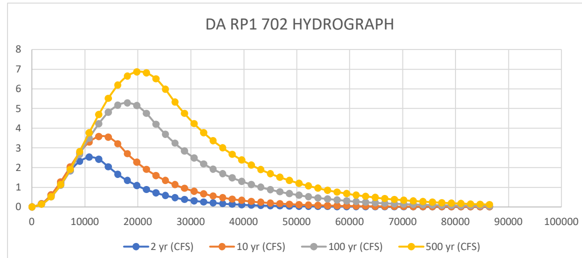
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left[\frac{Q_p}{2}\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right]\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i \ge 1.25T_p$$

DA RP1 702 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	2.53	3.60	5.29	6.87
Tp=	11124.358	13335.374	17907.503	20372.567
1.25*Tp=	13905.447	16669.218	22384.378	25465.709

ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.159914888	0.159538953	0.130756727	0.131523896	0.5
3600.00	0.5992195	0.609895076	0.510096066	0.516027014	1
5400.00	1.206820363	1.271292273	1.100504251	1.124074432	1.5
7200.00	1.82906443	2.026570625	1.843594417	1.909118204	2
9000.00	2.308595612	2.741940104	2.665880617	2.81106076	2.5
10800.00	2.524147745	3.29068014	3.486045021	3.760855558	3
12600.00	2.421210963	3.575586906	4.222979626	4.685792815	3.5
14400.00	2.040270596	3.546192011	4.803807223	5.515065674	4
16200.00	1.653233753	3.207702466	5.171088396	6.185190686	4.5
18000.00	1.339617327	2.70414254	5.288501838	6.644867673	5
19800.00	1.085493554	2.26893766	5.144436257	6.858906915	5.5
21600.00	0.879576751	1.903774682	4.753138638	6.810923033	6
23400.00	0.712722115	1.597381058	4.198577763	6.504589345	6.5
25200.00	0.577519599	1.340298445	3.684277173	5.973465385	7
27000.00	0.467964836	1.124590724	3.23297532	5.325288471	7.5
28800.00	0.379192477	0.943599018	2.836955237	4.747444821	8
30600.00	0.307260127	0.79173613	2.489445238	4.232302615	8.5
32400.00	0.248973256	0.664314064	2.18450313	3.773058162	9
34200.00	0.201743333	0.557399315	1.916914601	3.363646031	9.5
36000.00	0.163472869	0.467691432	1.682104061	2.998658948	10
37800.00	0.132462265	0.392421142	1.476056404	2.673276381	10.5
39600.00	0.107334335	0.329264857	1.295248349	2.383200868	11
41400.00	0.086973143	0.276272949	1.136588196	2.124601264	11.5
43200.00	0.070474443	0.231809562	0.99736296	1.894062138	12
45000.00	0.057105528	0.194502116	0.87519198	1.688538665	12.5
46800.00	0.046272679	0.163198933	0.767986212	1.505316413	13
48600.00	0.037494808	0.136933686	0.673912508	1.341975491	13.5
50400.00	0.030382089	0.114895569	0.591362269	1.196358587	14
52200.00	0.024618643	0.096404269	0.518923938	1.066542481	14.5
54000.00	0.019948517	0.080888959	0.455358868	0.950812638	15
55800.00	0.016164308	0.067870685	0.399580139	0.847640566	15.5
57600.00	0.013097958	0.056947572	0.350633969	0.755663629	16
59400.00	0.010613291	0.047782426	0.307683411	0.673667051	16.5
61200.00	0.008599963	0.040092319	0.269994039	0.60056787	17
63000.00	0.006968561	0.033639859	0.236921388	0.535400634	17.5
64800.00	0.005646633	0.028225858	0.20789994	0.477304653	18
66600.00	0.004575474	0.023683186	0.182433444	0.42551263	18.5
68400.00	0.003707512	0.019871613	0.160086442	0.379340526	19
70200.00	0.003004201	0.016673474	0.140476813	0.338178528	19.5
72000.00	0.002434308	0.013990044	0.123269246	0.301482992	20
73800.00	0.001972523	0.011738485	0.108169503	0.268769265	20.5
75600.00	0.001598338	0.009849293	0.094919387	0.239605284	21
77400.00	0.001295135	0.008264147	0.083292332	0.213605868	21.5
79200.00	0.001049449	0.006934115	0.073089521	0.190427631	22
81000.00	0.00085037	0.005818138	0.064136493	0.169764451	22.5
82800.00	0.000689056	0.004881766	0.056280157	0.151343419	23
84600.00	0.000558343	0.004096094	0.049386176	0.134921241	23.5
86400.00	0.000452426	0.003436869	0.043336665	0.120281023	24

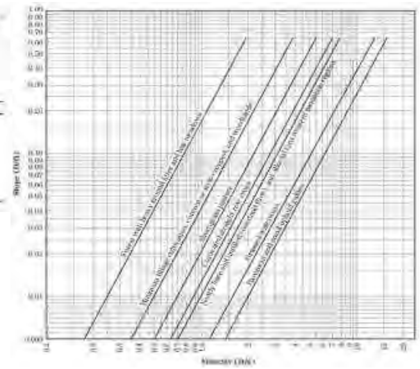


DA RP1 705 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$

T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	**T=**	
n=	0.15	D=	396 (ft)
L=	100 (ft)	S=	0.0026 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0026 (ft/ft)		
T_{OL}=	17.93 (min)	T_1=	13.20 (min)



Tc= 31.13 (min)

Intensity:

SEE FIG. 2.1-2.1a	
I (500-YR)=	8.60 (in/hr)
I (100-YR)=	6.7 (in/hr)
I (10-YR)=	4.6 (in/hr)
I (2-YR)=	3.2 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
8.60	6.7	4.6	3.2

A= 2.08 (Ac)

Q (500-YR)=	**6.26 (cfs)**
Q (100-YR)=	**4.88 (cfs)**
Q (10-YR)=	**3.35 (cfs)**
Q (2-YR)=	**2.33 (cfs)**

DA RP1 705 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		184833.79	cft
Volume (100-yr) = 1.38*area*43560 =		125034.62	cft
Volume (10-yr)= 0.70*area*43560=		63423.36	cft
Volume (2-yr)= 0.41*area*43560=		37147.968	cft
A=	2.08 Ac		

Tp = time to Qp in seconds

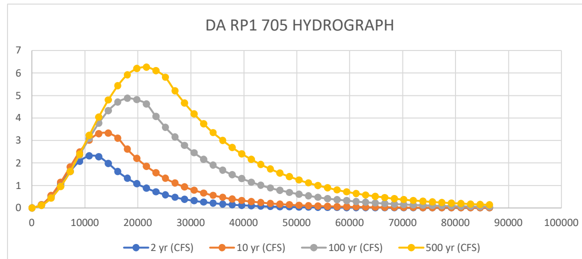
Tp = $\dfrac{V}{1.39\ Qp}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 705 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	2.33	3.35	4.88	6.26
Tp=	11471.994	13625.274	18442.055	21231.277
1.25*Tp=	14339.992	17031.592	23052.569	26539.097

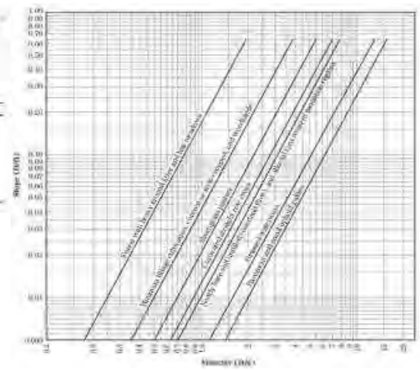
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.138668166	0.142147972	0.113754062	0.110421602	0.5
3600.00	0.521656076	0.544456621	0.444404481	0.433899275	1
5400.00	1.057775147	1.138618065	0.961105902	0.94762078	1.5
7200.00	1.619376602	1.823749786	1.615656844	1.615357537	2
9000.00	2.072744362	2.483523445	2.34699627	2.390019526	2.5
10800.00	2.309932556	3.005916243	3.086899782	3.216976164	3
12600.00	2.274467195	3.302231241	3.766344066	4.037908956	3.5
14400.00	1.977376343	3.322157192	4.321945863	4.794924217	4
16200.00	1.612516306	3.098194108	4.701874795	5.434635845	4.5
18000.00	1.314979238	2.609294104	4.870688466	5.911930203	5
19800.00	1.07234289	2.197543306	4.812638769	6.19314762	5.5
21600.00	0.874477133	1.850767444	4.617810822	6.258456128	6
23400.00	0.713121021	1.55871337	4.067533664	6.103250052	6.5
25200.00	0.581537894	1.312745898	3.582829775	5.80979686	7
27000.00	0.474234123	1.105592488	3.155885177	5.203496753	7.5
28800.00	0.386729749	0.931128218	2.779817037	4.660469051	8
30600.00	0.315371441	0.784194691	2.44856271	4.174110758	8.5
32400.00	0.257179971	0.66044751	2.156781998	3.738507955	9
34200.00	0.209725831	0.556227832	1.899771065	3.348363888	9.5
36000.00	0.171027798	0.468454187	1.673386602	2.998934565	10
37800.00	0.13947022	0.394531365	1.473979035	2.685971067	10.5
39600.00	0.113735559	0.332273682	1.298333686	2.405667886	11
41400.00	0.092749387	0.279840362	1.143618952	2.154616647	11.5
43200.00	0.075635525	0.235681103	1.007340657	1.929764671	12
45000.00	0.061679467	0.198490247	0.887301839	1.728377849	12.5
46800.00	0.050298541	0.167168167	0.781567336	1.548007399	13
48600.00	0.041017593	0.140788762	0.688432587	1.38646009	13.5
50400.00	0.03344914	0.118572069	0.606396154	1.241771571	14
52200.00	0.027277196	0.099861206	0.534135517	1.11218249	14.5
54000.00	0.022244083	0.084102948	0.470485752	0.996117096	15
55800.00	0.018139666	0.070831368	0.414420752	0.892164081	15.5
57600.00	0.014792585	0.059654064	0.365036686	0.799059418	16
59400.00	0.012063098	0.050240557	0.321537427	0.715670993	16.5
61200.00	0.009837248	0.042312516	0.283221717	0.640984836	17
63000.00	0.008022106	0.035635533	0.249471863	0.574092794	17.5
64800.00	0.006541889	0.030012189	0.219743779	0.514181487	18
66600.00	0.005334798	0.025276217	0.193558215	0.460522418	18.5
68400.00	0.004350436	0.02128759	0.170493029	0.412463115	19
70200.00	0.003547705	0.017928374	0.150176385	0.369419195	19.5
72000.00	0.002893093	0.015099248	0.132280755	0.330867262	20
73800.00	0.002359267	0.012716562	0.116517641	0.296338541	20.5
75600.00	0.001923942	0.010709868	0.102632924	0.265413176	21
77400.00	0.001568941	0.009019834	0.090402766	0.237715127	21.5
79200.00	0.001279444	0.00759649	0.079630004	0.212907597	22
81000.00	0.001043365	0.006397751	0.070140968	0.190688938	22.5
82800.00	0.000850846	0.005388176	0.061782685	0.170788978	23
84600.00	0.00069385	0.004537913	0.054420408	0.152965743	23.5
86400.00	0.000565823	0.003821823	0.047935451	0.137002509	24



DA RP1 707 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	242 (ft)
L=	100 (ft)	S=	0.0026 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0026 (ft/ft)		
T_{OL}=	17.93 (min)	T_1=	8.07 (min)

Tc= 25.99 (min)

Intensity:

SEE FIG. 2.1-2.1a	
I (500-YR)=	9.66 (in/hr)
I (100-YR)=	7.3 (in/hr)
I (10-YR)=	4.9 (in/hr)
I (2-YR)=	3.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
9.66	7.3	4.9	3.5

A= 2.16 (Ac)

Q (500-YR)=	**7.30 (cfs)**
Q (100-YR)=	**5.52 (cfs)**
Q (10-YR)=	**3.70 (cfs)**
Q (2-YR)=	**2.65 (cfs)**

DA RP1 707 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		191942.78	cft
Volume (100-yr) = 1.38*area*43560 =		129843.65	cft
Volume (10-yr)= 0.70*area*43560=		65862.72	cft
Volume (2-yr)= 0.41*area*43560=		38576.736	cft
A=	2.16 Ac		

Tp = time to Qp in seconds

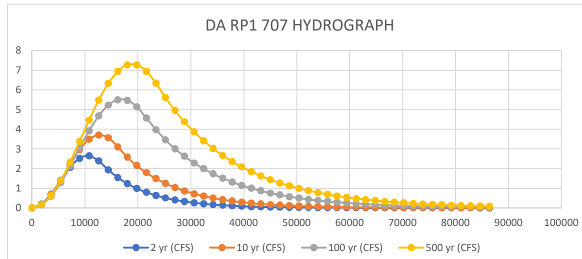
$$T_p = \frac{V}{1.39\,Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 707 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	2.65	3.70	5.52	7.30
Tp=	10488.680	12791.073	16926.270	18905.004
1.25*Tp=	13110.850	15988.842	21157.837	23631.256

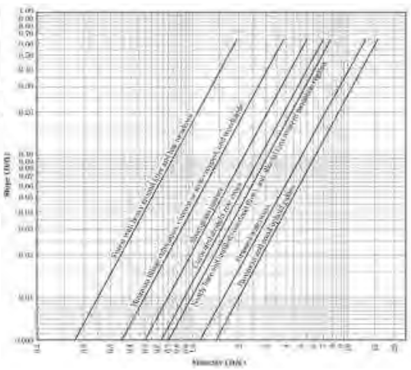
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.187666848	0.178075273	0.152568077	0.162170127	0.5
3600.00	0.697426505	0.678059862	0.593401235	0.634278551	1
5400.00	1.384660699	1.403814158	1.273751873	1.374398408	1.5
7200.00	2.054401818	2.21578639	2.118386397	2.316801351	2
9000.00	2.516645018	2.957846361	3.0339046	3.377794741	2.5
10800.00	2.640252393	3.487306961	3.919067915	4.463154188	3
12600.00	2.390156663	3.702360781	4.675994437	5.476491414	3.5
14400.00	1.927342517	3.561656168	5.220982765	6.327814266	4
16200.00	1.541944771	3.098552003	5.493767752	6.941518716	4.5
18000.00	1.233612425	2.580530051	5.464184667	7.263103081	5
19800.00	0.986935229	2.149112017	5.135504825	7.264008192	5.5
21600.00	0.789584416	1.789819289	4.558871149	6.944153668	6
23400.00	0.631696521	1.490593818	3.970247326	6.331945055	6.5
25200.00	0.505380408	1.241393443	3.457624336	5.60392229	7
27000.00	0.40432288	1.033854872	3.011189245	4.951497281	7.5
28800.00	0.323473148	0.861013003	2.622396128	4.375029497	8
30600.00	0.258790394	0.717067174	2.283802476	3.865675778	8.5
32400.00	0.207041816	0.597186489	1.988926727	3.415622507	9
34200.00	0.165641054	0.49734769	1.732124195	3.017965753	9.5
36000.00	0.132518924	0.414200136	1.508479014	2.666605361	10
37800.00	0.106020004	0.344953351	1.313710034	2.356151372	10.5
39600.00	0.084819896	0.287283379	1.144088871	2.081841344	11
41400.00	0.06785903	0.239254785	0.996368538	1.839467291	11.5
43200.00	0.054289716	0.199255704	0.867721283	1.625311133	12
45000.00	0.043433766	0.165943748	0.755684465	1.436087662	12.5
46800.00	0.034748607	0.138200949	0.658113408	1.268894139	13
48600.00	0.027800161	0.115096246	0.573140348	1.121165776	13.5
50400.00	0.02224115	0.095854231	0.499138681	0.99063638	14
52200.00	0.017793736	0.079829135	0.434691824	0.875303597	14.5
54000.00	0.014235642	0.066483145	0.378566096	0.773398195	15
55800.00	0.011389036	0.055368363	0.329687105	0.683356917	15.5
57600.00	0.009111647	0.046111772	0.28711918	0.603798507	16
59400.00	0.007289652	0.038402717	0.250047461	0.533502521	16.5
61200.00	0.005831989	0.031982476	0.217762299	0.471390598	17
63000.00	0.004665806	0.026635583	0.189645673	0.416509927	17.5
64800.00	0.003732816	0.022182595	0.165159357	0.368018624	18
66600.00	0.00298639	0.018474065	0.143834619	0.325172821	18.5
68400.00	0.002389221	0.015385535	0.125263249	0.287315251	19
70200.00	0.001911465	0.012813351	0.109089742	0.253865169	19.5
72000.00	0.001529242	0.01067119	0.095004496	0.224309445	20
73800.00	0.00122345	0.00888716	0.082737883	0.198194684	20.5
75600.00	0.000978805	0.007401387	0.072055087	0.175120279	21
77400.00	0.00078308	0.006164009	0.062751613	0.154732265	21.5
79200.00	0.000626493	0.005133498	0.054649367	0.136717882	22
81000.00	0.000501217	0.00427527	0.047593252	0.120800787	22.5
82800.00	0.000400992	0.003560522	0.041448195	0.106736806	23
84600.00	0.000320808	0.002965267	0.036096565	0.094310195	23.5
86400.00	0.000256658	0.002469528	0.031435916	0.083330327	24



DA RP1 708 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	905 (ft)
L=	100 (ft)	S=	0.0128 (ft/ft)
P_2=	4.89 (in)	V=	0.8 (ft/s)
S=	0.0128 (ft/ft)		
T_{OL}=	9.48 (min)	T_1=	18.85 (min)

Tc= 28.33 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	9.10 (in/hr)
I (100-YR)=	7 (in/hr)
I (10-YR)=	4.8 (in/hr)
I (2-YR)=	3.3 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.45 Single family residential district; lots 1/4-1/2 acre; basin slope 1-3.5%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
9.10	7	4.8	3.3

A=	6.19 (Ac)
Q (500-YR)=	**25.35 (cfs)**
Q (100-YR)=	**19.50 (cfs)**
Q (10-YR)=	**13.37 (cfs)**
Q (2-YR)=	**9.19 (cfs)**

DA RP1 708 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		550058.26	cft
Volume (100-yr) = 1.38*area*43560 =		372098.23	cft
Volume (10-yr)= 0.70*area*43560=		188745.48	cft
Volume (2-yr)= 0.41*area*43560=		110550.924	cft
A=	6.19 Ac		

Tp = time to Qp in seconds

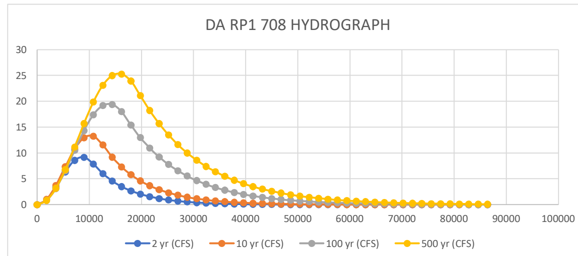
$$T_p = \frac{V}{1.39\,Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p\,e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 708 Existing Conditions					
		2 - Year	10 - Year	100 - Year	500 - Year
Qp=		9.19	13.37	19.50	25.35
Tp=		8652.278	10155.875	13729.085	15609.995
1.25*Tp=		10815.348	12694.844	17161.357	19512.494

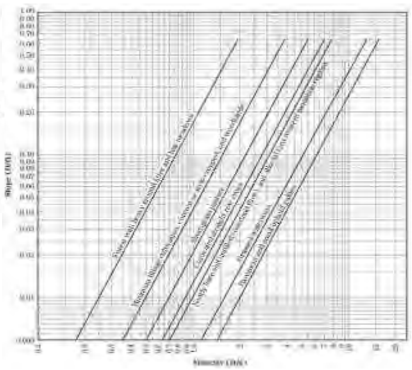
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.947166479	1.009821909	0.815368838	0.822651102	0.5
3600.00	3.398278752	3.734213656	3.125090226	3.183821866	1
5400.00	6.343078554	7.350118196	6.542821657	6.777025364	1.5
7200.00	8.567827789	10.76514648	10.49688599	11.13585318	2
9000.00	9.155566705	12.94759554	14.32589473	15.69451661	2.5
10800.00	7.864050951	13.23813284	17.3893772	19.86128768	3
12600.00	6.007935577	11.54898512	19.17491078	23.09530723	3.5
14400.00	4.584276011	9.185715844	19.38383281	24.97678997	4
16200.00	3.497971353	7.295379125	17.98119731	25.2615139	4.5
18000.00	2.669080911	5.794056499	15.39128099	23.91252101	5
19800.00	2.036606989	4.601692405	12.97935618	21.10491455	5.5
21600.00	1.554006105	3.65470599	10.94539739	18.20754248	6
23400.00	1.185763864	2.90260076	9.230174623	15.67288232	6.5
25200.00	0.904781479	2.305271941	7.783739643	13.49107056	7
27000.00	0.690381576	1.830867957	6.563971464	11.61298739	7.5
28800.00	0.526786557	1.454091995	5.535349762	9.996350959	8
30600.00	0.401957535	1.154853096	4.667920504	8.604765436	8.5
32400.00	0.306708396	0.91719484	3.936423671	7.40690163	9
34200.00	0.234029797	0.728444489	3.319557672	6.375791666	9.5
36000.00	0.17857335	0.578537243	2.799359027	5.488221851	10
37800.00	0.13625804	0.459479544	2.360679263	4.724210052	10.5
39600.00	0.1039699	0.364922836	1.990743785	4.06655584	11
41400.00	0.079332861	0.289825037	1.678779866	3.500453244	11.5
43200.00	0.060533894	0.230181683	1.415702945	3.013157422	12
45000.00	0.046189589	0.182812387	1.193852076	2.593697735	12.5
46800.00	0.035244357	0.145191262	1.006766839	2.232630758	13
48600.00	0.026892742	0.115312222	0.84899921	1.921827681	13.5
50400.00	0.020520152	0.091582016	0.715954906	1.654291298	14
52200.00	0.015657631	0.072735271	0.603759605	1.423998481	14.5
54000.00	0.011947349	0.057767014	0.509146117	1.225764578	15
55800.00	0.009116267	0.045879088	0.429359246	1.055126687	15.5
57600.00	0.006956047	0.036437589	0.362075554	0.908243187	16
59400.00	0.00530772	0.028939065	0.305335701	0.781807243	16.5
61200.00	0.004049986	0.022983669	0.257487393	0.672972364	17
63000.00	0.003090288	0.018253839	0.21713726	0.579288319	17.5
64800.00	0.002358004	0.014497365	0.183110284	0.498645968	18
66600.00	0.001799244	0.011513939	0.154415581	0.429229787	18.5
68400.00	0.001372889	0.009144475	0.130217545	0.369476987	19
70200.00	0.001047565	0.007262626	0.109811516	0.318042336	19.5
72000.00	0.000799331	0.005768043	0.092603259	0.273767869	20
73800.00	0.000609919	0.004581033	0.07809166	0.235656822	20.5
75600.00	0.00046539	0.003638298	0.065854133	0.202851189	21
77400.00	0.00035511	0.002889569	0.055534315	0.174612406	21.5
79200.00	0.000270962	0.002294922	0.046831687	0.150304727	22
81000.00	0.000206754	0.001822648	0.039492824	0.129380903	22.5
82800.00	0.000157761	0.001447564	0.033304013	0.111369872	23
84600.00	0.000120377	0.001149668	0.028085034	0.095866144	23.5
86400.00	9.18524E-05	0.000913077	0.023683907	0.082520681	24



DA RP1 711 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1557 (ft)
L=	100 (ft)	S=	0.0128 (ft/ft)
P_2=	4.89 (in)	V=	0.8 (ft/s)
S=	0.0128 (ft/ft)		
T_{OL}=	9.48 (min)	T_1=	32.44 (min)

Tc= 41.91 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	7.68 (in/hr)
I (100-YR)=	5.6 (in/hr)
I (10-YR)=	3.8 (in/hr)
I (2-YR)=	2.6 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.45 Single family residential district; lots 1/4-1/2 acre; basin slope 1-3.5%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
7.68	5.6	3.8	2.6

A= 22.51 (Ac)

Q (500-YR)=	**77.75 (cfs)**
Q (100-YR)=	**56.73 (cfs)**
Q (10-YR)=	**38.49 (cfs)**
Q (2-YR)=	**26.34 (cfs)**

DA RP1 711 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		2000292.62	cft
Volume (100-yr) = 1.38*area*43560 =		1353139.13	cft
Volume (10-yr)= 0.70*area*43560=		686374.92	cft
Volume (2-yr)= 0.41*area*43560=		402019.596	cft
A=	22.51 Ac		

Tp = time to Qp in seconds

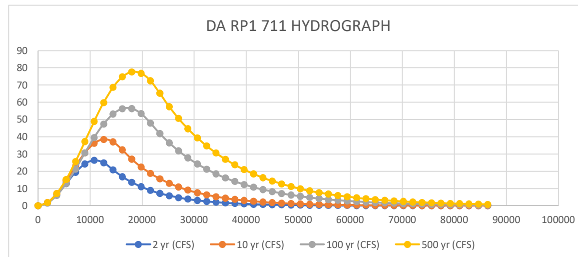
$$Tp = \frac{V}{1.39\,Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA RP1 711 Existing Conditions					
		2 - Year	10 - Year	100 - Year	500 - Year
Qp=		26.34	38.49	56.73	77.75
Tp=		10981.738	12828.474	17161.357	18509.007
1.25*Tp=		13727.172	16035.593	21451.696	23136.259

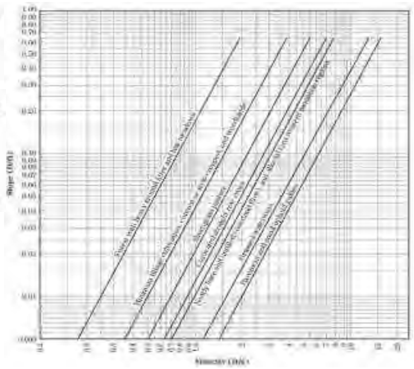
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	1.707600817	1.839766216	1.525894261	1.800252029	0.5
3600.00	6.387538284	7.007331418	5.939392285	7.034271491	1
5400.00	12.82607415	14.514741	12.76560592	15.21729141	1.5
7200.00	19.353379	22.92670008	21.27004115	25.59141283	2
9000.00	24.27660125	30.6349786	30.53762889	37.1958003	2.5
10800.00	26.31890692	36.16587879	39.57118562	48.95567297	3
12600.00	24.95062558	38.4619823	47.39870929	59.7818492	3.5
14400.00	20.78412544	37.08431138	53.17796589	68.67162488	4
16200.00	16.79545751	32.35170767	56.28711295	74.80164243	4.5
18000.00	13.57225223	26.95746025	56.39160924	77.60414886	5
19800.00	10.96761017	22.46263692	53.48021105	76.81958028	5.5
21600.00	8.862823269	18.71726983	47.93560871	72.52060223	6
23400.00	7.161964646	15.59639641	41.82548189	65.22466838	6.5
25200.00	5.78751669	12.99589007	36.49418423	57.47860633	7
27000.00	4.676838143	10.82898601	31.84244203	50.65246429	7.5
28800.00	3.77930919	9.023386431	27.78363556	44.63699283	8
30600.00	3.054024433	7.518848263	24.24218608	39.33591695	8.5
32400.00	2.467928599	6.265173241	21.15214852	34.66439525	9
34200.00	1.994310034	5.220533034	18.45598353	30.54766207	9.5
36000.00	1.611583298	4.350073671	16.10348603	26.91983089	10
37800.00	1.3023054	3.624752649	14.05085033	23.72283985	10.5
39600.00	1.052380822	3.020369943	12.25985445	20.90552251	11
41400.00	0.850419106	2.516760584	10.69714841	18.42278893	11.5
43200.00	0.687215731	2.097121861	9.333633162	16.23490404	12
45000.00	0.555332609	1.747452709	8.143918797	14.30685171	12.5
46800.00	0.448759091	1.456086567	7.105851732	12.60777429	13
48600.00	0.362638027	1.213302127	6.200102199	11.1104788	13.5
50400.00	0.2930444	1.010998993	5.409804303	9.791001672	14
52200.00	0.236806441	0.842427406	4.720241966	8.628225251	14.5
54000.00	0.191361071	0.701963047	4.118574901	7.603539809	15
55800.00	0.154637093	0.584919385	3.593599509	6.700545702	15.5
57600.00	0.12496079	0.487391306	3.135540264	5.904790905	16
59400.00	0.100979646	0.40612483	2.735867679	5.203539709	16.5
61200.00	0.081600708	0.338408534	2.387139481	4.585568894	17
63000.00	0.06594077	0.281983093	2.082862027	4.040988108	17.5
64800.00	0.05328612	0.234965897	1.817369391	3.561081573	18
66600.00	0.043060015	0.195788238	1.585717854	3.138168594	18.5
68400.00	0.034796396	0.163142969	1.383593849	2.765480633	19
70200.00	0.028118642	0.135940895	1.207233642	2.437052983	19.5
72000.00	0.022722412	0.113274431	1.053353242	2.147629302	20
73800.00	0.018361769	0.09438732	0.919087253	1.89257749	20.5
75600.00	0.014837974	0.078649401	0.80193552	1.667815555	21
77400.00	0.011990428	0.065535585	0.699716567	1.46974628	21.5
79200.00	0.009689353	0.054608336	0.610526984	1.295199653	22
81000.00	0.007829875	0.045503071	0.532705978	1.141382131	22.5
82800.00	0.006327249	0.037915996	0.46480445	1.005831931	23
84600.00	0.005112991	0.031593973	0.40555801	0.886379633	23.5
86400.00	0.00413176	0.026326068	0.353863436	0.781113454	24



DA RP2 107 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + ...T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1862 (ft)
L=	100 (ft)	S=	0.0049 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0049 (ft/ft)		
T_{OL}=	13.91 (min)	T_1=	62.07 (min)

Tc= 75.98 (min)

Intensity:

SEE FIG. 2.1-2.1a	
I (500-YR)=	5.75 (in/hr)
I (100-YR)=	4.1 (in/hr)
I (10-YR)=	2.7 (in/hr)
I (2-YR)=	1.8 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
5.75	4.1	2.7	1.8

A= 17.48 (Ac)

Q (100-YR)=	**35.16 (cfs)**
Q (100-YR)=	**25.08 (cfs)**
Q (10-YR)=	**16.52 (cfs)**
Q (2-YR)=	**11.01 (cfs)**

DA RP2 107 EXISTING CALCULATIONS				
Volume (500-yr) = 2.04*area*43560 =			1553314.75	cft
Volume (100-yr) = 1.38*area*43560 =			1050771.74	cft
Volume (10-yr)= 0.70*area*43560=			533000.16	cft
Volume (2-yr)= 0.41*area*43560=			312185.808	cft
A=	#REF!	Ac		from DA#15B
A=	17.48	Ac		from DA RP2 107

Tp = time to Qp in seconds

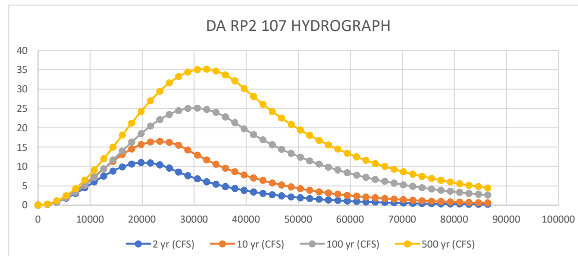
Tp = $\frac{V}{1.39\ Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA#15B Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	11.01	16.52	25.08	35.16
Tp=	20394.656	23213.429	30137.017	31782.025
1.25*Tp=	25493.320	29016.787	37671.271	39727.531

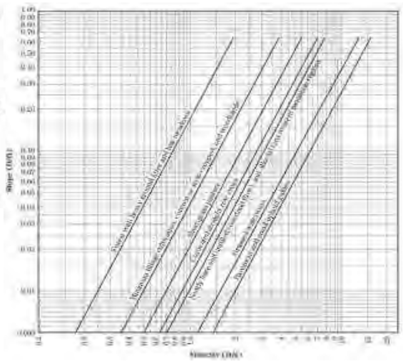
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.210305112	0.243854433	0.220142036	0.277548385	0.5
3600.00	0.825155562	0.961018211	0.872840046	1.101430106	1
5400.00	1.797583861	2.109143055	1.935181031	2.445631563	1.5
7200.00	3.053307693	3.620432582	3.369871455	4.267710355	2
9000.00	4.496404229	5.405645659	5.126546432	6.510135371	2.5
10800.00	6.016637525	7.359366057	7.143537794	9.10210331	3
12600.00	7.497879277	9.36622725	9.350038951	11.96177425	3.5
14400.00	8.826979685	11.30772476	11.66859056	14.99885569	4
16200.00	9.902410794	13.06921383	14.01779975	18.1174535	4.5
18000.00	10.64202206	14.54667911	16.31519739	21.21909972	5
19800.00	10.98931571	15.65287679	18.48013323	24.20586161	5.5
21600.00	10.91776251	16.32248626	20.43660707	26.98343387	6
23400.00	10.4328283	16.51596732	22.1159368	29.46411621	6.5
25200.00	9.571556463	16.22189497	23.45916945	31.56958249	7
27000.00	8.549366219	15.45763408	24.41915077	33.2333538	7.5
28800.00	7.622628162	14.26831401	24.96218057	34.4028975	8
30600.00	6.796347075	12.9189877	25.06919575	35.04128591	8.5
32400.00	6.059633579	11.68019211	24.73643954	35.12836228	9
34200.00	5.402778684	10.56018404	23.97559337	34.66137721	9.5
36000.00	4.817125843	9.547573006	22.81336678	33.65507551	10
37800.00	4.294956862	8.632060767	21.3178267	32.14123057	10.5
39600.00	3.829390191	7.804336562	19.72522513	30.16764119	11
41400.00	3.414290225	7.055982437	18.25160285	28.06171416	11.5
43200.00	3.044186453	6.379387634	16.88807121	26.06985428	12
45000.00	2.714201356	5.767671185	15.6264056	24.21937941	12.5
46800.00	2.419986133	5.214611936	14.45899589	22.50025385	13
48600.00	2.157663384	4.714585275	13.37880043	20.90315423	13.5
50400.00	1.923776015	4.262505933	12.37930368	19.41941899	14
52200.00	1.715241675	3.853776265	11.45447683	18.04100136	14.5
54000.00	1.529312134	3.48423949	10.59874149	16.76042574	15
55800.00	1.363537067	3.150137421	9.806935997	15.57074719	15.5
57600.00	1.215731761	2.848072241	9.074284313	14.46551368	16
59400.00	1.083948321	2.574971947	8.396367205	13.43873121	16.5
61200.00	0.966450002	2.32805911	7.769095591	12.48483119	17
63000.00	0.861688319	2.104822628	7.188685872	11.59864034	17.5
64800.00	0.76828264	1.902992187	6.651637112	10.77535256	18
66600.00	0.685001991	1.72051517	6.154709924	10.0105029	18.5
68400.00	0.610748836	1.555535788	5.694906924	9.299943347	19
70200.00	0.544544609	1.406376201	5.269454657	8.639820308	19.5
72000.00	0.485516816	1.271519455	4.875786866	8.026553729	20
73800.00	0.432887545	1.149594059	4.511529012	7.456817672	20.5
75600.00	0.385963206	1.039360031	4.174483953	6.927522282	21
77400.00	0.344125392	0.939696291	3.862618687	6.435797021	21.5
79200.00	0.306822733	0.84958926	3.574052096	5.97897511	22
81000.00	0.273563624	0.76812255	3.307043595	5.55457906	22.5
82800.00	0.243909751	0.694467643	3.059982631	5.160307238	23
84600.00	0.217470311	0.627875471	2.831378974	4.794021383	23.5
86400.00	0.193896866	0.567668791	2.619853726	4.453735012	24



DA RP2 202 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1577 (ft)
L=	100 (ft)	S=	0.0039 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0039 (ft/ft)		
T_{OL}=	15.24 (min)	T_1=	52.57 (min)

Tc= 67.81 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	5.94 (in/hr)
I (100-YR)=	4.4 (in/hr)
I (10-YR)=	2.9 (in/hr)
I (2-YR)=	2 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
5.94	4.4	2.9	2

A=	19.17 (Ac)
Q (500-YR)=	**39.84 (cfs)**
Q (100-YR)=	**29.52 (cfs)**
Q (10-YR)=	**19.46 (cfs)**
Q (2-YR)=	**13.42 (cfs)**

DA RP2 202 EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	1703492.21	cft
Volume (100-yr) =	1.38*area*43560 =	1152362.38	cft
Volume (10-yr)=	0.70*area*43560=	584531.64	cft
Volume (2-yr)=	0.41*area*43560=	342368.532	cft
	A=	19.17 Ac	

Tp = time to Qp in seconds

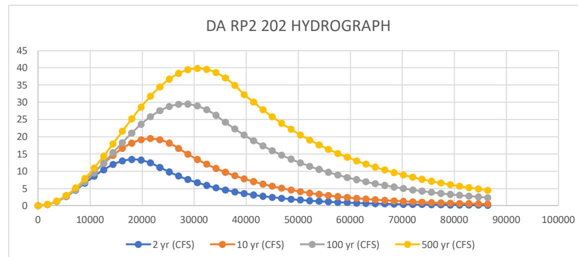
Tp = $\dfrac{\mathbf{V}}{\mathbf{1.39\ Qp}}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA RP2 202 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	13.42	19.46	29.52	39.84
Tp=	18355.190	21612.503	28082.220	30761.662
1.25*Tp=	22943.988	27015.629	35102.775	38452.077

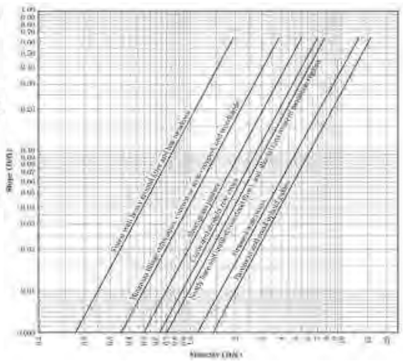
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.315899832	0.331118717	0.298261162	0.335627378	0.5
3600.00	1.233852639	1.301935625	1.180991221	1.331199602	1
5400.00	2.667419451	2.846367246	2.612517001	2.953168056	1.5
7200.00	4.481608535	4.859284165	4.534987212	5.146875939	2
9000.00	6.505586884	7.203667184	6.87071036	7.838400076	2.5
10800.00	8.5487667	9.719934219	9.525294435	10.93704197	3
12600.00	10.41875208	12.23680305	12.39146152	14.33838414	3.5
14400.00	11.93945596	14.58295048	15.35338312	17.92780876	4
16200.00	12.96768135	16.59867432	18.29136111	21.58436006	4.5
18000.00	13.40660547	18.14676432	21.08666494	25.18482022	5
19800.00	13.21489705	19.12184203	23.62632989	28.60786158	5.5
21600.00	12.41060832	19.45753393	25.80772218	31.7381351	6
23400.00	11.10337421	19.1309895	27.54268668	34.47015739	6.5
25200.00	9.774379906	18.1644366	28.76110943	36.71186525	7
27000.00	8.604456692	16.62366845	29.41375113	38.38771802	7.5
28800.00	7.5745649	14.9360677	29.47423701	39.4412431	8
30600.00	6.667943774	13.40339828	28.9401227	39.83693899	8.5
32400.00	5.869838699	12.02800423	27.832993	39.56147162	9
34200.00	5.16726108	10.79374668	26.19758959	38.62412362	9.5
36000.00	4.548776966	9.686142875	24.20280189	37.05648158	10
37800.00	4.004320968	8.692196189	22.26779939	34.91137163	10.5
39600.00	3.52503245	7.800243664	20.48749942	32.26107929	11
41400.00	3.103111332	6.999819136	18.84953358	30.0588377	11.5
43200.00	2.731691148	6.28153043	17.34252234	27.85710375	12
45000.00	2.404727298	5.636949152	15.95599592	25.81664125	12.5
46800.00	2.116898677	5.058511791	14.68032164	23.92563748	13
48600.00	1.863521079	4.539430967	13.5066369	22.17314496	13.5
50400.00	1.640470963	4.073615789	12.42678771	20.54901809	14
52200.00	1.444118347	3.655600386	11.43327194	19.04385441	14.5
54000.00	1.271267732	3.28047977	10.51918729	17.64894017	15
55800.00	1.119106097	2.943852277	9.678183264	16.35619987	15.5
57600.00	0.985157118	2.641767922	8.904417114	15.15814954	16
59400.00	0.867240873	2.370682052	8.192513201	14.04785336	16.5
61200.00	0.763438356	2.127413746	7.537525666	13.01888358	17
63000.00	0.672060257	1.909108496	6.934904074	12.06528324	17.5
64800.00	0.591619462	1.71320471	6.380461791	11.18153171	18
66600.00	0.520806853	1.537403654	5.870346905	10.36251275	18.5
68400.00	0.458470005	1.379642481	5.401015461	9.603484862	19
70200.00	0.403594432	1.238070021	4.969206844	8.900053849	19.5
72000.00	0.355287071	1.111025065	4.57192112	8.248147381	20
73800.00	0.312761755	0.997016869	4.2063982	7.643991415	20.5
75600.00	0.275326415	0.89470766	3.870098665	7.084088349	21
77400.00	0.242371817	0.802896944	3.560686117	6.565196768	21.5
79200.00	0.213361648	0.720507414	3.276010955	6.084312684	22
81000.00	0.187823788	0.646572313	3.014095437	5.638652146	22.5
82800.00	0.165342627	0.580224086	2.77311994	5.225635116	23
84600.00	0.145552299	0.520684203	2.55141032	4.842870541	23.5
86400.00	0.128130732	0.467254025	2.347426278	4.488142504	24



DA RP3 106 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	**T=**	
n=	0.15	D=	122 (ft)
L=	100 (ft)	S=	0.0039 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0039 (ft/ft)		
T_{OL}=	15.24 (min)	T_1=	4.07 (min)

Tc= 19.31 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	11.27 (in/hr)
I (100-YR)=	8.5 (in/hr)
I (10-YR)=	5.8 (in/hr)
I (2-YR)=	4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
11.27	8.5	5.8	4

A= 3.38 (Ac)

Q (500-YR)=	**13.33 (cfs)**
Q (100-YR)=	**10.06 (cfs)**
Q (10-YR)=	**6.86 (cfs)**
Q (2-YR)=	**4.73 (cfs)**

DA RP3 106 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		300354.91	cft
Volume (100-yr) = 1.38*area*43560 =		203181.26	cft
Volume (10-yr)= 0.70*area*43560=		103062.96	cft
Volume (2-yr)= 0.41*area*43560=		60365.448	cft
A=	3.38 Ac		

Tp = time to Qp in seconds

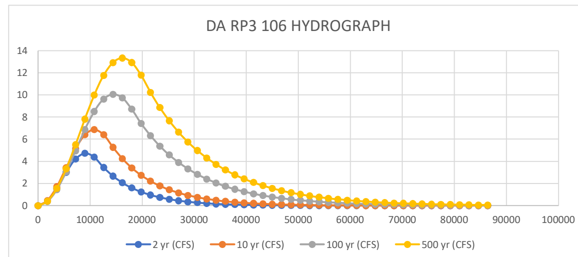
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p\,e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA RP3 106 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	4.73	6.86	10.06	13.33
Tp=	9177.595	10806.252	14536.679	16213.193
1.25*Tp=	11471.994	13507.814	18170.848	20266.491

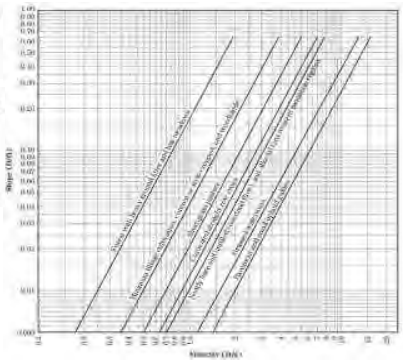
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.435098792	0.45910719	0.37564227	0.401228669	0.5
3600.00	1.580368998	1.713550389	1.446437763	1.556598503	1
5400.00	3.01458857	3.427582437	3.052380094	3.326979246	1.5
7200.00	4.210261986	5.14244889	4.953497179	5.499180697	2
9000.00	4.727629262	6.399171977	6.865709684	7.811625187	2.5
10800.00	4.376406481	6.861394334	8.503280312	9.985846909	3
12600.00	3.446781855	6.405403828	9.62151084	11.76002491	3.5
14400.00	2.671051577	5.266970145	10.05330678	12.92051173	4
16200.00	2.069906604	4.241487146	9.734145907	13.32756091	4.5
18000.00	1.604054893	3.415666449	8.711719661	12.93215537	5
19800.00	1.243047437	2.750633655	7.428327631	11.78191007	5.5
21600.00	0.963288063	2.21508324	6.323852705	10.23473409	6
23400.00	0.746491135	1.783804888	5.383595746	8.859234236	6.5
25200.00	0.57848637	1.436496752	4.583140138	7.668595055	7
27000.00	0.448292638	1.156809768	3.901699629	6.637972149	7.5
28800.00	0.347400215	0.931578047	3.321578554	5.745860087	8
30600.00	0.269214569	0.750199109	2.827712315	4.973643667	8.5
32400.00	0.208625329	0.604134786	2.407276182	4.305209482	9
34200.00	0.161672261	0.486509294	2.049352257	3.726609689	9.5
36000.00	0.125286416	0.391785573	1.744645963	3.225770972	10
37800.00	0.097089544	0.315504631	1.485244679	2.79224261	10.5
39600.00	0.07523864	0.254075645	1.264412268	2.41697841	11
41400.00	0.058305485	0.204606928	1.076414145	2.092147943	11.5
43200.00	0.045183294	0.164769808	0.916368373	1.810973154	12
45000.00	0.035014374	0.132689004	0.780118878	1.567586928	12.5
46800.00	0.027134064	0.106854356	0.664127529	1.356910659	13
48600.00	0.021027291	0.086049734	0.565382261	1.174548284	13.5
50400.00	0.016294904	0.069295787	0.481318854	1.01669455	14
52200.00	0.012627584	0.055803845	0.409754347	0.880055611	14.5
54000.00	0.009785629	0.044938795	0.348830351	0.761780299	15
55800.00	0.007583282	0.036189179	0.29696479	0.65940063	15.5
57600.00	0.005876594	0.029143119	0.252810819	0.570780304	16
59400.00	0.004554012	0.023468932	0.215221846	0.49407013	16.5
61200.00	0.003529089	0.018899513	0.183221758	0.427669442	17
63000.00	0.002734835	0.015219764	0.155979578	0.370192691	17.5
64800.00	0.002119335	0.012256465	0.13278788	0.320440545	18
66600.00	0.001642359	0.009870122	0.113044421	0.277374851	18.5
68400.00	0.001272731	0.007948402	0.096236502	0.240096983	19
70200.00	0.000986291	0.006400842	0.081927655	0.207829084	19.5
72000.00	0.000764317	0.005154593	0.069746307	0.179897838	20
73800.00	0.0005923	0.00415099	0.059376134	0.155720419	20.5
75600.00	0.000458998	0.003342789	0.050547841	0.134792332	21
77400.00	0.000355696	0.002691946	0.043032176	0.11667688	21.5
79200.00	0.000275643	0.002167822	0.036633971	0.100996059	22
81000.00	0.000213607	0.001745745	0.031187079	0.087422666	22.5
82800.00	0.000165533	0.001405847	0.026550053	0.075673473	23
84600.00	0.000128278	0.001132128	0.02260248	0.065503316	23.5
86400.00	9.9408E-05	0.000911702	0.019241848	0.056699981	24



DA RP2 204 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	404 (ft)
L=	100 (ft)	S=	0.0040 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0040 (ft/ft)		
T_{OL}=	15.09 (min)	T_1=	13.47 (min)

Tc= 28.56 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	9.05 (in/hr)
I (100-YR)=	7 (in/hr)
I (10-YR)=	4.8 (in/hr)
I (2-YR)=	3.3 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4-1/2 acre; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
9.05	7	4.8	3.3

A= 3.16 (Ac)

Q (500-YR)=	**11.44 (cfs)**
Q (100-YR)=	**8.85 (cfs)**
Q (10-YR)=	**6.07 (cfs)**
Q (2-YR)=	**4.17 (cfs)**

DA RP2 204 EXISTING CALCULATIONS			
Volume (500-yr) = 2.04*area*43560 =		280805.18	cft
Volume (100-yr) = 1.38*area*43560 =		189956.45	cft
Volume (10-yr)= 0.70*area*43560=		96354.72	cft
Volume (2-yr)= 0.41*area*43560=		56436.336	cft
A=	3.16 Ac		

Tp = time to Qp in seconds

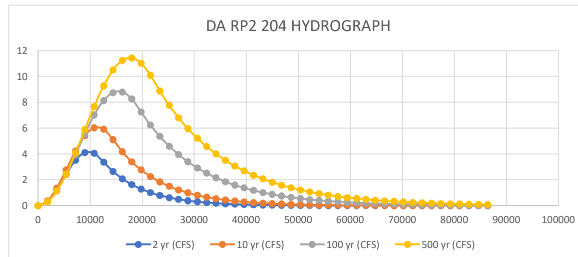
Tp = $\dfrac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP2 204 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	4.17	6.07	8.85	11.44
Tp=	9733.813	11425.360	15445.221	17666.450
1.25*Tp=	12167.266	14281.700	19306.526	22083.063

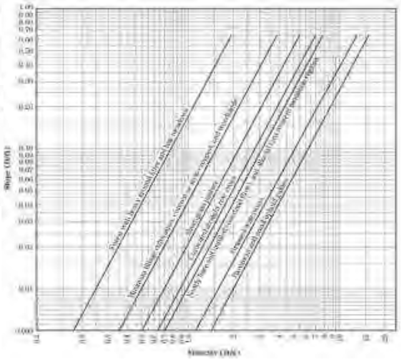
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.342161053	0.364040368	0.29321412	0.290412922	0.5
3600.00	1.256375141	1.368789774	1.133989154	1.132149729	1
5400.00	2.442672516	2.773102818	2.410875235	2.43970154	1.5
7200.00	3.511808107	4.239936623	3.954613308	4.080239078	2
9000.00	4.11297969	5.417242984	5.560571455	5.887106295	2.5
10800.00	4.048932277	6.022461879	7.015870109	7.676750335	3
12600.00	3.364516678	5.910337435	8.127600539	9.267367982	3.5
14400.00	2.645566467	5.115683991	8.748396082	10.49737436	4
16200.00	2.080245872	4.168280318	8.795966493	11.24181775	4.5
18000.00	1.635726391	3.396331916	8.264006025	11.42507293	5
19800.00	1.286194513	2.767345188	7.253839236	11.0285237	5.5
21600.00	1.011352714	2.254844221	6.234059368	10.09245401	6
23400.00	0.795240768	1.837256328	5.357645094	8.869837543	6.5
25200.00	0.625308925	1.497003999	4.604441386	7.769470608	7
27000.00	0.491689144	1.219765004	3.957126705	6.805612081	7.5
28800.00	0.386622043	0.993869533	3.400814659	5.961327113	8
30600.00	0.304006313	0.809808976	2.922711655	5.221781749	8.5
32400.00	0.239044411	0.659835678	2.511822688	4.573982288	9
34200.00	0.18796396	0.537636819	2.158698484	4.006546995	9.5
36000.00	0.147798688	0.438068688	1.855218191	3.509506118	10
37800.00	0.116216173	0.356940165	1.594402628	3.074126725	10.5
39600.00	0.0913824	0.290836312	1.370253781	2.692759266	11
41400.00	0.071855258	0.236974621	1.177616865	2.358703175	11.5
43200.00	0.056500793	0.193087894	1.01206178	2.066089137	12
45000.00	0.044427363	0.157328809	0.869781231	1.809775968	12.5
46800.00	0.034933856	0.128192159	0.747503171	1.585260285	13
48600.00	0.027468979	0.104451498	0.642415553	1.388597382	13.5
50400.00	0.021599242	0.085107509	0.552101662	1.216331922	14
52200.00	0.016983786	0.069345948	0.474484535	1.065437227	14.5
54000.00	0.013354588	0.056503363	0.4077792	0.933262101	15
55800.00	0.010500899	0.046039172	0.350451624	0.817484247	15.5
57600.00	0.008257004	0.037512906	0.301183437	0.716069466	16
59400.00	0.006492597	0.03056567	0.25884161	0.627235915	16.5
61200.00	0.00510522	0.024905034	0.222452402	0.549422803	17
63000.00	0.004014306	0.020292724	0.191178965	0.481262966	17.5
64800.00	0.003156505	0.016534594	0.1643021	0.421558845	18
66600.00	0.002482004	0.013472455	0.141203715	0.369261448	18.5
68400.00	0.001951634	0.010977412	0.121352612	0.323451918	19
70200.00	0.001534597	0.00894444	0.104292274	0.283325389	19.5
72000.00	0.001206675	0.007287967	0.089630361	0.248176843	20
73800.00	0.000948826	0.005938265	0.07702969	0.217388727	20.5
75600.00	0.000746075	0.004838523	0.066200483	0.190420097	21
77400.00	0.000586649	0.003942448	0.056893699	0.166797119	21.5
79200.00	0.00046129	0.003212323	0.048895307	0.14610474	22
81000.00	0.000362719	0.002617414	0.042021368	0.1279794	22.5
82800.00	0.000285211	0.00213268	0.0361138	0.112102638	23
84600.00	0.000224265	0.001737716	0.031036747	0.098195502	23.5
86400.00	0.000176343	0.001415898	0.026673451	0.086013646	24



DA RP2 301 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	**T=**	
n=	0.15	D=	927 (ft)
L=	100 (ft)	S=	0.0040 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0040 (ft/ft)		
T_{OL}=	15.09 (min)	T_1=	30.90 (min)

Tc= 45.99 (min)

Intensity:

SEE FIG. 2.1-2.1a	
I (500-YR)=	7.32 (in/hr)
I (100-YR)=	5.4 (in/hr)
I (10-YR)=	3.6 (in/hr)
I (2-YR)=	2.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4-1/2 acre; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
7.32	5.4	3.6	2.5

A= 6.54 (Ac)

Q (500-YR)=	**19.16 (cfs)**
Q (100-YR)=	**14.13 (cfs)**
Q (10-YR)=	**9.42 (cfs)**
Q (2-YR)=	**6.54 (cfs)**

DA RP2 301 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		581160.10	cft
Volume (100-yr) = 1.38*area*43560 =		393137.71	cft
Volume (10-yr)= 0.70*area*43560=		199417.68	cft
Volume (2-yr)= 0.41*area*43560=		116801.784	cft
A=	6.54 Ac		

Tp = time to Qp in seconds

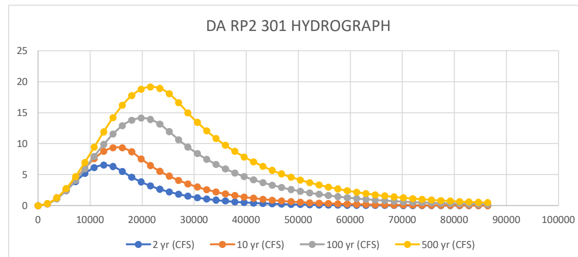
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP2 301 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	6.54	9.42	14.13	19.16
Tp=	12848.633	15233.813	20021.583	21819.052
1.25*Tp=	16060.791	19042.266	25026.978	27273.815

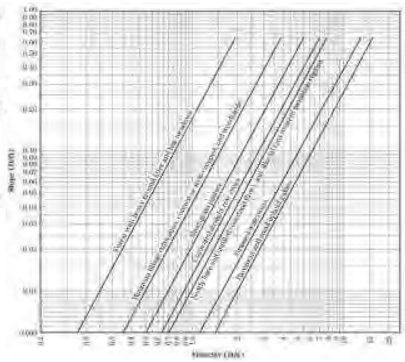
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.311621239	0.32071194	0.279853345	0.319982182	0.5
3600.00	1.187091807	1.239160984	1.097237058	1.258555678	1
5400.00	2.459552241	2.630237729	2.387379488	2.753028944	1.5
7200.00	3.886479179	4.304452317	4.048046329	4.703579392	2
9000.00	5.195908867	6.033746387	5.947641939	6.979920985	2.5
10800.00	6.138271823	7.582558751	7.935637327	9.430006633	3
12600.00	6.533959293	8.739913103	9.854498468	11.8901841	3.5
14400.00	6.307555609	9.348156809	11.55216972	14.19612707	4
16200.00	5.510892849	9.324436056	12.89412311	16.19381124	4.5
18000.00	4.593333951	8.671982039	13.7740187	17.7498023	5
19800.00	3.828547817	7.544299836	14.12213123	18.76016862	5.5
21600.00	3.191097913	6.470068026	13.91087534	19.15742328	6
23400.00	2.659782868	5.548795934	13.1569915	18.91503187	6.5
25200.00	2.216931318	4.758703648	11.93750895	18.04918478	7
27000.00	1.847814169	4.081112494	10.62077064	16.61771585	7.5
28800.00	1.540154707	3.50000345	9.449272	14.95254894	8
30600.00	1.283720279	3.001638443	8.406992705	13.43194817	8.5
32400.00	1.069981961	2.57423556	7.479679528	12.06598503	9
34200.00	0.891830889	2.207690514	6.654651409	10.83893363	9.5
36000.00	0.743341817	1.893337767	5.920626039	9.736667328	10
37800.00	0.619576046	1.623745664	5.267565577	8.746496095	10.5
39600.00	0.51641717	1.392540744	4.686539384	7.857020412	11
41400.00	0.430434157	1.19425706	4.169601892	7.058000037	11.5
43200.00	0.358767242	1.024206962	3.709683951	6.340236108	12
45000.00	0.299032806	0.878370274	3.300496156	5.695465244	12.5
46800.00	0.249244102	0.753299253	2.93644284	5.116264409	13
48600.00	0.207745175	0.646037076	2.612545552	4.595965454	13.5
50400.00	0.173155783	0.554047946	2.324374978	4.128578347	14
52200.00	0.144325494	0.475157136	2.067990368	3.708722212	14.5
54000.00	0.120295424	0.407499577	1.839885648	3.331563383	15
55800.00	0.10026634	0.349475768	1.636941472	2.992759754	15.5
57600.00	0.083572081	0.299713962	1.456382568	2.68841079	16
59400.00	0.069657402	0.257037732	1.29573978	2.415012621	16.5
61200.00	0.058059505	0.220438165	1.15281631	2.169417702	17
63000.00	0.048392647	0.189050005	1.02565767	1.948798579	17.5
64800.00	0.040335313	0.162131201	0.91252496	1.750615338	18
66600.00	0.033619518	0.139045362	0.811871082	1.572586358	18.5
68400.00	0.028021898	0.119246712	0.722319588	1.412662052	19
70200.00	0.023356276	0.102267189	0.642645858	1.269001261	19.5
72000.00	0.019467476	0.087705378	0.571760347	1.139950067	20
73800.00	0.016226158	0.075217022	0.508693693	1.024022746	20.5
75600.00	0.013524517	0.06450688	0.452583454	0.919884663	21
77400.00	0.011272697	0.055321755	0.402662321	0.826336912	21.5
79200.00	0.009395802	0.047444498	0.358247619	0.742302508	22
81000.00	0.007831409	0.040688882	0.318731974	0.66681399	22.5
82800.00	0.006527486	0.034895198	0.283575008	0.599002283	23
84600.00	0.005440666	0.029926475	0.252295947	0.538086694	23.5
86400.00	0.004534799	0.025665249	0.224467047	0.48336592	24



DA RP3 302 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T_1=	
n=	0.15	D=	488 (ft)
L=	100 (ft)	S=	0.0039 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0039 (ft/ft)		
T_{OL}=	15.24 (min)	T_1=	16.27 (min)

Tc= 31.51 (min)

Intensity:

SEE FIG. 2.1-2.1a	
I (500-YR)=	8.57 (in/hr)
I (100-YR)=	6.7 (in/hr)
I (10-YR)=	4.5 (in/hr)
I (2-YR)=	3.1 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
8.57	6.7	4.5	3.1

A= 13.52 (Ac)

Q (500-YR)=	**40.55 (cfs)**
Q (100-YR)=	**31.70 (cfs)**
Q (10-YR)=	**21.29 (cfs)**
Q (2-YR)=	**14.67 (cfs)**

DA RP3 302 EXISTING CALCULATIONS		
Volume (500-yr) = 2.04*area*43560 =	1201419.65	cft
Volume (100-yr) = 1.38*area*43560 =	812725.06	cft
Volume (10-yr)= 0.70*area*43560=	412251.84	cft
Volume (2-yr)= 0.41*area*43560=	241461.792	cft
A= 13.52 Ac		

Tp = time to Qp in seconds

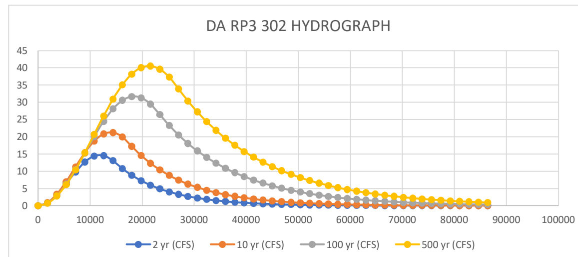
Tp = $\dfrac{V}{1.39\ Qp}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1 - \cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP3 302 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	14.67	21.29	31.70	40.55
Tp=	11842.058	13928.058	18442.055	21312.847
1.25*Tp=	14802.573	17410.072	23052.569	26641.059

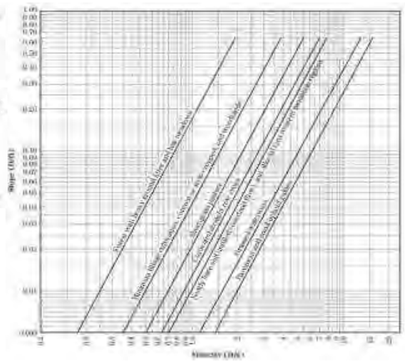
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.820480806	0.865539554	0.739401401	0.709563013	0.5
3600.00	3.098357999	3.32143149	2.88862913	2.788592423	1
5400.00	6.324004737	6.968376173	6.247188366	6.091584831	1.5
7200.00	9.77575079	11.21342256	10.50176949	10.3873763	2
9000.00	12.68134099	15.36637519	15.25547575	15.37532064	2.5
10800.00	14.39071098	18.75201197	20.06484858	20.70633051	3
12600.00	14.52142539	20.81986751	24.48123643	26.0073087	3.5
14400.00	13.04423963	21.23373241	28.09264811	30.90725981	4
16200.00	10.75334996	19.92631701	30.56218617	35.06325482	4.5
18000.00	8.825246588	17.22286235	31.65947503	38.18443135	5
19800.00	7.242857119	14.55932249	31.282152	40.05235008	5.5
21600.00	5.944194162	12.30770281	29.46541638	40.53628245	6
23400.00	4.878384822	10.40429927	26.43896882	39.60235985	6.5
25200.00	4.003677845	8.795259773	23.28839354	37.315944	7
27000.00	3.285808084	7.435060491	20.51325365	33.90714464	7.5
28800.00	2.696654222	6.285217939	18.06881074	30.381468	8
30600.00	2.213137167	5.313200153	15.91565762	27.22239243	8.5
32400.00	1.816315966	4.491506284	14.01908299	24.39179864	9
34200.00	1.49064583	3.796888526	12.34851192	21.85553097	9.5
36000.00	1.223369189	3.209694381	10.87701292	19.58298529	10
37800.00	1.004015939	2.713310635	9.580863727	17.5467397	10.5
39600.00	0.823993293	2.293693333	8.439168958	15.72222363	11
41400.00	0.676249171	1.938970436	7.433523191	14.08742137	11.5
43200.00	0.554995951	1.639105933	6.547714272	12.62260642	12
45000.00	0.455483746	1.385615898	5.767461953	11.31010343	12.5
46800.00	0.373814336	1.171328452	5.080187681	10.13407496	13
48600.00	0.306788461	0.990180861	4.474811813	9.080330335	13.5
50400.00	0.251780499	0.837048	3.941575	8.136154442	14
52200.00	0.206635606	0.70759735	3.471880859	7.290154286	14.5
54000.00	0.169585309	0.598166426	3.058157386	6.532121518	15
55800.00	0.139178226	0.505659148	2.693734888	5.852909261	15.5
57600.00	0.114223211	0.42745825	2.37273846	5.244321729	16
59400.00	0.093742695	0.361351231	2.089993275	4.699015339	16.5
61200.00	0.076934388	0.305467755	1.840941159	4.210410097	17
63000.00	0.063139854	0.258226738	1.621567107	3.772610197	17.5
64800.00	0.051818715	0.21829161	1.428334562	3.380332882	18
66600.00	0.042527486	0.184532506	1.258128394	3.028844698	18.5
68400.00	0.034902198	0.155994294	1.108204687	2.713904378	19
70200.00	0.028644144	0.131869558	0.9761465	2.431711661	19.5
72000.00	0.023508175	0.111475745	0.859824905	2.17886144	20
73800.00	0.019293099	0.094235865	0.757364665	1.952302673	20.5
75600.00	0.015833796	0.079662156	0.667114005	1.749301565	21
77400.00	0.012994756	0.067342291	0.587617981	1.567408582	21.5
79200.00	0.010664763	0.056927711	0.517595028	1.404428895	22
81000.00	0.008752543	0.048123761	0.455916295	1.258395892	22.5
82800.00	0.00718319	0.040681354	0.401587451	1.127547451	23
84600.00	0.005895225	0.034389925	0.353732654	1.010304677	23.5
86400.00	0.004838196	0.029071475	0.311580429	0.905252847	24



DA RP2 306 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	302 (ft)
L=	100 (ft)	S=	0.0039 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0039 (ft/ft)		
T_{OL}=	15.24 (min)	T_1=	10.07 (min)

Tc= 25.31 (min)

Intensity:

SEE FIG. 2.1-2.1a	
I (500-YR)=	9.83 (in/hr)
I (100-YR)=	7.4 (in/hr)
I (10-YR)=	5.1 (in/hr)
I (2-YR)=	3.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
9.83	7.4	5.1	3.5

A= 1.58 (Ac)

Q (500-YR)=	**5.43 (cfs)**
Q (100-YR)=	**4.09 (cfs)**
Q (10-YR)=	**2.82 (cfs)**
Q (2-YR)=	**1.94 (cfs)**

DA RP2 306 EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	140402.59	cft
Volume (100-yr) =	1.38*area*43560 =	94978.22	cft
Volume (10-yr)=	0.70*area*43560=	48177.36	cft
Volume (2-yr)=	0.41*area*43560=	28218.168	cft
	A=	1.58 Ac	

Tp = time to Qp in seconds

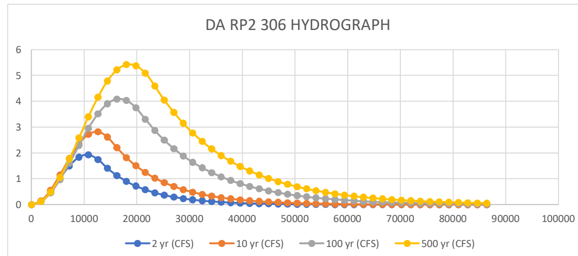
Tp = $\frac{V}{1.39\ Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP2 306 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	1.94	2.82	4.09	5.43
Tp=	10488.680	12289.463	16697.536	18589.255
1.25*Tp=	13110.850	15361.828	20871.920	23236.569

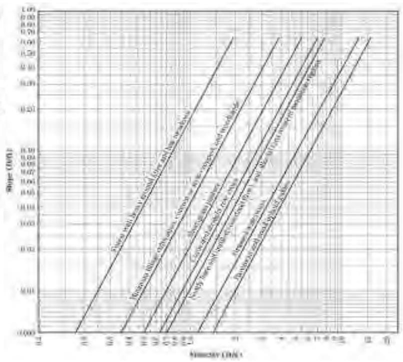
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.137274824	0.146668895	0.116220288	0.124740491	0.5
3600.00	0.510154573	0.556165686	0.451678322	0.487507454	1
5400.00	1.01285366	1.143307317	0.968265476	1.054989185	1.5
7200.00	1.502756885	1.785957258	1.607296537	1.775075692	2
9000.00	1.840879226	2.350432203	2.296176446	2.581643789	2.5
10800.00	1.931295732	2.719310719	2.95664723	3.400628966	3
12600.00	1.748355337	2.815859119	3.513678239	4.156826492	3.5
14400.00	1.409815359	2.619993515	3.903989766	4.780797224	4
16200.00	1.127904045	2.205720885	4.083241733	5.21524397	4.5
18000.00	0.902364644	1.823298754	4.031070799	5.420272907	5
19800.00	0.721924844	1.507179974	3.753403674	5.377056899	5.5
21600.00	0.577566379	1.245869043	3.304455929	5.089564329	6
23400.00	0.462074307	1.029863519	2.872352565	4.59087954	6.5
25200.00	0.369676409	0.85130847	2.496752699	4.047876648	7
27000.00	0.295754699	0.703710829	2.170267716	3.569099388	7.5
28800.00	0.236614617	0.581703282	1.886475164	3.146951241	8
30600.00	0.18930038	0.480849085	1.639792418	2.774734194	8.5
32400.00	0.151447254	0.397480725	1.425366856	2.446542465	9
34200.00	0.121163363	0.328566554	1.238980405	2.157168801	9.5
36000.00	0.096935139	0.271600543	1.076966563	1.902021854	10
37800.00	0.07755167	0.224511149	0.936138274	1.677053336	10.5
39600.00	0.062044183	0.185585992	0.813725234	1.478693783	11
41400.00	0.049637624	0.153409577	0.707319393	1.303795924	11.5
43200.00	0.039711922	0.126811825	0.61482759	1.149584743	12
45000.00	0.031770995	0.104825522	0.53443037	1.013613447	12.5
46800.00	0.025417963	0.086651146	0.4645462	0.893724648	13
48600.00	0.020335303	0.071627797	0.403800352	0.788016131	13.5
50400.00	0.016268989	0.059209156	0.350997866	0.694810671	14
52200.00	0.013015789	0.048943627	0.305100035	0.612629425	14.5
54000.00	0.010413109	0.040457909	0.265203981	0.540168462	15
55800.00	0.008330869	0.033443422	0.230524889	0.476278082	15.5
57600.00	0.006665001	0.027645089	0.200380568	0.419944569	16
59400.00	0.005332246	0.022852056	0.174178034	0.370274105	16.5
61200.00	0.004265992	0.018890026	0.151401845	0.326478595	17
63000.00	0.00341295	0.015614922	0.131603957	0.287863158	17.5
64800.00	0.002730486	0.012907648	0.114394918	0.253815101	18
66600.00	0.002184489	0.010669754	0.099436199	0.223794201	18.5
68400.00	0.001747671	0.00881986	0.086433539	0.197324132	19
70200.00	0.001398201	0.007290695	0.075131157	0.173984906	19.5
72000.00	0.001118612	0.006026654	0.065306718	0.153406212	20
73800.00	0.000894931	0.004981768	0.05676696	0.135261537	20.5
75600.00	0.000715978	0.004118042	0.049343894	0.119262989	21
77400.00	0.000572808	0.003404067	0.042891497	0.105156728	21.5
79200.00	0.000458268	0.002813879	0.03728284	0.092718935	22
81000.00	0.000366631	0.002326016	0.032407592	0.081752267	22.5
82800.00	0.000293318	0.001922737	0.028169851	0.072082722	23
84600.00	0.000234665	0.001589378	0.024486253	0.063556877	23.5
86400.00	0.000187741	0.001313816	0.021284336	0.056039458	24



DA RP4 301 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	401 (ft)
L=	100 (ft)	S=	0.0039 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0039 (ft/ft)		
T_{OL}=	15.24 (min)	T_1=	13.37 (min)

Tc= 28.61 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	9.03 (in/hr)
I (100-YR)=	7 (in/hr)
I (10-YR)=	4.8 (in/hr)
I (2-YR)=	3.3 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
9.03	7	4.8	3.3

A= 3.7 (Ac)

Q (500-YR)=	**11.70 (cfs)**
Q (100-YR)=	**9.07 (cfs)**
Q (10-YR)=	**6.22 (cfs)**
Q (2-YR)=	**4.27 (cfs)**

DA RP4 301 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		328790.88	cft
Volume (100-yr) = 1.38*area*43560 =		222417.36	cft
Volume (10-yr)= 0.70*area*43560=		112820.4	cft
Volume (2-yr)= 0.41*area*43560=		66080.52	cft
A=	3.70 Ac		

Tp = time to Qp in seconds

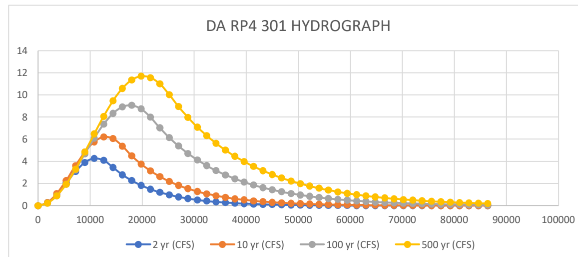
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA RP4 301 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	4.27	6.22	9.07	11.70
Tp=	11124.358	13057.554	17651.681	20218.968
1.25*Tp=	13905.447	16321.942	22064.601	25273.710

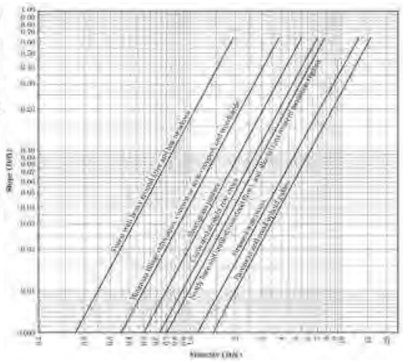
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.270175838	0.286928539	0.23060194	0.227289828	0.5
3600.00	1.012379978	1.094736045	0.898942892	0.891495926	1
5400.00	2.038920247	2.27426999	1.937015921	1.941000804	1.5
7200.00	3.090200178	3.607742759	3.239192056	3.294244226	2
9000.00	3.900367016	4.848943676	4.672968552	4.846061506	2.5
10800.00	4.264541853	5.768699016	6.092451692	6.475856173	3
12600.00	4.090630394	6.197186349	7.353202173	8.056971896	3.5
14400.00	3.447032514	6.055290331	8.326932515	9.466535335	4
16200.00	2.793134652	5.369210459	8.914560926	10.595005	4.5
18000.00	2.263280416	4.494861455	9.056293364	11.35468406	5
19800.00	1.833938882	3.757403776	8.737707865	11.68653553	5.5
21600.00	1.486042913	3.140938443	7.991222049	11.56477022	6
23400.00	1.204142386	2.625614623	7.021287373	10.99885088	6.5
25200.00	0.975718044	2.19483835	6.149564771	10.03275684	7
27000.00	0.790625521	1.834738175	5.386070227	8.947531634	7.5
28800.00	0.640644825	1.533718496	4.717366768	7.969683562	8
30600.00	0.519115283	1.282086161	4.13168568	7.098701482	8.5
32400.00	0.420639747	1.071738346	3.618719382	6.322906342	9
34200.00	0.3408449	0.895901631	3.169440025	5.631895454	9.5
36000.00	0.276187038	0.748913889	2.775940606	5.01640301	10
37800.00	0.223794694	0.62604196	2.431295808	4.468175833	10.5
39600.00	0.181341114	0.523329239	2.129440123	3.979862709	11
41400.00	0.146940926	0.437468269	1.865061102	3.544915816	11.5
43200.00	0.119066411	0.365694236	1.633505857	3.157502925	12
45000.00	0.096479658	0.305695941	1.430699178	2.812429192	12.5
46800.00	0.078177585	0.255541376	1.253071808	2.505067499	13
48600.00	0.063347392	0.213615512	1.097497629	2.231296416	13.5
50400.00	0.051330469	0.178568292	0.961238645	1.987444929	14
52200.00	0.041593142	0.149271158	0.841896791	1.770243216	14.5
54000.00	0.033702974	0.124780712	0.737371734	1.576778808	15
55800.00	0.027309561	0.104308336	0.645823906	1.404457526	15.5
57600.00	0.02212897	0.087194798	0.56564213	1.250968705	16
59400.00	0.017931132	0.072889023	0.495415261	1.114254202	16.5
61200.00	0.014529618	0.060930352	0.433907355	0.992480805	17
63000.00	0.011773367	0.050933702	0.380035917	0.884015646	17.5
64800.00	0.009539974	0.042577171	0.332852846	0.787404309	18
66600.00	0.007730252	0.03559167	0.291527754	0.701351326	18.5
68400.00	0.006263833	0.029752257	0.255333347	0.624702808	19
70200.00	0.005075591	0.024870899	0.223632629	0.556430969	19.5
72000.00	0.004112758	0.020790409	0.19586769	0.495620349	20
73800.00	0.003332573	0.017379393	0.171549886	0.441455533	20.5
75600.00	0.002700388	0.014528011	0.15025124	0.393210222	21
77400.00	0.002188128	0.012144446	0.131596911	0.350237493	21.5
79200.00	0.001773042	0.010151945	0.115258597	0.31196112	22
81000.00	0.001436698	0.008486348	0.100948753	0.277867853	22.5
82800.00	0.001164158	0.00709402	0.088415537	0.247500535	23
84600.00	0.000943319	0.005930126	0.077438373	0.220451966	23.5
86400.00	0.000764373	0.004957189	0.067824071	0.196359452	24



DA RP4 306 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	**T=**	
n=	0.15	D=	346 (ft)
L=	100 (ft)	S=	0.0039 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0039 (ft/ft)		
T_{OL}=	15.24 (min)	T_1=	11.53 (min)

Tc= 26.78 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	9.47 (in/hr)
I (100-YR)=	7.1 (in/hr)
I (10-YR)=	4.9 (in/hr)
I (2-YR)=	3.4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
9.47	7.1	4.9	3.4

A= 2.73 (Ac)

Q (500-YR)=	**9.05 (cfs)**
Q (100-YR)=	**6.78 (cfs)**
Q (10-YR)=	**4.68 (cfs)**
Q (2-YR)=	**3.25 (cfs)**

DA RP4 306 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		242594.35	cft
Volume (100-yr) = 1.38*area*43560 =		164107.94	cft
Volume (10-yr)= 0.70*area*43560=		83243.16	cft
Volume (2-yr)= 0.41*area*43560=		48756.708	cft
A=	2.73 Ac		

Tp = time to Qp in seconds

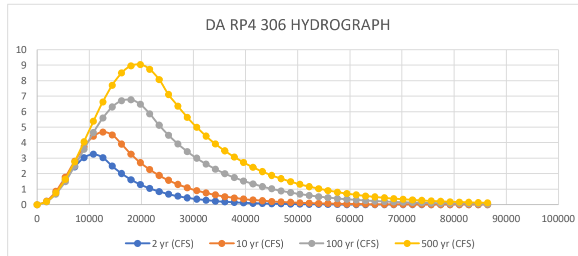
Tp = $\frac{V}{1.39\,Qp}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1 - \cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP4 306 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	3.25	4.68	6.78	9.05
Tp=	10797.171	12791.073	17403.066	19279.932
1.25*Tp=	13496.463	15988.842	21753.832	24099.916

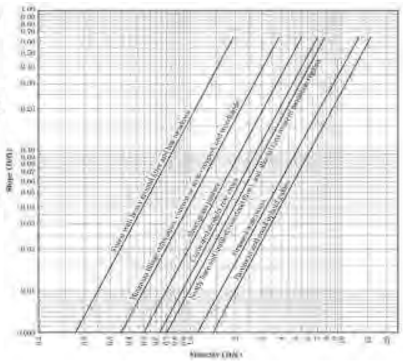
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.217733084	0.225067359	0.177499747	0.193294047	0.5
3600.00	0.812561053	0.856992325	0.69142238	0.756666589	1
5400.00	1.625018611	1.774265116	1.487982248	1.641998937	1.5
7200.00	2.437296923	2.800507798	2.483813705	2.773673225	2
9000.00	3.03163521	3.73838915	3.574695921	4.055031066	2.5
10800.00	3.24869945	4.40756852	4.646460329	5.376629325	3
12600.00	3.03029767	4.679372654	5.586939175	6.625587859	3.5
14400.00	2.490146942	4.501537657	6.297704672	7.695230818	4
16200.00	2.004948308	3.908258555	6.704370165	8.494198025	4.5
18000.00	1.614289361	3.261503259	6.764375224	8.95424822	5
19800.00	1.299749291	2.716238799	6.471439894	9.036087666	5.5
21600.00	1.046496533	2.262132712	5.856221936	8.732726306	6
23400.00	0.842589414	1.883944964	5.126795199	8.070074793	6.5
25200.00	0.678413065	1.56898338	4.481786232	7.104731414	7
27000.00	0.54622605	1.306677686	3.917926707	6.362050501	7.5
28800.00	0.439795329	1.088224768	3.425007103	5.634909072	8
30600.00	0.354102357	0.906293234	2.994102375	4.990875229	8.5
32400.00	0.285106437	0.754777368	2.617410347	4.42045031	9
34200.00	0.229554191	0.628592219	2.288110447	3.915221287	9.5
36000.00	0.184826156	0.523502949	2.000240209	3.467736691	10
37800.00	0.148813262	0.435982708	1.748587311	3.071396704	10.5
39600.00	0.119817386	0.36309427	1.5285952	2.720355827	11
41400.00	0.096471281	0.302391464	1.336280592	2.409436663	11.5
43200.00	0.077674104	0.251837071	1.168161342	2.134053559	12
45000.00	0.062539507	0.209734459	1.0211934	1.890144971	12.5
46800.00	0.050353847	0.174670644	0.892715691	1.674113565	13
48600.00	0.040542532	0.145468866	0.780401935	1.482773158	13.5
50400.00	0.032642925	0.121149098	0.682218523	1.313301729	14
52200.00	0.026282536	0.100895156	0.596387697	1.163199793	14.5
54000.00	0.021161453	0.084027308	0.521355363	1.030253542	15
55800.00	0.017038199	0.069979459	0.455762947	0.912502193	15.5
57600.00	0.01371835	0.058280157	0.3984228	0.808209065	16
59400.00	0.011045366	0.048536767	0.348296694	0.71583597	16.5
61200.00	0.008893205	0.040422296	0.304477021	0.634020525	17
63000.00	0.007160387	0.033664418	0.266170359	0.56155606	17.5
64800.00	0.005765204	0.028036335	0.23268311	0.497373816	18
66600.00	0.004641869	0.023349166	0.203408937	0.44052719	18.5
68400.00	0.003737413	0.019445607	0.177817786	0.390177767	19
70200.00	0.003009188	0.016194652	0.155446292	0.345582959	19.5
72000.00	0.002422856	0.013487199	0.135889386	0.306085051	20
73800.00	0.001950768	0.011232383	0.118792961	0.271101499	20.5
75600.00	0.001570666	0.009354531	0.103847459	0.240116343	21
77400.00	0.001264626	0.007790622	0.090782271	0.21267259	21.5
79200.00	0.001018217	0.006488171	0.079360832	0.188365482	22
81000.00	0.00081982	0.005403466	0.06937634	0.166836519	22.5
82800.00	0.00066008	0.004500104	0.06064801	0.147768179	23
84600.00	0.000531465	0.003747768	0.053017802	0.130879227	23.5
86400.00	0.000427911	0.003121209	0.046347562	0.115920574	24



DA RP4 602 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	557 (ft)
L=	100 (ft)	S=	0.0039 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0039 (ft/ft)		
T_{OL}=	15.24 (min)	T_1=	18.57 (min)

Tc= 33.81 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	8.37 (in/hr)
I (100-YR)=	6.3 (in/hr)
I (10-YR)=	4.3 (in/hr)
I (2-YR)=	3 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area; lots 1/4-1/2 acre; MOSTLY golf course; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
8.37	6.3	4.3	3

A=	5.52 (Ac)
Q (500-YR)=	**16.18 (cfs)**
Q (100-YR)=	**12.17 (cfs)**
Q (10-YR)=	**8.31 (cfs)**
Q (2-YR)=	**5.80 (cfs)**

DA RP4 602 EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	490520.45	cft
Volume (100-yr) =	1.38*area*43560 =	331822.66	cft
Volume (10-yr)=	0.70*area*43560=	168315.84	cft
Volume (2-yr)=	0.41*area*43560=	98584.992	cft
	A=	5.52 Ac	

Tp = time to Qp in seconds

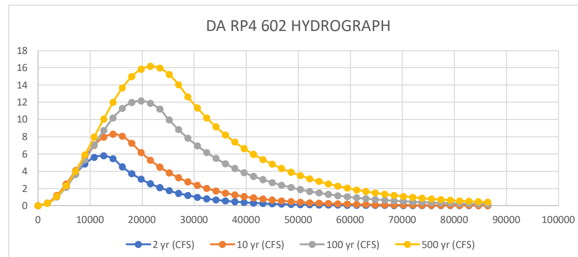
$$Tp = \frac{V}{1.39\,Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP4 602 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	5.80	8.31	12.17	16.18
Tp=	12236.793	14575.874	19612.979	21816.365
1.25*Tp=	15295.992	18219.843	24516.224	27270.457

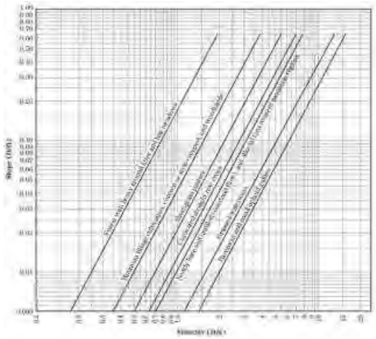
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.303973185	0.308700267	0.251208684	0.270176125	0.5
3600.00	1.152124833	1.188917369	0.984096031	1.062653802	1
5400.00	2.366528542	2.509820137	2.138158027	2.324486918	1.5
7200.00	3.692425053	4.075076038	3.618120297	3.971371321	2
9000.00	4.851666	5.652033084	5.301803548	5.893277252	2.5
10800.00	5.601064244	7.006300086	7.050210159	7.961800529	3
12600.00	5.783410004	7.936585415	8.718999233	10.03874134	3.5
14400.00	5.447897938	8.304616004	10.17040275	11.98533748	4
16200.00	4.499666431	8.055689585	11.2845991	13.67153521	4.5
18000.00	3.716478947	7.240226892	11.96960505	14.98467819	5
19800.00	3.069608819	6.166388217	12.16886946	15.83703424	5.5
21600.00	2.535329391	5.251816581	11.86594193	16.1716567	6
23400.00	2.094043736	4.472890196	11.2005846	15.96618916	6.5
25200.00	1.729565864	3.809490754	9.940896657	15.23435909	7
27000.00	1.42852703	3.244483805	8.822881118	14.04818534	7.5
28800.00	1.179885379	2.763276207	7.830604613	12.61938724	8
30600.00	0.974520942	2.353439208	6.949925742	11.33590783	8.5
32400.00	0.804901123	2.004387434	6.168293537	10.1829672	9
34200.00	0.664804408	1.707105487	5.474568588	9.147288649	9.5
36000.00	0.549092166	1.453915094	4.858864294	8.216945805	10
37800.00	0.453520168	1.238276789	4.312405964	7.381225296	10.5
39600.00	0.374582912	1.05462101	3.827405763	6.630503373	11
41400.00	0.309385046	0.898204251	3.396951724	5.956135087	11.5
43200.00	0.255535167	0.764986538	3.014909244	5.350354745	12
45000.00	0.211058104	0.651527093	2.675833655	4.806186474	12.5
46800.00	0.174322478	0.554895454	2.374892632	4.317363899	13
48600.00	0.143980855	0.472595796	2.107797323	3.878257978	13.5
50400.00	0.11892033	0.402502461	1.870741226	3.483812182	14
52200.00	0.098221703	0.342805063	1.660345943	3.129484265	14.5
54000.00	0.081125767	0.291961721	1.473613033	2.81119396	15
55800.00	0.067005457	0.24865924	1.307881276	2.525275992	15.5
57600.00	0.055342852	0.211779193	1.160788751	2.268437869	16
59400.00	0.045710176	0.180369032	1.030239173	2.037721969	16.5
61200.00	0.037754111	0.153617489	0.914372019	1.830471479	17
63000.00	0.031182835	0.130833617	0.811536011	1.644299805	17.5
64800.00	0.025755321	0.111428949	0.720265585	1.477063085	18
66600.00	0.021272489	0.094902297	0.639260004	1.326835501	18.5
68400.00	0.017569916	0.080826805	0.567364817	1.191887107	19
70200.00	0.014511792	0.068838928	0.503555414	1.070663903	19.5
72000.00	0.011985948	0.05862904	0.446922416	0.961769941	20
73800.00	0.009899739	0.049933438	0.39665872	0.863951252	20.5
75600.00	0.008176644	0.04252753	0.352047995	0.776081404	21
77400.00	0.006753462	0.036220033	0.312454471	0.69714853	21.5
79200.00	0.005577991	0.030848037	0.277313883	0.626243678	22
81000.00	0.004607116	0.026272791	0.246125426	0.562550343	22.5
82800.00	0.003805227	0.022376126	0.218444618	0.505335063	23
84600.00	0.00314291	0.019057397	0.193876967	0.453938974	23.5
86400.00	0.002595872	0.016230888	0.172072348	0.407770225	24



DA RP4 603 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	138 (ft)
L=	100 (ft)	S=	0.0076 (ft/ft)
P_2=	4.89 (in)	V=	1.75 (ft/s)
S=	0.0076 (ft/ft)		
T_{OL}=	11.67 (min)	T_1=	1.31 (min)

Tc= 12.99 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	13.27 (in/hr)
I (100-YR)=	10.2 (in/hr)
I (10-YR)=	7 (in/hr)
I (2-YR)=	4.8 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.18 Mixed use area. Lots 1/4-1/2 acre; golf course; and MOSTLY woodlands; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
13.27	10.2	7	4.8

A= 0.68 (Ac)

Q (500-YR)=	**1.62 (cfs)**
Q (100-YR)=	**1.25 (cfs)**
Q (10-YR)=	**0.86 (cfs)**
Q (2-YR)=	**0.59 (cfs)**

DA RP4 603 EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	60426.43	cft
Volume (100-yr) =	1.38*area*43560 =	40876.70	cft
Volume (10-yr)=	0.70*area*43560=	20734.56	cft
Volume (2-yr)=	0.41*area*43560=	12144.528	cft
	A=	0.68 Ac	

Tp = time to Qp in seconds

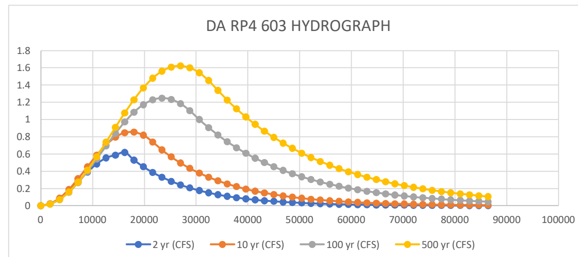
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP4 603 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	0.59	0.86	1.25	1.62
Tp=	14871.103	17410.072	23554.803	26771.361
1.25*Tp=	18588.879	21762.590	29443.504	33464.202

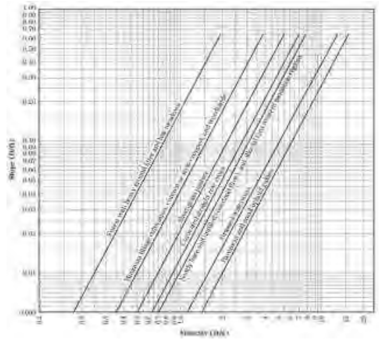
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.020983677	0.022399671	0.017902782	0.018045553	0.5
3600.00	0.080936924	0.087256268	0.070584247	0.071380055	1
5400.00	0.171294656	0.187787502	0.155022658	0.157632697	1.5
7200.00	0.279148121	0.313480458	0.266374742	0.272969402	2
9000.00	0.389089078	0.451190967	0.398253494	0.412263254	2.5
10800.00	0.485411064	0.586518142	0.543094527	0.569322405	3
12600.00	0.554353256	0.705310329	0.692589954	0.737165307	3.5
14400.00	0.586066385	0.795144999	0.838164921	0.908331054	4
16200.00	0.618696791	0.846627815	0.971469442	1.075211037	4.5
18000.00	0.528616475	0.854375032	1.084857353	1.230387154	5
19800.00	0.451651571	0.817576495	1.171824874	1.366961562	5.5
21600.00	0.385892516	0.740080361	1.227383666	1.478863295	6
23400.00	0.329707774	0.647950565	1.248346952	1.56111813	6.5
25200.00	0.281703354	0.566461686	1.233512307	1.610069697	7
27000.00	0.240688228	0.495221178	1.183730626	1.623542016	7.5
28800.00	0.205644775	0.432940164	1.101857317	1.600936219	8
30600.00	0.17570354	0.378491861	1.000974109	1.543257174	8.5
32400.00	0.150121654	0.330891197	0.906314267	1.453068811	9
34200.00	0.128264411	0.289276984	0.82060619	1.339015479	9.5
36000.00	0.109589515	0.252896343	0.743003331	1.226945553	10
37800.00	0.093633624	0.221091078	0.672739197	1.124255405	10.5
39600.00	0.080000862	0.193285772	0.609119783	1.030159988	11
41400.00	0.068352987	0.168977373	0.551516712	0.943939959	11.5
43200.00	0.058401006	0.147726096	0.499361032	0.864936181	12
45000.00	0.049898002	0.129147466	0.452137596	0.792544685	12.5
46800.00	0.042633009	0.11290536	0.409379973	0.72621205	13
48600.00	0.036425777	0.098705926	0.370665841	0.665431177	13.5
50400.00	0.031122298	0.08629227	0.335612816	0.609737405	14
52200.00	0.026590989	0.075439806	0.303874676	0.558704966	14.5
54000.00	0.022719424	0.065952191	0.27513794	0.511943726	15
55800.00	0.019411547	0.057657778	0.249118771	0.469096203	15.5
57600.00	0.016585286	0.050406503	0.225560176	0.429834837	16
59400.00	0.014170521	0.044067177	0.204229464	0.393859481	16.5
61200.00	0.012107337	0.038525111	0.184915949	0.36089511	17
63000.00	0.010344547	0.033680038	0.167428868	0.330689718	17.5
64800.00	0.008838413	0.0294443	0.151595501	0.303012388	18
66600.00	0.007551568	0.025741266	0.13725946	0.277651535	18.5
68400.00	0.006452083	0.022503941	0.124279145	0.254413277	19
70200.00	0.00551268	0.019673754	0.11252635	0.233119963	19.5
72000.00	0.004710051	0.017199504	0.101884989	0.213608809	20
73800.00	0.004024282	0.015036425	0.092249957	0.195730656	20.5
75600.00	0.00343836	0.013145383	0.083526089	0.179348829	21
77400.00	0.002937745	0.011492167	0.075627217	0.164338091	21.5
79200.00	0.002510019	0.010046865	0.068475323	0.150583689	22
81000.00	0.002144568	0.008783331	0.061999768	0.137980472	22.5
82800.00	0.001832325	0.007678704	0.056136591	0.12643209	23
84600.00	0.001565545	0.006712999	0.050827881	0.11585026	23.5
86400.00	0.001337606	0.005868745	0.046021204	0.106154083	24



DA RP4 604 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1024 (ft)
L=	100 (ft)	S=	0.0076 (ft/ft)
P_2=	4.89 (in)	V=	1.75 (ft/s)
S=	0.0076 (ft/ft)		
T_{OL}=	11.67 (min)	T_1=	9.75 (min)

Tc= 21.42 (min)

Intensity:

SEE FIG. 2.1-2.1a	
I (500-YR)=	10.76 (in/hr)
I (100-YR)=	8.1 (in/hr)
I (10-YR)=	5.5 (in/hr)
I (2-YR)=	3.9 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.18 Mixed use area. Lots 1/4-1/2 acre; golf course; and MOSTLY woodlands; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
10.76	8.1	5.5	3.9

A= 10.22 (Ac)

Q (500-YR)=	**19.79 (cfs)**
Q (100-YR)=	**14.90 (cfs)**
Q (10-YR)=	**10.12 (cfs)**
Q (2-YR)=	**7.17 (cfs)**

DA RP4 604 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		908173.73	cft
Volume (100-yr) = 1.38*area*43560 =		614352.82	cft
Volume (10-yr)= 0.70*area*43560=		311628.24	cft
Volume (2-yr)= 0.41*area*43560=		182525.112	cft
A=	10.22 Ac		

Tp = time to Qp in seconds

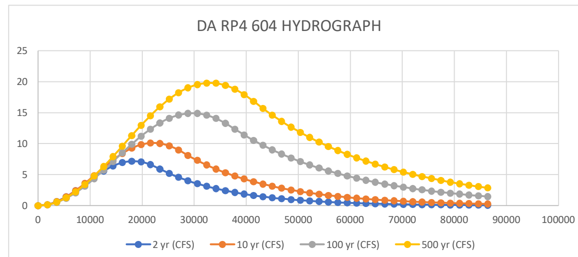
$$Tp = \frac{V}{1.39\ Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP4 604 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	7.17	10.12	14.90	19.79
Tp=	18302.896	22158.273	29661.604	33013.567
1.25*Tp=	22878.620	27697.842	37077.005	41266.959

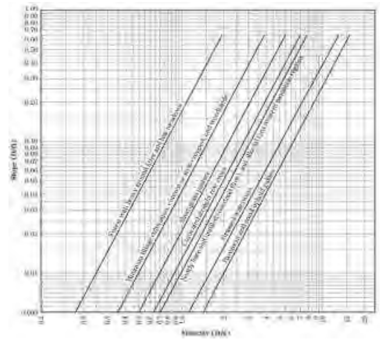
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.169853972	0.163847814	0.13498581	0.144810291	0.5
3600.00	0.6633308	0.644777841	0.5350519	0.575002812	1
5400.00	1.433698476	1.411637326	1.185701495	1.277986551	1.5
7200.00	2.408003565	2.41475213	2.063357686	2.233186358	2
9000.00	3.493979862	3.589144425	3.136217764	3.412645144	2.5
10800.00	4.588785954	4.858741701	4.365405623	4.781842134	3
12600.00	5.588744249	6.141304444	5.706380469	6.30070324	3.5
14400.00	6.399159198	7.353753287	7.110550799	7.924773954	4
16200.00	6.943284908	8.417550568	8.527035165	9.60652046	4.5
18000.00	7.169592947	9.263787685	9.904505904	11.29672087	5
19800.00	7.056652056	9.83764873	11.19304905	12.94590586	5.5
21600.00	6.615157681	10.10196124	12.34597302	14.50580658	6
23400.00	5.908352383	10.0396041	13.32150051	15.93076733	6.5
25200.00	5.199270819	9.654616549	14.08428235	17.17908194	7
27000.00	4.575288558	8.971936571	14.60667842	18.21421433	7.5
28800.00	4.02619254	8.105219682	14.8697592	19.00586791	8
30600.00	3.542995412	7.292922543	14.86399169	19.53087233	8.5
32400.00	3.117788423	6.562033024	14.58958491	19.77386158	9
34200.00	2.743611978	5.904392533	14.05648223	19.72772378	9.5
36000.00	2.414341727	5.312660125	13.28400114	19.3938093	10
37800.00	2.124588325	4.780230556	12.33695659	18.78189127	10.5
39600.00	1.869609218	4.301160555	11.401096	17.90987948	11
41400.00	1.645231026	3.870102477	10.53622821	16.82471326	11.5
43200.00	1.447781227	3.482244616	9.736967822	15.67346073	12
45000.00	1.274028054	3.133257488	8.998337969	14.60098413	12.5
46800.00	1.121127593	2.819245507	8.315739324	13.60189311	13
48600.00	0.986577238	2.536703497	7.684921453	12.67116617	13.5
50400.00	0.868174732	2.282477569	7.101956355	11.80412542	14
52200.00	0.763982115	2.053729914	6.563214	10.99641304	14.5
54000.00	0.67229401	1.847907123	6.065339726	10.24396941	15
55800.00	0.591609708	1.66271169	5.605233349	9.543012695	15.5
57600.00	0.520608605	1.496076361	5.180029861	8.890019843	16
59400.00	0.458128587	1.346141061	4.787081588	8.281708862	16.5
61200.00	0.403147009	1.211232128	4.423941703	7.715022339	17
63000.00	0.354763959	1.089843637	4.088348994	7.187112065	17.5
64800.00	0.312187524	0.98062058	3.778213779	6.695324728	18
66600.00	0.274720832	0.882343751	3.491604894	6.237188568	18.5
68400.00	0.241750646	0.793916129	3.226737673	5.810400961	19
70200.00	0.212737325	0.714350636	2.98196283	5.412816842	19.5
72000.00	0.187205991	0.642759118	2.755756191	5.042437925	20
73800.00	0.16473876	0.578342432	2.546709204	4.697402659	20.5
75600.00	0.144967899	0.520381522	2.353520166	4.375976873	21
77400.00	0.127569806	0.468229398	2.174986121	4.076545057	21.5
79200.00	0.112259717	0.421303909	2.009995365	3.797602247	22
81000.00	0.098787045	0.379081246	1.857520528	3.537746455	22.5
82800.00	0.086931274	0.341090097	1.716612174	3.295671628	23
84600.00	0.076498355	0.306906383	1.586392888	3.07016108	23.5
86400.00	0.067317526	0.276148527	1.466051816	2.860081381	24



DA RP4 605 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	220 (ft)
L=	100 (ft)	S=	0.0076 (ft/ft)
P_2=	4.89 (in)	V=	1.75 (ft/s)
S=	0.0076 (ft/ft)		
T_{OL}=	11.67 (min)	T_1=	2.10 (min)

Tc= 13.77 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	12.89 (in/hr)
I (100-YR)=	10 (in/hr)
I (10-YR)=	6.8 (in/hr)
I (2-YR)=	4.7 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.18 Mixed use area. Lots 1/4-1/2 acre; golf course; and MOSTLY woodlands; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
12.89	10	6.8	4.7

A= 2.97 (Ac)

Q (500-YR)=	**6.89 (cfs)**
Q (100-YR)=	**5.35 (cfs)**
Q (10-YR)=	**3.64 (cfs)**
Q (2-YR)=	**2.51 (cfs)**

DA RP4 605 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		263921.33	cft
Volume (100-yr) = 1.38*area*43560 =		178535.02	cft
Volume (10-yr)= 0.70*area*43560=		90561.24	cft
Volume (2-yr)= 0.41*area*43560=		53043.012	cft
A=	2.97 Ac		

Tp = time to Qp in seconds

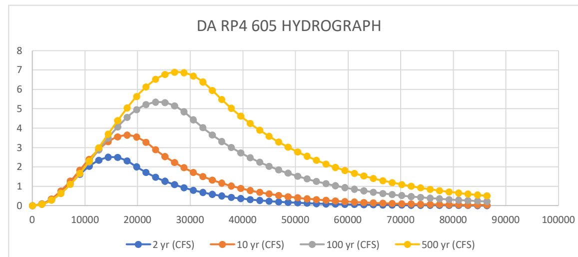
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP4 605 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	2.51	3.64	5.35	6.89
Tp=	15187.510	17922.133	24025.899	27549.799
1.25*Tp=	18984.387	22402.666	30032.374	34437.249

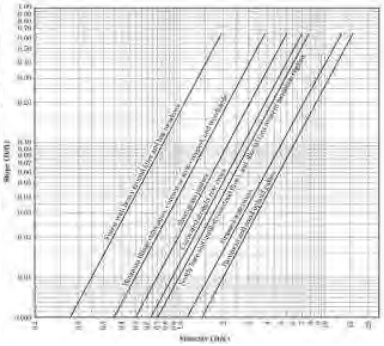
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.086082582	0.089729907	0.073696796	0.072337552	0.5
3600.00	0.332533541	0.350060385	0.290723422	0.286313197	1
5400.00	0.70557915	0.755288404	0.639112676	0.632943407	1.5
7200.00	1.154097109	1.26540486	1.099653803	1.097675302	2
9000.00	1.616622358	1.830044772	1.646951813	1.660997635	2.5
10800.00	2.029770275	2.393459932	2.250827798	2.29925995	3
12600.00	2.336922924	2.900023055	2.877983049	2.98566552	3.5
14400.00	2.495987998	3.299719988	3.493835199	3.691396378	4
16200.00	2.485167164	3.553087725	4.064425154	4.386823205	4.5
18000.00	2.305943312	3.635110683	4.55828965	5.042749286	5
19800.00	2.002480444	3.537690545	4.948196191	5.631636301	5.5
21600.00	1.716543468	3.270445825	5.212644693	6.12876049	6
23400.00	1.471435832	2.889888338	5.337053032	6.513250651	6.5
25200.00	1.261327456	2.536164872	5.31456113	6.768964396	7
27000.00	1.081220749	2.225737297	5.146409226	6.885165871	7.5
28800.00	0.92683173	1.953306178	4.841869491	6.856976487	8
30600.00	0.794488134	1.714220736	4.43048787	6.685579744	8.5
32400.00	0.681042065	1.504399445	4.01932834	6.378171542	9
34200.00	0.583795119	1.320260363	3.646325366	5.947658069	9.5
36000.00	0.500434199	1.158659977	3.307937932	5.471126027	10
37800.00	0.428976502	1.016839541	3.000953635	5.025612576	10.5
39600.00	0.367722349	0.892377982	2.722458191	4.616377258	11
41400.00	0.315214761	0.783150567	2.469807769	4.240465946	11.5
43200.00	0.270204806	0.687292631	2.240603891	3.895165069	12
45000.00	0.231621885	0.603167743	2.032670663	3.577982021	12.5
46800.00	0.198548273	0.529339775	1.84403412	3.286627168	13
48600.00	0.170197288	0.464548379	1.672903485	3.018997323	13.5
50400.00	0.14589458	0.407687475	1.51765417	2.77316056	14
52200.00	0.125062089	0.357786368	1.37681235	2.547342269	14.5
54000.00	0.107204299	0.313993176	1.249040977	2.339912347	15
55800.00	0.091896448	0.275560288	1.133127083	2.149373431	15.5
57600.00	0.078774426	0.241831601	1.027970266	1.974350087	16
59400.00	0.067526115	0.212231318	0.932572246	1.813578882	16.5
61200.00	0.057883967	0.186254122	0.846027383	1.665899267	17
63000.00	0.049618635	0.163456544	0.767514083	1.530245194	17.5
64800.00	0.042533521	0.143449399	0.696287	1.405637423	18
66600.00	0.0364601	0.125891136	0.631669955	1.291176456	18.5
68400.00	0.031253911	0.110482012	0.573049521	1.186036038	19
70200.00	0.026791122	0.09695897	0.519869199	1.089457197	19.5
72000.00	0.02296558	0.085091154	0.471624134	1.000742766	20
73800.00	0.019686293	0.074675964	0.427856322	0.919252345	20.5
75600.00	0.01687526	0.065535596	0.388150265	0.844397684	21
77400.00	0.014465618	0.057514014	0.352129022	0.775638433	21.5
79200.00	0.012400052	0.050474276	0.319450634	0.712478244	22
81000.00	0.010629431	0.044296205	0.289804875	0.654461185	22.5
82800.00	0.00911164	0.038874332	0.262910312	0.601168452	23
84600.00	0.007810576	0.034116098	0.238511627	0.552215342	23.5
86400.00	0.006695293	0.029940275	0.216377196	0.507248481	24



DA RP4 CVTR 2B DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1303 (ft)
L=	100 (ft)	S=	0.0051 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0051 (ft/ft)		
T_{OL}=	13.69 (min)	T_1=	43.43 (min)

Tc= 57.12 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	6.37 (in/hr)
I (100-YR)=	4.8 (in/hr)
I (10-YR)=	3.2 (in/hr)
I (2-YR)=	2.2 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4-1/2 acre; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
6.37	4.8	3.2	2.2

A=	26.04 (Ac)
Q (500-YR)=	**66.32 (cfs)**
Q (100-YR)=	**50.00 (cfs)**
Q (10-YR)=	**33.33 (cfs)**
Q (2-YR)=	**22.92 (cfs)**

DA RP4 CVTR 2B EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	2313976.90	cft
Volume (100-yr) =	1.38*area*43560 =	1565337.31	cft
Volume (10-yr)=	0.70*area*43560=	794011.68	cft
Volume (2-yr)=	0.41*area*43560=	465063.984	cft
	A=	26.04 Ac	

Tp = time to Qp in seconds

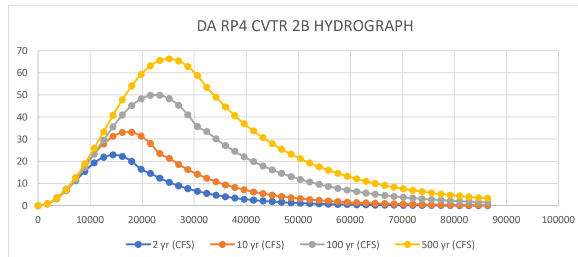
Tp = $\frac{V}{1.39\,Qp}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1 - \cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP4 CVTR 2B Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	22.92	33.33	50.00	66.32
Tp=	14600.719	17138.040	22524.281	25100.842
1.25*Tp=	18250.899	21422.549	28155.351	31376.052

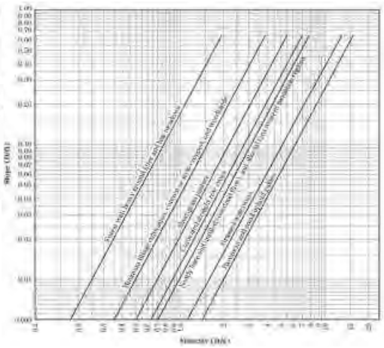
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.848641684	0.899020478	0.783687298	0.837966189	0.5
3600.00	3.268852328	3.499087167	3.085612785	3.309514399	1
5400.00	6.902111535	7.519680528	6.761448043	7.289733931	1.5
7200.00	11.21020272	12.52702131	11.58072189	12.57746666	2
9000.00	15.55494235	17.98087071	17.24127069	18.90547344	2.5
10800.00	19.29271795	23.29281639	23.38818371	25.95394027	3
12600.00	21.8698303	27.88975591	29.63605568	33.36664147	3.5
14400.00	22.90451619	31.27572842	35.5931513	40.76894315	4
16200.00	22.24350137	33.08542349	40.88596663	47.78673702	4.5
18000.00	19.98470595	33.12359427	45.18264748	54.0653476	5
19800.00	16.46273891	31.38612255	48.21379627	59.28745733	5.5
21600.00	14.53387148	28.06046303	49.78936301	63.18914363	6
23400.00	12.38165342	23.50541901	49.81056124	65.57321739	6.5
25200.00	10.54814208	21.38802216	48.27606185	66.31918882	7
27000.00	8.986142451	18.65832977	45.28207643	65.38935694	7.5
28800.00	7.655448279	16.27702024	41.01632485	62.83071494	8
30600.00	6.52180718	14.19963047	35.74626545	58.7725752	8.5
32400.00	5.556038959	12.38737205	33.44329499	53.42003389	9
34200.00	4.733284512	10.80640701	30.14332263	48.96652052	9.5
36000.00	4.032365942	9.427216037	27.16897062	44.60798351	10
37800.00	3.435241438	8.224047284	24.48810882	40.63740229	10.5
39600.00	2.926540871	7.174435535	22.07177747	37.02024469	11
41400.00	2.493170167	6.258782747	19.89387437	33.72505229	11.5
43200.00	2.12397426	5.459992118	17.93087295	30.72316677	12
45000.00	1.809449959	4.763148863	16.16156807	27.98848075	12.5
46800.00	1.541501334	4.15524173	14.56684698	25.49721064	13
48600.00	1.313231323	3.624920054	13.12948285	23.22768985	13.5
50400.00	1.1187642	3.162281824	11.83394871	21.16018036	14
52200.00	0.953094335	2.758688795	10.66624966	19.27670103	14.5
54000.00	0.811957348	2.406605195	9.613771757	17.56087124	15
55800.00	0.691720336	2.099457023	8.6651457	15.9977684	15.5
57600.00	0.589288372	1.831509299	7.810124048	14.57379821	16
59400.00	0.502024832	1.597758979	7.039470514	13.27657639	16.5
61200.00	0.427683532	1.393841548	6.344860185	12.094821	17
63000.00	0.364350907	1.215949518	5.718789601	11.01825431	17.5
64800.00	0.310396763	1.060761342	5.154495693	10.03751341	18
66600.00	0.264432305	0.925379391	4.645882731	9.144068807	18.5
68400.00	0.225274399	0.807275853	4.187456472	8.330150197	19
70200.00	0.191915109	0.704245533	3.774264811	7.588678932	19.5
72000.00	0.16349576	0.61436468	3.401844283	6.913206433	20
73800.00	0.139284831	0.535955065	3.066171853	6.297858114	20.5
75600.00	0.118659127	0.467552645	2.76362145	5.737282289	21
77400.00	0.101087738	0.407880232	2.490924804	5.226603627	21.5
79200.00	0.086118371	0.355823639	2.245136133	4.761380754	22
81000.00	0.073365711	0.31041088	2.023600331	4.337567627	22.5
82800.00	0.062501503	0.270794023	1.823924278	3.951478339	23
84600.00	0.053246098	0.236233353	1.643950991	3.599755072	23.5
86400.00	0.045361261	0.206083562	1.481736328	3.279338887	24



DA RP4 202A DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	602 (ft)
L=	100 (ft)	S=	0.0051 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0051 (ft/ft)		
T_{OL}=	13.69 (min)	T_1=	20.07 (min)

Tc= 33.76 (min)

Intensity:

SEE FIG. 2.1-2.1a

I (500-YR)=	8.38 (in/hr)
I (100-YR)=	6.4 (in/hr)
I (10-YR)=	4.3 (in/hr)
I (2-YR)=	3 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4-1/2 acre; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
8.38	6.4	4.3	3

A= 5.13 (Ac)

Q (500-YR)=	**17.19 (cfs)**
Q (100-YR)=	**13.13 (cfs)**
Q (10-YR)=	**8.82 (cfs)**
Q (2-YR)=	**6.16 (cfs)**

DA RP4 202A EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		455864.11	cft
Volume (100-yr) = 1.38*area*43560 =		308378.66	cft
Volume (10-yr)= 0.70*area*43560=		156423.96	cft
Volume (2-yr)= 0.41*area*43560=		91619.748	cft
A=	5.13 Ac		

Tp = time to Qp in seconds

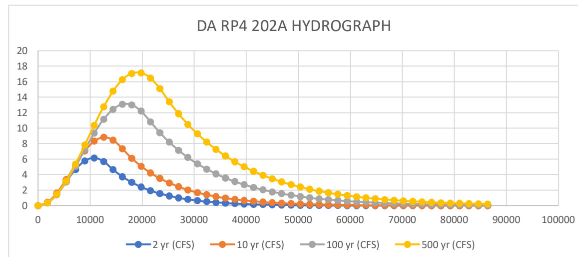
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP4 202A Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	6.16	8.82	13.13	17.19
Tp=	10707.194	12753.890	16893.210	19079.353
1.25*Tp=	13383.993	15942.362	21116.513	23849.191

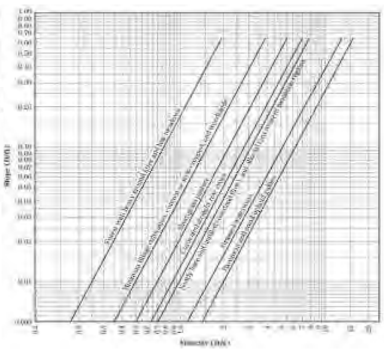
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.419385753	0.426597945	0.364467337	0.374742449	0.5
3600.00	1.563258145	1.623892209	1.417409905	1.466290791	1
5400.00	3.119905816	3.360338627	3.041940773	3.179457751	1.5
7200.00	4.665133927	5.300126656	5.057721113	5.364848485	2
9000.00	5.777859532	7.068121618	7.240979578	7.831888392	2.5
10800.00	6.154858936	8.322411814	9.349353106	10.36544196	3
12600.00	5.69339778	8.820430662	11.1487916	12.74457344	3.5
14400.00	4.650358801	8.465866536	12.43953977	14.76181328	4
16200.00	3.737435682	7.345173106	13.07831194	16.24125029	4.5
18000.00	3.003730696	6.113931023	12.99419815	17.05387179	5
19800.00	2.414061101	5.089077141	12.19653584	17.12881401	5.5
21600.00	1.940150961	4.23601543	10.81334494	16.45954171	6
23400.00	1.559275261	3.525949052	9.414620242	15.10441803	6.5
25200.00	1.253170185	2.93490827	8.196822984	13.39818503	7
27000.00	1.007157332	2.442941298	7.136549887	11.85172686	7.5
28800.00	0.809439855	2.033440788	6.213424932	10.48376547	8
30600.00	0.65053677	1.692583216	5.409707772	9.273698235	8.5
32400.00	0.522828333	1.40886224	4.709952803	8.203300539	9
34200.00	0.420190646	1.172700279	4.100712339	7.256451313	9.5
36000.00	0.33770201	0.976125207	3.570278172	6.418890227	10
37800.00	0.271406916	0.81250123	3.108456573	5.67800292	10.5
39600.00	0.218126372	0.676304888	2.70637239	5.022631019	11
41400.00	0.175305459	0.562938596	2.356298485	4.442904082	11.5
43200.00	0.140890823	0.468575444	2.051507239	3.930090944	12
45000.00	0.113232207	0.39003001	1.786141262	3.476468216	12.5
46800.00	0.09100332	0.324650835	1.55510083	3.075203966	13
48600.00	0.073138239	0.27023091	1.353945873	2.720254823	13.5
50400.00	0.058780296	0.22493318	1.178810655	2.406274961	14
52200.00	0.047240995	0.187228528	1.026329477	2.128535583	14.5
54000.00	0.037967001	0.155844156	0.893572001	1.882853707	15
55800.00	0.030513608	0.129720621	0.777986931	1.66552916	15.5
57600.00	0.024523408	0.107976071	0.677352989	1.473288855	16
59400.00	0.019709159	0.089876473	0.589736219	1.303237495	16.5
61200.00	0.015840007	0.074810838	0.513452829	1.152813966	17
63000.00	0.012730417	0.062270595	0.447036826	1.019752767	17.5
64800.00	0.010231278	0.051832424	0.389211847	0.902049884	18
66600.00	0.008222751	0.043143961	0.338866627	0.797932617	18.5
68400.00	0.006608523	0.035911911	0.295033649	0.705832873	19
70200.00	0.005311188	0.029892141	0.256870541	0.624363554	19.5
72000.00	0.004268536	0.02488144	0.223643896	0.552297665	20
73800.00	0.003430569	0.020710664	0.194715175	0.488549834	20.5
75600.00	0.002757106	0.017239018	0.169528433	0.432159966	21
77400.00	0.002215852	0.01434931	0.14759964	0.382278784	21.5
79200.00	0.001780853	0.011943992	0.128507374	0.338155035	22
81000.00	0.001431249	0.009941868	0.111884725	0.29912418	22.5
82800.00	0.001150277	0.008275353	0.097412244	0.264598382	23
84600.00	0.000924464	0.006888188	0.084811803	0.234057654	23.5
86400.00	0.00074298	0.005733549	0.073841251	0.207042027	24



DA RP4 CVTR 7 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	897 (ft)
L=	100 (ft)	S=	0.0051 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0051 (ft/ft)		
T_{OL}=	13.69 (min)	T_1=	29.90 (min)

Tc= 43.59 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	7.53 (in/hr)
I (100-YR)=	5.5 (in/hr)
I (10-YR)=	3.8 (in/hr)
I (2-YR)=	2.6 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4-1/2 acre; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
7.53	5.5	3.8	2.6

A=	5.17 (Ac)
Q (500-YR)=	**15.57 (cfs)**
Q (100-YR)=	**11.37 (cfs)**
Q (10-YR)=	**7.86 (cfs)**
Q (2-YR)=	**5.38 (cfs)**

DA RP4 CVTR 7 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		459418.61	cft
Volume (100-yr) = 1.38*area*43560 =		310783.18	cft
Volume (10-yr)= 0.70*area*43560=		157643.64	cft
Volume (2-yr)= 0.41*area*43560=		92334.132	cft
A=	5.17 Ac		

Tp = time to Qp in seconds

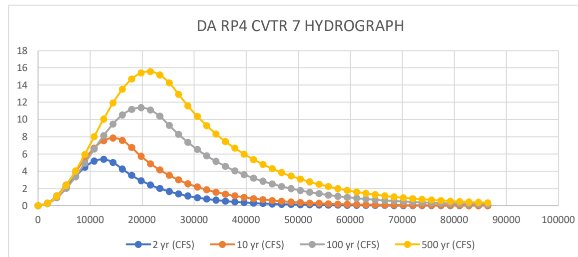
Tp = $\dfrac{V}{1.39\ Qp}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1 - \cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP4 CVTR 7 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	5.38	7.86	11.37	15.57
Tp=	12354.455	14432.033	19657.554	21221.755
1.25*Tp=	15443.069	18040.042	24571.942	26527.193

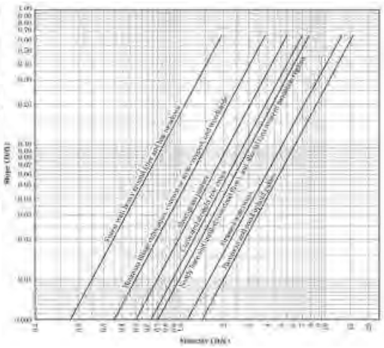
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.276736149	0.297783296	0.233691019	0.274829559	0.5
3600.00	1.049971754	1.145996825	0.915558346	1.079919457	1
5400.00	2.160517524	2.41607303	1.989563202	2.358442617	1.5
7200.00	3.379740695	3.915500725	3.367439263	4.02015479	2
9000.00	4.456634629	5.417004881	4.935946768	5.947764422	2.5
10800.00	5.169494607	6.692995731	6.566179047	8.005211649	3
12600.00	5.371561127	7.550065578	8.124156624	10.04727206	3.5
14400.00	5.021233896	7.858304474	9.481838222	11.9298073	4
16200.00	4.243207603	7.570991257	10.52764375	13.51993908	4.5
18000.00	3.511046466	6.740028943	11.17562442	14.70542833	5
19800.00	2.905218986	5.731199834	11.37252641	15.40259757	5.5
21600.00	2.403926418	4.873369509	11.10216747	15.56223729	6
23400.00	1.98913137	4.143936881	10.38676685	15.17307935	6.5
25200.00	1.645908785	3.523683736	9.324725076	14.26259237	7
27000.00	1.361908905	2.996268386	8.27824736	12.92989968	7.5
28800.00	1.126912915	2.547795124	7.349211777	11.57998555	8
30600.00	0.932465243	2.166448114	6.524438254	10.37100586	8.5
32400.00	0.771569318	1.842180082	5.792225863	9.288246703	9
34200.00	0.63843582	1.566447603	5.142186827	8.318530328	9.5
36000.00	0.528274372	1.331986007	4.565099151	7.450054787	10
37800.00	0.437121169	1.132617982	4.052775785	6.672250282	10.5
39600.00	0.361696358	0.963090819	3.597948483	5.975650529	11
41400.00	0.299286021	0.818938017	3.194164685	5.351777547	11.5
43200.00	0.247644524	0.696361613	2.835695975	4.793038477	12
45000.00	0.204913714	0.592132111	2.517456818	4.292633175	12.5
46800.00	0.169556062	0.503503395	2.234932407	3.844471448	13
48600.00	0.140299337	0.428140383	1.984114614	3.443098935	13.5
50400.00	0.11609083	0.364057501	1.761445129	3.083630725	14
52200.00	0.096059475	0.309566369	1.563764977	2.761691902	14.5
54000.00	0.079484511	0.263231321	1.388269701	2.473364304	15
55800.00	0.06576954	0.223831576	1.232469578	2.215138834	15.5
57600.00	0.054421073	0.190329078	1.094154299	1.983872755	16
59400.00	0.045030772	0.161841142	0.971361608	1.776751437	16.5
61200.00	0.037260759	0.137617202	0.862349463	1.591254107	17
63000.00	0.030831453	0.117019035	0.765571329	1.425123166	17.5
64800.00	0.025511517	0.099503946	0.679654229	1.276336714	18
66600.00	0.021109531	0.084610467	0.603379272	1.143083943	18.5
68400.00	0.017467103	0.071946204	0.535664357	1.023743097	19
70200.00	0.014453172	0.061177493	0.475548825	0.916861737	19.5
72000.00	0.011959292	0.052020613	0.422179825	0.821139059	20
73800.00	0.009895728	0.04423431	0.374800221	0.735410071	20.5
75600.00	0.008188231	0.037613439	0.332737847	0.658631405	21
77400.00	0.00677536	0.031983562	0.295395969	0.589868626	21.5
79200.00	0.005606278	0.02719635	0.262244826	0.528284854	22
81000.00	0.004638921	0.023125675	0.232814106	0.473130583	22.5
82800.00	0.00383848	0.019664287	0.206686283	0.423734558	23
84600.00	0.003176154	0.01672099	0.183490683	0.379495601	23.5
86400.00	0.002628112	0.014218238	0.162898236	0.339875304	24



DA RP4 205 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	79 (ft)
L=	100 (ft)	S=	0.0051 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0051 (ft/ft)		
T_{OL}=	13.69 (min)	T_1=	2.63 (min)

Tc= 16.32 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	11.98 (in/hr)
I (100-YR)=	9.4 (in/hr)
I (10-YR)=	6.3 (in/hr)
I (2-YR)=	4.4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4-1/2 acre; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
11.98	9.4	6.3	4.4

A= 1.08 (Ac)

Q (500-YR)=	**5.18 (cfs)**
Q (100-YR)=	**4.06 (cfs)**
Q (10-YR)=	**2.72 (cfs)**
Q (2-YR)=	**1.90 (cfs)**

DA RP4 205 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		95971.39	cft
Volume (100-yr) = 1.38*area*43560 =		64921.82	cft
Volume (10-yr)= 0.70*area*43560=		32931.36	cft
Volume (2-yr)= 0.41*area*43560=		19288.368	cft
A=	1.08 Ac		

Tp = time to Qp in seconds

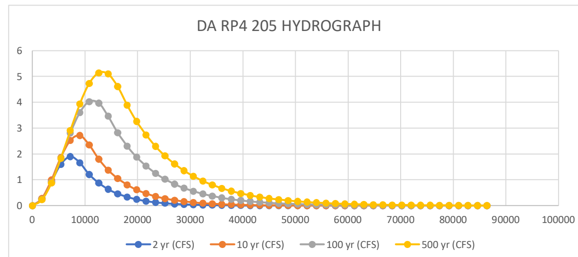
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP4 205 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	1.90	2.72	4.06	5.18
Tp=	7300.360	8705.036	11501.760	13338.574
1.25*Tp=	9125.450	10881.295	14377.200	16673.217

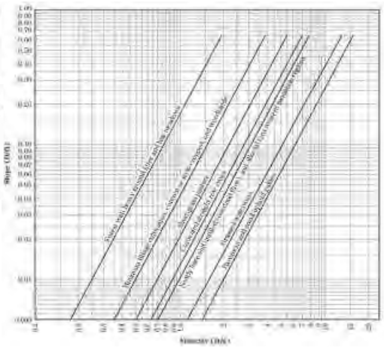
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.271149041	0.277166969	0.240492668	0.229123195	0.5
3600.00	0.929878566	0.995761455	0.904999904	0.87592507	1
5400.00	1.600317618	1.863057627	1.836105319	1.825885257	1.5
7200.00	1.899913785	2.525754704	2.813237573	2.910807294	2
9000.00	1.657717544	2.71389716	3.604921938	3.938598867	2.5
10800.00	1.205574593	2.350843498	4.023614792	4.727282972	3
12600.00	0.874961094	1.799348886	3.970131186	5.137218098	3.5
14400.00	0.635014143	1.375221696	3.461414745	5.095822635	4
16200.00	0.460869591	1.051066155	2.824214497	4.610425912	4.5
18000.00	0.334481968	0.803317796	2.304314309	3.88704854	5
19800.00	0.242754542	0.613966569	1.880120806	3.261603978	5.5
21600.00	0.176182197	0.4692476	1.534015663	2.736796415	6
23400.00	0.12786647	0.358640554	1.251623858	2.296432881	6.5
25200.00	0.092800717	0.274104858	1.021216613	1.926925929	7
27000.00	0.067351301	0.209495196	0.833224267	1.6168744	7.5
28800.00	0.048881063	0.160114773	0.679838803	1.356711634	8
30600.00	0.035476053	0.122373883	0.554689554	1.138410292	8.5
32400.00	0.025747197	0.093528954	0.452578612	0.955234672	9
34200.00	0.018686356	0.071483106	0.369264931	0.801532879	9.5
36000.00	0.01356186	0.054633717	0.301288187	0.672562434	10
37800.00	0.009842693	0.041755923	0.245825053	0.564343946	10.5
39600.00	0.007143459	0.031913572	0.200571943	0.473538326	11
41400.00	0.005184456	0.024391177	0.163649325	0.397343761	11.5
43200.00	0.003762685	0.018641897	0.133523669	0.333409264	12
45000.00	0.002730817	0.014247788	0.108943744	0.279762131	12.5
46800.00	0.001981925	0.01088942	0.088888655	0.234747076	13
48600.00	0.001438407	0.008322659	0.07252544	0.196975157	13.5
50400.00	0.001043942	0.006360913	0.059174475	0.165280919	14
52200.00	0.000757654	0.004861573	0.048281244	0.138686435	14.5
54000.00	0.000549877	0.003715644	0.039393312	0.116371129	15
55800.00	0.00039908	0.002839824	0.032141529	0.097646462	15.5
57600.00	0.000289638	0.002170445	0.026224702	0.081934683	16
59400.00	0.000210208	0.001658846	0.021397085	0.068751003	16.5
61200.00	0.000152561	0.001267837	0.017458167	0.057688641	17
63000.00	0.000110723	0.000968993	0.014244352	0.048406264	17.5
64800.00	8.03589E-05	0.00074059	0.011622157	0.040617467	18
66600.00	5.83215E-05	0.000566025	0.009482673	0.034081924	18.5
68400.00	4.23275E-05	0.000432606	0.007737039	0.02859798	19
70200.00	3.07198E-05	0.000330636	0.006312754	0.023996429	19.5
72000.00	2.22953E-05	0.000252701	0.00515066	0.02013529	20
73800.00	1.61811E-05	0.000193137	0.004202492	0.016895426	20.5
75600.00	1.17436E-05	0.000147612	0.003428869	0.014176872	21
77400.00	8.52308E-06	0.000112818	0.00279766	0.011895746	21.5
79200.00	6.18573E-06	8.62257E-05	0.002282648	0.009981664	22
81000.00	4.48937E-06	6.59013E-05	0.001862443	0.008375567	22.5
82800.00	3.25822E-06	5.03676E-05	0.001519592	0.007027898	23
84600.00	2.36469E-06	3.84954E-05	0.001239856	0.005897076	23.5
86400.00	1.71621E-06	2.94216E-05	0.001011615	0.004948209	24



DA RP4 CVTR 9 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	849 (ft)
L=	100 (ft)	S=	0.0053 (ft/ft)
P_2=	4.89 (in)	V=	0.525 (ft/s)
S=	0.0053 (ft/ft)		
T_{OL}=	13.48 (min)	T_1=	26.95 (min)

Tc= 40.43 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	7.80 (in/hr)
I (100-YR)=	5.8 (in/hr)
I (10-YR)=	4.7 (in/hr)
I (2-YR)=	2.7 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.28 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and MOSTLY golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
7.80	5.8	4.7	2.7

A=	5.95 (Ac)
Q (500-YR)=	**13.00 (cfs)**
Q (100-YR)=	**9.66 (cfs)**
Q (10-YR)=	**7.83 (cfs)**
Q (2-YR)=	**4.50 (cfs)**

DA RP4 CVTR 9 EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	528731.28	cft
Volume (100-yr) =	1.38*area*43560 =	357671.16	cft
Volume (10-yr)=	0.70*area*43560=	181427.4	cft
Volume (2-yr)=	0.41*area*43560=	106264.62	cft
	A=	5.95 Ac	

Tp = time to Qp in seconds

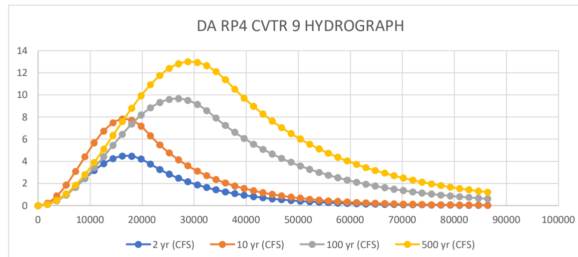
Tp = $\frac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA RP4 CVTR 9 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	4.50	7.83	9.66	13.00
Tp=	16995.546	16669.218	26629.691	29261.995
1.25*Tp=	21244.433	20836.522	33287.114	36577.494

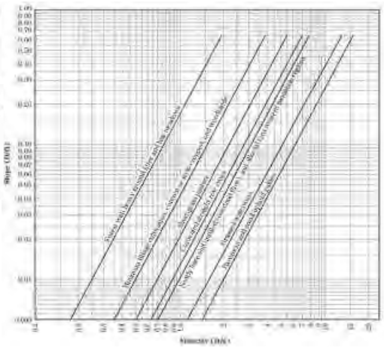
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.123351077	0.223130096	0.108523276	0.120987688	0.5
3600.00	0.479874016	0.86708704	0.429217786	0.479446464	1
5400.00	1.030462074	1.85846981	0.947676603	1.062031158	1.5
7200.00	1.714721646	3.084276267	1.640608402	1.847052549	2
9000.00	2.457596792	4.404783642	2.47688381	2.805284838	2.5
10800.00	3.177602077	5.669474736	3.418933863	3.901053706	3
12600.00	3.79576064	6.734194539	4.424437761	5.093564442	3.5
14400.00	4.244267115	7.477581638	5.448224092	6.338420703	4
16200.00	4.473925152	7.814901526	6.444300123	7.58927736	4.5
18000.00	4.459543726	7.707705009	7.367917984	8.799565893	5
19800.00	4.202700327	7.168210815	8.177584922	9.924228103	5.5
21600.00	3.741004372	6.304856767	8.836927339	10.9213936	6
23400.00	3.259816794	5.479104852	9.316324834	11.75393861	6.5
25200.00	2.840522083	4.761502297	9.594240881	12.39086807	7
27000.00	2.475159254	4.137884697	9.658190337	12.80846952	7.5
28800.00	2.156791305	3.595942772	9.505300327	12.99119597	8
30600.00	1.87937351	3.124979396	9.142439305	12.93224464	8.5
32400.00	1.637638645	2.715698453	8.585908495	12.63381023	9
34200.00	1.426996984	2.360021349	7.897867857	12.10700327	9.5
36000.00	1.243449158	2.050927547	7.233485371	11.37143639	10
37800.00	1.083510214	1.782315997	6.624991903	10.52180755	10.5
39600.00	0.944143454	1.548884707	6.067685973	9.713171066	11
41400.00	0.822702778	1.346026091	5.557261594	8.96668103	11.5
43200.00	0.716882437	1.169736024	5.089775008	8.277561277	12
45000.00	0.624673263	1.016534802	4.661614214	7.641402707	12.5
46800.00	0.544324516	0.883398461	4.269471056	7.054135073	13
48600.00	0.474310645	0.767699089	3.910315667	6.512000943	13.5
50400.00	0.413302326	0.667152952	3.58137306	6.011531654	14
52200.00	0.360141216	0.579775419	3.280101681	5.549525122	14.5
54000.00	0.313817966	0.503841789	3.004173778	5.123025353	15
55800.00	0.273453055	0.437853244	2.751457415	4.729303534	15.5
57600.00	0.238280091	0.38050727	2.519999995	4.365840568	16
59400.00	0.207631258	0.330671941	2.308013178	4.03031096	16.5
61200.00	0.180924638	0.287363584	2.113859064	3.720567936	17
63000.00	0.157653163	0.249727356	1.936037535	3.434629711	17.5
64800.00	0.137374987	0.217020373	1.773174664	3.170666805	18
66600.00	0.119705097	0.188597049	1.624012104	2.926990341	18.5
68400.00	0.104308	0.163896349	1.487397359	2.702041238	19
70200.00	0.090891359	0.142430719	1.362274886	2.494380233	19.5
72000.00	0.079200436	0.123776458	1.247677935	2.302678679	20
73800.00	0.069013261	0.107565361	1.14272108	2.125710037	20.5
75600.00	0.060136414	0.093477443	1.04659338	1.962342034	21
77400.00	0.052401354	0.081234631	0.958552111	1.811529414	21.5
79200.00	0.045661217	0.070595269	0.877917027	1.672307254	22
81000.00	0.039788032	0.061349353	0.804065108	1.543784787	22.5
82800.00	0.034670287	0.053314381	0.736425742	1.425139707	23
84600.00	0.030210813	0.046331756	0.674476318	1.315612902	23.5
86400.00	0.02632494	0.04026365	0.617738188	1.214503602	24



DA RP4 402 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	335 (ft)
L=	100 (ft)	S=	0.0040 (ft/ft)
P_2=	4.89 (in)	V=	0.5 (ft/s)
S=	0.0040 (ft/ft)		
T_{OL}=	15.09 (min)	T_1=	11.17 (min)

Tc= 26.26 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	9.60 (in/hr)
I (100-YR)=	7.3 (in/hr)
I (10-YR)=	5 (in/hr)
I (2-YR)=	3.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4-1/2 acre; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
9.60	7.3	5	3.5

A=	1.08 (Ac)
Q (500-YR)=	**4.15 (cfs)**
Q (100-YR)=	**3.15 (cfs)**
Q (10-YR)=	**2.16 (cfs)**
Q (2-YR)=	**1.51 (cfs)**

DA RP4 402 EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	95971.39	cft
Volume (100-yr) =	1.38*area*43560 =	64921.82	cft
Volume (10-yr)=	0.70*area*43560=	32931.36	cft
Volume (2-yr)=	0.41*area*43560=	19288.368	cft
	A=	1.08 Ac	

Tp = time to Qp in seconds

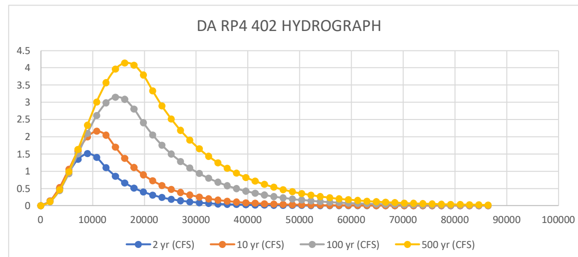
$$Tp = \frac{V}{1.39\,Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA RP4 402 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	1.51	2.16	3.15	4.15
Tp=	9177.595	10968.345	14810.486	16650.500
1.25*Tp=	11471.994	13710.432	18513.107	20813.125

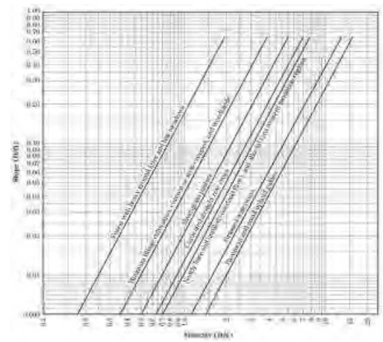
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.13902565	0.140383187	0.113545593	0.118427208	0.5
3600.00	0.504969976	0.525037489	0.437829502	0.460179907	1
5400.00	0.963241318	1.053964765	0.926148267	0.986216846	1.5
7200.00	1.345290812	1.589660391	1.50817408	1.636444454	2
9000.00	1.510603433	1.992860185	2.100083417	2.336581827	2.5
10800.00	1.398378402	2.158744753	2.616629328	3.006646455	3
12600.00	1.101338581	2.044189273	2.983418723	3.570091286	3.5
14400.00	0.853472101	1.701062296	3.147626488	3.962549334	4
16200.00	0.661390276	1.374254953	3.085603375	4.139186856	4.5
18000.00	0.51253825	1.110233693	2.80628197	4.079825079	5
19800.00	0.397186755	0.896936082	2.407192586	3.791245392	5.5
21600.00	0.307796186	0.724617115	2.055388742	3.332572968	6
23400.00	0.238523795	0.585403992	1.754999956	2.89564635	6.5
25200.00	0.184841799	0.472936433	1.498512073	2.516004261	7
27000.00	0.143241435	0.382076093	1.279509111	2.186136245	7.5
28800.00	0.111003619	0.308671801	1.092512763	1.89951653	8
30600.00	0.086021223	0.24936991	0.93284536	1.650474921	8.5
32400.00	0.066661348	0.201461072	0.79651286	1.434084633	9
34200.00	0.051658592	0.162756459	0.680104939	1.246064819	9.5
36000.00	0.040032346	0.13148776	0.580709679	1.082695887	10
37800.00	0.031022695	0.106226389	0.495840733	0.940745911	10.5
39600.00	0.024040749	0.085818221	0.423375125	0.817406698	11
41400.00	0.018630155	0.069330862	0.361500144	0.710238228	11.5
43200.00	0.014437266	0.056011047	0.308668002	0.617120391	12
45000.00	0.011188025	0.04525023	0.263557116	0.536211037	12.5
46800.00	0.008670056	0.036556775	0.225039049	0.465909538	13
48600.00	0.006718779	0.029533504	0.192150279	0.404825121	13.5
50400.00	0.005206656	0.02385954	0.164068103	0.351749353	14
52200.00	0.004034849	0.019275655	0.140090051	0.305632236	14.5
54000.00	0.003126769	0.015572425	0.119616318	0.265561438	15
55800.00	0.002423061	0.012580658	0.102134758	0.230744238	15.5
57600.00	0.001877728	0.010163667	0.087208075	0.200491847	16
59400.00	0.001455128	0.008211028	0.074462882	0.174205783	16.5
61200.00	0.001127638	0.006633529	0.063580359	0.15136603	17
63000.00	0.000873853	0.005359098	0.054288284	0.131520749	17.5
64800.00	0.000677184	0.004329511	0.046354217	0.114277341	18
66600.00	0.000524777	0.003497727	0.03957969	0.09929468	18.5
68400.00	0.000406671	0.002825745	0.033795239	0.086276363	19
70200.00	0.000315146	0.002282864	0.028856168	0.074964851	19.5
72000.00	0.00024422	0.001844281	0.024638927	0.065136368	20
73800.00	0.000189256	0.001489959	0.021038023	0.056596476	20.5
75600.00	0.000146662	0.001203709	0.01796338	0.049176231	21
77400.00	0.000113654	0.000972453	0.015338087	0.042728839	21.5
79200.00	8.80754E-05	0.000785625	0.013096473	0.037126751	22
81000.00	6.82532E-05	0.000634691	0.011182463	0.032259141	22.5
82800.00	5.28922E-05	0.000512755	0.00954818	0.028029713	23
84600.00	4.09883E-05	0.000414245	0.008152743	0.024354796	23.5
86400.00	3.17635E-05	0.00033466	0.006961244	0.02116169	24



DA FE 206E DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.011	D=	475 (ft)
L=	100 (ft)	S=	0.0073 (ft/ft)
P_2=	4.89 (in)	V=	0.6 (ft/s)
S=	0.0073 (ft/ft)		
T_{OL}=	1.47 (min)	T_1=	13.19 (min)

Tc= 14.66 (min)

Intensity:

SEE FIG. 2.1-2.1a	
I (500-YR)=	12.30 (in/hr)
I (100-YR)=	9.7 (in/hr)
I (10-YR)=	6.6 (in/hr)
I (2-YR)=	4.6 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4-1/2 acre; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
12.30	9.7	6.6	4.6

A= 3.92 (Ac)

Q (500-YR)=	**19.29 (cfs)**
Q (100-YR)=	**15.21 (cfs)**
Q (10-YR)=	**10.35 (cfs)**
Q (2-YR)=	**7.21 (cfs)**

DA FE 206E EXISTING CALCULATIONS			
Volume (500-yr) = 2.04*area*43560 =		348340.61	cft
Volume (100-yr) = 1.38*area*43560 =		235642.18	cft
Volume (10-yr)= 0.70*area*43560=		119528.64	cft
Volume (2-yr)= 0.41*area*43560=		70009.632	cft
A=	3.92 Ac		

Tp = time to Qp in seconds

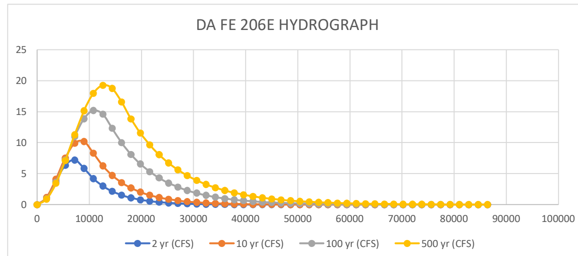
Tp = $\dfrac{V}{1.39\,Qp}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA FE 206E Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	7.21	10.35	15.21	19.29
Tp=	6982.953	8309.353	11146.036	12993.859
1.25*Tp=	8728.691	10386.691	13932.545	16242.323

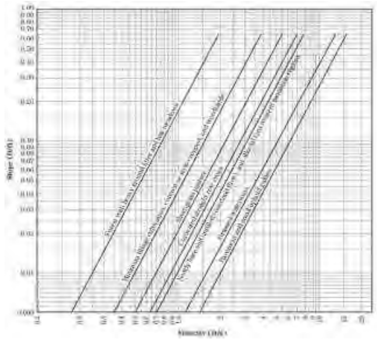
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	1.119297275	1.152693111	0.957913101	0.898864811	0.5
3600.00	3.782409601	4.097205109	3.590331789	3.427888739	1
5400.00	6.336267787	7.521647198	7.234088499	7.115599531	1.5
7200.00	7.195619776	9.900304007	10.97123607	11.27451721	2
9000.00	5.860427796	10.17339612	13.8603	15.12931724	2.5
10800.00	4.191760487	8.29027036	15.17345782	17.96137011	3
12600.00	2.998220709	6.25556953	14.5798945	19.24271151	3.5
14400.00	2.144523153	4.720250179	12.30837906	18.7344679	4
16200.00	1.533902939	3.561747918	9.977575673	16.55203168	4.5
18000.00	1.097147504	2.687579631	8.088150017	13.82424285	5
19800.00	0.784751509	2.027960551	6.556519624	11.54599592	5.5
21600.00	0.561305502	1.530233356	5.314929804	9.643206022	6
23400.00	0.401482333	1.154664533	4.308456382	8.053997507	6.5
25200.00	0.287166371	0.871272462	3.492576023	6.7266919	7
27000.00	0.205400133	0.657433984	2.83119665	5.618127381	7.5
28800.00	0.146915582	0.496078393	2.295060843	4.692255233	8
30600.00	0.105083614	0.37432469	1.860451577	3.918967599	8.5
32400.00	0.07516266	0.282453288	1.508143055	3.273118421	9
34200.00	0.05376124	0.213130104	1.222550214	2.733705735	9.5
36000.00	0.038453548	0.160821074	0.991039292	2.283188716	10
37800.00	0.027504488	0.121350374	0.803368948	1.906917283	10.5
39600.00	0.019673005	0.091567062	0.651237213	1.5926557	11
41400.00	0.014071417	0.06909354	0.527914239	1.330184693	11.5
43200.00	0.010064796	0.052135748	0.427944593	1.110969129	12
45000.00	0.007198999	0.039339947	0.34690592	0.927880476	12.5
46800.00	0.005149194	0.02968465	0.281213314	0.774964989	13
48600.00	0.00368304	0.022399075	0.227960734	0.647250102	13.5
50400.00	0.00263435	0.016901617	0.184792446	0.540582738	14
52200.00	0.001884259	0.012753413	0.149798816	0.451494245	14.5
54000.00	0.001347745	0.009623312	0.121431833	0.377087611	15
55800.00	0.000963995	0.00726144	0.098436625	0.314943254	15.5
57600.00	0.000689512	0.005479247	0.079795956	0.263040339	16
59400.00	0.000493184	0.004134463	0.064685219	0.219691068	16.5
61200.00	0.000352758	0.003119732	0.05243596	0.183485794	17
63000.00	0.000252315	0.002354048	0.042506308	0.15324718	17.5
64800.00	0.000180472	0.001776289	0.034457007	0.127991915	18
66600.00	0.000129086	0.00134033	0.02793198	0.106898739	18.5
68400.00	9.23304E-05	0.00101137	0.022642579	0.089281736	19
70200.00	6.60408E-05	0.000763147	0.018354817	0.074568031	19.5
72000.00	4.72367E-05	0.000575846	0.014879016	0.062279156	20
73800.00	3.37867E-05	0.000434515	0.012061419	0.052015498	20.5
75600.00	2.41665E-05	0.000327871	0.009777381	0.0434433	21
77400.00	1.72854E-05	0.000247401	0.007925866	0.036283808	21.5
79200.00	1.23637E-05	0.00018668	0.006424967	0.030304205	22
81000.00	8.84331E-06	0.000140863	0.005208289	0.025310047	22.5
82800.00	6.32531E-06	0.000106291	0.00422201	0.02113893	23
84600.00	4.52428E-06	8.02035E-05	0.0034225	0.017655216	23.5
86400.00	3.23606E-06	6.0519E-05	0.00277439	0.014745622	24



DA RP5 001 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.011	D=	3090 (ft)
L=	100 (ft)	S=	0.0073 (ft/ft)
P_2=	4.89 (in)	V=	0.6 (ft/s)
S=	0.0073 (ft/ft)		
T_{OL}=	1.47 (min)	T_1=	85.83 (min)

Tc= 87.30 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	5.48 (in/hr)
I (100-YR)=	3.9 (in/hr)
I (10-YR)=	2.5 (in/hr)
I (2-YR)=	1.6 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Single family residential districts; lots 1/4-1/2 acre; basin slope <1%

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
5.48	3.9	2.5	1.6

A= 41.38 (Ac)

Q (500-YR)=	**90.75 (cfs)**
Q (100-YR)=	**64.55 (cfs)**
Q (10-YR)=	**41.38 (cfs)**
Q (2-YR)=	**26.48 (cfs)**

DA RP5 001 EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	3677126.11	cft
Volume (100-yr) =	1.38*area*43560 =	2487467.66	cft
Volume (10-yr)=	0.70*area*43560=	1261758.96	cft
Volume (2-yr)=	0.41*area*43560=	739030.248	cft
A=	41.38 Ac		

Tp = time to Qp in seconds

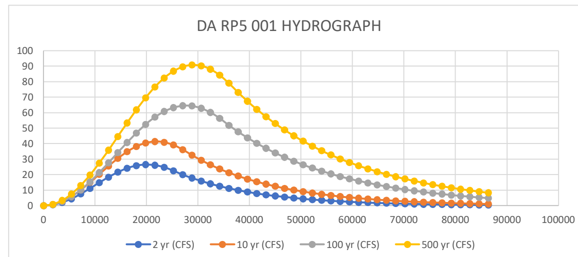
Tp = $\dfrac{V}{1.39\,Qp}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.8t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA RP5 001 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	26.48	41.38	64.55	90.75
Tp=	20075.989	21936.691	27722.191	29149.110
1.25*Tp=	25094.987	27420.863	34652.739	36436.388

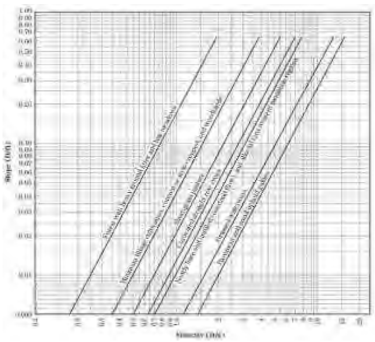
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.521828765	0.683638871	0.669172863	0.851216607	0.5
3600.00	2.046186305	2.6893779	2.648944099	3.372931074	1
5400.00	4.452927983	5.88466985	5.8572222	7.470535464	1.5
7200.00	7.552362668	10.05835708	10.16097544	12.9902987	2
9000.00	11.10020354	14.93462569	15.38174804	19.72513412	2.5
10800.00	14.81682194	20.1912324	21.3030599	27.42236884	3
12600.00	18.40928675	25.48079965	27.67938294	35.79322334	3.5
14400.00	21.5944522	30.45377176	34.24632198	44.5236457	4
16200.00	24.12127447	34.78151487	40.73157791	53.28609399	4.5
18000.00	25.79059808	38.17803447	46.86623863	61.75182474	5
19800.00	26.47085267	40.41887498	52.39592952	69.60322653	5.5
21600.00	26.10842291	41.35595272	57.09136112	76.54573592	6
23400.00	24.73187426	40.92734186	60.75783668	82.31888863	6.5
25200.00	22.47907502	39.16136672	63.24332523	86.70609153	7
27000.00	20.00591004	36.17472997	64.44476561	89.54274859	7.5
28800.00	17.80484455	32.58794343	64.31233994	90.72243606	8
30600.00	15.84594197	29.29075052	62.85153925	90.20089525	8.5
32400.00	14.10255934	26.32716201	60.12293586	87.99769297	9
34200.00	12.550985	23.66342436	56.3503543	84.19548743	9.5
36000.00	11.17011606	21.26919917	51.78909556	78.93692714	10
37800.00	9.941171365	19.11721763	47.59704624	72.98239453	10.5
39600.00	8.847436107	17.18296994	43.74432081	67.35258936	11
41400.00	7.874034436	15.44442615	40.20345282	62.15706299	11.5
43200.00	7.007727159	13.88178528	36.94919909	57.36231548	12
45000.00	6.23673167	12.47724977	33.95835974	52.93743107	12.5
46800.00	5.550561693	11.21482277	31.20961278	48.8538788	13
48600.00	4.939884661	10.080126	28.68336213	45.08532857	13.5
50400.00	4.396394781	9.060235933	26.36159792	41.60748138	14
52200.00	3.912700073	8.143536611	24.22776805	38.39791262	14.5
54000.00	3.482221826	7.319587374	22.26666026	35.4359275	15
55800.00	3.099105123	6.579003924	20.46429362	32.70242761	15.5
57600.00	2.758139213	5.913351453	18.80781889	30.17978777	16
59400.00	2.454686632	5.315048571	17.2854269	27.85174241	16.5
61200.00	2.184620136	4.777280962	15.88626436	25.70328065	17
63000.00	1.944266562	4.293923768	14.60035653	23.72054957	17.5
64800.00	1.730356871	3.859471835	13.41853603	21.89076482	18
66600.00	1.539981688	3.468977014	12.33237756	20.20212824	18.5
68400.00	1.370551728	3.117991797	11.33413778	18.64375178	19
70200.00	1.219762581	2.802518669	10.41670016	17.20558726	19.5
72000.00	1.085563371	2.518964578	9.573524192	15.87836164	20
73800.00	0.966128861	2.26410001	8.798598792	14.65351717	20.5
75600.00	0.859834626	2.035022207	8.086399443	13.52315625	21
77400.00	0.765234965	1.829122107	7.431848809	12.47999049	21.5
79200.00	0.68104323	1.644054632	6.830280536	11.51729373	22
81000.00	0.606114334	1.477711969	6.277405986	10.62885865	22.5
82800.00	0.539429173	1.328199576	5.769283663	9.808956754	23
84600.00	0.480080764	1.193814593	5.302291115	9.052301457	23.5
86400.00	0.427261912	1.073026455	4.873099108	8.354013961	24



DA RP5 203 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + ...T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	522 (ft)
L=	100 (ft)	S=	0.0051 (ft/ft)
P_2=	4.89 (in)	V=	0.525 (ft/s)
S=	0.0051 (ft/ft)		
T_{OL}=	13.69 (min)	T_1=	16.57 (min)

Tc= 30.26 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	8.70 (in/hr)
I (100-YR)=	6.8 (in/hr)
I (10-YR)=	4.6 (in/hr)
I (2-YR)=	3.2 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
8.70	6.8	4.6	3.2

A= 1.82 (Ac)

Q (500-YR)=	**5.54 (cfs)**
Q (100-YR)=	**4.33 (cfs)**
Q (10-YR)=	**2.93 (cfs)**
Q (2-YR)=	**2.04 (cfs)**

DA RP5 203 EXISTING CALCULATIONS			
Volume (500-yr) = 2.04*area*43560 =		161729.57	cft
Volume (100-yr) = 1.38*area*43560 =		109405.30	cft
Volume (10-yr)= 0.70*area*43560=		55495.44	cft
Volume (2-yr)= 0.41*area*43560=		32504.472	cft
A=	1.82 Ac		

Tp = time to Qp in seconds

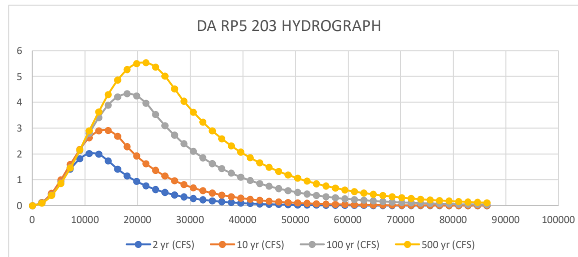
$$Tp = \frac{V}{1.39\ Qp}$$

$$q_i = \left[\frac{Q_p}{2}\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right]\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA RP5 203 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	2.04	2.93	4.33	5.54
Tp=	11471.994	13625.274	18170.848	20995.003
1.25*Tp=	14339.992	17031.592	22713.560	26243.754

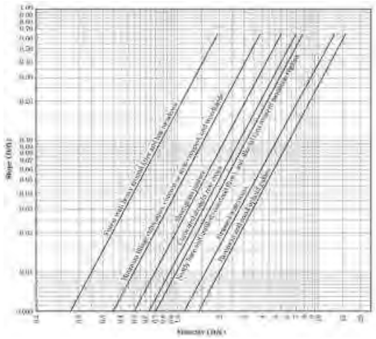
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.121334645	0.124379476	0.104033881	0.099904363	0.5
3600.00	0.456449066	0.476399544	0.40614102	0.392413509	1
5400.00	0.925553254	0.996290807	0.877298073	0.856435077	1.5
7200.00	1.416954527	1.595781062	1.472241124	1.458509221	2
9000.00	1.813651317	2.173083014	2.133814169	2.155221348	2.5
10800.00	2.021190987	2.630176712	2.798460084	2.896332673	3
12600.00	1.990158795	2.889452336	3.402326533	3.628402856	3.5
14400.00	1.7302043	2.906887543	3.887400245	4.2986435	4
16200.00	1.410951768	2.679522016	4.207080334	4.858724635	4.5
18000.00	1.150606833	2.283132341	4.330655228	5.268259716	5
19800.00	0.938300029	1.922850392	4.246253125	5.49771783	5.5
21600.00	0.765167492	1.619421514	3.961982508	5.530553123	6
23400.00	0.623980893	1.363874199	3.524368474	5.364397895	6.5
25200.00	0.508845657	1.148652661	3.098516864	5.011233333	7
27000.00	0.414954858	0.967393427	2.724121165	4.519427673	7.5
28800.00	0.33838853	0.814737191	2.39496393	4.042770695	8
30600.00	0.27595001	0.686170354	2.105578965	3.616385984	8.5
32400.00	0.225032474	0.577891571	1.851160564	3.234971402	9
34200.00	0.183510102	0.486699353	1.627483694	2.893784021	9.5
36000.00	0.149649323	0.409897414	1.430833839	2.588581139	10
37800.00	0.122036442	0.345214944	1.257945306	2.31556753	10.5
39600.00	0.099518614	0.290739472	1.105947001	2.071348239	11
41400.00	0.081155713	0.244860316	0.972314745	1.852886375	11.5
43200.00	0.066181085	0.206220965	0.854829356	1.657465343	12
45000.00	0.053969533	0.173678966	0.751539799	1.482655062	12.5
46800.00	0.044011224	0.146272146	0.660730783	1.326281748	13
48600.00	0.035890394	0.123190167	0.580894276	1.186400883	13.5
50400.00	0.029267997	0.103750561	0.510704464	1.061273035	14
52200.00	0.023867547	0.087378556	0.448995729	0.949342226	14.5
54000.00	0.019463573	0.073590079	0.394743299	0.849216584	15
55800.00	0.015872208	0.061977447	0.347046224	0.759651037	15.5
57600.00	0.012943512	0.052197306	0.305112415	0.679531829	16
59400.00	0.010555211	0.043960487	0.268245494	0.607862668	16.5
61200.00	0.008607592	0.037023452	0.235833226	0.543752342	17
63000.00	0.007019343	0.031181092	0.207337352	0.486403631	17.5
64800.00	0.005724153	0.026260665	0.182284653	0.4351034	18
66600.00	0.004667948	0.02211669	0.160259086	0.389213724	18.5
68400.00	0.003806631	0.018626641	0.140894882	0.34816396	19
70200.00	0.003104242	0.015687327	0.123870467	0.311443651	19.5
72000.00	0.002531456	0.013211842	0.108903122	0.278596176	20
73800.00	0.002064359	0.011126992	0.095744291	0.249213072	20.5
75600.00	0.001683449	0.009371135	0.084175449	0.222928959	21
77400.00	0.001372824	0.007892355	0.074004478	0.19941699	21.5
79200.00	0.001119514	0.006646928	0.065062471	0.178384791	22
81000.00	0.000912944	0.005598032	0.057200933	0.159570826	22.5
82800.00	0.00074449	0.004714654	0.050289309	0.14274114	23
84600.00	0.000607119	0.003970674	0.044212821	0.127686455	23.5
86400.00	0.000495095	0.003344095	0.038870559	0.114219564	24



DA FE 20B DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1004 (ft)
L=	100 (ft)	S=	0.0051 (ft/ft)
P_2=	4.89 (in)	V=	0.525 (ft/s)
S=	0.0051 (ft/ft)		
T_{OL}=	13.69 (min)	T_1=	31.87 (min)

Tc= 45.56 (min)

Intensity:

SEE FIG. 2.1-2.1a	
I (500-YR)=	7.36 (in/hr)
I (100-YR)=	5.4 (in/hr)
I (10-YR)=	3.7 (in/hr)
I (2-YR)=	2.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
7.36	5.4	3.7	2.5

A=	13.63 (Ac)
Q (500-YR)=	**35.12 (cfs)**
Q (100-YR)=	**25.76 (cfs)**
Q (10-YR)=	**17.65 (cfs)**
Q (2-YR)=	**11.93 (cfs)**

DA FE 206B EXISTING CALCULATIONS

Volume (500-yr) =	2.04*area*43560 =	1211194.51	cft
Volume (100-yr) =	1.38*area*43560 =	819337.46	cft
Volume (10-yr)=	0.70*area*43560=	415605.96	cft
Volume (2-yr)=	0.41*area*43560=	243426.348	cft
	A=	13.63 Ac	

Tp = time to Qp in seconds

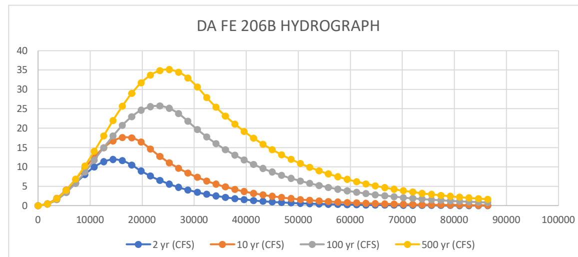
Tp = $\dfrac{V}{1.39\,Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA FE 206B Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	11.93	17.65	25.76	35.12
Tp=	14684.152	16939.529	22881.809	24812.466
1.25*Tp=	18355.190	21174.412	28602.261	31015.583

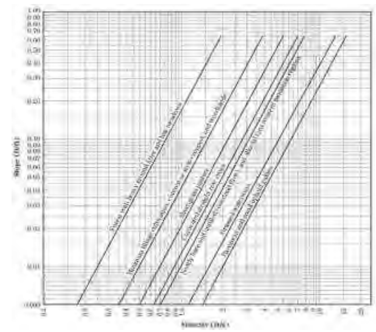
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.436734044	0.487203943	0.391336369	0.454039313	0.5
3600.00	1.682964139	1.895023987	1.541565974	1.792676189	1
5400.00	3.556144688	4.068023884	3.380795268	3.946681785	1.5
7200.00	5.78189549	6.766284509	5.79726373	6.804659711	2
9000.00	8.034192472	9.691893136	8.644134978	10.218807	2.5
10800.00	9.983123125	12.52183573	11.74841926	14.01255786	3
12600.00	11.34321151	14.94366067	14.92148517	17.98971498	3.5
14400.00	11.91523425	16.68997626	17.97052177	21.94459598	4
16200.00	11.61540248	17.56797324	20.71025476	25.67267056	4.5
18000.00	10.48763502	17.48071269	22.97420465	28.98113787	5
19800.00	8.968388465	16.43782897	24.62480281	31.69889749	5.5
21600.00	7.647283823	14.59964381	25.56175087	33.68539796	6
23400.00	6.520786883	12.71597023	25.72811532	34.83790557	6.5
25200.00	5.560230608	11.07533177	25.11378702	35.09681732	7
27000.00	4.741170807	9.646371581	23.75609558	34.44874337	7.5
28800.00	4.042764088	8.401778528	21.76906975	32.92719944	8
30600.00	3.447237431	7.317765217	19.65291161	30.61087359	8.5
32400.00	2.939435902	6.373613349	17.74246393	27.91189551	9
34200.00	2.506436993	5.551277734	16.01772971	25.39990738	9.5
36000.00	2.13722177	4.835041412	14.46065587	23.11399075	10
37800.00	1.822394462	4.211215251	13.05494424	21.03379987	10.5
39600.00	1.553943358	3.667876317	11.78588099	19.14082003	11
41400.00	1.325036928	3.194639998	10.64018261	17.41820277	11.5
43200.00	1.129849973	2.78246152	9.605856875	15.85061598	12
45000.00	0.963415384	2.423463088	8.672077323	14.42410737	12.5
46800.00	0.821497743	2.11078331	7.829069919	13.12598032	13
48600.00	0.700485536	1.838446066	7.068010755	11.94468087	13.5
50400.00	0.597299251	1.601246288	6.380933694	10.86969489	14
52200.00	0.509313007	1.394650472	5.760646979	9.891454459	14.5
54000.00	0.434287736	1.214710038	5.200657962	9.00125278	15
55800.00	0.370314197	1.057985858	4.695105139	8.191166623	15.5
57600.00	0.315764396	0.921482527	4.238696801	7.453985827	16
59400.00	0.269250152	0.802591114	3.826655642	6.783149124	16.5
61200.00	0.229587773	0.699039295	3.454668756	6.172685743	17
63000.00	0.195767932	0.608847927	3.118842491	5.617162263	17.5
64800.00	0.166929983	0.530293219	2.815661694	5.111634254	18
66600.00	0.142340061	0.461873788	2.541952919	4.651602273	18.5
68400.00	0.121372402	0.402281961	2.29485121	4.232971811	19
70200.00	0.103493421	0.350378783	2.071770108	3.852016854	19.5
72000.00	0.088248136	0.305172252	1.870374586	3.505346717	20
73800.00	0.075248585	0.265798353	1.688556601	3.189875869	20.5
75600.00	0.064163956	0.231504548	1.524413032	2.902796465	21
77400.00	0.054712169	0.201635394	1.376225761	2.641553359	21.5
79200.00	0.046652694	0.175620016	1.242443685	2.403821361	22
81000.00	0.039780435	0.15296119	1.121666484	2.18748454	22.5
82800.00	0.033920506	0.133225849	1.012629962	1.990617394	23
84600.00	0.028923785	0.116036799	0.914192814	1.81146771	23.5
86400.00	0.024663115	0.101065512	0.825324682	1.648440968	24



DA FE 203 W/ WEIR DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + ... T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	1077 (ft)
L=	100 (ft)	S=	0.0051 (ft/ft)
P_2=	4.89 (in)	V=	0.525 (ft/s)
S=	0.0051 (ft/ft)		
T_{OL}=	13.69 (min)	T_1=	34.19 (min)

Tc= 47.88 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	7.16 (in/hr)
I (100-YR)=	5.2 (in/hr)
I (10-YR)=	3.6 (in/hr)
I (2-YR)=	2.4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
7.16	5.2	3.6	2.4

A= 8.05 (Ac)

Q (500-YR)= 20.18 (cfs)
Q (100-YR)= 14.65 (cfs)
Q (10-YR)= 10.14 (cfs)
Q (2-YR)= 6.76 (cfs)

DA FE 203 W/ WEIR EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		715342.32	cft
Volume (100-yr) = 1.38*area*43560 =		483908.04	cft
Volume (10-yr)= 0.70*area*43560=		245460.6	cft
Volume (2-yr)= 0.41*area*43560=		143769.78	cft
A=	8.05 Ac		

Tp = time to Qp in seconds

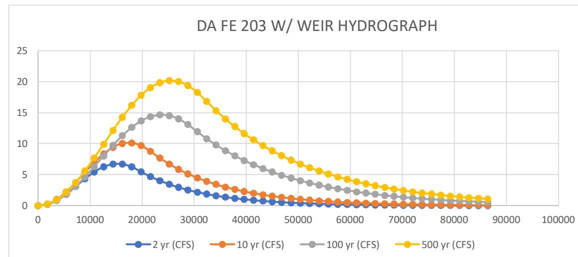
$$Tp = \frac{V}{1.39\ Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA FE 203 W/ WEIR Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	6.76	10.14	14.65	20.18
Tp=	15295.992	17410.072	23761.878	25502.921
1.25*Tp=	19119.990	21762.590	29702.348	31878.652

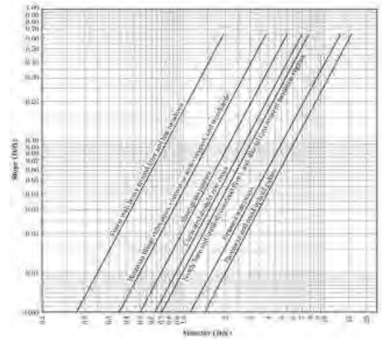
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.228429697	0.265172572	0.206461864	0.24702106	0.5
3600.00	0.882852106	1.032960231	0.814209617	0.97598888	1
5400.00	1.874838057	2.223072638	1.788985737	2.151209631	1.5
7200.00	3.070344928	3.711055423	3.075844051	3.715138759	2
9000.00	4.307829229	5.341304829	4.602246939	5.591198644	2.5
10800.00	5.420075245	6.943339767	6.282154136	7.687528222	3
12600.00	6.256790151	8.349629633	8.020872645	9.901480943	3.5
14400.00	6.704912408	9.413113596	9.720394393	12.12465086	4
16200.00	6.703889262	10.02257928	11.28492075	14.24818069	4.5
18000.00	6.253858965	10.11429266	12.62626251	16.16809204	5
19800.00	5.454272578	9.678662917	13.66881093	17.79037666	5.5
21600.00	4.680561152	8.761245445	14.35379965	19.03559956	6
23400.00	4.016603935	7.670591244	14.64261722	19.84278853	6.5
25200.00	3.446831832	6.705906727	14.51898359	20.17241966	7
27000.00	2.957884289	5.862544828	13.98986772	20.0083526	7.5
28800.00	2.538296006	5.125247526	13.08509483	19.35862087	8
30600.00	2.178228078	4.480675709	11.92065807	18.25503851	8.5
32400.00	1.869237296	3.917167846	10.80269678	16.79301949	9
34200.00	1.604078151	3.424529006	9.789581827	15.32076503	9.5
36000.00	1.376532942	2.993846415	8.871480366	13.97758402	10
37800.00	1.181265974	2.617328205	8.039481693	12.75216054	10.5
39600.00	1.013698445	2.288162445	7.285510786	11.63417069	11
41400.00	0.869901072	2.0003939	6.602249926	10.61419571	11.5
43200.00	0.746501959	1.748816288	5.983067676	9.683642565	12
45000.00	0.640607527	1.528878093	5.421954518	8.834671596	12.5
46800.00	0.549734664	1.336600212	4.913464528	8.060130441	13
48600.00	0.471752498	1.168503974	4.45266252	7.35349379	13.5
50400.00	0.404832429	1.021548198	4.035076147	6.708808415	14
52200.00	0.347405252	0.893074173	3.656652495	6.120643007	14.5
54000.00	0.298124361	0.78075756	3.313718746	5.584042427	15
55800.00	0.255834171	0.682566338	3.002946532	5.094485953	15.5
57600.00	0.219543021	0.59672404	2.72131963	4.6478492	16
59400.00	0.188399924	0.521677616	2.466104691	4.240369369	16.5
61200.00	0.161674605	0.456069333	2.234824708	3.868613548	17
63000.00	0.138740384	0.398712213	2.025234976	3.529449792	17.5
64800.00	0.119059479	0.348568556	1.835301307	3.220020732	18
66600.00	0.102170393	0.304731167	1.663180287	2.937719511	18.5
68400.00	0.087677095	0.266406945	1.507201382	2.680167814	19
70200.00	0.075239731	0.232902533	1.365850729	2.445195834	19.5
72000.00	0.06456666	0.20361177	1.237756437	2.230823994	20
73800.00	0.055407609	0.178004732	1.121675279	2.035246267	20.5
75600.00	0.047547807	0.155618138	1.016480621	1.85681496	21
77400.00	0.040802951	0.136046973	0.921151489	1.694026838	21.5
79200.00	0.035014882	0.118937157	0.834762658	1.545510451	22
81000.00	0.030047874	0.10397914	0.756475676	1.410014588	22.5
82800.00	0.025785457	0.090902303	0.685530723	1.286397732	23
84600.00	0.022127682	0.079470063	0.621239237	1.173618442	23.5
86400.00	0.018988778	0.069475587	0.562977234	1.070726583	24



DA FE 211 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	442 (ft)
L=	100 (ft)	S=	0.0051 (ft/ft)
P_2=	4.89 (in)	V=	0.525 (ft/s)
S=	0.0051 (ft/ft)		
T_{OL}=	13.69 (min)	T_1=	14.03 (min)

Tc= 27.72 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	9.25 (in/hr)
I (100-YR)=	7.2 (in/hr)
I (10-YR)=	4.9 (in/hr)
I (2-YR)=	3.4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.35 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope <1%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
9.25	7.2	4.9	3.4

A= 4.36 (Ac)

Q (500-YR)=	**14.11 (cfs)**
Q (100-YR)=	**10.99 (cfs)**
Q (10-YR)=	**7.48 (cfs)**
Q (2-YR)=	**5.19 (cfs)**

DA FE 211 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		387440.06	cft
Volume (100-yr) = 1.38*area*43560 =		262091.81	cft
Volume (10-yr)= 0.70*area*43560=		132945.12	cft
Volume (2-yr)= 0.41*area*43560=		77867.856	cft
A=	4.36 Ac		

Tp = time to Qp in seconds

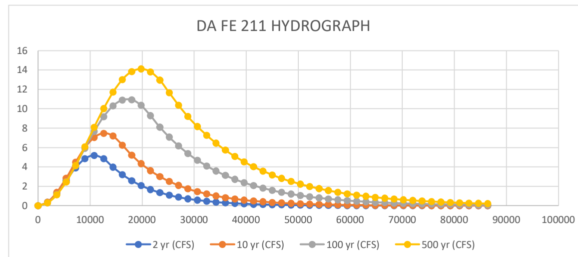
$$Tp = \frac{V}{1.39\ Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA FE 211 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	5.19	7.48	10.99	14.11
Tp=	10797.171	12791.073	17161.357	19754.113
1.25*Tp=	13496.463	15988.842	21451.696	24692.642

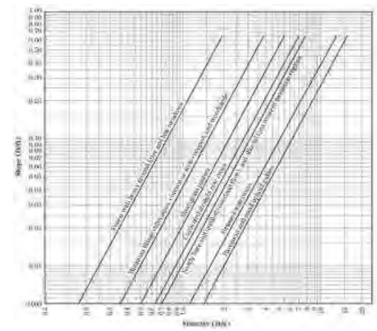
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.347734888	0.359448236	0.295553042	0.287100603	0.5
3600.00	1.297716554	1.368676388	1.150410945	1.125035784	1
5400.00	2.595267819	2.833624873	2.472591818	2.445607435	1.5
7200.00	3.892532815	4.472605861	4.119830271	4.141336491	2
9000.00	4.841732423	5.970467654	5.914885028	6.074210468	2.5
10800.00	5.188399121	7.03919368	7.664609919	8.086916065	3
12600.00	4.839596278	7.473283799	9.180736229	10.01564262	3.5
14400.00	3.976937973	7.189268931	10.30013022	11.70341438	4
16200.00	3.202041986	6.241760916	10.90234618	13.0128665	4.5
18000.00	2.57813246	5.208847696	10.92258624	13.83742491	5
19800.00	2.075790077	4.338022404	10.3586726	14.10998021	5.5
21600.00	1.671327797	3.612783379	9.284729185	13.8083496	6
23400.00	1.345673936	3.008791225	8.10124838	12.95708227	6.5
25200.00	1.083472881	2.505775654	7.068620313	11.66253118	7
27000.00	0.872361017	2.086855205	6.167616494	10.35971677	7.5
28800.00	0.702383749	1.737970692	5.381459398	9.202438984	8
30600.00	0.565526108	1.447413371	4.695510053	8.174440009	8.5
32400.00	0.455334822	1.205431987	4.096995449	7.261278187	9
34200.00	0.36661402	1.003905523	3.574770689	6.450125128	9.5
36000.00	0.295180235	0.836070644	3.119111465	5.729585494	10
37800.00	0.237665136	0.696294727	2.721532982	5.089536913	10.5
39600.00	0.191356704	0.57988682	2.37463196	4.520987778	11
41400.00	0.15407135	0.482940213	2.071948781	4.015950927	11.5
43200.00	0.124050949	0.402201329	1.807847205	3.567331443	12
45000.00	0.099879946	0.334960528	1.577409416	3.168826973	12.5
46800.00	0.080418599	0.278961176	1.376344449	2.8148392	13
48600.00	0.064749245	0.232323903	1.200908289	2.500395191	13.5
50400.00	0.052133023	0.193483541	1.047834152	2.221077534	14
52200.00	0.04197504	0.161136586	0.914271656	1.972962286	14.5
54000.00	0.033796313	0.134197458	0.797733744	1.752563845	15
55800.00	0.027211189	0.111762066	0.696050371	1.556785982	15.5
57600.00	0.02190916	0.093077467	0.607328101	1.382878348	16
59400.00	0.017640217	0.077516595	0.529914841	1.228397832	16.5
61200.00	0.014203067	0.06455722	0.462369086	1.091174242	17
63000.00	0.011435637	0.053764418	0.403433071	0.969279818	17.5
64800.00	0.009207433	0.044775978	0.352009353	0.861002147	18
66600.00	0.007413388	0.037290243	0.307140375	0.76482011	18.5
68400.00	0.005968909	0.031055988	0.267990635	0.679382512	19
70200.00	0.004805883	0.025863987	0.233831127	0.603489096	19.5
72000.00	0.003869469	0.021539995	0.204025772	0.536073689	20
73800.00	0.003115513	0.017938897	0.178019566	0.476189217	20.5
75600.00	0.002508463	0.014939837	0.155328248	0.422994403	21
77400.00	0.002019696	0.012442166	0.135529286	0.37574195	21.5
79200.00	0.001626163	0.010362061	0.118254005	0.333768041	22
81000.00	0.00130931	0.008629711	0.103180722	0.296483012	22.5
82800.00	0.001054194	0.007186979	0.090028761	0.263363071	23
84600.00	0.000848787	0.005985446	0.078553217	0.23394294	23.5
86400.00	0.000683403	0.004984788	0.068540408	0.207809313	24



DA FE 202Y DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	711 (ft)
L=	100 (ft)	S=	0.0113 (ft/ft)
P_2=	4.89 (in)	V=	0.7 (ft/s)
S=	0.0113 (ft/ft)		
T_{OL}=	9.96 (min)	T_1=	16.93 (min)

Tc= 26.89 (min)

Intensity:

SEE FIG. 2.1-2.1a

I (500-YR)=	9.45 (in/hr)
I (100-YR)=	7.3 (in/hr)
I (10-YR)=	4.9 (in/hr)
I (2-YR)=	3.5 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope 1-3.5%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
9.45	7.3	4.9	3.5

A= 3.99 (Ac)

Q (500-YR)=	**15.08 (cfs)**
Q (100-YR)=	**11.65 (cfs)**
Q (10-YR)=	**7.82 (cfs)**
Q (2-YR)=	**5.59 (cfs)**

DA FE 202Y EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		354560.98	cft
Volume (100-yr) = 1.38*area*43560 =		239850.07	cft
Volume (10-yr)= 0.70*area*43560=		121663.08	cft
Volume (2-yr)= 0.41*area*43560=		71259.804	cft
A=	3.99 Ac		

Tp = time to Qp in seconds

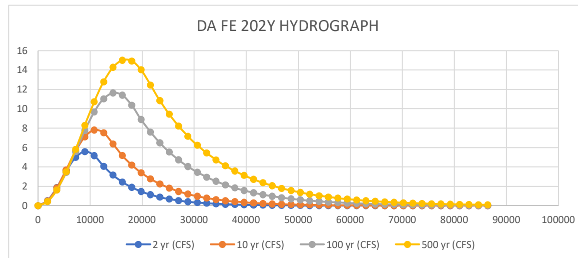
$$T_p = \frac{V}{1.39\,Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p\,e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA FE 202Y Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	5.59	7.82	11.65	15.08
Tp=	9177.595	11192.189	14810.486	16918.247
1.25*Tp=	11471.994	13990.236	18513.107	21147.809

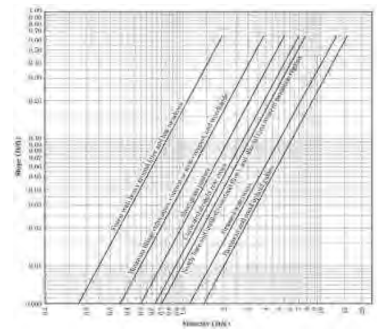
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.513622538	0.48856806	0.419487884	0.417203268	0.5
3600.00	1.865583521	1.832181939	1.617536771	1.622635123	1
5400.00	3.558641537	3.695080384	3.421603319	3.482872905	1.5
7200.00	4.970102166	5.611735962	5.571865351	5.792017067	2
9000.00	5.580840461	7.103187651	7.758641514	8.29448107	2.5
10800.00	5.166231319	7.796730393	9.666991684	10.71328086	3
12600.00	4.068834202	7.51905191	11.02207473	12.78069271	3.5
14400.00	3.153105264	6.372647548	11.62873119	14.26788612	4
16200.00	2.44346963	5.170351273	11.39959025	15.01025177	4.5
18000.00	1.893544089	4.194886362	10.36765283	14.92562127	5
19800.00	1.4673844	3.403457649	8.893239275	14.02336192	5.5
21600.00	1.137135908	2.761343924	7.59351952	12.44491099	6
23400.00	0.881212908	2.240374658	6.483749837	10.83736175	6.5
25200.00	0.682887756	1.817694118	5.536169604	9.437464814	7
27000.00	0.529197522	1.474758651	4.727075327	8.218397078	7.5
28800.00	0.410096703	1.196523142	4.036227708	7.15680025	8
30600.00	0.31780063	0.970780967	3.446345357	6.232333304	8.5
32400.00	0.246276646	0.787628466	2.94267251	5.427282732	9
34200.00	0.190849799	0.639030451	2.512609912	4.726223136	9.5
36000.00	0.147897279	0.518467699	2.145399648	4.115721666	10
37800.00	0.114611622	0.420650931	1.831856043	3.584080639	10.5
39600.00	0.088817212	0.341288775	1.564135878	3.121113395	11
41400.00	0.068828073	0.27689949	1.335542197	2.717949123	11.5
43200.00	0.053337676	0.224658216	1.140356785	2.366862878	12
45000.00	0.041333536	0.182273048	0.973697124	2.061127574	12.5
46800.00	0.03203104	0.147884483	0.831394263	1.794885085	13
48600.00	0.024822157	0.11998384	0.709888531	1.563033996	13.5
50400.00	0.0192357	0.097347075	0.606140491	1.361131859	14
52200.00	0.014906527	0.078981078	0.51755491	1.185310071	14.5
54000.00	0.011551675	0.064080104	0.441915841	1.032199751	15
55800.00	0.008951863	0.051990424	0.37733119	0.898867183	15.5
57600.00	0.006937163	0.042181645	0.32218539	0.782757613	16
59400.00	0.00537589	0.03422344	0.275098979	0.68164629	16.5
61200.00	0.004165996	0.027766671	0.234894104	0.593595843	17
63000.00	0.0032284	0.022528069	0.200565048	0.516919156	17.5
64800.00	0.002501819	0.018277808	0.171253079	0.450147043	18
66600.00	0.001938761	0.014829423	0.146224964	0.392000099	18.5
68400.00	0.001502425	0.012031628	0.124854632	0.341364183	19
70200.00	0.00116429	0.00976168	0.106607509	0.297269072	19.5
72000.00	0.000902256	0.007919991	0.091027147	0.258869868	20
73800.00	0.000699195	0.006425765	0.077723808	0.225430813	20.5
75600.00	0.000541835	0.005213448	0.066364711	0.196311189	21
77400.00	0.00041989	0.004229852	0.056665711	0.17095304	21.5
79200.00	0.00032539	0.003431826	0.04838419	0.148870485	22
81000.00	0.000252158	0.00278436	0.041312989	0.129640405	22.5
82800.00	0.000195407	0.002259049	0.035275222	0.112894336	23
84600.00	0.000151429	0.001832845	0.030119856	0.098311411	23.5
86400.00	0.000117348	0.001487051	0.025717931	0.085612209	24



DA FE 201X DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + ...T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	338 (ft)
L=	100 (ft)	S=	0.0113 (ft/ft)
P_2=	4.89 (in)	V=	0.7 (ft/s)
S=	0.0113 (ft/ft)		
T_{OL}=	9.96 (min)	T_1=	8.05 (min)

Tc= 18.01 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	11.58 (in/hr)
I (100-YR)=	8.8 (in/hr)
I (10-YR)=	6 (in/hr)
I (2-YR)=	4.1 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope 1-3.5%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
11.58	8.8	6	4.1

A= 1.27 (Ac)

Q (500-YR)= 5.88 (cfs)
Q (100-YR)= 4.47 (cfs)
Q (10-YR)= 3.05 (cfs)
Q (2-YR)= 2.08 (cfs)

DA FE 201X EXISTING CALCULATIONS			
Volume (500-yr) = 2.04*area*43560 =	112855.25	cft	
Volume (100-yr) = 1.38*area*43560 =	76343.26	cft	
Volume (10-yr)= 0.70*area*43560=	38724.84	cft	
Volume (2-yr)= 0.41*area*43560=	22681.692	cft	
A=	1.27 Ac		

Tp = time to Qp in seconds

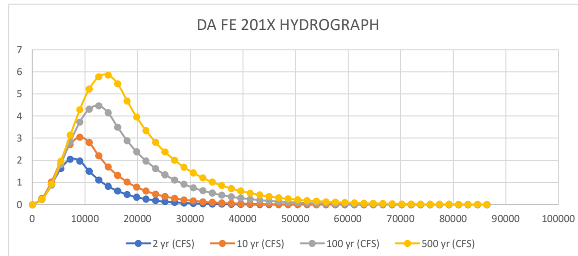
$$T_p = \frac{V}{1.39\,Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA FE 201X Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	2.08	3.05	4.47	5.88
Tp=	7834.532	9140.288	12285.971	13803.797
1.25*Tp=	9793.165	11425.360	15357.464	17254.746

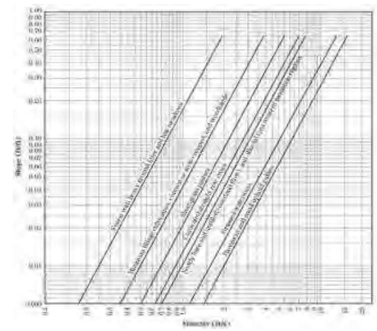
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0.0000000000	0	0	0
1800.00	0.259698143	0.2824769634	0.232611681	0.243340211	0.5
3600.00	0.909268614	1.0251923224	0.882032092	0.933091055	1
5400.00	1.624739364	1.9528180201	1.813094112	1.955107318	1.5
7200.00	2.049270706	2.7214788724	2.832011143	3.140257979	2
9000.00	1.971128434	3.0462287068	3.726710884	4.292415294	2.5
10800.00	1.506096757	2.8066812409	4.310974999	5.220911511	3
12600.00	1.117220259	2.2040440340	4.463197676	5.772092016	3.5
14400.00	0.828752271	1.7062268722	4.151696045	5.854743268	4
16200.00	0.614767161	1.3208493545	3.494541014	5.45518751	4.5
18000.00	0.456033335	1.0225152619	2.888510316	4.685849117	5
19800.00	0.338284827	0.7915645016	2.387578744	3.955189689	5.5
21600.00	0.250939165	0.6127775139	1.973519785	3.338461203	6
23400.00	0.186146287	0.4743723105	1.631267807	2.817898528	6.5
25200.00	0.138083029	0.3672280459	1.348369892	2.378506632	7
27000.00	0.102429779	0.2842839573	1.114532731	2.007628644	7.5
28800.00	0.075982253	0.2200740638	0.921248106	1.694581262	8
30600.00	0.056363518	0.1703669599	0.76148331	1.430347024	8.5
32400.00	0.041810371	0.1318869681	0.629425263	1.207314546	9
34200.00	0.031014869	0.1020982728	0.520269002	1.019059284	9.5
36000.00	0.023006782	0.0790378114	0.43004285	0.860158462	10
37800.00	0.017066396	0.0611859090	0.355463909	0.726034876	10.5
39600.00	0.012659826	0.0473661327	0.293818606	0.612825036	11
41400.00	0.00939104	0.0366677649	0.242863961	0.517267886	11.5
43200.00	0.006966259	0.0283857876	0.200745979	0.436610859	12
45000.00	0.00516756	0.0219744219	0.165932187	0.368530596	12.5
46800.00	0.003833288	0.0170111616	0.137155876	0.311066015	13
48600.00	0.002843527	0.0131689297	0.113370013	0.262561825	13.5
50400.00	0.002109324	0.0101945249	0.093709146	0.221620841	14
52200.00	0.001564693	0.0078919350	0.077457907	0.187063741	14.5
54000.00	0.001160687	0.0061094204	0.064024993	0.157895093	15
55800.00	0.000860996	0.0047295141	0.052921643	0.13327468	15.5
57600.00	0.000638685	0.0036612808	0.04374386	0.112493302	16
59400.00	0.000473776	0.0028343243	0.036157707	0.094952342	16.5
61200.00	0.000351446	0.0021941487	0.029887161	0.080146525	17
63000.00	0.000260702	0.0016985665	0.024704066	0.067649364	17.5
64800.00	0.000193389	0.0013149192	0.020419835	0.057100871	18
66600.00	0.000143455	0.0010179245	0.016878584	0.048197193	18.5
68400.00	0.000106415	0.0007880107	0.013951464	0.040681857	19
70200.00	7.89384E-05	0.0006100264	0.011531972	0.034338378	19.5
72000.00	5.85564E-05	0.0004722426	0.009532073	0.028984032	20
73800.00	4.34371E-05	0.0003655793	0.007879001	0.024464583	20.5
75600.00	3.22215E-05	0.0002830076	0.006512608	0.020649847	21
77400.00	2.39019E-05	0.0002190860	0.005383177	0.017429938	21.5
79200.00	1.77304E-05	0.0001696021	0.004449615	0.014712107	22
81000.00	1.31524E-05	0.0001312948	0.003677954	0.012418064	22.5
82800.00	9.75641E-06	0.0001016399	0.003040115	0.010481728	23
84600.00	7.23729E-06	0.0000786830	0.002512892	0.008847324	23.5
86400.00	5.36861E-06	0.0000609112	0.002077101	0.00746777	24



DA FV 311A DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + ... T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	**T=**	
n=	0.15	D=	413 (ft)
L=	100 (ft)	S=	0.0113 (ft/ft)
P_2=	4.89 (in)	V=	0.7 (ft/s)
S=	0.0113 (ft/ft)		
T_{OL}=	9.96 (min)	T_1=	9.83 (min)

Tc= 19.79 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	11.15 (in/hr)
I (100-YR)=	8.6 (in/hr)
I (10-YR)=	5.8 (in/hr)
I (2-YR)=	4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope 1-3.5%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
11.15	8.6	5.8	4

A= 1.36 (Ac)

Q (500-YR)=	**6.07 (cfs)**
Q (100-YR)=	**4.68 (cfs)**
Q (10-YR)=	**3.16 (cfs)**
Q (2-YR)=	**2.18 (cfs)**

DA FV 311A EXISTING CALCULATIONS			
Volume (500-yr) = 2.04*area*43560 =		120852.86	cft
Volume (100-yr) = 1.38*area*43560 =		81753.41	cft
Volume (10-yr)= 0.70*area*43560=		41469.12	cft
Volume (2-yr)= 0.41*area*43560=		24289.056	cft
A=	1.36 Ac		

Tp = time to Qp in seconds

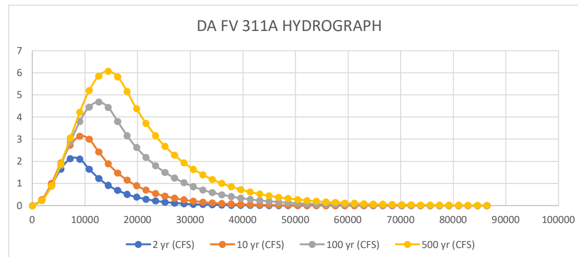
$$\mathbf{Tp} = \frac{\mathbf{V}}{\mathbf{1.39\ Qp}}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA FV 311A Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	2.18	3.16	4.68	6.07
Tp=	8030.396	9455.470	12571.691	14334.385
1.25*Tp=	10037.995	11819.338	15714.614	17917.981

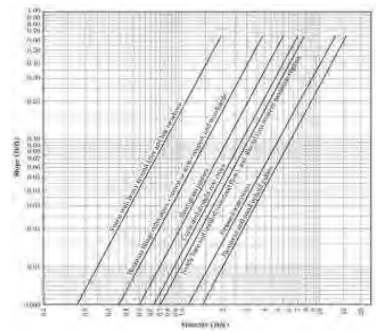
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0.000000000	0	0	0
1800.00	0.258790755	0.273818139	0.23268039	0.232943208	0.5
3600.00	0.912051523	1.000221372	0.88443209	0.895988163	1
5400.00	1.649014202	1.927051509	1.825595524	1.887278087	1.5
7200.00	2.119092157	2.732575660	2.868935505	3.054531303	2
9000.00	2.098660704	3.137170189	3.80688983	4.218434703	2.5
10800.00	1.643791545	3.000387174	4.452861732	5.200189777	3
12600.00	1.22827731	2.422004868	4.67834147	5.848979589	3.5
14400.00	0.917795906	1.891026604	4.438472071	6.065137232	4
16200.00	0.685797351	1.476455173	3.802422185	5.81545663	4.5
18000.00	0.512442912	1.152770602	3.156632547	5.145100186	5
19800.00	0.38290865	0.900047686	2.620521487	4.370166041	5.5
21600.00	0.286117791	0.702729438	2.175461591	3.711949337	6
23400.00	0.213793526	0.548669443	1.805989059	3.152870566	6.5
25200.00	0.15975124	0.428384157	1.499266406	2.677997975	7
27000.00	0.119369651	0.334469120	1.24463642	2.27464877	7.5
28800.00	0.089195637	0.261143160	1.03325187	1.932050388	8
30600.00	0.066648948	0.203892514	0.857768108	1.641052786	8.5
32400.00	0.049801564	0.159192979	0.712087873	1.393884064	9
34200.00	0.037212828	0.124292961	0.591149443	1.183942893	9.5
36000.00	0.027806246	0.097044106	0.490750759	1.005622211	10
37800.00	0.02077744	0.075769041	0.407403424	0.854159468	10.5
39600.00	0.015525362	0.059158127	0.338211499	0.725509429	11
41400.00	0.011600893	0.046188839	0.280770881	0.616236139	11.5
43200.00	0.008668443	0.036062819	0.23308577	0.523421148	12
45000.00	0.006477252	0.028156735	0.193499325	0.444585575	12.5
46800.00	0.004839946	0.021983909	0.160636099	0.377623897	13
48600.00	0.003616514	0.017164358	0.133354245	0.320747716	13.5
50400.00	0.002702339	0.013401400	0.110705842	0.272437994	14
52200.00	0.002019247	0.010463399	0.091903962	0.231404487	14.5
54000.00	0.001508826	0.008169499	0.076295325	0.196551281	15
55800.00	0.001127428	0.006378493	0.063337603	0.166947523	15.5
57600.00	0.000842439	0.004980130	0.052580574	0.141802564	16
59400.00	0.000629489	0.003888332	0.043650479	0.120444836	16.5
61200.00	0.000470368	0.003035889	0.036237039	0.102303923	17
63000.00	0.00035147	0.002370329	0.030082672	0.08689532	17.5
64800.00	0.000262626	0.001850679	0.024973539	0.073807499	18
66600.00	0.00019624	0.001444953	0.020732124	0.062690913	18.5
68400.00	0.000146635	0.001128175	0.017211055	0.053248661	19
70200.00	0.000109569	0.000880844	0.014287992	0.045228564	19.5
72000.00	8.18721E-05	0.000687736	0.011861371	0.038416421	20
73800.00	6.11767E-05	0.000536963	0.009846878	0.032630295	20.5
75600.00	4.57126E-05	0.000419244	0.00817452	0.027715652	21
77400.00	3.41574E-05	0.000327333	0.006786189	0.023541233	21.5
79200.00	2.55232E-05	0.000255571	0.005633647	0.019995548	22
81000.00	1.90715E-05	0.000199542	0.004676849	0.016983899	22.5
82800.00	1.42506E-05	0.000155796	0.00388255	0.014425853	23
84600.00	1.06484E-05	0.000121641	0.003223152	0.01225309	23.5
86400.00	7.95671E-06	0.000094974	0.002675743	0.010407579	24



DA FV 310 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	**T=**	
n=	0.15	D=	30 (ft)
L=	100 (ft)	S=	0.0113 (ft/ft)
P_2=	4.89 (in)	V=	0.7 (ft/s)
S=	0.0113 (ft/ft)		
T_{OL}=	9.96 (min)	T_1=	0.71 (min)

Tc= 10.67 (min)

Intensity:

SEE FIG. 2.1-2.1a

I (500-YR)=	14.38	(in/hr)
I (100-YR)=	11.8	(in/hr)
I (10-YR)=	7.9	(in/hr)
I (2-YR)=	5.4	(in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope 1-3.5%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
14.38	11.8	7.9	5.4

A=	0.62	(Ac)
Q (500-YR)=	**3.57**	**(cfs)**
Q (100-YR)=	**2.93**	**(cfs)**
Q (10-YR)=	**1.96**	**(cfs)**
Q (2-YR)=	**1.34**	**(cfs)**

DA FV 310 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		55094.69	cft
Volume (100-yr) = 1.38*area*43560 =		37269.94	cft
Volume (10-yr)= 0.70*area*43560=		18905.04	cft
Volume (2-yr)= 0.41*area*43560=		11072.952	cft
A=	0.62 Ac		

Tp = time to Qp in seconds

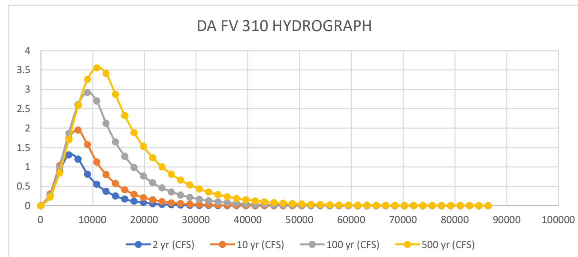
Tp = $\frac{V}{1.39\ Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA FV 310 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	1.34	1.96	2.93	3.57
Tp=	5948.441	6941.991	9162.419	11116.990
1.25*Tp=	7435.552	8677.488	11453.024	13896.238

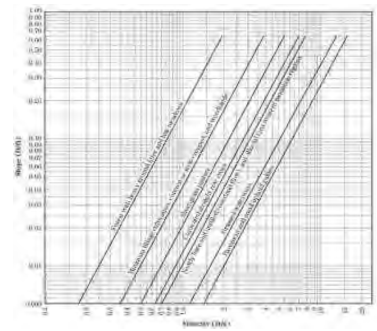
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0.00000000000	0.0000000000	0	0
1800.00	0.280457386	0.30743012873	0.2699407507	0.225700997	0.5
3600.00	0.886894222	1.03675750134	0.9801621158	0.84565359	1
5400.00	1.311306658	1.73020913285	1.8686114867	1.702877808	1.5
7200.00	1.198170194	1.95252997150	2.6074749076	2.580313449	2
9000.00	0.813056183	1.57619712226	2.9241316205	3.255782522	2.5
10800.00	0.548627578	1.12517205133	2.7017438032	3.558247566	3
12600.00	0.370198549	0.80320673551	2.1252934632	3.411120541	3.5
14400.00	0.249799629	0.57337103175	1.6462810392	2.872665411	4
16200.00	0.168557805	0.40930226991	1.2752315419	2.327399824	4.5
18000.00	0.113738093	0.29218139542	0.9878115866	1.885632041	5
19800.00	0.076747285	0.20857438160	0.7651722049	1.527716964	5.5
21600.00	0.051786922	0.14889131662	0.5927127310	1.237738366	6
23400.00	0.034944367	0.10628641925	0.4591232917	1.002801108	6.5
25200.00	0.023579482	0.07587281228	0.3556431066	0.812457696	7
27000.00	0.015910775	0.05416198686	0.2754859568	0.658243697	7.5
28800.00	0.010736146	0.03866366269	0.2133951452	0.533301323	8
30600.00	0.007244451	0.02760014724	0.1652987635	0.432074477	8.5
32400.00	0.004888353	0.01970243052	0.1280426561	0.350061674	9
34200.00	0.003298524	0.01406462672	0.0991835719	0.283615862	9.5
36000.00	0.002225752	0.01004006712	0.0768289352	0.229782245	10
37800.00	0.001501875	0.00716712571	0.0595127315	0.18616688	10.5
39600.00	0.001013423	0.00511626967	0.0460993661	0.150830223	11
41400.00	0.00068383	0.00365226123	0.0357091920	0.122200878	11.5
43200.00	0.000461429	0.00260717534	0.0276608227	0.099005718	12
45000.00	0.000311359	0.00186113829	0.0214264471	0.080213271	12.5
46800.00	0.000210097	0.00132857798	0.0165972155	0.064987852	13
48600.00	0.000141767	0.00094840854	0.0128564274	0.052652395	13.5
50400.00	9.56607E-05	0.00067702368	0.0099587624	0.042658353	14
52200.00	6.45491E-05	0.00048329496	0.0077141920	0.034561297	14.5
54000.00	4.3556E-05	0.00034500125	0.0059755174	0.028001158	15
55800.00	2.93903E-05	0.00024627996	0.0046287165	0.02268621	15.5
57600.00	1.98318E-05	0.00017580754	0.0035854664	0.018380101	16
59400.00	1.33819E-05	0.00012550063	0.0027773507	0.014891342	16.5
61200.00	9.02975E-06	0.00008958892	0.0021513734	0.012064791	17
63000.00	6.09302E-06	0.00006395326	0.0016664829	0.009774752	17.5
64800.00	4.1114E-06	0.00004565319	0.0012908802	0.007919389	18
66600.00	2.77426E-06	0.00003258964	0.0009999332	0.006416196	18.5
68400.00	1.87199E-06	0.00002326419	0.0007745618	0.005198327	19
70200.00	1.26317E-06	0.00001660720	0.0005999860	0.004211624	19.5
72000.00	8.52351E-07	0.00001185509	0.0004647573	0.003412208	20
73800.00	5.75142E-07	0.00000846278	0.0003600073	0.002764531	20.5
75600.00	3.8809E-07	0.00000604118	0.0002788665	0.002239791	21
77400.00	2.61872E-07	0.00000431251	0.0002160138	0.001814652	21.5
79200.00	1.76704E-07	0.00000307849	0.0001673272	0.00147021	22
81000.00	1.19235E-07	0.00000219759	0.0001296139	0.001191147	22.5
82800.00	8.04564E-08	0.00000156876	0.0001004007	0.000965053	23
84600.00	5.42897E-08	0.00000111986	0.0000777717	0.000781875	23.5
86400.00	3.66332E-08	0.00000079941	0.0000602430	0.000633466	24



DA FV 309 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	485 (ft)
L=	100 (ft)	S=	0.0113 (ft/ft)
P_2=	4.89 (in)	V=	0.7 (ft/s)
S=	0.0113 (ft/ft)		
T_{OL}=	9.96 (min)	T_1=	11.55 (min)

Tc= 21.51 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	10.74 (in/hr)
I (100-YR)=	8.1 (in/hr)
I (10-YR)=	5.5 (in/hr)
I (2-YR)=	3.9 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope 1-3.5%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
10.74	8.1	5.5	3.9

A= 2.07 (Ac)

Q (500-YR)=	**8.89 (cfs)**
Q (100-YR)=	**6.71 (cfs)**
Q (10-YR)=	**4.55 (cfs)**
Q (2-YR)=	**3.23 (cfs)**

DA FV 309 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		183945.17	cft
Volume (100-yr) = 1.38*area*43560 =		124433.50	cft
Volume (10-yr)= 0.70*area*43560=		63118.44	cft
Volume (2-yr)= 0.41*area*43560=		36969.372	cft
A=	2.07 Ac		

Tp = time to Qp in seconds

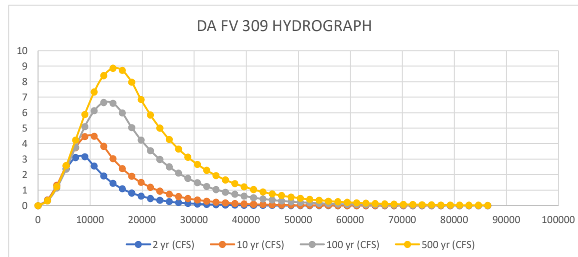
$$T_p = \frac{V}{1.39\,Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA FV 309 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	3.23	4.55	6.71	8.89
Tp=	8236.303	9971.223	13347.722	14883.594
1.25*Tp=	10295.379	12464.029	16684.652	18604.493

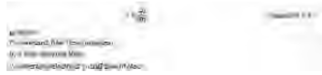
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0	0	0	0
1800.00	0.365836779	0.356459035	0.296469669	0.317032814	0.5
3600.00	1.297564199	1.31423048	1.133457693	1.222914161	1
5400.00	2.372959842	2.573440568	2.362970057	2.588441882	1.5
7200.00	3.104696471	3.739836497	3.76760763	4.218856333	2
9000.00	3.161179671	4.448225148	5.099006103	5.881618156	2.5
10800.00	2.548386771	4.476813342	6.121751111	7.339574422	3
12600.00	1.918133308	3.823449567	6.655003581	8.384782779	3.5
14400.00	1.443750779	3.02368933	6.604475219	8.868169427	4
16200.00	1.086690014	2.391216886	5.979100315	8.720790901	4.5
18000.00	0.817935619	1.89104024	5.0424301	7.963667199	5
19800.00	0.615648132	1.495486758	4.231587901	6.845063979	5.5
21600.00	0.46338931	1.182672159	3.551132253	5.849216493	6
23400.00	0.34878633	0.93528975	2.980096497	4.998248912	6.5
25200.00	0.26252635	0.73965292	2.500885492	4.271083524	7
27000.00	0.197599729	0.584937922	2.098733464	3.649709085	7.5
28800.00	0.148730415	0.462585035	1.761249032	3.118734703	8
30600.00	0.1119472	0.365824999	1.478033398	2.665008614	8.5
32400.00	0.084261014	0.289304495	1.240359929	2.277292424	9
34200.00	0.063422028	0.228789971	1.040905271	1.945982747	9.5
36000.00	0.047736829	0.180933417	0.873523691	1.662873337	10
37800.00	0.03593081	0.143087134	0.733057714	1.420951825	10.5
39600.00	0.027044594	0.113157251	0.615179207	1.214226028	11
41400.00	0.020356068	0.089487874	0.516256019	1.037575534	11.5
43200.00	0.015321714	0.070769478	0.433240061	0.886624865	12
45000.00	0.011532429	0.055966454	0.363573389	0.757635108	12.5
46800.00	0.00868029	0.044259815	0.305109387	0.6474113	13
48600.00	0.006533527	0.035001882	0.256046621	0.553223296	13.5
50400.00	0.00491769	0.027680453	0.214873337	0.472738142	14
52200.00	0.003701473	0.021890466	0.180320876	0.403962292	14.5
54000.00	0.002786044	0.017311584	0.151324584	0.34519223	15
55800.00	0.002097015	0.013690478	0.126991008	0.294972274	15.5
57600.00	0.001578392	0.010826807	0.106570364	0.252058519	16
59400.00	0.001188033	0.008562138	0.089433439	0.21538803	16.5
61200.00	0.000894215	0.006771174	0.075052197	0.184052512	17
63000.00	0.000673062	0.005354831	0.062983514	0.157275811	17.5
64800.00	0.000506604	0.004234748	0.052855522	0.134394692	18
66600.00	0.000381313	0.003348956	0.044356151	0.114842411	18.5
68400.00	0.000287009	0.002648447	0.037223511	0.098134674	19
70200.00	0.000216027	0.002094465	0.031237827	0.083857647	19.5
72000.00	0.000162601	0.00165636	0.026214664	0.071657698	20
73800.00	0.000122387	0.001309895	0.021999245	0.061232648	20.5
75600.00	9.2119E-05	0.001035901	0.018461681	0.052324275	21
77400.00	6.93366E-05	0.000819219	0.015492972	0.044711929	21.5
79200.00	5.21887E-05	0.000647861	0.013001642	0.038207057	22
81000.00	3.92816E-05	0.000512347	0.010910928	0.032648541	22.5
82800.00	2.95667E-05	0.000405178	0.009156409	0.0278987	23
84600.00	2.22544E-05	0.000320426	0.007684023	0.023839884	23.5
86400.00	1.67506E-05	0.000253402	0.006448402	0.020371562	24

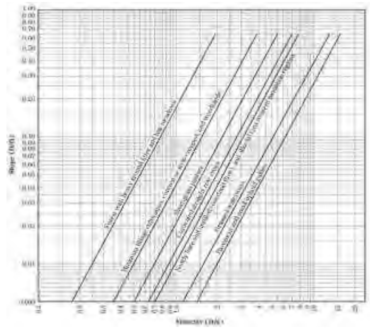


DA FV 304 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$





T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	297 (ft)
L=	100 (ft)	S=	0.0113 (ft/ft)
P_2=	4.89 (in)	V=	0.7 (ft/s)
S=	0.0113 (ft/ft)		
T_{OL}=	9.96 (min)	T_1=	7.07 (min)

Tc= 17.03 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	11.81 (in/hr)
I (100-YR)=	9.1 (in/hr)
I (10-YR)=	6.2 (in/hr)
I (2-YR)=	4.3 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope 1-3.5%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
11.81	9.1	6.2	4.3

A= 1.23 (Ac)

Q (500-YR)=	**5.81 (cfs)**
Q (100-YR)=	**4.48 (cfs)**
Q (10-YR)=	**3.05 (cfs)**
Q (2-YR)=	**2.12 (cfs)**

DA FV 304 EXISTING CALCULATIONS			
Volume (500-yr) =	2.04*area*43560 =	109300.75	cft
Volume (100-yr) =	1.38*area*43560 =	73938.74	cft
Volume (10-yr)=	0.70*area*43560=	37505.16	cft
Volume (2-yr)=	0.41*area*43560=	21967.308	cft
A=	1.23 Ac		

Tp = time to Qp in seconds

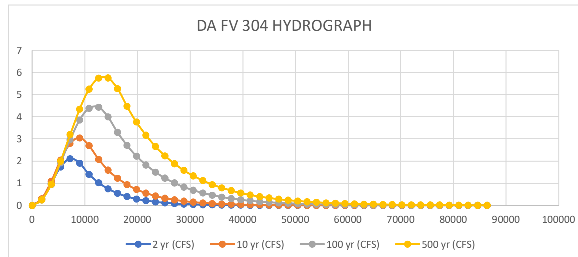
Tp = $\frac{V}{1.39\ Q_p}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA FV 304 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	2.12	3.05	4.48	5.81
Tp=	7470.136	8845.440	11880.939	13530.018
1.25*Tp=	9337.669	11056.800	14851.174	16912.523

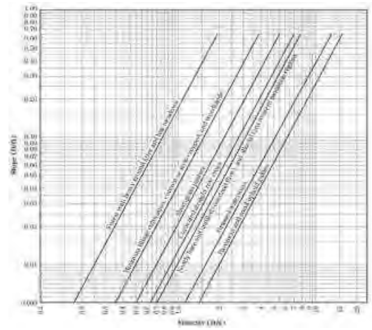
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0.000000000	0	0	0
1800.00	0.288883188	0.301203907	0.248814367	0.250130587	0.5
3600.00	0.997745843	1.085849206	0.939947375	0.957461396	1
5400.00	1.739409852	2.044024764	1.919763873	2.000222683	1.5
7200.00	2.108781127	2.797280251	2.970455926	3.198899043	2
9000.00	1.904110469	3.048102560	3.858460345	4.347133687	2.5
10800.00	1.401760341	2.697424475	4.386378526	5.247253563	3
12600.00	1.024783637	2.077874352	4.436857096	5.744299539	3.5
14400.00	0.749187626	1.594886114	3.998674942	5.752703221	4
16200.00	0.547707905	1.224165317	3.301196779	5.271017883	4.5
18000.00	0.400412312	0.939616134	2.711036236	4.473966557	5
19800.00	0.292729059	0.721208539	2.226379694	3.76341435	5.5
21600.00	0.214005162	0.553568353	1.828366023	3.165711543	6
23400.00	0.156452556	0.424895027	1.50150593	2.662935473	6.5
25200.00	0.114377626	0.326130971	1.23307917	2.240009943	7
27000.00	0.083617945	0.250323970	1.012639517	1.884253147	7.5
28800.00	0.061130494	0.192137808	0.831608235	1.584997394	8
30600.00	0.044690614	0.147476637	0.682940221	1.333269228	8.5
32400.00	0.032671926	0.113196662	0.560849841	1.121520352	9
34200.00	0.023885434	0.086884842	0.460585764	0.943401282	9.5
36000.00	0.017461902	0.066689031	0.378246066	0.793570957	10
37800.00	0.012765857	0.051187604	0.310626376	0.667536579	10.5
39600.00	0.009332723	0.039289382	0.255095172	0.561518891	11
41400.00	0.006822865	0.030156823	0.209491376	0.472338858	11.5
43200.00	0.004987986	0.023147068	0.172040248	0.397322334	12
45000.00	0.003646562	0.017766684	0.141284321	0.334219882	12.5
46800.00	0.002665889	0.013636935	0.116026684	0.281139316	13
48600.00	0.001948949	0.010467119	0.095284397	0.236488969	13.5
50400.00	0.001424816	0.008034106	0.078250244	0.198929958	14
52200.00	0.001041639	0.006166631	0.064261315	0.167336043	14.5
54000.00	0.00076151	0.004733238	0.052773211	0.140759851	15
55800.00	0.000556717	0.003633028	0.043338854	0.118404471	15.5
57600.00	0.000406998	0.002788555	0.035591094	0.099599556	16
59400.00	0.000297544	0.002140373	0.029228414	0.083781225	16.5
61200.00	0.000217525	0.001642858	0.024003201	0.07047515	17
63000.00	0.000159026	0.001260986	0.019712108	0.059282337	17.5
64800.00	0.000116259	0.000967878	0.016188141	0.049867158	18
66600.00	8.49933E-05	0.000742901	0.01329416	0.041947291	18.5
68400.00	6.2136E-05	0.000570219	0.01091754	0.035285252	19
70200.00	4.54257E-05	0.000437675	0.008965793	0.029681273	19.5
72000.00	3.32093E-05	0.000335940	0.007362963	0.024967314	20
73800.00	2.42783E-05	0.000257853	0.006046674	0.021002023	20.5
75600.00	1.77491E-05	0.000197917	0.0049657	0.017666497	21
77400.00	1.29758E-05	0.000151912	0.004077973	0.014860716	21.5
79200.00	9.48623E-06	0.000116601	0.003348947	0.012500548	22
81000.00	6.93509E-06	0.000089498	0.00275025	0.01051522	22.5
82800.00	5.07003E-06	0.000068695	0.002258583	0.0088452	23
84600.00	3.70654E-06	0.000052727	0.001854812	0.007440411	23.5
86400.00	2.70974E-06	0.000040471	0.001523224	0.006258731	24



DA FV 302 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	166 (ft)
L=	100 (ft)	S=	0.0113 (ft/ft)
P_2=	4.89 (in)	V=	0.7 (ft/s)
S=	0.0113 (ft/ft)		
T_{OL}=	9.96 (min)	T_1=	3.95 (min)

Tc= 13.91 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	12.82 (in/hr)
I (100-YR)=	10 (in/hr)
I (10-YR)=	6.8 (in/hr)
I (2-YR)=	4.7 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope 1-3.5%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
12.82	10	6.8	4.7

A=	2.88 (Ac)
Q (500-YR)=	**14.77 (cfs)**
Q (100-YR)=	**11.52 (cfs)**
Q (10-YR)=	**7.83 (cfs)**
Q (2-YR)=	**5.41 (cfs)**

DA FV 302 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		255923.71	cft
Volume (100-yr) = 1.38*area*43560 =		173124.86	cft
Volume (10-yr)= 0.70*area*43560=		87816.96	cft
Volume (2-yr)= 0.41*area*43560=		51435.648	cft
A=	2.88 Ac		

Tp = time to Qp in seconds

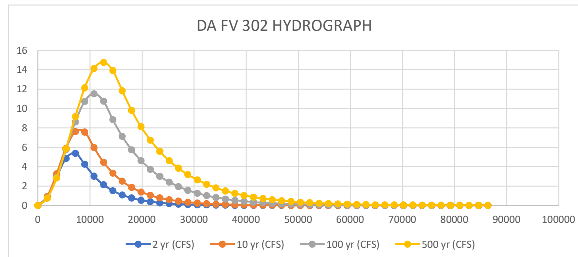
$$Tp = \frac{V}{1.39\ Qp}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA FV 302 Existing Conditions				
	2 - Year	10 - Year	100 - Year	500 - Year
Qp=	5.41	7.83	11.52	14.77
Tp=	6834.379	8064.960	10811.655	12464.562
1.25*Tp=	8542.974	10081.200	13514.568	15580.702

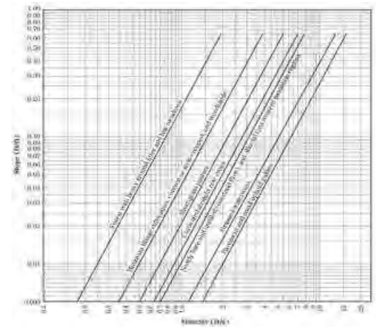
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0.0000000000	0	0	0
1800.00	0.875017983	0.9240075269	0.770068923	0.747115391	0.5
3600.00	2.934427376	3.2600671225	2.874370781	2.837308606	1
5400.00	4.846948442	5.9059848278	5.750246731	5.847701342	1.5
7200.00	5.376255585	7.6133701836	8.628730559	9.169244751	2
9000.00	4.241866315	7.5766487823	10.74015874	12.12993941	2.5
10800.00	3.012037396	5.9621568064	11.51996697	14.13079115	3
12600.00	2.138768316	4.4606221780	10.75964618	14.76699684	3.5
14400.00	1.518682973	3.3372403412	8.850678806	13.90984225	4
16200.00	1.078376726	2.4967757077	7.128216419	11.8339245	4.5
18000.00	0.765726872	1.8679772198	5.740968623	9.808389937	5
19800.00	0.543722457	1.3975379859	4.623698103	8.129552721	5.5
21600.00	0.386082976	1.0455761458	3.72386361	6.738070965	6
23400.00	0.274147339	0.7822538548	2.99914914	5.584759936	6.5
25200.00	0.194664795	0.5852477563	2.415473956	4.628853525	7
27000.00	0.138226337	0.4378565016	1.945389895	3.83656329	7.5
28800.00	0.098150876	0.3275848800	1.566790581	3.179884134	8
30600.00	0.069694349	0.2450845270	1.261871839	2.635604404	8.5
32400.00	0.049488119	0.1833614097	1.016294429	2.184485435	9
34200.00	0.035140208	0.1371829016	0.818509721	1.810581515	9.5
36000.00	0.024952135	0.1026341831	0.659216604	1.500676255	10
37800.00	0.017717853	0.0767863591	0.530924094	1.243815429	10.5
39600.00	0.01258098	0.0574481597	0.427599049	1.030919771	11
41400.00	0.008933422	0.0429801737	0.344382463	0.854464054	11.5
43200.00	0.006343387	0.0321558661	0.277360955	0.708211095	12
45000.00	0.004504272	0.0240575976	0.223382743	0.586991287	12.5
46800.00	0.003198365	0.0179988311	0.179909425	0.486519872	13
48600.00	0.002271075	0.0134659299	0.144896606	0.403245484	13.5
50400.00	0.00161263	0.0100746135	0.116697757	0.334224622	14
52200.00	0.001145086	0.0075373805	0.093986788	0.277017605	14.5
54000.00	0.000813095	0.0056391349	0.075695681	0.229602334	15
55800.00	0.000577358	0.0042189515	0.060964273	0.190302822	15.5
57600.00	0.000409966	0.0031564330	0.049099797	0.157729947	16
59400.00	0.000291106	0.0023615036	0.039544309	0.130732355	16.5
61200.00	0.000206707	0.0017667726	0.031848449	0.108355763	17
63000.00	0.000146777	0.0013218212	0.025650308	0.089809224	17.5
64800.00	0.000104223	0.0009889282	0.020658409	0.074437173	18
66600.00	7.40057E-05	0.0007398724	0.016638002	0.061696255	18.5
68400.00	5.25495E-05	0.0005535398	0.013400021	0.051136115	19
70200.00	3.7314E-05	0.0004141340	0.010792195	0.042383484	19.5
72000.00	2.64957E-05	0.0003098368	0.008691887	0.035128984	20
73800.00	1.88139E-05	0.0002318062	0.007000328	0.029116188	20.5
75600.00	1.33593E-05	0.0001734271	0.005637969	0.024132563	21
77400.00	9.48605E-06	0.0001297505	0.004540743	0.020001952	21.5
79200.00	6.7358E-06	0.0000970736	0.003657053	0.01657835	22
81000.00	4.78291E-06	0.0000726262	0.002945341	0.013740743	22.5
82800.00	3.39622E-06	0.0000543357	0.002372137	0.011388831	23
84600.00	2.41157E-06	0.0000406516	0.001910487	0.00943948	23.5
86400.00	1.71239E-06	0.0000304137	0.00153868	0.007823787	24



DA FV 201 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + ...T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	255 (ft)
L=	100 (ft)	S=	0.0113 (ft/ft)
P_2=	4.89 (in)	V=	0.7 (ft/s)
S=	0.0113 (ft/ft)		
T_{OL}=	9.96 (min)	T_1=	6.07 (min)

Tc= 16.03 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	15.65 (in/hr)
I (100-YR)=	9.4 (in/hr)
I (10-YR)=	6.4 (in/hr)
I (2-YR)=	4.6 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope 1-3.5%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
15.65	9.4	6.4	4.6

A= 1.09 (Ac)

Q (500-YR)= 6.82 (cfs)
Q (100-YR)= 4.10 (cfs)
Q (10-YR)= 2.79 (cfs)
Q (2-YR)= 2.01 (cfs)

DA FV 201 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		96860.02	cft
Volume (100-yr) = 1.38*area*43560 =		65522.95	cft
Volume (10-yr)= 0.70*area*43560=		33236.28	cft
Volume (2-yr)= 0.41*area*43560=		19466.964	cft
A=	1.09 Ac		

Tp = time to Qp in seconds

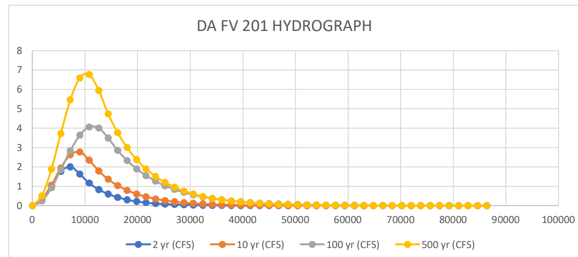
Tp = $\frac{V}{1.39\,Qp}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1 - \cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

DA FV 201 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	2.01	2.79	4.10	6.82
Tp=	6982.953	8569.020	11501.760	10210.740
1.25*Tp=	8728.691	10711.275	14377.200	12763.425

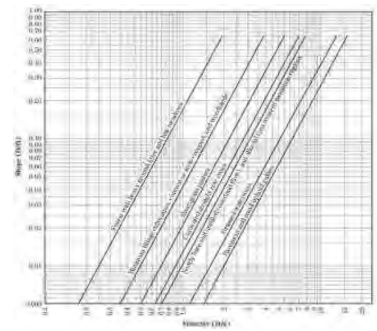
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0.0000000000	0	0	0
1800.00	0.311233171	0.2929343327	0.242719452	0.510051491	0.5
3600.00	1.051741445	1.0487291265	0.913379533	1.887725034	1
5400.00	1.76187038	1.9500130461	1.853106295	3.721162323	1.5
7200.00	2.000822846	2.6183213501	2.839286069	5.462253552	2
9000.00	1.629557729	2.7730197968	3.638300845	6.59049596	2.5
10800.00	1.165566054	2.3527829327	4.060870485	6.768599184	3
12600.00	0.833688922	1.7905487064	4.00689166	5.943318904	3.5
14400.00	0.596308734	1.3626691291	3.493464881	4.735245789	4
16200.00	0.426518929	1.0370380593	2.850364632	3.765434205	4.5
18000.00	0.305074178	0.7892216191	2.325650553	2.994246843	5
19800.00	0.218208966	0.6006247875	1.897529332	2.381004067	5.5
21600.00	0.156077295	0.4570961143	1.548219512	1.893357717	6
23400.00	0.111636669	0.3478658591	1.263212967	1.505584763	6.5
25200.00	0.079849833	0.2647378793	1.030672323	1.197230433	7
27000.00	0.057113812	0.2014746285	0.840939307	0.952029235	7.5
28800.00	0.040851527	0.1533291195	0.686133606	0.757046963	8
30600.00	0.029219678	0.1166887318	0.559825569	0.60199843	8.5
32400.00	0.020899821	0.0888041369	0.456769155	0.478704925	9
34200.00	0.014948916	0.0675830015	0.372684051	0.380662795	9.5
36000.00	0.010692441	0.0514329878	0.304077892	0.302700382	10
37800.00	0.007647932	0.0391422721	0.248101211	0.240705219	10.5
39600.00	0.0054703	0.0297886149	0.20242909	0.1914071	11
41400.00	0.003912715	0.0226701601	0.165164597	0.152205582	11.5
43200.00	0.00279863	0.0172527713	0.134759999	0.12103281	12
45000.00	0.002001763	0.0131299522	0.109952483	0.096244441	12.5
46800.00	0.001431791	0.0099923450	0.089711698	0.076532904	13
48600.00	0.001024111	0.0076045181	0.073196972	0.060858428	13.5
50400.00	0.000732511	0.0057872998	0.059722387	0.048394194	14
52200.00	0.000523939	0.0044043341	0.048728293	0.038482724	14.5
54000.00	0.000374756	0.0033518497	0.039758064	0.030601192	15
55800.00	0.00026805	0.0025508729	0.032439135	0.024333853	15.5
57600.00	0.000191727	0.0019413019	0.026467524	0.019350109	16
59400.00	0.000137135	0.0014773975	0.021595206	0.015387071	16.5
61200.00	9.80882E-05	0.0011243503	0.017619817	0.012235691	17
63000.00	7.01591E-05	0.0008556692	0.014376244	0.009729735	17.5
64800.00	5.01824E-05	0.0006511937	0.011729769	0.007737017	18
66600.00	3.58937E-05	0.0004955808	0.009570475	0.006152422	18.5
68400.00	2.56735E-05	0.0003771540	0.007808678	0.004892363	19
70200.00	1.83634E-05	0.0002870272	0.006371205	0.003890372	19.5
72000.00	1.31347E-05	0.0002184376	0.005198351	0.003093597	20
73800.00	9.39478E-06	0.0001662385	0.004241404	0.002460006	20.5
75600.00	6.71976E-06	0.0001265132	0.003460618	0.00195618	21
77400.00	4.80641E-06	0.0000962809	0.002823565	0.00155554	21.5
79200.00	3.43786E-06	0.0000732731	0.002303784	0.001236955	22
81000.00	2.45898E-06	0.0000557633	0.001879688	0.000983618	22.5
82800.00	1.75882E-06	0.0000424378	0.001533663	0.000782166	23
84600.00	1.25803E-06	0.0000322966	0.001251336	0.000621973	23.5
86400.00	8.99822E-07	0.0000245788	0.001020982	0.000494588	24



DA FV 203 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + ... T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	520 (ft)
L=	100 (ft)	S=	0.0113 (ft/ft)
P_2=	4.89 (in)	V=	0.7 (ft/s)
S=	0.0113 (ft/ft)		
T_{OL}=	9.96 (min)	T_1=	12.38 (min)

Tc= 22.34 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	14.14 (in/hr)
I (100-YR)=	7.9 (in/hr)
I (10-YR)=	5.3 (in/hr)
I (2-YR)=	3.4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope 1-3.5%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
14.14	7.9	5.3	3.4

A= 2.73 (Ac)

Q (500-YR)=	**15.44 (cfs)**
Q (100-YR)=	**8.63 (cfs)**
Q (10-YR)=	**5.79 (cfs)**
Q (2-YR)=	**3.71 (cfs)**

DA FV 203 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		242594.35	cft
Volume (100-yr) = 1.38*area*43560 =		164107.94	cft
Volume (10-yr)= 0.70*area*43560=		83243.16	cft
Volume (2-yr)= 0.41*area*43560=		48756.708	cft
A=	2.73 Ac		

Tp = time to Qp in seconds

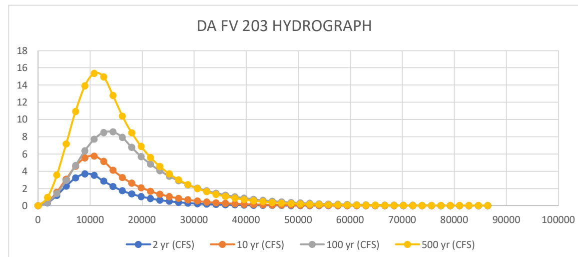
$$T_p = \frac{V}{1.39\,Q_p}$$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34\,Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA FV 203 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	3.71	5.79	8.63	15.44
Tp=	9447.524	10347.496	13685.639	11304.364
1.25*Tp=	11809.405	12934.369	17107.049	14130.455

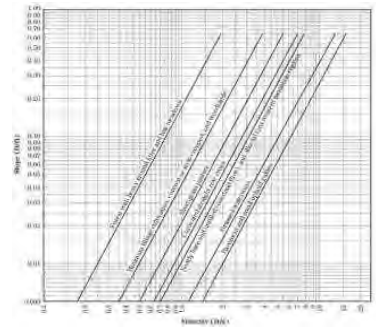
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0.0000000000	0	0	0
1800.00	0.322734338	0.4214799764	0.363008285	0.945881796	0.5
3600.00	1.178722903	1.5631433691	1.390932841	3.551726892	1
5400.00	2.270339209	3.0924252049	2.910756961	7.178939999	1.5
7200.00	3.218029209	4.5638477922	4.666669106	10.93862668	2
9000.00	3.69228191	5.5487877588	6.363120218	13.90942819	2.5
10800.00	3.528200055	5.7603334494	7.714569511	15.36331204	3
12600.00	2.845882219	5.1368618959	8.493545716	14.94398562	3.5
14400.00	2.22151452	4.1142585431	8.568934251	12.79142278	4
16200.00	1.734128956	3.2815535628	7.928045979	10.39968119	4.5
18000.00	1.353672555	2.6173838305	6.772880316	8.455147693	5
19800.00	1.056685767	2.0876386703	5.70843152	6.874203279	5.5
21600.00	0.824855913	1.6651112332	4.811275099	5.588864019	6
23400.00	0.643887992	1.3281011979	4.055118818	4.54385763	6.5
25200.00	0.502623233	1.0593002779	3.417802618	3.694246647	7
27000.00	0.392351027	0.8449032953	2.880649189	3.003496016	7.5
28800.00	0.306271812	0.6738991704	2.427916612	2.441902012	8
30600.00	0.239077806	0.5375054096	2.046337018	1.985314914	8.5
32400.00	0.18662572	0.4287170516	1.724727766	1.61410052	9
34200.00	0.145681273	0.3419469033	1.453663712	1.312295833	9.5
36000.00	0.113719767	0.2727385911	1.225201002	1.066922619	10
37800.00	0.088770404	0.2175376890	1.032644265	0.867429314	10.5
39600.00	0.069294766	0.1735091684	0.870350397	0.705237289	11
41400.00	0.054091953	0.1383917962	0.733563182	0.573371946	11.5
43200.00	0.042224537	0.1103820013	0.61827391	0.466162798	12
45000.00	0.032960754	0.0880412463	0.521103889	0.378999629	12.5
46800.00	0.025729383	0.0702221463	0.439205438	0.308134238	13
48600.00	0.020084527	0.0560095415	0.370178425	0.250519265	13.5
50400.00	0.015678115	0.0446734955	0.31199993	0.203677146	14
52200.00	0.01223844	0.0356318074	0.262964965	0.165593572	14.5
54000.00	0.009553407	0.0284201110	0.221636501	0.134630868	15
55800.00	0.007457453	0.0226680253	0.186803358	0.109457574	15.5
57600.00	0.005821337	0.0180801324	0.15744471	0.088991185	16
59400.00	0.004544175	0.0144208056	0.132700167	0.072351604	16.5
61200.00	0.003547213	0.0115021080	0.111844559	0.058823293	17
63000.00	0.002768978	0.0091741399	0.09426669	0.047824508	17.5
64800.00	0.002161482	0.0073173407	0.079451418	0.038882276	18
66600.00	0.001687267	0.0058363482	0.066964564	0.031612064	18.5
68400.00	0.001317092	0.0046551010	0.056440186	0.025701237	19
70200.00	0.001028131	0.0037129323	0.047569856	0.020895617	19.5
72000.00	0.000802566	0.0029614537	0.040093616	0.016988552	20
73800.00	0.000626488	0.0023620706	0.033792368	0.013812031	20.5
75600.00	0.000489041	0.0018839995	0.028481445	0.011229456	21
77400.00	0.000381749	0.0015026876	0.024005205	0.009129771	21.5
79200.00	0.000297995	0.0011985513	0.020232465	0.007422686	22
81000.00	0.000232617	0.0009559706	0.017052663	0.006034791	22.5
82800.00	0.000181583	0.0007624870	0.014372608	0.004906405	23
84600.00	0.000141745	0.0006081635	0.012113761	0.003989005	23.5
86400.00	0.000110647	0.0004850743	0.010209921	0.00324314	24



DA FE 101 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	328 (ft)
L=	100 (ft)	S=	0.0113 (ft/ft)
P_2=	4.89 (in)	V=	0.7 (ft/s)
S=	0.0113 (ft/ft)		
T_{OL}=	9.96 (min)	T_1=	7.81 (min)

Tc= 17.77 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	15.24 (in/hr)
I (100-YR)=	8.8 (in/hr)
I (10-YR)=	6 (in/hr)
I (2-YR)=	4.1 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope 1-3.5%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
15.24	8.8	6	4.1

A=	2.99 (Ac)
Q (500-YR)=	**18.22 (cfs)**
Q (100-YR)=	**10.52 (cfs)**
Q (10-YR)=	**7.18 (cfs)**
Q (2-YR)=	**4.90 (cfs)**

DA FE 101 EXISTING CALCULATIONS

Volume (500-yr) = 2.04*area*43560 =		265698.58	cft
Volume (100-yr) = 1.38*area*43560 =		179737.27	cft
Volume (10-yr)= 0.70*area*43560=		91171.08	cft
Volume (2-yr)= 0.41*area*43560=		53400.204	cft
A=	2.99 Ac		

Tp = time to Qp in seconds

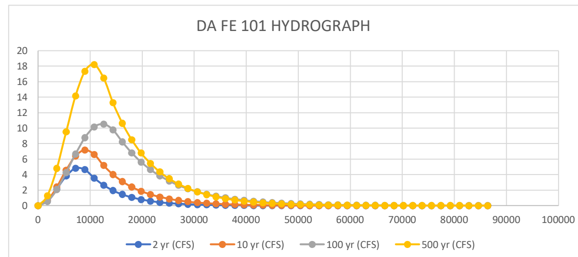
Tp = $\dfrac{\textbf{V}}{\textbf{1.39 Qp}}$

$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

$$q_i = 4.34Q_p e^{\left(-1.3t_i/T_p\right)} \qquad t_i > 1.25T_p$$

DA FE 101 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	4.90	7.18	10.52	18.22
Tp=	7834.532	9140.288	12285.971	10490.308
1.25*Tp=	9793.165	11425.360	15357.464	13112.885

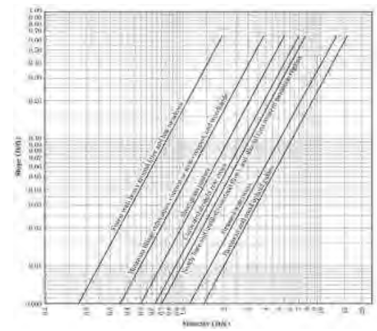
ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0.0000000000	0	0	0
1800.00	0.611415314	0.6650441895	0.547644825	1.291969825	0.5
3600.00	2.14071902	2.4136417670	2.076595241	4.801459822	1
5400.00	3.825173779	4.5975794332	4.268623145	9.5331329	1.5
7200.00	4.824660954	6.4072612824	6.667490801	14.14502492	2
9000.00	4.640688203	7.1718297900	8.773909875	17.32914321	2.5
10800.00	3.545849844	6.6078558350	10.14946083	18.18243034	3
12600.00	2.630305964	5.1890485526	10.50784335	16.46288295	3.5
14400.00	1.951156922	4.0170223213	9.774465492	13.27625359	4
16200.00	1.447365205	3.1097161968	8.227305222	10.62185804	4.5
18000.00	1.073653285	2.4073390813	6.800508538	8.498170619	5
19800.00	0.796434356	1.8636046139	5.621149955	6.79908389	5.5
21600.00	0.590793781	1.4426809185	4.646318234	5.439705063	6
23400.00	0.438249919	1.1168292980	3.840543892	4.35211444	6.5
25200.00	0.325093116	0.8645762655	3.174508643	3.481971886	7
27000.00	0.241153574	0.6692984507	2.623978635	2.785801794	7.5
28800.00	0.178887351	0.5181271266	2.168922707	2.228820877	8
30600.00	0.132698362	0.4011001654	1.792783541	1.783200267	8.5
32400.00	0.098435441	0.3105055390	1.481875225	1.426675076	9
34200.00	0.073019259	0.2403730989	1.224885288	1.141431957	9.5
36000.00	0.054165574	0.1860811465	1.012463089	0.913219089	10
37800.00	0.040179939	0.1440518645	0.836879597	0.730634095	10.5
39600.00	0.029805417	0.1115155407	0.691746166	0.584554338	11
41400.00	0.022109613	0.0863280448	0.571782082	0.467681124	11.5
43200.00	0.016400877	0.0668295314	0.472622423	0.374175024	12
45000.00	0.012166145	0.0517350564	0.390659242	0.299364121	12.5
46800.00	0.009024828	0.0400499001	0.32291029	0.23951058	13
48600.00	0.006694603	0.0310040157	0.266910504	0.191623891	13.5
50400.00	0.004966046	0.0240012830	0.22062232	0.153311456	14
52200.00	0.003683806	0.0185802250	0.18236153	0.12265904	14.5
54000.00	0.002732641	0.0143835961	0.150736007	0.098135133	15
55800.00	0.002027069	0.0111348402	0.12459505	0.078514428	15.5
57600.00	0.001503677	0.0086198657	0.102987513	0.0628166	16
59400.00	0.001115425	0.0066729368	0.0851272	0.050257326	16.5
61200.00	0.000827421	0.0051657516	0.070364261	0.040209098	17
63000.00	0.000613779	0.0039989874	0.058161542	0.032169868	17.5
64800.00	0.000455301	0.0030957547	0.048075044	0.025737967	18
66600.00	0.000337741	0.0023965310	0.039737768	0.020592031	18.5
68400.00	0.000250536	0.0018552377	0.032846361	0.016474951	19
70200.00	0.000185847	0.0014362038	0.027150075	0.013181022	19.5
72000.00	0.000137861	0.0011118151	0.022441652	0.010545667	20
73800.00	0.000102265	0.0008606946	0.018549773	0.008437213	20.5
75600.00	7.58602E-05	0.0006662935	0.015332832	0.006750314	21
77400.00	5.6273E-05	0.0005158009	0.01267378	0.005400686	21.5
79200.00	4.17432E-05	0.0003992994	0.010475866	0.004320897	22
81000.00	3.0965E-05	0.0003091115	0.008659119	0.003456996	22.5
82800.00	2.29698E-05	0.0002392939	0.007157436	0.002765819	23
84600.00	1.7039E-05	0.0001852457	0.005916179	0.002212833	23.5
86400.00	1.26395E-05	0.0001434051	0.004890182	0.001770409	24



DA FE 102 DRAINAGE CALCULATIONS

Time of Concentration:

Tc= $T_{OL} + T_1 + \ldots T_n$



T_{OL}=	Tt=Tol; multiply by 60 to convert hrs. to min. (L=max 300')	T=	
n=	0.15	D=	421 (ft)
L=	100 (ft)	S=	0.0113 (ft/ft)
P_2=	4.89 (in)	V=	0.7 (ft/s)
S=	0.0113 (ft/ft)		
T_{OL}=	9.96 (min)	T_1=	10.02 (min)

Tc= 19.98 (min)

Intensity:

	SEE FIG. 2.1-2.1a
I (500-YR)=	14.70 (in/hr)
I (100-YR)=	8.3 (in/hr)
I (10-YR)=	5.7 (in/hr)
I (2-YR)=	4 (in/hr)

Peak Flow Rate:

Q=CiA

C= 0.4 Mixed use area. Residential lots b/w 1/4 and 1/2 acres; sub-basin slope 1-3.5%; and golf course

i (500-YR)	i (100-YR)	i (10-YR)	i (2-YR)
14.70	8.3	5.7	4

A= 2.48 (Ac)

Q (500-YR)=	**14.59 (cfs)**
Q (100-YR)=	**8.23 (cfs)**
Q (10-YR)=	**5.65 (cfs)**
Q (2-YR)=	**3.97 (cfs)**

DA FE 102 EXISTING CALCULATIONS		
Volume (500-yr) = 2.04*area*43560 =	220378.75	cft
Volume (100-yr) = 1.38*area*43560 =	149079.74	cft
Volume (10-yr)= 0.70*area*43560=	75620.16	cft
Volume (2-yr)= 0.41*area*43560=	44291.808	cft
A=	2.48 Ac	

Tp = time to Qp in seconds

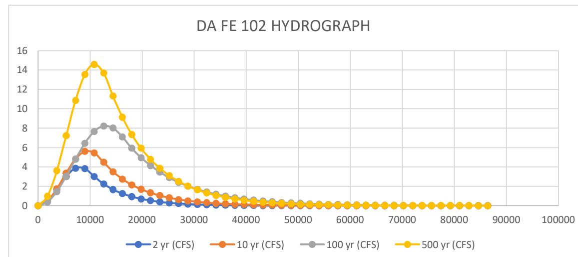
Tp = $\frac{V}{1.39\,Qp}$

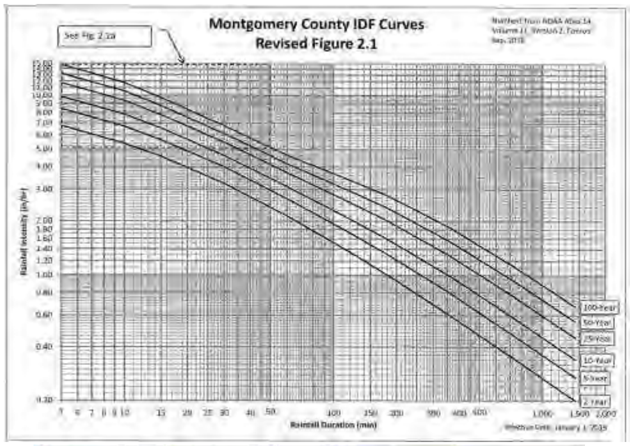
$$q_i = \left(\frac{Q_p}{2}\right)\left[1-\cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad t_i \le 1.25T_p$$

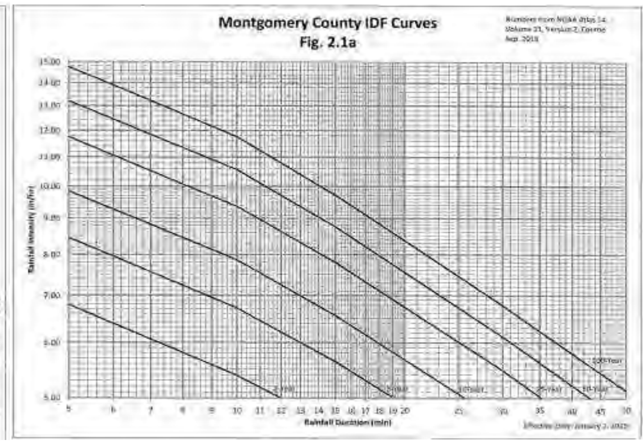
$$q_i = 4.34 Q_p e^{\left(-1.3 t_i / T_p\right)} \qquad t_i > 1.25T_p$$

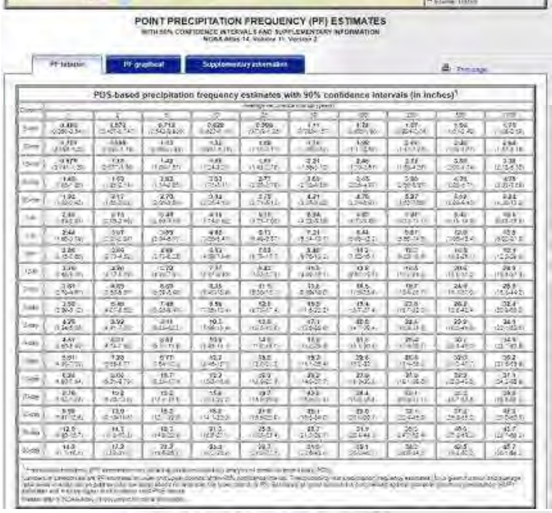
DA FE 102 Existing Conditions				
	2 - Year	**10 - Year**	**100 - Year**	**500 - Year**
Qp=	3.97	5.65	8.23	14.59
Tp=	8030.396	9621.356	13026.090	10869.446
1.25*Tp=	10037.995	12026.694	16282.612	13586.808

ti (sec)	2 yr (CFS)	10 yr (CFS)	100 yr (CFS)	500 yr (CFS)	ti (hrs)
0	0	0.0000000000	0	0	0
1800.00	0.471912554	0.4744174972	0.381869598	0.964938439	0.5
3600.00	1.663152778	1.7384510005	1.456634828	3.60441796	1
5400.00	3.007025897	3.3678789403	3.024907736	7.219996496	1.5
7200.00	3.864226875	4.8158499265	4.795745966	10.85494294	2
9000.00	3.82696952	5.5964112347	6.440627714	13.54740119	2.5
10800.00	2.997502229	5.4475991253	7.65439833	14.58491027	3
12600.00	2.239799801	4.4720438503	8.211881903	13.69293122	3.5
14400.00	1.673627829	3.5065637470	8.009655371	11.31018505	4
16200.00	1.25057164	2.7495234222	7.09466002	9.119557588	4.5
18000.00	0.934454721	2.1559223202	5.928094999	7.35322457	5
19800.00	0.698245185	1.6904751613	4.953346633	5.929005991	5.5
21600.00	0.521744208	1.3255144883	4.138874777	4.780638985	6
23400.00	0.389858784	1.0393460365	3.458325388	3.854694891	6.5
25200.00	0.291311085	0.8149591672	2.889677783	3.108093448	7
27000.00	0.21767407	0.6390157088	2.414532109	2.506098447	7.5
28800.00	0.162650868	0.5010570990	2.017513972	2.020701607	8
30600.00	0.121536317	0.3928826991	1.685776973	1.629319467	8.5
32400.00	0.090814618	0.3080623258	1.408587024	1.31374267	9
34200.00	0.067858686	0.2415540231	1.17697503	1.059288763	9.5
36000.00	0.050705507	0.1894043548	0.983446673	0.854119083	10
37800.00	0.037888274	0.1485134016	0.821739912	0.688687951	10.5
39600.00	0.028310954	0.1164504927	0.686622368	0.555298556	11
41400.00	0.02115457	0.0913097210	0.573722013	0.447744854	11.5
43200.00	0.015807161	0.0715966498	0.479385705	0.361022827	12
45000.00	0.01181146	0.0561394800	0.400560984	0.291097666	12.5
46800.00	0.008825783	0.0440193952	0.334697302	0.234716047	13
48600.00	0.00659482	0.0345159440	0.279663493	0.189254773	13.5
50400.00	0.004927795	0.0270642154	0.233678816	0.152598724	14
52200.00	0.003682157	0.0212212581	0.195255335	0.123042447	14.5
54000.00	0.002751389	0.0166397506	0.163149774	0.099210816	15
55800.00	0.002055899	0.0130473555	0.136323285	0.079995044	15.5
57600.00	0.001536213	0.0102305311	0.113907838	0.064501103	16
59400.00	0.001147892	0.0080218376	0.095178131	0.052008125	16.5
61200.00	0.00085773	0.0062899842	0.079528124	0.041934866	17
63000.00	0.000640915	0.0049320246	0.066451426	0.033812658	17.5
64800.00	0.000478906	0.0038672382	0.055524911	0.027263611	18
66600.00	0.000357849	0.0030323310	0.046395028	0.021983024	18.5
68400.00	0.000267393	0.0023776739	0.038766358	0.017725214	19
70200.00	0.000199802	0.0018643523	0.03239206	0.014292084	19.5
72000.00	0.000149296	0.0014618529	0.027065879	0.011523904	20
73800.00	0.000111557	0.0011462500	0.022615474	0.009291882	20.5
75600.00	8.33582E-05	0.0008987834	0.018896844	0.007492172	21
77400.00	6.22871E-05	0.0007047429	0.015789662	0.006041041	21.5
79200.00	4.65423E-05	0.0005525943	0.01319339	0.004870974	22
81000.00	3.47774E-05	0.0004332934	0.011024019	0.003927534	22.5
82800.00	2.59865E-05	0.0003397487	0.009211355	0.003166824	23
84600.00	1.94177E-05	0.0002663995	0.007696745	0.002553454	23.5
86400.00	1.45093E-05	0.0002088859	0.00643118	0.002058885	24









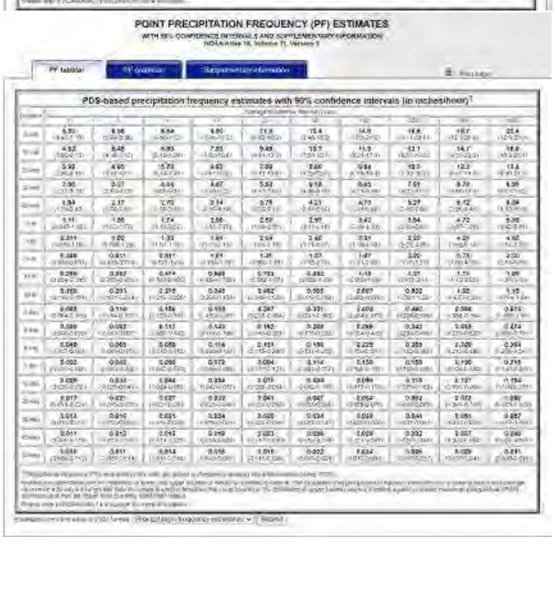


TABLE 2.2 Rational Method Runoff Coefficients for 5-10 Year Frequency Storms

Description of Area	Basin Slope < 1%	Basin Slope 1%-3.5%	Basin Slope 3.5%-5.5%
Single Family Residential Districts			
Lots greater than 1/2 acre	0.30	0.35	0.40
Lots 1/4 - 1/2 acre	0.40	0.45	0.50
Lots less than 1/4 acre	0.50	0.55	0.60
Multi-Family Residential Districts	0.60	0.65	0.70
Apartment Dwelling Areas	0.75	0.80	0.85
Business Districts			
Downtown	0.85	0.87	0.90
Neighborhood	0.75	0.80	0.85
Industrial Districts			
Light	0.50	0.65	0.80
Heavy	0.60	0.75	0.90
Railroad Yard Areas	0.20	0.30	0.40
Cemeteries	0.10	0.18	0.25
Playgrounds	0.20	0.28	0.35
Streets			
Asphalt	0.80	0.80	0.80
Concrete	0.85	0.85	0.85
Concrete Drives and Walks	0.85	0.85	0.85
Roofs	0.85	0.85	0.85
Lawn Areas			
Sandy Soil	0.05	0.08	0.12
Clay Soil	0.15	0.18	0.22
Woodlands			
Sandy Soil	0.15	0.18	0.25
Clay Soil	0.18	0.20	0.30
Pasture			
Sandy Soil	0.25	0.35	0.40
Clay Soil	0.30	0.40	0.50
Cultivated			
Sandy Soil	0.30	0.55	0.70
Clay Soil	0.35	0.60	0.80