1731 Round Rock Drive, Raleigh, NC 27615 ● (919) 872-3250 ● fax (919) 877-5775 ● www.flsamerica.com

OAK HAVEN LOT 41

FIRE SPRINKLER PRODUCT DATA

6/1/2021

Steel Pipe Submittal Data for Fire Sprinkler System

See Chart For Inside Diameters and Wall Thickness

All piping to be one or more of the following: (Refer to checked for submittal items).

- Schedule 40 Steel pipe conforming to ASTM A-135 or A-795 using Cast Iron, Malleable Iron or Ductile Iron screw fittings in accordance with standard ANSI B16.3 or ANSI B16.4. Pipe may also be joined by grooved fittings approved for fire protection use.
- Schedule 7 or 10 Steel Pipe conforming to ASTM A-135 or A-795 using grooved fittings listed for fire protection use.
- All welding will comply with the applicable requirements of AWS B2.1, Specification for Welding Procedure and Performance Qualification. This will be limited to pipe outlets and flanged end treatments.

All materials to be used in the installation of sprinkler system are to conform to NFPA 13, Local Authorities Having Jurisdiction and any applicable referenced codes and standards.

Steel Pipe Dimensions per NFPA 13:

Pipe		Sch 40		Sch 10		Sch 07	
Nom. Dia.	O.D (in)	I.D. (in)	Wall (in)	I.D. (in)	Wall (in)	I.D. (in)	Wall (in)
1"	1.315	1.049	0.133	1.097	0.109	n/a	n/a
1¼"	1.660	1.380	0.140	1.442	0.109	1.536	0.062
1½"	1.900	1.610	0.145	1.682	0.109	1.728	0.086
2"	2.375	2.067	0.154	2.157	0.109	2.203	0.086
2½"	2.875	2.469	0.203	2.635	0.120	2.703	0.086
3"	3.500	3.068	0.216	3.260	0.120	3.314	0.093
4"	4.500	4.026	0.237	4.260	0.120	4.310	0.095
6"	6.625	6.065	0.280	6.357	0.134	n/a	n/a
8"	8.625	7.981	0.322	8.249	0.188	n/a	n/a
10"	10.750	10.020	0.365	n/a	n/a	n/a	n/a
12"	12.750	11.938	0.406	n/a	n/a	n/a	n/a

This submittal shall include the following checked items.

	Domestic	***Foreign***
Origin of Manufacture	☒	☐

	Black	***Galvanized***
Exterior Finish	☒	☐

	Sch. 40	***Sch.10***	***Sch.7***
Schedule	☒	☐	☐

	A-135	***A-795***	***A-53***
ASTM	☒	☐	☐

Submittal Data CPVC Pipe and Fittings

Listings:

- Light hazard occupancies as defined in the standard for “Installation of Sprinkler Systems”, NFPA 13.
- Residential occupancies as defined in the standard for “Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height”, NFPA 13R.
- Residential occupancies as defined in the standard for “Installation of Sprinkler Systems in One and Two Family Dwellings and Manufactured Homes”, NFPA 13D.- Underground fire service systems as described in the “Installation of Sprinkler
- Systems”, NFPA 13 2007 Edition, and where appropriate the “Standard for Installationof Private Service Mains & Their Appurtenances”, NFPA 24
- Local Authorities having jurisdiction and any applicable referenced
- codes and standards.

Approvals:
UL, FM, CUL, NSF, Dade County, LPCB, MEA, and the City of Los Angeles.

Material Specifications:
Pipe: ASTM F442, SDR 13.5
Fittings: ASTM F438, (Sch. 40) and ASTM F439 (Sch. 80)
Maximum Working Pressure of 175 PSI


Straight Elbow


Reducing Elbow


Straight Tee


Reducing Tee


Cross


Reducing Cross


45 Elbow


Coupling


Sprinkler Adapter w/ Brass Insert


Slip-Thread Adapter

Sprinkler Head Adapter 90° Ell

Sprinkler Head Adapter Tee

Back-to Back Tee

Grooved Coupling Adapter

Reducer Bushing

Cap

CPVC Pipe Submittal Data for Fire Sprinkler Systems

All material used in the installation of the sprinkler system conforms to:

NFPA 13 ☐ NFPA 13R ☐ NFPA 13D ☒

- All CPVC piping should be pressure tested at 200 PSI for 2 hours.
- Chemical compatibility should be checked per manufacturer.
- Glycerin antifreeze solutions are acceptable and installation of antifreeze systems should comply with NFPA Section 7.6.2 of NFPA 13 (2007 Edition).

BlazeMaster® Pipe Dimensions and Weights
SDR 13.5 (ASTM F 442)

Nominal Size		Average OD		Average ID		Pounds Per Foot	Kilograms Per Meter	Pounds Per Foot	Kilograms Per Meter
Inches	mm	Inches	mm	Inches	mm	Empty	Empty	H_2O Filled	H_2O Filled
3/4	20.0	1.050	26.7	.874	22.2	0.168	0.250	0.428	0.637
1	25.0	1.315	33.4	1.101	28.0	0.262	0.390	0.675	1.005
1 1/4	32.0	1.660	42.2	1.394	35.4	0.418	0.622	1.079	1.606
1 1/2	40.0	1.900	48.3	1.598	40.6	0.548	0.816	1.417	2.109
2	50.0	2.375	60.3	2.003	50.9	0.859	1.278	2.224	3.310
2 1/2	65.0	2.875	73.0	2.423	61.5	1.257	1.871	3.255	4.844
3	80.0	3.500	88.9	2.950	75.0	1.867	2.778	4.829	7.186

Note: The above average OD and average ID information is per ASTM F442. Check with individual manufacturers for actual OD and ID information.

Allowance for Friction Loss in Fittings
(Equivalent Feet of Pipe)

Fitting Size (In.)	¾"	1"	1¼"	1½"	2"	2½"	3"
Tee Branch	3	5	6	8	10	12	15
Elbow 90° *	4	5	6	7	9	12	13
Elbow 45°	1	1	2	2	2	3	4
Coupling	1	1	1	1	1	2	2
Tee Run	1	1	1	1	1	2	2

Submittal Data for CPVC Strap Hangers

All materials to be used in the installation of sprinkler system are to conform to NFPA 13, 13R and 13D, Local Authorities having Jurisdiction and any applicable referenced codes and standards.

UL Listed in the USA and Canada to support fire sprinkler piping.

- A “one-hole strap” can function as a hanger and restraining device. It supports CPVC pipe horizontally from top or side of beam. As a restraining device, the hanger will be inverted so the fastener is downward. This installation will prevent upward movement of the sprinkler during activation.
- A “two-hole strap” can function as a hanger and restraining device. It supports CPVC pipe horizontally from top, bottom, or side of beam. A hex-head self-threading screw (furnished with most CPVC hangers) is easily installed using an electric drill. No pre-drilling pilot hole is required.
- A “side-mount strap” supports the CPVC pipe horizontally from top or bottom of beam
- A “stand-off 2-hole strap” supports the CPVC pipe off of the vertical face of the structural or composite wood joists.

Hangers must be clean, free of burrs, and all surface oils. Any contaminants must be removed from the hanger.
The pipe size of the hanger shall be the same size as the supported pipe.
Pipe hangers must have a load bearing surface at least ½” inch wide.

Examples of CPVC Hangers

			
1-Hole Strap	2-Hole Strap	Side-Mount Strap	Stand-Off 2-Hole Strap

This submittal shall include the following checked items:

Product

☐	¾” Hangers
☒	1” Hangers
☐	1-1/4” Hangers
☐	1-1/2” Hangers
☐	2” Hangers

Origin of Manufacture

Domestic	Foreign
☒	☐

VIKING®

TECHNICAL DATA

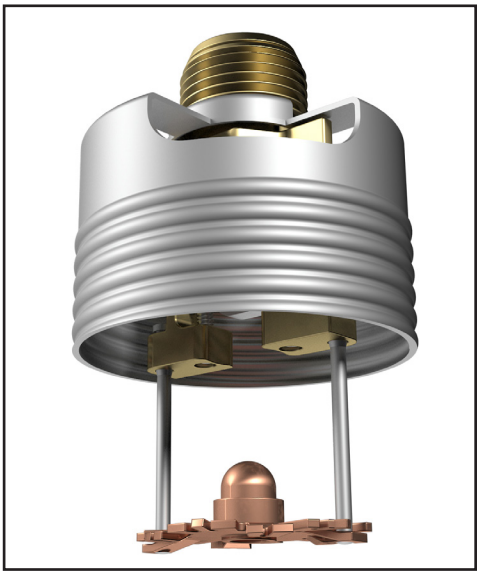
FREEDOM® RESIDENTIAL CONCEALED PENDENT SPRINKLER VK494 (K4.9)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

1. DESCRIPTION

Viking Freedom® Residential Concealed Pendent Sprinkler VK494 is a small thermosensitive, glass-bulb residential sprinkler designed for installation on concealed pipe systems where the appearance of a smooth ceiling is desired. The orifice design, with a K-factor of 4.9 (70.6 metric*), allows the sprinkler's efficient use of available water supplies for the hydraulically designed fire-protection system. The fast response glass bulb operating element and special deflector characteristics meet the challenges of residential sprinkler standards.

The sprinkler is pre-assembled with a threaded adapter for installation with a low-profile small-diameter cover assembly installed flush to the ceiling. The two-piece design allows installation and testing of the sprinkler prior to installation of the cover plate. The "push-on" and "thread-on" designs of the concealed cover plate assemblies allow easy installation of the cover plate after the system has been tested and the ceiling finish has been applied, while also providing up to 1/2" (13 mm) of vertical adjustment. The cover assembly can be removed and reinstalled, allowing temporary removal of ceiling panels without taking the sprinkler system out of service or removing the sprinkler. The Electroless Nickel PTFE (ENT) coating has been investigated for installation in corrosive atmospheres and is C-UL-US-EU Listed as indicated in the Approval Charts. The ENT finish is only available for the sprinkler assembly, the cover plate is not plated.



WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

2. LISTINGS AND APPROVALS

c UL us EU

cULusEU Listed: Category VKKW
Refer to the Approval Charts and Design Criteria for C-UL-US-EU Listing requirements that must be followed.

3. TECHNICAL DATA

Specifications:
Minimum Operating Pressure: Refer to the Approval Chart.
Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).
Thread size: 1/2" (15 mm) NPT
Nominal K-factor: 4.9 U.S. (70.6 metric*)
Glass-bulb fluid temperature rating: to -65 °F (-55 °C)

* Metric K-factor measurement shown is in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

Material Standards:
Sprinkler Body: Brass UNS-C84400 or QM Brass
Deflector: Phosphor Bronze UNS-C51000
Deflector Pins: Stainless Steel UNS-S30200
Button: Brass UNS-C36000
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400
Compression Screw: 18-8 Stainless Steel
Yoke: Phosphor Bronze UNS-C51000
Belleville Spring Sealing Assembly: Beryllium Nickel Alloy, coated on both sides with PTFE Tape
Cover Adapter: Cold Rolled Steel UNS-G10080, Finish: Clear Chromate over Zinc Plating
Shipping Cap: High Density Polyethylene

Cover Plate Materials:
Cover Plate Assembly: Copper UNS-C11000 and Brass UNS-C26800 or Stainless Steel UNS-S30400
Spring: Beryllium Nickel
Solder: Eutectic

Ordering Information: The sprinkler and cover plate must be ordered separately. Refer to Tables 1 and 2.

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

5. OPERATION

During fire conditions, when the temperature around the sprinkler approaches the cover plate's nominal temperature rating, the cover plate detaches and releases the deflector. Continued heating of the exposed sprinkler causes the heat-sensitive liquid in the glass bulb to expand. When the temperature reaches the sprinkler's nominal temperature rating, the glass bulb shatters releasing the yoke, pip cap assembly and sealing spring. Water begins flowing through the sprinkler orifice and strikes the deflector forming a uniform spray pattern over a specific area of coverage, which is determined by the water supply pressure at the sprinkler, in order to extinguish or control the fire.

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6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY

Viking Sprinkler Model VK494 is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

TABLE 1: SPRINKLER ORDERING INFORMATION

Instructions:
(1) Select a Sprinkler Base Part Number
(2) Add the suffix for the desired Finish
(3) Add the suffix for the desired Sprinkler Temperature Rating
(4) Order a cover plate (refer to Table 2)

Example:
20759AE = 200 °F (93 °C) Temperature Rated Sprinkler with a standard Brass finish.

Sprinkler Base Part Number[1]	Size	1: Finishes		2: Temperature Ratings[7]			
	NPT Inch	Description	Suffix	Nominal Rating	Bulb Color	Max. Ambient Ceiling Temperature[2]	Suffix
20759	1/2	Brass	A	155 °F (68 °C)	Red	100 °F (38 °C)	B
		ENT[5,6]	JN	200 °F (93 °C)	Green	150 °F (65 °C)	E
		Corrosion Resistant Sprinkler Finish: ENT					

Accessories

Sprinkler Wrenches and tools:

A. Heavy Duty Part Number: 14047W/B[3] (available since 2006)
B. Head Cabinet Wrench Part Number: 14031[3,4] (available since 2006)
C. Optional Concealed Cover Plate Installer Tool Part Number: 14412[8] (available since 2007)
D. Optional Large Concealed Cover Plate Installer Tool Part No. 14867[8] (available since 2007)

Sprinkler Cabinet:

Holds up to 6 sprinklers: Part number 01731A (available since 1971).

Footnotes

1. Part number shown is the base part number. For complete part number, refer to the current Viking price list schedule.
2. Based on NFPA 13, NFPA 13R, and NFPA 13D. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.
3. Requires a ½" ratchet (not available from Viking).
4. Also optional for removal of the protective cap. Ideal for sprinkler cabinets.
5. cULus Listed as corrosion resistant.
6. The corrosion resistant coatings have passed the standard corrosion test required by the approving agencies indicated in the Approval Charts. These tests cannot and do not represent all possible corrosive environments. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. For automatic sprinklers, the ENT coating is applied to all exposed exterior surfaces, including the waterway. For ENT coated sprinklers, the Belleville spring is exposed.
7. The sprinkler temperature rating is stamped on the deflector.
8. The installer tool is for push-on style cover plates only.

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TABLE 2: COVER PLATE ORDERING INFORMATION

Instructions:
(1) Select a Cover Plate Base Part Number
(2) Add the suffix for the desired Finish
(3) Add the suffix for the required Cover Plate Nominal Rating.

Example:
23190MC/W = 165 °F (74 °C) Temperature Rated, 2-3/4" (70 mm) diameter, Thread-On style, Round Cover Plate with a Painted White finish.

1: Select a Cover Plate Base Part Number[3]						2: Select a Finish	
Thread-On Style			Push-On Style				
Base Part Number[1]	Size Inch (mm)	Type	Base Part Number	Size Inch (mm)	Type	Description	Suffix[5]
23190	2-3/4 (70)	Round	23447	2-3/4 (70)	Round	Polished Chrome	F
23174	3-5/16 (84)	Round	23463	3-5/16 (84)	Round	Brushed Chrome	F-/B
23179	3-5/16 (84)	Square	23482	3-5/16 (84)	Square	Bright Brass	B
23193[5]	2-3/4 (70)	Stainless Steel Round	23455[5]	2-3/4 (70)	Stainless Steel Round	Antique Brass	B-/A
						Brushed Brass	B-/B
23183[5]	3-5/16 (84)	Stainless Steel Round	23473[5]	3-5/16 (84)	Stainless Steel Round	Brushed Copper	E-/B
						Painted White	M-/W
						Painted Ivory	M-/I
						Painted Black	M-/B

3: Temperature Rating Matrix[1,2]

Cover Plate Nominal Rating (Required)	Temperature Classification	Sprinkler Nominal Rating	Sprinkler Maximum Ambient Ceiling Temperature[2]	Suffix
135 °F (57 °C)	Ordinary	155 °F (68 °C)	100 °F (38 °C)	**A**
165 °F (74 °C)	Intermediate	200 °F (93 °C)	150 °F (65 °C)	**C**

Footnotes

1. Part number shown is the base part number. For complete part number, refer to the current Viking price list schedule.
2. The sprinkler temperature rating is stamped on the deflector.
3. Based on NFPA-13, NFPA 13R, and NFPA 13D. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.
4. Where a dash (-) is shown in the Finish suffix designation, insert the desired Temperature Rating suffix. See example above.
5. Stainless Steel versions are not available with any finishes or paint.

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Approval Chart
Viking VK494, 4.9 K-factor Residential Concealed Pendent Sprinkler

For systems designed to NFPA 13D or NFPA 13R. For systems designed to NFPA 13, refer to the Design Criteria. For Ceiling types refer to current editions of NFPA 13, 13R or 13D

Sprinkler Base Part Number [1]	SIN	NPT Thread Size		Nominal K-factor		Maximum Water Working Pressure
		Inches	mm	U.S.	metric [2]	
20759	VK494	1/2	15	4.9	70.6	175 psi (12 bar)

Max. Coverage Area [6] W X L Ft. X Ft. (m X m)	Flow GPM (LPM)	Pressure PSI (bar)	Deflector to Ceiling	Installation Type	Listings and Approvals[3,5]	Minimum Spacing Ft. (m)
	155 °F (68 °C), 200 °F (93 °C) Temperature Rated Sprinklers				c UL us [4] EU	
12 X 12 (3.7 X 3.7)	13 (49.2)	7.0 (0.48)	Refer to Figure 2	Concealed with Cover Plate Assembly. See Footnote 7.	See Footnotes 8, & 9	8 (2.4)
14 X 14 (4.3 X 4.3)	13 (49.2)	7.0 (0.48)				
16 X 16 (4.9 X 4.9)	13 (49.2)	7.0 (0.48)				
18 X 18 (5.5 X 5.5)	17 (64.4)	12.0 (0.83)				
20 X 20 (6.1 X 6.1)	20 (75.7)	16.7 (1.15)				

Footnotes

1. Part number shown is the base part number. For complete part number, refer to the current Viking price schedule.
2. Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
3. This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals. Refer also to Design Criteria.
4. Listed by Underwriter's Laboratories, Inc. for use in the U.S., Canada, and European Union.
5. Meets New York City requirements, effective July 1, 2008.
6. For areas of coverage smaller than shown, use the "Flow" and "Pressure" for the next larger area listed. Flows and pressures listed are per sprinkler. The distance from sprinklers to walls shall not exceed one-half the sprinkler spacing indicated for the minimum "Flow" and "Pressure" used.
7. Other paint colors are available on request with the same listings as the standard finish colors. Stainless Steel cover plates are not available with any finishes or paint. Listings and approvals apply for any paint manufacturer. Contact Viking for additional information. Custom colors are indicated on a label inside the cover assembly. Refer to Figure 3.
8. Accepted Cover Plate Finishes are: Polished Chrome, Brushed Chrome, Bright Brass, Antique Brass, Brushed Brass, Brushed Copper, Painted White, Painted Ivory, or Painted Black [7].
9. C-UL-US-EU Listed as corrosion resistant - Electroless Nickel PTFE (ENT)

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DESIGN CRITERIA

(Also refer to the Approval Chart.)

UL Listing Requirements (C-UL-US-EU):

When using Viking Residential Concealed Pendent Sprinkler VK494 for systems designed to NFPA 13D or NFPA 13R, apply the listed areas of coverage and minimum water supply requirements shown in the Approval Chart.

For systems designed to NFPA 13: The number of design sprinklers is to be the four contiguous most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

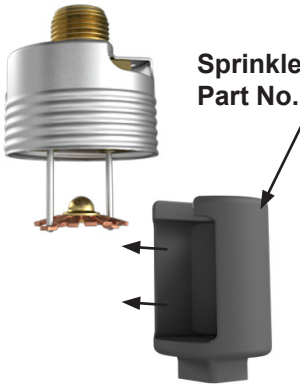
- The flow rates given in the Approval Chart for NFPA 13D and NFPA 13R applications for each listed area of coverage, **or**
- Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the "design area" in accordance with sections 9.5.2.1 or 10.2.4.1.2 of the current edition of NFPA 13.
- Minimum distance between residential sprinklers: 8 ft. (2.4 m).

NOTE: Concealed sprinklers must be installed in neutral or negative pressure plenums only.

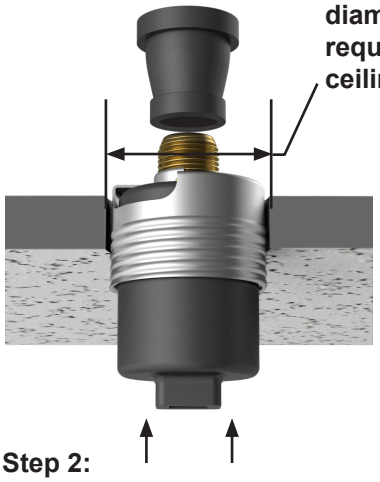
IMPORTANT: Always refer to Bulletin Form No. F_080415 - Best Practices for Residential Sprinkler Handling and Installation. Also refer to Form No. F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.

Sprinkler and Adapter Assembly

- **Protective cap removed**
- **Use wrench 14047W/B****



Step 1:
Carefully slide the wrench sideways around the deflector and pins



Step 2:
Carefully press the wrench upward and turn slightly to ensure engagement with the sprinkler wrench flats.

NEVER install the sprinkler by applying the installation wrench across the frame arms. DO NOT overtighten. Use only the designated sprinkler wrenches, Viking Part Numbers 14047W/B or 14031**. A leak tight seal should be achieved by turning the sprinkler clockwise 1 to 1-1/2 turns beyond finger tight.**

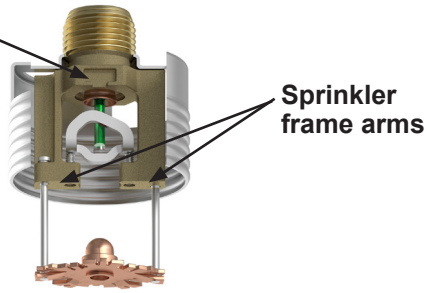


Figure 1: Sprinkler Installation and Proper Wrench Usage
**** A 1/2" ratchet is required (Not available from Viking)**

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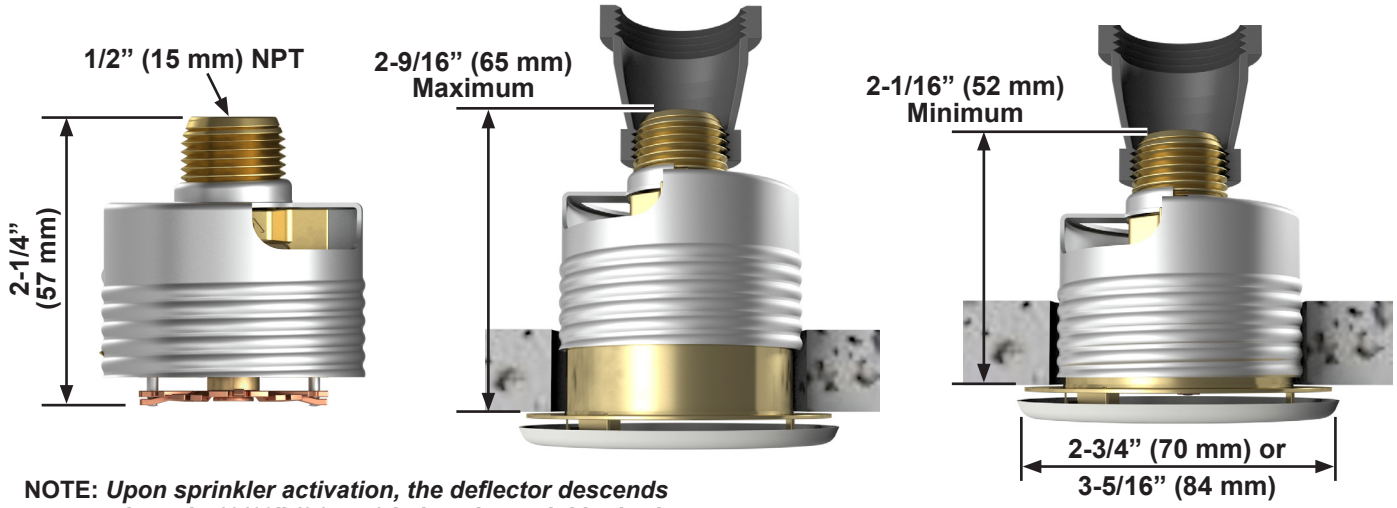
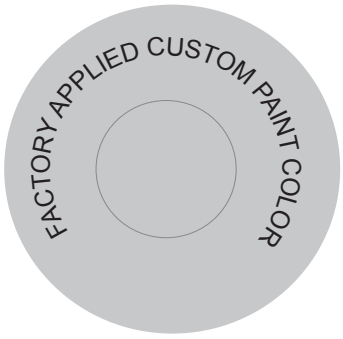


NOTE: ***Upon sprinkler activation, the deflector descends to approximately 13/16” (21 mm) below the sprinkler body.***

Figure 2: Sprinkler Dimensions and Cover Installation



All custom color painted cover plates will have an identifying label affixed to the inside of the cover that indicates the custom color and will have a representative sample (a paint dot) of the paint on the label.

Figure 3: Identification of Custom Paint for Concealed Covers

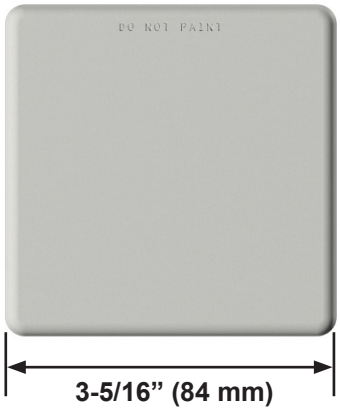
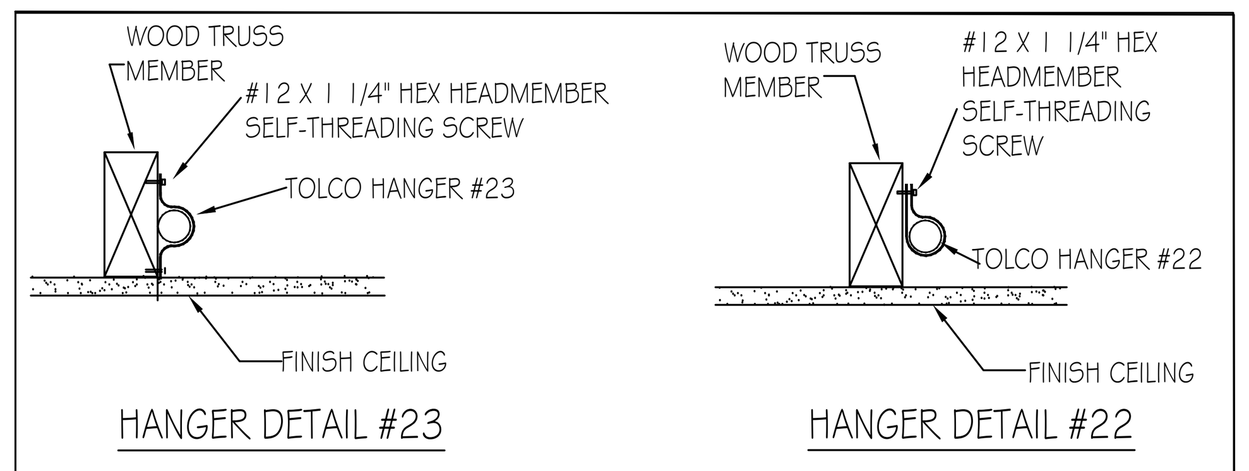
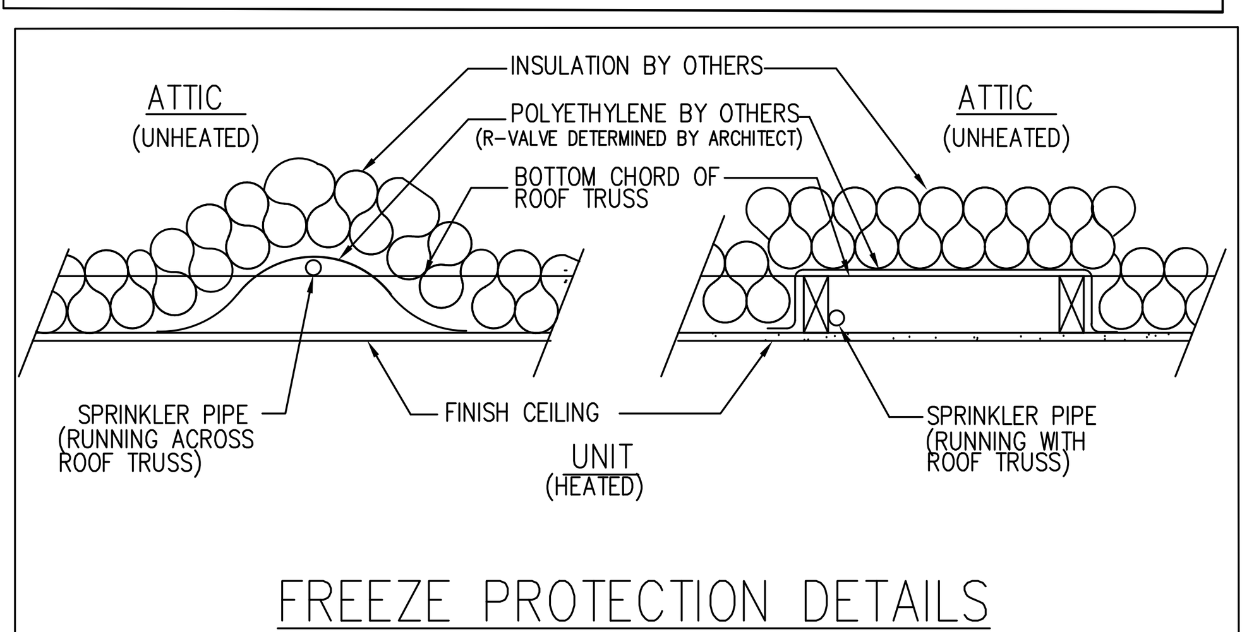


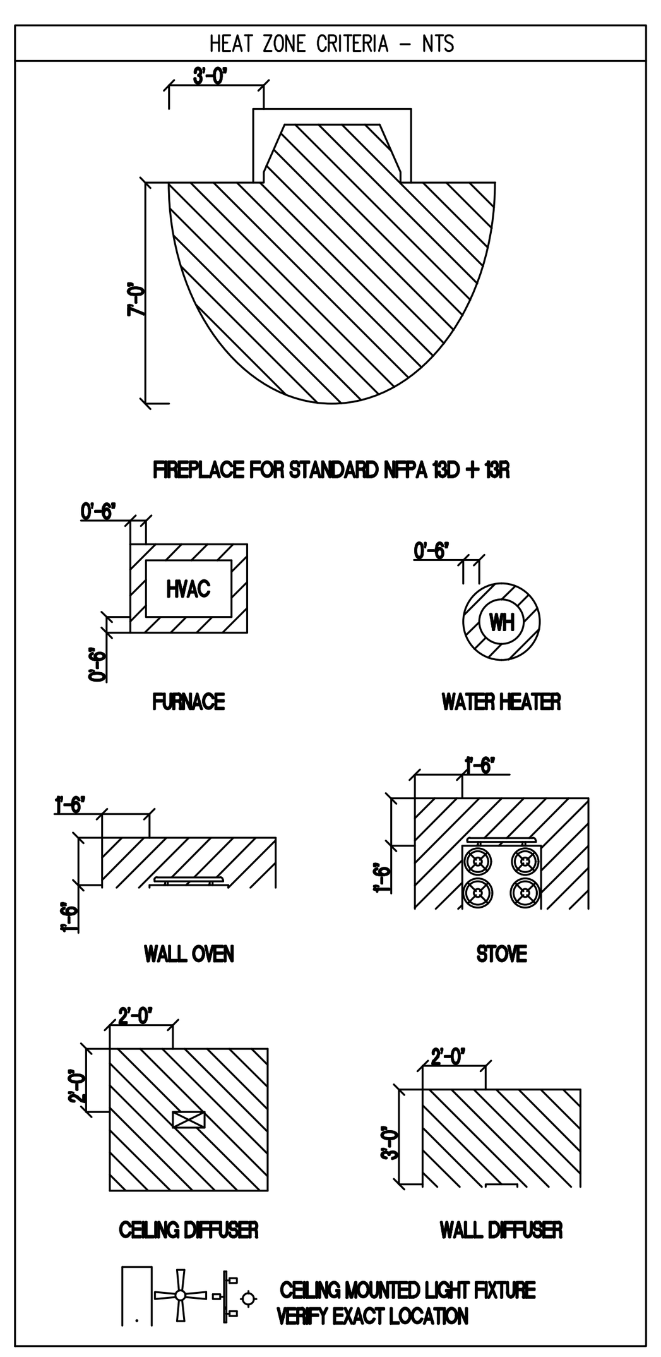
Figure 4: Square Cover Assembly

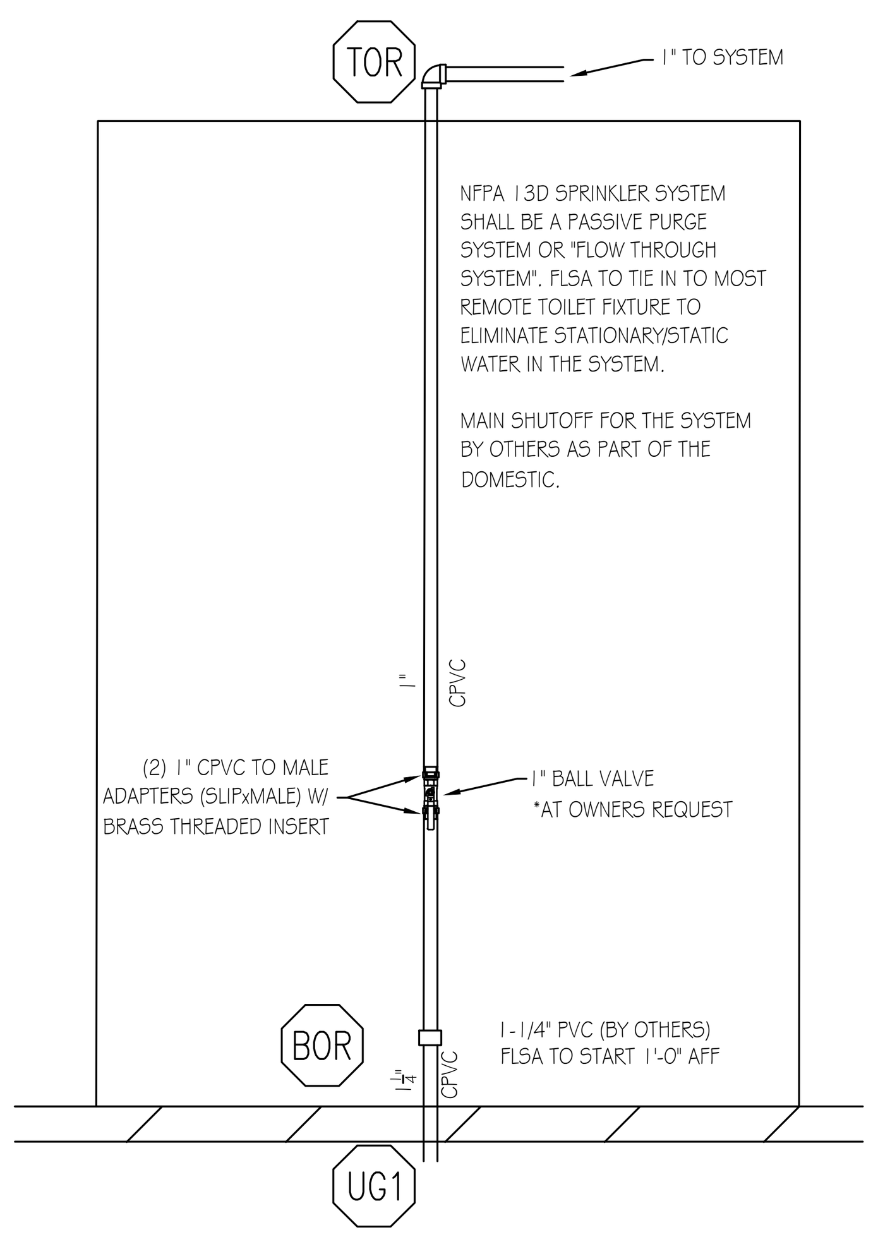
GENERAL NOTES

— THIS WET PIPE FIRE SPRINKLER SYSTEM IS DESIGNED AS LIGHT HAZARD/RESIDENTIAL OCCUPANCY WITH A DESIGN DENSITY OF .05 GPM/2 SPRINKLERS MAX IN ACCORDANCE WITH 13D (2013 EDITION) AND NFPA 13–11.3.1.1.
– HYDRAULIC CALCULATIONS ARE BASED UPON FLOW DATA PERFORMED BY FLSA ON 04/21/2021 AT 4:00PM. HYDRAULIC CALCULATIONS TO BE BASED ON NFPA 13D (2013 EDITION).
– FIRE SPRINKLER OVERHEAD PIPE AND FITTINGS ARE TO BE CPVC PIPE LISTED FOR FIRE PROTECTION USED UNLESS NOTED OTHERWISE.
– ALL HANGERS TO BE U.L. LISTED FOR FIRE PROTECTION SERVICES. HANGERS SHALL BE INSTALLED IN ACCORDANCE WITH THEIR LISTING. SPACING AND LOCATION TO COMPLY WITH NFPA 13.
– ALL EQUIPMENT TO BE U.L. LISTED FOR FIRE PROTECTION SERVICES AND LISTED IN ACCORDANCE WITH ITS LISTING.
– PENDENT SPRINKLERS ARE TO BE SPACED A MAXIMUM OF 18 FT. X 18 FT. AND A MINIMIM OF 8 FT. APART. PENDANTS MAY BE A MAXIMUM OF 9'–0" OFF OF ANY WALL.
– IN AREAS WHERE WET–TYPE SPRINKLER SYSTEM PIPING HAS BEEN INSTALLED, IT IS THE OWNERS' RESPONSIBILITY TO PROVIDE ADEQUATE HEAT. (AMBIENT TEMPERATURE OF A MINIMUM 40°F)
– ALL DRAINAGE TO COMPLY WITH NFPA 13D AND CONTRACT DOCUMENTS.
– [X'–X'] DENOTES CENTERLINE OF PIPE AFF.
– ALL SPRINKLER HEADS SHALL BE LISTED RESIDENTIAL SPRINKLER HEADS IN ACCORDANCE WITH 7.5.1 OF NFPA 13D.
– FLSA POINT OF CONNECTION IS AT 1'–0" AFF.
– UNDERGROUND PIPING TO BE FLUSHED PRIOR TO SPRINKLER PIPE CONNECTION. FLUSHING IS TO BE COMPLETED BY OTHERS.
– PIPING TO SPRINKLER HEADS 1" CPVC UNLESS OTHERWISE NOTED.









RISER DETAIL
N.T.S.

Sprinkler Design Data

Project Name: OAKHAVEN LOT 41		System: WET
Project Street Address: 83 OAKHAVEN DRIVE.		Sys. Sq. Ft.: VARIES
Suite: –	Floor#: 2	Ceiling Height: VARIES
Designed By: HAILEY WEYANT	Phone: (919) 872–3250	Total Bldg. Hgt.: –
Occupancy: RESIDENTIAL	Hazard: LIGHT/RESIDENTIAL	

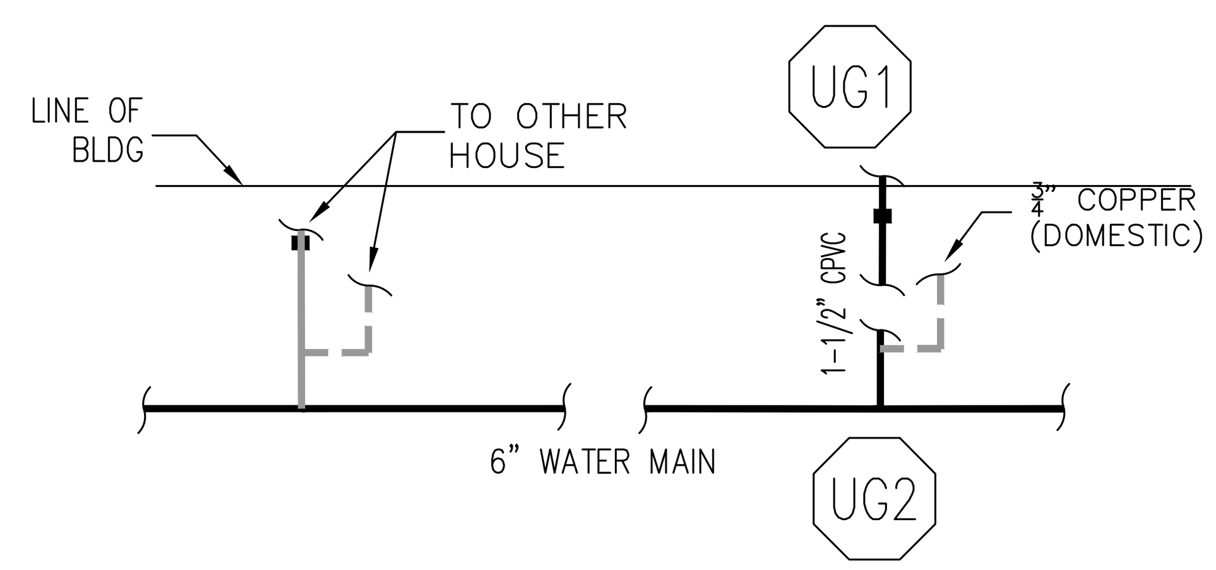
Design Summary

	RA # 1	RA # 2	RA #	RA #	RA #
Design Method	CALCULATED	CALCULATED	–	–	–
Design Area #	REMOTE AREA #1	REMOTE AREA #2	–	–	–
Location	MASTER BEDROOM	KITCHEN	–	–	–
Type of System	WET	WET	–	–	–
Hazard Class	RESIDENTIAL	RESIDENTIAL	–	–	–
Criteria Form	NFPA 13D (2013)	NFPA 13D (2013)	–	–	–
Design Area	1 HEADS	2 HEAD	–	–	–
Sprinkler Spacing	20X20 (400 SF)	16X16 (256 SF)	–	–	–
Density	.05	.05	–	–	–
K–factor	4.9	4.9	–	–	–
Domestic Flow	3 GPM	3 GPM	–	–	–
# Design Sprinklers	1	2	–	–	–
Special Application Spk.	–	–	–	–	–
Requirement @ TEST					
G.P.M. Req'd	23.03	29.05	–	–	–
P.S.I. Req'd	29.25	25.85	–	–	–
Safety Factor @ TEST	25.05	28.36	–	–	–
Volume of Dry System	–	–	–	–	–

Water Supply Information

Tested by	–	Date/Time	4/21/2021	4:00 pm	Pressure Hydrant	4918B037
Hydrant Elevation	–	Flow Hydrant	–		Static	–
Static (PSI)	54.5	Residiual (PSI)	13.5		Flow (GPM)	417

Copy of Water Test Data Included with Calculation is required



WATER SERVICE DETAIL
N.T.S.

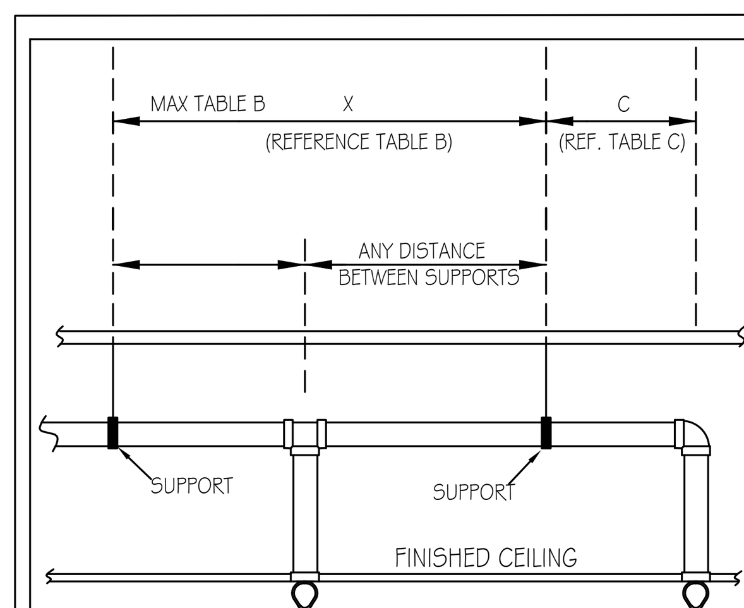


TABLE A - CPVC STANDARD SUPPORT SPACING

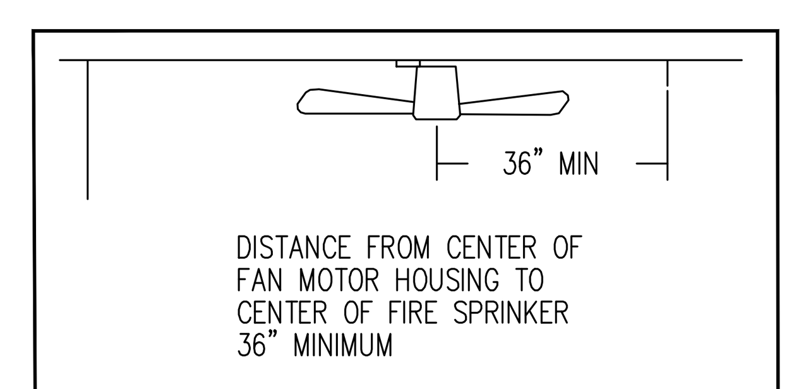
NOMINAL SIZE, INCHES	MAX SUPPORT SPACING, FEET
3/4"	5'-6"
1"	6'-0"
1 1/4"	6'-6"
1 1/2"	7'-0"
2"	8'-0"
2 1/2"	9'-0"
3"	10'-0"

TABLE B - MAX SUPPORT SPACING DISTANCE IN LINE SPRINKLER HEAD DROP TEE

NOMINAL PIPE SIZE	LESS THAN 100 psi	MORE THAN 100 psi
3/4"	4'-0"	3'-0"
1"	5'-0"	4'-0"
1 1/4"	6'-0"	5'-0"
1 1/2" - 3"	7'-0"	7'-0"

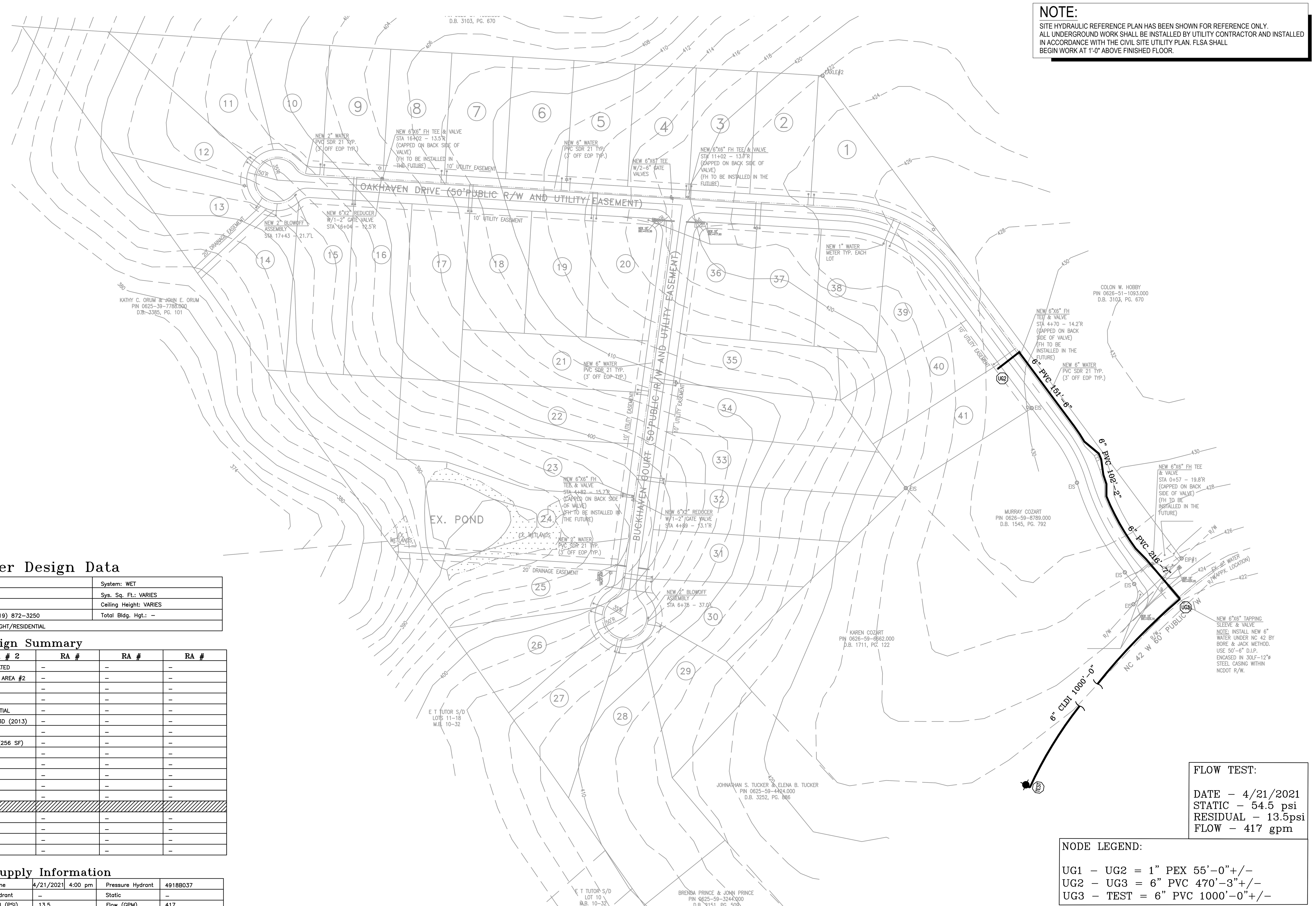
TABLE C - MAX SUPPORT SPACING DISTANCE END SPRINKLER HEAD DROP ELBOW

NOMINAL PIPE SIZE	LESS THAN 100 psi	MORE THAN 100 psi
3/4"	4'-0"	3'-0"
1"	5'-0"	4'-0"
1 1/4"	6'-0"	5'-0"
1 1/2" - 3"	7'-0"	7'-0"



CEILING FAN DETAIL
NOT TO SCALE

NOTE:
SITE HYDRAULIC REFERENCE PLAN HAS BEEN SHOWN FOR REFERENCE ONLY.
ALL UNDERGROUND WORK SHALL BE INSTALLED BY UTILITY CONTRACTOR AND INSTALLED IN ACCORDANCE WITH THE CIVIL SITE UTILITY PLAN. FLSA SHALL BEGIN WORK AT 1'-0" ABOVE FINISHED FLOOR.



SITE PLAN - FOR HYDRAULIC REFERENCE ONLY

FLOW TEST:

DATE – 4/21/2021
STATIC – 54.5 psi
RESIDUAL – 13.5psi
FLOW – 417 gpm

NODE LEGEND:

UG1 – UG2 = 1" PEX 55'–0"+/–
UG2 – UG3 = 6" PVC 470'–3"+/–
UG3 – TEST = 6" PVC 1000'–0"+/–

SCOPE OF WORK

– FLSA TO BEGIN WORK AT 1'–0" AFF
– FLSA TO INSTALL AUTOMATIC SPRINKLER SYSTEM UNDER NFPA 13D (2013) TO PROTECT NEW RESIDENTIAL HOME
– FLSA TO TIE NEW SPRINKLER SYSTEM INTO PLUMBING FOR A PASSIVE PURGE SYSTEM.
– ALL PIPING TO BE CPVC.
– ALL UNDERGROUND AND RUN–IN BY OTHERS

THIS FIRE SPRINKLER PLANNING AND DESIGN DRAWING HAS BEEN PREPARED BY FIRE & LIFE SAFETY AMERICA, INC. AS A LICENSED FIRE SPRINKLER CONTRACTOR UNDER ARTICLE 2 OF CHAPTER 87 OR THE GENERAL STATUTES FOR THE STATE OF NORTH CAROLINA.

EXCLUSIVE USE PURSUANT TO G.S.-89C-25(8) IS FOR FIRE & LIFE SAFETY AMERICA, INC. AND FIRE & LIFE SAFETY AMERICA, INC. SHALL PERFORM ANY AND ALL INSTALLATION WORK AND OTHER WORK PERFORMED IN RELIANCE ON THE DRAWING PURSUANT TO G.S.-55B-15(A)(2).

INSTALLATION WORK OR ANY OTHER WORK PERFORMED BY ANOTHER PERSON OR ENTITY IN RELIANCE UPON THIS DRAWING OR ANY COPY THEREOF IS STRICTLY PROHIBITED.

NICET CERTIFIED
JONATHAN STEBILA
LEVEL III AUTOMATIC SPRINKLER SYSTEMS
#111897
NORTH CAROLINA STATE LICENSE #29733
PERMIT NUMBER: SFD2011-0043

SYSTEM DESIGN CRITERIA

TYPE SYSTEM: ■ WET ☐ DRY ☐ DELUGE ☐ PREACTION ☐ ANTI-FREEZE
NFPA STANDARD: ☐ #13 ■ #13D ☐ #13R ☐ #14 ☐ #20 ☐ #22 ☐ #24 ☐ #231 ☐ #231C ☐ #15 ☐ #16 ☐ #409
OCCUPANCY: RESIDENTIAL HAZARD: LIGHT PIPE ID REQUIRED: NO
MAXIMUM SPACING: VARIES LOCAL HOSE THREADS: N.S.T. SLEEVES REQUIRED: NO
SPRINKLERS ARE REQUIRED TO BE LOCATED IN THE CENTER OF THE CEILING TILES.

PIPE TYPES AND FITTING TYPES

LINE PIPING: CPVC	LINE FITTINGS: CPVC
MAIN PIPING: CPVC	MAIN FITTINGS: CPVC

APPROVING AGENCIES

APPROVING AUTHORITY: HARNETT COUNTY
UNDERWRITER: N/A
GENERAL CONTRACTOR: WATERMARK HOMES
ADDRESS: 1303 FT BRAGG ROAD SUITE 201
CITY & STATE: FAYETTEVILLE, NC 28305
PHONE NO.: (910) 483–2229
FAX NO.:

GENERAL NOTES

1. Freeze Protection: The owner is responsible for maintaining a min. of 40° F temperature for all wet systems and portions of other systems containing water.
2. M.I.C. Protection: The owner is responsible for all detection/testing/prevention.
3. Design is subject to minor deviations arising from field conditions and/or trade coordination. Such deviations shall not affect code compliance or scope of work and shall not require resubmittal except in "as-built" if required by contract documents.
4. Underground provider to ensure lead-in is plumbed, 2-holed, rodded, flushed, thrust blocked and a fully executed underground test certificate required per NFPA to be provided to FLSA prior to connection. FLSA is not responsible for damage to its system or components due to debris entering the system from underground water lines provided "by others".
5. This drawing is property of Fire and Life Safety America and is not to be duplicated and/or distributed without written authorization from FLSA.
6. Hydrostatic testing will only be performed with water or air depending on adequate temperature. Any other form of testing is excluded.

LEGEND

Symbol	Description
⬡	Hydraulic Reference Point
[* 18" BTS]	Elev. Below Top of Steel
[12'–0 AFF]	Elev. Above Finished Floor
+ TOS 12'–0	Elev. of Top of Steel
(10–0)	Ceiling Height
	Denotes Hanger Location
	Denotes Seismic Support
DESCRIPTION	Room name or use
=	Sleeve Location
	FLSA Start Point

SPRINKLER SUMMARY

SYM	TYPE	FINISH	TEMP	ORIF.	"K"	NPT	MANUF.	SIN#	ESCUTCHEON	QTY.
●	RES. PENDENT	WHITE	200°	1/2"	4.9	1/2"	VIKING	VK494	CONCEALED	0
			°							0
			°							0
			°							0
			°							0
			°							0
			°							0
			°							0

TOTAL SPRINKLERS THIS PROJECT 17 TOTAL SPRINKLERS THIS DRAWING 0

GRAPHIC SCALE: 1/8" = 1'- 0" (0 4 8 16 32)

REVISIONS

#	DATE	DESCRIPTION	BY
1	6/4/2021	SUBMITTAL TO AHJ	HCW
2			
3			
4			
5			
6			
7			

RICHMOND, VA CHESAPEAKE, VA ROANOKE, VA SPRINGFIELD, VA ORLANDO, FL HOUSTON, TX SAN ANTONIO, TX DALLAS, TX AUSTIN, FL CHARLOTTE, NC RALEIGH, NC BALTIMORE, MD ATLANTA, GA
1731 Round Rock Drive
Raleigh, NC 27615
PHONE (919) 872–3250
FAX (919) 877–5775
FLSA FIRE & LIFE SAFETY AMERICA PROTECTING AMERICA

JOB #:	21NC1524	HYD. SITE PLAN, GENERAL NOTES & DETAILS	DRAWING #:
DATE:	6/1/2021	OAKHAVEN LOT 41	FP1
DRAWN BY:	H. WEYANT	83 OAKHAVEN DR.	
SCALE:	AS NOTED	HOLLY SPRINGS, NC 27540	OF 2

NOTES:
– PORCHES AND GARAGES ARE OMITTED PER NFPA 13D (2013) 8.3.4
– CLOSETS 24 SQ. FT. OR LESS IN AREA ARE UNSPRINKLERED PER NFPA 13D (2013) 8.3.3; WALLS AND CEILING TO BE SURFACED WITH NONCOMBUSTIBLE OR LIMITED COMBUSTIBLE MATERIAL AS DEFINED BY NFPA 220
– BATHROOMS 55 SQ. FT. OR LESS IN AREA ARE UNSPRINKLERED PER NFPA 13D (2013) 8.3.2

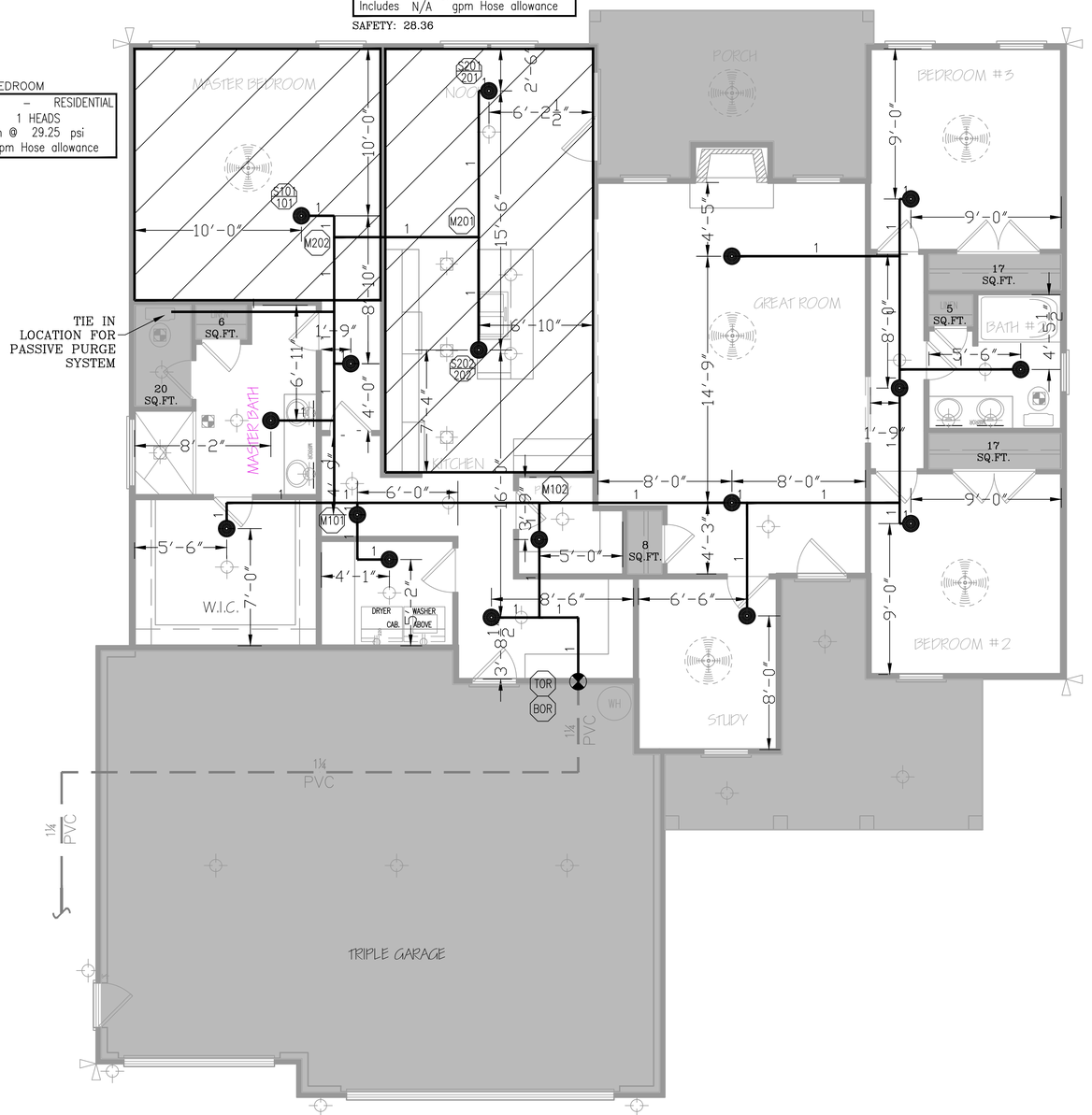
SPRINKLER LEGEND

NO HEADS REQUIRED

REMOTE AREA

RA2 – KITCHEN
Design Area No. 2 – RESIDENTIAL
Density .05 Area 2 HEADS
Flow 29.05 gpm @ 25.85 psi
Includes N/A gpm Hose allowance
SAFETY: 28.36

RA1 – MASTER BEDROOM
Design Area No. 1 – RESIDENTIAL
Density .05 Area 1 HEADS
Flow 23.03 gpm @ 29.25 psi
Includes N/A gpm Hose allowance
SAFETY: 25.05



LEVEL 1 - SPRINKLER PLAN

1/4" = 1' - 0"

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JONATHAN STEBILA
LEVEL III AUTOMATIC SPRINKLER SYSTEMS
#111897

NORTH CAROLINA STATE LICENSE #29733

PERMIT NUMBER: SFD2011-0043

SYSTEM DESIGN CRITERIA

TYPE SYSTEM: ■WET ☐DRY ☐DELUGE ☐PREACTION ☐ANTI-FREEZE
NFPA STANDARD: ☐#13 ■#13D ☐#13R ☐#14 ☐#20 ☐#22 ☐#24 ☐#231 ☐#231C ☐#15 ☐#16 ☐#409
OCCUPANCY: RESIDENTIAL
HAZARD: LIGHT
PIPE ID REQUIRED: NO
MAXIMUM SPACING: VARIES
LOCAL HOSE THREADS: N.S.T.
SLEEVES REQUIRED: NO
SPRINKLERS ARE REQUIRED TO BE LOCATED IN THE CENTER OF THE CEILING TILES.

PIPE TYPES AND FITTING TYPES

LINE PIPING: CPVC	LINE FITTINGS: CPVC
MAIN PIPING: CPVC	MAIN FITTINGS: CPVC

APPROVING AGENCIES

APPROVING AUTHORITY: HARNETT COUNTY

UNDERWRITER: N/A

GENERAL CONTRACTOR: WATERMARK HOMES
ADDRESS: 1303 FT BRAGG ROAD SUITE 201
CITY & STATE: FAYETTEVILLE, NC 28305
PHONE NO.: (910) 483-2229
FAX NO.:

GENERAL NOTES

1. Freeze Protection: The owner is responsible for maintaining a min. of 40° F temperature for all wet systems and portions of other systems containing water.
2. M.I.C. Protection: The owner is responsible for all detection/testing/prevention.
3. Design is subject to minor deviations arising from field conditions and/or trade coordination. Such deviations shall not affect code compliance or scope of work and shall not require resubmittal except in "as-built" if required by contract documents.
4. Underground provider to ensure lead-in is plumbed, 2-holed, rodded, flushed, thrust blocked and a fully executed underground test certificate required per NFPA to be provided to FLSA prior to connection. FLSA is not responsible for damage to its system or components due to debris entering the system from underground water lines provided "by others".
5. This drawing is property of Fire and Life Safety America and is not to be duplicated and/or distributed without written authorization from FLSA.
6. Hydrostatic testing will only be performed with water or air depending on adequate temperature. Any other form of testing is excluded.

LEGEND

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12'-0 AFF	Elev. Above Finished Floor
+ TOS 12'-0	Elev. of Top of Steel
(10-0)	Ceiling Height
	Denotes Hanger Location
	Denotes Seismic Support
DESCRIPTION	Room name or use
=	Sleeve Location
	FLSA Start Point

SPRINKLER SUMMARY

SYM	TYPE	FINISH	TEMP	ORIF.	"K"	NPT	MANUF.	SIN#	ESCUTCHEON	QTY.
●	RES. PENDENT	WHITE	200°	1/2"	4.9	1/2"	VIKING	VK494	CONCEALED	17
			°							0
			°							0
			°							0
			°							0
			°							0
			°							0
			°							0
			°							0

TOTAL SPRINKLERS THIS PROJECT 17 TOTAL SPRINKLERS THIS DRAWING 17

GRAPHIC SCALE: 1/8" = 1'- 0"

REVISIONS

#	DATE	DESCRIPTION	BY
1	6/4/2021	SUBMITTAL TO AHJ	HCW

1731 Round Rock Drive
Raleigh, NC 27615
PHONE (919) 872-3250
FAX (919) 877-5775

RICHMOND, VA CHESAPEAKE, VA ROANOKE, VA SPRINGFIELD, VA ORLANDO, FL HOUSTON, TX SAN ANTONIO, TX DALLAS, TX AUSTIN, FL CHARLOTTE, NC RALEIGH, NC BALTIMORE, MD ATLANTA, GA

FLSA FIRE & LIFE SAFETY AMERICA PROTECTING AMERICA

JOB #:	21NC1524
DATE:	6/1/2021
DRAWN BY:	H. WEYANT
SCALE:	AS NOTED

SPRINKLER PLAN

OAKHAVEN LOT 41
83 OAKHAVEN DR.
HOLLY SPRINGS, NC 27540

DRAWING #: FP2
OF 2

ISO 9001: 2008 Certified

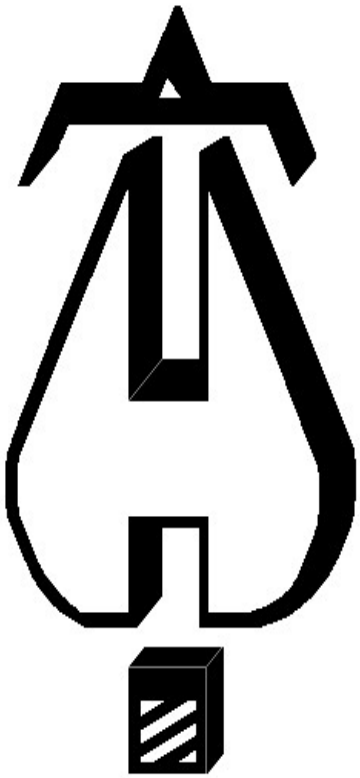
FLSA FIRE & LIFE SAFETY AMERICA PROTECTING AMERICA

1731 Round Rock Drive, Raleigh, NC 27615 ● (919) 872-3250 ● fax (919) 877-5775 ● www.flsamerica.com

OAKHAVEN LOT 41

HYDRAULIC CALCULATIONS

6/1/2021



Hydraulic calculations using HydraCALC

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

Job Name	:	Oakhaven Lot 41
Drawing	:	FP2
Location	:	83 Oakhaven Dr.
Remote Area	:	RA1
Contract	:	21NC1524
Data File	:	RA1- Master Bedroom.WXF

HYDRAULIC CALCULATIONS
for

Project name: Oakhaven Lot 41
Location: 83 Oakhaven Dr.
Drawing no: FP2
Date: 6/1/2021

Design

Remote area number: RA1
Remote area location: Master Bedroom
Occupancy classification: Residential
Density: .05 - Gpm/SqFt
Area of application: 221 - 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 @ 29.25 - 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.)

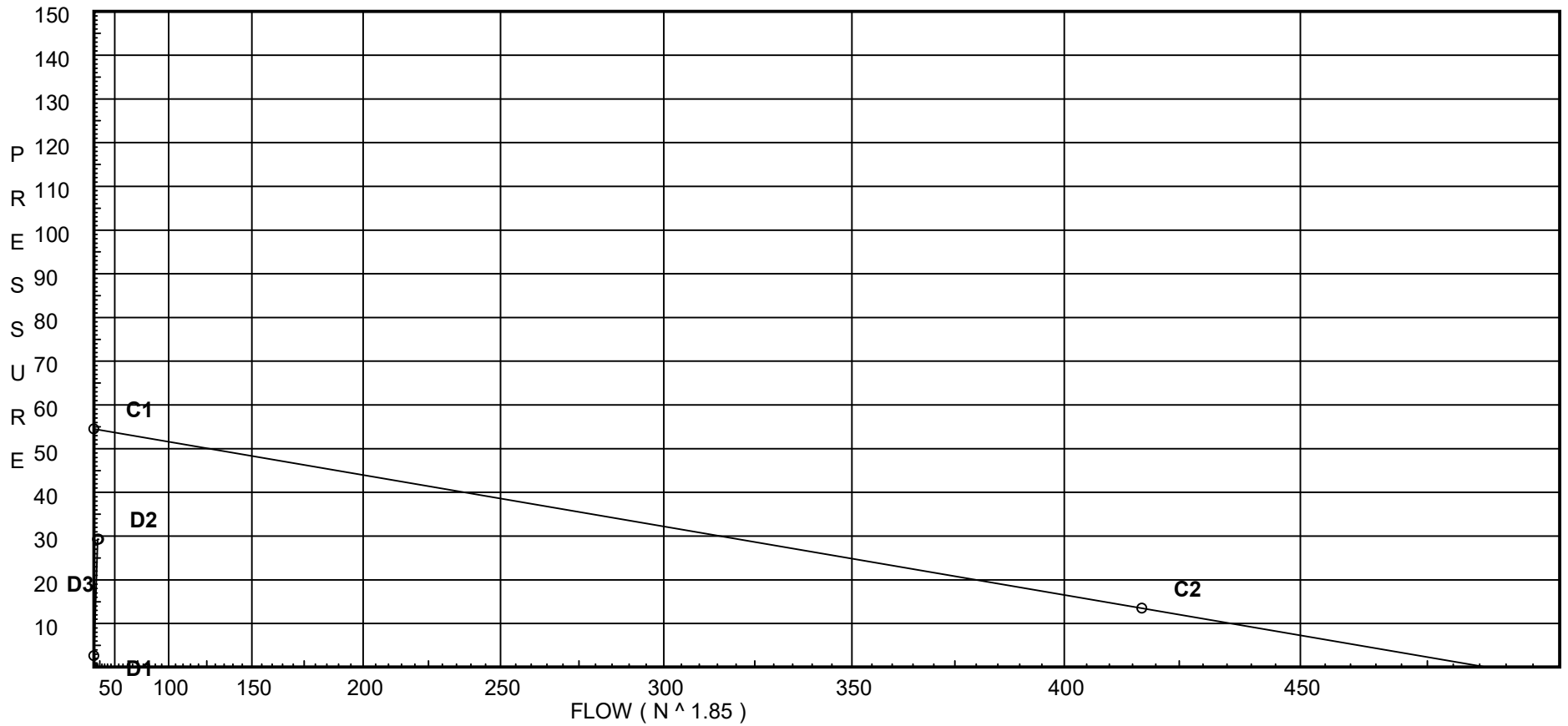
Water Supply Curve C

Fire & Life Safety America
Oakhaven Lot 41

Date 6/1/2021

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 : 29.254
- Hose (Demand) : 3
- D3 - System Demand : 23.024
- Safety Margin : 25.053



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	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'Ell 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.

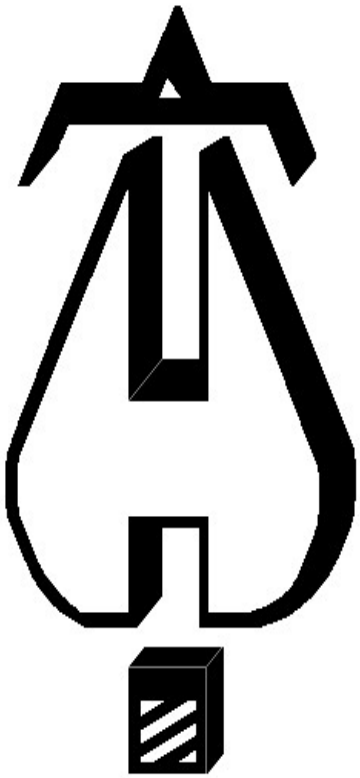
SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	54.5	13.5	417.0	54.307	23.02	29.254

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
S101	9.0	4.9	16.7	20.02	
101	10.0		16.81		
M101	10.0		18.93		
M102	10.0		20.11		
TOR	8.0		23.17		
BOR	3.0		26.35		
UG1	3.0		27.15	3.0	
UG2	-3.0		31.82		
UG3	-3.0		31.83		
TEST	3.0		29.25		

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	9	4.90	20.02	1	N	7.0	1.000	150	16.700	
to						0.0	7.000		-0.433	
101	10		20.02	1.101		0.0	8.000	0.0681	0.545	Vel = 6.75
			0.0							
101			20.02						16.812	K Factor = 4.88
101	10		20.02	1	N	7.0	19.125	150	16.812	
to					O	5.0	12.000		0.0	
M101	10		20.02	1.101		0.0	31.125	0.0682	2.123	Vel = 6.75
M101	10		0.0	1	O	5.0	12.292	150	18.935	
to						0.0	5.000		0.0	
M102	10		20.02	1.101		0.0	17.292	0.0682	1.179	Vel = 6.75
M102	10		0.0	1	O	5.0	13.042	150	20.114	
to					2N	14.0	19.000		0.866	
TOR	8		20.02	1.101		0.0	32.042	0.0682	2.185	Vel = 6.75
			0.0							
TOR			20.02						23.165	K Factor = 4.16
TOR	8		20.02	1	N	7.0	8.000	150	23.165	
to						0.0	7.000		2.166	
BOR	3		20.02	1.101		0.0	15.000	0.0682	1.023	Vel = 6.75
BOR	3		0.0	1	2E	7.65	4.000	150	26.354	
to						0.0	7.650		0.0	
UG1	3		20.02	1.101		0.0	11.650	0.0682	0.794	Vel = 6.75
UG1	3	H3	3.00	1.25	T	9.523	55.000	150	27.148	
to					2E	9.523	19.046		2.599	
UG2	-3		23.02	1.394		0.0	74.046	0.0280	2.072	Vel = 4.84
UG2	-3		0.0	6	2G	9.25	470.250	150	31.819	
to					3E	64.749	95.581		0.0	
UG3	-3		23.02	6.09	2F	21.583	565.831	0	0.012	Vel = 0.25
UG3	-3		0.0	6	T	48.896	1000.000	150	31.831	
to					2E	45.637	99.422		-2.599	
TEST	3		23.02	6.16	G	4.89	1099.422	0	0.022	Vel = 0.25
			0.0							
TEST			23.02						29.254	K Factor = 4.26



Hydraulic calculations using HydraCALC

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

Job Name	:	Oakhaven Lot 41
Drawing	:	FP2
Location	:	83 Oakhaven Dr.
Remote Area	:	RA2
Contract	:	21NC1524
Data File	:	RA2- Kitchen.WXF

HYDRAULIC CALCULATIONS
for

Project name: Oakhaven Lot 41
Location: 83 Oakhaven Dr.
Drawing no: FP2
Date: 6/1/2021

Design

Remote area number: RA2
Remote area location: Kitchen
Occupancy classification: Residential
Density: .05 - Gpm/SqFt
Area of application: 314 - SqFt
Coverage per sprinkler: 256 - 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): 29.05 - GPM @ 25.85 - Psi
Type of system: Wet
Volume of dry or preaction system: N/A - Gal

Water supply information

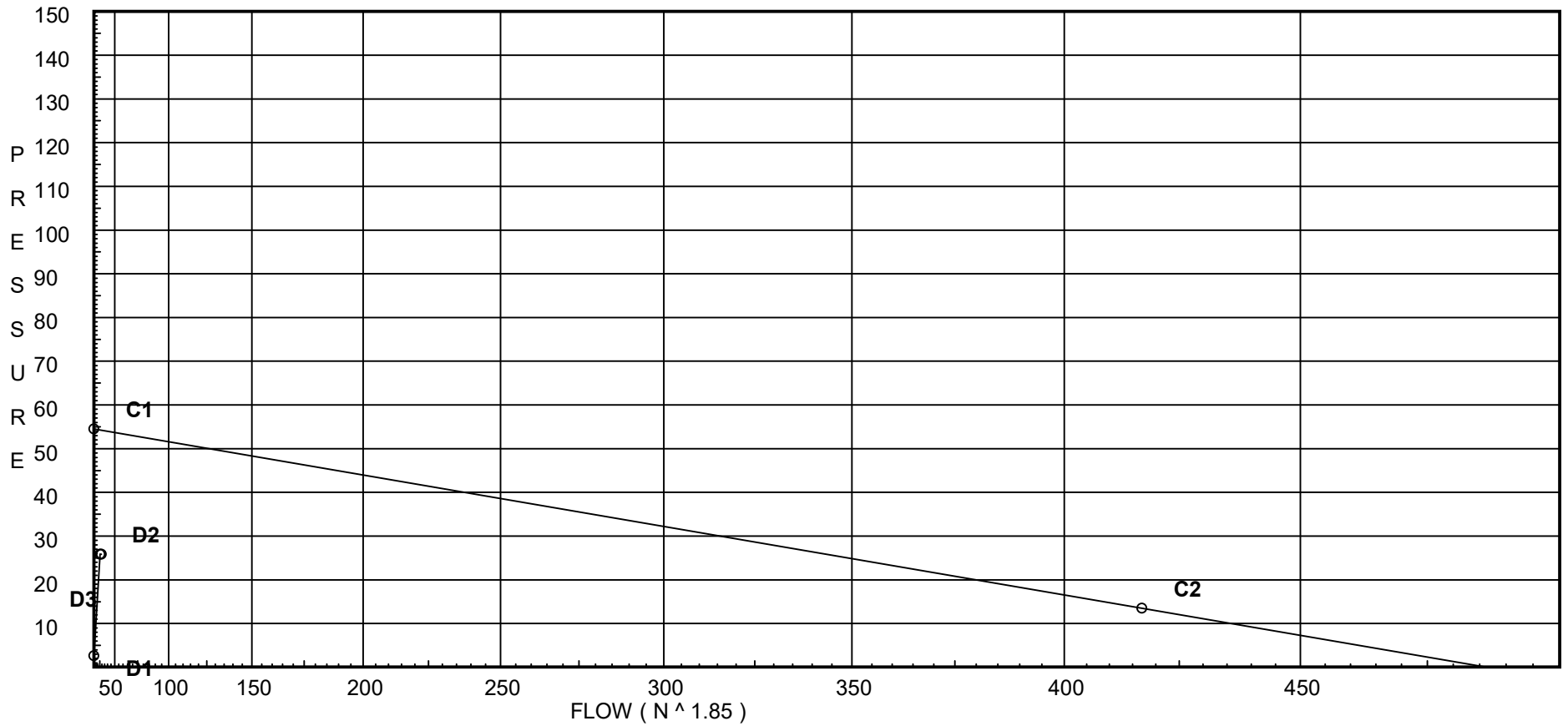
Date: 4/21/2021
Location: NC 42, NC 27540
Source: Fire & Life Safety America

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

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 : 26.05
- D2 - System Pressure : 25.848
- Hose (Demand) : 3
- D3 - System Demand : 29.05
- Safety Margin : 28.355



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	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'Ell 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.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	54.5	13.5	417.0	54.203	29.05	25.848

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
S201	9.0	4.9	7.0	12.96	
S202	9.0	4.9	7.13	13.09	
201	10.0		6.81		
202	10.0		6.95		
M201	10.0		7.31		
M202	10.0		8.83		
M101	10.0		11.15		
M102	10.0		13.07		
TOR	8.0		17.49		
BOR	3.0		21.32		
UG1	3.0		22.61	3.0	
UG2	-3.0		28.39		
UG3	-3.0		28.41		
TEST	3.0		25.85		

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 ******
S201	9	4.90	12.96	1	N	7.0	1.000	150	7.000	
to						0.0	7.000		-0.433	
201	10		12.96	1.101		0.0	8.000	0.0305	0.244	Vel = 4.37
			0.0							
201			12.96						6.811	K Factor = 4.97
S202	9	4.90	13.09	1	N	7.0	1.000	150	7.132	
to						0.0	7.000		-0.433	
202	10		13.09	1.101		0.0	8.000	0.0310	0.248	Vel = 4.41
			0.0							
202			13.09						6.947	K Factor = 4.97
201	10		12.96	1	N	7.0	9.417	150	6.811	
to						0.0	7.000		0.0	
M201	10		12.96	1.101		0.0	16.417	0.0305	0.501	Vel = 4.37
			0.0							
M201			12.96						7.312	K Factor = 4.79
202	10		13.09	1	O	5.0	6.750	150	6.947	
to						0.0	5.000		0.0	
M201	10		13.09	1.101		0.0	11.750	0.0311	0.365	Vel = 4.41
			0.0							
M201			13.09						7.312	K Factor = 4.84
M201	10		26.05	1	O	5.0	8.667	150	7.312	
to						0.0	5.000		0.0	
M202	10		26.05	1.101		0.0	13.667	0.1109	1.516	Vel = 8.78
M202	10		0.0	1	O	5.0	15.917	150	8.828	
to						0.0	5.000		0.0	
M101	10		26.05	1.101		0.0	20.917	0.1110	2.321	Vel = 8.78
M101	10		0.0	1	O	5.0	12.292	150	11.149	
to						0.0	5.000		0.0	
M102	10		26.05	1.101		0.0	17.292	0.1109	1.918	Vel = 8.78
M102	10		0.0	1	O	5.0	13.042	150	13.067	
to					2N	14.0	19.000		0.866	
TOR	8		26.05	1.101		0.0	32.042	0.1109	3.555	Vel = 8.78
			0.0							
TOR			26.05						17.488	K Factor = 6.23
TOR	8		26.05	1	N	7.0	8.000	150	17.488	
to						0.0	7.000		2.166	
BOR	3		26.05	1.101		0.0	15.000	0.1109	1.664	Vel = 8.78
BOR	3		0.0	1	2E	7.65	4.000	150	21.318	
to						0.0	7.650		0.0	
UG1	3		26.05	1.101		0.0	11.650	0.1109	1.292	Vel = 8.78
UG1	3	H3	3.00	1.25	T	9.523	55.000	150	22.610	
to					2E	9.523	19.046		2.599	
UG2	-3		29.05	1.394		0.0	74.046	0.0430	3.185	Vel = 6.11
UG2	-3		0.0	6	2G	9.25	470.250	150	28.394	
to					3E	64.749	95.581		0.0	
UG3	-3		29.05	6.09	2F	21.583	565.831	0	0.019	Vel = 0.32
UG3	-3		0.0	6	T	48.896	1000.000	150	28.413	
to					2E	45.637	99.422		-2.599	
TEST	3		29.05	6.16	G	4.89	1099.422	0	0.034	Vel = 0.31

Final Calculations : Hazen-Williams

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	******
			0.0									
TEST			29.05						25.848	K Factor =	5.71	