Table 1. Density, size, and shape of facilities.

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
ρ	1.0	1.2	1.4	1.0	1.0	1.0	1.0
b_1	0.3	0.3	0.3	0.4	0.5	$0.3\sqrt{2}$	$0.3\sqrt{3}$
b_2	0.3	0.3	0.3	0.4	0.5	$0.3/\sqrt{2}$	$0.3/\sqrt{3}$

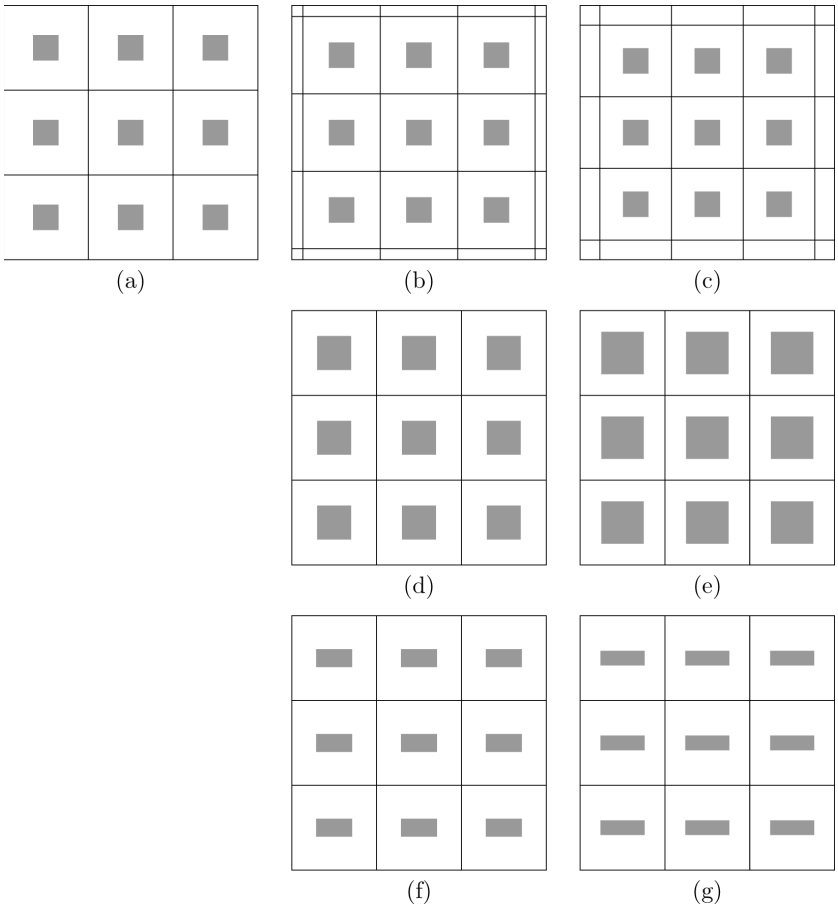

Fig. 3. Seven grid patterns of facilities: The square around a facility represents the nearest region of the facility.

Table 2. Proportion of facility area.

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Grid	0.090	0.108	0.126	0.160	0.250	0.090	0.090
Random	0.086	0.102	0.118	0.148	0.221	0.086	0.086

depends on the area rather than the number of facilities. If the closest distance from a location to a facility is less than or equal to r, the buffer region around the rectangle (blank rectangle in Fig. 2) centered at the location contains the center of the facility, as shown in Fig. 2. The cumulative distribution function $F(r)$ is thus the probability that the buffer region contains the center of at least one facility. Using the Poisson distribution (5), we have

$$\begin{aligned} F(r) &= 1 - P(0, 2(r + b_1 + b_2)r) \\ &= 1 - \exp\{-2\rho r(r + b_1 + b_2)\}. \end{aligned} \tag{7}$$

Differentiating $F(r)$ with respect to r yields

$$f(r) = 2\rho(2r + b_1 + b_2)\exp\{-2\rho r(r + b_1 + b_2)\}. \tag{8}$$

The average closest distance is

$$\begin{aligned} E &= \int_0^\infty r f(r)\,\mathrm{d}r \\ &= \frac{1}{2\sqrt{\rho}} \exp\left\{\frac{\rho(b_1 + b_2)^2}{2}\right\} \operatorname{erfc}\left\{\frac{\sqrt{\rho}(b_1 + b_2)}{\sqrt{2}}\right\}, \end{aligned} \tag{9}$$