Appendix O4. Private Residential Water Systems Memorandum

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MEMORANDUM **646-380**

TO: **Tom Blessent, HomeFed**

FROM: **Stephen M. Nielsen, P.E., Dexter Wilson Engineering, Inc.**

DATE: **March 4, 2020**

SUBJECT: **Fanita Ranch Private Residential Water Systems**

Single-Family Residential

The proposed water system requirements for the Fanita Ranch project have been established by the December 20, 2019 Water Service Study prepared by Michael Baker International for the Padre Dam Municipal Water District. This study identified an area within Phase 3 of the project where approximately 21 single-family residential units will experience residual pressures of less than 40 psi during peak hour demand conditions. These lots are identified in Attachment A on excerpts from the Michael Baker International Study and tentative map for reference. Residual pressures at these lots range from approximately 29 psi to 40 psi during peak hour demands. Table 1 summarizes these lots and provides maximum static pressures and residual pressures during peak hour demands. These pressures are measured based on lot pad elevations and do not take into account losses through the meter, backflow preventer, or house plumbing. The Michael Baker International Study does verify that required fire flows can be provided to the hydrants in the area at a residual pressure in excess of 25 psi.

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TABLE 1
FANITA RANCH PA 13
LOW PRESSURE LOT SUMMARY

Lot Numbers	Pad Elevation, Ft.	Maximum Static Pressure, psi	Peak Hour Residual Pressure, psi
12	1132.5	42.2	38.7
13	1139.4	39.3	35.7
14	1142.9	37.7	34.2
15	1143.9	37.3	33.8
16	1145.4	36.7	33.1
17	1146.4	36.2	32.7
18	1145.9	36.4	32.9
19	1145.2	36.7	33.2
20	1153.0	33.4	29.8
21	1152.2	33.7	30.2
22	1153.6	33.1	29.5
23	1139.0	39.4	35.9
24	1132.8	42.1	38.6
25	1127.4	44.5	40.9
34	1130.4	43.2	39.6
35	1136.2	40.6	37.1
36	1141.6	38.3	34.7
37	1145.1	36.8	33.2
38	1142.5	37.9	34.4
39	1137.4	40.1	36.6
40	1130.4	43.2	39.6

The recommended approach for providing adequate domestic pressures to these residences is to install private booster pumps. The private booster pump installed at each residence that requires additional pressure would increase pressure in both the domestic plumbing that supplies the house fixtures and the fire sprinkler system. NFPA 13D is the governing standard for residential fire sprinkler systems and this standard along with the California Amendments dictate that when a residential fire sprinkler system requires a pump to obtain

adequate pressure, it shall be in the form of a single pump that boosts both domestic and fire sprinkler system pressures. This requirement eliminates the possibility that a homeowner will neglect to fix a pump that boosts pressure in the fire sprinkler system since the pump would also be necessary to provide adequate domestic pressures.

Since the fire sprinkler systems will be reliant on a pump to provide adequate pressures, a question that can come up is what happens in the event of power outage. NFPA 13D makes no reference to power supplies and the California Residential Code does not require backup power supplies for individual residences. NFPA 20 is the fire pump standard that defines a "reliable" source of electric power. Even with the potential for summer brownout and shutdowns for wild fires, SDG&E meets the requirements for a "reliable" source of power. Thus, there are no codes or standards that require backup power to be provided at residences where booster pumps increase domestic and fire sprinkler system pressures. In practice, there are numerous homes throughout San Diego County that rely on private booster pumps to provide adequate pressures for domestic and fire sprinkler systems and have no backup power supply.

Another consideration is what the performance of a fire sprinkler system will be during a power outage such that the private pumps are not in operation and sprinkler system supply pressures are reduced. To evaluate this, we looked at the worst case (Lot 22) and evaluated losses in the system to the fire sprinkler head. Table 2 summarizes the worst case analysis and estimates the residual pressure at the most remote upstairs fire sprinkler head to be 1.8 psi. In addition to the losses listed in Table 2, there would be losses through the private pump. This can be mitigated by installing a bypass line around the pump with a check valve that only opens in low pressure conditions. These losses would be minimal and have been included in the "Estimated Piping/Fitting Losses" in Table 2. Attachment B provides a data sheet for a residential fire sprinkler head and indicates that maximum coverage ranges from 12 feet by 12 feet at a pressure of 7.1 psi to 16 feet by 16 feet at a pressure of 18.8 psi.

TABLE 2 LOT 22 WORST CASE FIRE SPRINKLER RESIDUAL PRESSURE	
Minimum Residual at Pad	29.5 psi
Elevation Loss to 2nd Floor Sprinkler	(8.7 psi)
Water Meter Loss[1]	(3 psi)
Backflow Preventer Loss[2]	(11 psi)
Estimated Piping/Fitting Losses[3]	(5 psi)
Residual Pressure at Sprinkler Head	**1.8 psi**

[1] Neptune T-10 water meter, (30 gpm).
[2] Febco LF 825Y.
[3] Will vary. Pipe can be oversized to reduce losses.

Based on the above, there will be a slight positive residual pressure at the most remote upstairs sprinkler head for the worst case residential lot. This means that all the sprinkler heads will operate in the event of a power outage, but sprinkler head coverage would range from normal at first floor sprinkler heads to significantly reduced coverages at upstairs sprinkler heads. For these marginal pressure lots, the plumbing designer can evaluate the supply pipe sizing and spacing of sprinkler heads to optimize the performance of the system in the event of a power outage. For lots where the fire sprinkler designer determines that adequate sprinkler coverage cannot be provided during a power outage, we recommend a backup, secondary power source for these dwelling units to ensure adequate pressure in the event of a power outage.

Multi-Family Residential Sites

Phase 3 and 4 of the Fanita Ranch project will also include several multi-family residential pads that will be served from the proposed 1230 Zone system. While these pads will receive better pressures than the marginal single-family lots in Planning Area R-13, an evaluation of pressures available to these multi-family pads was performed. Based on tentative map

pad elevations and hydraulic data from the December 20, 2019 Fanita Ranch Water Service Study, Table 3 summarizes the anticipated pressures for the multi-family pads.

TABLE 3
FANITA RANCH MULTI-FAMILY RESIDENTIAL PRESURE SUMMARY

MF Pad	Average Pad Elevation, ft.	Maximum Static Pressure, psi	Peak Hour Residual Pressure, psi
M-4	1,065	71.5	67.8
M-5	1,090	60.7	57.2
M-6	1,087	62.0	58.6
M-7	1,088	61.5	58.1
M-8	1,086	62.4	58.9

Based on the information provided in Table 3, the pressures provided to the multi-family residential sites are considered normal and acceptable. As with any multi-family building, the plumbing designer will need to evaluate the available pressure to the site and determine if an onsite private pumping system needs to be incorporated into the building plumbing design.

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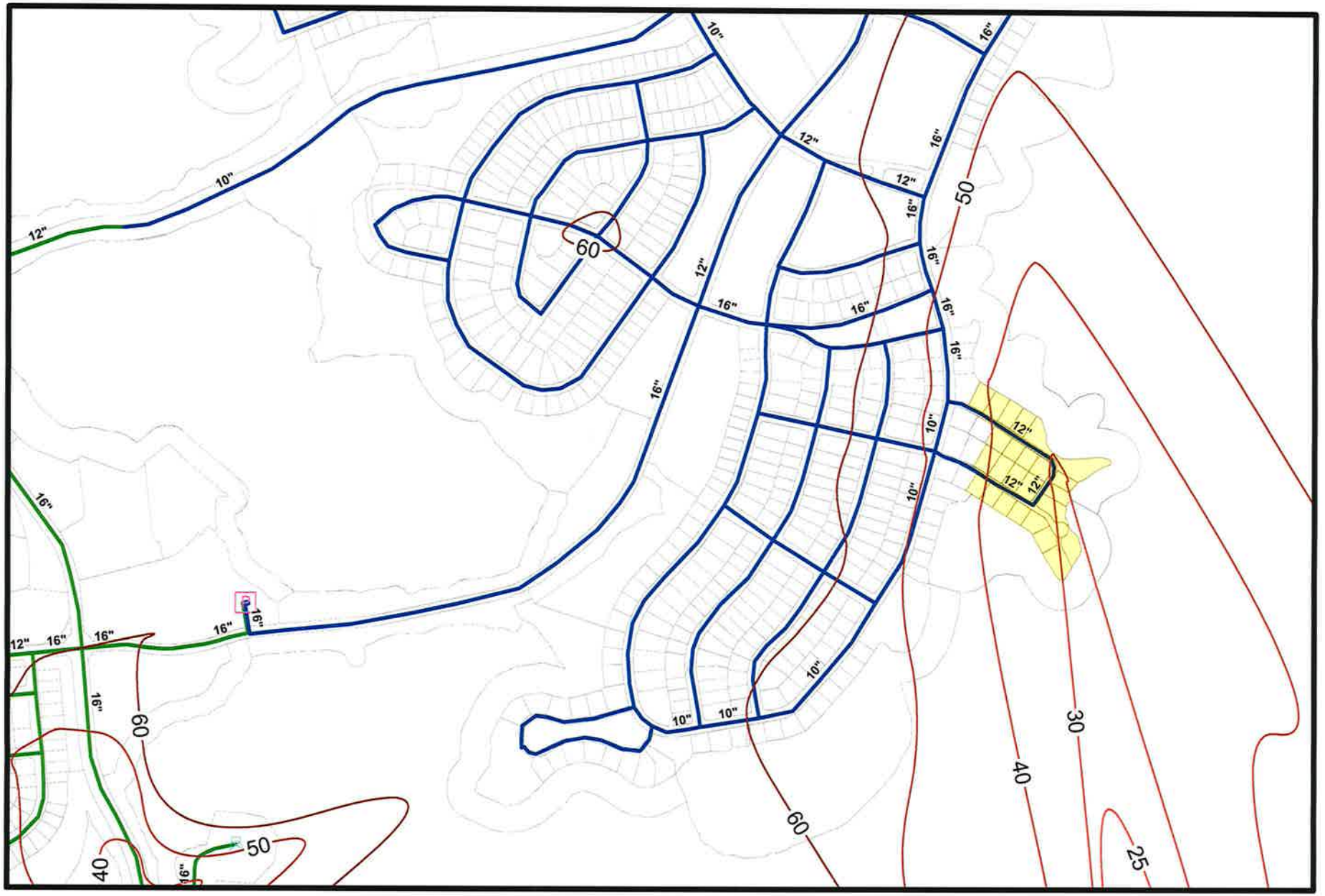
ATTACHMENT A

MARGINAL PRESSURE SINGLE-FAMILY LOTS

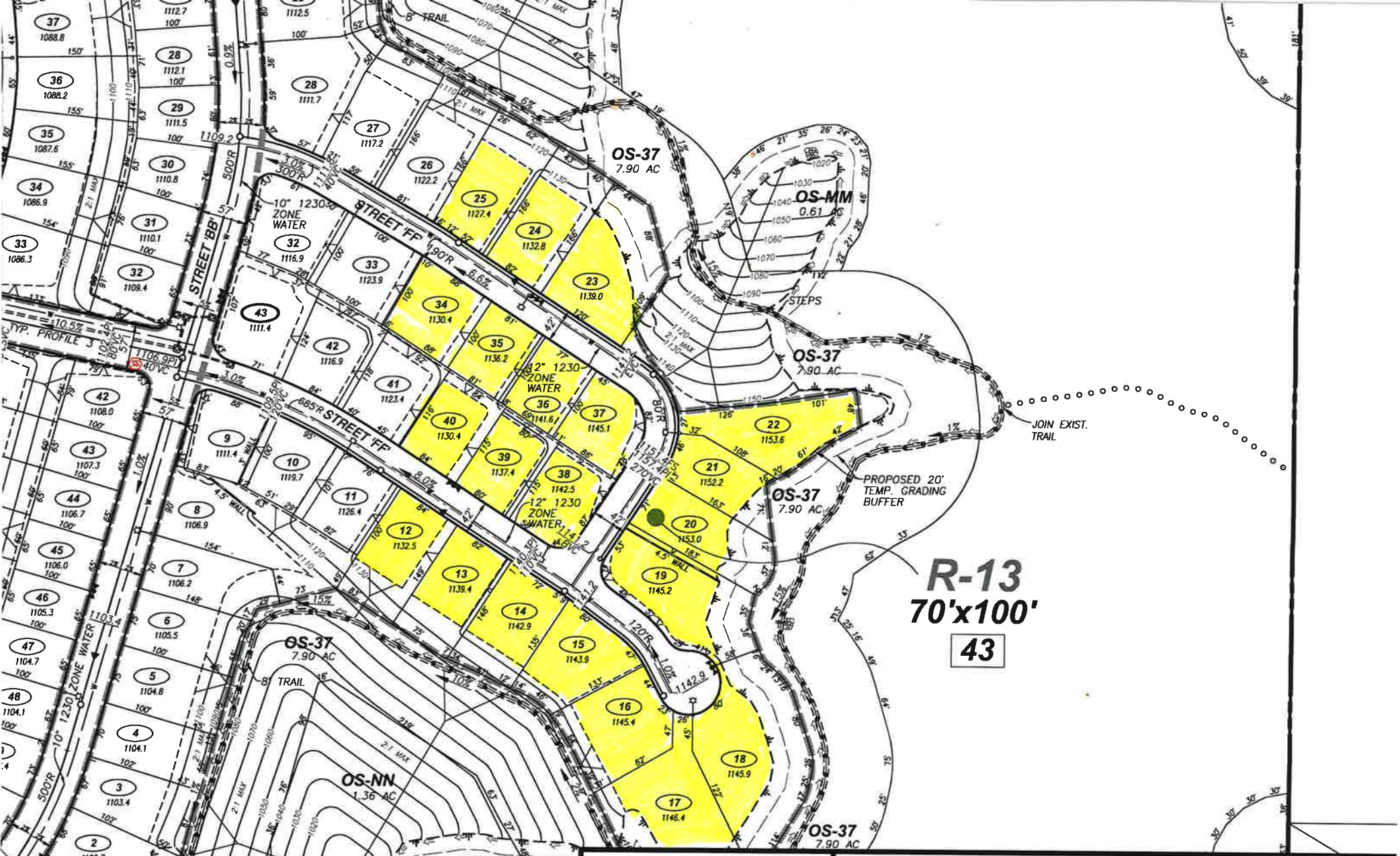


Fanita Ranch Water Service Study

Peak Hour Low Pressure Area

Figure 4-2

Michael Baker INTERNATIONAL



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VESTING TENTATIVE MAP/ PRELIMINARY GRADING PLAN

FANITA RANCH

City Of Santee, California

R:\1284\&Pln\Tentative MapFANITA TM SHT 00.dwg[$(GETVAR,??)

ATTACHMENT B

FIRE SPRINKLER DATA SHEET

VIKING®

TECHNICAL DATA

FREEDOM® RESIDENTIAL PENDENT SPRINKLER VK470 (K3.0)

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

Approval Chart
Viking VK470, 3.0 K-Factor Residential 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 the current editions of NFPA 13, 13R or 13D

Sprinkler Base Part Number [1]	SIN	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure	Overall Length	
		Inches	mm	U.S.	metric [2]		Inches	mm
17147	VK470	1/2	15	3.0	43.2	175 psi (12 bar)	2-1/4	58

Max. Coverage Area [4] Ft.X Ft. (m X m)	Ordinary Temp Rating (155 °F/68 °C)		Intermediate Temp Rating (175 °F/79 °C)		Deflector to Ceiling	Installation Type	Listings and Approvals [3]			Minimum Spacing Ft. (m)
	Flow [4] GPM (L/min)	Pressure [4] PSI (bar)	Flow [4] GPM (L/min)	Pressure [4] PSI (bar)			c UL [5] us EU	NYC	NSF	
12 X 12 (3.7 X 3.7)	8 (30.3)	7.11 (0.49)	8 (30.3)	7.11 (0.49)	1-1/8 to 2 inch	Standard surface-mounted es-cutcheons, **or** recessed with the Micromatic® Model E-1, E-2, or E-3 Recessed Escutcheon	See Footnotes 6 and 9	See Foot-note 7	--	8 (2.4)
14 X 14 (4.3 X 4.3)	10 (37.9)	11.11 (0.77)	10 (37.9)	11.11 (0.77)						
15 X 15 (4.6 X 4.6)	12 (45.4)	16 (1.10)	12 (45.4)	16 (1.10)						
16 X 16 (4.9 X 4.9)	13 (49.2)	18.8 (1.29)	13 (49.2)	18.8 (1.29)						

Footnotes

[1] Part number shown is the base part number. For complete part number, refer to Viking's current 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] 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.

[5] Listed by Underwriter's Laboratories, Inc. for use in the U.S., Canada, and European Union.

[6] Approved Finishes are: Brass, Chrome, White Polyester, and Black Polyester [8].

[7] Meets New York City requirements, effective July 1, 2008.

[8] Other paint colors are available on request with the same C-UL-US-EU listings as the standard finish colors.

[9] Approved finish is Electroless Nickel PTFE (ENT). ENT is C-UL-US-EU Listed as corrosion resistant. ENT is available with standard surface-mounted escutcheons or the Micromatic Model E-1 Recessed Escutcheon.