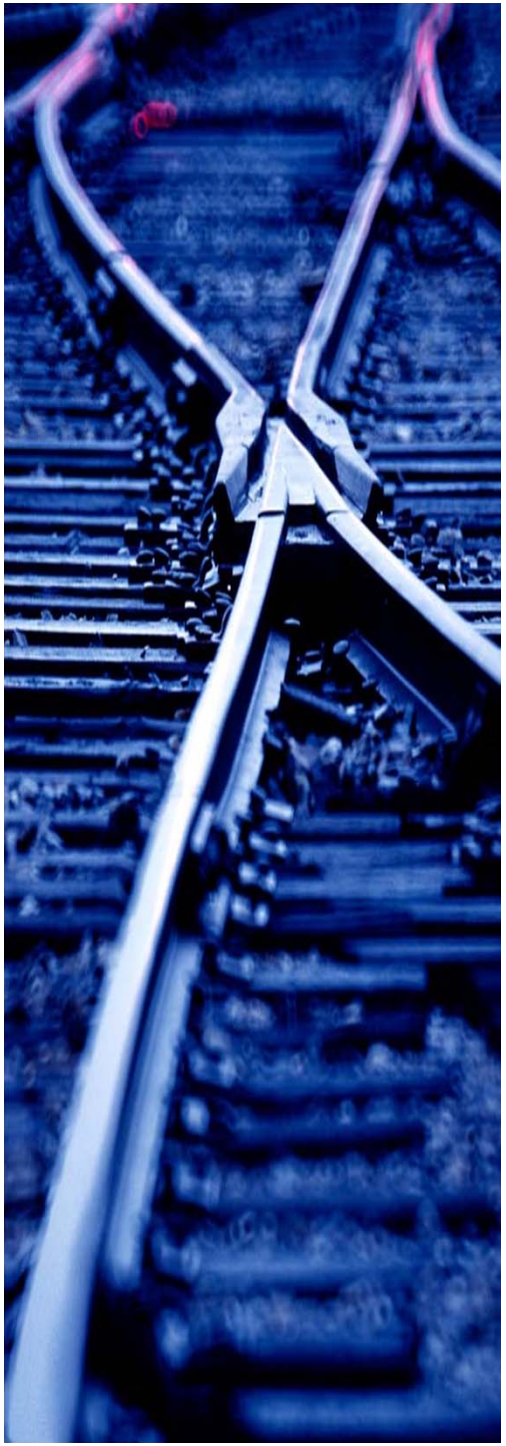

SURFACE TRANSPORTATION BOARD

Review of the General Purpose Costing System

Supplemental Notice of Proposed Rulemaking

Ex Parte 431 (Sub-No. 4)

Workshop

September 7, 2016

Michael Boyles

Section Chief

Applied Economics & Special Studies

Office of Economics

Objectives

- The objective of the Supplemental NPR is to eliminate the Make-Whole Adjustment because it produces step functions and does not appropriately reflect operating costs and economies of scale.
- The Supplemental NPR also proposes certain other related changes to URCS (i.e., the allocation of LUMs and TMs).
- The proposals use the existing efficiency adjustments and cost relationships in URCS as the basis for changes.
- The proposals are based on the principles of cost causation, cost allocation, and practicality.
- The objective of this technical workshop is to assist commenters in reviewing the revised proposals and to answer technical questions about the mechanics of the proposals.

Workshop Topics

1. Switching Costs Related to Switch Engine Minutes (SEMs)
2. Equipment Costs for the Use of Railroad-Owned Cars During Switching
3. Station Clerical Costs
4. Car-Mile Costs
5. Other Related Changes

Workshop Topics

1. **Switching Costs Related to Switch Engine Minutes (SEMs)**
2. Equipment Costs for the Use of Railroad-Owned Cars During Switching
3. Station Clerical Costs
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5. Other Related Changes

Switch Engine Minutes (SEMs)

- The Supplemental NPR proposes to use a new concept called the Carload Weighted Block (CWB) Adjustment to reflect that switching is dependent, to some extent, on the number of cars in the block.
- The CWB Adjustment applies a weighting to a block of cars based on the number of cars in the block.
- The Supplemental NPR defines “shipment” as a block of one or more cars or TCUs moving under the same waybill from origin to destination.

Carload Weighted Blocks Calculation

The Carload Weighted Blocks are calculated as follows:

CWBs = (Number of Cars * Carload%) + (Number of Blocks * Block%)

where,

Carload% = The percentage by which switching varies by carload

Block% = The percentage by which switching varies by block

Notes:

Block% = 1 – Carload%

The Number of Blocks is always 1 for carload traffic

Carload Weighted Blocks per Carload

Economies of Scale in the Carload Weighted Block Calculation
Using Carload%=10% and Block%=90%

(1)	*(2)*	*(3)=(10%*(1)) + (90%*(2))*	*(4)=(3)/(1)*
Carloads	**Blocks**	**Total CWBs**	**CWBs per Carload**
1	1	**1.0000**	**1.0000**
2	1	**1.1000**	**0.5500**
3	1	**1.2000**	**0.4000**
4	1	1.3000	0.3250
5	1	1.4000	0.2800
6	1	1.5000	0.2500
7	1	1.6000	0.2286
8	1	1.7000	0.2125
9	1	1.8000	0.2000
10	1	1.9000	0.1900
…			
10,000	1	1,000.9	0.1001

Carload Weighted Blocks for Intermodal

Carload Weighted Block Calculation for Intermodal

Using AvgTCUs per Flatcar = 4

(1)	*(2)=(1)/AvgTCUs*	*(3)=(2)/ROUNDUP(2)*	*(4)=(10%*(2)) + (90%*(3))*	*(5)=(4/(2)*
TCUs	**Carloads**	**Blocks**	**Total CWBs**	**CWBs per Carload**
1	2500	0	0.250	1.0000
2				
3				
4				
5	1.2500	0.6250	0.6875	0.5500
6	**1.5000**	**0.7500**	0.8250	0.5500
7	1.7500	0.8750	0.9625	0.5500
8	2.0000	1.0000	1.1000	0.5500
9	2.2500	0.7500	0.9000	0.4000
10	2.5000	0.8333	1.0000	0.4000
11	2.7500	0.9167	1.1000	0.4000
12	3.0000	1.0000	1.2000	0.4000
13	3.2500	0.8125	1.0563	0.3250
14	3.5000	0.8750	1.1375	0.3250
15	3.7500	0.9375	1.2188	0.3250
16	4.0000	1.0000	1.3000	0.3250

(2)=(1)/AvgTCUs

(3)=(2)/ROUNDUP(2)

(4)=(10%*(2))+(90%*(3))

Conversion of Phase II SEMs per Carload

The Phase III SEMs are calculated as follows:

Phase III SEMs=(Phase II SEMs)*(CWB Ratio)*(CWBs)

where,

Phase II SEMs=Unadjusted SEMs-per-Carload from Phase II

> *The Supplemental NPR does not propose any changes to the Phase II SEMs, which are found in Worktable B6 Part 2A, columns 35-39 and Worktable E2 Part 1, columns 25-29.*

CWB Ratio = SEMs-per-CWB ÷ SEMs-per-Carload

CWBs = (#Carloads * Carload%) + (#Blocks * Block%)

Solving for the Carload Percentage

- The CWB Adjustment “solves” for the values that cause SEMs to be reduced at the same amount as is currently done in Phase III at the minimum unit train level.
- Carload Percentages will be different for each type of switching.
- There is an interdependency between the Carload Percentage, the Total CWBs, and the CWB Ratio.
- The workpapers use “Solver” in MS Excel for the solution.
- The Total SEMs assigned to all shipments in the CWB Adjustment is the same as those assigned in the Make-Whole Adjustment, however the distribution of those SEMs across various shipment sizes differs (i.e., a zero sum change).
- The CWB Adjustment is dependent on the mix of shipment sizes, which differs for each railroad.

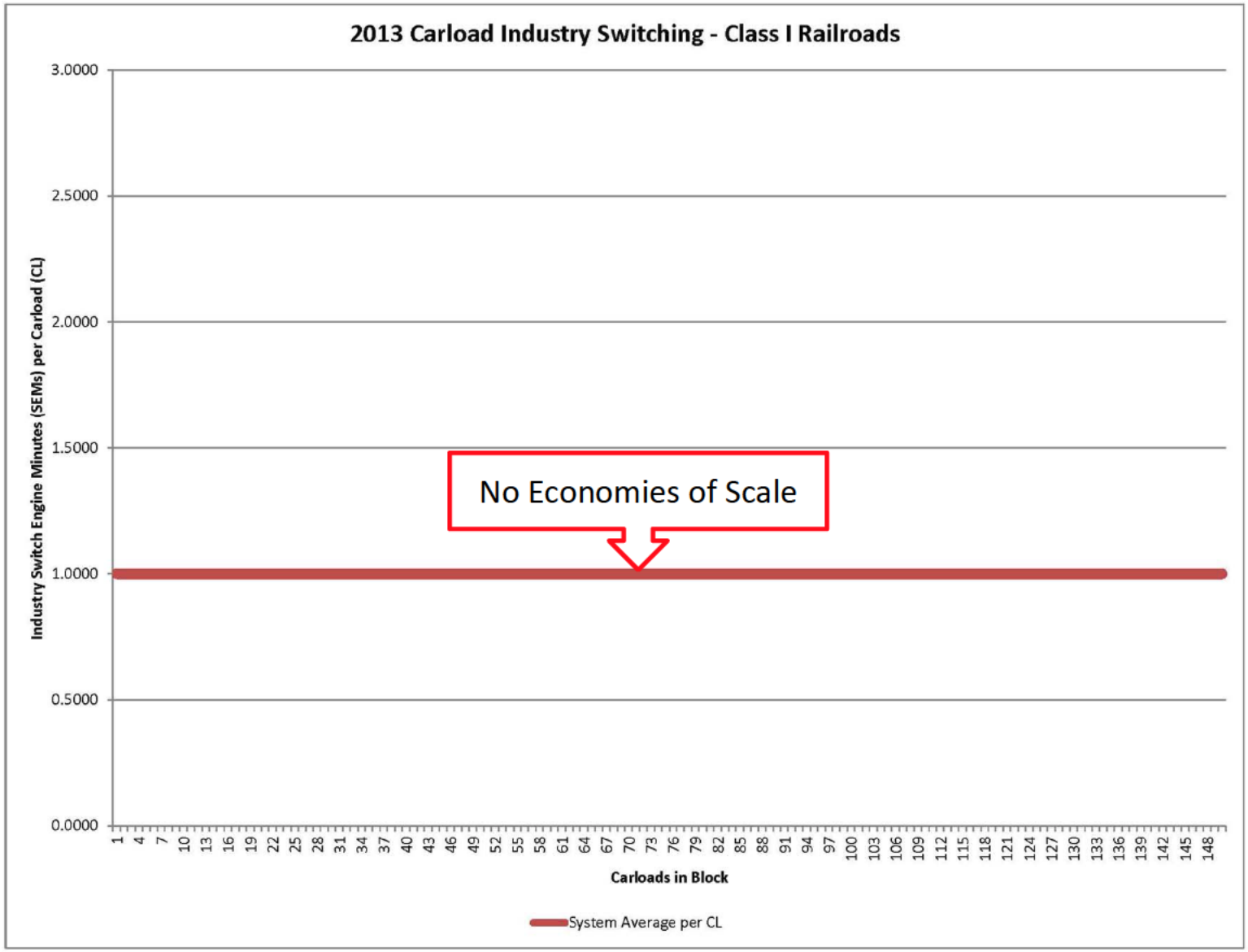
Impact of the CWB Adjustment

Industry Switching

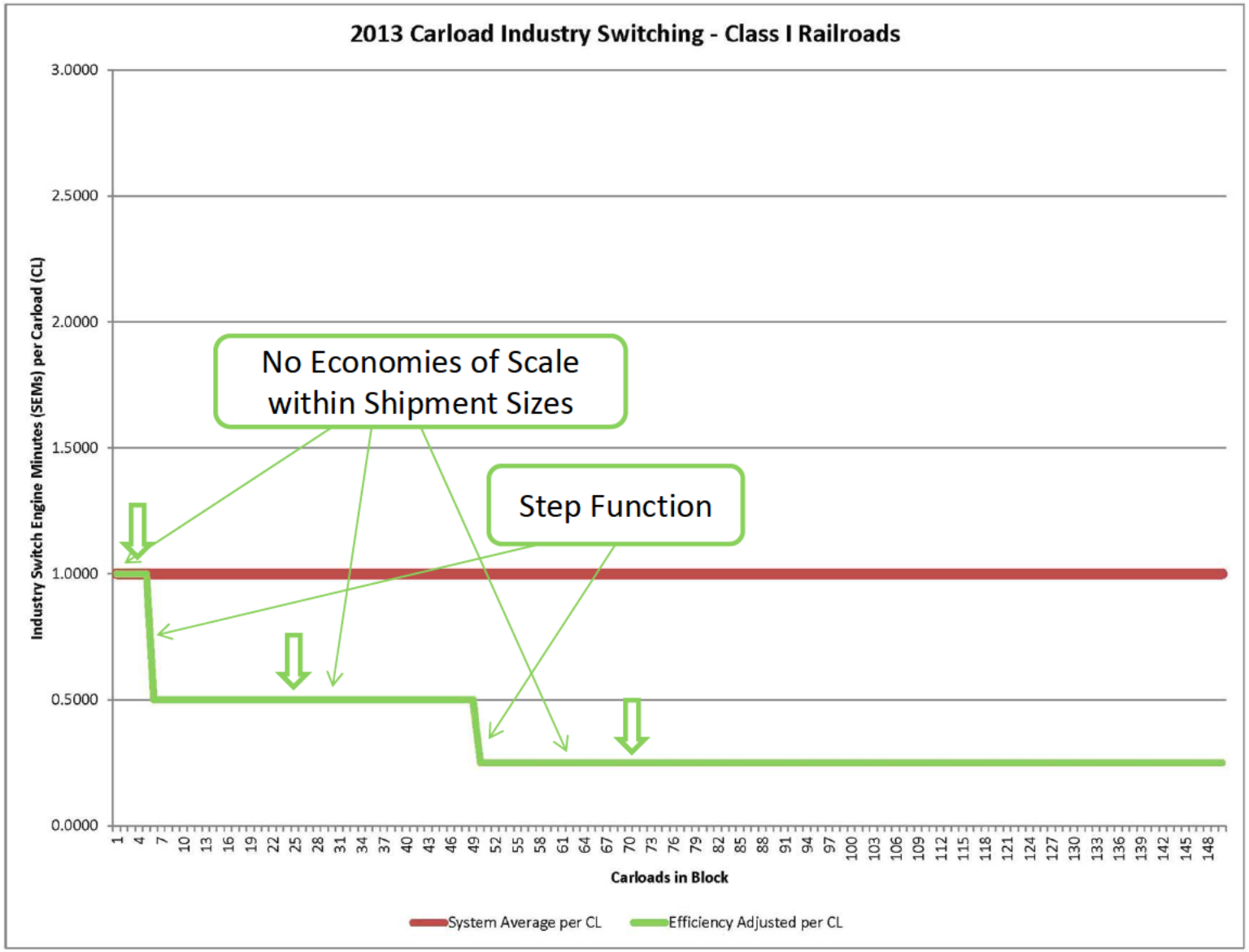
Industry switching is switching that occurs at origin or destination points.

The "Impact" slides use the 2013 Waybill Sample for all Class I railroads

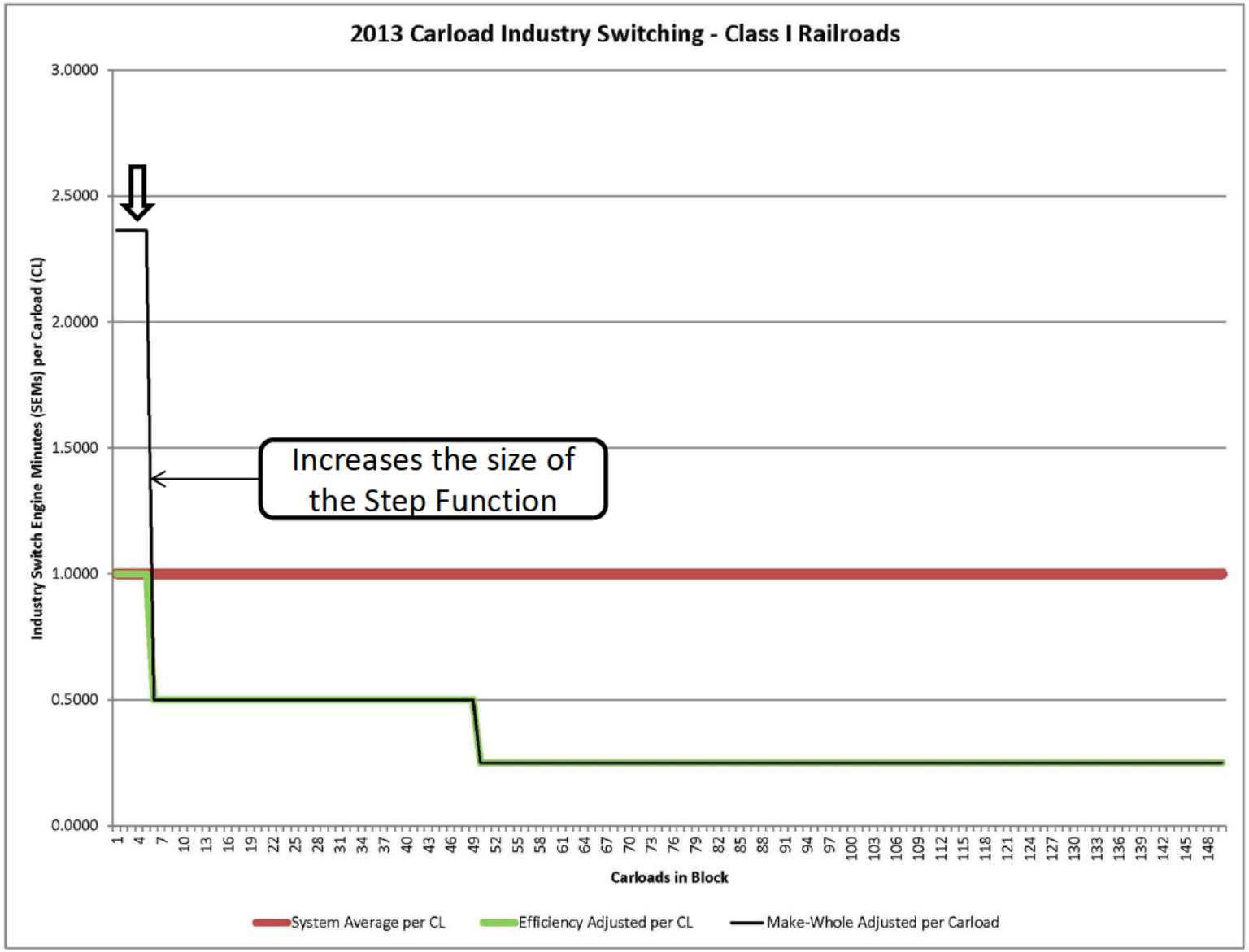
Industry Switching per Carload



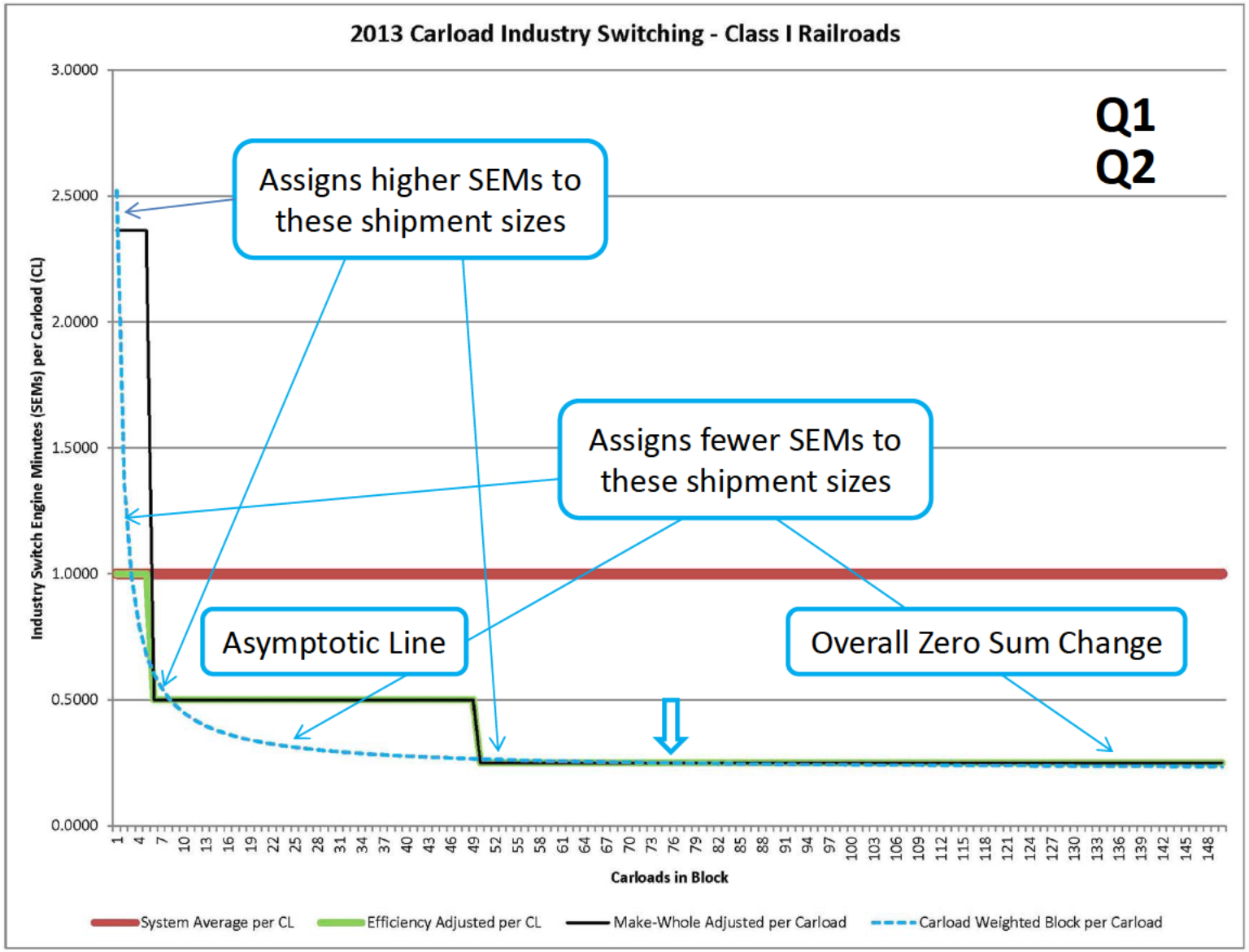
Industry Switching per Carload



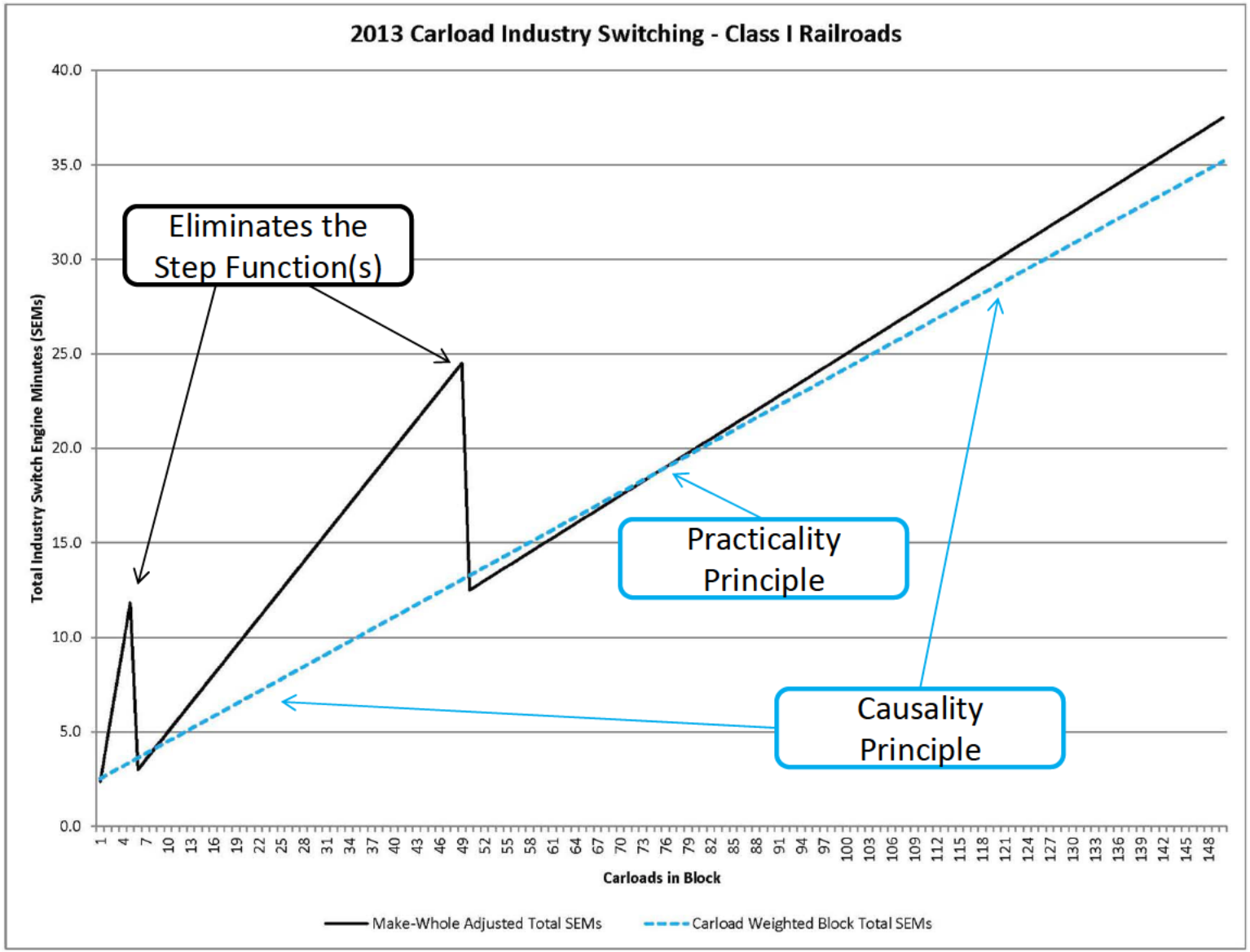
Industry Switching per Carload



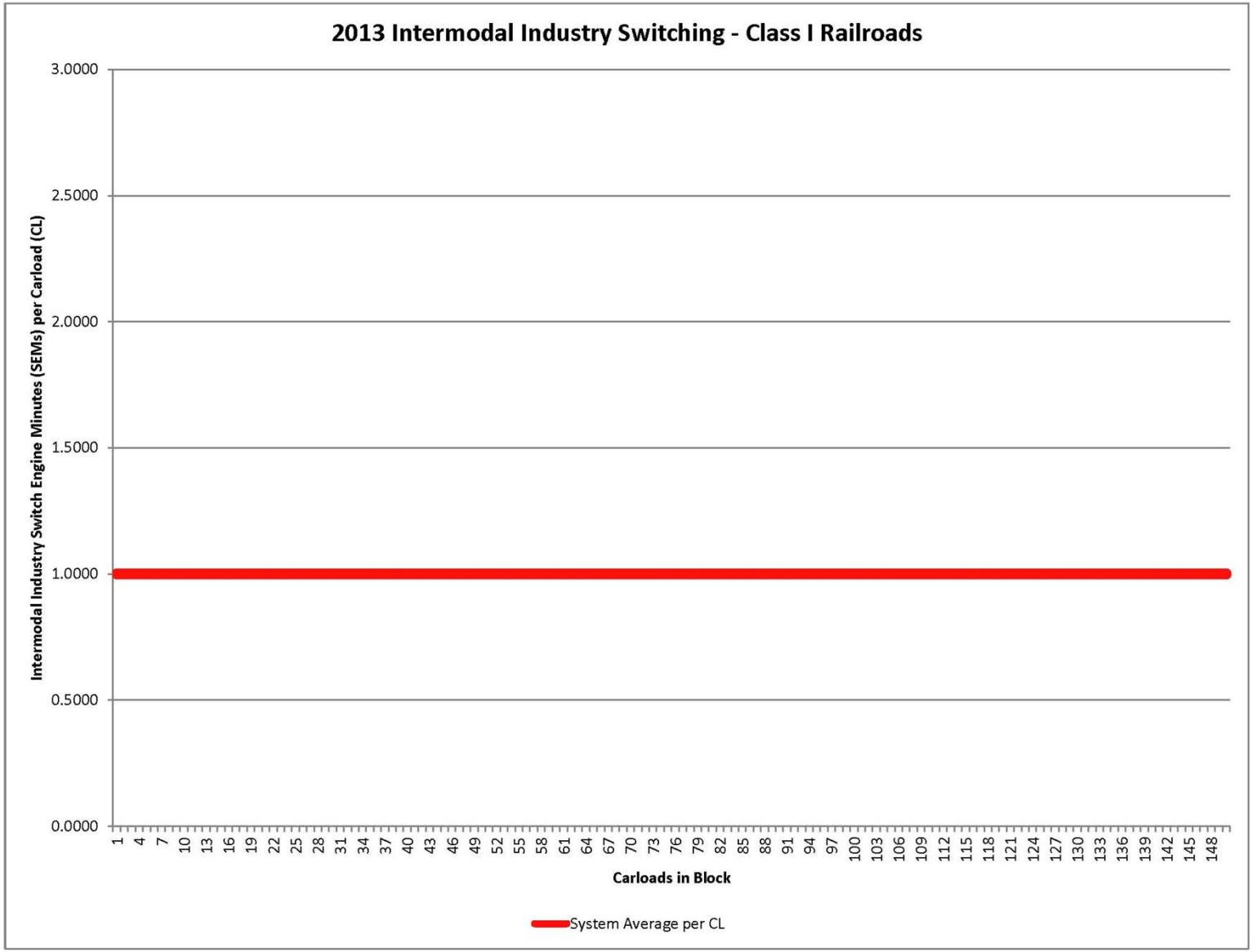
Industry Switching per Carload



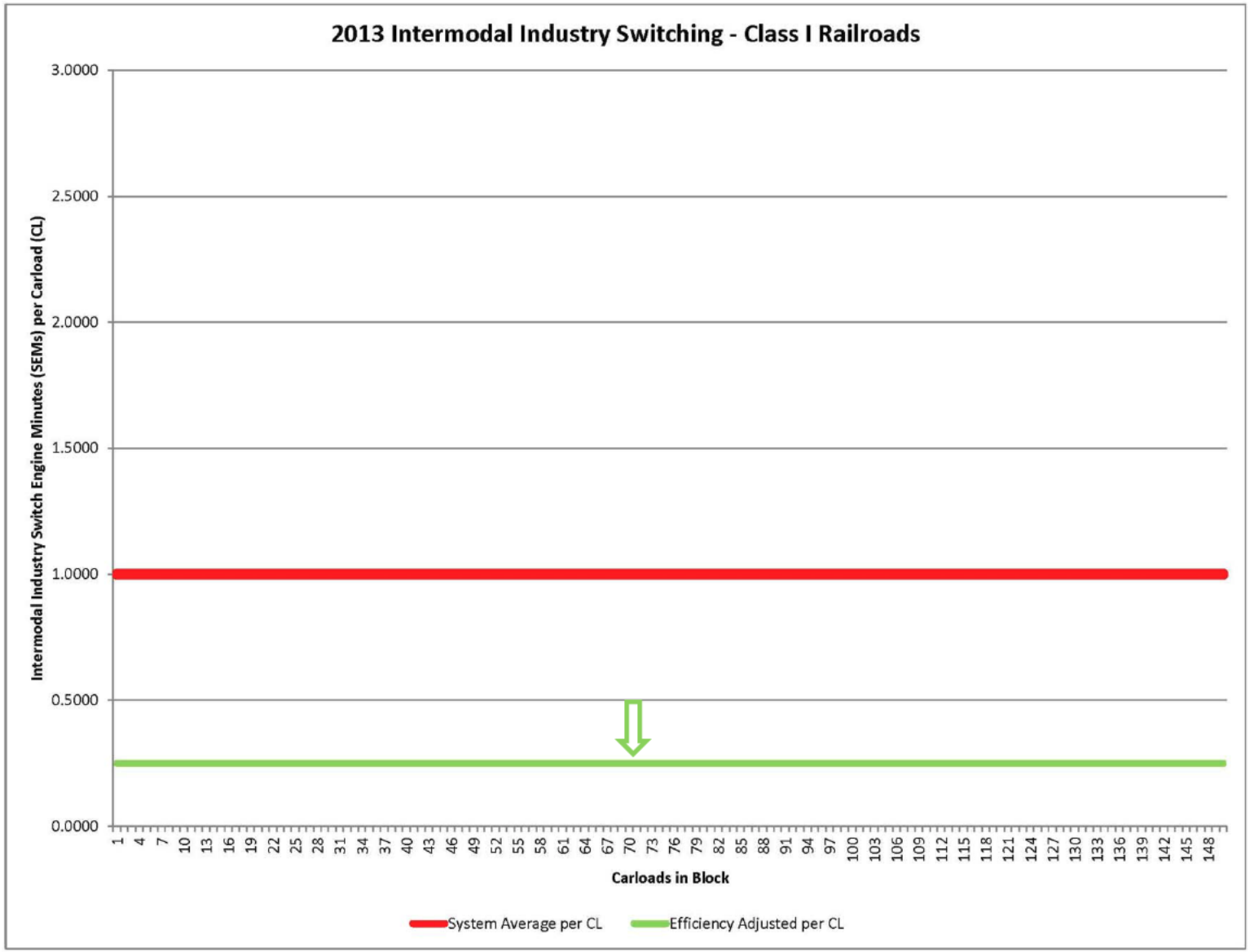
Total Carload Industry Switching



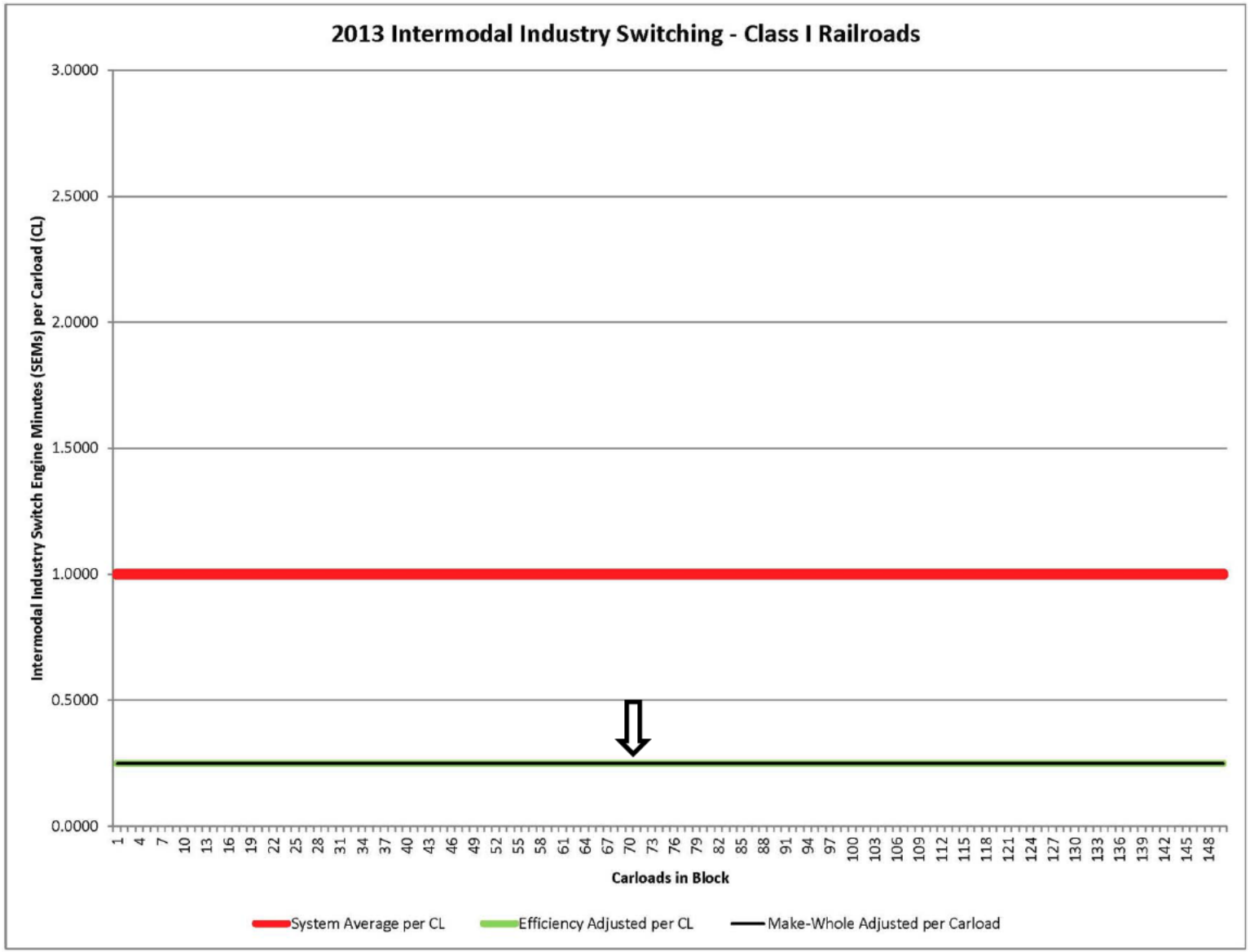
Intermodal Industry Switching



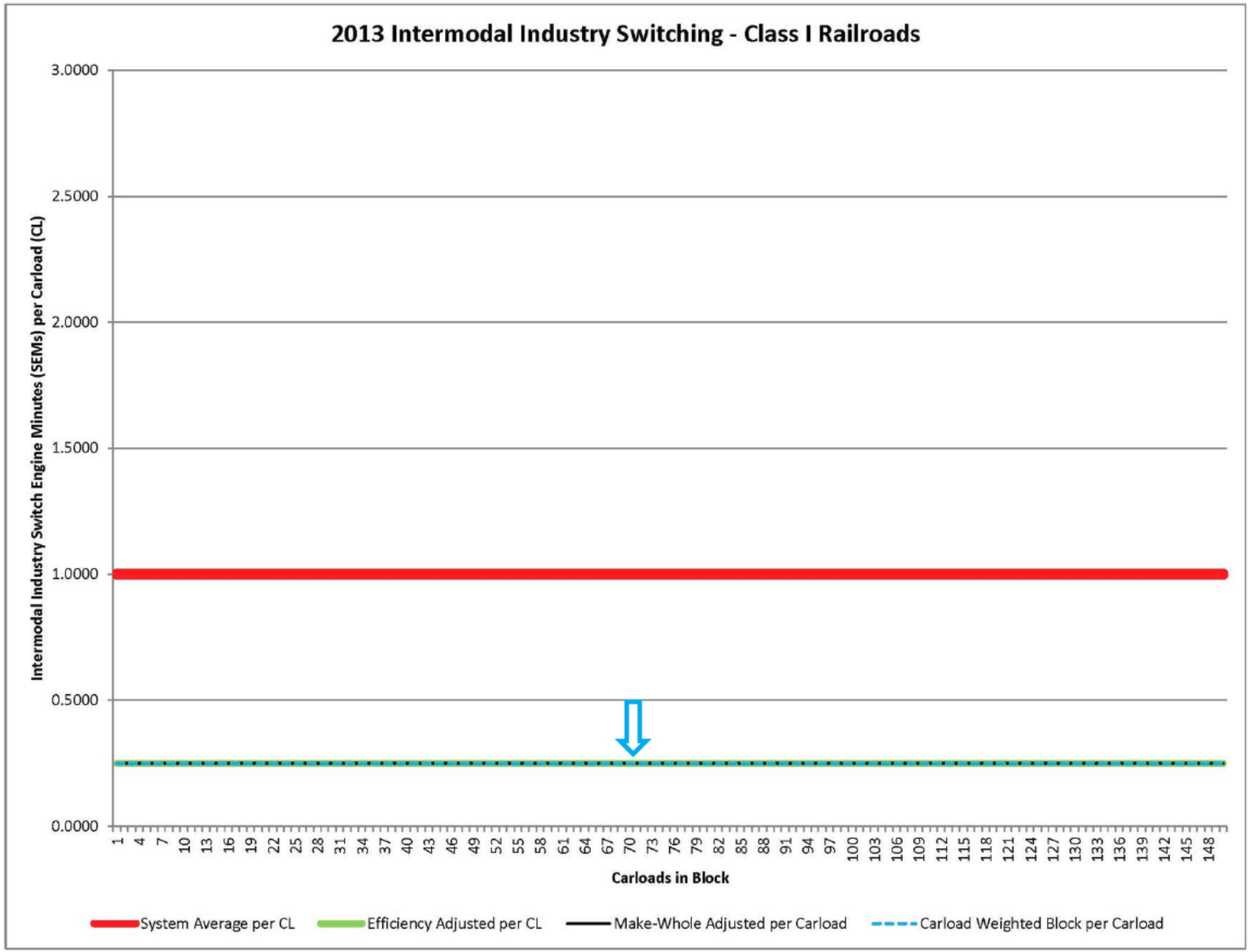
Intermodal Industry Switching



Intermodal Industry Switching



Intermodal Industry Switching

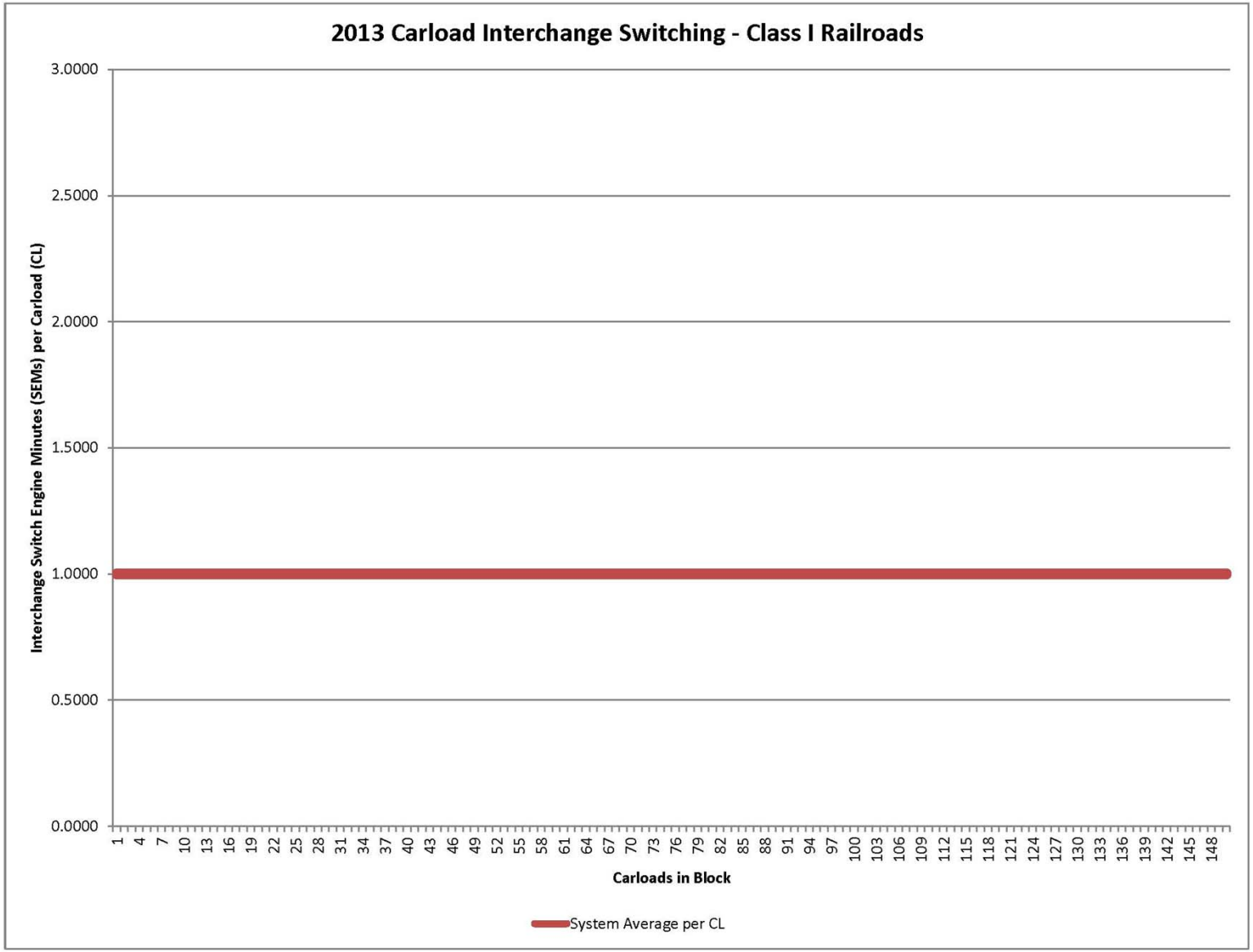


Impact of the CWB Adjustment

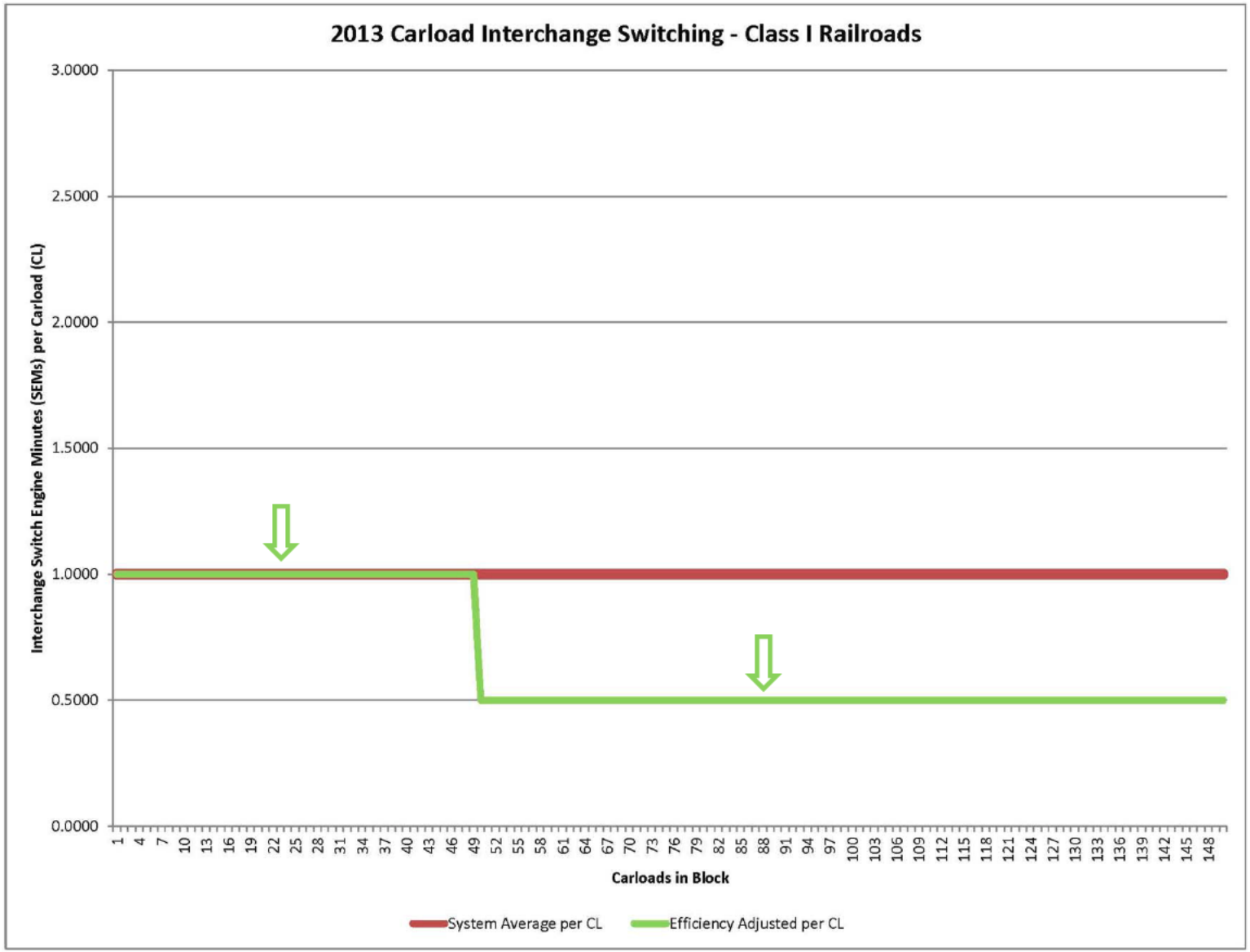
Interchange Switching

Interchange switching is switching that occurs at intermediate yards between different carriers.

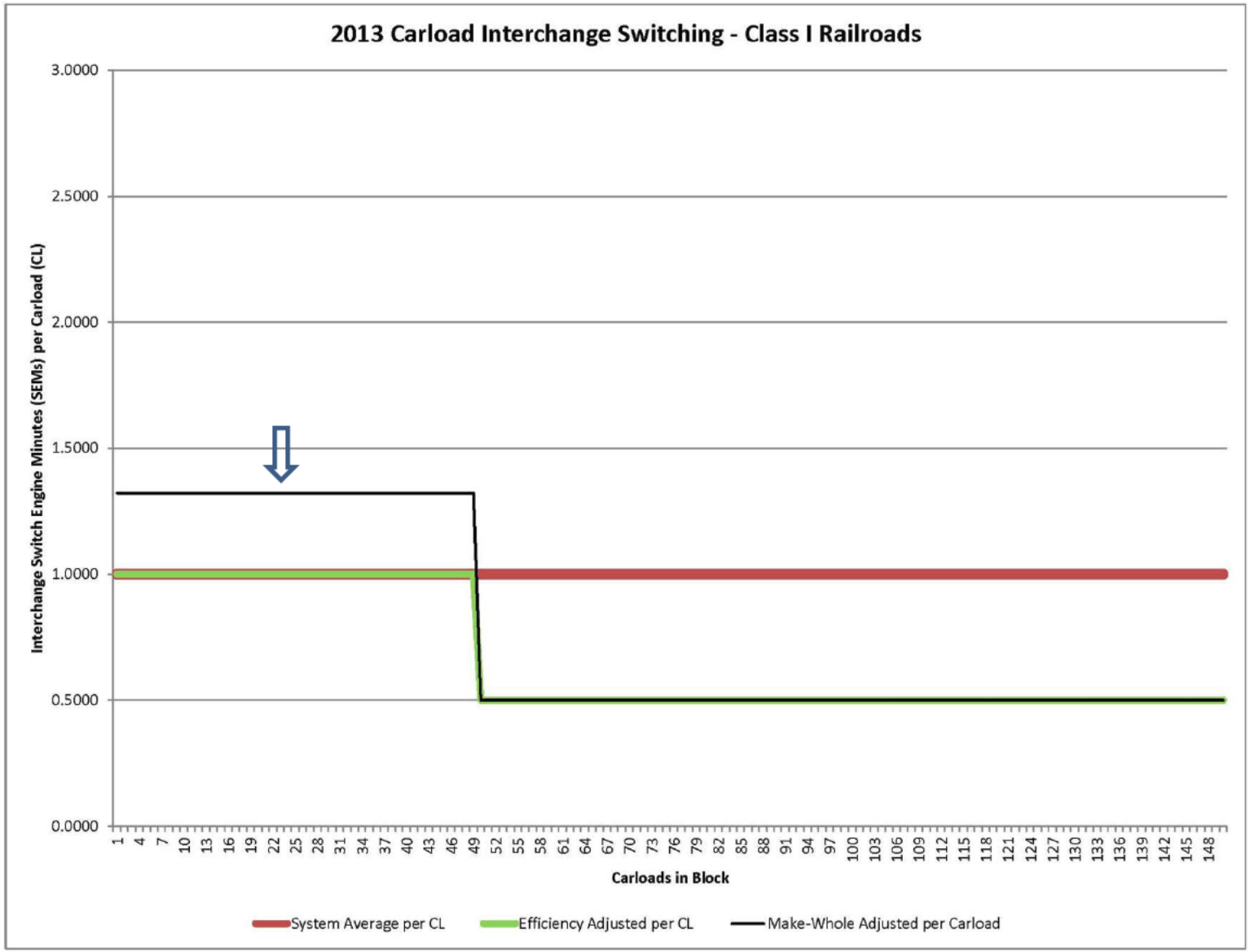
Interchange Switching per Carload



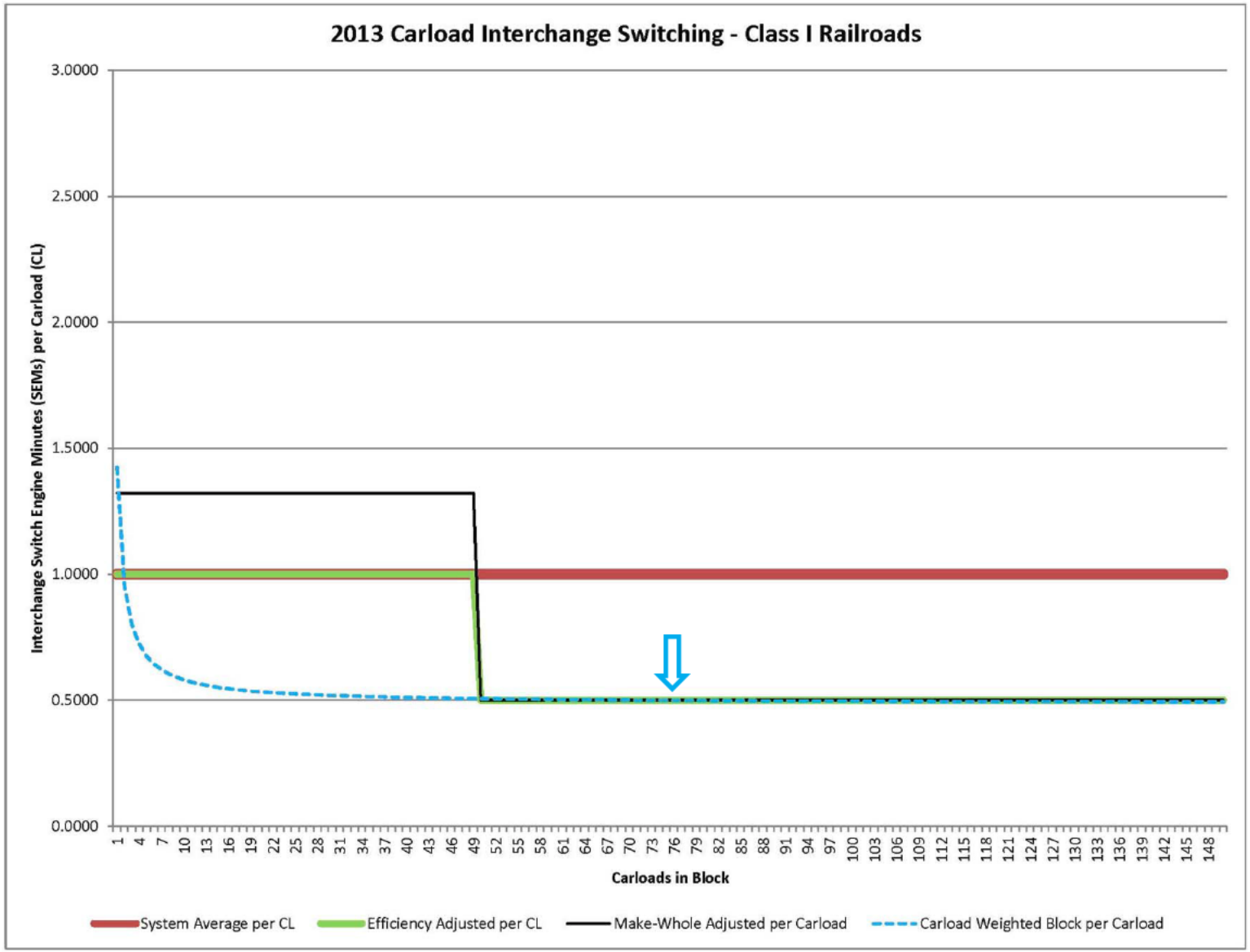
Interchange Switching per Carload



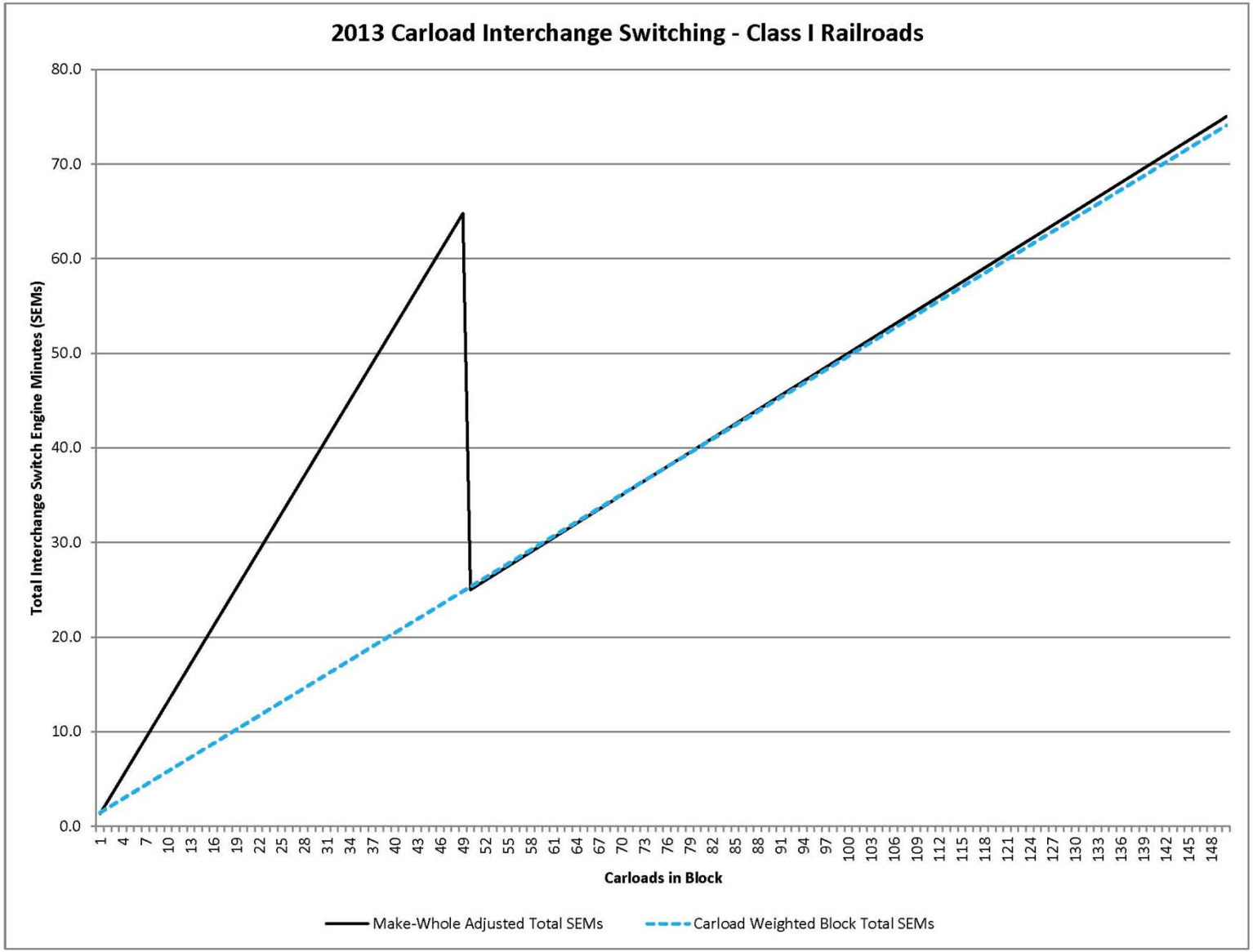
Interchange Switching per Carload



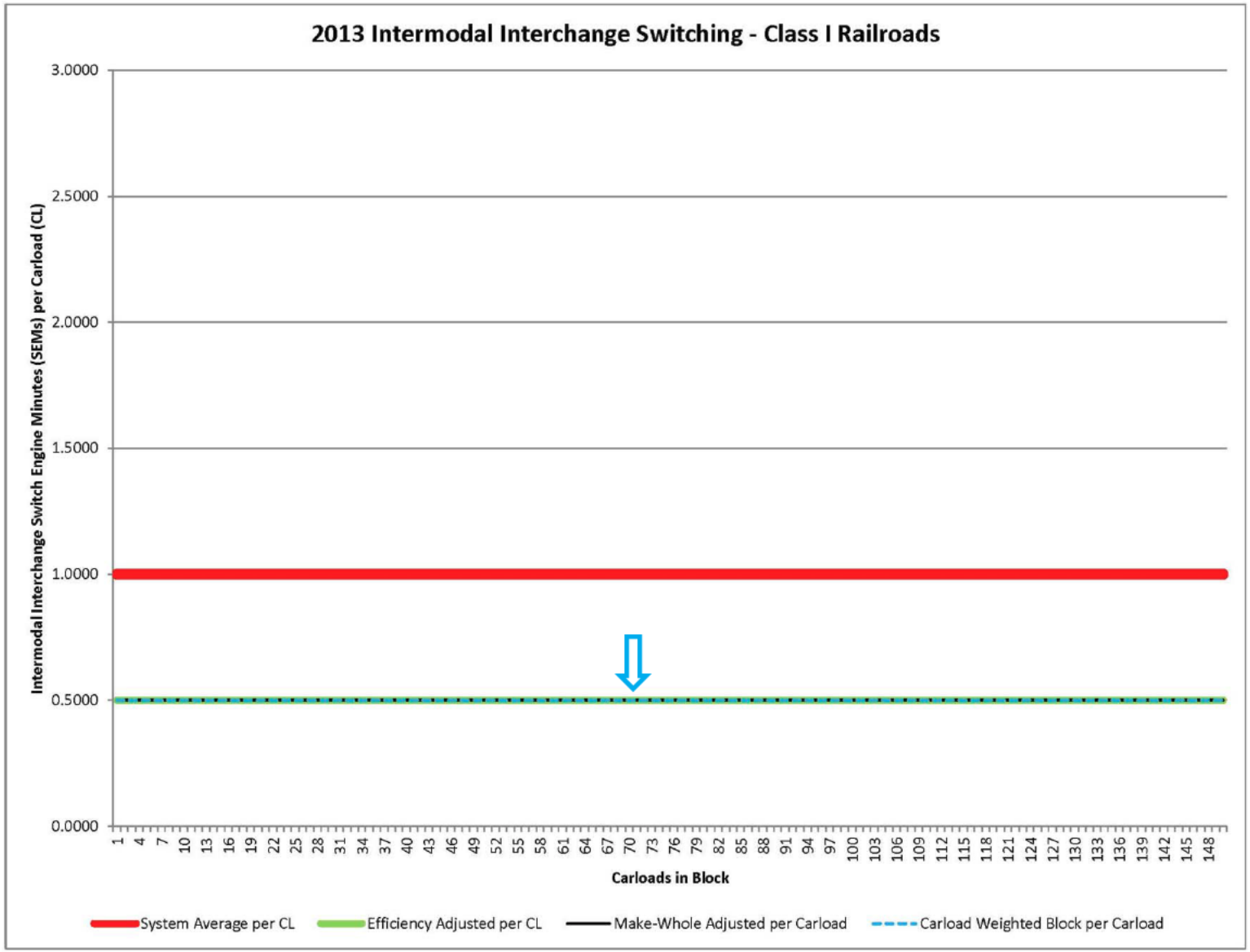
Interchange Switching per Carload



Total Carload Interchange Switching



Intermodal Interchange Switching

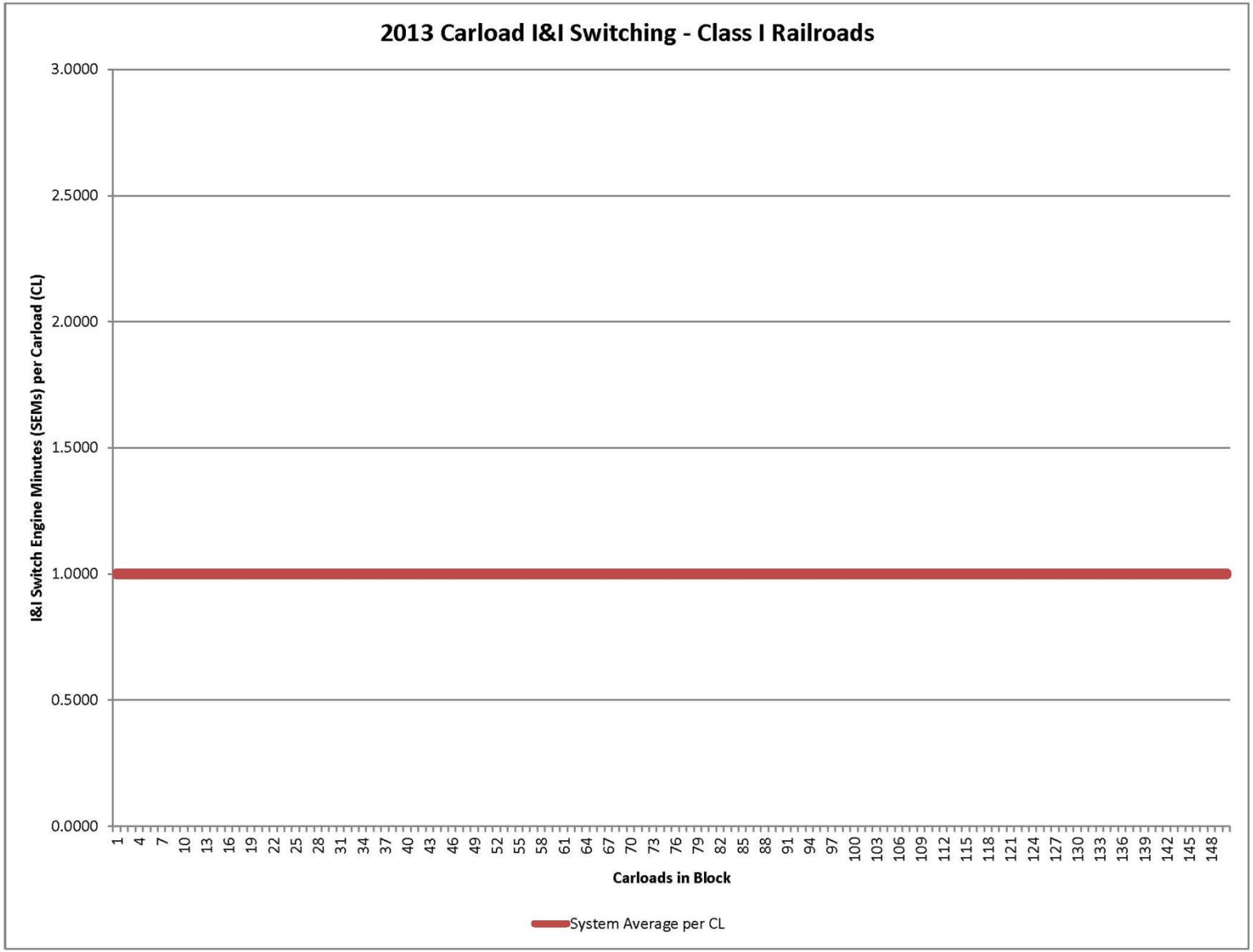


Impact of the CWB Adjustment

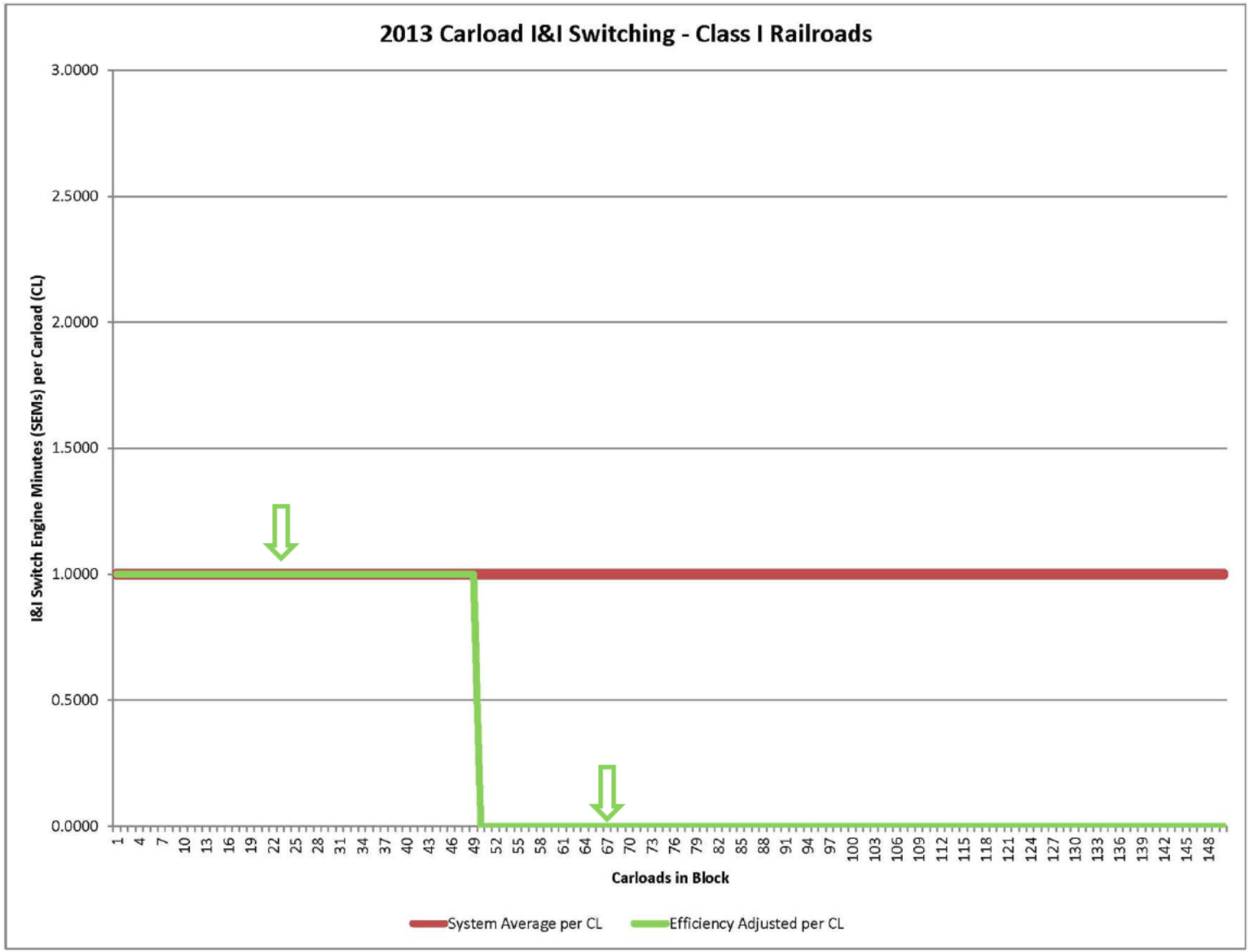
Intra-train & Inter-train (I&I) Switching

I&I switching is switching that occurs at intermediate yards on a rail carrier's own lines.

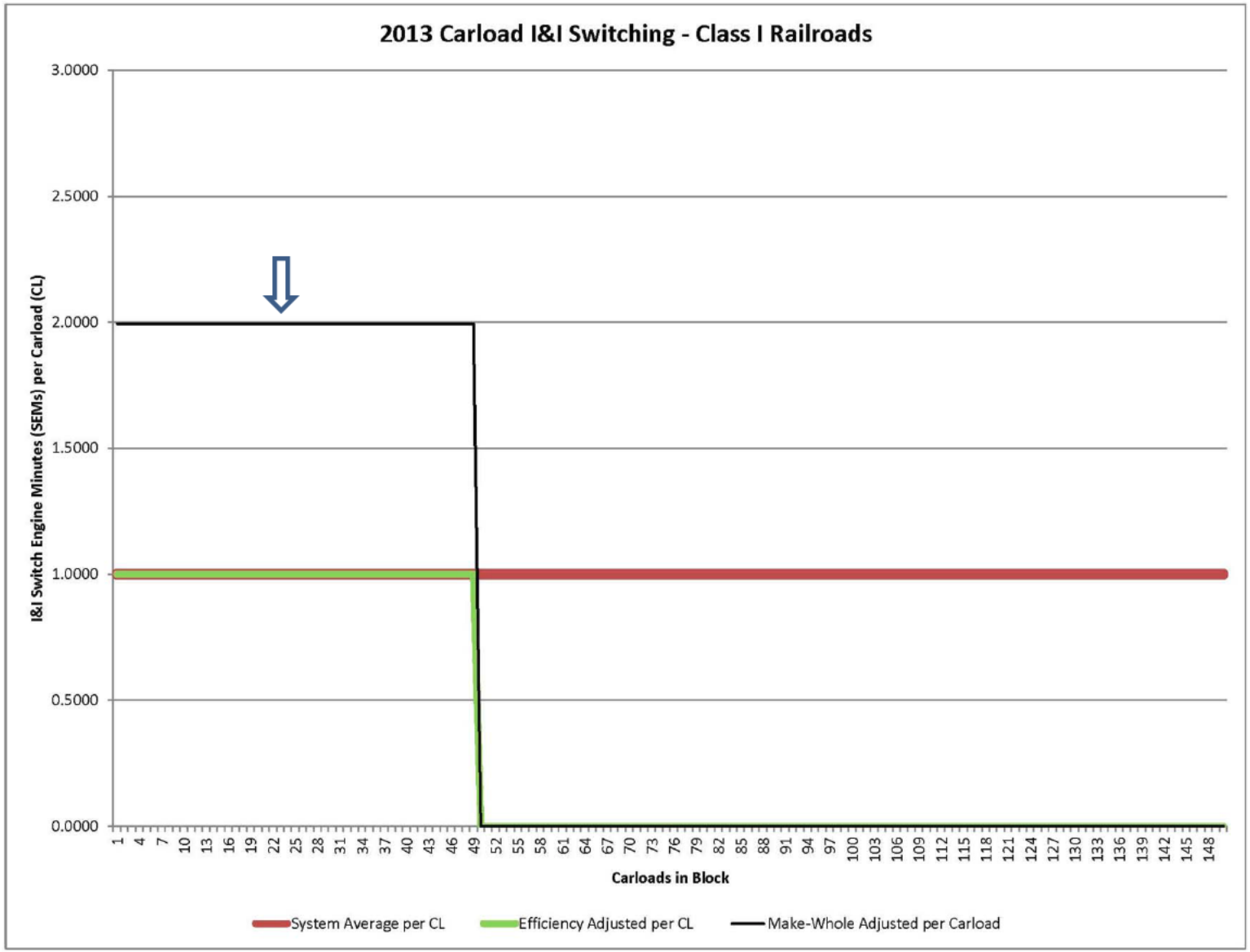
I&I Switching per Carload



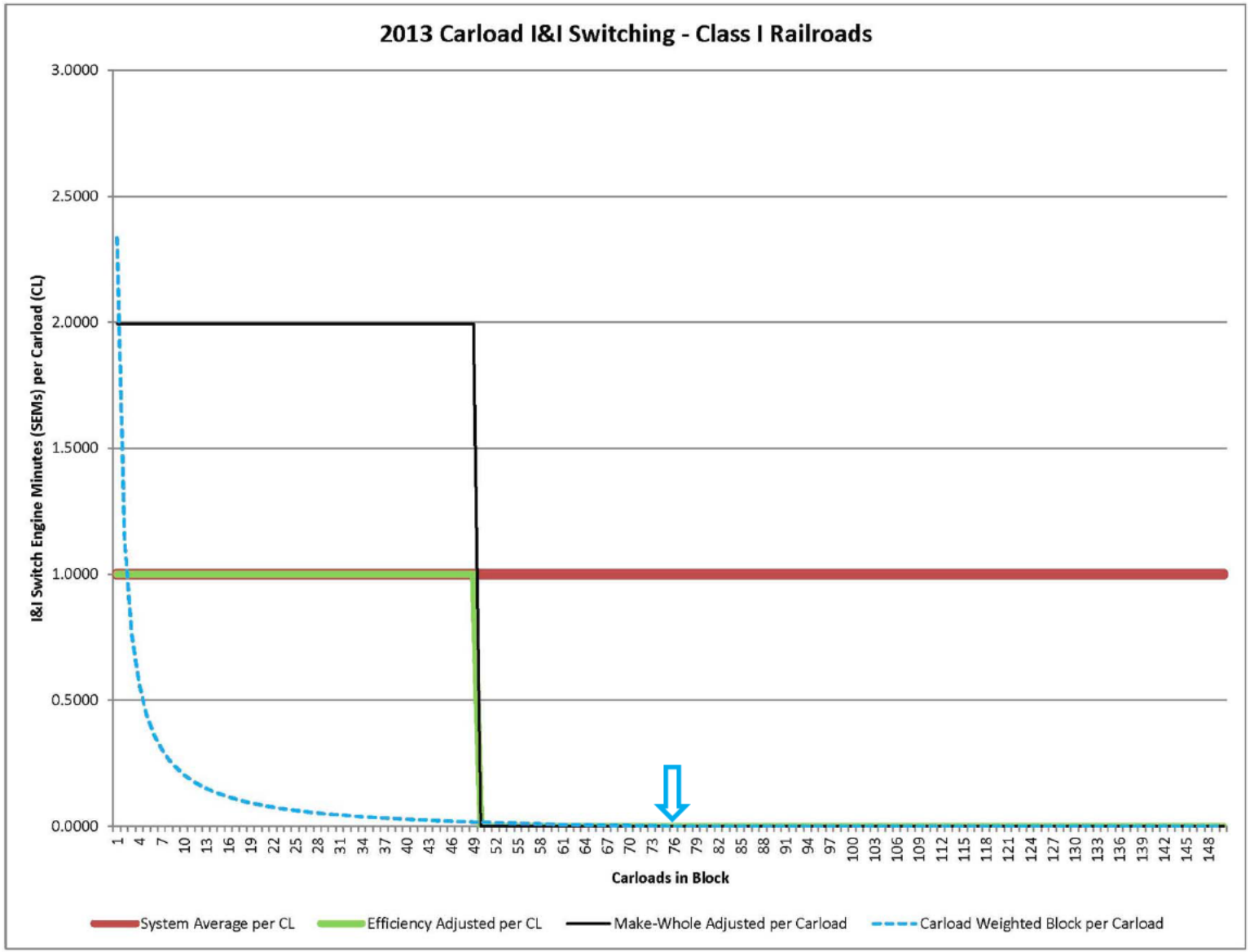
I&I Switching per Carload



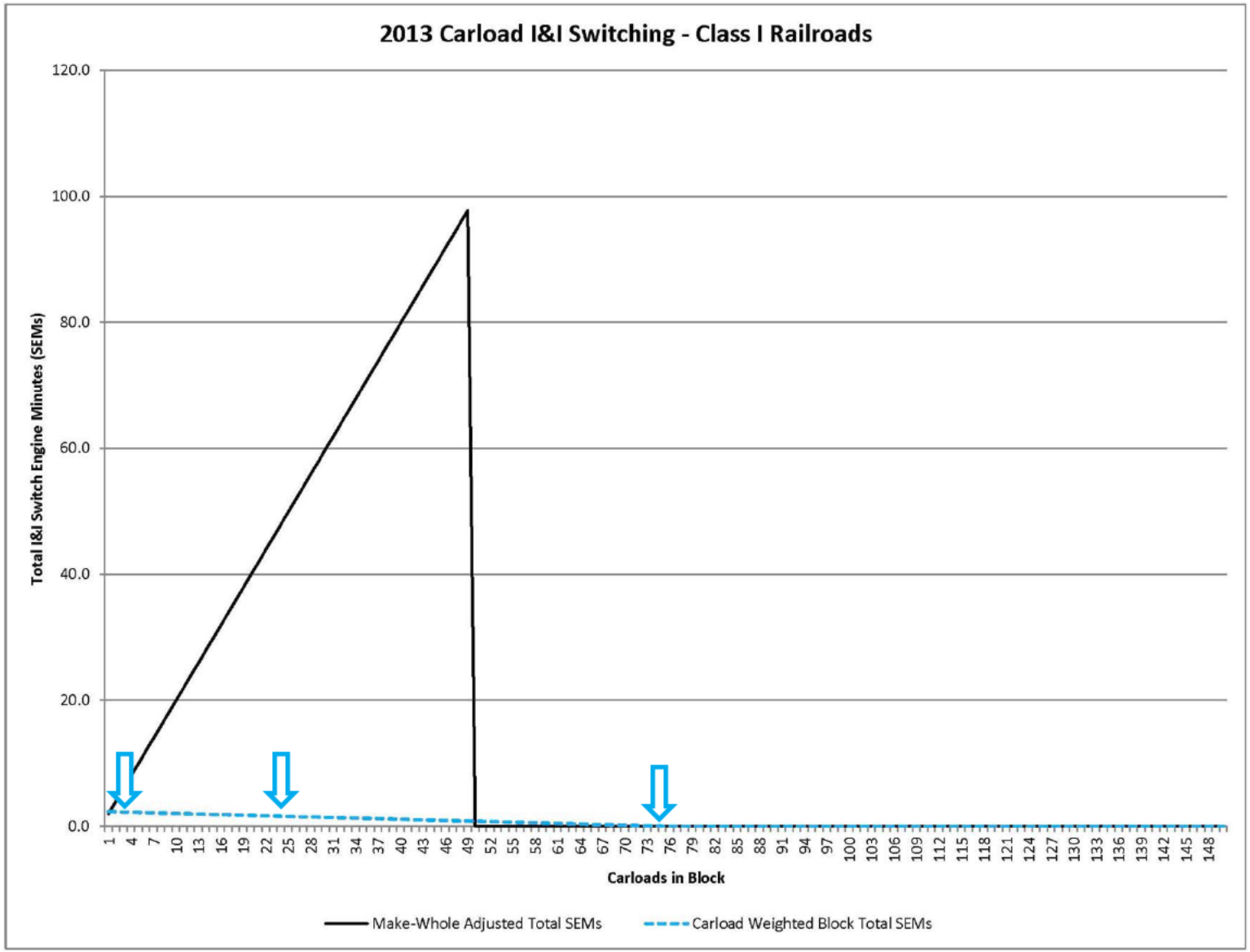
I&I Switching per Carload



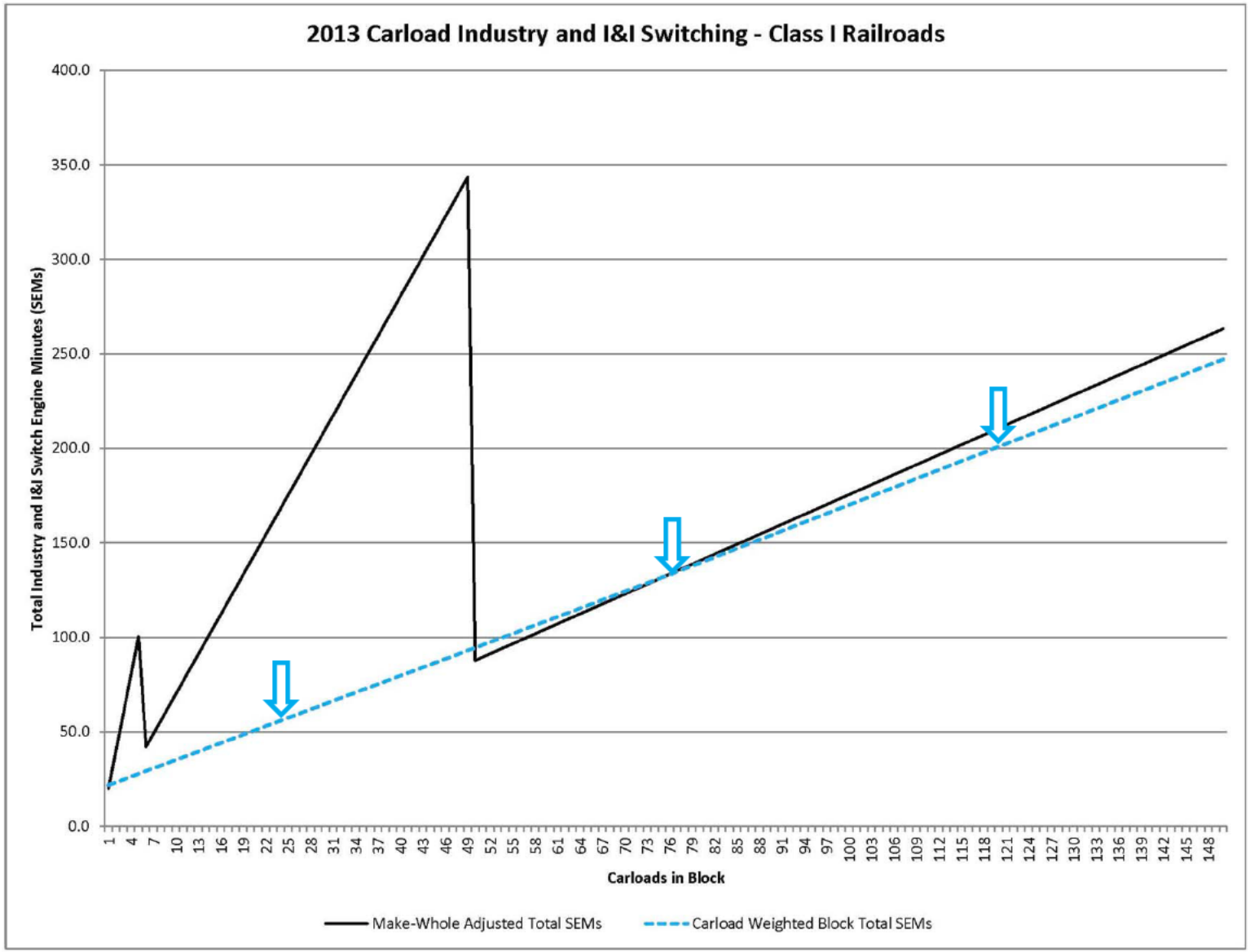
I&I Switching per Carload



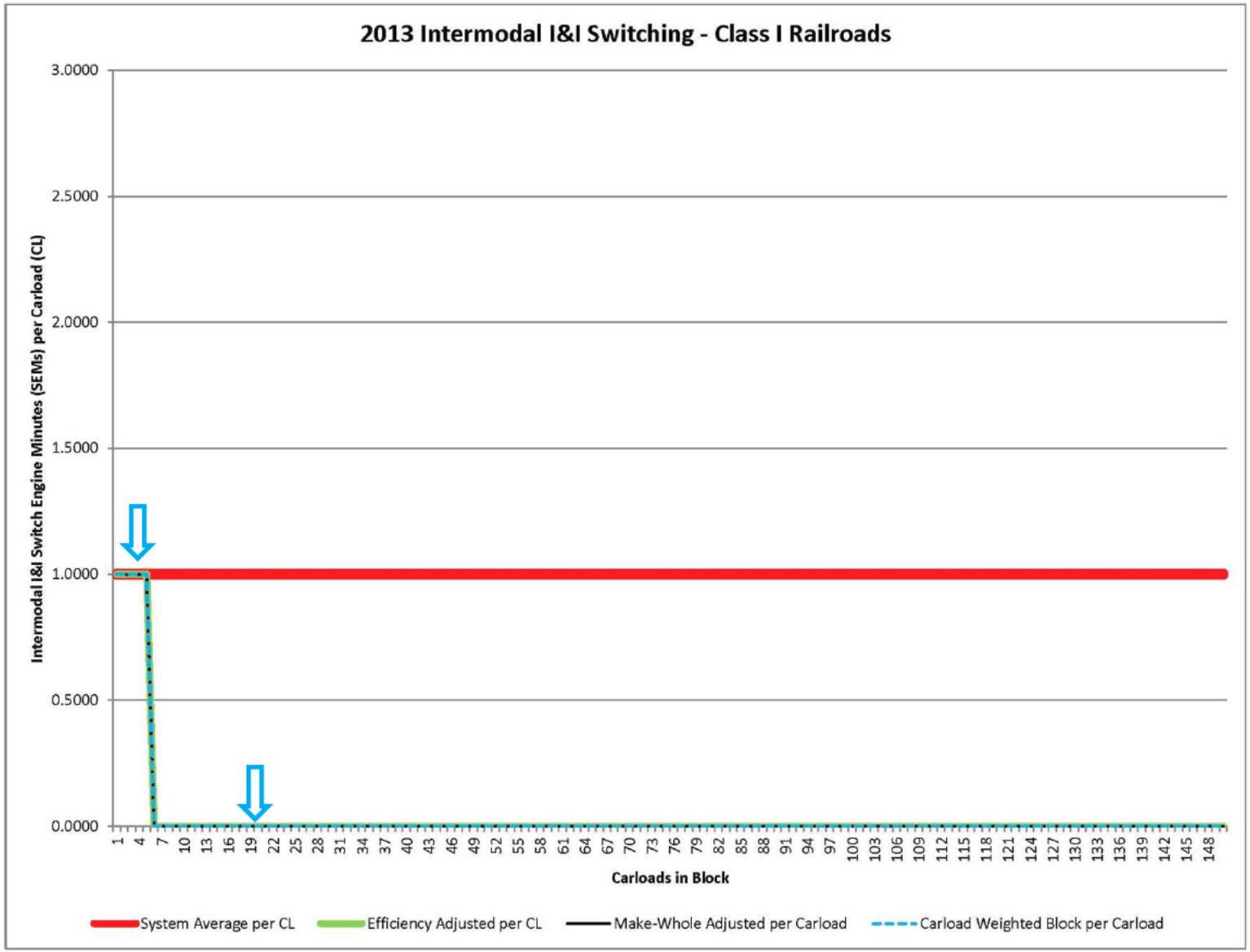
Total Carload I&I Switching



Total Combined Industry and I&I Switching



Intermodal I&I Switching



Workshop Topics

1. Switching Costs Related to Switch Engine Minutes (SEMs)
2. **Equipment Costs for the Use of Railroad-Owned Cars During Switching**
3. Station Clerical Costs
4. Car-Mile Costs
5. Other Related Changes

Railroad-Owned Equipment Events

- The Supplemental NPR proposes to adjust the inputs to Phase II for the railroad-owned equipment in order to reflect economies of scale.
- Adjusting the Phase II inputs also eliminates the misallocation currently in URCS of assigning efficiency savings from one type of equipment onto other types of equipment.

Phase II Inputs for Railroad-Owned Equipment Events

Phase II Inputs for Railroad-Owned Equipment Events

Equipment Event Type: **CM(Y) Industry** <= Select the Equipment Event Type from the pull-down list
Railroad(s): Class I Railroads
Ownership: Railroad-Owned
Unit Train Starts at : 75
System Average Value (Miles): **4.00** (See A1P5B C9)

	Efficiency Adjustments (Reductions) by Shipment Size			
Equipment Event Description	Single	Multi	Unit	Intermodal
CM(Y) Industry	0%	50%	**50%**	50%

	Efficiency Adjusted Values (Miles)			
Equipment Event Description	Single	Multi	Unit	Intermodal
CM(Y) Industry	4.00	2.00	2.00	2.00

Railroad Owned Carloads by Car Type and Shipment Size

STB Car Type	Description	Single	Multi	Unit	Intermodal	Total
39	**Plain Gondola Cars**	103,960	106,149	1,303,484	0	1,513,593

A1P5B C9

CM(Y) Industry Phase II Inputs by Car Type

STB Car Type	Description	Single%	Multi%	Unit%	Intermodal%	CM(Y) Industry
39	**Plain Gondola Cars**	7%	7%	**86%**	0%	**2.00**

Phase II Inputs for Railroad-Owned Equipment Events

Phase II Inputs for Railroad-Owned Equipment Events

Equipment Event Type: **CM(Y) Industry** <= Select the Equipment Event Type from the pull-down list
Railroad(s): Class I Railroads
Ownership: Railroad-Owned
Unit Train Starts at : 75
System Average Value (Miles) **4.00** (See A1P5B C9)

	Efficiency Adjustments (Reductions) by Shipment Size			
Equipment Event Description	Single	Multi	Unit	Intermodal
CM(Y) Industry	0%	50%	50%	50%

	Efficiency Adjusted Values (Miles)			
Equipment Event Description	Single	Multi	Unit	Intermodal
CM(Y) Industry	4.00	2.00	2.00	2.00

Railroad Owned Carloads by Car Type and Shipment Size

STB Car Type	Description	Single	Multi	Unit	Intermodal	Total
37	Plain Box Cars 50' and Longer	46,400	252	0	0	46,652

A1P5B C9

CM(Y) Industry Phase II Inputs by Car Type

STB Car Type	Description	Single%	Multi%	Unit%	Intermodal%	CM(Y) Industry
37	Plain Box Cars 50' and Longer	99%	1%	0%	0%	4.00

Phase II Inputs for Railroad-Owned Equipment Events

Phase II Inputs for Railroad-Owned Equipment Events

Equipment Event Type: **CM(Y) Industry** <= Select the Equipment Event Type from the pull-down list
Railroad(s): Class I Railroads
Ownership: Railroad-Owned
Unit Train Starts at : 75
System Average Value (Miles) **4.00** (See A1P5B C9)

	Efficiency Adjustments (Reductions) by Shipment Size			
Equipment Event Description	Single	Multi	Unit	Intermodal
CM(Y) Industry	0%	**50%**	**50%**	50%

	Efficiency Adjusted Values (Miles)			
Equipment Event Description	Single	Multi	Unit	Intermodal
CM(Y) Industry	4.00	2.00	2.00	2.00

Railroad Owned Carloads by Car Type and Shipment Size

STB Car Type	Description	Single	Multi	Unit	Intermodal	Total
41	**Covered Hopper Cars**	530,336	423,784	650,536	0	1,604,656

A1P5B C9

CM(Y) Industry Phase II Inputs by Car Type

STB Car Type	Description	Single%	Multi%	Unit%	Intermodal%	CM(Y) Industry
41	**Covered Hopper Cars**	33%	**26%**	**41%**	0%	**2.00**

Phase II Inputs for Railroad-Owned Equipment Events

Phase II Inputs for Railroad-Owned Equipment Events

Equipment Event Type: **CM(Y) Interchange** <= Select the Equipment Event Type from the pull-down list
Railroad(s): Class I Railroads
Ownership: Railroad-Owned
Unit Train Starts at : 75
System Average Value (Miles): **2.75** (See A1P5B C10)

Q3

	Efficiency Adjustments (Reductions) by Shipment Size			
Equipment Event Description	Single	Multi	Unit	Intermodal
CM(Y) Interchange	0%	0%	50%	50%

	Efficiency Adjusted Values (Miles)			
Equipment Event Description	Single	Multi	Unit	Intermodal
CM(Y) Interchange	2.75	2.75	1.38	1.38

Railroad Owned Carloads by Car Type and Shipment Size

STB Car Type	Description	Single	Multi	Unit	Intermodal	Total
41	Covered Hopper Cars	530,336	423,784	650,536	0	1,604,656

A1P5B C10

CM(Y) Interchange Phase II Inputs by Car Type

STB Car Type	Description	Single%	Multi%	Unit%	Intermodal%	CM(Y) Interchange
41	Covered Hopper Cars	33%	26%	41%	0%	2.75

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3. **Station Clerical Costs**
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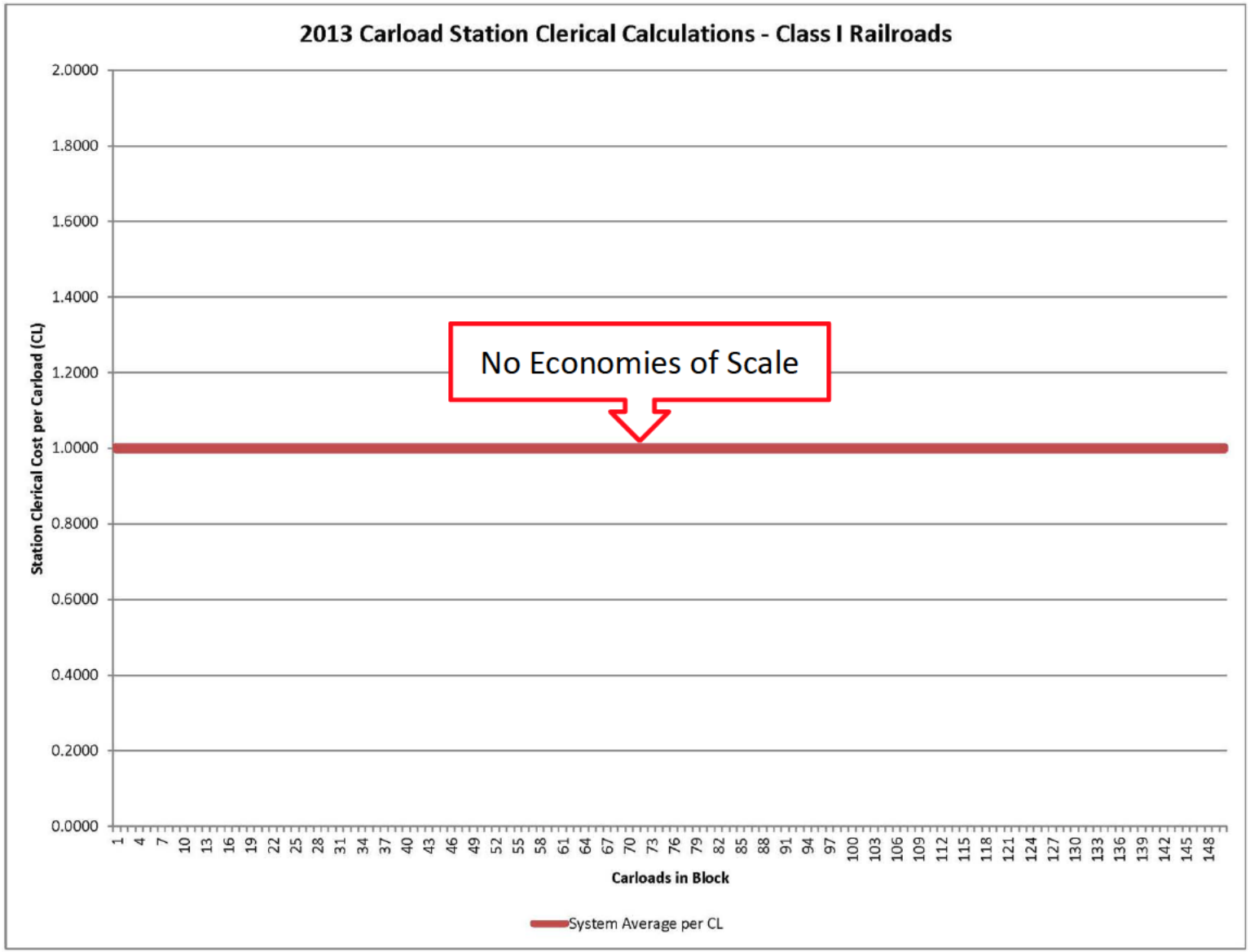
5. Other Related Changes

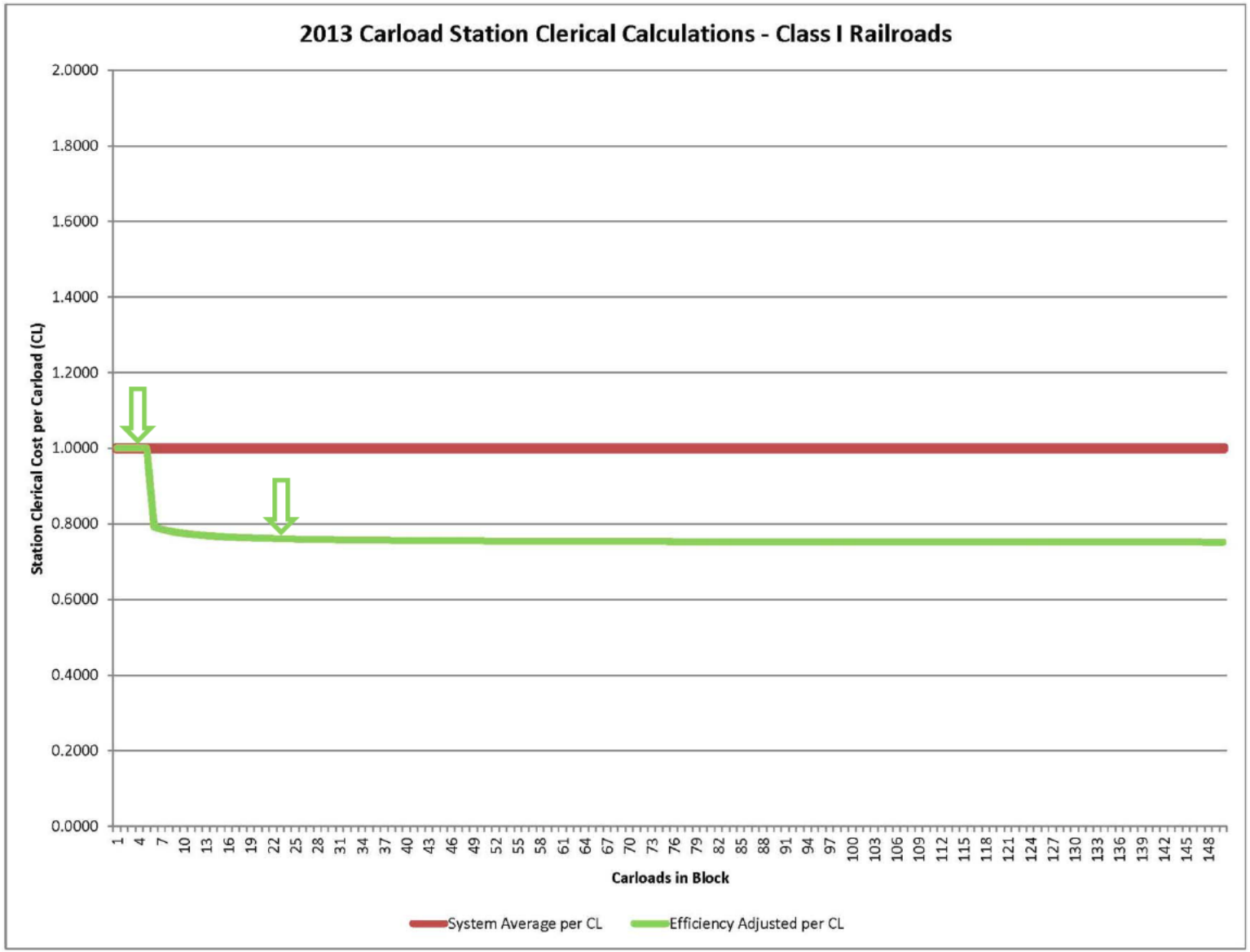
Station Clerical

- The Supplemental NPR proposes to use the Carload Weighted Block (CWB) Adjustment for station clerical.
- The CWB Adjustment "solves" for the values that cause station clerical to be reduced at the same amount as is currently done in Phase III at the minimum multi-car level.
- URCS currently uses an efficiency adjustment, starting at the multi-car level, that is based on a function where 75% of costs are based on the carloads and 25% of costs are based on the shipment.

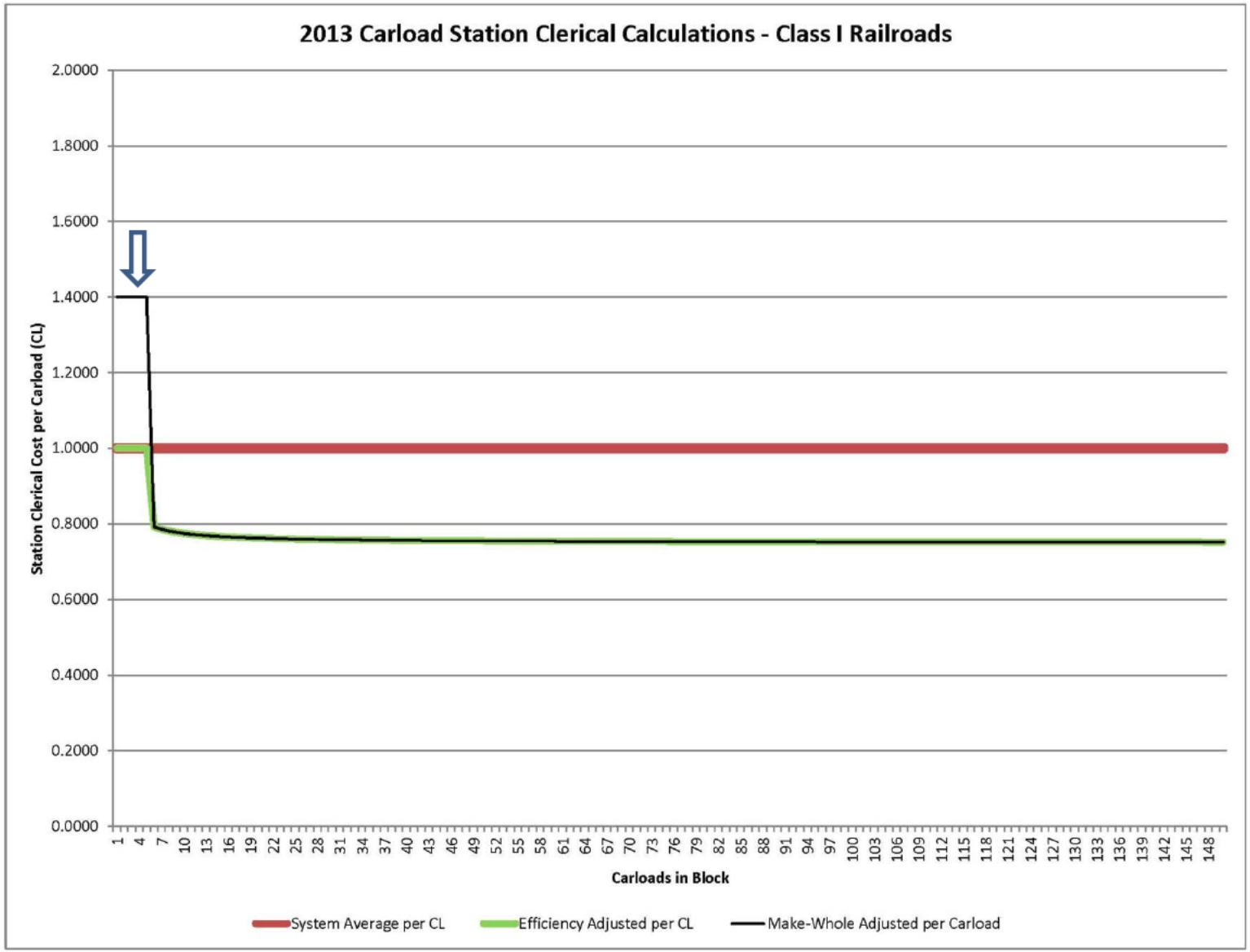
Station Clerical per Carload



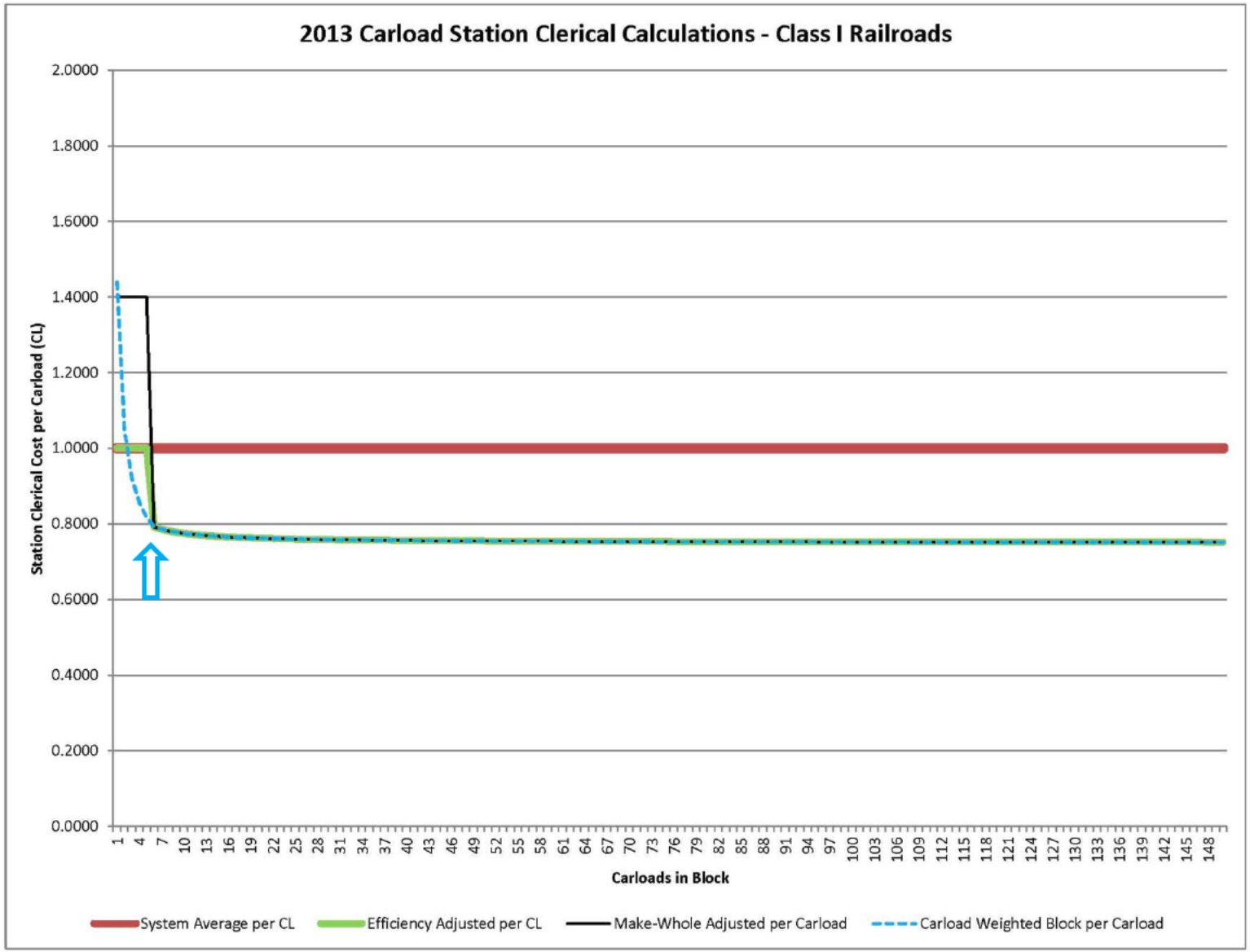
Station Clerical per Carload



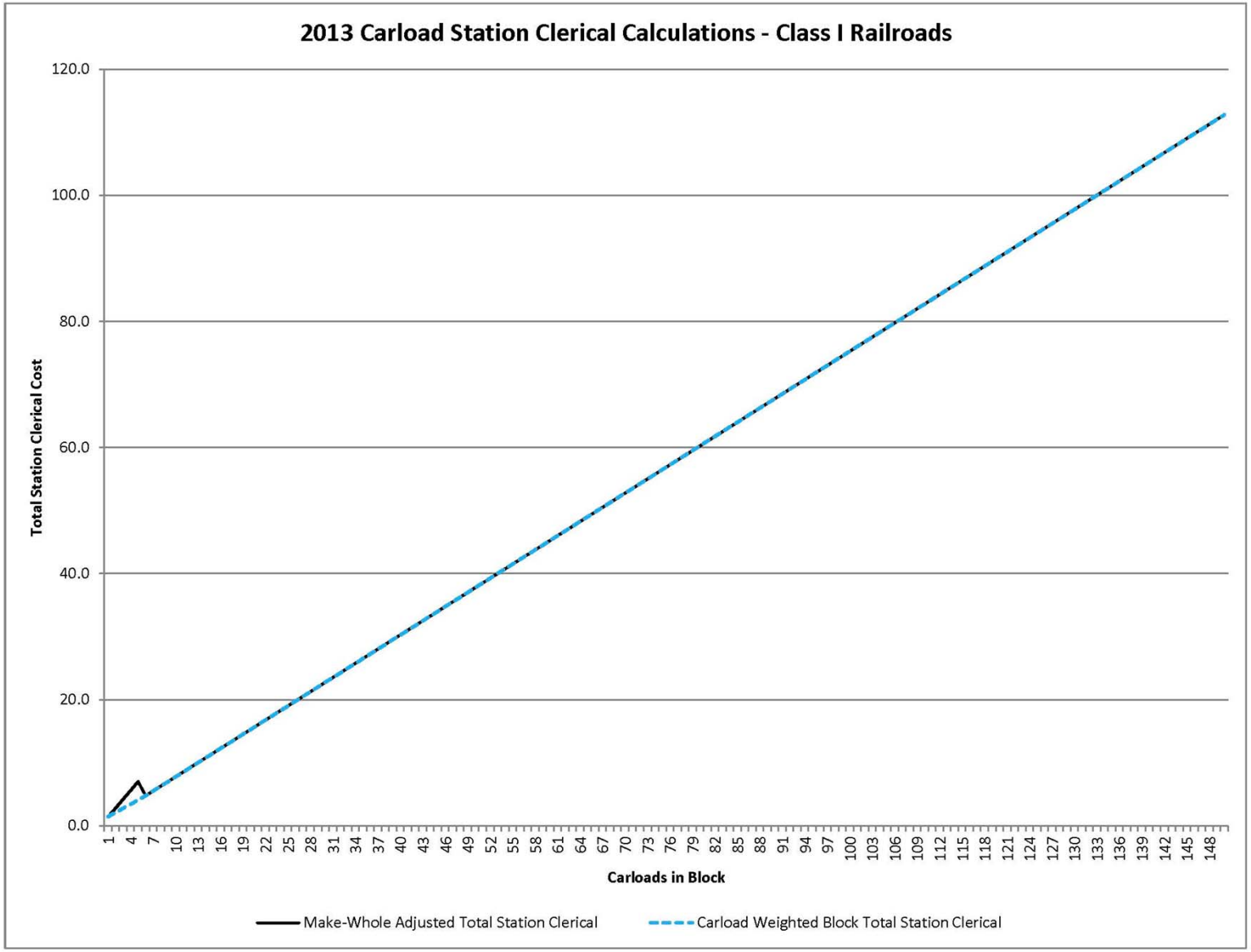
Station Clerical per Carload



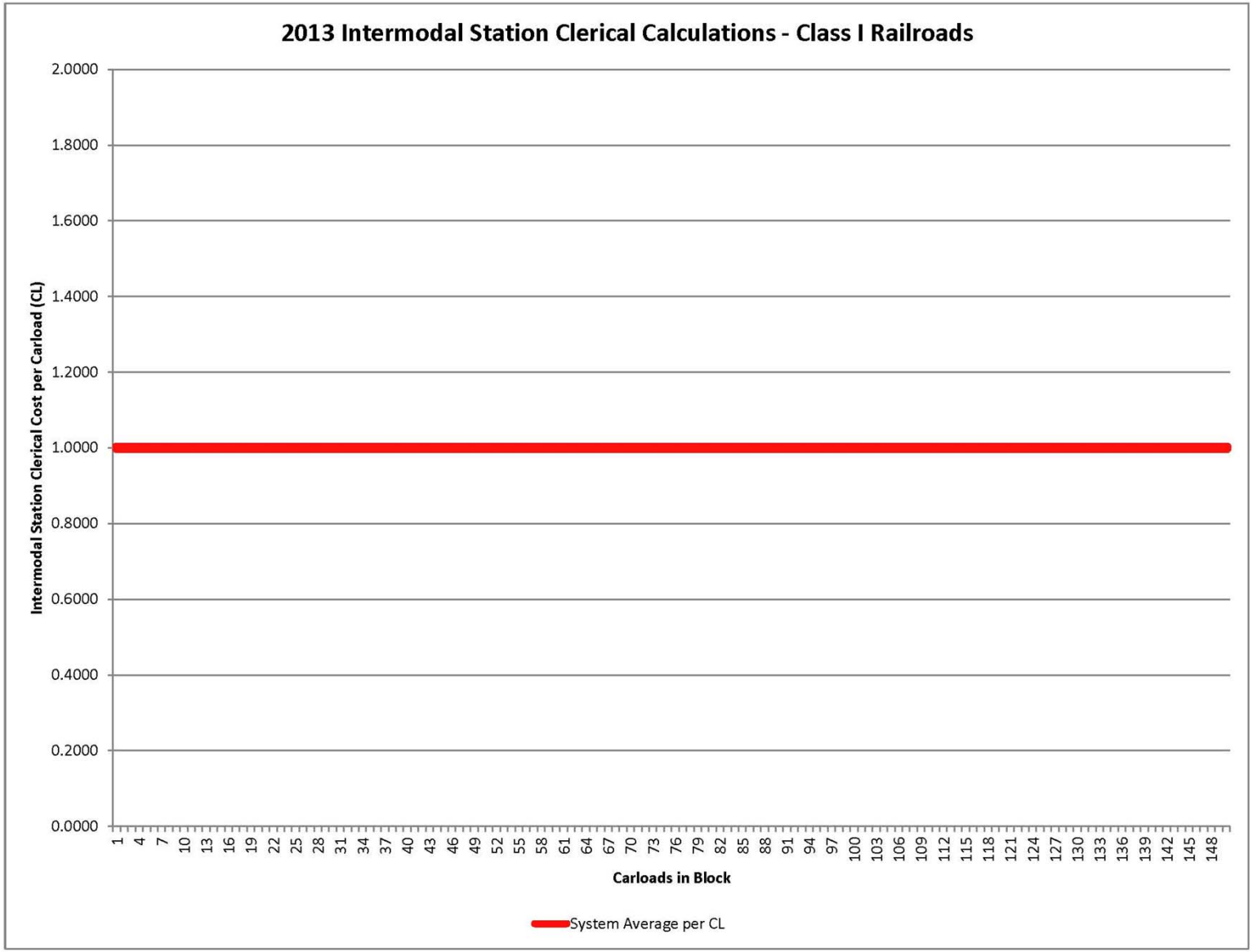
Station Clerical per Carload



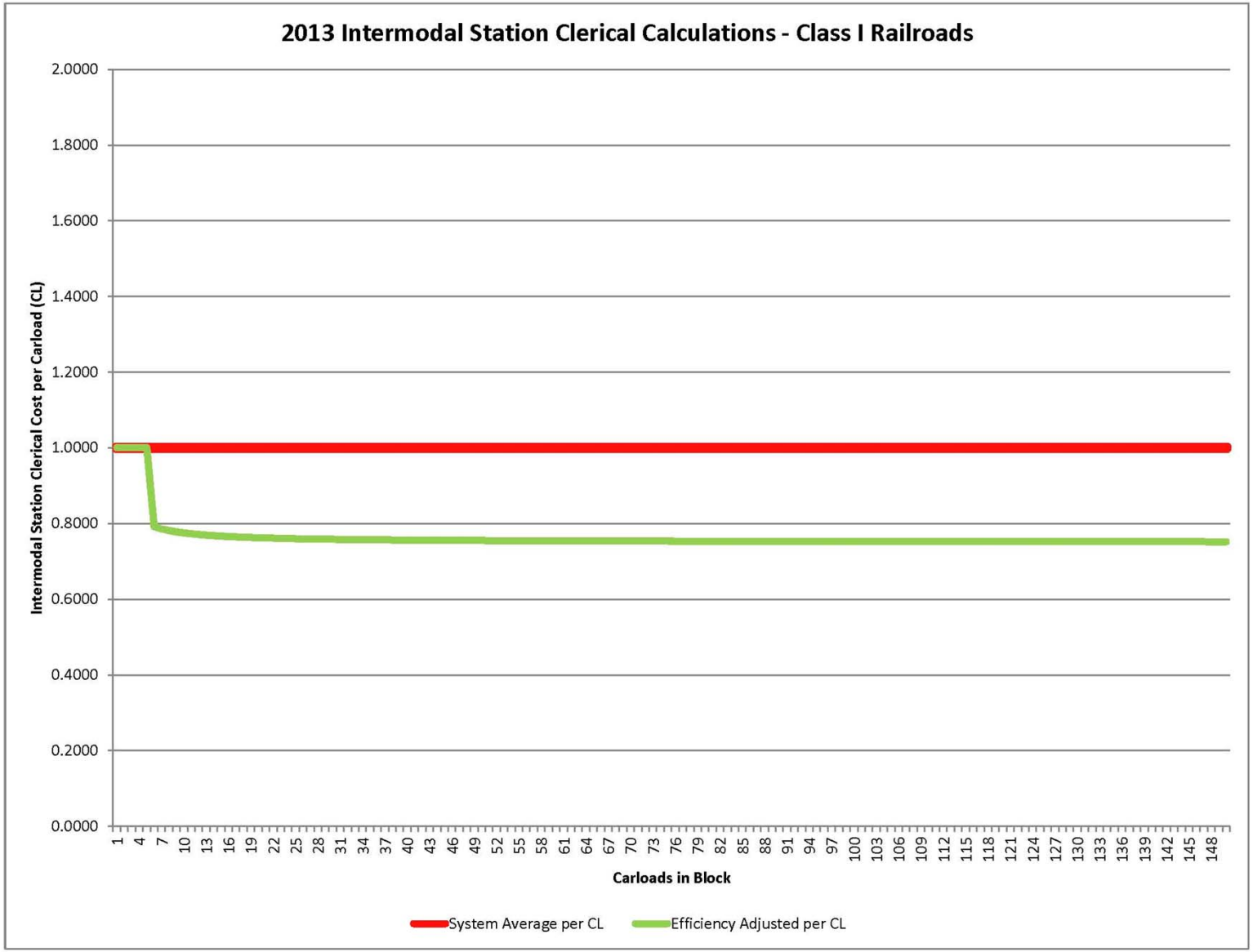
Total Carload Station Clerical



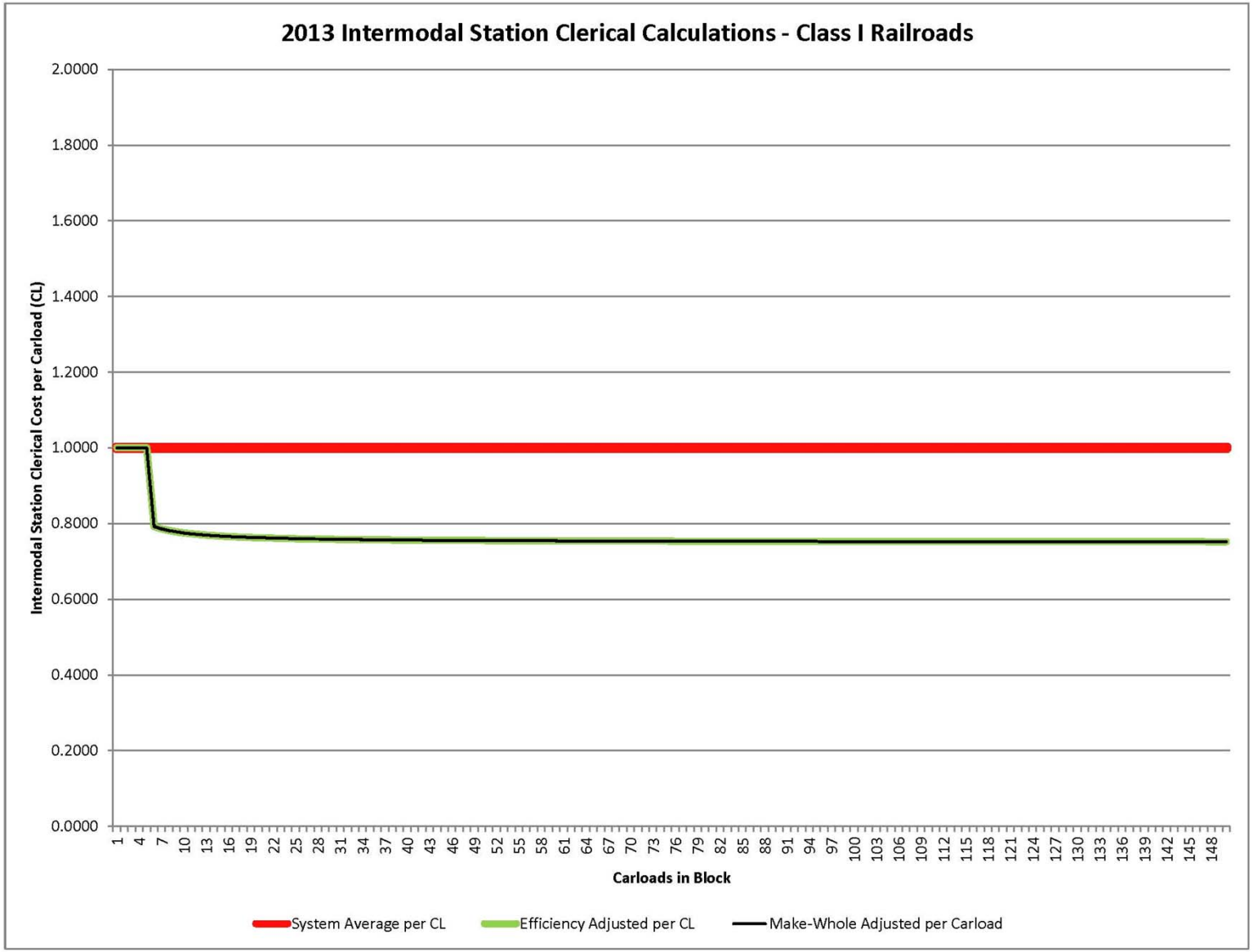
Intermodal Station Clerical



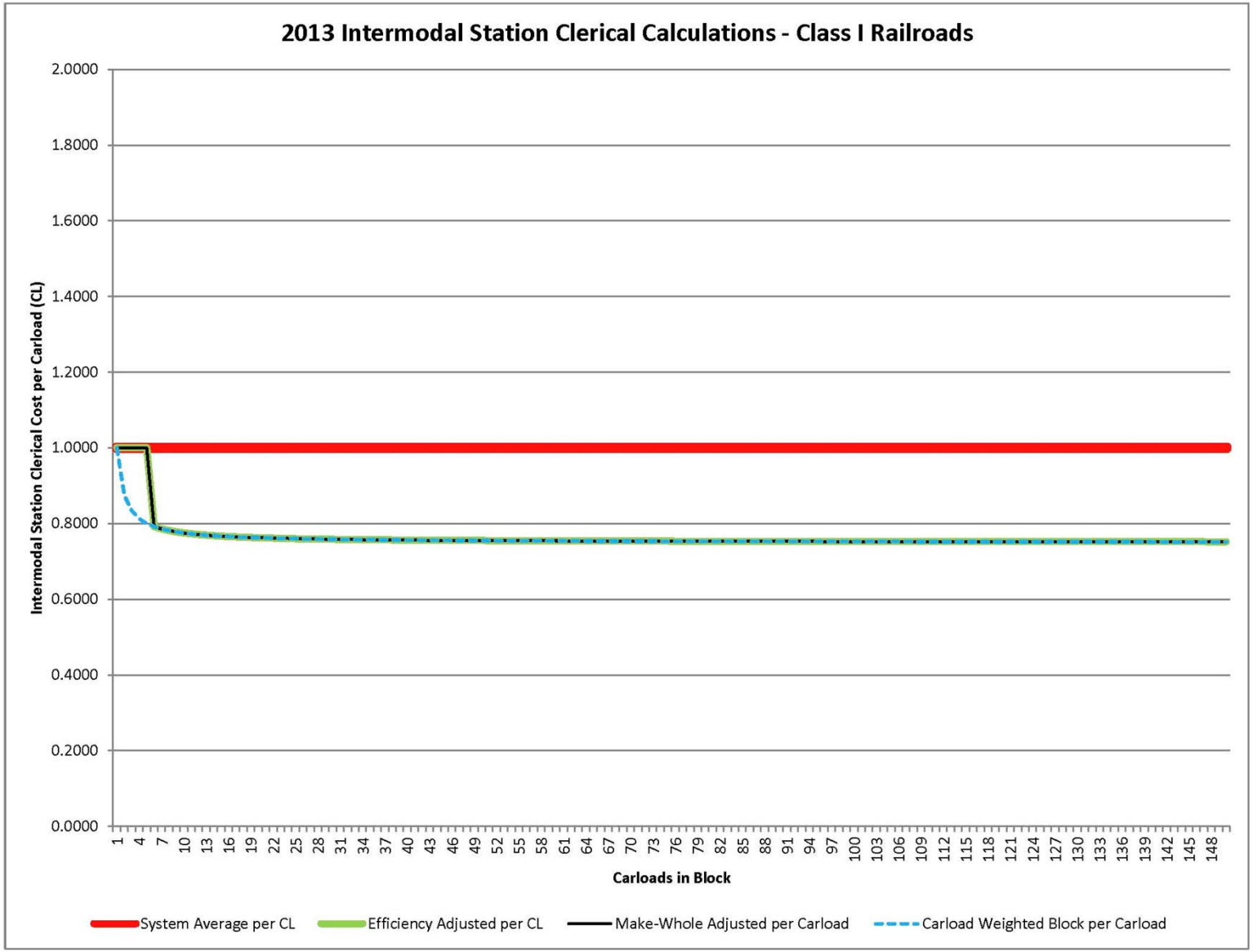
Intermodal Station Clerical



Intermodal Station Clerical



Intermodal Station Clerical



Workshop Topics

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Empty/Loaded Ratio

- For Unit train shipments, URCS applies a E/L ratio of 2.0. Thus, even if a rail carrier's actual E/L ratio is less than 2.0, URCS disregards that more efficient E/L ratio and applies the less efficient value of 2.0.
- The Supplemental NPR proposes to no longer set the Empty/Loaded Ratio of Unit train shipments to 2.

Empty/Loaded Ratios for Eastern Class I Railroads

E/L Ratios for Eastern Class I Railroads (2013)			
Ownership/Equipment Type	**CN**	**CSXT**	**NS**
Privately-Owned, Plain Gondola Cars	2.0773	**1.8681**	2.0508
Privately-Owned, Open Top Hopper Cars-General Service	2.0301	**1.8519**	2.0226
Privately-Owned, Open Top Hopper Cars-Special Service	2.0328	**1.8998**	2.0317
Railroad-Owned, Plain Gondola Cars	2.0584	**1.9844**	**1.9409**
Railroad-Owned, Open Top Hopper Cars-General Service	**1.9965**	2.0191	2.0954
Railroad-Owned, Open Top Hopper Cars-Special Service	2.0229	2.0553	2.1020
Percentage of E/L Ratio Values Less than 2 =	**33%**		

Car-Miles (000s) in Unit Train Service			
Ownership/Equipment Type	**CN**	**CSXT**	**NS**
Privately-Owned, Plain Gondola Cars	9,315	108,056	43,139
Privately-Owned, Open Top Hopper Cars-General Service	4,501	41,918	12,481
Privately-Owned, Open Top Hopper Cars-Special Service	48,874	143,299	113,924
Railroad-Owned, Plain Gondola Cars	1,907	196,671	149,867
Railroad-Owned, Open Top Hopper Cars-General Service	1,406	24,557	38,774
Railroad-Owned, Open Top Hopper Cars-Special Service	28,999	5,265	16,461
Percentage of Car-Miles with E/L Ratios Less Than 2 =	**65%**		

Empty/Loaded Ratios for Western Class I Railroads

E/L Ratios for Western Class I Railroads (2013)

Ownership/Equipment Type	BNSF	CP	KCS	UP
Privately-Owned, Plain Gondola Cars	2.0116	**1.9941**	**1.9334**	**1.9914**
Privately-Owned, Open Top Hopper Cars-General Service	2.0046	**1.9947**	2.0213	**1.9725**
Privately-Owned, Open Top Hopper Cars-Special Service	2.0191	2.0459	**1.9398**	**1.9852**
Railroad-Owned, Plain Gondola Cars	**1.8549**	**1.8316**	2.0597	**1.9973**
Railroad-Owned, Open Top Hopper Cars-General Service	2.3389	2.0665	**1.9868**	2.0384
Railroad-Owned, Open Top Hopper Cars-Special Service	2.1288	2.0000	**1.9980**	**1.9248**
Percentage of E/L Ratio Values Less than 2 =	**54%**			

Car-Miles (000s) in Unit Train Service

Ownership/Equipment Type	BNSF	CP	KCS	UP
Privately-Owned, Plain Gondola Cars	1,150,330	14,223	43,668	978,608
Privately-Owned, Open Top Hopper Cars-General Service	56,526	0	115	47,070
Privately-Owned, Open Top Hopper Cars-Special Service	694,355	1,833	35,643	298,929
Railroad-Owned, Plain Gondola Cars	331,695	273	864	163,476
Railroad-Owned, Open Top Hopper Cars-General Service	31,752	545	0	149,562
Railroad-Owned, Open Top Hopper Cars-Special Service	142,980	20	107	113,919
Percentage of Car-Miles with E/L Ratios Less Than 2 =	**48%**			

Workshop Topics

1. Switching Costs Related to Switch Engine Minutes (SEMs)
2. Equipment Costs for the Use of Railroad-Owned Cars During Switching
3. Station Clerical Costs
4. Car-Mile Costs
5. **Other Related Changes**

These include:

a) Increase the distance between I&I switches for carload traffic,
b) Increase the minimum shipment size for Unit trains,
c) Cap the allocation of LUMs for large Multi-Car shipments, and
d) Cap the allocation of TMs for large Multi-Car shipments.

Distance Between I&I Switches

- The NPR proposed to increase the distance between I&I switches for carload traffic from 200 miles to 320 miles to reflect that the average length of haul on railroads has increased.
- The Supplemental NPR proposes to revise that distance to 268 miles.

Distance Between I&I Switches

Changes in Average Length of Haul

Q4

Includes Single Car and Multi Car Shipments Only

Railroad		1990 Records	1990 Miles	1990 Avg Miles	2011 Records	2011 Miles	2011 Avg Miles	Change
103	CN	25,473	9,217,847	361.9	37,336	16,632,332	445.5	23.1%
105	CP	14,675	7,256,974	494.5	21,822	10,290,067	471.5	-4.6%
190	CR	36,081	16,616,793	460.5	0	0	0.0	-100.0%
400	KCS	3,032	838,505	276.6	8,563	3,508,316	409.7	48.1%
555	NS	64,437	23,502,074	364.7	48,169	24,488,500	508.4	39.4%
712	CSXT	55,040	23,354,237	424.3	46,563	27,588,856	592.5	39.6%
777	BNSF	43,921	33,744,671	768.3	39,524	40,337,538	1,020.6	32.8%
802	UP	90,883	54,903,375	604.1	63,159	57,640,657	912.6	51.1%
		333,542	169,434,475	508.0	265,136	180,486,267	680.7	34.0%
							200.0	**268.0**

Unit Train Definition

- The NPR proposed to increase the definition of Unit train service from 50 or more cars to 80 or more cars to reflect that train lengths have increased over the years.
- The Supplemental NPR proposes to revise the definition of Unit train service to 75 or more cars.

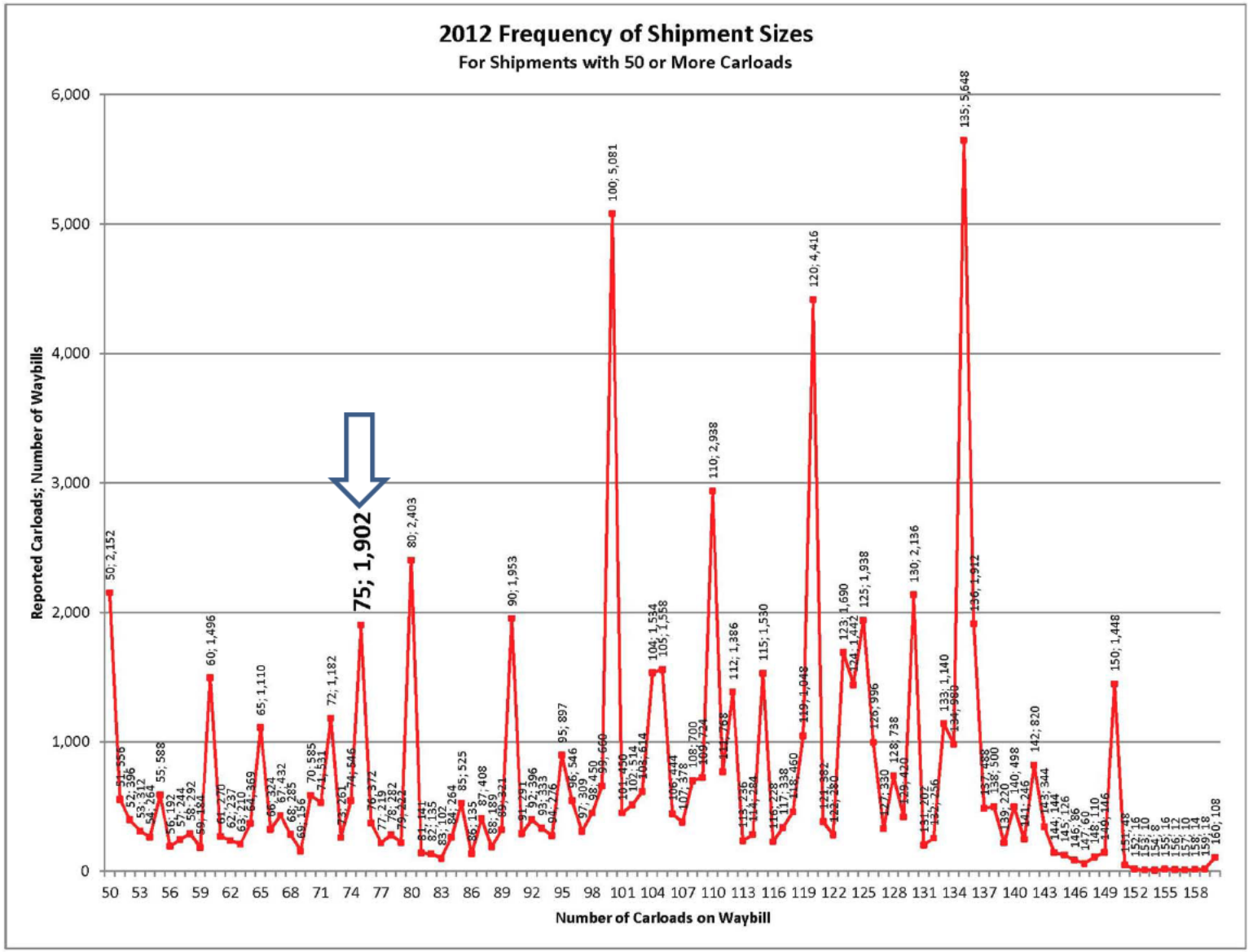
Unit Train Definition – 2012 Worktable A1 Part 1

2012 - URCS Worktable A1 Part 1									
Line(s)	Description	BNSF	CN	CP	CSXT	KCS	NS	UP	Total
103	Through Train Miles	100,493	9,525	8,369	54,432	4,817	52,607	94,532	324,775
117	Car Miles Through Trains	5,048,855	931,895	609,661	3,145,271	358,850	2,959,525	8,076,968	21,151,025
L117/L103	Average Cars per Train, Through	50.2	97.8	72.8	57.8	74.5	56.3	85.4	**65.1**
Line(s)	Description	BNSF	CN	CP	CSXT	KCS	NS	UP	Total
101	Unit Train Miles	56,407	2,032	2,252	17,804	2,391	10,804	41,224	132,914
115	Car Miles Unit Trains	6,217,701	245,929	206,259	1,608,116	248,873	1,039,704	4,792,218	14,358,800
L117/L103	Average Cars per Train, Unit	110.2	121.0	91.6	90.3	104.1	96.2	116.2	**108.0**
Line(s)	Description	BNSF	CN	CP	CSXT	KCS	NS	UP	Total
103+101	Through + Unit Train Miles	156,900	11,557	10,621	72,236	7,208	63,411	135,756	457,689
117+115	Car Miles Through + Unit Trains	11,266,556	1,177,824	815,920	4,753,387	607,723	3,999,229	12,869,186	35,489,825
(L117+L115)/(L103+L101)	Average Cars per Train, Through + Unit	71.8	101.9	76.8	65.8	84.3	63.1	94.8	**77.5**

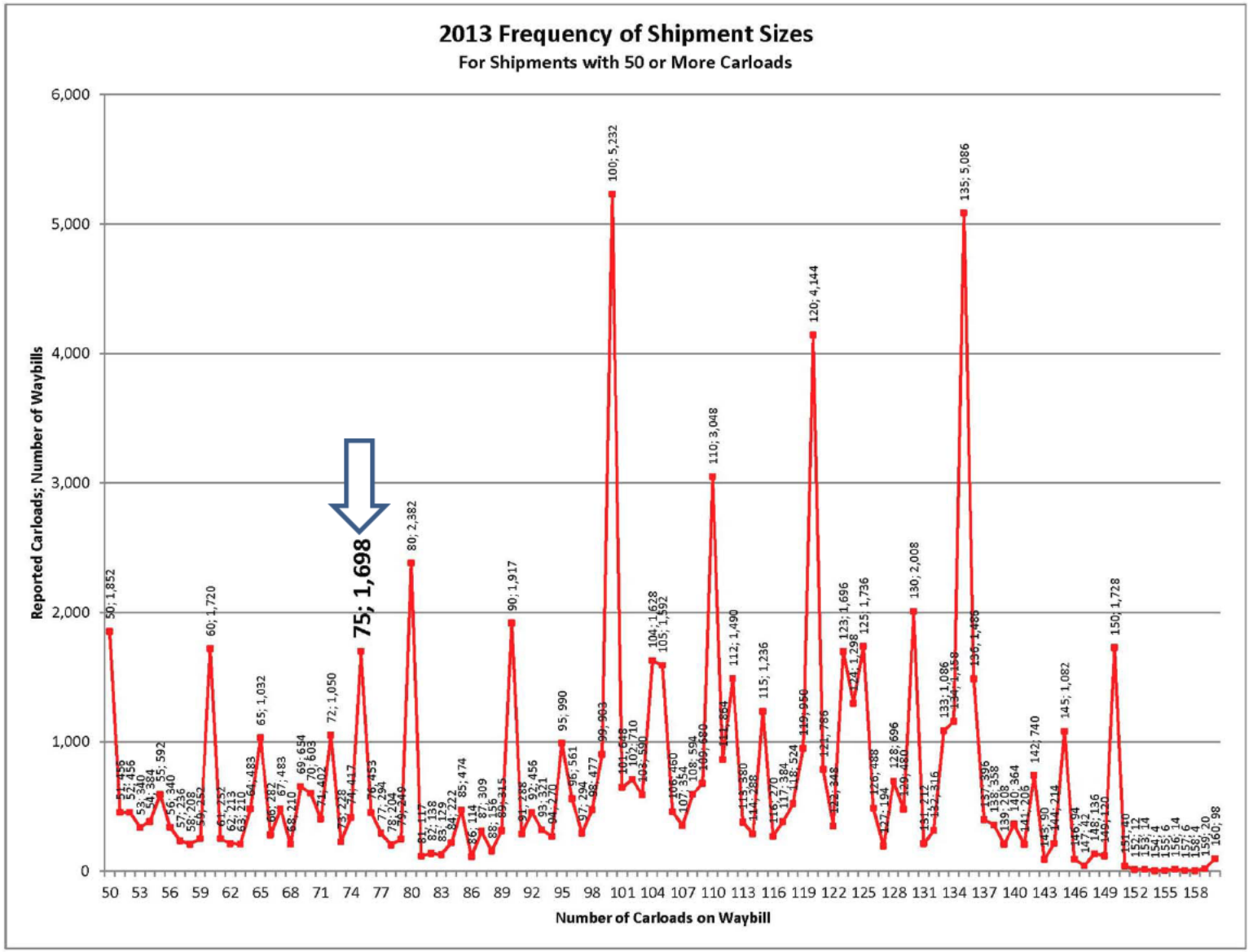
Unit Train Definition – 2013 Worktable A1 Part 1

2013 - URCS Worktable A1 Part 1									
Line(s)	Description	BNSF	CN	CP	CSXT	KCS	NS	UP	Total
103	Through Train Miles	102,897	10,201	7,809	53,327	4,996	52,246	95,886	327,362
117	Car Miles Through Trains	5,171,818	1,009,575	652,559	3,130,183	379,179	3,066,700	6,284,484	19,694,498
L117/L103	Average Cars per Train, Through	50.3	99.0	83.6	58.7	75.9	58.7	65.5	**60.2**
Line(s)	Description	BNSF	CN	CP	CSXT	KCS	NS	UP	Total
101	Unit Train Miles	58,749	1,970	2,767	19,340	2,397	11,232	38,953	135,408
115	Car Miles Unit Trains	6,478,762	242,111	260,759	1,677,775	247,819	1,098,509	4,506,185	14,511,920
L117/L103	Average Cars per Train, Unit	110.3	122.9	94.2	86.8	103.4	97.8	115.7	**107.2**
Line(s)	Description	BNSF	CN	CP	CSXT	KCS	NS	UP	Total
103+101	Through + Unit Train Miles	161,646	12,171	10,576	72,667	7,393	63,478	134,839	462,770
117+115	Car Miles Through + Unit Trains	11,650,580	1,251,686	913,318	4,807,958	626,998	4,165,209	10,790,669	34,206,418
(L117+L115)/(L103+L101)	Average Cars per Train, Through + Unit	72.1	102.8	86.4	66.2	84.8	65.6	80.0	**73.9**

Unit Train Definition – 2012 Frequency of Shipment Sizes



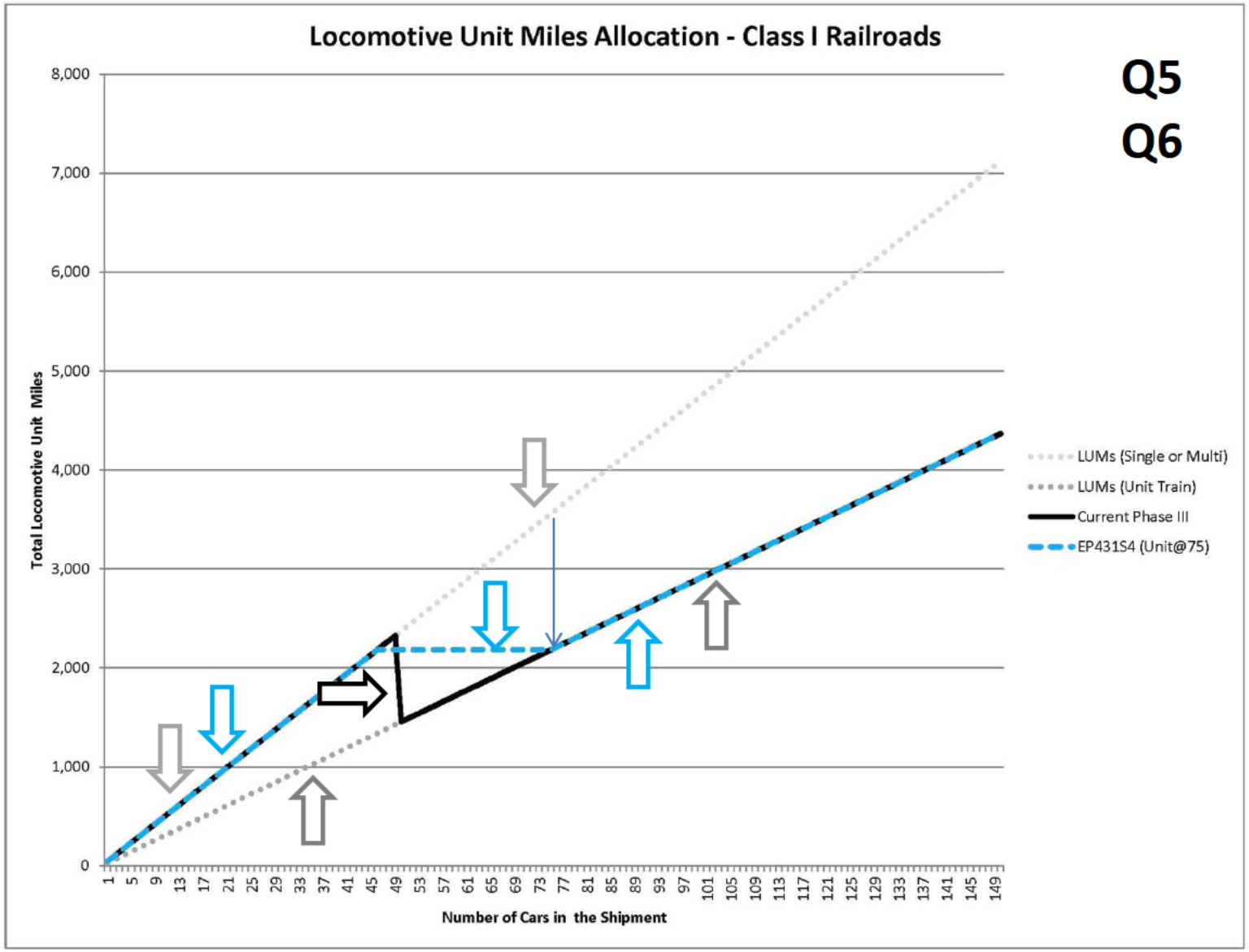
Unit Train Definition – 2013 Frequency of Shipment Sizes



Locomotive Unit Miles (LUMs) Allocation

- The Supplemental NPR proposes to cap the LUMs allocated to Multi-Car shipments in Phase III to be less than or equal to those allocated to the smallest Unit train.

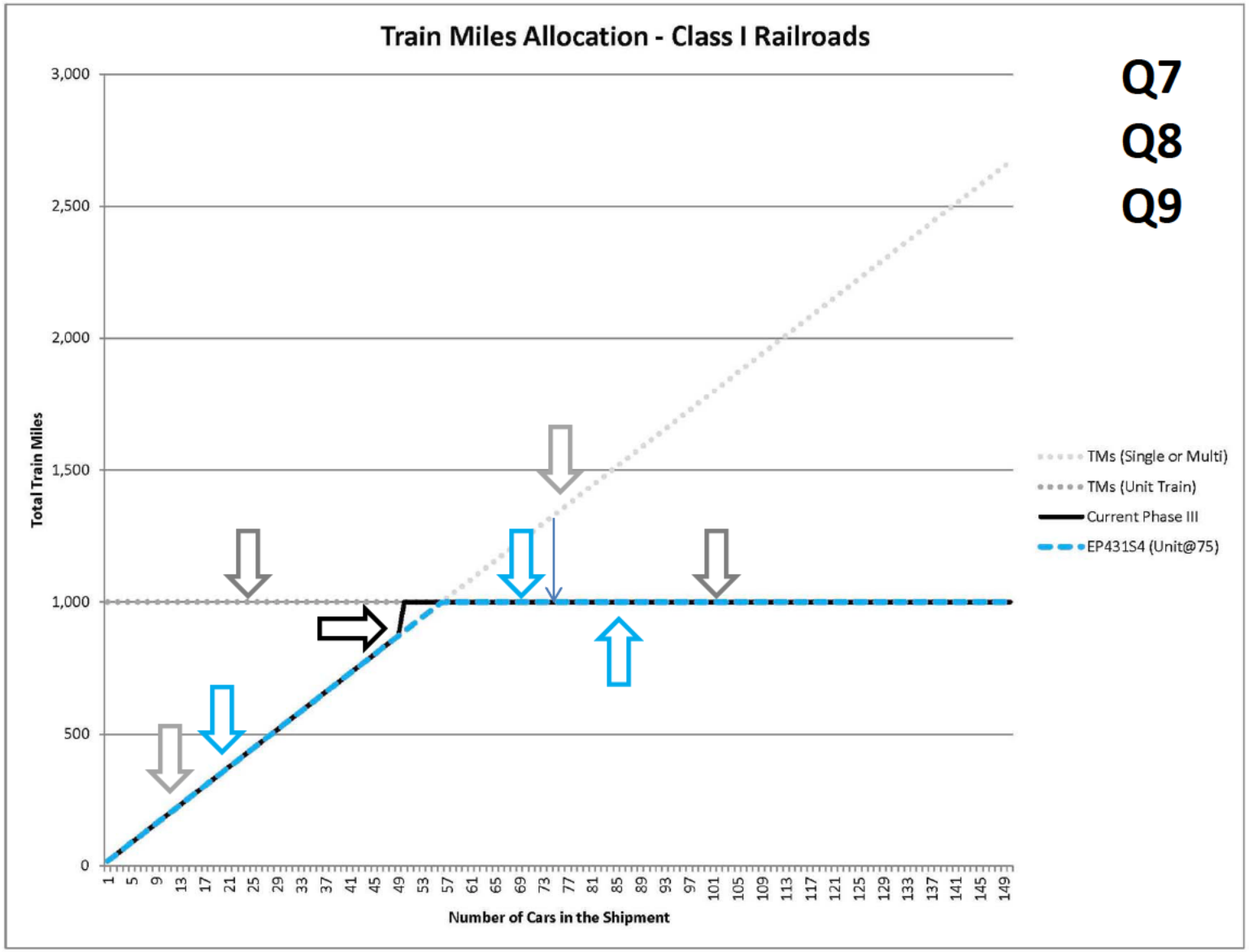
Locomotive Unit Miles (LUMs) Allocation



Train Miles (TMs) Allocation

- The Supplemental NPR proposes to cap the TMs allocated to Multi-Car shipments in Phase III to be less than or equal to those allocated to Unit trains.

Train Miles (TMs) Allocation



Questions