We begin with equation 7 of Lee, Battle, Raina and Ng (2006):

\[
L(B, \lambda) = \text{Tr}((X - BS)^T (X - BS)) + \sum_j \lambda_j \left( \sum_i B_{ij}^2 - c \right)
\]

\[
= \text{Tr}(X^TX - 2X^TBS + S^TB^TBS + \Lambda B^T B - c\Lambda)
\]

\[
= \text{Tr}(X^TX - 2BSX^T + (SST + \Lambda)B^T B - c\Lambda)
\]

\[
\frac{\partial L}{\partial (B^T)} = 0 = -2SX^T + 2(SST + \Lambda)B^T
\]

\[
B^T = (SST + \Lambda)^{-1}(SX^T)
\]

\[
g(\lambda) = \text{Tr}(XX^T - 2XS^T(SST + \Lambda)^{-1}SX^T + SX^T(SST + \Lambda)SX^T - c\Lambda)
\]

\[
= \text{Tr}(XX^T - XS^T(SST + \Lambda)^{-1}SX^T - c\Lambda)
\]