



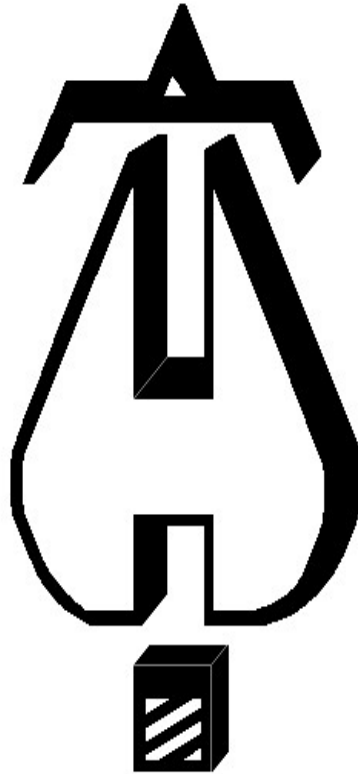
---

1731 Round Rock Drive, Raleigh, NC 27615 • (919) 872-3250 • fax (919) 877-5775 • [www.flsamerica.com](http://www.flsamerica.com)

# OAK HAVEN LOT 20

## HYDRAULIC CALCULATIONS

4/22/2021



Hydraulic calculations using HydraCALC

Fire & Life Safety America  
1731 Roundrock Drive  
Raleigh, NC 27615  
P: (919) 872-3250  
F: (919) 877-5775

Job Name : Oak Haven Lot 20 - RA1  
Drawing : FP1  
Location : 227 Oak Haven Drive  
Remote Area : RA1  
Contract : 21NC1515  
Data File : RA1.WXF

---

**HYDRAULIC CALCULATIONS**  
**for**

**Project name:** Oak Haven Lot 20  
**Location:** 227 Oak Haven Drive  
**Drawing no:** FP1  
**Date:** 4/22/2021

**Design**

**Remote area number:** RA1  
**Remote area location:** Master Bedroom  
**Occupancy classification:** Residential  
**Density:** .05 - Gpm/SqFt  
**Area of application:** 241 - SqFt  
**Coverage per sprinkler:** 400 - SqFt  
**Type of sprinklers calculated:** VK494  
**No. of sprinklers calculated:** 1  
**In-rack demand:** N/A - GPM  
**Hose streams:** 3 - GPM  
**Total water required (including hose streams):** 23.03 - GPM @ 39.27 - Psi  
**Type of system:** WET  
**Volume of dry or preaction system:** N/A - Gal

**Water supply information**

**Date:** 4/21/2021  
**Location:** NC 42, NC 27540  
**Source:** Fire & Life Safety America

**Name of contractor:** Fire & Life Safety America  
**Address:** 1731 Roundrock Drive / Raleigh, NC 27615 / P: (919) 872-3250  
**Phone number:** F: (919) 877-57  
**Name of designer:** H. WEYANT  
**Authority having jurisdiction:** Harnett County  
**Notes: (Include peaking information or gridded systems here.)**

# Water Supply Curve C

Fire & Life Safety America  
Oak Haven Lot 20 - RA1

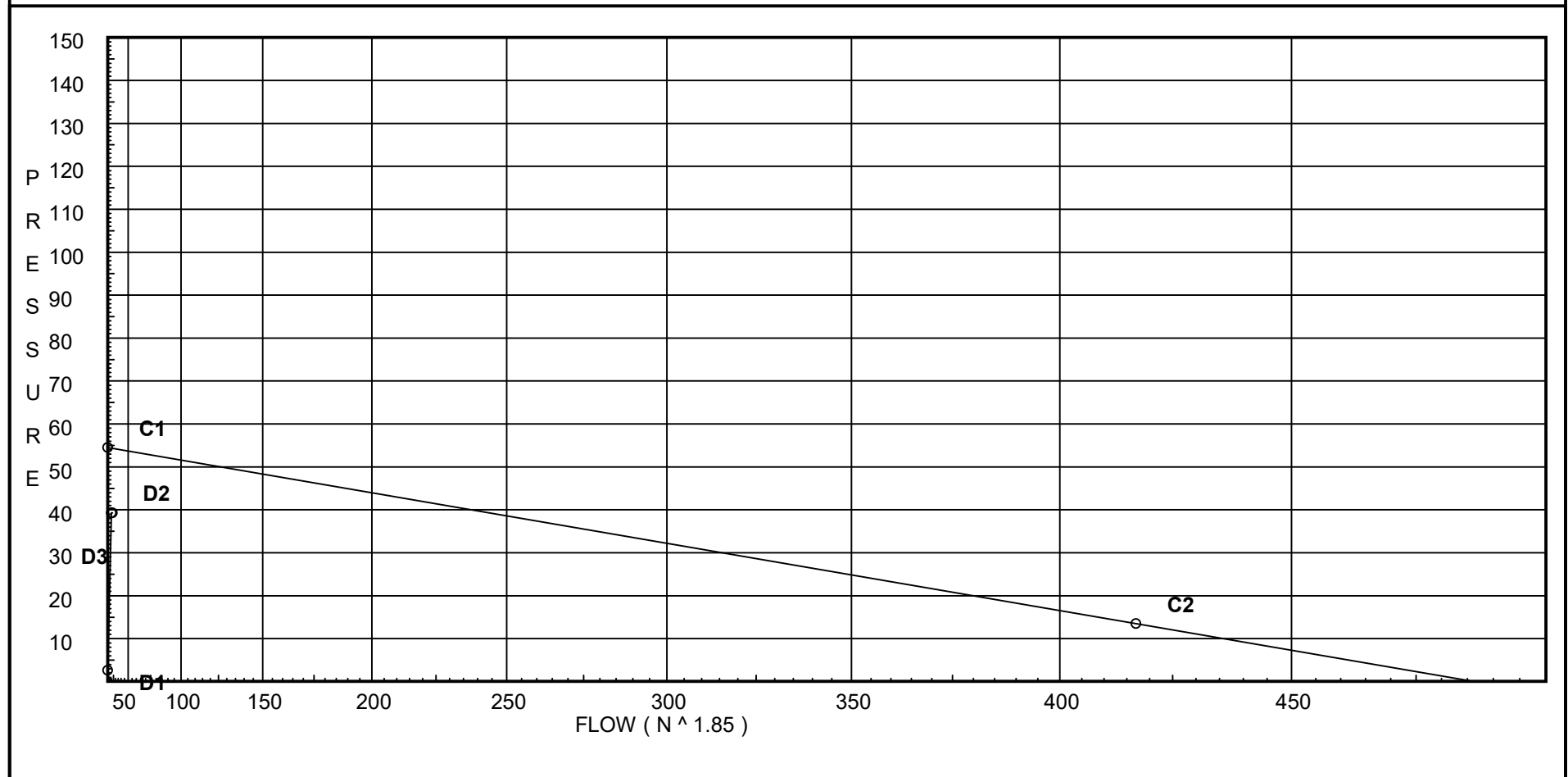
Page 2  
Date 4/22/2021

## City Water Supply:

C1 - Static Pressure : 54.5  
C2 - Residual Pressure: 13.5  
C2 - Residual Flow : 417

## Demand:

D1 - Elevation : 2.599  
D2 - System Flow : 20.024  
D2 - System Pressure : 39.271  
Hose ( Demand ) : 3  
D3 - System Demand : 23.024  
Safety Margin : 15.036



# Fittings Used Summary

Fire & Life Safety America  
Oak Haven Lot 20 - RA1

Page 3  
Date 4/22/2021

## Fitting Legend

Abbrev.	Name	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14	16	18	20	24
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
N *	CPVC 90'El Harvel-Spears		7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O *	CPVC Tee - Branch	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

## Units Summary

Diameter Units                   Inches  
Length Units                       Feet  
Flow Units                         US Gallons per Minute  
Pressure Units                   Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with \*. The fittings marked with a \* show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a \* will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

# Flow Summary - NFPA

Fire & Life Safety America  
Oak Haven Lot 20 - RA1

Page 4  
Date 4/22/2021

## SUPPLY ANALYSIS

<i>Node at Source</i>	<i>Static Pressure</i>	<i>Residual Pressure</i>	<i>Flow</i>	<i>Available Pressure</i>	<i>Total Demand</i>	<i>Required Pressure</i>
TEST	54.5	13.5	417.0	54.307	23.02	39.271

## NODE ANALYSIS

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>
S101	9.0	4.9	16.7	20.02	
101	10.0		16.68		
M202	10.0		17.07		
M203	10.0		17.08		
M205	10.0		17.06		
M206	10.0		17.0		
M204	10.0		17.1		
TOR	8.0		18.22		
BOR	3.0		20.73		
UG1	3.0		21.52	3.0	
UG2	-3.0		41.81		
UG3	-3.0		41.85		
TEST	3.0		39.27		

# Final Calculations : Hazen-Williams

Fire & Life Safety America  
Oak Haven Lot 20 - RA1

Page 5  
Date 4/22/2021

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
S101 to 101	9 10	4.90	20.02 20.02	1 1.101	O	5.0 0.0 0.0	1.000 5.000 6.000	150	16.700 -0.433 0.409		Vel = 6.75	
101			0.0 20.02						16.676		K Factor = 4.90	
101 to M206	10 10		7.41 7.41	1 1.101	N	7.0 0.0 0.0	23.333 7.000 30.333	150	16.676 0.0 0.329		Vel = 2.50	
M206			0.0 7.41						17.005		K Factor = 1.80	
M202 to M203	10 10		2.34 2.34	1.25 1.394	N	8.0 0.0 0.0	18.917 8.000 26.917	150	17.071 0.0 0.011		Vel = 0.49	
M203 to M204	10 10		0.0 2.34	1.25 1.394	O	6.0 0.0 0.0	26.750 6.000 32.750	150	17.082 0.0 0.013		Vel = 0.49	
M204			0.0 2.34						17.095		K Factor = 0.57	
M202 to M205	10 10		-2.34 -2.34	1.25 1.394	2O	12.0 0.0 0.0	16.000 12.000 28.000	150	17.071 0.0 -0.012		Vel = 0.49	
M205 to M206	10 10		0.0 -2.34	1.25 1.394	3N O	24.0 6.0 0.0	103.417 30.000 133.417	150	17.059 0.0 -0.054		Vel = 0.49	
M206 to M204	10 10		7.41 5.07	1.25 1.394	N	8.0 0.0 0.0	44.917 8.000 52.917	150	17.005 0.0 0.090		Vel = 1.07	
M204 to TOR	10 8		14.95 20.02	1.25 1.394	N	8.0 0.0 0.0	3.917 8.000 11.917	150	17.095 0.866 0.258		Vel = 4.21	
TOR			0.0 20.02						18.219		K Factor = 4.69	
M204 to 101	10 10		-12.61 -12.61	1.25 1.394	3N	24.0 0.0 0.0	21.587 24.000 45.587	150	17.095 0.0 -0.419		Vel = 2.65	
101			0.0 -12.61						16.676		K Factor = -3.09	
TOR to BOR	8 3		20.02 20.02	1.25 1.394	N	8.0 0.0 0.0	8.000 8.000 16.000	150	18.219 2.166 0.345		Vel = 4.21	
BOR to UG1	3 3		0.0 20.02	1 1.101	2E	7.65 0.0 0.0	4.000 7.650 11.650	150	20.730 0.0 0.794		Vel = 6.75	
UG1 to UG2	3 -3	H3	3.00 23.02	1 0.86	T 2E	2.871 2.297 0.0	55.000 5.168 60.168	150	21.524 2.599 17.692		Vel = 12.71	
UG2 to UG3	-3 -3		0.0 23.02	6 6.09	2G 3E 2F	9.25 64.749 21.583	1332.910 95.581 1428.491	150	41.815 0.0 0.030		Vel = 0.25	

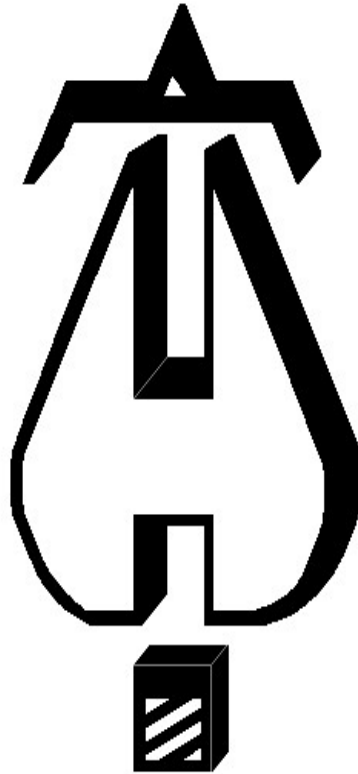
# Final Calculations : Hazen-Williams

Fire & Life Safety America  
Oak Haven Lot 20 - RA1

Page 6  
Date 4/22/2021

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
UG3 to TEST	-3 3		0.0 23.02	6 6.16	T 2E G	43.037 40.168 4.304	1000.000 87.509 1087.509	140 0	41.845 -2.599 0.025		Vel = 0.25	
TEST			0.0 23.02						39.271		K Factor = 3.67	





Hydraulic calculations using HydraCALC

Fire & Life Safety America  
1731 Roundrock Drive  
Raleigh, NC 27615  
P: (919) 872-3250  
F: (919) 877-5775

Job Name : Oak Haven Lot 20 - RA2  
Drawing : FP1  
Location : 227 Oak Haven Drive  
Remote Area : RA2  
Contract : 21NC1515  
Data File : RA2- loop.WXF

---

**HYDRAULIC CALCULATIONS**  
**for**

**Project name:** Oak Haven Lot 20  
**Location:** 227 Oak Haven Drive  
**Drawing no:** FP1  
**Date:** 4/22/2021

**Design**

**Remote area number:** RA2  
**Remote area location:** Bonus Room  
**Occupancy classification:** Residential  
**Density:** .05 - Gpm/SqFt  
**Area of application:** 291 - SqFt  
**Coverage per sprinkler:** 256 - SqFt  
**Type of sprinklers calculated:** VK494  
**No. of sprinklers calculated:** 2  
**In-rack demand:** N/A - GPM  
**Hose streams:** 3 - GPM  
**Total water required (including hose streams):** 29.44 - GPM @ 48.17 - Psi  
**Type of system:** WET  
**Volume of dry or preaction system:** N/A - Gal

**Water supply information**

**Date:** 4/21/2021  
**Location:** NC 42, NC 27540  
**Source:** Fire & Life Safety America

**Name of contractor:** Fire & Life Safety America  
**Address:** 1731 Roundrock Drive / Raleigh, NC 27615 / P: (919) 872-3250  
**Phone number:** F: (919) 877-57  
**Name of designer:** H. WEYANT  
**Authority having jurisdiction:** Harnett County  
**Notes: (Include peaking information or gridded systems here.)**

# Water Supply Curve C

Fire & Life Safety America  
Oak Haven Lot 20 - RA2

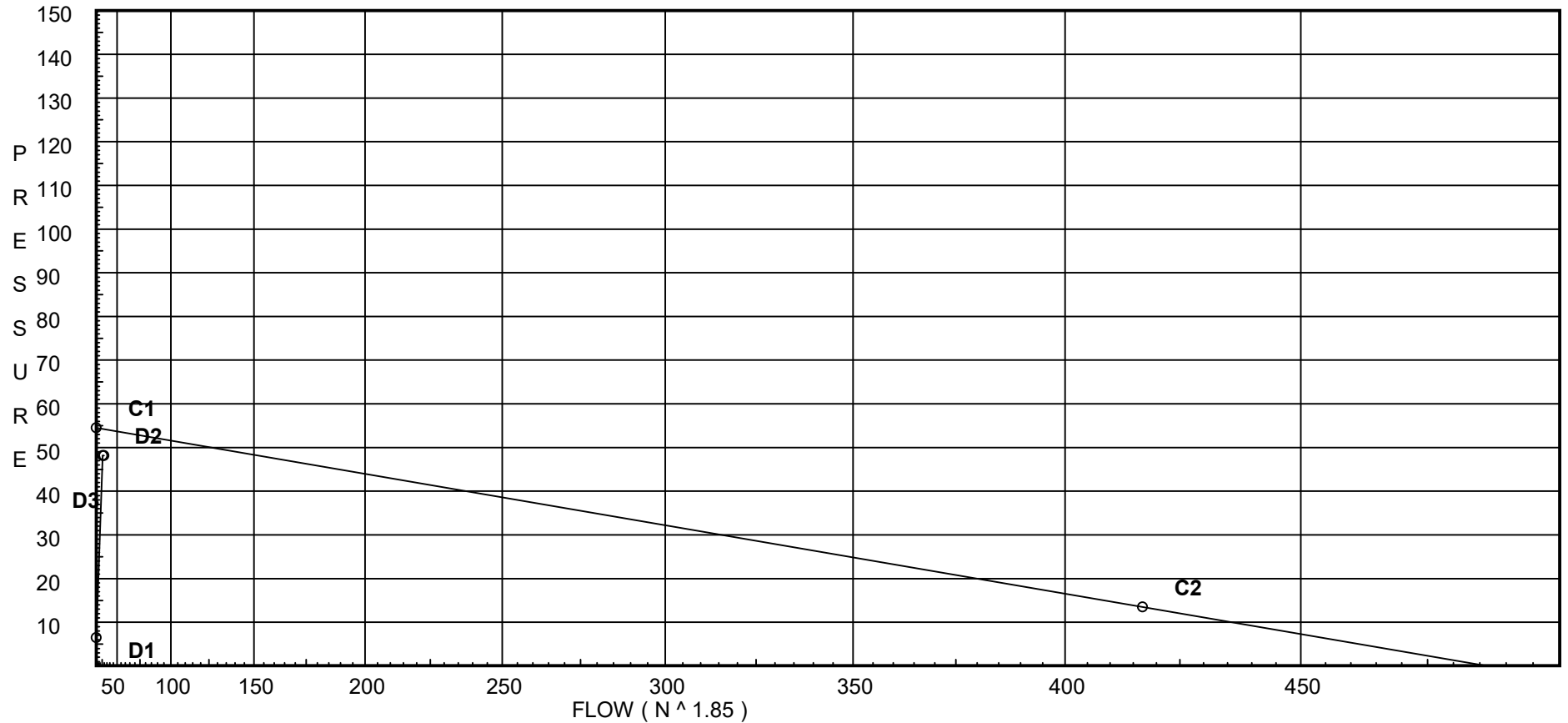
Page 2  
Date 4/22/2021

## City Water Supply:

C1 - Static Pressure : 54.5  
C2 - Residual Pressure: 13.5  
C2 - Residual Flow : 417

## Demand:

D1 - Elevation : 6.496  
D2 - System Flow : 26.443  
D2 - System Pressure : 48.172  
Hose ( Demand ) : 3  
D3 - System Demand : 29.443  
Safety Margin : 6.024



# Fittings Used Summary

Fire & Life Safety America  
Oak Haven Lot 20 - RA2

Page 3  
Date 4/22/2021

## Fitting Legend

Abbrev.	Name	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14	16	18	20	24
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
N *	CPVC 90'El Harvel-Spears		7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O *	CPVC Tee - Branch	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

## Units Summary

Diameter Units                      Inches  
 Length Units                         Feet  
 Flow Units                            US Gallons per Minute  
 Pressure Units                       Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with \*. The fittings marked with a \* show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a \* will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

# Flow Summary - NFPA

Fire & Life Safety America  
Oak Haven Lot 20 - RA2

Page 4  
Date 4/22/2021

## SUPPLY ANALYSIS

<i>Node at Source</i>	<i>Static Pressure</i>	<i>Residual Pressure</i>	<i>Flow</i>	<i>Available Pressure</i>	<i>Total Demand</i>	<i>Required Pressure</i>
TEST	54.5	13.5	417.0	54.196	29.44	48.172

## NODE ANALYSIS

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>
S201	18.0	4.9	7.0	12.96	
S202	18.0	4.9	7.57	13.48	
201	19.0		7.07		
202	19.0		7.4		
M201	19.0		7.72		
M202	19.0		8.5		
R202	19.0		9.29		
T202	10.0		13.82		
M203	10.0		14.28		
M205	10.0		13.95		
M206	10.0		14.58		
M204	10.0		14.84		
TOR	8.0		16.13		
BOR	3.0		18.88		
UG1	3.0		20.21	3.0	
UG2	-3.0		50.69		
UG3	-3.0		50.74		
TEST	3.0		48.17		

# Final Calculations : Hazen-Williams

Fire & Life Safety America  
Oak Haven Lot 20 - RA2

Page 5  
Date 4/22/2021

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
S201 to 201	18 19	4.90	12.96 12.96	1 1.101	2N 0.0	14.0 0.0	2.500 14.000	150 -0.433	7.000 0.503		Vel = 4.37
201			0.0 12.96						7.070	K Factor = 4.87	
S202 to 202	18 19	4.90	13.48 13.48	1 1.101	N 0.0	7.0 0.0	1.000 7.000	150 -0.433	7.567 0.262		Vel = 4.54
202			0.0 13.48						7.396	K Factor = 4.96	
201 to M201	19 19		12.96 12.96	1 1.101	O 0.0	5.0 0.0	16.250 5.000	150 0.0	7.070 0.0		Vel = 4.37
M201			0.0 12.96						7.719	K Factor = 4.66	
202 to M201	19 19		13.48 13.48	1 1.101		0.0 0.0	9.833 0.0	150 0.0	7.396 0.0		Vel = 4.54
M201			0.0 13.48						7.719	K Factor = 4.85	
M201 to M202	19 19		26.44 26.44	1.25 1.394	2N 0.0	16.0 0.0	5.490 16.000	150 0.0361	7.719 0.776		Vel = 5.56
M202			0.0 26.44						8.495	K Factor = 9.07	
M202 to R202	19 19		26.44 26.44	1.25 1.394	2O 0.0	12.0 0.0	10.000 12.000	150 0.0362	8.495 0.796		Vel = 5.56
R202			0.0 26.44						9.291	K Factor = 8.67	
R202 to T202	19 10		26.44 26.44	1.25 1.394	2O 0.0	12.0 0.0	5.410 12.000	150 0.0361	9.291 3.898		Vel = 5.56
T202 to M203	10 10		-8.82 17.62	1.25 1.394	N 0.0	8.0 0.0	18.917 8.000	150 0.0171	13.818 0.459		Vel = 3.70
M203 to M204	10 10		0.0 17.62	1.25 1.394	O 0.0	6.0 0.0	26.750 6.000	150 0.0171	14.277 0.0		Vel = 3.70
M204			0.0 17.62						14.836	K Factor = 4.57	
T202 to M205	10 10		8.83 8.83	1.25 1.394	2O 0.0	12.0 0.0	16.000 12.000	150 0.0048	13.818 0.133		Vel = 1.86
M205 to M206	10 10		0.0 8.83	1.25 1.394	3N O	24.0 6.0	103.417 30.000	150 0.0047	13.951 0.633		Vel = 1.86
M206			8.83	1.394		0.0	133.417				

# Final Calculations : Hazen-Williams

Fire & Life Safety America  
Oak Haven Lot 20 - RA2

Page 6  
Date 4/22/2021

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
M206 to M204	10 10		0.0 8.83	1.25 1.394	N	8.0 0.0	44.917 8.000	150	14.584 0.0			
						0.0	52.917	0.0048	0.252	Vel =	1.86	
M204 to TOR	10 8		17.61 26.44	1.25 1.394	N	8.0 0.0	3.917 8.000	150	14.836 0.866			
						0.0	11.917	0.0361	0.430	Vel =	5.56	
TOR			0.0 26.44						16.132	K Factor =	6.58	
TOR to BOR	8 3		26.44 26.44	1.25 1.394	N	8.0 0.0	8.000 8.000	150	16.132 2.166			
						0.0	16.000	0.0361	0.578	Vel =	5.56	
BOR to UG1	3 3		0.0 26.44	1 1.101	2E	7.65 0.0	4.000 7.650	150	18.876 0.0			
						0.0	11.650	0.1141	1.329	Vel =	8.91	
UG1 to UG2	3 -3	H3	3.00 29.44	1 0.86	T 2E	2.871 2.297	55.000 5.168	150	20.205 2.599			
						0.0	60.168	0.4634	27.884	Vel =	16.26	
UG2 to UG3	-3 -3		0.0 29.44	6 6.09	2G 3E 2F	9.25 64.749 21.583	1332.910 95.581 1428.491	150	50.688 0.0			
								0	0.048	Vel =	0.32	
UG3 to TEST	-3 3		0.0 29.44	6 6.16	T 2E G	48.896 45.637 4.89	1000.000 99.422 1099.422	150	50.736 -2.599			
								0	0.035	Vel =	0.32	
TEST			0.0 29.44						48.172	K Factor =	4.24	