

COST OF CAPITAL STUDY

**YIELD CAPITALIZATION
 2019 ASSESSMENT YEAR**

APPENDIX C

Railroads

EQUITY RATE				12.00%		
CAPITAL ASSET PRICING MODEL					PAGE	
CAPM Ex Ante		9.50%			6	
DIVIDEND GROWTH MODELS (Single Stage)						
Value Line, based on Dividends Growth		11.50%			7	
Value Line, based on Earnings Growth		10.75%			8	
Value Line, based on Return on Equity		12.00%			9	
FCFE GROWTH MODEL (Multi Stage)		10.75%			10	
			RANGE	9.4975% - 12%		
DEBT RATE				5.00%	11	
SECURED DEBT (LEASE) RATE				4.25%	11	
MARKET CAPITAL STRUCTURE						
Equity	78%	x	12.00%	=	9.36%	3
Debt	22%	x	5.00%	=	1.10%	3
Marginal Tax Rate	24%	=	(1-.24)	x	1.10%	<u>0.84%</u>
WEIGHTED AVERAGE COST OF CAPITAL				10.2%		

rounded

SUPPORT FOR GUIDELINE COMPANIES

WASHINGTON STATE DEPARTMENT OF REVENUE

2019 ASSESSMENT YEAR

RAILROADS

Capital Structure at Book Value

Company	Ticker	Beta	Fin'l Strength	Operating Margin	P/E Ratio	Div'd Yield	Common Stock	%	Preferred Stock	%	Long Term Debt	%	Total Debt & Equity
Union Pacific Corp.	UNP	1.10	A++	47.5%	15.6	2.55%	20,482,762,000	49.5%	-	0.0%	20,925,000,000	50.5%	41,407,762,000
Norfolk Southern Corp.	NSC	1.15	A+	43.0%	14.6	2.37%	15,387,549,000	59.3%	-	0.0%	10,560,000,000	40.7%	25,947,549,000
CSX Corp.	CSX	1.20	B++	50.5%	14.8	1.61%	12,750,742,000	46.4%	-	0.0%	14,739,000,000	53.6%	27,489,742,000
Kansas City Southern	KSU	1.10	A	49.5%	13.8	1.68%	4,683,146,850	63.6%	-	0.0%	2,679,000,000	36.4%	7,362,146,850
Genesee & Wyoming	GWR	1.50	B+	30.0%	15.6	0.00%	3,683,187,500	60.3%	-	0.0%	2,425,000,000	39.7%	6,108,187,500
Canadian National	CNI	1.05	A	50.0%	15.4	2.05%	13,887,555,000	62.4%	-	0.0%	8,377,083,000	37.6%	22,264,638,000
Canadian Pacific	CP	1.20	B++	48.0%	14.4	1.22%	5,133,600,000	46.0%	-	0.0%	6,026,202,000	54.0%	11,159,802,000
	Mean	1.19		45.5%	14.9	1.64%	10,858,363,193	55.3%		0.0%	9,390,183,571	44.7%	
	Weighted Mean						76,008,542,350	53.6%	-	0.00%	65,731,285,000	46.4%	141,739,827,350
	Median	1.15			14.8	1.68%		59.3%		0.0%		40.7%	
	Std Dev	0.15			0.68	0.9%		7.7%		-		7.7%	
	Coeff Var	0.13			0.05	0.52		14.0%		-		17.4%	
	Harmonic Mean	1.17			14.87			54.4%		-		43.5%	
	Max	1.50			15.62	2.55%		63.6%		0.0%		54.0%	
	Min	1.05			13.83	0.00%		46.0%		0.0%		36.4%	

Say **1.15**

**SUPPORT FOR CAPITAL STRUCTURE
MARKET VALUE**

WASHINGTON STATE DEPARTMENT OF REVENUE

2019 ASSESSMENT YEAR

RAILROADS

Capital Structure at Market Value

Company	Ticker	Stock Price	Common Shares	Common Stock	%	Preferred Stock	%	Operating Lease	%	Long Term Debt	%	Total Debt & Equity
Union Pacific Corp.	UNP	138.23	736,790,000	101,846,481,700	78.8%	-	0.0%	5,481,087,912	4.2%	21,900,000,000	16.9%	129,227,569,612
Norfolk Southern Corp.	NSC	148.77	272,346,000	40,516,914,420	72.7%	-	0.0%	3,009,688,903	5.4%	12,203,000,000	21.9%	55,729,603,323
CSX Corp.	CSX	62.13	844,420,000	52,463,814,600	76.8%	-	0.0%	914,598,516	1.3%	14,914,000,000	21.8%	68,292,413,116
Kansas City Southern	KSU	95.45	101,697,000	9,706,978,650	74.5%	242,170	0.0%	665,943,875	5.1%	2,661,300,000	20.4%	13,034,464,695
Genesee & Wyoming	GWR	74.02	58,931,000	4,362,072,620	62.4%	-	0.0%	222,321,958	3.2%	2,406,601,000	34.4%	6,990,995,578
Canadian National	CNI	74.11	742,650,000	55,037,791,500	76.9%	-	0.0%	3,188,580,663	4.5%	13,316,000,000	18.6%	71,542,372,163
Canadian Pacific	CP	177.62	142,600,000	25,328,612,000	69.6%	-	0.0%	1,410,899,818	3.9%	9,639,000,000	26.5%	36,378,511,818
			Mean		73.1%		0.0%		3.9%		22.9%	
			Weighted Mean	289,262,665,490	75.9%	242,170	0.00%	14,893,121,645	3.91%	77,039,901,000	20.2%	381,195,930,305
			Median		74.5%		0.00%		4.24%		21.8%	
			Harmonic Mean		72.7%				3.2%		21.9%	
			Std Dev		5.6%		0.0%		1.4%		5.9%	
			Coeff Var		13.00		0.38		2.89		3.90	
			Max		78.8%		0.0%		5.4%		34.4%	
			Min		62.4%		0.0%		1.3%		16.9%	
			Target		78%		0%		4%		18%	100%

Source:
Stock Price: Yahoo
Market Value Debt: Bond Analysis

SUPPORT FOR MARKET MULTIPLES

WASHINGTON STATE DEPARTMENT OF REVENUE

2019 ASSESSMENT YEAR

RAILROADS

Company	Ticker	Stock Price	Revenues	Multiple	Cash Flow	Multiple	Earnings	Multiple	Book Value	Multiple
Union Pacific Corp.	UNP	138.23	31.15	4.4	11.20	12.3	7.85	17.6	27.80	5.0
Norfolk Southern Corp.	NSC	148.77	42.35	3.5	13.50	11.0	9.27	16.0	56.50	2.6
CSX Corp.	CSX	62.13	14.50	4.3	5.40	11.5	3.80	16.4	15.10	4.11
Kansas City Southern	KSU	95.45	23.50	4.06	9.90	9.6	6.15	15.5	46.05	2.1
Genesee & Wyoming	GWR	74.02	39.60	1.9	8.65	8.6	3.77	19.6	62.50	1.18
Canadian National	CNI	74.11	15.05	4.9	5.65	13.1	4.25	17.4	18.70	3.96
Canadian Pacific	CP	177.62	40.10	4.4	14.45	12.3	10.75	16.5	36.00	4.93
		Mean		3.9		11.2		17.0		3.4
		Median		4.3		11.5		16.5		4.0
		Harmonic Mean		3.6		11.0		16.9		2.7
		Max		4.9		13.1		19.6		5.0
		Min		1.9		8.6		15.5		1.18
		Std Dev		1.0		1.6		1.4		1.5
		Coefficient of Variation		0.3		0.1		0.1		0.4
		Percentile .25		3.8		10.3		16.2		2.4
		Percentile .75		4.4		12.3		17.5		4.5
		Say		4.00		11.25		17.00		3.50

ENTERPRISE VALUE MULTIPLES

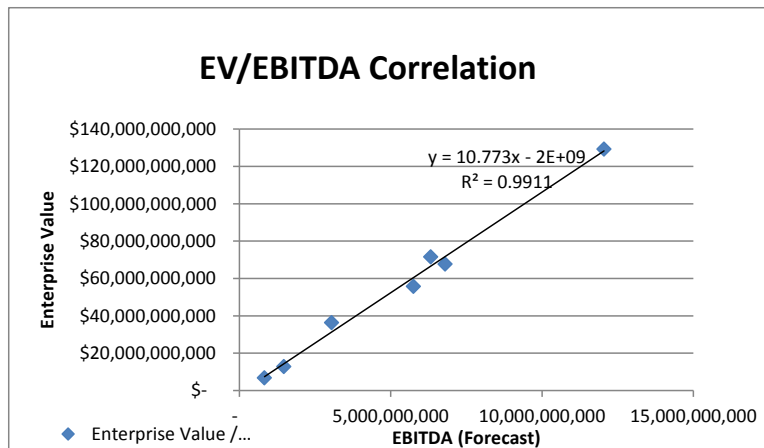
WASHINGTON STATE DEPARTMENT OF REVENUE

2019 ASSESSMENT YEAR

RAILROADS

Guideline Companies	Ticker	EV+OL	EBITDA + OL	EV / EBITDA	Annual Cash Flow Rate Change VL	EBITDA	EV / EBITDA	Revenue	EV/Sales	Cash Flow	Debt Service	EV / CF
Union Pacific Corp.	UNP	\$ 129,227,569,612	11,105,000,000	11.64	8.48%	12,046,941,964	10.73	23,785,000,000	5.43	8,626,500,000	1,095,000,000	13.29
Norfolk Southern Corp.	NSC	\$ 55,729,603,323	5,267,000,000	10.58	9.26%	5,754,685,185	9.68	11,951,500,000	4.66	3,908,750,000	610,150,000	12.33
CSX Corp.	CSX	\$ 67,642,413,116	6,170,000,000	10.96	10.19%	6,798,425,926	9.95	12,638,500,000	5.35	4,789,750,000	745,700,000	12.22
Kansas City Southern	KSU	\$ 12,846,464,695	1,364,300,000	9.42	7.58%	1,467,656,061	8.75	2,935,350,000	4.38	1,054,350,000	133,065,000	10.82
Genesee & Wyoming	GWR	\$ 6,844,995,578	717,187,000	9.54	15.61%	829,117,919	8.26	2,499,800,000	2.74	580,000,000	120,330,050	9.77
Canadian National	CNI	\$ 71,542,372,163	5,582,717,800	12.81	13.27%	6,323,786,535	11.31	11,667,750,000	6.13	4,512,000,000	665,800,000	13.82
Canadian Pacific	CP	\$ 36,378,511,818	2,661,998,800	13.67	14.53%	3,048,863,678	11.93	5,953,500,000	6.11	2,234,250,000	481,950,000	13.39
Mean							10.09		4.97	3,672,228,571		12.24
Median							9.95		5.35	3,908,750,000		12.33
Max							11.93		6.13	8,626,500,000.00		13.82
Min							8.26		2.74	580,000,000.00		9.77
Std Dev							1.33		1.19	2,739,761,732.17		1.47
Coefficient of Var							0.13		0.24	0.75		0.12
Harmonic Mean							9.94		4.65	1,784,650,974		12.07
						Say	10.00		5.00			12.25

9.25 put in income direct excluding IPP
 11.00 put in income direct including IPP



Forecast EV/EBITDA By Rank

Guideline Companies	EV/EBITDA forecast		
Genesee & Wyoming	8.26	9.16	Low Average
Kansas City Southern	8.75	9.22	Low Median
Norfolk Southern Corp.	9.68	9.25	Say
CSX Corp.	9.95		
Union Pacific Corp.	10.73	10.98	Average
Canadian National	11.31	11.02	Median
Canadian Pacific	11.93	11.00	Say

**SUPPORT FOR YIELD CAPITALIZATION EQUITY COMPONENT
CAPITAL ASSET PRICING MODEL**

WASHINGTON STATE DEPARTMENT OF REVENUE
2019 ASSESSMENT YEAR
RAILROADS

Ex Ante
Ke = Rf + B (Rp)

Ke = Cost of Equity **9.50%**

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Rm =	rate of return	8.65%
Rf =	risk free rate	3.00%
Rp =	risk premium	5.65%
B =	Beta	1.15

Rp = Risk Premium **5.65%**

to above

Shannon Pratt and Roger Grabowski	3.5 - 6%	
Cost of Capital, Applications and Examples, Fifth Edition, 2014		
Dr. Aswath Damodaran	5.96%	chart page 15
http://pages.stern.nyu.edu/~adamodar/	5.65%	adjusted for Rf
2018 Implied Premium		
John Graham and Campbell Harvey	6.21%	10 year expected return
Duke CFO magazine Global Business Outlook	5.89%-6.54%	95% Interval 10 year expected
4th Qtr	6.27%	adjusted for Rf
	3.06%	Rf rate used in survey

Rf = Risk Free Rate **3.00%**

to above

Value Line Investment Survey, Selected Yields January 4, 2019, page 1949
as of 12-26-18

US Treasury Securities year end data		
5 year	2.65%	
10 year	2.81%	
30 year	3.06%	
30 year Zero	3.10%	

Federal Reserve Statistical Release (<http://www.federalreserve.gov/Releases/H15/Current/>)
January 2, 2019 as of 12-31-18

Treasury Constant Maturities		
5 year	2.51%	
10 year	2.69%	
20 year	2.87%	
30 year	3.02%	
20 year TIPS	<u>1.09%</u>	1.78%
30 year TIPS	<u>1.21%</u>	1.81%

Inflation **2.00%**

TIPS inflation indication
to appraisal template

Value Line Investment Survey, Economic Series January 4, 2019, page 1500	
Consumer Price Index Annual Rate of Change 2021-2023	2.30%
The Livingston Survey December 21, 2018, page 4, 10	
Inflation median (measured by the Consumer Price Index) over next 10 years	2.23%

Gross Domestic Product (GDP) **3.90%**

real GDP + inflation est

Federal Reserve Projected Long Run Real GDP Growth		
Median Projection Value From Dec 19, 2018 Report	1.90%	
https://www.federalreserve.gov/monetarypolicy/files/fomcproitabl20181219.pdf		
Congressional Budget Office Real GDP Economic Projections		
The Budget and Economic Outlook 2019-2029 Table E-1, pg 147		
Average Percentage Change Year To Year	2019-2023	1.90%
http://www.cbo.gov/publication/54918	2024-2029	1.78%
Federal Reserve Bank of Philadelphia		
The Livingston Survey, December 21, 2018, page 4, 10		
Average Annual Real GDP Growth Rate for Next 10 Years		2.07%
https://www.philadelphiafed.org/research-and-data/real-time-center/livingston-survey		

**SUPPORT FOR YIELD CAPITALIZATION EQUITY COMPONENT
DIVIDEND GROWTH MODEL**

WASHINGTON STATE DEPARTMENT OF REVENUE
2019 ASSESSMENT YEAR
RAILROADS

Based on Dividend Growth

$$K_e = (D_1 / P_0) + G_D$$

Ke = Cost of Equity
D1 = Expected Dividends
P0 = Current Stock Price
GD = Sustainable Growth -- Dividend
assumption Sustainable growth can not exceed inflation plus real GDP

Company	Ticker	Stock Price (Po)	Expected Dividend (D1)	Dividend Yield (D1/Po)	Dividend Growth (GD) VL	Ke	Forecast Dividend Growth	Ke Forecast Growth	Sustainable Dividend Growth	Ke Sustainable Growth
Union Pacific Corp.	UNP	138.23	3.52	2.55%	8.50%	11.05%	10.52%	13.07%	3.90%	6.45%
Norfolk Southern Corp.	NSC	148.77	3.52	2.37%	6.00%	8.37%	6.98%	9.34%	3.90%	6.27%
CSX Corp.	CSX	62.13	1.00	1.61%	11.00%	12.61%	14.51%	16.12%	3.90%	5.51%
Kansas City Southern	KSU	95.45	1.60	1.68%	8.50%	10.18%	10.52%	12.20%	3.90%	5.58%
Genesee & Wyoming	GWR	74.02	0.00						3.90%	
Canadian National	CNI	74.11	1.52	2.05%	11.00%	13.05%	14.51%	16.56%	3.90%	5.95%
Canadian Pacific	CP	177.62	2.16	1.22%	11.50%	12.72%	15.36%	16.58%	3.90%	5.12%
			Mean			11.33%				5.81%
			Median			11.83%				5.76%
			Harmonic Mean			11.05%				5.77%
			Std Dev			1.83%				0.50%
			Coeff Var			16.14%				8.64%
			Max			13.05%				6.45%
			Min			8.37%				5.12%

Source: Value Line Projections 15-17 to 21-23

11.50%

5.75%

Say

11.50%
to page 1

SUPPORT FOR YIELD CAPITALIZATION EQUITY COMPONENT DIVIDEND GROWTH MODEL

WASHINGTON STATE DEPARTMENT OF REVENUE

2019 ASSESSMENT YEAR

RAILROADS

Based on Earnings Growth

$$K_e = (D_1 / P_0) + G$$

Ke = Cost of Equity
 D1 = Expected Dividends
 P0 = Current Stock Price
 G = Sustainable Growth -- Earnings
 assumption Sustainable growth can not exceed inflation plus real GDP

Company	Ticker	Stock Price (Po)	Expected Earnings (D1)	Yield (D1/Po)	Earnings Growth (G) VL	Ke	Forecast Earnings Growth	Ke Forecast Growth	Sustainable Earnings Growth	Ke Sustainable Growth
Union Pacific Corp.	UNP	138.230	8.85	6.40%	11.00%	17.40%	14.51%	20.91%	3.90%	10.30%
Norfolk Southern Corp.	NSC	148.770	10.20	6.86%	11.50%	18.36%	15.36%		3.90%	10.76%
CSX Corp.	CSX	62.130	4.20	6.76%	13.50%	20.26%	18.96%	25.72%	3.90%	10.66%
Kansas City Southern	KSU	95.450	6.90	7.23%	12.50%	19.73%	17.12%	24.35%	3.90%	11.13%
Genesee & Wyoming	GWR	74.020	4.75	6.42%	6.00%	12.42%	6.98%	13.39%	3.90%	10.32%
Canadian National	CNI	74.110	4.80	6.48%	10.00%	16.48%	12.86%	19.34%	3.90%	10.38%
Canadian Pacific	CP	177.620	12.30	6.92%	11.50%	18.42%	15.36%		3.90%	10.82%
			Mean	6.72%		17.58%				10.62%
			Median	6.76%		18.36%				10.66%
			Harmonic Mean	6.71%		17.18%				10.62%
			Std Dev	0.31%		2.61%				0.31%
			Coeff Var	4.60%		14.87%				2.91%
			Max	7.23%		20.26%				11.13%
			Min	6.40%		12.42%				10.30%

Source: Value Line Projections 15-17 to 21-23

17.50%

10.75%

Say 10.75%
to page 1

**SUPPORT FOR YIELD CAPITALIZATION EQUITY COMPONENT
DIVIDEND GROWTH MODEL**

WASHINGTON STATE DEPARTMENT OF REVENUE
2019 ASSESSMENT YEAR
RAILROADS

Based on Return on Equity

Ke = (D1 / Po) + G
Ke = Cost of Equity
D1 = Expected Dividends
E1 = Expected Earnings
Po = Current Price
G = Sustainable Growth
b = Retained Earnings % (plowback)
ROE = Return on Equity

Company	Ticker	Stock Price (Po)	Expected Dividend (D1)	Dividend Yield (D1/Po)	b (1-payout ratio)	ROE	Growth (b*ROE) (G)	Ke Dividends	Expected Earnings (E1)	Ke Earnings
Union Pacific Corp.	UNP	138.23	3.52	2.55%	60.0%	6.40%	3.84%	6.39%	8.85	10.24%
Norfolk Southern Corp.	NSC	148.77	3.52	2.37%	65.0%	6.86%	4.46%	6.82%	10.20	11.31%
CSX Corp.	CSX	62.13	1.00	1.61%	76.0%	6.76%	5.14%	6.75%	4.20	11.90%
Kansas City Southern	KSU	95.45	1.60	1.68%	77.0%	7.23%	5.57%	7.24%	6.90	12.80%
Genesee & Wyoming	GWR	74.02	0.00		100.0%	6.42%	6.42%		4.75	12.83%
Canadian National	CNI	74.11	1.52	2.05%	68.0%	6.48%	4.40%	6.46%	4.80	10.88%
Canadian Pacific	CP	177.62	2.16	1.22%	81.0%	6.92%	5.61%	6.83%	12.30	12.53%
							Mean	6.75%		11.79%
							Median	6.78%		11.90%
							Harmonic Mean	6.74%		11.71%
							Std Dev	0.31%		1.01%
							Coeff Var	4.55%		8.56%
							Max	7.24%		12.83%
							Min	6.39%		10.24%
								6.75%		12.00%

Say 12.00%
to page 1

SUPPORT FOR DEBT RATING AND DEBT YIELD RATE

WASHINGTON STATE DEPARTMENT OF REVENUE

2019 ASSESSMENT YEAR

RAILROADS

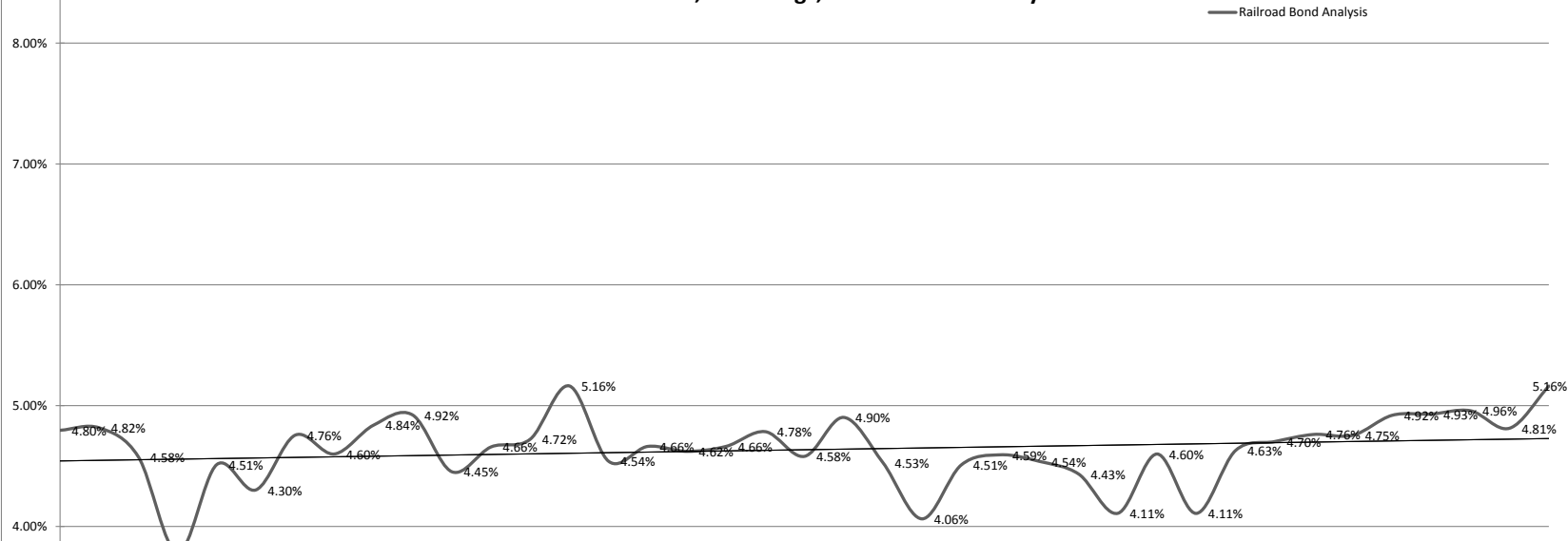
Company	Ticker	Mergent's Ratings	S&P Ratings	WAYTM	S&P YTM (avg)	Mergent's Ratings	S&P Ratings	Mergent's	S&P		
Union Pacific Corp.	UNP	Aa3	A-	4.44%	4.26%	6	9	Aaa1	AAA+	1	
Norfolk Southern Corp.	NSC	Baa1	BBB+	4.37%	4.36%	10	10	Aaa2	AAA	2	
CSX Corp.	CSX	Baa1	BBB+	4.06%	4.32%	10	10	Aaa3	AAA-	3	
Canadian Pacific	CP	Aa2	BBB+	4.28%	4.46%	5	10	Aa1	AA+	4	
Kansas City Southern	KSU	Baa2	BBB-	4.69%	4.51%	11	12	Aa2	AA	5	
Canadian National	CNI	A2	A	3.98%	4.16%	8	8	Aa3	AA-	6	
Genesee & Wyoming	GWR		BB				14	A1	A+	7	
Overall Average Debt Rating		A3	BBB+	4.30%		8.3	10.4	A2	A	8	
					bond analysis, A-CCC bonds				A3	A-	9
									Baa1	BBB+	10
					All issues 20+ year maturities				Baa2	BBB	11
Guideline Companies, All Ratings			4.29%	4.75%							
					bond analysis page 12				Baa3	BBB-	12
									Ba1	BB+	13
									Ba2	BB	14
									Ba3	BB-	15
									B1	B+	16
									B2	B	17
									B3	B-	18
									Caa1	CCC+	19
									Caa2	CCC	20
Mergent's Bond Record January 2019, page 13											
Corporate	Aaa	Aa	A	Baa							
October	4.14%	4.28%	4.46%	5.07%							
November	4.22%	4.37%	4.53%	5.22%							
December	4.02%	4.20%	4.37%	5.13%							
4th Qtr Average	4.13%	4.28%	4.45%	5.14%							
Public Utilities	Aaa	Aa	A	Baa							
October		4.31%	4.45%	4.91%							
November		4.40%	4.52%	5.03%							
December		4.24%	4.37%	4.92%							
4th Qtr Average		4.32%	4.45%	4.95%							
Industrials	Aaa	Aa	A	Baa							
October	4.14%	4.24%	4.45%	5.22%							
November	4.22%	4.34%	4.53%	5.42%							
December	4.02%	4.16%	4.36%	5.34%							
4th Qtr Average	4.13%	4.25%	4.45%	5.33%							
Debt Yield Rate				5.00%	to page 1						
Cost of Secured Debt (Operating Lease) Rate				4.25%	to page 1						

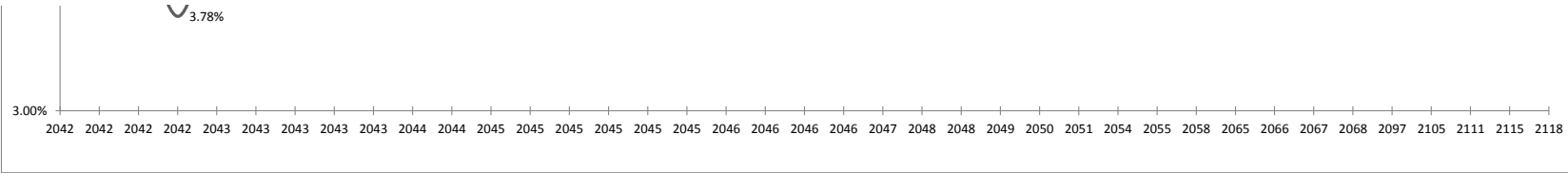
Union Pacific Corp	SR NOTES	3.350	2046	81.89	\$	300,000,000	4.09%	4.54%	0.03%	A-	\$	245,676,000	81.89%	10,050,000	0.00028598	0.001012707	4.50		
Union Pacific Corp	SR NOTES	4.000	2047	93.19	\$	500,000,000	4.29%	4.43%	0.05%	A-	\$	465,940,000	93.19%	20,000,000	0.00046562	0.001648845	4.42		
Union Pacific Corp	SR NOTES	4.500	2048	98.44	\$	1,500,000,000	4.57%	4.60%	0.14%	A-	\$	1,476,540,000	98.44%	67,500,000	0.00144920	0.005131832	4.60		
Union Pacific Corp	SR NOTES	3.799	2051	85.31	\$	1,044,261,000	4.45%	4.70%	0.10%	A-	\$	890,838,174	85.31%	39,671,475	0.00103142	0.003652423	4.68		
Union Pacific Corp	SR NOTES	3.875	2055	85.06	\$	450,000,000	4.56%	4.75%	0.04%	A-	\$	382,756,500	85.06%	17,437,500	0.00044941	0.001591427	4.74		
Union Pacific Corp	SR NOTES	4.800	2058	97.95	\$	500,000,000	4.90%	4.92%	0.05%	A-	\$	489,740,000	97.95%	24,000,000	0.00051670	0.001829707	4.92		
Union Pacific Corp	SR NOTES	4.375	2065	90.00	\$	600,000,000	4.86%	4.93%	0.06%	A-	\$	540,012,000	90.00%	26,250,000	0.00062133	0.002200217	4.92		
Union Pacific Corp	SR NOTES	4.100	2067	86.77	\$	500,000,000	4.73%	4.81%	0.05%	A-	\$	433,860,000	86.77%	20,500,000	0.00050550	0.001790036	4.81		
23	Book Value 2300		sum	2288.53	\$	13,444,261,000	Percent of book	99.50%	1.25%		\$	13,293,114,174	98.88%	4.71%	\$	633,425,975	4.435%		
Kansas City Southern	Deb Z100	7.000	2025	125.00	\$	100,000,000	5.60%	2.13%	0.00%	BBB	\$	125,000,000	125.00%	7,000,000	0.00004483	0.000949483	3.39		
Kansas City Southern	SR NOTES	3.250	2026	92.39	\$	250,000,000	3.52%	4.63%	0.02%	BBB	\$	230,967,500	92.39%	8,125,000	0.00024330	0.005152958	4.33		
Kansas City Southern	SR NOTES	4.300	2043	94.087	\$	448,651,000	4.57%	4.72%	0.04%	BBB	\$	422,122,266	94.09%	19,291,993	0.00044498	0.009424557	4.71		
Kansas City Southern	SR NOTES	4.300	2043	88.41	\$	450,000,000	4.86%	5.16%	0.05%	BBB-	\$	397,836,000	88.41%	19,350,000	0.00048800	0.010335644	5.14		
Kansas City Southern	SR NOTES	4.950	2045	105.50	\$	500,000,000	4.69%	4.58%	0.05%	BBB-	\$	527,500,000	105.50%	24,750,000	0.00048101	0.010187657	4.59		
Kansas City Southern	SR NOTES	4.950	2045	100.68	\$	499,165,000	4.92%	4.90%	0.05%	BBB	\$	502,569,305	100.68%	24,708,668	0.00051403	0.010886969	4.90		
6	Book Value 600		sum	606.06	\$	2,247,816,000	Percent of book	101.01%	0.22%		\$	2,205,995,072	98.14%	4.59%	\$	103,225,661	4.694%		
Canadian Pacific, Ltd	Deb (foreign) NC	9.450	2021	113.96	\$	250,000,000	8.29%	0.13%	0.00%	BBB+	\$	284,905,000	113.96%	23,625,000	6.67948E-06	5.94387E-05	3.744		
Canadian Pacific Railway	Deb (foreign) NC	4.500	2022	96.75	\$	250,000,000	4.65%	5.94%	0.03%	BBB+	\$	241,875,000	96.75%	11,250,000	0.000311765	0.002774305	3.564		
Canadian Pacific Railway	SR NOTES	4.450	2023	103.17	\$	350,000,000	4.31%	3.47%	0.03%	BBB+	\$	361,081,000	103.17%	15,575,000	0.000255377	0.002272529	3.584		
Canadian Pacific Railway	SR NOTES	2.900	2025	94.87	\$	700,000,000	3.06%	3.96%	0.06%	BBB+	\$	664,069,000	94.87%	20,300,000	0.00058178	0.005177092	3.853		
Canadian Pacific Railway	SR NOTES	3.700	2026	99.31	\$	250,000,000	3.73%	3.82%	0.02%	BBB+	\$	248,285,000	99.31%	9,250,000	0.000200658	0.001785599	6.564		
Canadian Pacific Railway	SR NOTES	4.000	2028	100.68	\$	500,000,000	3.97%	3.90%	0.04%	BBB+	\$	503,410,000	100.68%	20,000,000	0.000410033	0.003648761	3.911		
Canadian Pacific Railway	SR NOTES	7.125	2031	125.66	\$	350,000,000	5.67%	4.26%	0.03%	BBB+	\$	439,824,000	125.66%	24,937,500	0.000312926	0.002784636	4.472		
Canadian Pacific Railway	SR NOTES	5.750	2033	112.60	\$	250,000,000	5.11%	4.49%	0.02%	BBB+	\$	281,505,000	112.60%	14,375,000	0.000235536	0.002095969	4.541		
Canadian Pacific Railway	SR NOTES	4.800	2035	103.01	\$	300,000,000	4.66%	4.53%	0.03%	BBB+	\$	309,033,000	103.01%	14,400,000	0.000285173	0.002537673	4.535		
Canadian Pacific Railway	SR NOTES	5.950	2037	117.82	\$	450,000,000	5.05%	4.46%	0.04%	BBB+	\$	530,167,500	117.82%	26,775,000	0.000421746	0.003752995	4.514		
Canadian Pacific Railway	SR NOTES	5.750	2042	112.34	\$	250,000,000	5.12%	4.84%	0.03%	BBB+	\$	280,850,000	112.34%	14,375,000	0.000254052	0.002260735	4.856		
Canadian Pacific Railway	SR NOTES	4.800	2045	104.04	\$	550,000,000	4.61%	4.53%	0.05%	BBB+	\$	572,231,000	104.04%	26,400,000	0.000523279	0.004656502	4.534		
Canadian Pacific Railway	SR NOTES	6.125	2115	114.88	\$	900,000,000	5.33%	5.33%	0.10%	BBB+	\$	1,033,875,000	114.88%	55,125,000	0.001007034	0.008961297	5.327		
13	Book Value 1300		sum	1399.09	\$	5,350,000,000	Percent of book	107.62%	0.48%		\$	5,751,110,500	107.50%	5.17%	\$	276,387,500	4.277%		
				Total	\$	47,608,077,005.00				Total	\$	49,850,348,060.02	104.71%	5.08%	\$	2,420,431,636	4.29%	4.302%	4.332

Source: Standard & Poor's Bond Guide, January 2018, 2017 Yr End Prices

This includes short term. For 20+ year maturities see below
Embedded debt rate **5.0841%**
Weighted average yield to maturity **4.2882%**
Debt service / Market value **4.8554%**

20+ Year, All Ratings, Railroad Bond Analysis





12/31/2019

Railroad Bond Analysis

Company	type	Call	coupon	maturity	Price	Issued / Book	current yield	yield to maturity	Weighted Ave Rating	Mkt Val	Mkt : Book	Embedded / Debt Service	WAYTM	WAYTM	Finra YTM		
CSX Corp	Fixed Rt nts		6.220	2040	118.33	\$ 660,000,000	5.26%	4.80%	0.07%	BBB+	\$ 780,971,400	118.33%	41,052,000	0.000664855	0.002811055	4.833	
CSX Corp	NOTES		5.500	2041	109.03	\$ 550,000,000	5.04%	4.82%	0.06%	BBB+	\$ 599,681,500	109.03%	30,250,000	0.000556404	0.002352516	4.8	
Norfolk Southern	Notes		4.837	2041	103.53	\$ 596,000,000	4.672%	4.58%	0.06%	BBB+	\$ 617,038,800	103.53%	28,828,520	0.000572811	0.002354756	4.585	
Norfolk Southern	Notes		4.837	2041	115.35	\$ 596,000,000	4.193%	3.78%	0.05%	BBB+	\$ 687,486,000	115.35%	28,828,520	0.000473368	0.001945957	3.78	
Union Pacific Corp	SR NOTES		4.750	2041	103.23	\$ 500,000,000	4.601%	4.51%	0.05%	A-	\$ 516,155,000	103.23%	23,750,000	0.00047388	0.001678078	4.518	
Canadian National Ry	SR Notes		3.500	2042	88.58	\$ 250,000,000	3.95%	4.30%	0.02%	A	\$ 221,440,000	88.58%	8,750,000	0.000225938	0.00288765	4.266	
CSX Corp	NOTES		4.750	2042	99.93	\$ 600,000,000	4.75%	4.76%	0.06%	BBB+	\$ 599,562,000	99.93%	28,500,000	0.000599313	0.002533936	4.76	
Norfolk Southern	SR NTS		3.950	2042	91.01	\$ 600,000,000	4.340%	4.60%	0.06%	BBB+	\$ 546,072,000	91.01%	23,700,000	0.000579679	0.002382989	4.574	
Canadian Pacific Railway	SR NOTES		5.750	2042	112.34	\$ 250,000,000	5.118%	4.84%	0.03%	\$	\$ 280,850,000	112.34%	14,375,000	0.000254052	0.002260735	4.856	
Norfolk Southern	SR NTS		4.800	2043	98.32	\$ 500,000,000	4.882%	4.92%	0.05%	BBB+	\$ 491,595,000	98.32%	24,000,000	0.000516958	0.002125151	4.918	
Canadian National Ry	SR Notes		4.500	2043	100.68	\$ 250,000,000	4.47%	4.45%	0.02%	A	\$ 251,702,500	100.68%	11,250,000	0.000233819	0.002988374	4.454	
Union Pacific Corp	Fixed Rate		4.750	2043	101.30	\$ 500,000,000	4.689%	4.66%	0.05%	A-	\$ 506,485,000	101.30%	23,750,000	0.000489207	0.001732352	4.66	
Kansas City Southern	SR NOTES		4.300	2043	94.09	\$ 448,651,000	4.570%	4.72%	0.04%	BBB	\$ 422,122,266	94.09%	19,291,993	0.000444981	0.009424557	4.71	
Kansas City Southern	SR NOTES		4.300	2043	88.41	\$ 450,000,000	4.864%	5.16%	0.05%	BBB-	\$ 397,836,000	88.41%	19,350,000	0.000487998	0.010335644	5.138	
CSX Corp	NOTES		4.100	2044	93.58	\$ 800,000,000	4.38%	4.54%	0.08%	BBB+	\$ 748,616,000	93.58%	32,800,000	0.00076286	0.003225428	4.53	
Union Pacific Corp	Fixed Rate		4.821	2044	102.29	\$ 700,000,000	4.713%	4.66%	0.07%	A-	\$ 716,016,000	102.29%	33,747,000	0.000685529	0.002427558	4.663	
Norfolk Southern	FR SR Note		4.450	2045	97.46	\$ 500,000,000	4.566%	4.62%	0.05%	BBB+	\$ 487,310,000	97.46%	22,250,000	0.000485367	0.001995284	4.617	
Union Pacific Corp	Fixed Rate		4.050	2045	90.97	\$ 500,000,000	4.452%	4.66%	0.05%	A-	\$ 454,865,000	90.97%	20,250,000	0.000489675	0.001734011	4.641	
Union Pacific Corp	SR NOTES		4.150	2045	90.77	\$ 350,000,000	4.572%	4.78%	0.04%	A-	\$ 317,688,000	90.77%	14,525,000	0.00035173	0.001245526	4.631	
Kansas City Southern	SR NOTES		4.950	2045	105.50	\$ 500,000,000	4.692%	4.58%	0.05%	BBB-	\$ 527,500,000	105.50%	24,750,000	0.00048101	0.010187657	4.594	
Kansas City Southern	SR NOTES		4.950	2045	100.68	\$ 499,165,000	4.916%	4.90%	0.05%	BBB	\$ 499,569,305	100.68%	24,708,668	0.000514028	0.010886969	4.903	
Canadian Pacific Railway	SR NOTES		4.800	2045	104.04	\$ 550,000,000	4.614%	4.53%	0.05%	\$	\$ 572,231,000	104.04%	26,400,000	0.000523279	0.004656502	4.534	
Canadian National Ry	SR Notes		3.200	2046	86.15	\$ 650,000,000	3.71%	4.06%	0.06%	A	\$ 560,001,000	86.15%	20,800,000	0.000554712	0.00708960	4.404	
Norfolk Southern	FR SR Note		4.650	2046	102.17	\$ 600,000,000	4.551%	4.51%	0.06%	NR	\$ 613,002,000	102.17%	27,900,000	0.00056817	0.002335677	4.509	
Union Pacific Corp	SR NOTES		4.050	2046	91.78	\$ 600,000,000	4.413%	4.59%	0.06%	A-	\$ 550,650,000	91.78%	24,300,000	0.000578844	0.002049771	4.582	
Union Pacific Corp	SR NOTES		3.350	2046	81.89	\$ 300,000,000	4.091%	4.54%	0.03%	A-	\$ 245,676,000	81.89%	10,050,000	0.000285983	0.001012707	4.502	
Union Pacific Corp	SR NOTES		4.000	2047	93.19	\$ 500,000,000	4.292%	4.43%	0.05%	A-	\$ 465,940,000	93.19%	20,000,000	0.000465625	0.001648845	4.424	
Canadian National Ry	SR Notes		3.650	2048	92.38	\$ 600,000,000	3.95%	4.11%	0.05%	A	\$ 554,256,000	92.38%	21,900,000	0.000517843	0.006618397	4.10	
Union Pacific Corp	SR NOTES		4.500	2048	98.44	\$ 1,500,000,000	4.571%	4.60%	0.14%	A-	\$ 1,476,540,000	98.44%	67,500,000	0.001449201	0.005131832	4.596	
Canadian National Ry	SR Notes		4.450	2049	105.79	\$ 650,000,000	4.21%	4.11%	0.06%	A	\$ 687,615,500	105.79%	28,925,000	0.00056087	0.007168273	4.11	
CSX Corp	FR SR Note		3.950	2050	89.05	\$ 600,000,000	4.44%	4.63%	0.06%	BBB+	\$ 534,270,000	89.05%	23,700,000	0.000583188	0.00246576	4.614	
Union Pacific Corp	SR NOTES		3.799	2051	85.31	\$ 1,044,261,000	4.453%	4.70%	0.10%	A-	\$ 890,838,174	85.31%	39,671,475	0.001031424	0.003652423	4.68	
CSX Corp	SR NOTES		4.500	2054	95.61	\$ 450,000,000	4.71%	4.76%	0.05%	BBB+	\$ 430,254,000	95.61%	20,250,000	0.00045006	0.001902897	4.76	
Union Pacific Corp	SR NOTES		3.875	2055	85.06	\$ 450,000,000	4.556%	4.75%	0.04%	A-	\$ 382,756,500	85.06%	17,437,500	0.00044941	0.001591427	4.744	
Union Pacific Corp	SR NOTES		4.800	2058	97.95	\$ 500,000,000	4.901%	4.92%	0.05%	A-	\$ 489,740,000	97.95%	24,000,000	0.000516699	0.001829707	4.917	
Union Pacific Corp	SR NOTES		4.375	2065	90.00	\$ 600,000,000	4.861%	4.93%	0.06%	A-	\$ 540,012,000	90.00%	26,250,000	0.000621329	0.002200217	4.923	
CSX Corp	SR Notes		4.250	2066	87.23	\$ 600,000,002	4.87%	4.96%	0.06%	BBB+	\$ 523,392,002	87.23%	25,500,000	0.00062480	0.002641685	4.95	
Union Pacific Corp	SR NOTES		4.100	2067	86.77	\$ 500,000,000	4.725%	4.81%	0.05%	A-	\$ 433,860,000	86.77%	20,500,000	0.000505496	0.001790036	4.805	
CSX Corp	SR Notes		4.650	2068	90.95	\$ 600,000,003	5.113%	5.16%	0.07%	BBB+	\$ 545,694,003	90.95%	27,900,000	0.000650531	0.002750489	5.158	
Norfolk Southern	Notes	Z100	7.900	2097	142.43	\$ 350,000,000	5.547%	5.52%	0.04%	BBB+	\$ 498,508,500	142.43%	27,650,000	0.000405857	0.001668428	5.523	
Norfolk Southern	FR SR Note	Z100	6.000	2105	104.60	\$ 550,000,000	5.736%	5.73%	0.07%	BBB+	\$ 575,316,500	104.60%	33,000,000	0.000662408	0.002723076	5.773	
Norfolk Southern	SR NOTES		6.000	2111	111.60	\$ 400,000,000	5.376%	5.37%	0.05%	BBB+	\$ 446,400,000	111.60%	24,000,000	0.000451323	0.001855333	5.372	
Canadian Pacific Railway	SR NOTES		6.125	2115	114.88	\$ 900,000,000	5.332%	5.33%	0.10%	\$	\$ 1,033,875,000	114.88%	55,125,000	0.001007034	0.008961297	5.327	
Norfolk Southern	SR NOTES		5.100	2118	99.39	\$ 600,000,000	5.132%	5.13%	0.06%	BBB+	\$ 596,316,000	99.39%	30,600,000	0.000646748	0.002658702	7.773	
Total						\$ 24,694,077,005				Total	\$ 24,320,705,950	98.49%	4.62%	\$ 1,142,065,676	2.45%	0.354%	4.776

Source: Standard & Poor's Bond Guide, January 2018, 2017 Yr End Prices

Embedded debt rate	4.6249%
Weighted average yield to maturity	2.4454%
Debt service / Market value	4.6959%
Finra YTM	4.78%
	4.75%

SAY

DATA INPUT

WASHINGTON STATE DEPARTMENT OF REVENUE

2019 ASSESSMENT YEAR

RAILROADS

Instructions: Data entered on this page will flow to the applicable worksheets.

Guideline Companies		Stock Price 12/31/2018	Current Year										
			Beta levered	Revenues Per Share	Cash Flow Per Share	Earnings Per Share	Dividends Per Share	Book Value	Common Shares	Long-Term Debt	Capital Spending per share	Trailing P/E Ratio	Average Annual Dividend Yield
Name	Ticker	Yahoo	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL
Union Pacific Corp.	UNP	\$138.23	1.10	\$ 31.15	\$ 11.20	\$ 7.85	\$ 3.06	27.80	736,790	\$ 20,943,000,000	\$ 4.25	20.2	0.00%
Norfolk Southern Corp.	NSC	\$148.77	1.15	\$ 42.35	\$ 13.50	\$ 9.27	\$ 3.04	56.50	272,346	\$ 10,635,000,000	\$ 6.50	19.3	0.00%
CSX Corp.	CSX	\$62.13	1.20	\$ 14.50	\$ 5.40	\$ 3.80	\$ 0.88	15.10	844,420	\$ 13,754,000,000	\$ 2.30	20.2	0.00%
Kansas City Southern	KSU	\$95.45	1.10	\$ 23.50	\$ 9.90	\$ 6.15	\$ 1.44	46.05	101,697	\$ 2,680,700,000	\$ 6.00	16.9	0.00%
Genesee & Wyoming	GWR	\$74.02	1.50	\$ 39.60	\$ 8.65	\$ 3.77	\$ -	62.50	58,931	\$ 2,300,600,000	\$ 4.00	21.7	0.00%
Canadian National	CNI	\$74.11	1.05	\$ 15.05	\$ 5.65	\$ 4.25	\$ 1.40	18.70	742,650	\$ 7,755,000,000	\$ 3.70	20.9	0.00%
Canadian Pacific	CP	\$177.62	1.20	\$ 40.10	\$ 14.45	\$ 10.75	\$ 1.84	36.00	142,600	\$ 6,011,000,000	\$ 8.00	20.6	0.00%

Value Line November 23, 2018

The harmonic mean is the preferable method for averaging multiples, such as the price/earning ratio, in which price is in the numerator. If these ratios are averaged using an arithmetic mean (a common error),

High data points are given greater weights than low data points.

The harmonic mean, on the other hand, gives equal weight to each data point

Note:

Canadian Exchange Rate January 2, 2019:

0.7358

Value Line figures are all values in US dollars.

														Forecast % Change	
Projected (Next Year) 2019														Dividends	Earnings
Operating Margin	Income Tax Rate	% Return on Shareholders' Equity	Revenues Per Share	Cash Flow Per Share	Earnings Per Share	Dividends	Bk Value	Common Shares	Capital Spending per share	% Return on Shareholders' Equity	% Retained to Common Equity	All Dividends to Net Profits	Market to Book	2019-2023	2019-2023
VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL
47.5%	24.0%	29.0%	\$ 33.50	\$ 12.15	\$ 8.85	\$ 3.52	25.45	710,000	4.35	35.0%	21.0%	40.0%	102.3%	8.50	11.00
43.0%	24.0%	16.5%	\$ 45.10	\$ 14.75	\$ 10.20	\$ 3.52	60.20	265,000	6.50	17.0%	11.5%	35.0%	109.5%	6.00	11.50
50.5%	25.0%	25.5%	\$ 15.70	\$ 5.95	\$ 4.20	\$ 1.00	14.70	805,000	2.30	29.0%	22.0%	24.0%	101.1%	11.00	13.50
49.5%	29.0%	13.5%	\$ 29.65	\$ 10.65	\$ 6.90	\$ 1.60	49.25	99,000	5.75	14.0%	10.5%	23.0%	99.0%	8.50	12.50
30.0%	27.0%	6.0%	\$ 43.10	\$ 10.00	\$ 4.75	\$ -	68.55	58,000	4.15	7.0%	7.0%	nil	100.6%	0.00	6.00
50.0%	25.0%	22.5%	\$ 16.55	\$ 6.40	\$ 4.80	\$ 1.52	20.50	705,000	3.50	23.5%	16.0%	32.0%	105.9%	11.00	10.00
48.0%	25.0%	29.0%	\$ 44.10	\$ 16.55	\$ 12.30	\$ 2.16	41.65	135,000	8.50	30.0%	19.5%	19.0%	110.8%	11.50	11.50

Cash Flow		Revenue	Income	Balance Sheet					Cash Flow	Fair Value
2019-2023	2019-2023		Operating Income	Current Assets	PP & E Gross	Current Liabilities	Long Term Debt	Intangibles (excluding Goodwill)	Depreciation & Amortization	Debt
VL	VL	M*	M*	M*	M*	M*	M*	M*	M*	10-k
9.50	6.00	\$ 8,517,000,000	\$ 4,163,000,000	\$ 72,805,000,000	\$ 4,626,000,000	\$ 20,925,000,000	\$ -	\$ 2,191,000,000	\$ 21,900,000,000	
9.50	5.50	\$ 3,959,000,000	\$ 1,862,000,000	\$ 43,465,000,000	\$ 2,591,000,000	\$ 10,560,000,000	\$ -	\$ 1,104,000,000	\$ 12,203,000,000	
10.50	4.50	\$ 4,773,000,000	\$ 2,565,000,000	\$ 44,805,000,000	\$ 1,915,000,000	\$ 14,739,000,000	\$ -	\$ 1,331,000,000	\$ 14,914,000,000	
11.00	8.50	\$ 968,000,000	\$ 635,000,000	\$ 10,956,000,000	\$ 447,000,000	\$ 2,679,000,000	\$ -	\$ 347,000,000	\$ 2,661,300,000	
6.50	4.00	\$ 435,000,000	\$ 628,000,000	\$ 5,985,000,000	\$ 482,000,000	\$ 2,425,000,000	\$ 1,430,000,000	\$ 263,000,000	\$ 2,406,601,000	
9.50	8.50	\$ 4,386,839,600	\$ 2,007,262,400	\$ 37,583,192,400	\$ 2,575,300,000	\$ 8,377,083,000	\$ 53,713,400	\$ 977,878,200	\$ 13,316,000,000	
10.50	8.00	\$ 2,052,882,000	\$ 821,888,600	\$ 19,411,875,600	\$ 1,438,489,000	\$ 6,026,202,000	\$ 5,886,400	\$ 512,116,800	\$ 9,639,000,000	

Carrying Value	Operating Lease	ROE	All Div'ds to Net Prof
Debt	Rent	5 yr	5 yr
10-k	10-k	VL	VL
\$ 21,400,000,000	\$ 397,000,000	43.0%	39%
\$ 11,145,000,000	\$ 204,000,000	17.0%	27%
\$ 14,757,000,000	\$ 66,000,000	30.5%	25%
\$ 2,689,400,000	\$ 49,300,000	16.5%	21%
\$ 2,391,633,000	\$ 19,187,000	7.5%	
\$ 12,569,000,000	\$ 218,000,000	25.0%	31%
\$ 8,696,000,000	\$ 97,000,000	27.0%	18%

25%	26%
24%	27%
18%	25%

SUPPORT FOR DIRECT CAPITALIZATION EQUITY COMPONENT

WASHINGTON STATE DEPARTMENT OF REVENUE

2019 ASSESSMENT YEAR

RAILROADS

Company	Ticker	Stock Price	2017		2018		2017		2018	
			Actual Earnings Ratio (EPS/P)		Projected Earnings Ratio (PEPS/P)		Cash Flow Ratio (CF/P)		Projected Cash Flow Ratio (PCF/P)	
Union Pacific Corp.	UNP	138.23	7.85	5.68%	8.85	6.40%	11.20	8.10%	12.15	8.79%
Norfolk Southern Corp.	NSC	148.77	9.27	6.23%	10.20	6.86%	13.50	9.07%	14.75	9.91%
CSX Corp.	CSX	62.13	3.80	6.12%	4.20	6.76%	5.40	8.69%	5.95	9.58%
Kansas City Southern	KSU	95.45	6.15	6.44%	6.90	7.23%	9.90	10.37%	10.65	11.16%
Genesee & Wyoming	GWR	74.02	3.77	5.09%	4.75	6.42%	8.65	11.69%	10.00	13.51%
Canadian National	CNI	74.11	4.25	5.73%	4.80	6.48%	5.65	7.62%	6.40	8.64%
Canadian Pacific	CP	177.62	10.75	6.05%	12.30	6.92%	14.45	8.14%	16.55	9.32%
		Mean		5.91%		6.72%		9.10%		10.13%
		Median		6.05%		6.76%		8.69%		9.58%
		Max		6.44%		7.23%		11.69%		13.51%
		Min		5.09%		6.40%		7.62%		8.64%
		stdev		0.00		0.00		0.01		0.02
		cov		0.08		0.05		0.16		0.17
		harmean		5.88%		6.71%		8.92%		9.92%
		Say		6.00%		7.00%		9.00%		10.00%

Source:

Actual earnings: Value Line / Q4 Year End stock price

Estimated Earnings: Value Line / Q4 Year End stock price

Actual Cash Flow: Value Line / Q4 Year End stock price

Estimated Cash Flow: Value Line / Q4 Year End stock price

IMPLIED PREMIUMS FOR US MARKET

Updated January 4, 2019

These implied premiums are calculated using the S&P 500.

Source: <http://pages.stern.nyu.edu/~adamodar/>

Year	Earnings Yield	Dividend Yield	S&P 500	Earnings*	Dividends*	Change in Earnings	Change in Dividend	T.Bill Rate	T.Bond Rate	Bond-Bill	Boothed Growth	Premium (t)	Net Growth Est	Implied Premium (FCFE)	ERP/Riskfree Rate	ERP+Riskfree Rate
1960	5.34%	3.41%	58.11	3.10	1.98			0.0266	2.76%	0.10%	2.45%					2.76%
1961	4.71%	2.85%	71.55	3.37	2.04	8.60%	2.91%	2.13%	2.35%	0.22%	2.41%	2.92%		2.92%	1.24	5.27%
1962	5.81%	3.40%	63.1	3.67	2.15	8.79%	5.21%	2.73%	3.85%	1.12%	4.05%	3.56%		3.56%	0.92	7.41%
1963	5.51%	3.13%	75.02	4.13	2.35	12.75%	9.45%	3.12%	4.14%	1.02%	4.96%	3.38%		3.38%	0.82	7.52%
1964	5.62%	3.05%	84.75	4.76	2.58	15.23%	10.08%	3.54%	4.21%	0.67%	5.13%	3.31%		3.31%	0.79	7.52%
1965	5.73%	3.06%	92.43	5.30	2.83	11.20%	9.42%	3.93%	4.65%	0.72%	5.46%	3.32%		3.32%	0.71	7.97%
1966	6.74%	3.59%	80.33	5.41	2.88	2.23%	1.96%	4.76%	4.64%	-0.12%	4.19%	3.68%		3.68%	0.79	8.32%
1967	5.66%	3.09%	96.47	5.46	2.98	0.85%	3.37%	4.21%	5.70%	1.49%	5.25%	3.20%		3.20%	0.56	8.90%
1968	5.51%	2.93%	103.86	5.72	3.04	4.81%	2.09%	5.21%	6.16%	0.95%	5.32%	3.00%		3.00%	0.49	9.16%
1969	6.63%	3.52%	92.06	6.10	3.24	6.66%	6.49%	6.58%	7.88%	1.30%	7.55%	3.74%		3.74%	0.47	11.62%
1970	5.98%	3.46%	92.15	5.51	3.19	-9.72%	-1.61%	6.53%	6.50%	-0.03%	4.78%	3.41%		3.41%	0.52	9.91%
1971	5.46%	3.10%	102.09	5.57	3.16	1.15%	-0.74%	4.39%	5.89%	1.50%	4.57%	3.09%		3.09%	0.52	8.98%
1972	5.23%	2.70%	118.05	6.17	3.19	10.76%	0.71%	3.84%	6.41%	2.57%	5.21%	2.72%		2.72%	0.42	9.13%
1973	8.16%	3.70%	97.55	7.96	3.61	28.93%	13.24%	6.93%	6.90%	-0.03%	8.30%	4.30%		4.30%	0.62	11.20%
1974	13.64%	5.43%	68.56	9.35	3.72	17.48%	3.14%	8.00%	7.40%	-0.60%	6.42%	5.59%		5.59%	0.76	12.99%
1975	8.55%	4.14%	90.19	7.71	3.73	-17.54%	0.30%	5.80%	7.76%	1.96%	5.99%	4.13%		4.13%	0.53	11.89%
1976	9.07%	3.93%	107.46	9.75	4.22	26.39%	13.10%	5.08%	6.81%	1.73%	8.19%	4.55%		4.55%	0.67	11.36%
1977	11.43%	5.11%	95.1	10.87	4.86	11.53%	15.07%	5.12%	7.78%	2.66%	9.52%	5.92%		5.92%	0.76	13.70%
1978	12.11%	5.39%	96.11	11.64	5.18	7.07%	6.60%	7.18%	9.15%	1.97%	8.48%	5.72%		5.72%	0.63	14.87%
1979	13.48%	5.53%	107.94	14.55	5.97	25.01%	15.23%	10.38%	10.33%	-0.05%	11.70%	6.45%		6.45%	0.62	16.78%
1980	11.04%	4.74%	135.76	14.99	6.44	3.01%	7.81%	11.24%	12.43%	1.19%	11.01%	5.03%		5.03%	0.40	17.46%
1981	12.39%	5.57%	122.55	15.18	6.83	1.31%	6.08%	14.71%	13.98%	-0.73%	11.42%	5.73%		5.73%	0.41	19.71%
1982	9.83%	4.93%	140.64	13.82	6.93	-8.95%	1.58%	10.54%	10.47%	-0.07%	7.96%	4.90%		4.90%	0.47	15.37%
1983	8.06%	4.32%	164.93	13.29	7.12	-3.84%	2.76%	8.80%	11.80%	3.00%	9.09%	4.31%		4.31%	0.37	16.11%
1984	10.07%	4.68%	167.24	16.84	7.83	26.69%	9.85%	9.85%	11.51%	1.66%	11.02%	5.11%		5.11%	0.44	16.62%
1985	7.42%	3.88%	211.28	15.68	8.20	-6.91%	4.74%	7.72%	8.99%	1.27%	7.89%	4.03%	6.75%	3.84%	0.43	12.83%
1986	5.96%	3.38%	242.17	14.43	8.19	-7.93%	-0.15%	6.16%	7.22%	1.06%	5.54%	3.36%	6.96%	3.58%	0.50	10.80%
1987	6.49%	3.71%	247.08	16.04	9.17	11.10%	11.99%	5.47%	8.86%	3.39%	9.66%	4.18%	8.58%	3.99%	0.45	12.85%
1988	8.20%	3.68%	277.72	24.12	10.22	50.42%	11.49%	6.35%	9.14%	2.79%	9.76%	4.12%	7.67%	3.77%	0.41	12.91%
1989	6.80%	3.32%	353.4	24.32	11.73	0.83%	14.80%	8.37%	7.93%	-0.44%	9.58%	3.85%	7.46%	3.51%	0.44	11.44%
1990	6.58%	3.74%	330.22	22.65	12.35	-6.87%	5.26%	7.81%	8.07%	0.26%	7.39%	3.92%	7.19%	3.89%	0.48	11.96%
1991	4.58%	3.11%	417.09	19.30	12.97	-14.79%	5.03%	7.00%	6.70%	-0.30%	6.34%	3.27%	7.81%	3.48%	0.52	10.18%
1992	4.16%	2.90%	435.71	20.87	12.64	8.13%	-2.59%	5.30%	6.68%	1.38%	4.67%	2.83%	9.83%	3.55%	0.53	10.23%
1993	4.25%	2.72%	466.45	26.90	12.69	28.89%	0.41%	3.50%	5.79%	2.29%	4.73%	2.74%	8.00%	3.17%	0.55	8.96%
1994	5.89%	2.91%	459.27	31.75	13.36	18.03%	5.34%	5.00%	7.82%	2.82%	7.23%	3.06%	7.17%	3.55%	0.45	11.37%
1995	5.74%	2.30%	615.93	37.70	14.17	18.74%	6.00%	3.50%	5.57%	2.07%	5.65%	2.44%	6.50%	3.29%	0.59	8.86%
1996	4.83%	2.01%	740.74	40.63	14.89	7.77%	5.10%	5.00%	6.41%	1.41%	6.13%	2.11%	7.92%	3.20%	0.50	9.61%
1997	4.08%	1.60%	970.43	44.09	15.52	8.52%	4.25%	5.35%	5.74%	0.39%	5.45%	1.67%	8.00%	2.73%	0.48	8.47%
1998	3.11%	1.32%	1229.23	44.27	16.20	0.41%	4.37%	4.33%	4.65%	0.32%	4.60%	1.38%	7.20%	2.26%	0.49	6.91%
1999	3.07%	1.14%	1469.25	51.68	16.71	16.74%	3.16%	5.37%	6.44%	1.07%	5.75%	1.20%	12.50%	2.05%	0.32	8.49%
2000	3.94%	1.23%	1320.28	56.13	16.27	8.61%	-2.65%	5.73%	5.11%	-0.62%	3.71%	1.65%	12.00%	2.87%	0.56	7.98%
2001	3.85%	1.37%	1148.09	38.85	15.74	-30.79%	-3.24%	1.80%	5.05%	3.25%	3.56%	1.73%	10.30%	3.62%	0.72	8.67%
2002	5.23%	1.83%	879.82	46.04	16.08	18.51%	2.15%	1.20%	3.81%	2.61%	3.57%	2.29%	8.00%	4.10%	1.08	7.91%
2003	4.87%	1.61%	1111.91	54.69	17.88	18.79%	11.19%	1.00%	4.25%	3.25%	5.35%	2.12%	11.00%	3.69%	0.87	7.94%
2004	5.58%	1.60%	1211.92	67.68	19.407	23.75%	8.54%	2.18%	4.22%	2.04%	4.90%	2.02%	8.50%	3.65%	0.86	7.87%
2005	5.47%	1.79%	1248.29	76.45	22.38	12.96%	15.32%	4.31%	4.39%	0.08%	6.16%	2.20%	8.00%	4.08%	0.93	8.47%
2006	6.18%	1.77%	1418.3	87.72	25.05	14.74%	11.93%	4.88%	4.70%	-0.18%	5.93%	1.97%	12.50%	4.16%	0.89	8.86%
2007	5.62%	1.89%	1468.36	82.54	27.73	-5.91%	10.70%	3.31%	4.02%	0.71%	5.03%	2.06%	5.00%	4.37%	1.09	8.39%
2008	7.24%	3.11%	903.25	65.39	28.05	-20.78%	1.15%	1.59%	2.21%	0.62%	2.11%	4.05%	4.00%	6.43%	2.91	8.64%
2009	5.35%	2.00%	1115.10	59.65	22.31	-8.78%	-20.46%	0.14%	3.84%	3.70%	0.28%	2.60%	7.20%	4.36%	1.14	8.20%

2010	6.65%	1.84%	1257.64	83.66	23.12	40.25%	3.63%	0.13%	3.29%	3.16%	3.33%	2.24%	6.95%	5.20%	1.58	8.49%
2011	7.72%	2.07%	1257.60	97.05	26.02	16.01%	12.54%	0.03%	1.88%	1.85%	2.75%	2.71%	7.18%	6.01%	3.20	7.89%
2012	7.18%	2.13%	1426.19	102.47	30.44	5.58%	16.99%	0.05%	1.76%	1.71%	2.93%	2.47%	5.27%	5.78%	3.28	7.54%
2013	5.81%	1.96%	1848.36	107.45	36.28	4.86%	19.19%	0.07%	3.04%	2.97%	5.01%	2.03%	4.28%	4.96%	1.63	8.00%
2014	5.49%	1.92%	2058.90	113.01	39.44	5.17%	8.71%	0.05%	2.17%	2.12%	2.77%	2.24%	5.58%	5.78%	2.66	7.95%
2015	5.20%	2.11%	2043.94	106.32	43.16	-5.92%	9.43%	0.21%	2.27%	2.06%	2.96%	2.46%	5.51%	6.12%	2.70	8.39%
2016	4.86%	2.01%	2238.83	108.86	45.03	2.39%	4.33%	0.51%	2.45%	1.94%	2.64%	2.41%	5.54%	5.69%	2.32	8.14%
2017	4.67%	1.86%	2673.61	124.94	49.73	14.77%	10.44%	1.39%	2.41%	1.02%	3.22%	2.36%	7.05%	5.08%	2.11	7.49%
2018	5.92%	2.14%	2506.85	148.34	53.61	18.73%	7.80%	2.37%	2.68%	0.31%	3.24%	2.50%	4.12%	5.96%	2.22	8.64%

2018 Multi Stage Earnings Growth Model
Railroad Industry

Company 3.90% GDP
 Ticker 14.8 Industry P/E
 26.0% Target Dividend Payout Ratio (All dividends to net profit)
 25.0% Target ROE

Canadian National CNI		Growth	Reinvestment	Payout	Earnings	FCFE	Terminal	Cash
Year	Rate	Rate	Ratio				Value	Flow
0			51.76%	48.24%	\$ 4.25		stock price =	(74.11)
1	12.94%	33.33%	66.67%		\$ 4.80	3.20		3.20
2	8.33%	30.77%	69.23%		5.20	3.60		3.60
3	7.69%	28.57%	71.43%		5.60	4.00		4.00
4	7.14%	26.67%	73.33%		6.00	4.40		4.40
5	6.67%	24.45%	75.55%		6.40	4.83		4.83
6	6.11%	22.24%	77.76%		6.79	5.28		5.28
7	5.56%	20.03%	79.97%		7.17	5.73		5.73
8	5.01%	17.81%	82.19%		7.53	6.19		6.19
9	4.45%	15.60%	84.40%		7.86	6.64		6.64
10	3.90%	15.60%	84.40%		8.17	6.90	125.57	132.46
11+	3.90%	15.60%	84.40%		8.49	7.16		7.16

Value Line Dividends Growth Rate $K_e = 10.61\%$

Union Pacific UP		Growth	Reinvestment	Payout	Earnings	FCFE	Terminal	Cash
Year	Rate	Rate	Ratio				Value	Flow
0			50.96%	49.04%	\$ 7.85		stock price =	(138.23)
1	12.74%	31.64%	68.36%		8.85	6.05		6.05
2	7.91%	29.32%	70.68%		9.55	6.75		6.75
3	7.33%	27.32%	72.68%		10.25	7.45		7.45
4	6.83%	25.57%	74.43%		10.95	8.15		8.15
5	6.39%	23.58%	76.42%		11.65	8.90		8.90
6	5.89%	21.58%	78.42%		12.34	9.67		9.67
7	5.40%	19.59%	80.41%		13.00	10.46		10.46
8	4.90%	17.59%	82.41%		13.64	11.24		11.24
9	4.40%	15.60%	84.40%		14.24	12.02		12.02
10	3.90%	15.60%	84.40%		14.79	12.49	227.38	239.87
11+	3.90%	15.60%	84.40%		15.37	12.97		

Value Line Dividends Growth Rate $K_e = 10.30\%$

Norfolk Southern NSC		Growth	Reinvestment	Payout	Earnings	FCFE	Terminal	Cash
Year	Rate	Rate	Ratio				Value	Flow
0			40.13%	59.87%	\$ 9.27		stock price =	(148.77)
1	10.03%	21.57%	78.43%		10.20	8.00		8.00
2	5.39%	20.47%	79.53%		10.75	8.55		8.55
3	5.12%	19.47%	80.53%		11.30	9.10		9.10
4	4.87%	18.57%	81.43%		11.85	9.65		9.65
5	4.64%	17.97%	82.03%		12.40	10.17		10.17
6	4.49%	17.38%	82.62%		12.96	10.71		10.71
7	4.34%	16.79%	83.21%		13.52	11.25		11.25
8	4.20%	16.19%	83.81%		14.09	11.81		11.81
9	4.05%	15.60%	84.40%		14.66	12.37		12.37
10	3.90%	15.60%	84.40%		15.23	12.85	234.07	246.93
11+	3.90%	15.60%	84.40%		15.82	13.35		

Value Line Dividends Growth Rate $K_e = 10.28\%$

CSX Corp CSX		Growth	Reinvestment	Payout	Earnings	FCFE	Terminal	Cash
Year	Rate	Rate	Ratio				Value	Flow
0			42.11%	57.89%	\$ 3.80		stock price =	(62.13)
1	10.53%	34.52%	65.48%		4.20	2.75		2.75
2	8.63%	31.78%	68.22%		4.56	3.11		3.11
3	7.95%	29.44%	70.56%		4.93	3.48		3.48
4	7.36%	27.42%	72.58%		5.29	3.84		3.84
5	6.86%	25.06%	74.94%		5.65	4.23		4.23
6	6.26%	22.69%	77.31%		6.00	4.64		4.64

7	5.67%	20.33%	79.67%	6.34	5.05		5.05
8	5.08%	17.96%	82.04%	6.67	5.47		5.47
9	4.49%	15.60%	84.40%	6.97	5.88		5.88
10	3.90%	15.60%	84.40%	7.24	6.11	111.25	117.36
11+	3.90%	15.60%	84.40%	7.52	6.35		

Value Line Dividends Growth Rate

Ke = 11.30%

Kansas City Southern

Year	Growth Rate	Reinvestment Rate	Payout Ratio	Earnings	FCFE	Terminal Value	Cash Flow
0		48.78%	51.22%	\$ 6.15		stock price =	(95.45)
1	12.20%	37.68%	62.32%	6.90	4.30		4.30
2	9.42%	34.44%	65.56%	7.55	4.95		4.95
3	8.61%	31.71%	68.29%	8.20	5.60		5.60
4	7.93%	29.38%	70.62%	8.85	6.25		6.25
5	7.34%	26.62%	73.38%	9.50	6.97		6.97
6	6.66%	23.87%	76.13%	10.13	7.71		7.71
7	5.97%	21.11%	78.89%	10.74	8.47		8.47
8	5.28%	18.36%	81.64%	11.30	9.23		9.23
9	4.59%	15.60%	84.40%	11.82	9.98		9.98
10	3.90%	15.60%	84.40%	12.28	10.37	188.79	199.16
11+	3.90%	15.60%	84.40%	12.76	10.77		

Value Line Dividends Growth Rate

Ke = 12.48%

Genesee & Wyoming

Year	Growth Rate	Reinvestment Rate	Payout Ratio	Earnings	FCFE	Terminal Value	Cash Flow
0		103.98%	-3.98%	\$ 3.77		stock price =	(74.02)
1	25.99%	23.16%	76.84%	4.75	3.65		3.65
2	5.79%	21.89%	78.11%	5.03	3.93		3.93
3	5.47%	20.75%	79.25%	5.30	4.20		4.20
4	5.19%	19.73%	80.27%	5.58	4.48		4.48
5	4.93%	18.90%	81.10%	5.85	4.74		4.74
6	4.73%	18.08%	81.92%	6.13	5.02		5.02
7	4.52%	17.25%	82.75%	6.40	5.30		5.30
8	4.31%	16.43%	83.57%	6.68	5.58		5.58
9	4.11%	15.60%	84.40%	6.95	5.87		5.87
10	3.90%	15.60%	84.40%	7.23	6.10	111.05	117.15
11+	3.90%	15.60%	84.40%	7.51	6.34		

Value Line Dividends Growth Rate

Ke = 9.54%

Canadian Pacific

Year	Growth Rate	Reinvestment Rate	Payout Ratio	Earnings	FCFE	Terminal Value	Cash Flow
0		57.67%	42.33%	\$ 10.75		stock price =	(177.62)
1	14.42%	34.15%	65.85%	12.30	8.10		8.10
2	8.54%	31.46%	68.54%	13.35	9.15		9.15
3	7.87%	29.17%	70.83%	14.40	10.20		10.20
4	7.29%	27.18%	72.82%	15.45	11.25		11.25
5	6.80%	24.87%	75.13%	16.50	12.40		12.40
6	6.22%	22.55%	77.45%	17.53	13.57		13.57
7	5.64%	20.23%	79.77%	18.51	14.77		14.77
8	5.06%	17.92%	82.08%	19.45	15.97		15.97
9	4.48%	15.60%	84.40%	20.32	17.15		17.15
10	3.90%	15.60%	84.40%	21.11	17.82	324.52	342.34
11+	3.90%	15.60%	84.40%	21.94	18.52		

Value Line Dividends Growth Rate

Ke = 11.59%

ave 10.87%
 med 10.61%
 har mean 10.80%