

Solution

		A	B	Agg. A&B		
	PPI_TL	138.6	138.6	138.6	Jul 18 (P)	Prod Price Index for TL
	PPI_LTL	182.9	182.9	182.9	Jul 18 (P)	Prod Price Index for LTL
	Kwt	25	25.0	25.0	ton	Physical weight capacity
	Kcu	2750	2750.0	2750.0	ft^3	Effective cube capacity
	unit cube	6	15		ft^3	
	unit weight	67	80		lb	
	unit value	3015	1000		\$	
	s	11.1667	5.3333	9.4449	lb/ft^3	Density
	d	688	688	688	mi	Distance
	r	2.6991	2.6991	2.6991	\$/mi	TL rev per loaded tr-mi
	MC_TL	60.73	60.73	60.73	\$	Min charge TL
	MC_LTL	95.40	95.40		\$	Min charge LTL
	qmax	15.3542	7.3333	12.9868	ton	Max payload
	f	150	30	180	ton/yr	Annual demand
	n	9.76933514	4.09090909	13.8602442	per yr	
(1)	w	26.3686436			\$/mi	Monetary weight
	TC_FTL	18141.63	7596.81	25738.43	\$	
	a	1	1	1		Inventory fraction
	v	90000	25000	79166.6667	\$/ton	Value per ton
	h	0.3	0.3	0.3	1/yr	Inventory carrying rate
	IC_FTL	414562.5	55000	308436.123	\$	
	TLC_FTL	432704.127	62596.8062	334174.556	\$	TLC Full Truckload
	q*TL	3.2120	2.7254	3.7515	ton	Optimal TL size
	TC_TL	86722.7662	20440.752	89099.1723	\$	
	IC_TL	86722.7662	20440.752	89099.1723	\$	
	TLC*_TL	173445.532	40881.504	178198.345	\$	TLC Optimal TL
	rLTL	1.33881879	2.32441095		\$/ton-mi	
	TC_LTL	138166.1	47975.842		\$	
	IC_LTL	22490.23	7775.97		\$	
	TLC*_LTL	160656.33	55751.81		\$	TLC Optimal LTL
	qLTLmax	3.63	1.73		ton	
	q*LTL	0.83297144	1.03679618		ton	Optimal LTL size
	Min TLC	160656.33	40881.50	178198.34		
(2)			TL			
	Min TLC A+B		201537.83			
(3)	TL C A+B - A&B			23339.49		

C	D	E	F	G	H	I
		A	B	Agg. A&B		
	PPI_TL	138.6	=E2	=F2	Jul 18 (P	Prod Price Index for TL
	PPI_LTL	182.9	=E3	=F3	Jul 18 (P	Prod Price Index for LTL
	Kwt	25	=E4	=F4	ton	Physical weight capacity
	Kcu	2750	=E5	=F5	ft^3	Effective cube capacity
	unit cube	6	15		ft^3	
	unit weight	67	80		lb	
	unit value	=E7*E32/2000	1000		\$	
	s	=E7/E6	=F7/F6	=\$G27/(E27/E9+F27/F9)	lb/ft^3	Density
	d	688	=E10	=F10	mi	Distance
	r	=2*(E2/102.7)	=E11	=F11	\$/mi	TL rev per loaded tr-mi
	MC_TL	=(E11/2)^45	=(F11/2)^45	=(G11/2)^45	\$	Min charge TL
	MC_LTL	=(E3/104.2)^(45+E10*(28/19)/1625)	=(F3/104.2)^(45+F10*(28/19)/1625)		\$	Min charge LTL
	qmax	=MIN(E4,E9*E5/2000)	=MIN(F4,F9*F5/2000)	=MIN(G4,G9*G5/2000)	ton	Max payload
	f	150	30	=E27+F27	ton/yr	Annual demand
	n	=E27/E26	=F27/F26	=G27/G26	per yr	
(1)	w	=E28*E11			\$/mi	Monetary weight
	TC_FTL	=E28*E11*E10	=F28*F11*F10	=G28*G11*G10	\$	
	a	1	=E31	=F31		Inventory fraction
	v	90000	=2000*F8/F7	=(E27/\$G27)*E32+(F27/\$G27)*F32	\$/ton	Value per ton
	h	0.3	=E33	=F33	1/yr	Inventory carrying rate
	IC_FTL	=E31*E32*E33*E26	=F31*F32*F33*F26	=G31*G32*G33*G26	\$	
	TLC_FTL	=E30 + E34	=F30 + F34	=G30 + G34	\$	TLC Full Truckload
	t_max	=1/12			yr/TL	1-month interval constraint
	n_min	=1/E36			TL/yr	
	TC_1mo	=MAX(E28,E37)*E11*E10			\$	
	IC_1mo	=E31*E32*E33*E27/MAX(E28,E37)			\$	
	TLC_1mo	=E38+E39			\$	TLC 1-mo interval constraint
	q*TL	=MIN(SQRT((E27*MAX(E11*E10,E13))	=MIN(SQRT((F27*MAX(F11*F10,F13))	=MIN(SQRT((G27*MAX(G11*G10,G13))	ton	Optimal TL size
	TC_TL	=(E27/E41)*MAX(E11*E10,E13)	=(F27/F41)*MAX(F11*F10,F13)	=(G27/G41)*MAX(G11*G10,G13)	\$	
	IC_TL	=E31*E33*E32*E41	=F31*F33*F32*F41	=G31*G33*G32*G41	\$	
	TLC*_TL	=E42 + E43	=F42 + F43	=G42 + G43	\$	TLC Optimal TL
	rLTL	=E3*(((E9^2)/8+14)/((E50^(1/7)*E11	=F3*(((F9^2)/8+14)/((F50^(1/7)*F11		\$/ton-mi	
	TC_LTL	=E27*MAX(E10*E45,E24/E50)	=F27*MAX(F10*F45,F24/F50)		\$	
	IC_LTL	=E31*E32*E33*E50	=F31*F32*F33*F50		\$	
	TLC*_LTL	=E46+E47	=F46+F47		\$	TLC Optimal LTL
	qLTLmax	=MIN(5,650*E9/2000)	=MIN(5,650*F9/2000)		ton	
	q*LTL	0.832971444189039	1.03679618177092		ton	Optimal LTL size
	Min TLC	=MIN(E35,E44,E48)	=MIN(F35,F44,F48)	=MIN(G35,G44,G48)		
(2)			TL			
	Min TLC A+B		=E51+F51			
(3)	TLC A+B - A&B			=F53-G51		