

Industry Traffic & Capacity Worksheet

Purpose: This Waybill Tab will help determine 1) number of waybills per car type needed based upon car capacity at each on-line industry, car type distribution for the permanent fleet.

Last Revised: 07/23/13 RBS Refined Oroville spots and counts

Last Revised: 07/23/13 RBS Separated interchange locations from other on-line industries

Last Revised: 07/17/13 RBS Created new waybill distribution Tab

Waybill Distribution for On-line Industries

Car Type

Table 1 Waybill Distribution for On-line Industries																					
Industry (On-Line)	Commodity Shipped (S) or Received (R)	Car Capacity		Car Capacity for Waybill Planning 40ft-50ft Avg.	% of spotted cars to be "Held" until next op session	Number of cars pulled each op session	# of Waybills Needed (2 * Car Capacity)	Sum by Type (Location)	XM	XA	HM	LO	LT	GS	TA	TM	RS	RM	FM	FB	SM
		40's	50's																		
Keddie																					
Loco Shops	R Stores, pipe , fittings, paint,	1	1	1	50%	0.5	2	2	1.0					1.0							
Loco Service	R Fuel oil, lubricants, sand,	2	2	2		1	3	3				1.0				2.0					
House Track	S/R RPO?	2	1	1.5		0.75	3	3	2.0	1.0											
Total Car Spots and Waybills Needed				4.5		2	8	8	3.0	1.0	0.0	1.0	0.0	1.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
Reno																					
Freight House	S/R Mixed freight, boxed (S/R)	5	4	4.5		2.25	7	7	5.0										2.0		
Reno (Pierson) Lumber	R Lumber, Hardware (S/R)	3	2	2.5		1.25	4	4	2.0										1.0	1.0	
Total Car Spots and Waybills Needed				7		4	11	11	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	1.0	0.0
Quincy																					
Sierra Pacific Industries	S Lumber	3	2	2.5		1.25	4	4	2.0										2.0		
Homestead Mills	S Lumber, Plywood	3	2	2.5		1.25	4	4	1.0	1.0									2.0		
California Packing	S/R Ship fruit (apples, peaches) rec boxes, packing paper	2	2	2		1	3	3	1.0								2.0				
Stockyards	S/R Cattle	1	1	1		0.5	2	2													2.0
Enginehouse	R Fuel oil, machinery,	1	1	1		0.5	2	2								2.0					
Oil Distributers	R Gasoline, Diesel, Fuel Oil	3	2	2.5		1.25	4	4							4.0						
Warehouse/loading dock	R Mixed Freight, vehicles, lumber	3	2	2.5		1.25	4	4	3.0	1.0											
Total Car Spots and Waybills Needed				14		7	23	23	7.0	2.0	0.0	0.0	0.0	0.0	0.0	6.0	2.0	0.0	4.0	0.0	2.0
Sacramento																					
Loco Shops-Roundhouse	R Stores, pipe , fittings, paint,	2	2	2.0		1.0	3	3	3.0												
Diesel Shops	R Stores, pipe , fittings, paint,	2	2	2.0		1.0	3	3	3.0	0.0											
Loco Service- Sand, Fuel	R Fuel oil, lubricants, sand,	2	2	2.0		1.0	3	3			1.0	1.0				1.0					
Total Car Spots and Waybills Needed				6		3	9	9	6.0	0.0	1.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
West Oakland																					
Swift & Company	R frozen: poultry, ham, meat, sausage	3	3	3		1.5	5	5	0.0									5.0			
Newport Soap	R Cottonseed oil, cake, tallow, borax, packing mats	2	2	2		1	3	3	1.0			1.5			0.5						
Newport Soap	S Soap	2	2	2		1	3	3	3.0												
Peterbilt- Track 1	R truck parts, machinery	3	3	3		1.5	5	5	1.0	4.0									0.0		
Peterbilt- Track 2	S Trucks	3	3	3		1.5	5	5		2.0									3.0		
Key Pipe & Supply	R Steel Pipe (S/R)	2	2	2		1	3	3	0.0					2.0					1.0		
Schnitzer Steel	S Scrap Metal (S/R)	2	2	2		1	3	3						2.0					1.0		
Setout	R All car Types (S/R)	?	?				0	0													
Total Car Spots and Waybills Needed				17		9	27	27	5.0	6.0	0.0	1.5	0.0	4.0	0.5	0.0	0.0	5.0	5.0	0.0	0.0

Oroville: East- North																					
High Sierra Pine Mill (Track 1)	S	Lumber, hardwood, moulding	4	3	3.5	1.75	6	6	2.0					2.0	2.0						
High Sierra Pine Mill (Track 2)	S	(S) Lumber, hardwood, moulding (R) Machinery, fuel,	4	3	3.5	1.75	6	6	1.0	2.0				2.0	1.0						
National Wood Products	R	Lumber, Poles, creosote, machinery	5	4	4.5	2.25	7	5	2.0	1.0			1.0	1.0							
National Wood Products	S	Treated Wood Products						2					2.0								
Total Car Spots and Waybills Needed					29.5		15	50	14.5	7.0	0.5	0.0	0.0	3.0	3.0	1.0	11.0	0.0	7.0	3.0	0.0

Marysville, CA																							
Virden Cannery	S	Olive oil, general fruit & vegetable canning-packing?	4	4	2	1	3	2						2.0									
Virden Cannery	R	Cardboard boxes, cans, bottles, box shook						1	1.0														
Feather River Sand Co	S	Sand, gravel, ballast	2	2	2	1	3	3		3.0			0.0										
Stock Pens	S/R	Cattle, feed	2	2	2	1	3	3							3.0								
Las Plumas Lumber	R	Lumber, plywood, building materials, bagged cement	1	1	1	0.5	2	2	1.0						1.0								
Total Car Spots and Waybills Needed					7		4	11	11	2.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	1.0	0.0	3.0

Industry	Commodity Shipped (S) or Received (R)	Car Capacity		Average	Cars Pulled	# Waybills																		
		40's	50's																					
R Street Industries																								
Universal Carloading Warehouse	S	Freight Forwarder- Mixed Freight																						
Universal Carloading Warehouse	R	Freight Forwarder- Mixed Freight		6	6	6	3	9	6	6.0	0.0													

WP-SN-CCT Freight House#1	SR	Freight Forwarder- Mixed Freight		6	6	6	3	9	9	9.0	0.0													
P&A Shippers	R	Freight Forwarder- Mixed Freight		2	2	2	1	3	3	1.0	2.0													
P&A Shippers	S	Freight Forwarder- Mixed Freight							0															
Western Potato Distributors	R	Produce for local grocers							1						1.0									
Western Potato Distributors	S	Produce shipped east		2	2	2	1	3	2						2.0									
Safeway Produce	R	Produce for local grocers							3						3.0									
Safeway Produce	S	Produce shipped east		2	2	2	1	3	0															
Dallman Supply	R	Wire coils, steel beams, pipe, machinery		1	1	1	0.5	2	2	1.0	1.0													
Dallman Supply	S	Built up machinery, HVAC, Electrical components							0															
Sperry Flour/General Mills Whs	R	Flour, cereal, grain in sacks		2	2	2	1	3	2	2.0														
Sperry Flour/General Mills Whs	S	Flour, cereal, grain in sacks							1	1.0														
7th & R Crane	R	Wood/Steel beams, transformers, HVAC units		2	2	2	1	3	3	0.0				1.0		2.0								
7th & R Platform	R	Farm Equip, vehicles, Goods on pallets		2	2	2	1	3	3	1.0	1.0													
(Old Scale) Shasta Water Co	R	Empty bottles, labels, caps		1	1	1	0.5	2	2	2.0														
(Old Scale) Capital City Planing M	R	Softwoods & Hardwoods- Rough Cut		1	1	1	0.5	2	2	2.0														
Capital City Planing Mill	S	Window & door sash, mouldings							0															
Montgomery Ward Warehouse	R	Washers, beds, clothing, cooking utensils		1	1	1	0.5	2	2	1.0				1.0										
Leo J Meyburg	R	Radios		1	1	1	0.5	2	2	2.0	0.0													
Goodyear Tire Warehouse	R	Tires, fan belts, etc.		2	2	2	1	3	3		3.0													
WP Fuller	R	Paint components in 55 gal drums, supplies		3	2	2.5	1.25	4	4	3.0	1.0													
American Glass	R	Plate Glass, mirrors, windows		1	1	1	0.5	2	2	2.0														
Borden's Creamery	R	Packing materials, milk cartons, bulk milk, fuel oil		2	1	1.5	0.75	3	1					0.5	0.0									
Borden's Creamery	S	Ice cream, sour cream, cottage cheese							2				2.0											
Palm Iron Works	R	Steel shapes and pipe, iron castings, plate		4	4	4	2	6	5				3.0		0.0	2.0								
Palm Iron Works	S	Occasional steel fabrications							1				0.5				0.5		0.5					
Total Car Spots and Waybills Needed					40		20	64	64	36.0	8.0	0.0	0.0	0.0	0.0	4.5	0.0	0.5	9.0	0.0	5.5	0.0	0.0	

The following summary shows differences on the Traffic & Capacity tab vs. the Waybill Distribution tab even though they are expected to be the same. For both, the car capacity for total spots, on-line industry spots, and interchange spots are the same. The "waybills needed" information differs for both tabs as these are not calculated in the same way. For the Traffic & Capacity tab, the waybills needed for both on-line spots and interchange spots are calculated the same with the "held" factor applied. For the Waybill Distribution tab, the "held" factor is only applied to the on-line spots. The interchange spots are calc'd as 2x the capacity. The later may be a better predictor as all cars pulled from interchanges each session.

Table 2 Summary of Waybill Needs

Capacity & Traffic for On-line Industries (Summary)			Car Capacity for Waybill Planning 40ft-50ft Avg.	% of spotted cars to be "Held" until next op session	Number of cars pulled each op session	# of Waybills Needed (2 * Car Capacity)
		Total Car Spots, Cars Moved and Waybills needed - All On-Line Industries	165.0	50%	83	270
		Modeled interchanges that can be a target or source for online industries	44.5		45	89
		Total Combined On-line Industries & Interchanges	209.5		127	359

Table 3 Waybills by On-Line Location and Car Type

Waybills Counted 1 per Car		Waybills per On-Line Capacity					Waybills per Car Type															
Industry (On-Line)	Color Code	Car Capacity		Capacity 40ft-50ft Avg.	% Held	# Pulled	Waybills Needed	Sum by Type (Location)	XM	XA	HM	LO	LT	GS	TA	TM	RS	RM	FM	FB	SM	
Location	Waybills Needed By Type	40's	50's		50%																	
Keddie				4.5		2	8	8	3.0	1.0	0.0	1.0	0.0	1.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
Reno				7		4	11	11	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	1.0	0.0	
Quincy				14		7	23	23	7.0	2.0	0.0	0.0	0.0	0.0	0.0	6.0	2.0	0.0	4.0	0.0	2.0	
Sacramento				6		3	9	9	6.0	0.0	1.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	
West Oakland				17		9	27	27	5.0	6.0	0.0	1.5	0.0	4.0	0.5	0.0	0.0	5.0	5.0	0.0	0.0	
Oakland Pier				23		12	38	38	27.0	4.0	0.0	0.0	3.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	
Martinez				10		5	17	17	7.0	0.0	0.0	0.0	0.0	0.0	2.0	6.0	0.0	0.0	1.0	1.0	0.0	
Davis				7		4	12	12	2.0	2.0	0.0	0.0	3.0	0.0	0.0	2.0	2.0	1.0	0.0	0.0	0.0	
Oroville, CA				30		15	50	50	14.5	7.0	0.5	0.0	0.0	3.0	3.0	1.0	11.0	0.0	7.0	3.0	0.0	
Marysville, CA				7		4	11	11	2.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	1.0	0.0	3.0	
R Street Industries				40		20	64	64	36.0	8.0	0.0	0.0	0.0	4.5	0.0	0.5	9.0	0.0	5.5	0.0	0.0	
All Industry (On-Line)	Total Waybills Needed By Type			165		83	270	270	116.5	30.0	4.5	3.5	6.0	12.5	5.5	20.5	26.0	6.0	28.5	5.0	5.0	
Sum Total of Car Type Waybills								270														

Table 4 Waybills by Interchange and Car Type

Waybills Counted 0.5 per Car		Waybills per Interchange Capacity					Waybills per Car Type															
Interchange	Color Code	Car Capacity		Capacity 40ft-50ft Avg.	% Held	# Pulled	Waybills Needed	Sum by Type (Location)	XM	XA	HM	LO	LT	GS	TA	TM	RS	RM	FM	FB	SM	
SN-CCT Interchange (R Str)		5	4	4.5	0	4.5	9	9	3.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	3.0	0.0	1.0	0.0	0.0	
SN Interchange (MV)		5	4	4.5	0	4.5	9	9	3.0	0.0	2.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	0.0	1.0	0.0	
SP Interchange (OV)		11	9	10	0	10	20	20	9.0	2.0	0.0	0.0	0.0	1.0	0.0	0.0	8.0	0.0	0.0	0.0	0.0	
Ferry Slip-Freight (OP)		15	12	13.5	0	13.5	27	27	11.0	3.0	1.0	0.0	0.0	2.0	0.0	2.0	6.0	2.0	0.0	0.0	0.0	
OTR (WO)		7	5	6	0	6	12	12	4.0	4.0	0.0	1.0	0.0	1.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	
SP Interchange (Reno)		7	5	6	0	6	12	12	5.0	0.0	0.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0	1.0	0.0	2.0	
All Industry Interchanges	Total Waybills Needed By Type			45		45	89	89	35.0	9.0	3.0	3.0	0.0	6.0	0.0	7.0	18.0	2.0	3.0	1.0	2.0	
On-Line + Interchange Waybills								359														

Staging & Overhead Requirements (New Algorithm & Justifications)

Assumption: The size of the permanent fleet depends upon both the volume of traffic to the on-line industries and on the trains staged and built during the session. Note: For planning, local switching jobs and turns have been excluded from the totals.

Assumption: If the size of the fleet is smaller than the ultimate projection, then train length will shorten to feed industry needs or industries will starve to build longer trains. This is especially true for pre-staged through trains.

Capacity of Staging and Classification Yards

Assumption: Projected maximum train lengths can be used to determine yard and staging needs.

Assumption: Including the cars for the trains to be built during the session addresses yard classification needs.

Note: Capacity based upon Maximum Train Length	Car Capacity 40' -50' avg. (at least)	Length (feet)	Cars in Train (Staged or Built)				Comments
			Maximun (100%)	Standard (90%)	Reduced (75%)	Minimal (50%)	
Keddie Track #1	24	??	24	22	18	12	Keddie Sweeper
Keddie Track #2	24	??	xx	xx	xx	xx	Reno Turn (12 max)
Keddie Track #3	20	??	xx	xx	xx	xx	Quincy Turn (10 max)
Keddie Track #4	20	??	0	0	0	0	
Keddie Track #5	20	??	0	0	0	0	
East Staging Track #1	24	??	24	22	18	12	SLC Extra West
East Staging Track #2	24	??	24	22	18	12	Oakland Manifest (thru)
East Staging Track #3	24	??	24	22	18	12	GN Manifest West
Total	180		96	86	72	48	

Note: Capacity based upon Maximum Train Length	Car Capacity 40' -50' avg. (at least)	Length (feet)	Cars in Train (Staged or Built)				Comments
			Maximun (100%)	Standard (90%)	Reduced (75%)	Minimal (50%)	
Desert Track #1	24	??	24	22	18	12	Oakland Forwarder
Desert Track #2	24	??	24	22	18	12	Oakland Sweeper
Desert Track #3	24	??	24	22	18	12	SLC Manifest East (thru)
Desert Track #4	20	??	0	0	0	0	
Desert Track #5	20	??	0	0	0	0	
Total	112		72	65	54	36	

Note: Capacity based upon Maximum Train Length	Car Capacity 40' -50' avg. (at least)	Length (feet)	Cars in Train (Staged or Built)				Comments
			Maximun (100%)	Standard (90%)	Reduced (75%)	Minimal (50%)	
Track #1	24	??	24	22	18	12	Oakland Extra West
Track #2	24	??	20	18	15	10	Keddie Hauler
Track #3	24	??	20	18	15	10	Oakland Hauler
Track #4	24	??	24	22	18	12	SLC Extra East
Track #5	24	??	24	22	18	12	GN Extra East
Track #6	24	??	0	0	0	0	
Track #7	24	??	0	0	0	0	
Track #8	24	??	0	0	0	0	
Track #9	24	??	0	0	0	0	
Track #10	24	??	0	0	0	0	
Track #11	24	??	0	0	0	0	
Track #12	24	??	0	0	0	0	
Total	288		112	101	84	56	

Table 8 Yard & Staging Requirements (Summary)							
Note: Capacity based upon Maximum Train Length	Car Capacity 40' -50' avg. (at least)	Length (feet)	All Cars in Trains (Staged or Built)				Comments
			Maximun (100%)	Standard (90%)	Reduced (75%)	Minimal (50%)	
Totals	580	??	280	252	210	140	

Assumption: Industries cannot accept more cars than can be spotted at the industries considering that there are approximately 256 spots.

Assumption: Cars not at industries are available for inclusion in trains.

Assumption: If the projected size of the waybilled fleet is not attained, then occupancy at industries will be less than full, possibly much less.

Table 9 Fleet Sizing Requirements							
Note: On-line Needs includes both industries and interchanges.	Car Capacity 40' -50' avg.	On-line Waybilled Cars	Adjusted for Industry Occupancy & Waybilled Fleet #				Comments
			Full (100%)	Reasonable (90%)	Diminished (75%)	Starved (50%)	
On-line Needs as Calculated	210	359					
Total Waybilled Fleet (Industries + Interchanges)	xx	xx	359	323	270	180	
# of Cars at Industries (256 max.)	xx	xx	210	189	157	105	
# of Cars Available for Trains {Adusted Waybilled Fleet - Industry Occupancy}	xx	xx	150	135	112	75	
Yard & Staging Requirements (from above)							
Maximum Train Length (# Cars)	xx	xx	280	280	280	280	
Standard Train Length (# Cars)	xx	xx	252	252	252	252	
Reduced Train Length (# Cars)	xx	xx	210	210	210	210	
Minimal Train Length (# Cars)	xx	xx	140	140	140	140	
Deficit Adjustment (Yard & Staging Rqts - Cars Available for Trains)							
Deficit Adjustment (Maximum Train Length)	xx	xx	130	145	168	205	
Deficit Adjustment (Standard Train Length)	xx	xx	102	117	140	177	
Deficit Adjustment (Reduced Train Length)	xx	xx	60	75	98	135	
Deficit Adjustment (Minimal Train Length)	xx	xx	(10)	5	28	65	
Totals (Adjusted Waybilled Fleet + Deficit Adjustment)							
# of Cars in Fleet (Maximum Train Length)	xx	xx	490	469	437	385	
# of Cars in Fleet (Standard Train Length)	xx	xx	462	441	409	357	
# of Cars in Fleet (Reduced Train Length)	xx	xx	420	399	367	315	
# of Cars in Fleet (Minimal Train Length)	xx	xx	350	329	297	245	

Assumption: Fleet size can be optimized by varying the size of the waybilled fleet and the length of the trains on the schedule. Consider industry occupancy of full, reasonable, diminished, and starved. Consider train lengths of maximum, standard, reduced, and minimal.

Assumption: Even with waybilled fleet sized at 2X the industry capacity, additional cars will be needed to make up this deficit.

Assumption: Staging and yard capacity and working constraints will limit the ultimate size of the permanent fleet. Currently, the number of trains, not their length, is limited.

Table 10 Permanent Fleet Size (# of Cars)					
		Train Length			
		Maximun (100%)	Standard (90%)	Reduced (75%)	Minimal (50%)
Industry Occupancy & Waybilled Fleet Size	Full (100%)	490	462	420	350
	Reasonable (90%)	469	441	399	350
	Diminished (75%)	437	409	367	297
	Starved (50%)	385	357	315	245

Assumption: Successful Proto Ops sessions have been conducted with full crews, full train runs, and a fleet of about 300 cars. However, not all industries are on-line (Oroville), most industries appear to be at the "diminished" level, and train lengths seem to be between "reduced" and "minimal".

Assumption: If the assumptions are generally valid and the algorithm reasonable, then a permanent fleet sized at about 400 cars should be considered optimal. This allows trains to have an average length that varies between 90% to 75% of maximum and the on-line industries and interchanges to be populated between 90% to 75% of full.