APPENDIX A
PROOF OF LEMMA 1
The risk-free profit \( \Phi(p) = (p - r)d(p) \) is quasiconcave, since \( p - r \) is monotonic and thus quasiconcave, \( d(p) \) is concave and thus quasiconcave, and the product of two quasiconcave functions are quasiconcave. From (7) and (8), the first-order derivative of the profit loss function \( \Lambda(p) \) is \( d'(p)m \int_{C - d(p)}^{B} f(u)du \), which is increasing in \( p \). Thus \( -\Lambda(p) \) is concave in \( p \). Since \( E[R(p)] = \Phi(p) - \Lambda(p) \), it can be readily shown that the sum of a quasiconcave function and a concave function is quasiconcave.

APPENDIX B
PROOF OF THEOREM 2
Since \( \dd(p) \) includes both inelastic and elastic traffic demand, its elasticity is smaller, i.e. \( \bar{\sigma}(p) < \sigma(p) \) for any \( p \). The first-order condition of (15) amounts to

\[
\bar{p} = \bar{r} - \frac{\dd(\bar{p})}{d(\bar{p})} \Rightarrow \bar{p} = \frac{\bar{r}}{1 - \bar{\sigma}(\bar{p})^{-1}} \tag{22}
\]

by substituting (2). This implies that \( 1 < \bar{\sigma}(\bar{p}) \). At the optimal spot price \( p^* \), \( d(p^*) < C \) always holds as discussed in Sec. 3.3. Thus substituting (2) into (12), and applying the one-sided Chebyshev Inequality (Chebyshev-Cantelli Inequality) to upper bound \( \Pr(\epsilon > C - d(p^*)) \),

\[
p^* < \frac{r}{1 - \sigma(p^*)^{-1}} + ma, \text{ where } a = \frac{\theta^2}{\theta^2 + (C - d(p^*) - \mu)^2}.
\]

\( \mu \) and \( \theta \) are the mean and standard deviation of \( \epsilon \), respectively. Now assume that \( p^* \geq \bar{p} \), which implies

\[
\frac{\bar{r}}{1 - \bar{\sigma}(\bar{p})^{-1}} < \frac{r + ma (1 - \sigma(p^*)^{-1})}{1 - \sigma(p^*)^{-1}}.
\]

\( 1 < \bar{\sigma}(\bar{p}) \leq \bar{\sigma}(p^*) < \sigma(p^*) \) by (3), and \( 0 < 1 - \bar{\sigma}(\bar{p})^{-1} < 1 - \sigma(p^*)^{-1} \). Thus,

\[
\bar{r} < r + ma (1 - \sigma(p^*)^{-1}),
\]

which contradicts with condition (16).

APPENDIX C
PROOF OF LEMMA 3
Substituting (12) into (7),

\[
E[R(p^*]] = (p^* - r)d(p^*) - m \int_{C - d(p^*)}^{B} (d(p^*) - C + u) f(u)du
\]

\[
> (\bar{p} - r)d(\bar{p}) - m \int_{C - d(\bar{p})}^{B} (d(\bar{p}) - C + u) f(u)du
\]

\[
> (\bar{p} - r)d(\bar{p}) - (d(\bar{p}) - C + B)m \cdot \Pr(\epsilon > C - d(\bar{p}))
\]

The first inequality is due to the optimality of \( p^* \), and the second due to the fact that \( d(\bar{p}) - C + B \geq d(\bar{p}) - C + u \), \( u \geq 0 \) for any \( p \).