ICA 5: One-Time Truck Shipments

ISE 453: Design of PLS Systems Spring 2020

Using *Template-Truck Shipments.xltx* (see Schedule), answer the following questions. Unless noted, each question builds upon the results from the previous questions.

1. Product is to be shipped from Raleigh, NC (27606) to Detroit, MI (48234). Each unit weighs 67 lb and occupies 6 ft^3, and units can be stacked on top of each other in a trailer. Assuming that the product is to be shipped P2P TL, what is the maximum payload for each trailer used for the shipment?

$$q_{\max} = \min\left\{q_{\max}^{wt}, q_{\max}^{cu}\right\} = \min\left\{K_{wt}, \frac{sK_{cu}}{2000}\right\}$$

2. Next Monday, 20 units of the product are to be shipped. How many truckloads are required for this shipment?

3. Using the most recent rate estimate available, what is the TL transport charge for this shipment?

$$r = \frac{PPI_{TL}}{102.7} \times \$2.00/\text{mi} \qquad c_{TL} = \left\lceil \frac{q}{q_{\max}} \right\rceil r\,d$$

4. Using the most recent LTL rate estimate, what is charge to transport the shipment LTL?

$$r_{LTL} = PPI_{LTL}\left\lceil \frac{\frac{s^2}{8}+14}{\left(q^{\frac{1}{7}} d^{\frac{15}{29}} - \frac{7}{2}\right)(s^2+2s+14)} \right\rceil, \qquad c_{LTL} = r_{LTL}\,q\,d$$

5. Should TL or LTL be used to transport the shipment?

6. What is the TL minimum charge?

$$MC_{TL} = \left(\frac{r}{2}\right)45$$

7. What is the LTL minimum charge?

$$MC_{LTL} = \left(\frac{PPI_{LTL}}{104.2}\right)\left(45 + \frac{d^{\frac{28}{19}}}{1625}\right)$$