The inflow rate near time t_1 can be approximated by a quadratic function shown as follow：

$$\lambda(t) = \lambda(t_1) + \frac{1}{2}\lambda''(t_1)(t-t_1)^2 \tag{1}$$

let $\rho = -\frac{1}{2}\lambda''(t_1)$, then Eq. (1) can be transformed to

$$\lambda(t) = \lambda(t_1) - \rho(t-t_1)^2 \tag{2}$$

Given the total demand during the peak period t_s to t_e, V. Obviously, the peak period length is $t_e - t_s$.

$$\int_{t_s}^{t_e} \lambda(t)dt = \int_{t_s}^{t_e} [\lambda(t_1) - \rho(t-t_1)^2]dt$$

$$= \left\{-\frac{\rho}{3}t^3 + \rho t_1 t^2 + [\lambda(t_1) - t_1^2]t\right\}\Big|_{t_s}^{t_e}$$

$$= -\frac{\rho}{3}(t_e - t_s)^3 + \rho t_1(t_e - t_s)^2 + [\lambda(t_1) - t_1^2](t_e - t_s) \tag{3}$$

Since

$$\int_{t_s}^{t_e} \lambda(t)dt = V \tag{4}$$

Thus

$$-\frac{\rho}{3}(t_e - t_s)^3 + \rho t_1(t_e - t_s)^2 + [\lambda(t_1) - t_1^2](t_e - t_s) = V \tag{5}$$

Then

$$\lambda(t_1) = \frac{V}{t_e - t_s} + \frac{\rho}{3}(t_e - t_s)^2 - \rho t_1(t_e - t_s) + t_1^2 \tag{6}$$

As we all know

$$t_0 = t_1 - \left[\frac{\lambda(t_1) - \mu}{\rho}\right]^{1/2} \tag{7}$$

$$t_2 = t_1 + \left[\frac{\lambda(t_1) - \mu}{\rho}\right]^{1/2} \tag{8}$$

And the total waiting time during peak period is

$$\mathrm{W} = \frac{9[\lambda(t_1) - \mu]^2}{4\rho} \tag{9}$$

The average waiting time during peak period t_s to t_e is

$$w = \frac{\mathrm{W}}{V} \tag{6}$$