

Fire Flow Report for 5100 Central Avenue

Charlotte, North Carolina

Prepared for:

RRR Homes LLC
8021 Wicklow Hall Dr
Matthews, NC 28104

Prepared by:



Design Resource Group, PA
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Phone: (704) 343-0608

August 15, 2023

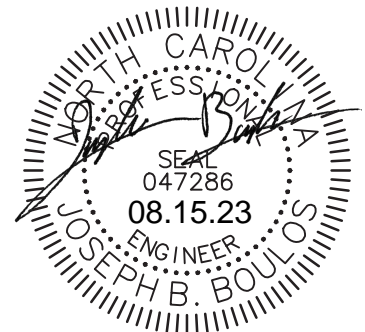
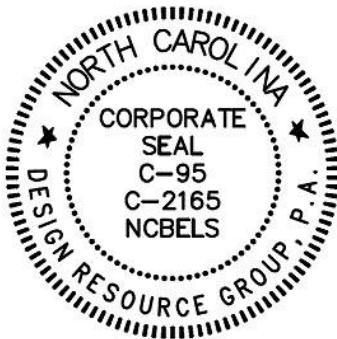




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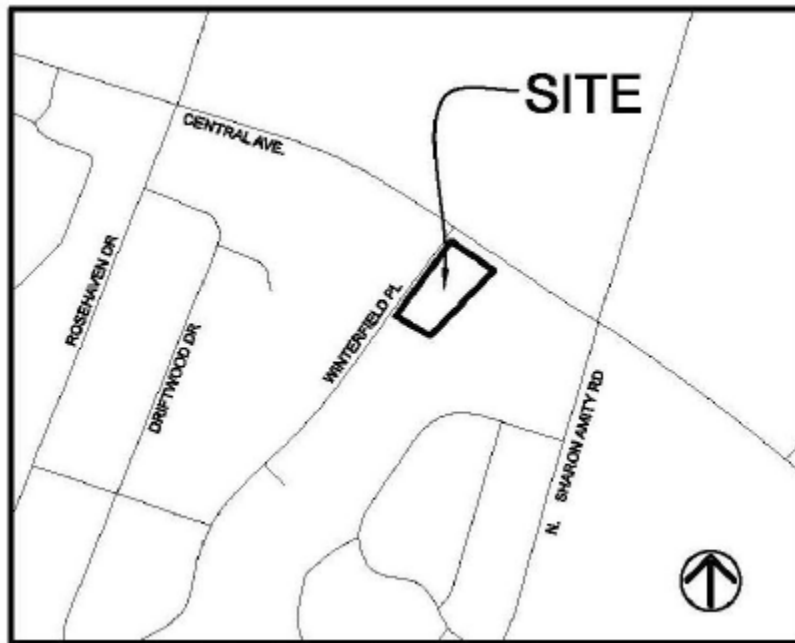


ENGINEER'S REPORT

5100 Central Avenue Engineer's Report

I. Existing Water System Infrastructure

The 5100 Central Avenue project is a proposed townhome development located in Charlotte, North Carolina. The property is approximately 1.42 acres in size and is located at the intersection of Central Avenue and Winterfield Place. Existing water infrastructure includes an 8 inch waterline that runs along Central Avenue.



Enclosed with this report is a letter from the Charlotte Water Department certifying that there is adequate flow to serve this proposed development during daily peak hour demand periods. Per a recent hydrant flow test performed by the Charlotte Fire Department on July 10, 2023. It was determined that the available static pressure in the existing line had a static pressure of 39 psi with an Available Fire Flow of 1,398 GPM at 20 psi. For reference purposes, a copy of this data has been included with this report.

II. Project Description

The 5100 Central Avenue is a proposed multi-family development with 28 townhome units to be served by a proposed (1) 3 inch private water system. Service shall be supplied through one (1) 3 inch Compound Domestic Meter with a (1) 3 inch RPPA and a separate irrigation service with a (1) 1 inch irrigation meter and a (1) 1 inch RPPA.



Onsite, the proposed system shall consist of approximately 125 LF of 6 inch fire line and 703 LF of 3 inch domestic water, 5 LF of the 3 inch will be permitted by Charlotte Water. All of the buildings within the project development shall be served with a Type 13-D sprinkler system. The proposed private water system includes one (1) private hydrant, hydrant to meet the spacing requirements of the Charlotte Fire Department and the International Fire Code.

Based on the information supplied in the CFD Hydrant Flow results, a capacity study was performed for the proposed site to verify that the onsite system shall be sufficient to meet the Needed Fire Flows and Minimum Pressure demands per the City of Charlotte.

III. Conclusion

Our analysis indicates that the proposed 3 inch water service shall provide sufficient capacity to serve the proposed 5100 Central Avenue project. Since the onsite system is a proposed private installation with no opportunity for future expansion, no additional consideration has been given to alternate systems.



Pump Conversion Calculations

CONVERSION OF FIRE HYD. DATA TO PUMP CURVE

PROJECT NAME: 5100 Central
PROJECT NUMBER: 843-008

BY: KAH
DATE: August 14, 2023

KY PIPE PROGRAM REQUIRES THAT A CONNECTION TO A SYSTEM/
MAIN BE MODELED AS A RESERVOIR AND A PUMP (WITH A 3 POINT PUMP CURVE). THE FOLLOWING
IS THE CONVERSION OF THE FIRE HYDRANT TEST DATA TO A 3 POINT PUMP CURVE
"KY PIPE" IS A HAESTAD METHODS COMPUTER PROGRAM.

FIRE HYDRANT FLOW DATA

PRESSURE (psi)			FLOW (gpm)		
STATIC	RESIDUAL	FLOW(*)	DISCHARGE	@20 PSI	@0 PSI
39	33	20	750	1398	2062

(*) = DATA NOT NEEDED FOR DETERMINING RESULTS

DETERMINE 3 POINT CURVE

1ST POINT (@STATIC PRESSURE)

Q = 0 gpm
H = 39 psi x 2.31 ft/psi
H = 90 ft

2ND POINT Flow at 58 psi

Q = 750 gpm
H = 33 psi x 2.31 ft/psi
H = 76 ft

3RD POINT (@ 20 PSI)

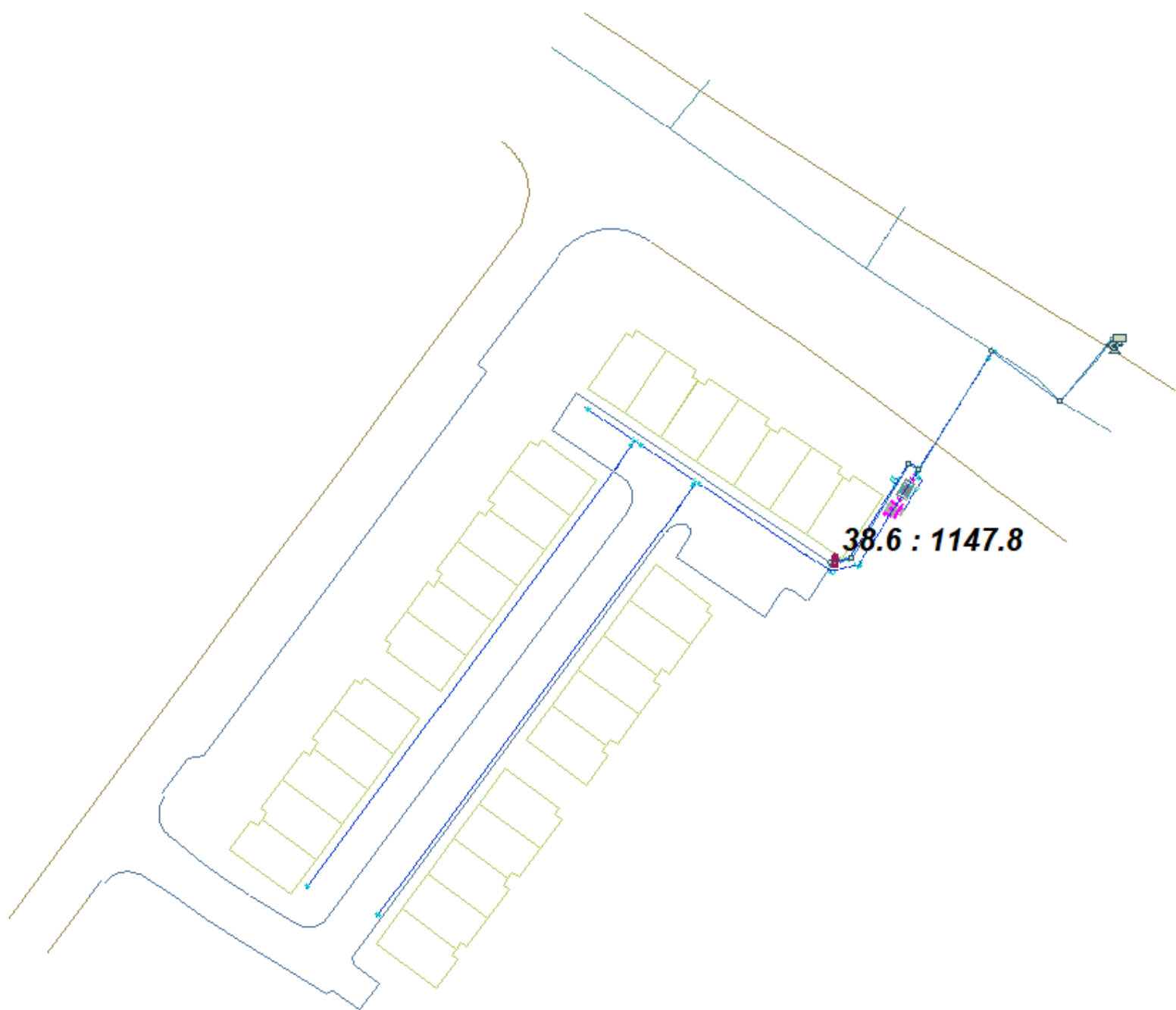
Q = 1398 gpm
H = 20 psi x 2.31 ft/psi
H = 46 ft

PUMP CURVE VALUES

POINT #	HEAD (ft)	DISCHARGE (gpm)
1	90	0
2	76	750
3	46	1398



**SITE LAYOUT
(KYPipe MODEL)**





**FIRE FLOW RESULTS
(KYPipe ANALYSIS)**

```

***** K Y P I P E *****
*
* Pipe Network Modeling Software
*
* Copyrighted by KYPIPE LLC (www.kypipe.com)
* Version: 10.009 10/01/2019
* Company: CORETECH Serial #: 580164
* Interface: Kynetic
* Licensed for Pipe2020
*
*****

```

Date & Time: Tue Aug 15 11:46:09 2023

Master File : g:\sdsproj\843-008 fiorenza - 5100 central\documents\calculations\water\fire flow\fire hydrant 08.14.23.KYP\fire hydrant 08.14.23.P2K

SUMMARY OF ORIGINAL DATA

U N I T S S P E C I F I E D

FLOWRATE = gallons/minute
HEAD (HGL) = feet
PRESSURE = psig

P I P E L I N E D A T A

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NAMES #1 #2	LENGTH (ft)	DIAMETER (in)	ROUGHNESS COEFF.	MINOR LOSS COEFF.
P-1	R-1 I-Pump-1	4.60	12.00	124.0000	0.00
P-2	O-Pump-1 J-1	73.70	8.00	139.0000	0.00
P-3	J-1 J-3	129.00	6.00	139.0000	0.00

P U M P / L O S S E L E M E N T D A T A

THERE IS A DEVICE AT NODE Pump-1 DESCRIBED BY THE FOLLOWING DATA: (ID= 1)

HEAD (ft)	FLOWRATE (gpm)	EFFICIENCY (%)
90.00	0.00	75.00 (Default)
76.00	750.00	75.00 (Default)
46.00	1398.00	75.00 (Default)

N O D E D A T A

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	EXTERNAL GRADE (ft)
J-1		0.00	768.00	
J-3		0.00	768.00	
I-Pump-1		0.00	767.00	
R-1		----	0.00	767.00
O-Pump-1		0.00	767.00	

O U T P U T O P T I O N D A T A

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT

MAXIMUM AND MINIMUM PRESSURES	= 2
MAXIMUM AND MINIMUM VELOCITIES	= 2
MAXIMUM AND MINIMUM HEAD LOSS/1000	= 2

S Y S T E M C O N F I G U R A T I O N

NUMBER OF PIPES	(P) = 3
NUMBER OF END NODES	(J) = 3
NUMBER OF PRIMARY LOOPS	(L) = 0
NUMBER OF SUPPLY NODES	(F) = 1
NUMBER OF SUPPLY ZONES	(Z) = 1

S I M U L A T I O N D E S C R I P T I O N (L A B E L)

PIPELINE RESULTS

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1 #2		FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	R-1	I-Pump-1	0.00	0.00	0.00	0.00	0.00	0.00
P-2	O-Pump-1	J-1	0.00	0.00	0.00	0.00	0.00	0.00
P-3	J-1	J-3	0.00	0.00	0.00	0.00	0.00	0.00

PUMP/LOSS ELEMENT RESULTS

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft	EFFIC- ENCY %	USEFUL POWER Hp	INCREMENTAL COST \$	TOTAL COST \$	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. ft	Case
Pump-1	0.00	0.00	90.00	90.0	75.00	0.	0.2	2.4	**	**	33.2	0.0000

NODE RESULTS

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
J-1		0.00	857.00	768.00	89.00	38.57
J-3		0.00	857.00	768.00	89.00	38.57
I-Pump-1		0.00	767.00	767.00	0.00	0.00
R-1		----	767.00	0.00	767.00	332.37
O-Pump-1		0.00	857.00	767.00	90.00	39.00

MAXIMUM AND MINIMUM VALUES

PRESSURES

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
R-1	332.37	J-1	38.57
O-Pump-1	39.00	J-3	38.57

VELOCITIES

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)

HL + ML / 1000

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)

HL / 1000

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)

SUMMARY OF INFLOWS AND OUTFLOWS

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
 (-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE gpm	NODE TITLE
R-1	0.00	

NET SYSTEM INFLOW = 0.00
 NET SYSTEM OUTFLOW = 0.00
 NET SYSTEM DEMAND = 0.00

FireFlow/Hydrant Report
 Fireflow/Hydrant Report:

Scenario: No Title
 Global Demand Factor for this Scenario: 1.000

Specified Minimum Pressure(psi): 20.0
Minimum Static Pressure(psi) : 20.0

Flow-1: Flowrate to maintain the specified
pressure at (hydrant) node
Node-2: Node that has a lower pressure than
specified value at Flow-1
Flow-2: Flowrate to maintain the specified
pressure at Node-2

Hose Constant = 0.00

Hydrant Node	Hydrant Constant	Elevation	Static Pressure	Flow-1 gpm	Flow-2 gpm	Node-2 gpm	Flow Capacity	NFPA Color
H-1	0.0	768.0	38.6	1147.8			1147.8	GREEN



ISO Calcs

FIRE & RESCUE			Page 1/3																					
ISO Fire Flow Worksheet																								
Needed Fire Flow Work Sheet (ISO formulas)			NFF = (Ci)(Oi)(Xi+Pi) C=18F(Ai)^0.5																					
Project Number:	843-008																							
Address:	5100 Central Avenue	NFPA-13 system on base floor																						
Project Name:	5100 Central Avenue	Occupancy Type:	TH-5 UNITS																					
Construction Type:	13D	Number of Stories:	3																					
STEP 1 Take the area, which is 100% sq. ft. of the first floor plus the following percentage of the total area of the other floors.																								
First Floor Area in Sq. Ft		3840	Sq. Ft. @ 100%																					
Additional Floors Enter total area in sq. ft for all other floors <div style="display: inline-block; border: 1px solid black; background-color: yellow; padding: 2px 10px; margin-left: 10px;">5530</div>																								
First Floor + 50% of Additional Floors		6605																						
STEP 2 F = Coefficient related to the class of construction as determined by using the construction type found in SBCCI																								
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 50%;">Construction Type</th> <th style="width: 10%;">Class</th> <th style="width: 40%;">F Value</th> </tr> </thead> <tbody> <tr><td>Frame</td><td>1</td><td>1.5</td></tr> <tr><td>Joist Masonry</td><td>2</td><td>1</td></tr> <tr><td>Non-combustible</td><td>3</td><td>0.8</td></tr> <tr><td>Heavy Timber</td><td>4</td><td>0.8</td></tr> <tr><td>Modified fire resistance</td><td>5</td><td>0.6</td></tr> <tr><td>Fire resistive</td><td>6</td><td>0.6</td></tr> </tbody> </table>				Construction Type	Class	F Value	Frame	1	1.5	Joist Masonry	2	1	Non-combustible	3	0.8	Heavy Timber	4	0.8	Modified fire resistance	5	0.6	Fire resistive	6	0.6
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Fire resistive	6	0.6																						
Construction Class		1																						
Square Root of the Area x F x 18		2250	= C Value																					

FIRE & RESCUE		Page 2/3
ISO Fire Flow Worksheet		
Needed Fire Flow Work Sheet (ISO formulas)		
STEP 3	<p>Multiply result of rounded off GPM by the Occupancy Factor (Oi)</p> <p>Noncombustible (C-1) = No active fuel loads such as storage of asbestos, clay, glass, marble, stone, or metal products.</p> <p>Limited - Combustible (C-2) = Limited fuel loads such as airports, apartments, art studios, auto repair, auto showroom, aviaries, banks, barber shops, beauty shops, churches, clubs, cold storage warehouses, day care center, educational occupancies, gas stations, green houses, health clubs, hospitals, jails, libraries, medical labs, motels, museums, nursing homes, offices, radio stations, recreation centers, and rooming houses.</p> <p>Combustible (C-3) = Moderate fuel loads such as auto part stores, auto repair training center, bakery, bookstores, bowling centers, casinos, commercial laundries, contractor equipment storage, dry cleaners with no flammable fluids, leather processing, municipal storage buildings, nursery sales stores, pavilions, pet shops, photographic supplies, printers, restaurants, shoe repair, supermarkets, theaters, vacant buildings, and most wholesale & retail sales occupancies.</p> <p>Free-Burning (C-4) = Active fuel loads such as aircraft hangers, cabinet making, combustible metals, dry cleaners using flammable fluids, feed stores, furniture stores, kennels, lumber, packaging and crating, paper products manufacturing, petroleum bulk distribution centers, tire manufacturers, tire recapping or retreading, wax products, and wood working shops.</p> <p>Rapid-Burning (C-5) = Contents that burn with great intensity, spontaneously ignite, have flammable or explosive vapors, or large quantities of dust such as ammunition, feed mills, fireworks, flammable compressed gases, flammable liquids, flour mills, highly flammable solids, matches, mattress factories, nitrocellulose-based products, rag storage, upholstery shops, & waste paper storage.</p> <p>Occupancy Class Selected (1 thru 5) 2</p> <p>GPM x Oi 1912.5</p>	<p>Occupancy Factor</p> <p>0.75</p> <p>0.85</p> <p>1.0</p> <p>1.15</p> <p>1.25</p>
FIRE & RESCUE		Page 3/3

ISO Fire Flow Worksheet

Needed Fire Flow Work Sheet (ISO formulas)

STEP 4

Now consider the exposure factor (Xi) - (Separation between buildings)

Distance (feet to the exposed building)	Xi	>3 stories
0-10	0.22	0.47
11-30	0.18	0.43
31-60	0.13	0.38
61-100	0.09	0.34

Distance, in feet, to the exposed building

101

Xi (from table)

0

Multiply GPM from step 4 by (1+Xi)

Total From Step 4

1913

STEP 5

Approved Fire Sprinkler System? (Y or N)

y

Take fire flow from step 5 and multiply by sprinkler credit of 0.5

Sprinkler credit (50%)

956

Now subtract sprinkler credit from fire flow in step 4

NEEDED FIRE FLOW

1000 GPM

FIRE & RESCUE			Page 1/3																					
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Address:	5100 Central Avenue	NFPA-13 system on base floor																						
Project Name:	5100 Central Avenue	Occupancy Type:	TH-6 UNITS																					
Construction Type:	13D	Number of Stories:	3																					
STEP 1 Take the area, which is 100% sq. ft. of the first floor plus the following percentage of the total area of the other floors.																								
First Floor Area in Sq. Ft		4608	Sq. Ft. @ 100%																					
Additional Floors Enter total area in sq. ft for all other floors																								
		6636																						
First Floor + 50% of Additional Floors		7926																						
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Construction Class		1																						
Square Root of the Area x F x 18		2500	= C Value																					

FIRE & RESCUE		Page 2/3
ISO Fire Flow Worksheet		
Needed Fire Flow Work Sheet (ISO formulas)		
STEP 3	<p>Multiply result of rounded off GPM by the Occupancy Factor (Oi)</p> <p>Noncombustible (C-1) = No active fuel loads such as storage of asbestos, clay, glass, marble, stone, or metal products.</p> <p>Limited - Combustible (C-2) = Limited fuel loads such as airports, apartments, art studios, auto repair, auto showroom, aviaries, banks, barber shops, beauty shops, churches, clubs, cold storage warehouses, day care center, educational occupancies, gas stations, green houses, health clubs, hospitals, jails, libraries, medical labs, motels, museums, nursing homes, offices, radio stations, recreation centers, and rooming houses.</p> <p>Combustible (C-3) = Moderate fuel loads such as auto part stores, auto repair training center, bakery, bookstores, bowling centers, casinos, commercial laundries, contractor equipment storage, dry cleaners with no flammable fluids, leather processing, municipal storage buildings, nursery sales stores, pavilions, pet shops, photographic supplies, printers, restaurants, shoe repair, supermarkets, theaters, vacant buildings, and most wholesale & retail sales occupancies.</p> <p>Free-Burning (C-4) = Active fuel loads such as aircraft hangers, cabinet making, combustible metals, dry cleaners using flammable fluids, feed stores, furniture stores, kennels, lumber, packaging and crating, paper products manufacturing, petroleum bulk distribution centers, tire manufacturers, tire recapping or retreading, wax products, and wood working shops.</p> <p>Rapid-Burning (C-5) = Contents that burn with great intensity, spontaneously ignite, have flammable or explosive vapors, or large quantities of dust such as ammunition, feed mills, fireworks, flammable compressed gases, flammable liquids, flour mills, highly flammable solids, matches, mattress factories, nitrocellulose-based products, rag storage, upholstery shops, & waste paper storage.</p> <p>Occupancy Class Selected (1 thru 5) 2</p> <p>GPM x Oi 2125</p>	<p>Occupancy Factor</p> <p>0.75</p> <p>0.85</p> <p>1.0</p> <p>1.15</p> <p>1.25</p>
FIRE & RESCUE		Page 3/3

ISO Fire Flow Worksheet

Needed Fire Flow Work Sheet (ISO formulas)

STEP 4

Now consider the exposure factor (Xi) - (Separation between buildings)

Distance (feet to the exposed building)	Xi	>3 stories
0-10	0.22	0.47
11-30	0.18	0.43
31-60	0.13	0.38
61-100	0.09	0.34

Distance, in feet, to the exposed building **101**

Xi (from table) **0**

Multiply GPM from step 4 by (1+Xi)

Total From Step 4 **2125**

STEP 5

Approved Fire Sprinkler System? (Y or N) **y**

Take fire flow from step 5 and multiply by sprinkler credit of 0.5

Sprinkler credit (50%) **1063**

Now subtract sprinkler credit from fire flow in step 4

NEEDED FIRE FLOW 1000 GPM

FIRE & RESCUE			Page 1/3																					
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FIRE & RESCUE		Page 3/3

ISO Fire Flow Worksheet

Needed Fire Flow Work Sheet (ISO formulas)

STEP 4

Now consider the exposure factor (Xi) - (Separation between buildings)

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0-10	0.22	0.47
11-30	0.18	0.43
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61-100	0.09	0.34

Distance, in feet, to the exposed building **101**

Xi (from table) **0**

Multiply GPM from step 4 by (1+Xi)

Total From Step 4 **2125**

STEP 5

Approved Fire Sprinkler System? (Y or N) **y**

Take fire flow from step 5 and multiply by sprinkler credit of 0.5

Sprinkler credit (50%) **1063**

Now subtract sprinkler credit from fire flow in step 4

NEEDED FIRE FLOW 1000 GPM



Existing Hydrant Fire Flow Result



Charlotte Fire Department Fire Hydrant Flow Request Form

500 Dalton Avenue Charlotte, NC 28206 (704) 336-2101

Hydrant Number: 111819 **Hydrant Mfg.:** AM DARLG **Type/Owner:** PUBLIC
Station: Station 42 **Shift:** B
Address: 5023 CENTRAL AV
(Confirm numeric address is on correct side of street)
Map X: -80.75863583 **Map Y:** 35.21078537

Flow Test Data:

Date Tested: 07/10/2023 08:25:00

Main Size: 12

Street Gate Value:

Coefficient	Static psi	Res. PSI	Flow PSI	2 1/2" Flow GPM	Flow @ 20Res	Flow @ 0Res
9	39	33	20	750.38	1398.32	2061.84
48hr High	48hr Low	48hr Average				
0	0	0				

Test Remarks

Project Name: Central Ave Townhomes
Project Address: 5100 Central Ave
Company Requesting: Bobbi Thomas Builders
Company Address: 3329 Weddington Rd, Matthews NC 28105
Name of Contact: Ricardo Fisher
Telephone Number: 704-622-5731
Email: fisherricardo@hotmail.com
Purpose Of Test: single hydrant test; fire flow only
Tested By: Adam Cloninger
2nd Hydrant #: N/A
Test Time: 0825
End Time: 0831
TB - .92
CL - 1.30